Hewlett Hewlett-Packard Company

TPC Benchmark™ H
Full Disclosure Report
for
HP Integrity rx8620 16P
using
Microsoft SQL Server 2005 Enterprise Edition 64-bit
and
Windows Server 2003, Datacenter Edition (64-bit) SP1

First Edition
June 2005

Hewlett-Packard Company (HP), the Sponsor of this benchmark test, believes that the information in this document is accurate as of the publication date. The information in this document is subject to change without notice. The Sponsor assumes no responsibility for any errors that may appear in this document.

The pricing information in this document is believed to accurately reflect the current prices as of the publication date. However, the Sponsor provides no warranty of the pricing information in this document.

Benchmark results are highly dependent upon workload, specific application requirements, and system design and implementation. Relative system performance will vary as a result of these and other factors. Therefore, the TPC Benchmark H should not be used as a substitute for a specific customer application benchmark when critical capacity planning and/or product evaluation decisions are contemplated.

All performance data contained in this report was obtained in a rigorously controlled environment. Results obtained in other operating environments may vary significantly. No warranty of system performance or price/performance is expressed or implied in this report.

Printed in the United States, June, 2005

Abstract

Overview

This report documents the methodology and results of the TPC Benchmark™ H test conducted on the HP Integrity rx8620 using Microsoft SQL Server 2005 Enterprise Edition (64-bit), in conformance with the requirements of the TPC Benchmark™ H Standard Specification, Revision 2.0. The operating system used for the benchmark was Microsoft Windows 2003 Datacenter Edition (64-bit) SP1.

The TPC Benchmark™ H was developed by the Transaction Processing Performance Council (TPC). The TPC was founded to define transaction processing benchmarks and to disseminate objective, verifiable performance data to the industry.

Requests for this TPC Benchmark H Full Disclosure Report should be sent to:

Transaction Processing Performance Council (TPC)
c/o Shanley Public Relations
777 North First Street, Suite 600
San Jose, CA 95112 USA
Telephone: (408) 295-8894
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Standard and Executive Summary Statements

Pages iv - vii contain the Executive Summary and Numerical Quantities Summary of the benchmark results for the HP Integrity rx8620.

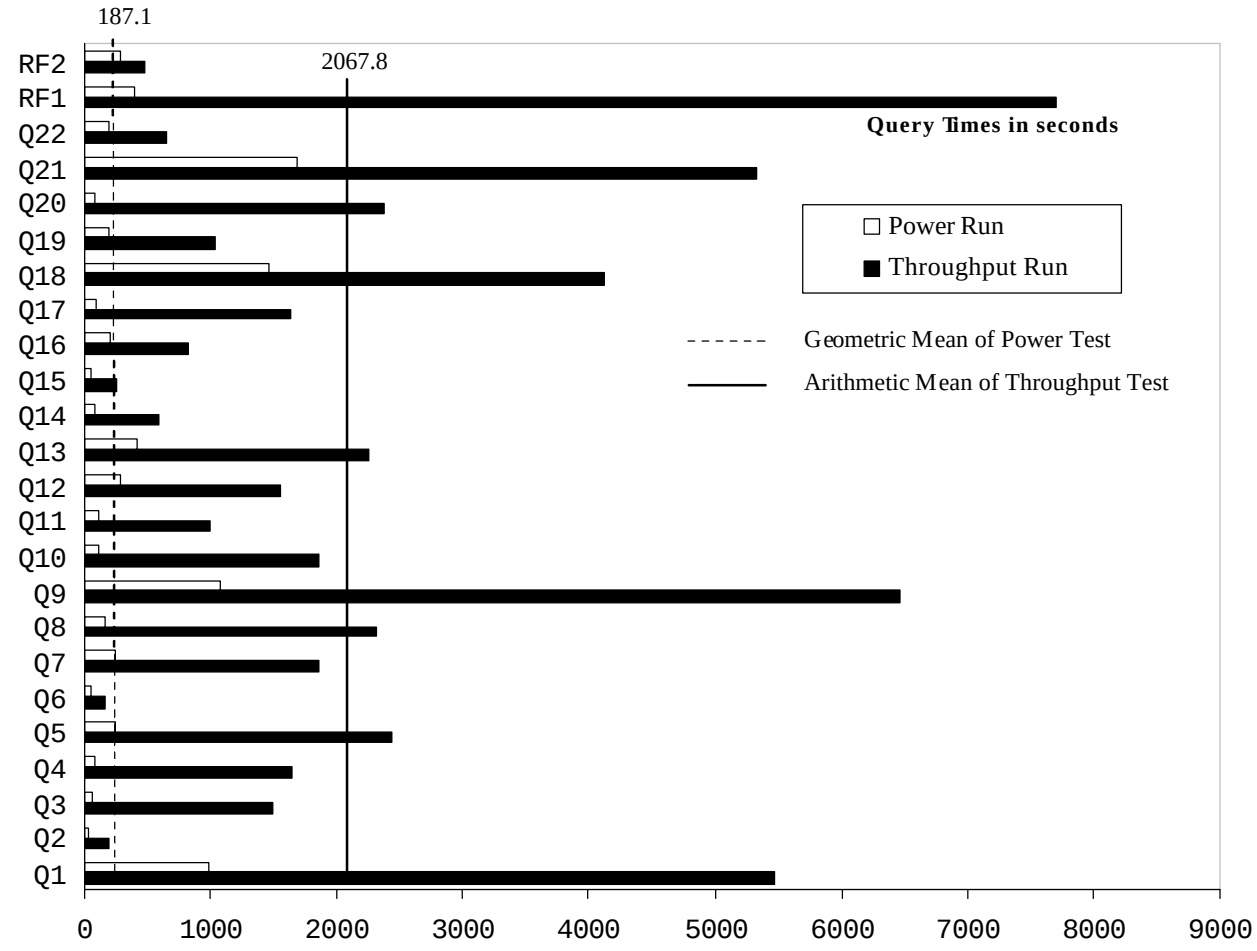
Auditor

The benchmark configuration, environment and methodology used to produce and validate the test results, and the pricing model used to calculate the cost per QppH and QthH were audited by Lorna Livingtree of Performance Metrics, Inc. to verify compliance with the relevant TPC specifications.

The auditor's letter of attestation is attached in Section 9.1 "Auditors' Report."

	HP Integrity rx8620	TPC-H Rev. 2.1.0 Report Date June 07 - 2005
Total System Cost	Composite Query per Hour Rating	Price Performance
$739,921	**13,637.8 QphH @ 1000GB**	**$54/ QphH @1000GB**

Database size	Database Manager	Operating System	Other Software	Availability Date
1000 GB	Microsoft SQL Server 2005 Enterprise Edition 64-bit	Microsoft Windows Server 2003, Datacenter Edition (64-bit) SP1	MS Visual Studio MS Resource Kit	December 07 - 2005



Database Load Time = 16h58min50sec **Load included backup: Y** **Total Data Storage / Database Size = 22.3**
RAID(Base Tables): Y **RAID(Base Tables and Auxiliary Data Structure): Y** **RAID(All)=N**

System configuration		
Processors	16 x 1.6 GHz Intel® Itanium2™ with 6MB Level 3 Cache	
Memory	64GB	Main Memory
Disk Controllers	12 1	SmartArray 6402 AB232A 2Gb Fibre Channel
Disk Drives Total Disk Storage	2 6 336 	36GB SCSI (local) 146GB SCSI (Log) 72.8GB SCSI (DB) 22,314 GB

HP Integrity rx8620

TPC-H Rev. 2.1.0

Report Date
June 07 - 2005

Description	Price Key	Part Number	Unit Price	Qty	Extended Price	3 Yr Maint Price
rx8620 16-way SMP Base System, incl cell boards, core IO, power supplies, PCI-X backplane, 16x1.6ghz Intel Madison 9M processors	1	AB240A-002	$263,995	1	$263,995	$154,128
HP 8GB HD SyncDRAM Midrange Memory	1	AB309A-0D1	$14,000	8	$112,000	
36GB, 15K hard disk for rx76/86	1	A9880A	$1,800	2	$3,600	
DVD+RW Drive for rx76/86	1	AB351A	$850	1	$850	
Server Expansion Unit: PCI-x I/O chassis	1	A6434A	$29,995	1	$29,995	$2,950
core I/O for SEU	1	A7109A	$5,000	2	$10,000	
HP Smart Array Controller 6402	1	A9890A-0D1	$1,669	12	$20,028	
2Gb PCI-X FC HBA for Windows, 64-bit	1	AB232A-0D1	$1,550	1	$1,550	
Field Rack Mount Kit - rx86xx	1	J1528A	$520	1	$520	
Field Rack Mount Kit - SEU	1	J1530B	$392	1	$392	
MSA 30	1	302969-B21	$2,978	24	$71,472	
MSA1000	1	201723-B22	$6,995	1	$6,995	
MSA1000 Controller	1	218231-B22	$4,290	1	$4,290	
Support 3yrs 24x7 (MSA1000) 4hr	1	HA101A3 6FG	$3,222	1		$3,222
Support 3yrs 24x7 (MSA30) 4hr	1	HA101A3 7GT	$1,827	24		$43,848
72.8GB, 15krpm Ultra320 SCSI disk	1	286778-B22	$569	336	$191,184	
146GB, 10krpm disk	1	286716-B22	$599	6	$3,594	
HP Rack 10642 42U pallet	1	245161-B21	$1,359	2	$2,718	
Storage Works LC/LC 2m Cable	1	221692-B21	$77.00	1	$77	
HP 16A High Voltage Modular PDU	1	252663-B24	$299	4	$1,196	
	Server Subtotal				**$724,456**	**$204,148**
Microsoft Windows Server 2003, Datacenter Edition (64-bit)	1	T2372A opt016	$32,000	1	$32,000	
Microsoft SQL Server 2005 Enterprise Edition 64-bit	2	810-00561	$7,233	1	$7,233	$245
Microsoft SQL Server 2005 Client License	2	359-00532	$139	70	$9,730	
Microsoft Visual C++	2	254-00170	$109	1	$109	
	Server Software Subtotal				**$49,072**	**$245**
HP's Large Configuration Discount *	*** Discounts:**				$184,231	$53,770
	Total:				**$589,297**	**$150,623**

Price Key: 1 - HP, 2 - Microsoft
Audited by Lorna Livingtree of Performance Metrics, Inc..

* All discounts are based on US list prices and for similar quatities and configurations

Three year cost of ownership: **$739,921**

QphH @ 1000GB: 13,638.7
$ / QphH @ 1000GB: 54

Prices used in TPC benchmarks reflect the actual prices a customer would pay for a one-time purchase of the stated components. Individually negotiated discounts are not permitted. Special prices based on assumptions about past or future purchases are not permitted. All discounts reflect standard pricing policies for the listed components. For complete details, see the pricing sections of the TPC benchmark specifications.

If you find that stated prices are not available according to these terms, please inform the TPC at pricing@tpc.org. Thank you.

Numerical Quantities

Measurement Results

Database Scale Factor	1000GB
Total Data Storage / Database Size	22.3
Start of Database Load	00:48:53
End of Database Load	17:47:43
Database Load Time	16h 58min 50sec
Query Streams for Throughput Test	7
TPC-H Power	19,241.0
TPC-H Throughput	9,666.3
TPC-H Composite Query-per-Hour (QphH@1000GB)	13,637.8
Total System Price over 3 Years	$739,921
TPC-H Price/Performance Metric (€/QphH@1000GB)	$ 54 / QphH@1000GB

Measurement Interval

Measurement Interval in Throughput Test (Ts) = seconds	57354 seconds

Duration of Stream Execution

	Seed	Query Start Date/Time		RF1 Start Date/Time		RF2 Start Date/Time		Duration
		Query End Date/Time		RF1 End Date/Time		RF2 End Date/Time		
Stream 00	522174743	05/22/05	18:34:30	05/22/05	18:27:59	05/22/05	20:45:15	2:10:44
		05/22/05	20:45:14	05/22/05	18:34:29	05/22/05	20:49:53	
Stream 01	522174744	05/22/05	20:49:57	5/22/05	20:49:56	05/23/05	10:56:38	11:41:08
		05/23/05	8:31:04	5/23/05	10:56:35	05/23/05	11:03:26	
Stream 02	522174745	05/22/05	20:49:57	5/23/05	11:03:30	05/23/05	11:11:11	13:14:41
		05/23/05	10:04:38	5/23/05	11:11:10	05/23/05	11:18:20	
Stream 03	522174746	05/22/05	20:49:58	5/23/05	11:18:33	05/23/05	11:26:51	12:14:28
		05/23/05	9:04:27	5/23/05	11:26:49	05/23/05	11:34:28	
Stream 04	522174747	05/22/05	20:50:00	5/23/05	11:34:42	05/23/05	11:43:19	12:21:10
		05/23/05	9:11:09	5/23/05	11:43:14	05/23/05	11:51:46	
Stream 05	522174748	05/22/05	20:50:02	5/23/05	11:52:02	05/23/05	12:00:33	12:12:30
		05/23/05	9:02:32	5/23/05	12:00:28	05/23/05	12:08:47	
Stream 06	522174749	05/22/05	20:50:03	5/23/05	12:09:07	05/23/05	12:18:32	12:43:17
		05/23/05	9:33:20	5/23/05	12:18:19	05/23/05	12:27:22	
Stream 07	522174750	05/22/05	20:50:05	5/23/05	12:27:46	05/23/05	12:37:11	13:59:59
		05/23/05	10:50:05	5/23/05	12:37:06	05/23/05	12:45:51	

TPC-H Timing Intervals (in seconds):

Query	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Stream 0	987.3	26.2	59.2	76.4	235.7	49.0	236.9	163.9
Stream 1	5775.0	113.2	1245.7	1088.8	1303.3	214.7	2664.8	1551.8
Stream 2	5240.4	158.2	2261.8	1526.6	1727.0	217.4	2109.2	4733.6
Stream 3	5617.6	274.3	1515.2	1157.5	5222.7	189.4	1833.9	531.5
Stream 4	5387.2	160.3	578.7	3866.9	993.4	189.4	1563.2	1694.5
Stream 5	4885.9	276.1	2624.1	1023.8	4066.8	188.2	2959.1	3680.8
Stream 6	5380.2	215.8	2118.1	1363.8	3575.8	82.2	1646.1	1736.2
Stream 7	5931.7	181.7	60.9	1455.1	241.9	48.7	248.9	2249.3
Min Qi	4885.9	113.2	60.9	1023.8	241.9	48.7	248.9	531.5
Max Qi	5931.7	276.1	2624.1	3866.9	5222.7	217.4	2959.1	4733.6
Avg Qi	5459.7	197.1	1486.3	1640.4	2447.3	161.4	1860.7	2311.1
Query	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16
Stream 0	1083.7	104.7	112.4	292.0	405.7	74.1	42.1	210.4
Stream 1	5081.7	2368.2	1804.6	2098.9	1955.1	548.8	265.5	503.3
Stream 2	3310.6	2448.2	121.9	2556.1	3643.4	1088.2	254.2	970.8
Stream 3	6015.8	1518.6	931.3	569.0	1569.9	812.4	246.7	733.6
Stream 4	4172.3	1406.7	1212.6	1849.0	2287.0	397.7	229.8	1746.6
Stream 5	1749.1	759.5	573.1	1315.9	2569.5	364.5	499.7	997.8
Stream 6	5505.7	4388.3	1695.5	2093.6	3371.4	797.4	215.5	579.8
Stream 7	19415.7	107.3	702.4	400.1	396.2	54.0	63.8	214.9
Min Qi	1749.1	107.3	121.9	400.1	396.2	54.0	63.8	214.9
Max Qi	19415.7	4388.3	1804.6	2556.1	3643.4	1088.2	499.7	1746.6
Avg Qi	6464.4	1856.7	1005.9	1554.7	2256.1	580.4	253.6	821.0
Query	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
Stream 0	90.5	1455.9	193.0	76.4	1685.7	182.6	390.0	278.5
Stream 1	1141.1	2739.8	793.0	2817.6	5266.9	725.9	50799.5	408.2
Stream 2	4062.2	3948.1	677.2	4277.7	1695.5	652.8	459.5	428.2
Stream 3	2633.9	2695.0	1312.4	2579.0	5392.1	716.6	496.2	457.2
Stream 4	1014.8	3961.9	1356.4	1829.7	8189.4	382.2	512.2	507.2
Stream 5	663.1	6695.2	1489.1	603.1	5366.9	599.2	506.4	494.3
Stream 6	533.2	4777.5	1418.9	535.0	3108.2	658.8	552.4	529.3
Stream 7	1362.1	4065.7	213.4	3989.7	8222.3	773.6	560.3	519.8
Min Qi	533.2	2695.0	213.4	535.0	1695.5	382.2	459.5	408.2
Max Qi	4062.2	6695.2	1489.1	4277.7	8222.3	773.6	50799.5	529.3
Avg Qi	1630.0	4126.2	1037.2	2376.0	5320.2	644.1	7698.1	477.7

1.0 General Items

1.1 Test Sponsor

A statement identifying the benchmark sponsor(s) and other participating companies must be provided.

This benchmark was sponsored by Hewlett-Packard Company. The benchmark was developed and engineered by Hewlett-Packard Company. Testing took place at Microsoft facilities in Redmond, Washington.

1.2 Parameter Settings

Settings must be provided for all customer-tunable parameters and options which have been changed from the defaults found in actual products, including by not limited to:

- *Database Tuning Options*
- *Optimizer/Query execution options*
- *Query processing tool/language configuration parameters*
- *Recovery/commit options*
- *Consistency/locking options*
- *Operating system and configuration parameters*
- *Configuration parameters and options for any other software component incorporated into the pricing structure*
- *Compiler optimization options*

This requirement can be satisfied by providing a full list of all parameters and options, as long as all those which have been modified from their default values have been clearly identified and these parameters and options are only set once.

Appendix A, “Tunable Parameters,” contains a list of all database parameters and operating system parameters.

1.3 Configuration Items

Diagrams of both measured and priced configurations must be provided, accompanied by a description of the differences. This includes, but is not limited to:

- *Number and type of processors*
- *Size of allocated memory, and any specific mapping/partitioning of memory unique to the test.*
- *Number and type of disk units (and controllers, if applicable).*
- *Number of channels or bus connections to disk units, including their protocol type.*
- *Number of LAN (e.g. Ethernet) Connections, including routers, workstations, terminals, etc., that were physically used in the test or are incorporated into the pricing structure.*
- *Type and the run-time execution location of software components (e.g., DBMS, query processing tools /languages, middle-ware components, software drivers, etc.).*

The server System Under Test (SUT), an HP Integrity rx8620, depicted in Figure 1.1, consisted of :

16	Intel Itanium 2 1.6GHz with 6MB L2 Cache
64	GB of memory
12	6402 Smart Array Controllers
24	HP StorageWorks MSA 30 Enclosures
336	72.8GB Pluggable Ultra320 15K rpm 1" height drives
1	AB232A 2Gb Fibre Channel Controller
1	HP StorageWorks MSA 1000 Dual Controller Enclosure
6	146GB Pluggable 10K rpm drives

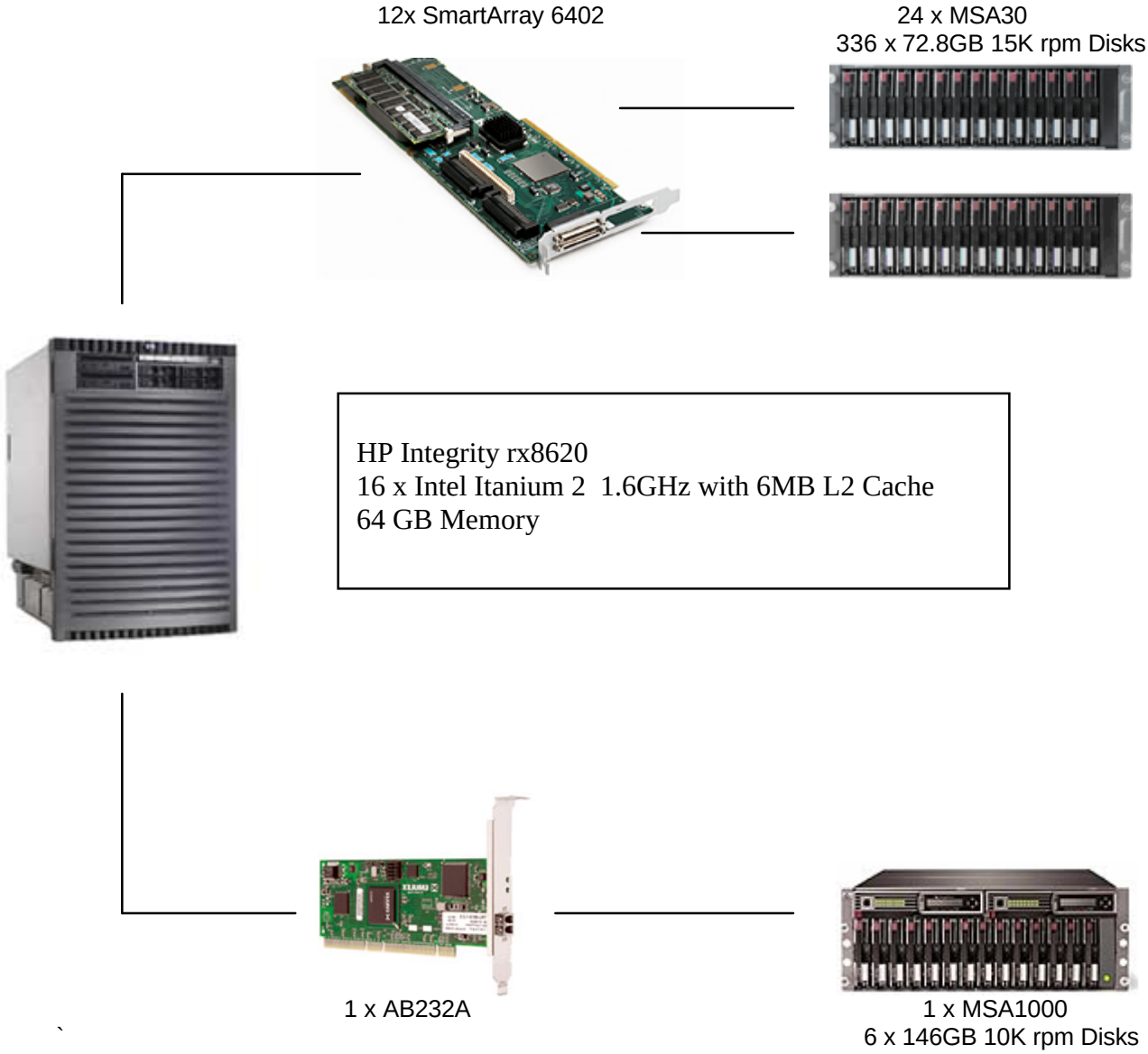


Figure 1.1 Benchmark and priced configuration for rx8620

2.0 Clause 1: Logical Database Design

2.1 Table Definitions

Listings must be provided for all table definition statements and all other statements used to set up the test and qualification databases. (8.1.2.1)

Appendix B, “Database Build Scripts,” contains the table definitions and the program used to load the database.

2.2 Physical Organization of Database

The physical organization of tables and indices, within the test and qualification databases, must be disclosed. If the column ordering of any table is different from that specified in Clause 1.4, it must be noted.

Appendix B, “Database Build Scripts,” contains the DDL for the index definitions.

2.3 Horizontal Partitioning

Horizontal partitioning of tables and rows in the test and qualification databases (see Clause 1.5.4) must be disclosed.

Horizontal partitioning was not used

2.4 Replication

Any replication of physical objects must be disclosed and must conform to the requirements of Clause 1.5.6.

No replication was used.

3.0 Clause 2: Queries and Refresh Functions - Related Items

3.1 Query Language

The query language used to implement the queries must be identified.

T-SQL was the query language used.

3.2 Random Number Generation

The method of verification for the random number generation must be described unless the supplied DBGEN and QGEN were used.

DBGEN version 1.3 and QGEN version 1.3 were used to generate all database populations.

3.3 Substitution Parameters Generation

The method used to generate values for substitution parameters must be disclosed. If QGEN is not used for this purpose, then the source code of any non-commercial tool used must be disclosed. If QGEN is used, the version number, release number, modification number and patch level of QGEN must be disclosed.

The TPC source based QGEN version 1.3.0 was used to generate the substitution parameters

3.4 Query Text and Output Data from Database

The executable query text used for query validation must be disclosed along with the corresponding output data generated during the execution of the query text against the qualification database. If minor modifications (see Clause 2.2.3) have been applied to any functional query definitions or approved variants in order to obtain executable query text, these modifications must be disclosed and justified. The justification for a particular minor query modification can apply collectively to all queries for which it has been used. The output data for the power and throughput tests must be made available electronically upon request..

Appendix C contains the query text and query output. The following modifications were used:

- In Q1 the function "count_big" is used in place of "count"
- The “dateadd” function is used to perform date arithmetic in Q1, Q4, Q5, Q6, Q10, Q12, Q14 , Q15 and Q20.
- The “datepart” function is used to extract part of a date (“YY”) in Q7, Q8 and Q9.
- The “top” function is used to restrict the number of output rows in Q2, Q3, Q10, Q18 and Q21.

3.5 Query Substitution Parameters and Seeds Used

All the query substitution parameters used during the performance test must be disclosed in tabular format, along with the seeds used to generate these parameters.

Appendix D contains the seed and query substitution parameters used.

3.6 Isolation Level

The isolation level used to run the queries must be disclosed. If the isolation level does not map closely to one of the isolation levels defined in Clause 3.4, additional descriptive detail must be provided.

The queries and transactions were run with isolation P2, Read Committed.

3.7 Refresh Functions

The details of how the refresh functions were implemented must be disclosed

Appendix E contains the source code for the refresh functions.

4.0 Clause 3: Database System Properties

4.1 Atomicity Requirements

The results of the ACID tests must be disclosed along with a description of how the ACID requirements were met. This includes disclosing the code written to implement the ACID Transaction and Query.

All ACID tests were conducted according to specification. The Atomicity, Isolation, Consistency and Durability tests were performed on the HP Integrity rx8620.

4.1.1 Atomicity of the Completed Transactions

Perform the ACID Transaction for a randomly selected set of input data and verify that the appropriate rows have been changed in the ORDER, LINEITEM, and HISTORY tables.

The following steps were performed to verify the Atomicity of completed transactions:
1. The total price from the ORDER table and the extended price from the LINEITEM table were retrieved for a randomly selected order key.
2. The ACID Transaction was performed using the order key from step 1.
3. The ACID Transaction committed.
4. The total price from the ORDER table and the extended price from the LINEITEM table were retrieved for the same order key. It was verified that the appropriate rows had been changed.

4.1.2 Atomicity of Aborted Transactions

Perform the ACID transaction for a randomly selected set of input data, submitting a ROLLBACK of the transaction for the COMMIT of the transaction. Verify that the appropriate rows have not been changed in the ORDER,
LINEITEM, and HISTORY tables.

The following steps were performed to verify the Atomicity of the aborted ACID transaction:
1. The total price from the ORDER table and the extended price from the LINEITEM table were retrieved for a randomly selected order key.
2. The ACID Transaction was performed using the order key from step 1. The transaction was stopped prior to the commit.
3. The ACID Transaction was ROLLED BACK. .
4. The total price from the ORDER table and the extended price from the LINEITEM table were retrieved for the same order key used in steps 1 and 2. It was verified that the appropriate rows had not been changed.

4.2 Consistency Requirements

Consistency is the property of the application that requires any execution of transactions to take the database from one consistent state to another. A consistent state for the TPC-H database is defined to exist when:

*O_TOTALPRICE = SUM(L_EXTENDEDPRICE – L_DISCOUNT) * (1 + L_TAX)*
For each ORDER and LINEITEM defined by (O_ORDERKEY = L_ORDERKEY)

4.2.1 Consistency Tests

Verify that ORDER and LINEITEM tables are initially consistent as defined in Clause 3.3.2.1, based upon a random sample of at least 10 distinct values of O_ORDERKEY.
The following steps were performed to verify consistency:
1. The consistency of the ORDER and LINEITEM tables was verified based on a sample of O_ORDERKEYs.
2. One hundred ACID Transactions were submitted from each of six execution streams.
3. The consistency of the ORDER and LINEITEM tables was re-verified.

4.3 Isolation Requirements

Operations of concurrent transactions must yield results which are indistinguishable from the results which would be obtained by forcing each transaction to be serially executed to completion in some order.

4.3.1 Isolation Test 1 - Read-Write Conflict with Commit

Demonstrate isolation for the read-write conflict of a read-write transaction and a read-only transaction when the read-write transaction is committed)

The following steps were performed to satisfy the test of isolation for a read-only and a read-write committed transaction:

1. An ACID Transaction was started for a randomly selected O_KEY, L_KEY and DELTA. The ACID Transaction was suspended prior to Commit.
2. An ACID query was started for the same O_KEY used in step 1. The ACID query blocked and did not see any uncommitted changes made by the ACID Transaction.
3. The ACID Transaction was resumed and committed. The ACID query completed. It returned the data as committed by the ACID Transaction.

4.3.2 Isolation Test 2 - Read-Write Conflict with Rollback

Demonstrate isolation for the read-write conflict of a read-write transaction and a read-only transaction when the read-write transaction is rolled back.

The following steps were performed to satisfy the test of isolation for read-only and a rolled back read-write transaction:

1. An ACID transaction was started for a randomly selected O_KEY, L_KEY and DELTA. The ACID Transaction was suspended prior to Rollback.
2. An ACID query was started for the same O_KEY used in step 1. The ACID query did not see any uncommitted changes made by the ACID Transaction.
3. The ACID Transaction was ROLLED BACK.
4. The ACID query completed.

4.3.3 Isolation Test 3 - Write-Write Conflict with Commit

Demonstrate isolation for the write-write conflict of two update transactions when the first transaction is committed.

The following steps were performed to verify isolation of two update transactions:

1. An ACID Transaction T1 was started for a randomly selected O_KEY, L_KEY and DELTA. The ACID transaction T1 was suspended prior to Commit.
2. Another ACID Transaction T2 was started using the same O_KEY and L_KEY and a randomly selected DELTA.
3. T2 waited.
4. The ACID transaction T1 was allowed to Commit and T2 completed.
5. It was verified that: T2.L_EXTENDEDPRICE = T1.L_EXTENDEDPRICE +(DELTA1*(T1.L_EXTENDEDPRICE/T1.L_QUANTITY))

4.3.4 Isolation Test 4 - Write-Write Conflict with Rollback

Demonstrate isolation for the write-write conflict of two update transactions when the first transaction is rolled back.

The following steps were performed to verify the isolation of two update transactions after the first one is rolled back:

1. An ACID Transaction T1 was started for a randomly selected O_KEY, L_KEY and DELTA. The ACID Transaction T1 was suspended prior to Rollback.
2. Another ACID Transaction T2 was started using the same O_KEY and L_KEY used in step 1 and a randomly selected DELTA.
3. T2 waited.
4. T1 was allowed to ROLLBACK and T2 completed.

5. It was verified that T2.L_EXTENDEDPRICE = T1.L_EXTENDEDPRICE.

4.3.5 Isolation Test 5 – Concurrent Read and Write Transactions on Different Tables

Demonstrate the ability of read and write transactions affecting different database tables to make progress concurrently.

The following steps were performed:

1. An ACID Transaction T1 for a randomly selected O_KEY, L_KEY and DELTA. The ACID Transaction T1 was suspended prior to Commit.
2. Another ACID Transaction T2 was started using random values for PS_PARTKEY and PS_SUPPKEY.
3. T2 completed.
4. T1 completed and the appropriate rows in the ORDER, LINEITEM and HISTORY tables were changed.

4.3.6 Isolation Test 6 – Update Transactions During Continuous Read-Only Query Stream

Demonstrate the continuous submission of arbitrary (read-only) queries against one or more tables of the database does not indefinitely delay update transactions affecting those tables from making progress.

The following steps were performed:

1. An ACID Transaction T1 was started, executing Q1 against the qualification database. The substitution parameter was chosen from the interval [0..2159] so that the query ran for a sufficient amount of time.
2. Before T1 completed, an ACID Transaction T2 was started using randomly selected values of O_KEY, L_KEY and DELTA.
3. T2 completed before T1 completed.
4. It was verified that the appropriate rows in the ORDER, LINEITEM and HISTORY tables were changed.

4.4 Durability Requirements

The tested system must guarantee durability: the ability to preserve the effects of committed transactions and insure database consistency after recovery from any one of the failures listed in Clause 3.5.2.

4.4.1 Permanent Unrecoverable Failure of Any Durable Medium and Loss of System Power

Guarantee the database and committed updates are preserved across a permanent irrecoverable failure of any single durable medium containing TPC-H database tables or recovery log tables

The database log was stored on a RAID-10 protected array of six physical drives. The tables for the database were stored on 24 RAID-0 arrays each containing 14 physical drives. A backup of the database was taken. The backup was spread across 12 RAID-5 arrays.

The tests were conducted on the qualification database. The steps performed are shown below:

1. The complete database was backed up.
2. Eight streams of ACID transactions were started. Each stream executed a minimum of 100 transactions.
3. While the test was running, one of the disks from the database RAID-1 log was removed.
4. After it was determined that the test would still run with the loss of a log disk, one physical drive of a RAID-0 data volume was removed.
5. A checkpoint was issued to force a failure.
6. The eight streams of ACID transactions failed and recorded their number of committed transaction in success files.
7. The database log was dumped to disk and the database was shut down.
8. The database and log disks were replaced with new disks and RAID rebuild process started
9. When log RAID rebuild process finished a database restore was done.
10. A command was issued causing the database to run through its recovery.
11. The counts in the success files and the HISTORY table count were compared and were found to match.

4.4.2 System Crash

Guarantee the database and committed updates are preserved across an instantaneous interruption (system crash/system hang) in processing which requires the system to reboot to recover.

1. Eight streams of ACID transactions were started. Each stream executed a minimum of 100 transactions.
2. While the streams of ACID transactions were running, the system was powered off.
3. When power was restored, the system rebooted and the database was restarted.
4. The database went through a recovery period.
5. The success file and the HISTORY table counts were compared and were found to match.

4.4.3 Memory Failure

Guarantee the database and committed updates are preserved across failure of all or part of memory (loss of contents).

See section 4.4.2

5.0 Clause 4: Scaling and Database Population

5.1 Initial Cardinality of Tables

The cardinality (i.e., the number of rows) of each table of the test database, as it existed at the completion of the database load (see clause 4.2.5) must be disclosed.

Table 5.1 lists the TPC-H Benchmark defined tables and the row count for each table as they existed upon completion of the build.

TABLE	Rows
LINEITEM	5,999,989,709
ORDERS	1,500,000,000
PARTSUPP	800,000,000
PART	200,000,000
CUSTOMER	150,000,000
SUPPLIER	10,000,000
NATION	25
REGION	5

Table 5.1 Initial Number of Rows

5.2 Distribution of Tables and Logs Across Media

The distribution of tables and logs across all media must be explicitly described for the tested and priced systems.

Microsoft SQL Server was configured on an HP Integrity rx8620 with the following configuration:

- 12 x Smart Array 6402 Disk RAID Controllers
- 24 x HP StorageWorks MSA 30 enclosures
- 336 x 72.8GB 15k rpm external disk drives
- 1 x AB232A 2Gb Fibre Channel Controller
- 1 x HP StorageWorks MSA1000 enclosure with dual-controller
- 6 x 146GB 10k rpm external disk drives
- 2 x 36GB internal disk drives

342 disks were used to hold table data, indexes, database log and the temporary database (TempDB).

The raw partitions for the database and the NTFS partition for the backup and flat files were mounted to a folder on the G: drive

G:\mnt\li
G:\mnt\gen
G:\mnt\temp
G:\mnt\ntfs

A description of distribution of database filegroups and log can be found in Table 5.2.1

SmartArray 6402	# of Disks	Array Fault Tolerance	Size in GB	Partition Format	Content
Slot 2 Channel A	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Flatfiles, Backup
Slot 2 Channel B	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Flatfiles
Slot 4 Channel A	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Flatfiles, Backup
Slot 4 Channel B	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Flatfiles
Slot 6 Channel A	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Flatfiles, Backup
Slot 6 Channel B	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Flatfiles
Slot 102 Channel A	14	RAID 0	235	RAW	Tpch1000g
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Flatfiles, Backup
Slot 102 Channel B	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Flatfiles
Slot 104 Channel A	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Flatfiles, Backup
Slot 104 Channel B	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Flatfiles

SmartArray 6402	# of Disks	Array Fault Tolerance	Size in GB	Partition Format	Content
Slot 106 Channel A	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Flatfiles, Backup
Slot 106 Channel B	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Flatfiles
Slot 80002 Channel A	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Flatfiles, Backup
Slot 80002 Channel B	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Flatfiles
Slot 80004 Channel A	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Flatfiles, Backup
Slot 80004 Channel B	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Flatfiles
Slot 80006 Channel A	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Backup
Slot 80006 Channel B	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	
Slot 80102 Channel A	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Backup
Slot 80102 Channel B	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	

SmartArray 6402	# of Disks	Array Fault Tolerance	Size in GB	Partition Format	Content
Slot 80104 Channel A	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Backup
Slot 80104 Channel B	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	
		RAID 0	4	RAW	Tpch1G LI
Slot 80106 Channel A	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	Backup
Slot 80106 Channel B	14	RAID 0	235	RAW	Tpch1000g LI
				RAW	Tpch1000g GEN
				RAW	Tpch1000g TempDB
		RAID 5	605	NTFS	
		RAID 0	4	RAW	Tpch1G GEN

AB232A Fibre Channel Controller	# of Disks	Array Fault Tolerance	Size in GB	Partition Format	Content
Slot 107	6	RAID 10	380	RAW	Tpch1000g Log L:\
			10	RAW	Tpch1g Log X:\
			20	NTFS	Tools and Mount Points G:\

U160 SCSI Controller	# of Disks	Array Fault Tolerance	Size in GB	Partition Format	Content
Embedded	2	Basic Disk	32	NTFS	OS, SQL C:\ I:\

5.3 Mapping of Database Partitions/Replications

The mapping of database partitions/replications must be explicitly described.

Database partitioning/replication was not used.

5.4 Implementation of RAID

Implementations may use some form of RAID to ensure high availability. If used for data, auxiliary storage (e.g. indexes) or temporary space, the level of RAID used must be disclosed for each device.

RAID 0 was used for database filegroups and tempdb, RAID 10 for database recovery logs, RAID 5 for Backup.

5.5 DBGEN Modifications

The version number, release number, modification number, and patch level of DBGEN must be disclosed. Any modifications to the DBGEN (see Clause 4.2.1) source code must be disclosed. In the event that a program other than DBGEN was used to populate the database, it must be disclosed in its entirety.

The standard distribution DBGEN version 1.3.0 was used, no modifications were made.

5.6 Database Load time

The database load time for the test database (see clause 4.3) must be disclosed.

The database load time was 16h 58min 50seconds

5.7 Data Storage Ratio

The data storage ratio must be disclosed. It is computed by dividing the total data storage of the priced configuration (expressed in GB) by the size chosen for the test database as defined in 4.1.3.1. The ratio must be reported to the nearest 1/100th, rounded up.

Disk Type	# of Disks	Total (GB)
72.8GB 15k rpm Ultra 320 SCSI	336	22.314
146GB 10K rpm Fiber disk	6	
36GB 15K Internal Disk	2	

Size of test database: 1000 GB

Data Storage Ratio: 22.31

5.8 Database Load Mechanism Details and Illustration

The details of the database load must be disclosed, including a block diagram illustrating the overall process. Disclosure of the load procedure includes all steps, scripts, input and configuration files required to completely reproduce the test and qualification databases.

Flat files for each of the tables were created using DBGEN. The tables were loaded as depicted in Figure 5-8.

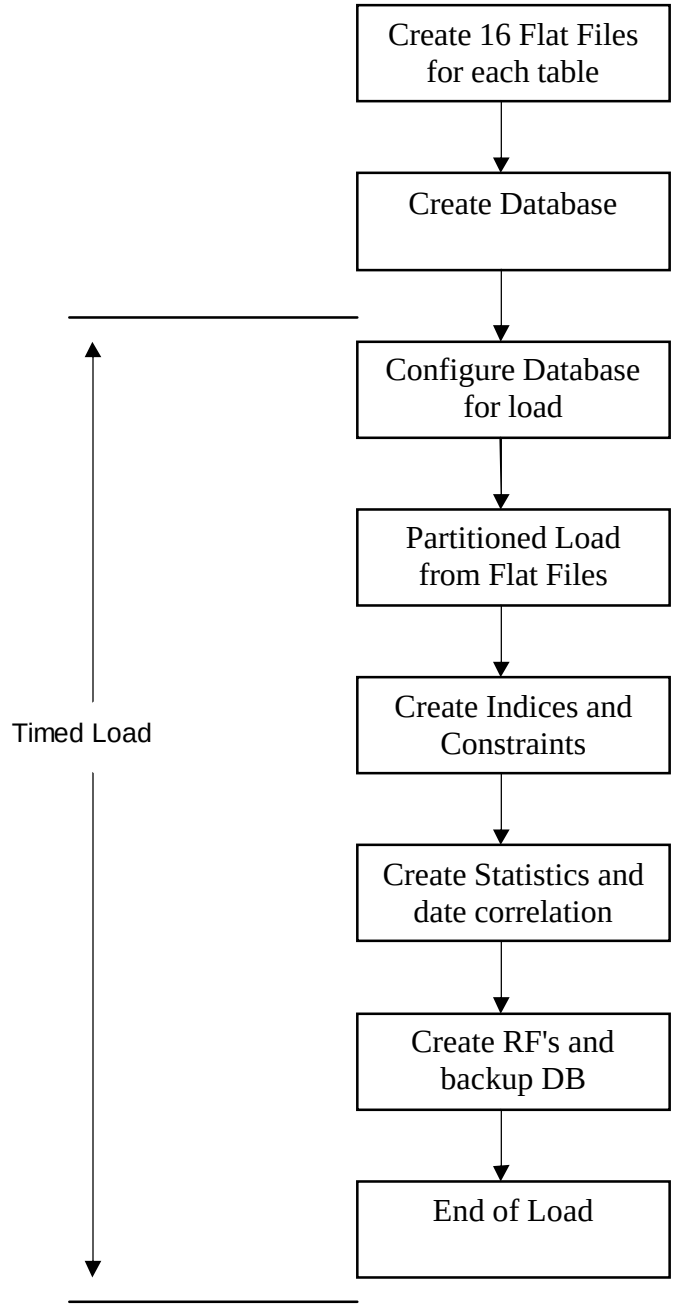


Figure 5.8: Block Diagram of Database Load Process

6.0 Clause 5: Performance Metrics and Execution Rules Related Items

6.1 Steps after the Load Test

Any system activity on the SUT that takes place between the conclusion of the load test and the beginning of the performance test must be fully disclosed including listings of scripts or command logs.

Auditor requested queries were run against the database to verify the correctness of the load.

6.2 Steps in the Power Test

The details of the steps followed to implement the power test (e.g., system boot, database restart, etc.) must be disclosed.

The following steps were used to implement the power test:
1. RF1 Refresh Transaction
2. Stream 00 Execution
3. RF2 Refresh Transaction.

6.3 Timing Intervals for Each Query and Refresh Function

The timing intervals (see Clause 5.3.6) for each query of the measured set and for both refresh functions must be reported for the power test.

The timing intervals for each query and both refresh functions are given in the Numerical Quantities Summary earlier in this document on page vi.

6.4 Number of Streams for The Throughput Test

The number of execution streams used for the throughput test must be disclosed.

Seven streams were used for the Throughput Test.

6.5 Start and End Date/Times for Each Query Stream

The start time and finish time for each query execution stream must be reported for the throughput test.

The Numerical Quantities Summary on page vi contains the start and stop times for the query execution streams run on the system reported.

6.6 Total Elapsed Time for the Measurement Interval

The total elapsed time of the measurement interval(see Clause 5.3.5) must be reported for the throughput test.

The Numerical Quantities Summary on page vi contains the timing intervals for the throughput test run on the system reported.

6.7 Refresh Function Start Date/Time and Finish Date/Time

Start and finish time for each update function in the update stream must be reported for the throughput test.

The Numerical Quantities Summary on page vi contains the start and finish times for the refresh functions of each stream.

6.8 Timing Intervals for Each Query and Each Refresh Function for Each Stream

The timing intervals (see Clause 5.3.6) for each query of each stream and for each update function must be reported for the throughput test.

The timing intervals for each query and each update function are given in the Numerical Quantities Summary earlier in this document on page vi.

6.9 Performance Metrics

The computed performance metrics, related numerical quantities and the price performance metric must be reported.

The Numerical Quantities Summary contains the performance metrics, related numerical quantities, and the price/performance metric for the system reported.

6.10 The Performance Metric and Numerical Quantities from Both Runs

A description of the method used to determine the reproducibility of the measurement results must be reported. This must include the performance metrics (QppH and QthH) from the reproducibility runs.

Performance results from the first two executions of the TPC-H benchmark indicated the following difference for the metric points:

Table with end results from both runs

Run ID	QppH@1000GB	QthH@1000GB	QphH@1000GB
Run 1	19,242.8	9,666.3	13,638.2
Run 2	19,118.4	9,734.1	13,641.9
Difference in %	- 0.6	0.7	0.13

6.11 System Activity Between Tests

Any activity on the SUT that takes place between the conclusion of Run1 and the beginning of Run2 must be disclosed.

The first attempt at run two failed due to an intermittent power failure which lead to an unexpected system shutdown. The system was rebooted, SQL Server was restarted and the database was restored before the next attempt was made.

7.0 Clause 6: SUT and Driver Implementation Related Items

7.1 Driver

A detailed description of how the driver performs its functions must be supplied, including any related source code or scripts. This description should allow an independent reconstruction of the driver.

The TPC-H benchmark was implemented using a Microsoft tool called StepMaster. This tool consist of GUI tool that allows the configuration of steps and a run only version which was used to execute the load and runs. StepMaster is a general purpose test tool which can drive ODBC and shell commands. Within StepMaster, the user designs a workspace corresponding to the sequence of operations (or steps) to be executed. When the workspace is executed, StepMaster records information about the run into a database as well as a log file for later analysis.

StepMaster provides a mechanism for creating parallel streams of execution. This is used in the throughput tests to drive the query and refresh streams. Each step is timed using a millisecond resolution timer. A timestamp T1 is taken before beginning the operation and a timestamp T2 is taken after completing the operation. These times are recorded in a database as well as a log file for later analysis.

Two types of ODBC connections are supported. A dynamic connection is used to execute a single operation and is closed when the operation finishes. A static connection is held open until the run completes and may be used to execute more than one step. A connection (either static or dynamic) can only have one outstanding operation at any time.

In TPC-H, static connections are used for the query streams in the power and throughput tests. StepMaster reads an Access database to determine the sequence of steps to execute. These commands are represented as the Implementation Specific Layer. StepMaster records its execution history, including all timings, in the Access database. Additionally, StepMaster writes a textual log file of execution for each run.

The source code is disclosed on Appendix F

7.2 Implementation Specific Layer (ISL)

If an implementation-specific layer is used, then a detailed description of how it performs its functions must be supplied, including any related source code or scripts. This description should allow an independent reconstruction of the implementation-specific layer.

The StepMaster Runonly program is used to control and track the execution of queries, via commands stored in a Microsoft Access database. The source of this program is contained in Appendix F. The following steps are performed, to accomplish the Power and Throughput Runs:

1. Power Run

- Execute 144 concurrent RF1 threads, each of which will apply a segment of a refresh set generated by dbgen. Each thread submits multiple transactions, where a transaction spans a set of orders and their associated line items.

- Execute the Stream 0 queries in the order according to TPC Benchmark H Specification, Appendix A

- Execute 144 concurrent RF2 threads, each of which will apply a segment of a refresh set generated by dbgen. Each thread submits multiple transactions, where a transaction spans a set of orders and their associated line items.

2. Throughput Run

- Execute seven concurrent query streams. Each stream executes queries in the order according to TPC Benchmark H Specification, Appendix A, for the appropriate Stream ID (01-07). Upon completion of each stream, a semaphore is set to indicate completion.
- Execute seven consecutive RF1/RF2 transactions, against ascending Refresh sets produced by dbgen. The first RF1 waits on a semaphore prior to beginning its insert operations.

Each step is timed by StepMaster. The timing information, together with an activity log, are stored for later analysis. The inputs and results of steps are stored in text files for later analysis.

7.3 Profile-Directed Optimization

If profile-directed optimization as described in Clause 5.2.9 is used, such used must be disclosed.

Profile-directed optimization was not used.

8. Clause 7: Pricing Related Items

8.1 Hardware and Software Used

A detailed list of hardware and software used in the priced system must be reported. Each item must have a vendor part number, description, and release/revision level, and indicate General Availability status or committed delivery date. If package pricing is used, contents of the package must be disclosed. Pricing source(s) and effective date(s) of price(s) must also be reported.

The pricing summary sheet is given on page *v* in the Executive Summary at the front of this report. The source for all prices is indicated.

The HP Integrity rx8620, system memory, additional processors, disk controllers, and hard drives are all available at the time of publication.

The pricing and availability of the Microsoft software used is given in a quote from Microsoft, which is included in this report in Appendix G.

8.2 Three-Year Cost of System Configuration

The total 3-year price of the entire configuration must be reported, including: hardware, software, and maintenance charges. Separate component pricing is required.

The pricing summary sheet on page v in the front of this report contains all details.

8.3 Availability Dates

The committed delivery date for general availability (availability date) of products used in the priced calculations must be reported. When the priced system includes products with different availability dates, the single availability date reported on the first page of the executive summary must be the date by which all components are committed to being available. The full disclosure report must report availability dates individually for at least each of the categories for which a pricing subtotal must be provided (see Clause 7.3.1.4). All availability dates, whether for individual components or for the SUT as a whole, must be disclosed to a precision of 1 day, but the precise format is left to the test sponsor.

Category	**Available**
Server Hardware	Now (date of publication)
Storage	Now (date of publication)
Server Software	Now (date of publication)
SQL Server	December - 7 - 2005

9. Clause 8: Audit Related Items

9.1 Auditors' Report

The auditor's agency name, address, phone number, and Attestation letter with a brief audit summary report indicating compliance must be included in the full disclosure report. A statement should be included specifying who to contact in order to obtain further information regarding the audit process.

This implementation of the TPC Benchmark H was audited by Lorna Livingtree of Performance Metrics, a certified TPC-H auditor, audited this benchmark. Further information regarding the audit process may be obtained from:

Lorna Livingtree
Performance Metrics Inc.
PO Box 984
Klamath, CA 95548
(707) 482 0523

Requests for this TPC Benchmark H Full Disclosure Report should be sent to:

Transaction Processing Performance Council
c/o Shanley Public Relations
777 North First Street, Suite 6000
San Jose, CA 95112-6311 USA
Telephone: (408) 295-8894
Fax: (408) 295-9768

May 28, 2005

Mr. Mike Fitzner
Senior Performance Engineer
Hewlett-Packard Company
14475 24th Street NE
Bellevue, WA 98007

I have verified the TPC Benchmark™ H for the following configuration:

Platform: HP Integrity rx8620
Database Manager: Microsoft SQL Server 2005 Enterprise Edition 64-bit
Operating System: Microsoft Windows Server 2003 SP1

CPU's	Memory	Total Disks	Qpph@ 1000GB	QthH@1000GB	QphH@1000GB
16 Intel Itanium2 @ 1.6 Ghz	64 GB	2 @ 36 GB 6 @ 146 GB 336 @ 72.8 GB	**19,241.0**	**9,666.3**	**13,637.8**

In my opinion, these performance results were produced in compliance with the TPC requirements for the benchmark. The following attributes of the benchmark were given special attention:

- The database tables were defined with the proper columns, layout and sizes.
- The tested database was correctly scaled and populated for 1000 GB using DBGEN. The version of DBGEN was 1.3.0.
- The qualification database layout was identical to the tested database except for the number and size of the files.
- The query text was verified to use only compliant variants and minor modifications.
- The executable query text was generated by QGEN and submitted through SQL Server's standard interactive interface. The version of QGEN was 1.3.0.

- The validation of the query text against the qualification database produced compliant results.
- The refresh functions were properly implemented and executed the correct number of inserts and deletes.
- The load timing was properly measured and reported.
- The execution times were correctly measured and reported.
- The performance metrics were correctly computed and reported.
- The repeatability of the measurement was verified.
- The ACID properties were tested and verified.
- Sufficient mirrored log space was present on the tested system.
- The system pricing was checked for major components and maintenance.
- The executive summary pages of the FDR were verified for accuracy.

Auditor's Notes: None

Sincerely,

Lorna Livingtree
Auditor

Appendix A: Tunable Parameters

System Info

System Information report written at: 05/26/05 17:53:34
System Name: SQLOLY2
[System Summary]

Item Value
OS Name Microsoft(R) Windows(R) Server 2003, Datacenter Edition for 64-Bit Itanium-based Systems
Version 5.2.3790 Service Pack 1 Build 3790
Other OS Description Not Available
OS Manufacturer Microsoft Corporation
System Name SQLOLY2
System Manufacturer hp
System Model server rx8620
System Type Itanium (TM) -based System
Processor ia64 Family 31 Model 2 Stepping 1 GenuineIntel ~1600 Mhz

Memory Address 0xF0080000-0xF0081FFF
Smart Array 6400 Controller (Non-Miniport)
Memory Address 0xF0080000-0xF0081FFF
Smart Array 6400 Controller (Non-Miniport)
Memory Address 0xF0080000-0xF0081FFF
Smart Array 6400 Controller (Non-Miniport)
Memory Address 0xF0080000-0xF0081FFF
Smart Array 6400 Controller (Non-Miniport)

I/O Port 0x00000800-0x000008FF
LSI Logic 53C1010-66 Device
I/O Port 0x00000800-0x000008FF
LSI Logic 53C1010-66 Device
I/O Port 0x00000800-0x000008FF
LSI Logic 53C1010-66 Device
I/O Port 0x00000800-0x000008FF
LSI Logic 53C1010-66 Device

Memory Address 0xC001D000-0xC001D3FF LSI Logic 53C1010-66 Device
Memory Address 0xC001D000-0xC001D3FF LSI Logic 53C1010-66 Device
Memory Address 0xC001D000-0xC001D3FF LSI Logic 53C1010-66 Device
Memory Address 0xC001D000-0xC001D3FF LSI Logic 53C1010-66 Device

Memory Address 0xC0012000-0xC0013FFF LSI Logic 53C1010-66 Device
Memory Address 0xC0012000-0xC0013FFF LSI Logic 53C1010-66 Device
Memory Address 0xC0012000-0xC0013FFF LSI Logic 53C1010-66 Device
Memory Address 0xC0012000-0xC0013FFF LSI Logic 53C1010-66 Device

PCI bus
HP Baseboard Management Controller Interface Driver
PCI bus
PCI bus
PCI bus

I/O Port 0x00006000-0x00007FFF
PCI bus
I/O Port 0x00006000-0x00007FFF
PCI bus
I/O Port 0x00006000-0x00007FFF
PCI bus
I/O Port 0x00006000-0x00007FFF
PCI bus

I/O Port 0x0000E000-0x0000FFFF
PCI bus
I/O Port 0x0000E000-0x0000FFFF
PCI standard PCI-to-PCI bridge
I/O Port 0x0000E000-0x0000FFFF
Smart Array 6400 Controller (Non-Miniport)
I/O Port 0x0000E000-0x0000FFFF
PCI bus
I/O Port 0x0000E000-0x0000FFFF
PCI standard PCI-to-PCI bridge
I/O Port 0x0000E000-0x0000FFFF
Smart Array 6400 Controller (Non-Miniport)
I/O Port 0x0000E000-0x0000FFFF
PCI bus
I/O Port 0x0000E000-0x0000FFFF
PCI standard PCI-to-PCI bridge
I/O Port 0x0000E000-0x0000FFFF
Smart Array 6400 Controller (Non-Miniport)

I/O Port 0x00000700-0x000007FF
LSI Logic 53C1010-66 Device
I/O Port 0x00000700-0x000007FF
LSI Logic 53C1010-66 Device
I/O Port 0x00000700-0x000007FF
LSI Logic 53C1010-66 Device
I/O Port 0x00000700-0x000007FF
LSI Logic 53C1010-66 Device

Memory Address 0xC8000000-0xCFFFFFFF PCI bus
Memory Address 0xC8000000-0xCFFFFFFF PCI bus
Memory Address 0xC8000000-0xCFFFFFFF PCI bus
Memory Address 0xC8000000-0xCFFFFFFF PCI bus

Memory Address 0xC0010000-0xC0011FFF LSI Logic 53C1010-66 Device
Memory Address 0xC0010000-0xC0011FFF LSI Logic 53C1010-66 Device
Memory Address 0xC0010000-0xC0011FFF LSI Logic 53C1010-66 Device
Memory Address 0xC0010000-0xC0011FFF LSI Logic 53C1010-66 Device

Memory Address 0xC001C000-0xC001C3FF LSI Logic 53C1010-66 Device
Memory Address 0xC001C000-0xC001C3FF LSI Logic 53C1010-66 Device
Memory Address 0xC001C000-0xC001C3FF LSI Logic 53C1010-66 Device
Memory Address 0xC001C000-0xC001C3FF LSI Logic 53C1010-66 Device

Memory Address 0xD0080000-0xD0081FFF Smart Array 6400 Controller (Non-Miniport)
Memory Address 0xD0080000-0xD0081FFF Smart Array 6400 Controller (Non-Miniport)
Memory Address 0xD0080000-0xD0081FFF Smart Array 6400 Controller (Non-Miniport)
Memory Address 0xD0080000-0xD0081FFF Smart Array 6400 Controller (Non-Miniport)

Memory Address 0xE0000000-0xEFFFFFFF PCI bus
Memory Address 0xE0000000-0xEFFFFFFF PCI standard PCI-to-PCI bridge
Memory Address 0xE0000000-0xEFFFFFFF Smart Array 6400 Controller (Non-Miniport)
Memory Address 0xE0000000-0xEFFFFFFF PCI bus
Memory Address 0xE0000000-0xEFFFFFFF PCI bus
Memory Address 0xE0000000-0xEFFFFFFF PCI standard PCI-to-PCI bridge
Memory Address 0xE0000000-0xEFFFFFFF Smart Array 6400 Controller (Non-Miniport)
Memory Address 0xE0000000-0xEFFFFFFF PCI bus
Memory Address 0xE0000000-0xEFFFFFFF Intel 21154 PCI to PCI bridge
Memory Address 0xE0000000-0xEFFFFFFF Standard VGA Graphics Adapter
Memory Address 0xE0000000-0xEFFFFFFF PCI bus
Memory Address 0xE0000000-0xEFFFFFFF PCI standard PCI-to-PCI bridge
Memory Address 0xE0000000-0xEFFFFFFF Smart Array 6400 Controller (Non-Miniport)
Memory Address 0xE0000000-0xEFFFFFFF PCI bus
Memory Address 0xE0000000-0xEFFFFFFF PCI bus
Memory Address 0xE0000000-0xEFFFFFFF PCI standard PCI-to-PCI bridge
Memory Address 0xE0000000-0xEFFFFFFF Smart Array 6400 Controller (Non-Miniport)
Memory Address 0xE0000000-0xEFFFFFFF PCI bus

Memory Address 0xD0000000-0xDFFFFFFF PCI bus
Memory Address 0xD0000000-0xDFFFFFFF PCI bus
Memory Address 0xD0000000-0xDFFFFFFF PCI standard PCI-to-PCI bridge
Memory Address 0xD0000000-0xDFFFFFFF Smart Array 6400 Controller (Non-Miniport)
Memory Address 0xD0000000-0xDFFFFFFF PCI bus
Memory Address 0xD0000000-0xDFFFFFFF PCI bus
Memory Address 0xD0000000-0xDFFFFFFF PCI standard PCI-to-PCI bridge
Memory Address 0xD0000000-0xDFFFFFFF Smart Array 6400 Controller (Non-Miniport)
Memory Address 0xD0000000-0xDFFFFFFF PCI bus
Memory Address 0xD0000000-0xDFFFFFFF PCI bus
Memory Address 0xD0000000-0xDFFFFFFF PCI standard PCI-to-PCI bridge

```
Memory Address 0xD0000000-
0xDFFFFFFF	Smart Array 6400
Controller (Non-Miniport)
Memory Address 0xD0000000-
0xDFFFFFFF	PCI bus
Memory Address 0xD0000000-
0xDFFFFFFF	PCI bus
Memory Address 0xD0000000-
0xDFFFFFFF	PCI standard PCI-to-
PCI bridge
Memory Address 0xD0000000-
0xDFFFFFFF	Smart Array 6400
Controller (Non-Miniport)

Memory Address 0xC0019000-
0xC0019FFF	HP Management
Processor
Memory Address 0xC0019000-
0xC0019FFF	HP Management
Processor
Memory Address 0xC0019000-
0xC0019FFF	HP Management
Processor
Memory Address 0xC0019000-
0xC0019FFF	HP Management
Processor

Memory Address 0xC0016000-
0xC0017FFF	LSI Logic 53C1010-
66 Device
Memory Address 0xC0016000-
0xC0017FFF	LSI Logic 53C1010-
66 Device
Memory Address 0xC0016000-
0xC0017FFF	LSI Logic 53C1010-
66 Device
Memory Address 0xC0016000-
0xC0017FFF	LSI Logic 53C1010-
66 Device

Memory Address 0xA0000-0xBFFFF
	PCI bus
Memory Address 0xA0000-0xBFFFF
	Intel 21154 PCI to PCI bridge
Memory Address 0xA0000-0xBFFFF
	Standard VGA Graphics Adapter

Memory Address 0xC001A000-
0xC001A3FF	LSI Logic 53C1010-
66 Device
Memory Address 0xC001A000-
0xC001A3FF	LSI Logic 53C1010-
66 Device
Memory Address 0xC001A000-
0xC001A3FF	LSI Logic 53C1010-
66 Device
Memory Address 0xC001A000-
0xC001A3FF	LSI Logic 53C1010-
66 Device

Memory Address 0xC0000000-
0xC7FFFFFF	PCI bus
Memory Address 0xC0000000-
0xC7FFFFFF	Broadcom NetXtreme
Gigabit Ethernet #2
Memory Address 0xC0000000-
0xC7FFFFFF	PCI bus
Memory Address 0xC0000000-
0xC7FFFFFF	PCI bus
Memory Address 0xC0000000-
0xC7FFFFFF	Broadcom NetXtreme
Gigabit Ethernet
Memory Address 0xC0000000-
0xC7FFFFFF	PCI bus
```

```
Memory Address 0xC0000000-
0xC7FFFFFF	PCI bus
Memory Address 0xC0000000-
0xC7FFFFFF	Broadcom NetXtreme
Gigabit Ethernet #3
Memory Address 0xC0000000-
0xC7FFFFFF	PCI bus
Memory Address 0xC0000000-
0xC7FFFFFF	PCI bus
Memory Address 0xC0000000-
0xC7FFFFFF	Broadcom NetXtreme
Gigabit Ethernet #4
Memory Address 0xC0000000-
0xC7FFFFFF	PCI bus

I/O Port 0x000003B0-0x000003BB
	Intel 21154 PCI to PCI bridge
I/O Port 0x000003B0-0x000003BB
	Standard VGA Graphics Adapter

I/O Port 0x00000300-0x000003FF
	PCI bus
I/O Port 0x00000300-0x000003FF
	PCI bus

Memory Address 0xE0080000-0xE0081FFF
	Smart Array 6400 Controller
(Non-Miniport)
Memory Address 0xE0080000-0xE0081FFF
	Smart Array 6400 Controller
(Non-Miniport)
Memory Address 0xE0080000-0xE0081FFF
	Smart Array 6400 Controller
(Non-Miniport)
Memory Address 0xE0080000-0xE0081FFF
	Smart Array 6400 Controller
(Non-Miniport)

I/O Port 0x00001000-0x00001FFF
	PCI bus
I/O Port 0x00001000-0x00001FFF
	PCI bus
I/O Port 0x00001000-0x00001FFF
	PCI bus
I/O Port 0x00001000-0x00001FFF
	PCI bus

Memory Address 0xC001B000-
0xC001B3FF	LSI Logic 53C1010-
66 Device
Memory Address 0xC001B000-
0xC001B3FF	LSI Logic 53C1010-
66 Device
Memory Address 0xC001B000-
0xC001B3FF	LSI Logic 53C1010-
66 Device
Memory Address 0xC001B000-
0xC001B3FF	LSI Logic 53C1010-
66 Device

I/O Port 0x00000500-0x000005FF
	LSI Logic 53C1010-66 Device
I/O Port 0x00000500-0x000005FF
	LSI Logic 53C1010-66 Device
I/O Port 0x00000500-0x000005FF
	LSI Logic 53C1010-66 Device
I/O Port 0x00000500-0x000005FF
	LSI Logic 53C1010-66 Device

I/O Port 0x00004000-0x00005FFF
	PCI bus
I/O Port 0x00004000-0x00005FFF
	PCI standard PCI-to-PCI bridge
```

```
I/O Port 0x00004000-0x00005FFF
	Smart Array 6400 Controller
(Non-Miniport)
I/O Port 0x00004000-0x00005FFF
	PCI bus
I/O Port 0x00004000-0x00005FFF
	PCI standard PCI-to-PCI bridge
I/O Port 0x00004000-0x00005FFF
	Smart Array 6400 Controller
(Non-Miniport)
I/O Port 0x00004000-0x00005FFF
	PCI bus
I/O Port 0x00004000-0x00005FFF
	PCI standard PCI-to-PCI bridge
I/O Port 0x00004000-0x00005FFF
	Smart Array 6400 Controller
(Non-Miniport)
I/O Port 0x00004000-0x00005FFF
	PCI bus
I/O Port 0x00004000-0x00005FFF
	PCI standard PCI-to-PCI bridge
I/O Port 0x00004000-0x00005FFF
	Smart Array 6400 Controller
(Non-Miniport)

I/O Port 0x0000C000-0x0000DFFF
	PCI bus
I/O Port 0x0000C000-0x0000DFFF
	PCI bus
I/O Port 0x0000C000-0x0000DFFF
	Intel 21154 PCI to PCI bridge
I/O Port 0x0000C000-0x0000DFFF
	Standard VGA Graphics Adapter
I/O Port 0x0000C000-0x0000DFFF
	PCI bus
I/O Port 0x0000C000-0x0000DFFF
	PCI bus

I/O Port 0x00008000-0x00009FFF
	PCI bus
I/O Port 0x00008000-0x00009FFF
	PCI bus
I/O Port 0x00008000-0x00009FFF
	PCI bus
I/O Port 0x00008000-0x00009FFF
	PCI bus

I/O Port 0x00000600-0x000006FF
	LSI Logic 53C1010-66 Device
I/O Port 0x00000600-0x000006FF
	LSI Logic 53C1010-66 Device
I/O Port 0x00000600-0x000006FF
	LSI Logic 53C1010-66 Device
I/O Port 0x00000600-0x000006FF
	LSI Logic 53C1010-66 Device


[DMA]

Resource	Device	Status

[Forced Hardware]

Device	PNP Device ID

[I/O]

Resource	Device	Status
0x00000000-0x00000FFF		PCI bus
	OK
0x00000000-0x00000FFF		PCI bus
	OK
0x00000000-0x00000FFF		PCI bus
	OK
```

```
0x00000000-0x00000FFF        PCI bus
             OK
0x00000500-0x000005FF        LSI Logic
53C1010-66 Device   OK
0x00000500-0x000005FF        LSI Logic
53C1010-66 Device   OK
0x00000500-0x000005FF        LSI Logic
53C1010-66 Device   OK
0x00000500-0x000005FF        LSI Logic
53C1010-66 Device   OK
0x00000600-0x000006FF        LSI Logic
53C1010-66 Device   OK
0x00000600-0x000006FF        LSI Logic
53C1010-66 Device   OK
0x00000600-0x000006FF        LSI Logic
53C1010-66 Device   OK
0x00000600-0x000006FF        LSI Logic
53C1010-66 Device   OK
0x00000700-0x000007FF        LSI Logic
53C1010-66 Device   OK
0x00000700-0x000007FF        LSI Logic
53C1010-66 Device   OK
0x00000700-0x000007FF        LSI Logic
53C1010-66 Device   OK
0x00000700-0x000007FF        LSI Logic
53C1010-66 Device   OK
0x00000800-0x000008FF        LSI Logic
53C1010-66 Device   OK
0x00000800-0x000008FF        LSI Logic
53C1010-66 Device   OK
0x00000800-0x000008FF        LSI Logic
53C1010-66 Device   OK
0x00000800-0x000008FF        LSI Logic
53C1010-66 Device   OK
0x00001000-0x00001FFF        PCI bus
             OK
0x00001000-0x00001FFF        PCI bus
             OK
0x00001000-0x00001FFF        PCI bus
             OK
0x00001000-0x00001FFF        PCI bus
             OK
0x00002000-0x00003FFF        PCI bus
             OK
0x00002000-0x00003FFF        PCI bus
             OK
0x00002000-0x00003FFF        Emulex
LightPulse PCI Fibre Channel HBA (with
adjunct driver)     OK
0x00002000-0x00003FFF        PCI bus
             OK
0x00002000-0x00003FFF        PCI bus
             OK
0x00004000-0x00005FFF        PCI bus
             OK
0x00004000-0x00005FFF        PCI
standard PCI-to-PCI bridge   OK
0x00004000-0x00005FFF        Smart
Array 6400 Controller (Non-Miniport)
             OK
0x00004000-0x00005FFF        PCI bus
             OK
0x00004000-0x00005FFF        PCI
standard PCI-to-PCI bridge   OK
0x00004000-0x00005FFF        Smart
Array 6400 Controller (Non-Miniport)
             OK
0x00004000-0x00005FFF        PCI bus
             OK
0x00004000-0x00005FFF        PCI
standard PCI-to-PCI bridge   OK
0x00004000-0x00005FFF        Smart
Array 6400 Controller (Non-Miniport)
             OK
0x00004000-0x00005FFF        PCI bus
             OK
0x00004000-0x00005FFF        PCI
standard PCI-to-PCI bridge   OK
0x00004000-0x00005FFF        Smart
Array 6400 Controller (Non-Miniport)
             OK
0x00006000-0x00007FFF        PCI bus
             OK
0x00006000-0x00007FFF        PCI bus
             OK
0x00006000-0x00007FFF        PCI bus
             OK
0x00006000-0x00007FFF        PCI bus
             OK
0x00008000-0x00009FFF        PCI bus
             OK
0x00008000-0x00009FFF        PCI bus
             OK
0x00008000-0x00009FFF        PCI bus
             OK
0x00008000-0x00009FFF        PCI bus
             OK
0x0000A000-0x0000BFFF        PCI bus
             OK
0x0000A000-0x0000BFFF        PCI
standard PCI-to-PCI bridge   OK
0x0000A000-0x0000BFFF        Smart
Array 6400 Controller (Non-Miniport)
             OK
0x0000A000-0x0000BFFF        PCI bus
             OK
0x0000A000-0x0000BFFF        PCI
standard PCI-to-PCI bridge   OK
0x0000A000-0x0000BFFF        Smart
Array 6400 Controller (Non-Miniport)
             OK
0x0000A000-0x0000BFFF        PCI bus
             OK
0x0000A000-0x0000BFFF        PCI
standard PCI-to-PCI bridge   OK
0x0000A000-0x0000BFFF        Smart
Array 6400 Controller (Non-Miniport)
             OK
0x0000A000-0x0000BFFF        PCI bus
             OK
0x0000A000-0x0000BFFF        PCI
standard PCI-to-PCI bridge   OK
0x0000A000-0x0000BFFF        Smart
Array 6400 Controller (Non-Miniport)
             OK
0x0000C000-0x0000DFFF        PCI bus
             OK
0x0000C000-0x0000DFFF        PCI bus
             OK
0x0000C000-0x0000DFFF        Intel
21154 PCI to PCI bridge      OK
0x0000C000-0x0000DFFF        Standard
VGA Graphics Adapter         OK
0x0000C000-0x0000DFFF        PCI bus
             OK
0x0000C000-0x0000DFFF        PCI bus
             OK
0x0000E000-0x0000FFFF        PCI bus
             OK
0x0000E000-0x0000FFFF        PCI
standard PCI-to-PCI bridge   OK
0x0000E000-0x0000FFFF        Smart
Array 6400 Controller (Non-Miniport)
             OK
0x0000E000-0x0000FFFF        PCI bus
             OK
0x0000E000-0x0000FFFF        PCI
standard PCI-to-PCI bridge   OK
0x0000E000-0x0000FFFF        Smart
Array 6400 Controller (Non-Miniport)
             OK
0x0000E000-0x0000FFFF        PCI bus
             OK
0x0000E000-0x0000FFFF        PCI
standard PCI-to-PCI bridge   OK
0x0000E000-0x0000FFFF        Smart
Array 6400 Controller (Non-Miniport)
             OK
0x0000E000-0x0000FFFF        PCI bus
             OK
0x0000E000-0x0000FFFF        PCI
standard PCI-to-PCI bridge   OK
0x0000E000-0x0000FFFF        Smart
Array 6400 Controller (Non-Miniport)
             OK
0x00000400-0x00000FFF        PCI bus
             OK
0x00000300-0x000003FF        PCI bus
             OK
0x00000300-0x000003FF        PCI bus
             OK
0x000003B0-0x000003BB        Intel
21154 PCI to PCI bridge      OK
0x000003B0-0x000003BB        Standard
VGA Graphics Adapter         OK
0x000003C0-0x000003DF        Intel
21154 PCI to PCI bridge      OK
0x000003C0-0x000003DF        Standard
VGA Graphics Adapter         OK

[IRQs]

Resource   Device      Status
IRQ 16     Microsoft ACPI-Compliant
System     OK
IRQ 29     HP MP Serial AUX/UPS Port
(COM5)     OK
IRQ 28     Broadcom NetXtreme Gigabit
Ethernet #2            OK
IRQ 24     LSI Logic 53C1010-66 Device
           OK
IRQ 25     LSI Logic 53C1010-66 Device
           OK
IRQ 26     LSI Logic 53C1010-66 Device
           OK
IRQ 27     LSI Logic 53C1010-66 Device
           OK
IRQ 17     HP Baseboard Management
Controller Interface Driver      OK
IRQ 54     Smart Array 6400 Controller
(Non-Miniport)         OK
IRQ 87     Smart Array 6400 Controller
(Non-Miniport)         OK
IRQ 109    Smart Array 6400 Controller
(Non-Miniport)         OK
IRQ 133    HP MP Serial AUX/UPS Port
(COM6)     OK
IRQ 132    Broadcom NetXtreme Gigabit
Ethernet   OK
IRQ 128    LSI Logic 53C1010-66 Device
           OK
IRQ 129    LSI Logic 53C1010-66 Device
           OK
IRQ 130    LSI Logic 53C1010-66 Device
           OK
IRQ 131    LSI Logic 53C1010-66 Device
           OK
IRQ 147    Emulex LightPulse PCI Fibre
Channel HBA (with adjunct driver)
           OK
IRQ 158    Smart Array 6400 Controller
(Non-Miniport)         OK
```

```
IRQ 191	Smart Array 6400 Controller
(Non-Miniport)	OK
IRQ 202	NEC PCI to USB Open Host
Controller	OK
IRQ 203	NEC PCI to USB Open Host
Controller	OK
IRQ 204	NEC PCI to USB Enhanced Host
Controller (B1)	OK
IRQ 213	Smart Array 6400 Controller
(Non-Miniport)	OK
IRQ 237	HP MP Serial AUX/UPS Port
(COM4)	OK
IRQ 236	Broadcom NetXtreme Gigabit
Ethernet #3	OK
IRQ 232	LSI Logic 53C1010-66 Device
	OK
IRQ 233	LSI Logic 53C1010-66 Device
	OK
IRQ 234	LSI Logic 53C1010-66 Device
	OK
IRQ 235	LSI Logic 53C1010-66 Device
	OK
IRQ 262	Smart Array 6400 Controller
(Non-Miniport)	OK
IRQ 295	Smart Array 6400 Controller
(Non-Miniport)	OK
IRQ 317	Smart Array 6400 Controller
(Non-Miniport)	OK
IRQ 341	HP MP Serial AUX/UPS Port
(COM3)	OK
IRQ 340	Broadcom NetXtreme Gigabit
Ethernet #4	OK
IRQ 336	LSI Logic 53C1010-66 Device
	OK
IRQ 337	LSI Logic 53C1010-66 Device
	OK
IRQ 338	LSI Logic 53C1010-66 Device
	OK
IRQ 339	LSI Logic 53C1010-66 Device
	OK
IRQ 366	Smart Array 6400 Controller
(Non-Miniport)	OK
IRQ 399	Smart Array 6400 Controller
(Non-Miniport)	OK
IRQ 421	Smart Array 6400 Controller
(Non-Miniport)	OK

[Memory]

Resource	Device	Status
0xC0000000-0xC7FFFFFF	PCI bus
	OK
0xC0000000-0xC7FFFFFF	Broadcom
NetXtreme Gigabit Ethernet #2	OK
0xC0000000-0xC7FFFFFF	PCI bus
	OK
0xC0000000-0xC7FFFFFF	PCI bus
	OK
0xC0000000-0xC7FFFFFF	Broadcom
NetXtreme Gigabit Ethernet	OK
0xC0000000-0xC7FFFFFF	PCI bus
	OK
0xC0000000-0xC7FFFFFF	PCI bus
	OK
0xC0000000-0xC7FFFFFF	Broadcom
NetXtreme Gigabit Ethernet #3	OK
0xC0000000-0xC7FFFFFF	PCI bus
	OK
0xC0000000-0xC7FFFFFF	PCI bus
	OK
0xC0000000-0xC7FFFFFF	Broadcom
NetXtreme Gigabit Ethernet #4	OK
0xC0000000-0xC7FFFFFF	PCI bus
	OK
0xC0018000-0xC001800F	HP MP
Serial AUX/UPS Port (COM5)	OK
0xC0018000-0xC001800F	HP MP
Serial AUX/UPS Port (COM6)	OK
0xC0018000-0xC001800F	HP MP
Serial AUX/UPS Port (COM4)	OK
0xC0018000-0xC001800F	HP MP
Serial AUX/UPS Port (COM3)	OK
0xC0019000-0xC0019FFF	HP
Management Processor	OK
0xC0019000-0xC0019FFF	HP
Management Processor	OK
0xC0019000-0xC0019FFF	HP
Management Processor	OK
0xC0019000-0xC0019FFF	HP
Management Processor	OK
0xC001A000-0xC001A3FF	LSI Logic
53C1010-66 Device	OK
0xC001A000-0xC001A3FF	LSI Logic
53C1010-66 Device	OK
0xC001A000-0xC001A3FF	LSI Logic
53C1010-66 Device	OK
0xC001A000-0xC001A3FF	LSI Logic
53C1010-66 Device	OK
0xC0010000-0xC0011FFF	LSI Logic
53C1010-66 Device	OK
0xC0010000-0xC0011FFF	LSI Logic
53C1010-66 Device	OK
0xC0010000-0xC0011FFF	LSI Logic
53C1010-66 Device	OK
0xC0010000-0xC0011FFF	LSI Logic
53C1010-66 Device	OK
0xC001B000-0xC001B3FF	LSI Logic
53C1010-66 Device	OK
0xC001B000-0xC001B3FF	LSI Logic
53C1010-66 Device	OK
0xC001B000-0xC001B3FF	LSI Logic
53C1010-66 Device	OK
0xC001B000-0xC001B3FF	LSI Logic
53C1010-66 Device	OK
0xC0012000-0xC0013FFF	LSI Logic
53C1010-66 Device	OK
0xC0012000-0xC0013FFF	LSI Logic
53C1010-66 Device	OK
0xC0012000-0xC0013FFF	LSI Logic
53C1010-66 Device	OK
0xC0012000-0xC0013FFF	LSI Logic
53C1010-66 Device	OK
0xC001C000-0xC001C3FF	LSI Logic
53C1010-66 Device	OK
0xC001C000-0xC001C3FF	LSI Logic
53C1010-66 Device	OK
0xC001C000-0xC001C3FF	LSI Logic
53C1010-66 Device	OK
0xC001C000-0xC001C3FF	LSI Logic
53C1010-66 Device	OK
0xC0014000-0xC0015FFF	LSI Logic
53C1010-66 Device	OK
0xC0014000-0xC0015FFF	LSI Logic
53C1010-66 Device	OK
0xC0014000-0xC0015FFF	LSI Logic
53C1010-66 Device	OK
0xC0014000-0xC0015FFF	LSI Logic
53C1010-66 Device	OK
0xC001D000-0xC001D3FF	LSI Logic
53C1010-66 Device	OK
0xC001D000-0xC001D3FF	LSI Logic
53C1010-66 Device	OK
0xC001D000-0xC001D3FF	LSI Logic
53C1010-66 Device	OK
0xC001D000-0xC001D3FF	LSI Logic
53C1010-66 Device	OK
0xC0016000-0xC0017FFF	LSI Logic
53C1010-66 Device	OK
0xC0016000-0xC0017FFF	LSI Logic
53C1010-66 Device	OK
0xC0016000-0xC0017FFF	LSI Logic
53C1010-66 Device	OK
0xC0016000-0xC0017FFF	LSI Logic
53C1010-66 Device	OK
0xC8000000-0xCFFFFFFF	PCI bus
	OK
0xC8000000-0xCFFFFFFF	PCI bus
	OK
0xC8000000-0xCFFFFFFF	PCI bus
	OK
0xC8000000-0xCFFFFFFF	PCI bus
	OK
0xD0000000-0xDFFFFFFF	PCI bus
	OK
0xD0000000-0xDFFFFFFF	PCI bus
	OK
0xD0000000-0xDFFFFFFF	PCI
standard PCI-to-PCI bridge	OK
0xD0000000-0xDFFFFFFF	Smart
Array 6400 Controller (Non-Miniport)
	OK
0xD0000000-0xDFFFFFFF	PCI bus
	OK
0xD0000000-0xDFFFFFFF	PCI bus
	OK
0xD0000000-0xDFFFFFFF	PCI
standard PCI-to-PCI bridge	OK
0xD0000000-0xDFFFFFFF	Smart
Array 6400 Controller (Non-Miniport)
	OK
0xD0000000-0xDFFFFFFF	PCI bus
	OK
0xD0000000-0xDFFFFFFF	PCI bus
	OK
0xD0000000-0xDFFFFFFF	PCI
standard PCI-to-PCI bridge	OK
0xD0000000-0xDFFFFFFF	Smart
Array 6400 Controller (Non-Miniport)
	OK
0xD0000000-0xDFFFFFFF	PCI bus
	OK
0xD0000000-0xDFFFFFFF	PCI bus
	OK
0xD0000000-0xDFFFFFFF	PCI
standard PCI-to-PCI bridge	OK
0xD0000000-0xDFFFFFFF	Smart
Array 6400 Controller (Non-Miniport)
	OK
0xE0000000-0xEFFFFFFF	PCI bus
	OK
0xE0000000-0xEFFFFFFF	PCI
standard PCI-to-PCI bridge	OK
0xE0000000-0xEFFFFFFF	Smart
Array 6400 Controller (Non-Miniport)
	OK
0xE0000000-0xEFFFFFFF	PCI bus
	OK
0xE0000000-0xEFFFFFFF	PCI bus
	OK
0xE0000000-0xEFFFFFFF	PCI
standard PCI-to-PCI bridge	OK
0xE0000000-0xEFFFFFFF	Smart
Array 6400 Controller (Non-Miniport)
	OK
0xE0000000-0xEFFFFFFF	PCI bus
	OK
0xE0000000-0xEFFFFFFF	Intel
21154 PCI to PCI bridge	OK
0xE0000000-0xEFFFFFFF	Standard
VGA Graphics Adapter	OK
0xE0000000-0xEFFFFFFF	PCI bus
	OK
```

```
0xE0000000-0xEFFFFFFF      PCI
standard PCI-to-PCI bridge    OK
0xE0000000-0xEFFFFFFF      Smart
Array 6400 Controller (Non-Miniport)
           OK
0xE0000000-0xEFFFFFFF      PCI bus
           OK
0xE0000000-0xEFFFFFFF      PCI bus
           OK
0xE0000000-0xEFFFFFFF      PCI
standard PCI-to-PCI bridge    OK
0xE0000000-0xEFFFFFFF      Smart
Array 6400 Controller (Non-Miniport)
           OK
0xE0000000-0xEFFFFFFF      PCI bus
           OK
0xE0080000-0xE0081FFF      Smart
Array 6400 Controller (Non-Miniport)
           OK
0xE0080000-0xE0081FFF      Smart
Array 6400 Controller (Non-Miniport)
           OK
0xE0080000-0xE0081FFF      Smart
Array 6400 Controller (Non-Miniport)
           OK
0xE0080000-0xE0081FFF      Smart
Array 6400 Controller (Non-Miniport)
           OK
0xF0000000-0xFFFFFFFF      PCI bus
           OK
0xF0000000-0xFFFFFFFF      PCI bus
           OK
0xF0000000-0xFFFFFFFF      PCI
standard PCI-to-PCI bridge    OK
0xF0000000-0xFFFFFFFF      Smart
Array 6400 Controller (Non-Miniport)
           OK
0xF0000000-0xFFFFFFFF      PCI bus
           OK
0xF0000000-0xFFFFFFFF      PCI bus
           OK
0xF0000000-0xFFFFFFFF      PCI
standard PCI-to-PCI bridge    OK
0xF0000000-0xFFFFFFFF      Smart
Array 6400 Controller (Non-Miniport)
           OK
0xF0000000-0xFFFFFFFF      PCI bus
           OK
0xF0000000-0xFFFFFFFF      PCI bus
           OK
0xF0000000-0xFFFFFFFF      PCI
standard PCI-to-PCI bridge    OK
0xF0000000-0xFFFFFFFF      Smart
Array 6400 Controller (Non-Miniport)
           OK
0xF0000000-0xFFFFFFFF      PCI bus
           OK
0xF0000000-0xFFFFFFFF      PCI bus
           OK
0xF0000000-0xFFFFFFFF      PCI
standard PCI-to-PCI bridge    OK
0xF0000000-0xFFFFFFFF      Smart
Array 6400 Controller (Non-Miniport)
           OK
0xD0080000-0xD0081FFF      Smart
Array 6400 Controller (Non-Miniport)
           OK
0xD0080000-0xD0081FFF      Smart
Array 6400 Controller (Non-Miniport)
           OK
0xD0080000-0xD0081FFF      Smart
Array 6400 Controller (Non-Miniport)
           OK
0xD0080000-0xD0081FFF      Smart
Array 6400 Controller (Non-Miniport)
           OK
0xF0080000-0xF0081FFF      Smart
Array 6400 Controller (Non-Miniport)
           OK
0xF0080000-0xF0081FFF      Smart
Array 6400 Controller (Non-Miniport)
           OK
0xF0080000-0xF0081FFF      Smart
Array 6400 Controller (Non-Miniport)
           OK
0xF0080000-0xF0081FFF      Smart
Array 6400 Controller (Non-Miniport)
           OK
0xD0040000-0xD0040FFF      Emulex
LightPulse PCI Fibre Channel HBA (with
adjunct driver)     OK
0xD0041000-0xD00410FF      Emulex
LightPulse PCI Fibre Channel HBA (with
adjunct driver)     OK
0xA0000-0xBFFFF   PCI bus    OK
0xA0000-0xBFFFF   Intel 21154 PCI to
PCI bridge OK
0xA0000-0xBFFFF   Standard VGA
Graphics Adapter    OK
0xE8030000-0xE8030FFF      NEC PCI
to USB Open Host Controller    OK
0xE8031000-0xE8031FFF      NEC PCI
to USB Open Host Controller    OK
0xE8032000-0xE80320FF      NEC PCI
to USB Enhanced Host Controller (B1)
           OK
0xE8020000-0xE802FFFF      Standard
VGA Graphics Adapter       OK

[Components]


[Multimedia]


[Audio Codecs]

CODEC     Manufacturer
          Description          Status
          File      Version    Size
          Creation Date
c:\windows\system32\tssoft32.acm
          DSP GROUP, INC.
          OK
          C:\WINDOWS\system32\TSSO
FT32.ACM            1.01       29.00 KB
(29,696 bytes)      3/29/2005 2:45 PM
c:\windows\system32\msg711.acm
          Microsoft Corporation
          OK
          C:\WINDOWS\system32\MSG7
11.ACM    5.2.3790.0 (srv03_rtm.030324-
2048)     33.00 KB (33,792 bytes)
          3/29/2005 2:44 PM
c:\windows\system32\msgsm32.acm
          Microsoft Corporation
          OK
          C:\WINDOWS\system32\MSGS
M32.ACM 5.2.3790.0 (srv03_rtm.030324-
2048)     66.50 KB (68,096 bytes)
          3/29/2005 2:44 PM
c:\windows\system32\msadp32.acm
          Microsoft Corporation
          OK
          C:\WINDOWS\system32\MSAD
P32.ACM   5.2.3790.0 (srv03_rtm.030324-
2048)     49.00 KB (50,176 bytes)
          3/29/2005 2:44 PM
c:\windows\system32\imaadp32.acm
Microsoft Corporation
          OK
          C:\WINDOWS\system32\IMAA
DP32.ACM            5.2.3790.0
(srv03_rtm.030324-2048)        55.00 KB
(56,320 bytes)      3/29/2005 2:44 PM

[Video Codecs]

CODEC     Manufacturer
          Description          Status
          File      Version    Size
          Creation Date
c:\windows\system32\msvidc32.dll
Microsoft Corporation
          OK
          C:\WINDOWS\system32\MSVI
DC32.DLL            5.2.3790.0
(srv03_rtm.030324-2048)        67.00 KB
(68,608 bytes)      3/29/2005 2:44 PM
c:\windows\system32\msrle32.dllMicrosoft
Corporation                    OK
          C:\WINDOWS\system32\MSRL
E32.DLL   5.2.3790.0 (srv03_rtm.030324-
2048)     24.50 KB (25,088 bytes)
          3/29/2005 2:44 PM

[CD-ROM]

Item      Value
Drive     D:
Description         CD-ROM Drive
Media Loaded        No
Media Type          CD-ROM
Name      HP DVD-ROM 305 SCSI
CdRom Device
Manufacturer        (Standard CD-ROM
drives)
Status    OK
Transfer Rate       Not Available
SCSI Target ID      2
PNP Device ID
          SCSI\CDROM&VEN_HP&PRO
D_DVD-
ROM_305&REV_1.01\6&16CD2462&0&0
20
Driver
          c:\windows\system32\drivers\cdr
om.sys (5.2.3790.1828
(srv03_sp1_rtm.050321-2020), 144.50 KB
(147,968 bytes), 3/29/2005 2:43 PM)

Drive     E:
Description         CD-ROM Drive
Media Loaded        No
Media Type          CD-ROM
Name      HP DVD-ROM 305 SCSI
CdRom Device
Manufacturer        (Standard CD-ROM
drives)
Status    OK
Transfer Rate       Not Available
SCSI Target ID      2
PNP Device ID
          SCSI\CDROM&VEN_HP&PRO
D_DVD-
ROM_305&REV_1.01\6&3EABE99&0&0
20
Driver
          c:\windows\system32\drivers\cdr
om.sys (5.2.3790.1828
```

(srv03_sp1_rtm.050321-2020), 144.50 KB (147,968 bytes), 3/29/2005 2:43 PM)

[Sound Device]

Item Value

[Display]

Item Value
Name Standard VGA Graphics Adapter
PNP Device ID PCI\VEN_1002&DEV_5159&SUBSYS_1292103C&REV_00\6&35C9EA34&0&2808
Adapter Type ATI RADEON VE, (Standard display types) compatible
Adapter Description Standard VGA Graphics Adapter
Adapter RAM 16.00 MB (16,777,216 bytes)
Installed Drivers vga.dll,framebuf.dll,vga256,vga64k
Driver Version 5.2.3790.1828
INF File display.inf (vga section)
Color Planes 1
Color Table Entries 65536
Resolution 800 x 600 x 1 hertz
Bits/Pixel 16
Memory Address 0xE0000000-0xEFFFFFFF
I/O Port 0x0000C000-0x0000DFFF
Memory Address 0xE8020000-0xE802FFFF
I/O Port 0x000003B0-0x000003BB
I/O Port 0x000003C0-0x000003DF
Memory Address 0xA0000-0xBFFFF
Driver c:\windows\system32\drivers\vgapnp.sys (5.2.3790.1828 (srv03_sp1_rtm.050321-2020), 78.50 KB (80,384 bytes), 12/10/2004 5:44 AM)

[Infrared]

Item Value

[Input]

[Keyboard]

Item Value

[Pointing Device]

Item Value

[Modem]

Item Value

[Network]

[Adapter]

Item Value
Name [00000001] Broadcom NetXtreme Gigabit Ethernet
Adapter Type Ethernet 802.3
Product Type Broadcom NetXtreme Gigabit Ethernet
Installed Yes
PNP Device ID PCI\VEN_14E4&DEV_1645&SUBSYS_12C1103C&REV_15\5&5CDAB61&0&08
Last Reset 5/26/2005 12:12 PM
Index 1
Service Name b57nd
IP Address 0.0.0.0
IP Subnet 0.0.0.0
Default IP Gateway Not Available
DHCP Enabled Yes
DHCP Server
DHCP Lease Expires Not Available
DHCP Lease Obtained Not Available
MAC Address 00:30:6E:4B:7A:9B
Memory Address 0xC0000000-0xC7FFFFFF
IRQ Channel IRQ 132
Driver c:\windows\system32\drivers\b57xp64.sys (2.91.0.0 built by: WinDDK, 499.25 KB (511,232 bytes), 12/10/2004 2:46 AM)

Name [00000002] Broadcom NetXtreme Gigabit Ethernet
Adapter Type Ethernet 802.3
Product Type Broadcom NetXtreme Gigabit Ethernet
Installed Yes
PNP Device ID PCI\VEN_14E4&DEV_1645&SUBSYS_12C1103C&REV_15\5&4F5EBC7&0&08
Last Reset 5/26/2005 12:12 PM
Index 2
Service Name b57nd
IP Address 15.1.101.82
IP Subnet 255.255.0.0
Default IP Gateway Not Available
DHCP Enabled Yes
DHCP Server 15.1.101.1
DHCP Lease Expires 6/3/2005 12:14 PM
DHCP Lease Obtained 5/26/2005 12:14 PM
MAC Address 00:0E:7F:ED:01:7C
Memory Address 0xC0000000-0xC7FFFFFF
IRQ Channel IRQ 28
Driver c:\windows\system32\drivers\b57xp64.sys (2.91.0.0 built by: WinDDK, 499.25 KB (511,232 bytes), 12/10/2004 2:46 AM)

Name [00000003] Broadcom NetXtreme Gigabit Ethernet
Adapter Type Ethernet 802.3
Product Type Broadcom NetXtreme Gigabit Ethernet
Installed Yes
PNP Device ID PCI\VEN_14E4&DEV_1645&SUBSYS_12C1103C&REV_15\5&194FB0DF&0&08
Last Reset 5/26/2005 12:12 PM
Index 3
Service Name b57nd
IP Address 0.0.0.0
IP Subnet 0.0.0.0
Default IP Gateway Not Available
DHCP Enabled Yes
DHCP Server
DHCP Lease Expires Not Available
DHCP Lease Obtained Not Available
MAC Address 00:30:6E:4B:7A:83
Memory Address 0xC0000000-0xC7FFFFFF
IRQ Channel IRQ 236
Driver c:\windows\system32\drivers\b57xp64.sys (2.91.0.0 built by: WinDDK, 499.25 KB (511,232 bytes), 12/10/2004 2:46 AM)

Name [00000004] Broadcom NetXtreme Gigabit Ethernet
Adapter Type Ethernet 802.3
Product Type Broadcom NetXtreme Gigabit Ethernet
Installed Yes
PNP Device ID PCI\VEN_14E4&DEV_1645&SUBSYS_12C1103C&REV_15\5&14C294CC&0&08
Last Reset 5/26/2005 12:12 PM
Index 4
Service Name b57nd
IP Address 0.0.0.0
IP Subnet 0.0.0.0
Default IP Gateway Not Available
DHCP Enabled Yes
DHCP Server
DHCP Lease Expires Not Available
DHCP Lease Obtained Not Available
MAC Address 00:30:6E:4B:7A:2C
Memory Address 0xC0000000-0xC7FFFFFF
IRQ Channel IRQ 340
Driver c:\windows\system32\drivers\b57xp64.sys (2.91.0.0 built by: WinDDK, 499.25 KB (511,232 bytes), 12/10/2004 2:46 AM)

Name [00000005] RAS Async Adapter
Adapter Type Not Available
Product Type RAS Async Adapter
Installed Yes
PNP Device ID Not Available
Last Reset 5/26/2005 12:12 PM
Index 5
Service Name AsyncMac
IP Address Not Available
IP Subnet Not Available
Default IP Gateway Not Available
DHCP Enabled No
DHCP Server Not Available
DHCP Lease Expires Not Available
DHCP Lease Obtained Not Available
MAC Address Not Available

Name [00000006] WAN Miniport (L2TP)
Adapter Type Not Available
Product Type WAN Miniport (L2TP)
Installed Yes
PNP Device ID ROOT\MS_L2TPMINIPORT\0000
Last Reset 5/26/2005 12:12 PM
Index 6

Service Name Rasl2tp
IP Address Not Available
IP Subnet Not Available
Default IP Gateway Not Available
DHCP Enabled No
DHCP Server Not Available
DHCP Lease Expires Not Available
DHCP Lease Obtained Not Available
MAC Address Not Available
Driver c:\windows\system32\drivers\rasl2tp.sys (5.2.3790.1828 (srv03_sp1_rtm.050321-2020), 188.00 KB (192,512 bytes), 3/29/2005 2:44 PM)

Name [00000007] WAN Miniport (PPTP)
Adapter Type Wide Area Network (WAN)
Product Type WAN Miniport (PPTP)
Installed Yes
PNP Device ID ROOT\MS_PPTPMINIPORT\0000
Last Reset 5/26/2005 12:12 PM
Index 7
Service Name PptpMiniport
IP Address Not Available
IP Subnet Not Available
Default IP Gateway Not Available
DHCP Enabled No
DHCP Server Not Available
DHCP Lease Expires Not Available
DHCP Lease Obtained Not Available
MAC Address 50:50:54:50:30:30
Driver c:\windows\system32\drivers\raspptp.sys (5.2.3790.1828 (srv03_sp1_rtm.050321-2020), 176.00 KB (180,224 bytes), 3/29/2005 2:44 PM)

Name [00000008] WAN Miniport (PPPOE)
Adapter Type Wide Area Network (WAN)
Product Type WAN Miniport (PPPOE)
Installed Yes
PNP Device ID ROOT\MS_PPPOEMINIPORT\0000
Last Reset 5/26/2005 12:12 PM
Index 8
Service Name RasPppoe
IP Address Not Available
IP Subnet Not Available
Default IP Gateway Not Available
DHCP Enabled No
DHCP Server Not Available
DHCP Lease Expires Not Available
DHCP Lease Obtained Not Available
MAC Address 33:50:6F:45:30:30
Driver c:\windows\system32\drivers\raspppoe.sys (5.2.3790.1828 (srv03_sp1_rtm.050321-2020), 131.00 KB (134,144 bytes), 3/29/2005 2:44 PM)

Name [00000009] Direct Parallel
Adapter Type Not Available
Product Type Direct Parallel
Installed Yes
PNP Device ID ROOT\MS_PTIMINIPORT\0000
Last Reset 5/26/2005 12:12 PM
Index 9
Service Name Raspti
IP Address Not Available
IP Subnet Not Available
Default IP Gateway Not Available
DHCP Enabled No
DHCP Server Not Available
DHCP Lease Expires Not Available
DHCP Lease Obtained Not Available
MAC Address Not Available
Driver c:\windows\system32\drivers\raspti.sys (5.2.3790.1828 (srv03_sp1_rtm.050321-2020), 54.50 KB (55,808 bytes), 3/29/2005 2:44 PM)

Name [00000010] WAN Miniport (IP)
Adapter Type Not Available
Product Type WAN Miniport (IP)
Installed Yes
PNP Device ID ROOT\MS_NDISWANIP\0000
Last Reset 5/26/2005 12:12 PM
Index 10
Service Name NdisWan
IP Address Not Available
IP Subnet Not Available
Default IP Gateway Not Available
DHCP Enabled No
DHCP Server Not Available
DHCP Lease Expires Not Available
DHCP Lease Obtained Not Available
MAC Address Not Available
Driver c:\windows\system32\drivers\ndiswan.sys (5.2.3790.1828 (srv03_sp1_rtm.050321-2020), 266.50 KB (272,896 bytes), 3/29/2005 2:44 PM)

Name [00000011] Intel(R) PRO/1000 MT Dual Port Server Adapter
Adapter Type Not Available
Product Type Intel(R) PRO/1000 MT Dual Port Server Adapter
Installed Yes
PNP Device ID Not Available
Last Reset 5/26/2005 12:12 PM
Index 11
Service Name E1000
IP Address Not Available
IP Subnet Not Available
Default IP Gateway Not Available
DHCP Enabled Yes
DHCP Server Not Available
DHCP Lease Expires Not Available
DHCP Lease Obtained Not Available
MAC Address Not Available

Name [00000012] Intel(R) PRO/1000 MT Dual Port Server Adapter
Adapter Type Not Available
Product Type Intel(R) PRO/1000 MT Dual Port Server Adapter
Installed Yes
PNP Device ID Not Available
Last Reset 5/26/2005 12:12 PM
Index 12
Service Name E1000
IP Address Not Available
IP Subnet Not Available
Default IP Gateway Not Available
DHCP Enabled Yes
DHCP Server Not Available
DHCP Lease Expires Not Available
DHCP Lease Obtained Not Available
MAC Address Not Available

[Protocol]

Item Value
Name MSAFD Tcpip [TCP/IP]
Connectionless Service No
Guarantees Delivery Yes
Guarantees Sequencing Yes
Maximum Address Size 16 bytes
Maximum Message Size 0 bytes
Message Oriented No
Minimum Address Size 16 bytes
Pseudo Stream Oriented No
Supports Broadcasting No
Supports Connect Data No
Supports Disconnect Data No
Supports Encryption No
Supports Expedited Data Yes
Supports Graceful Closing Yes
Supports Guaranteed Bandwidth No
Supports Multicasting No

Name MSAFD Tcpip [UDP/IP]
Connectionless Service Yes
Guarantees Delivery No
Guarantees Sequencing No
Maximum Address Size 16 bytes
Maximum Message Size 63.93 KB (65,467 bytes)
Message Oriented Yes
Minimum Address Size 16 bytes
Pseudo Stream Oriented No
Supports Broadcasting Yes
Supports Connect Data No
Supports Disconnect Data No
Supports Encryption No
Supports Expedited Data No
Supports Graceful Closing No
Supports Guaranteed Bandwidth No
Supports Multicasting Yes

Name RSVP UDP Service Provider
Connectionless Service Yes
Guarantees Delivery No
Guarantees Sequencing No
Maximum Address Size 16 bytes
Maximum Message Size 63.93 KB (65,467 bytes)
Message Oriented Yes
Minimum Address Size 16 bytes
Pseudo Stream Oriented No
Supports Broadcasting Yes
Supports Connect Data No
Supports Disconnect Data No
Supports Encryption Yes
Supports Expedited Data No
Supports Graceful Closing No
Supports Guaranteed Bandwidth No
Supports Multicasting Yes

Name RSVP TCP Service Provider
Connectionless Service No
Guarantees Delivery Yes
Guarantees Sequencing Yes
Maximum Address Size 16 bytes

Maximum Message Size 0 bytes
Message Oriented No
Minimum Address Size 16 bytes
Pseudo Stream Oriented No
Supports Broadcasting No
Supports Connect Data No
Supports Disconnect Data No
Supports Encryption Yes
Supports Expedited Data Yes
Supports Graceful Closing Yes
Supports Guaranteed Bandwidth No
Supports Multicasting No

[WinSock]

Item Value
File c:\windows\system32\wsock32.dll
Size 23.00 KB (23,552 bytes)
Version 5.2.3790.0 (srv03_rtm.030324-2048)

[Ports]

[Serial]

Item Value
Name HP MP Serial AUX/UPS Port (COM5)
Status OK
PNP Device ID PCI\VEN_103C&DEV_1290&SUBSYS_1291103C&REV_01\5&4F5EBC7&0&00
Maximum Input Buffer Size 0
Maximum Output Buffer Size No
Settable Baud Rate Yes
Settable Data Bits Yes
Settable Flow Control Yes
Settable Parity Yes
Settable Parity Check Yes
Settable Stop Bits Yes
Settable RLSD Yes
Supports RLSD Yes
Supports 16 Bit Mode No
Supports Special Characters No
Baud Rate 9600
Bits/Byte 8
Stop Bits 1
Parity None
Busy No
Abort Read/Write on Error No
Binary Mode Enabled Yes
Continue XMit on XOff No
CTS Outflow Control No
Discard NULL Bytes No
DSR Outflow Control 0
DSR Sensitivity 0
DTR Flow Control Type Enable
EOF Character 0
Error Replace Character 0
Error Replacement Enabled No
Event Character 0
Parity Check Enabled No
RTS Flow Control Type Enable
XOff Character 19
XOffXMit Threshold 512
XOn Character 17
XOnXMit Threshold 2048
XOnXOff InFlow Control 0
XOnXOff OutFlow Control 0
Memory Address 0xC0018000-0xC001800F
IRQ Channel IRQ 29
Driver c:\windows\system32\drivers\hpmpser.sys (5.0.3663.16, 154.00 KB (157,696 bytes), 12/10/2004 2:18 PM)

Name HP MP Serial AUX/UPS Port (COM6)
Status OK
PNP Device ID PCI\VEN_103C&DEV_1290&SUBSYS_1291103C&REV_01\5&5CDAB61&0&00
Maximum Input Buffer Size 0
Maximum Output Buffer Size No
Settable Baud Rate Yes
Settable Data Bits Yes
Settable Flow Control Yes
Settable Parity Yes
Settable Parity Check Yes
Settable Stop Bits Yes
Settable RLSD Yes
Supports RLSD Yes
Supports 16 Bit Mode No
Supports Special Characters No
Baud Rate 9600
Bits/Byte 8
Stop Bits 1
Parity None
Busy No
Abort Read/Write on Error No
Binary Mode Enabled Yes
Continue XMit on XOff No
CTS Outflow Control No
Discard NULL Bytes No
DSR Outflow Control 0
DSR Sensitivity 0
DTR Flow Control Type Enable
EOF Character 0
Error Replace Character 0
Error Replacement Enabled No
Event Character 0
Parity Check Enabled No
RTS Flow Control Type Enable
XOff Character 19
XOffXMit Threshold 512
XOn Character 17
XOnXMit Threshold 2048
XOnXOff InFlow Control 0
XOnXOff OutFlow Control 0
Memory Address 0xC0018000-0xC001800F
IRQ Channel IRQ 133
Driver c:\windows\system32\drivers\hpmpser.sys (5.0.3663.16, 154.00 KB (157,696 bytes), 12/10/2004 2:18 PM)

Name HP MP Serial AUX/UPS Port (COM4)
Status OK
PNP Device ID PCI\VEN_103C&DEV_1290&SUBSYS_1291103C&REV_01\5&194FB0DF&0&00
Maximum Input Buffer Size 0
Maximum Output Buffer Size No
Settable Baud Rate Yes
Settable Data Bits Yes
Settable Flow Control Yes
Settable Parity Yes
Settable Parity Check Yes
Settable Stop Bits Yes
Settable RLSD Yes
Supports RLSD Yes
Supports 16 Bit Mode No
Supports Special Characters No
Baud Rate 9600
Bits/Byte 8
Stop Bits 1
Parity None
Busy No
Abort Read/Write on Error No
Binary Mode Enabled Yes
Continue XMit on XOff No
CTS Outflow Control No
Discard NULL Bytes No
DSR Outflow Control 0
DSR Sensitivity 0
DTR Flow Control Type Enable
EOF Character 0
Error Replace Character 0
Error Replacement Enabled No
Event Character 0
Parity Check Enabled No
RTS Flow Control Type Enable
XOff Character 19
XOffXMit Threshold 512
XOn Character 17
XOnXMit Threshold 2048
XOnXOff InFlow Control 0
XOnXOff OutFlow Control 0
Memory Address 0xC0018000-0xC001800F
IRQ Channel IRQ 237
Driver c:\windows\system32\drivers\hpmpser.sys (5.0.3663.16, 154.00 KB (157,696 bytes), 12/10/2004 2:18 PM)

Name HP MP Serial AUX/UPS Port (COM3)
Status OK
PNP Device ID PCI\VEN_103C&DEV_1290&SUBSYS_1291103C&REV_01\5&14C294CC&0&00
Maximum Input Buffer Size 0
Maximum Output Buffer Size No
Settable Baud Rate Yes
Settable Data Bits Yes
Settable Flow Control Yes
Settable Parity Yes
Settable Parity Check Yes
Settable Stop Bits Yes
Settable RLSD Yes
Supports RLSD Yes
Supports 16 Bit Mode No
Supports Special Characters No
Baud Rate 9600
Bits/Byte 8
Stop Bits 1
Parity None
Busy No
Abort Read/Write on Error No
Binary Mode Enabled Yes
Continue XMit on XOff No
CTS Outflow Control No
Discard NULL Bytes No
DSR Outflow Control 0
DSR Sensitivity 0
DTR Flow Control Type Enable
EOF Character 0
Error Replace Character 0
Error Replacement Enabled No
Event Character 0
Parity Check Enabled No
RTS Flow Control Type Enable

XOff Character 19
XOffXMit Threshold 512
XOn Character 17
XOnXMit Threshold 2048
XOnXOff InFlow Control 0
XOnXOff OutFlow Control 0
Memory Address 0xC0018000-0xC001800F
IRQ Channel IRQ 341
Driver c:\windows\system32\drivers\hpmpser.sys (5.0.3663.16, 154.00 KB (157,696 bytes), 12/10/2004 2:18 PM)

[Parallel]

Item Value

[Storage]

[Drives]

Item Value
Drive C:
Description Local Fixed Disk
Compressed No
File System NTFS
Size 33.45 GB (35,919,794,176 bytes)
Free Space 15.61 GB (16,756,277,248 bytes)
Volume Name
Volume Serial Number 80D0A623

Drive D:
Description CD-ROM Disc

Drive E:
Description CD-ROM Disc

Drive G:
Description Local Fixed Disk
Compressed No
File System NTFS
Size 19.43 GB (20,867,645,440 bytes)
Free Space 7.60 GB (8,162,902,016 bytes)
Volume Name G-Drive
Volume Serial Number 84E8D013

Drive I:
Description Local Fixed Disk
Compressed No
File System NTFS
Size 32.00 GB (34,359,734,272 bytes)
Free Space 9.75 GB (10,473,541,632 bytes)
Volume Name
Volume Serial Number 6C94EA0B

Drive L:
Description Local Fixed Disk
Compressed Not Available
File System Not Available
Size Not Available
Free Space Not Available
Volume Name Not Available
Volume Serial Number Not Available

Drive X:
Description Local Fixed Disk
Compressed Not Available
File System Not Available
Size Not Available
Free Space Not Available
Volume Name Not Available
Volume Serial Number Not Available

[Disks]

Item Value
Description \\.\PHYSICALDRIVE4
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #4, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 136,314,880 bytes
Partition Disk #4, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)
Partition Starting Offset 104,993,914,880 bytes
Partition Disk #4, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 141,694,074,880 bytes

Description \\.\PHYSICALDRIVE5
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280 bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #5, Partition #0
Partition Size 609.65 GB (654,606,188,032 bytes)
Partition Starting Offset 136,314,880 bytes

Description \\.\PHYSICALDRIVE6
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #6, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 136,314,880 bytes
Partition Disk #6, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)
Partition Starting Offset 104,993,914,880 bytes
Partition Disk #6, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 141,694,074,880 bytes

Description \\.\PHYSICALDRIVE7
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280 bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #7, Partition #0
Partition Size 609.65 GB (654,606,188,032 bytes)
Partition Starting Offset 136,314,880 bytes

Description \\.\PHYSICALDRIVE12
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #12, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)

Partition Starting Offset
136,314,880 bytes
Partition Disk #12, Partition #1
Partition Size 34.18 GB
(36,700,160,000 bytes)
Partition Starting Offset
104,993,914,880 bytes
Partition Disk #12, Partition #2
Partition Size 97.66 GB
(104,857,600,000 bytes)
Partition Starting Offset
141,694,074,880 bytes

Description
\\.\PHYSICALDRIVE13
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280
bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #13, Partition #0
Partition Size 609.65 GB
(654,606,188,032 bytes)
Partition Starting Offset
136,314,880 bytes

Description
\\.\PHYSICALDRIVE14
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320
bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #14, Partition #0
Partition Size 97.66 GB
(104,857,600,000 bytes)
Partition Starting Offset
136,314,880 bytes
Partition Disk #14, Partition #1
Partition Size 34.18 GB
(36,700,160,000 bytes)
Partition Starting Offset
104,993,914,880 bytes
Partition Disk #14, Partition #2
Partition Size 97.66 GB
(104,857,600,000 bytes)
Partition Starting Offset
141,694,074,880 bytes

Description
\\.\PHYSICALDRIVE15
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280
bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #15, Partition #0
Partition Size 609.65 GB
(654,606,188,032 bytes)
Partition Starting Offset
136,314,880 bytes

Description
\\.\PHYSICALDRIVE36
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320
bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #36, Partition #0
Partition Size 97.66 GB
(104,857,600,000 bytes)
Partition Starting Offset
136,314,880 bytes
Partition Disk #36, Partition #1
Partition Size 34.18 GB
(36,700,160,000 bytes)
Partition Starting Offset
104,993,914,880 bytes
Partition Disk #36, Partition #2
Partition Size 97.66 GB
(104,857,600,000 bytes)
Partition Starting Offset
141,694,074,880 bytes

Description
\\.\PHYSICALDRIVE37
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280
bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #37, Partition #0
Partition Size 609.65 GB
(654,606,188,032 bytes)
Partition Starting Offset
136,314,880 bytes

Description
\\.\PHYSICALDRIVE38
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320
bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #38, Partition #0
Partition Size 97.66 GB
(104,857,600,000 bytes)
Partition Starting Offset
136,314,880 bytes
Partition Disk #38, Partition #1
Partition Size 34.18 GB
(36,700,160,000 bytes)
Partition Starting Offset
104,993,914,880 bytes
Partition Disk #38, Partition #2
Partition Size 97.66 GB
(104,857,600,000 bytes)
Partition Starting Offset
141,694,074,880 bytes

Description
\\.\PHYSICALDRIVE39
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280
bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #39, Partition #0
Partition Size 609.65 GB
(654,606,188,032 bytes)
Partition Starting Offset
136,314,880 bytes

Description
\\.\PHYSICALDRIVE45
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk

Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #45, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 136,314,880 bytes
Partition Disk #45, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)
Partition Starting Offset 104,993,914,880 bytes
Partition Disk #45, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 141,694,074,880 bytes

Description \\.\PHYSICALDRIVE46
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280 bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #46, Partition #0
Partition Size 609.65 GB (654,606,188,032 bytes)
Partition Starting Offset 136,314,880 bytes

Description \\.\PHYSICALDRIVE47
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #47, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 136,314,880 bytes
Partition Disk #47, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)
Partition Starting Offset 104,993,914,880 bytes
Partition Disk #47, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 141,694,074,880 bytes

Description \\.\PHYSICALDRIVE48
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 605.87 GB (650,545,620,480 bytes)
Total Cylinders 79,091
Total Sectors 1,270,596,915
Total Tracks 20,168,205
Tracks/Cylinder 255
Partition Disk #48, Partition #0
Partition Size 605.74 GB (650,412,801,024 bytes)
Partition Starting Offset 136,314,880 bytes

Description \\.\PHYSICALDRIVE49
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 4.20 GB (4,507,453,440 bytes)
Total Cylinders 548
Total Sectors 8,803,620
Total Tracks 139,740
Tracks/Cylinder 255
Partition Disk #49, Partition #0
Partition Size 4.17 GB (4,478,468,096 bytes)
Partition Starting Offset 33,571,840 bytes

Description \\.\PHYSICALDRIVE8
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #8, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 136,314,880 bytes
Partition Disk #8, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)
Partition Starting Offset 104,993,914,880 bytes
Partition Disk #8, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 141,694,074,880 bytes

Description \\.\PHYSICALDRIVE9
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280 bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #9, Partition #0
Partition Size 609.65 GB (654,606,188,032 bytes)
Partition Starting Offset 136,314,880 bytes

Description \\.\PHYSICALDRIVE10
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #10, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 136,314,880 bytes
Partition Disk #10, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)

Partition Starting Offset
104,993,914,880 bytes
Partition Disk #10, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset
141,694,074,880 bytes

Description
\\.\PHYSICALDRIVE11
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280 bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #11, Partition #0
Partition Size 609.65 GB (654,606,188,032 bytes)
Partition Starting Offset
136,314,880 bytes

Description
\\.\PHYSICALDRIVE40
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #40, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset
136,314,880 bytes
Partition Disk #40, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)
Partition Starting Offset
104,993,914,880 bytes
Partition Disk #40, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset
141,694,074,880 bytes

Description
\\.\PHYSICALDRIVE41
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 605.87 GB (650,545,620,480 bytes)
Total Cylinders 79,091
Total Sectors 1,270,596,915
Total Tracks 20,168,205
Tracks/Cylinder 255
Partition Disk #43, Partition #0
Partition Size 605.74 GB (650,412,801,024 bytes)
Partition Starting Offset
136,314,880 bytes

Description
\\.\PHYSICALDRIVE42
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #42, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset
136,314,880 bytes
Partition Disk #42, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)
Partition Starting Offset
104,993,914,880 bytes
Partition Disk #42, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset
141,694,074,880 bytes

Description
\\.\PHYSICALDRIVE43
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280 bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #41, Partition #0
Partition Size 609.65 GB (654,606,188,032 bytes)
Partition Starting Offset
136,314,880 bytes

Description
\\.\PHYSICALDRIVE44
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 4.20 GB (4,507,453,440 bytes)
Total Cylinders 548
Total Sectors 8,803,620
Total Tracks 139,740
Tracks/Cylinder 255
Partition Disk #44, Partition #0
Partition Size 4.17 GB (4,478,468,096 bytes)
Partition Starting Offset 33,571,840 bytes

Description
\\.\PHYSICALDRIVE32
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #32, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset
136,314,880 bytes
Partition Disk #32, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)
Partition Starting Offset
104,993,914,880 bytes
Partition Disk #32, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset
141,694,074,880 bytes

Description
\\.\PHYSICALDRIVE33
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63

Size 609.77 GB (654,740,513,280 bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #33, Partition #0
Partition Size 609.65 GB (654,606,188,032 bytes)
Partition Starting Offset 136,314,880 bytes

Description \\.\PHYSICALDRIVE34
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #34, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 136,314,880 bytes
Partition Disk #34, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)
Partition Starting Offset 104,993,914,880 bytes
Partition Disk #34, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 141,694,074,880 bytes

Description \\.\PHYSICALDRIVE35
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280 bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #35, Partition #0
Partition Size 609.65 GB (654,606,188,032 bytes)
Partition Starting Offset 136,314,880 bytes

Description \\.\PHYSICALDRIVE16
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #16, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 136,314,880 bytes
Partition Disk #16, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)
Partition Starting Offset 104,993,914,880 bytes
Partition Disk #16, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 141,694,074,880 bytes

Description \\.\PHYSICALDRIVE17
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280 bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #17, Partition #0
Partition Size 609.65 GB (654,606,188,032 bytes)
Partition Starting Offset 136,314,880 bytes

Description \\.\PHYSICALDRIVE18
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #18, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 136,314,880 bytes
Partition Disk #18, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)
Partition Starting Offset 104,993,914,880 bytes
Partition Disk #18, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 141,694,074,880 bytes

Description \\.\PHYSICALDRIVE19
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280 bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #19, Partition #0
Partition Size 609.65 GB (654,606,188,032 bytes)
Partition Starting Offset 136,314,880 bytes

Description \\.\PHYSICALDRIVE28
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #28, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 136,314,880 bytes
Partition Disk #28, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)
Partition Starting Offset 104,993,914,880 bytes
Partition Disk #28, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)

Partition Starting Offset
141,694,074,880 bytes

Description
\\.\PHYSICALDRIVE29
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280 bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #29, Partition #0
Partition Size 609.65 GB (654,606,188,032 bytes)
Partition Starting Offset
136,314,880 bytes

Description
\\.\PHYSICALDRIVE30
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #30, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset
136,314,880 bytes
Partition Disk #30, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)
Partition Starting Offset
104,993,914,880 bytes
Partition Disk #30, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset
141,694,074,880 bytes

Description
\\.\PHYSICALDRIVE31
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280 bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #31, Partition #0
Partition Size 609.65 GB (654,606,188,032 bytes)
Partition Starting Offset
136,314,880 bytes

Description
\\.\PHYSICALDRIVE20
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #20, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset
136,314,880 bytes
Partition Disk #20, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)
Partition Starting Offset
104,993,914,880 bytes
Partition Disk #20, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset
141,694,074,880 bytes

Description
\\.\PHYSICALDRIVE21
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280 bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #21, Partition #0
Partition Size 609.65 GB (654,606,188,032 bytes)
Partition Starting Offset
136,314,880 bytes

Description
\\.\PHYSICALDRIVE22
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #22, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset
136,314,880 bytes
Partition Disk #22, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)
Partition Starting Offset
104,993,914,880 bytes
Partition Disk #22, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset
141,694,074,880 bytes

Description
\\.\PHYSICALDRIVE23
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280 bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #23, Partition #0
Partition Size 609.65 GB (654,606,188,032 bytes)
Partition Starting Offset
136,314,880 bytes

Description
\\.\PHYSICALDRIVE24
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860

Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #24, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 136,314,880 bytes
Partition Disk #24, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)
Partition Starting Offset 104,993,914,880 bytes
Partition Disk #24, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 141,694,074,880 bytes

Description \\.\PHYSICALDRIVE25
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280 bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #25, Partition #0
Partition Size 609.65 GB (654,606,188,032 bytes)
Partition Starting Offset 136,314,880 bytes

Description \\.\PHYSICALDRIVE26
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #26, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 136,314,880 bytes
Partition Disk #26, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)
Partition Starting Offset 104,993,914,880 bytes
Partition Disk #26, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 141,694,074,880 bytes

Description \\.\PHYSICALDRIVE27
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280 bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #27, Partition #0
Partition Size 609.65 GB (654,606,188,032 bytes)
Partition Starting Offset 136,314,880 bytes

Description \\.\PHYSICALDRIVE0
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #0, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 136,314,880 bytes
Partition Disk #0, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)
Partition Starting Offset 104,993,914,880 bytes
Partition Disk #0, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 141,694,074,880 bytes

Description \\.\PHYSICALDRIVE1
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280 bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #1, Partition #0
Partition Size 609.65 GB (654,606,188,032 bytes)
Partition Starting Offset 136,314,880 bytes

Description \\.\PHYSICALDRIVE2
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 292.96 GB (314,567,608,320 bytes)
Total Cylinders 38,244
Total Sectors 614,389,860
Total Tracks 9,752,220
Tracks/Cylinder 255
Partition Disk #2, Partition #0
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 136,314,880 bytes
Partition Disk #2, Partition #1
Partition Size 34.18 GB (36,700,160,000 bytes)
Partition Starting Offset 104,993,914,880 bytes
Partition Disk #2, Partition #2
Partition Size 97.66 GB (104,857,600,000 bytes)
Partition Starting Offset 141,694,074,880 bytes

Description \\.\PHYSICALDRIVE3
Manufacturer Not Available
Model Not Available
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus Not Available
SCSI Logical Unit Not Available
SCSI Port Not Available
SCSI Target ID Not Available
Sectors/Track 63
Size 609.77 GB (654,740,513,280 bytes)
Total Cylinders 79,601
Total Sectors 1,278,790,065
Total Tracks 20,298,255
Tracks/Cylinder 255
Partition Disk #3, Partition #0
Partition Size 609.65 GB (654,606,188,032 bytes)
Partition Starting Offset 136,314,880 bytes

Description Disk drive
Manufacturer (Standard disk drives)

Model COMPAQ MSA1000 VOLUME SCSI Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus 1
SCSI Logical Unit 1
SCSI Port 16
SCSI Target ID 124
Sectors/Track 63
Size 410.18 GB (440,430,842,880 bytes)
Total Cylinders 53,546
Total Sectors 860,216,490
Total Tracks 13,654,230
Tracks/Cylinder 255
Partition Disk #52, Partition #0
Partition Size 9.77 GB (10,485,760,000 bytes)
Partition Starting Offset 134,235,136 bytes
Partition Disk #52, Partition #1
Partition Size 380.86 GB (408,944,640,000 bytes)
Partition Starting Offset 10,619,995,136 bytes
Partition Disk #52, Partition #2
Partition Size 19.43 GB (20,867,710,976 bytes)
Partition Starting Offset 419,564,635,136 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP 36.4G MAS3367NC SCSI Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 2
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 0
SCSI Target ID 6
Sectors/Track 63
Size 33.91 GB (36,413,314,560 bytes)
Total Cylinders 4,427
Total Sectors 71,119,755
Total Tracks 1,128,885
Tracks/Cylinder 255
Partition Disk #50, Partition #0
Partition Size 345.12 MB (361,880,064 bytes)
Partition Starting Offset 32,256 bytes
Partition Disk #50, Partition #1
Partition Size 33.45 GB (35,919,797,760 bytes)
Partition Starting Offset 493,516,800 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP 36.4G ST336706LC SCSI Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 3
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 4
SCSI Target ID 6
Sectors/Track 63
Size 33.91 GB (36,413,314,560 bytes)
Total Cylinders 4,427
Total Sectors 71,119,755
Total Tracks 1,128,885
Tracks/Cylinder 255
Partition Disk #51, Partition #0
Partition Size 100.00 MB (104,857,088 bytes)
Partition Starting Offset 17,408 bytes
Partition Disk #51, Partition #1
Partition Size 399.99 MB (419,423,744 bytes)
Partition Starting Offset 104,874,496 bytes
Partition Disk #51, Partition #2
Partition Size 32.00 GB (34,359,738,368 bytes)
Partition Starting Offset 658,516,480 bytes

[SCSI]

Item Value
Name LSI Logic 53C1010-66 Device
Manufacturer LSI Logic Inc.
Status OK
PNP Device ID PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&4F5EBC7&0&10
I/O Port 0x00000500-0x000005FF
Memory Address 0xC001A000-0xC001A3FF
Memory Address 0xC0010000-0xC0011FFF
IRQ Channel IRQ 24
Driver c:\windows\system32\drivers\sym_u3.sys (5.09.06.00 (NT.041001-1408), 73.00 KB (74,752 bytes), 3/29/2005 2:44 PM)

Name LSI Logic 53C1010-66 Device
Manufacturer LSI Logic Inc.
Status OK
PNP Device ID PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&4F5EBC7&0&11
I/O Port 0x00000600-0x000006FF
Memory Address 0xC001B000-0xC001B3FF
Memory Address 0xC0012000-0xC0013FFF
IRQ Channel IRQ 25
Driver c:\windows\system32\drivers\sym_u3.sys (5.09.06.00 (NT.041001-1408), 73.00 KB (74,752 bytes), 3/29/2005 2:44 PM)

Name LSI Logic 53C1010-66 Device
Manufacturer LSI Logic Inc.
Status OK
PNP Device ID PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&4F5EBC7&0&18
I/O Port 0x00000700-0x000007FF
Memory Address 0xC001C000-0xC001C3FF
Memory Address 0xC0014000-0xC0015FFF
IRQ Channel IRQ 26
Driver c:\windows\system32\drivers\sym_u3.sys (5.09.06.00 (NT.041001-1408), 73.00 KB (74,752 bytes), 3/29/2005 2:44 PM)

Name LSI Logic 53C1010-66 Device
Manufacturer LSI Logic Inc.
Status OK
PNP Device ID PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&4F5EBC7&0&19
I/O Port 0x00000800-0x000008FF
Memory Address 0xC001D000-0xC001D3FF
Memory Address 0xC0016000-0xC0017FFF
IRQ Channel IRQ 27
Driver c:\windows\system32\drivers\sym_u3.sys (5.09.06.00 (NT.041001-1408), 73.00 KB (74,752 bytes), 3/29/2005 2:44 PM)

Name Smart Array 6400 Controller (Non-Miniport)
Manufacturer Hewlett-Packard
Status OK
PNP Device ID PCI\VEN_0E11&DEV_0046&SUBSYS_409C0E11&REV_01\6&266093A2&0&2008
Memory Address 0xE0080000-0xE0081FFF
I/O Port 0x00004000-0x00005FFF
Memory Address 0xE0000000-0xEFFFFFFF
IRQ Channel IRQ 54
Driver c:\windows\system32\drivers\hpqcissb.sys (5.15.64.64 built by: WinDDK, 113.00 KB (115,712 bytes), 11/8/2004 6:12 PM)

Name Smart Array 6400 Controller (Non-Miniport)
Manufacturer Hewlett-Packard
Status OK
PNP Device ID PCI\VEN_0E11&DEV_0046&SUBSYS_409C0E11&REV_01\6&F1453BC&0&2008
Memory Address 0xD0080000-0xD0081FFF
I/O Port 0x0000A000-0x0000BFFF
Memory Address 0xD0000000-0xDFFFFFFF
IRQ Channel IRQ 87
Driver c:\windows\system32\drivers\hpqcissb.sys (5.15.64.64 built by: WinDDK, 113.00 KB (115,712 bytes), 11/8/2004 6:12 PM)

Name Smart Array 6400 Controller (Non-Miniport)
Manufacturer Hewlett-Packard
Status OK
PNP Device ID PCI\VEN_0E11&DEV_0046&SUBSYS_409C0E11&REV_01\6&2640A37&0&2008
Memory Address 0xF0080000-0xF0081FFF

I/O Port 0x0000E000-0x0000FFFF
Memory Address 0xF0000000-0xFFFFFFFF
IRQ Channel IRQ 109
Driver c:\windows\system32\drivers\hpqcissb.sys (5.15.64.64 built by: WinDDK, 113.00 KB (115,712 bytes), 11/8/2004 6:12 PM)

Name LSI Logic 53C1010-66 Device
Manufacturer LSI Logic Inc.
Status OK
PNP Device ID PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&5CDAB61&0&10
I/O Port 0x00000500-0x000005FF
Memory Address 0xC001A000-0xC001A3FF
Memory Address 0xC0010000-0xC0011FFF
IRQ Channel IRQ 128
Driver c:\windows\system32\drivers\sym_u3.sys (5.09.06.00 (NT.041001-1408), 73.00 KB (74,752 bytes), 3/29/2005 2:44 PM)

Name LSI Logic 53C1010-66 Device
Manufacturer LSI Logic Inc.
Status OK
PNP Device ID PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&5CDAB61&0&11
I/O Port 0x00000600-0x000006FF
Memory Address 0xC001B000-0xC001B3FF
Memory Address 0xC0012000-0xC0013FFF
IRQ Channel IRQ 129
Driver c:\windows\system32\drivers\sym_u3.sys (5.09.06.00 (NT.041001-1408), 73.00 KB (74,752 bytes), 3/29/2005 2:44 PM)

Name LSI Logic 53C1010-66 Device
Manufacturer LSI Logic Inc.
Status OK
PNP Device ID PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&5CDAB61&0&18
I/O Port 0x00000700-0x000007FF
Memory Address 0xC001C000-0xC001C3FF
Memory Address 0xC0014000-0xC0015FFF
IRQ Channel IRQ 130
Driver c:\windows\system32\drivers\sym_u3.sys (5.09.06.00 (NT.041001-1408), 73.00 KB (74,752 bytes), 3/29/2005 2:44 PM)

Name LSI Logic 53C1010-66 Device
Manufacturer LSI Logic Inc.
Status OK
PNP Device ID PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&5CDAB61&0&19
I/O Port 0x00000800-0x000008FF
Memory Address 0xC001D000-0xC001D3FF
Memory Address 0xC0016000-0xC0017FFF
IRQ Channel IRQ 131
Driver c:\windows\system32\drivers\sym_u3.sys (5.09.06.00 (NT.041001-1408), 73.00 KB (74,752 bytes), 3/29/2005 2:44 PM)

Name Emulex LightPulse PCI Fibre Channel HBA (with adjunct driver)
Manufacturer Emulex
Status OK
PNP Device ID PCI\VEN_10DF&DEV_F098&SUBSYS_F09810DF&REV_01\5&3815FDFD&0&08
Memory Address 0xD0040000-0xD0040FFF
Memory Address 0xD0041000-0xD00410FF
I/O Port 0x00002000-0x00003FFF
IRQ Channel IRQ 147
Driver c:\windows\system32\drivers\lpxnds.sys (6-5.10a9 02/02/2004 Win2003 Server 64 bits built by: WinDDK, 328.00 KB (335,872 bytes), 3/16/2005 8:42 AM)

Name Smart Array 6400 Controller (Non-Miniport)
Manufacturer Hewlett-Packard
Status OK
PNP Device ID PCI\VEN_0E11&DEV_0046&SUBSYS_409C0E11&REV_01\6&3533F53F&0&2008
Memory Address 0xE0080000-0xE0081FFF
I/O Port 0x00004000-0x00005FFF
Memory Address 0xE0000000-0xEFFFFFFF
IRQ Channel IRQ 158
Driver c:\windows\system32\drivers\hpqcissb.sys (5.15.64.64 built by: WinDDK, 113.00 KB (115,712 bytes), 11/8/2004 6:12 PM)

Name Smart Array 6400 Controller (Non-Miniport)
Manufacturer Hewlett-Packard
Status OK
PNP Device ID PCI\VEN_0E11&DEV_0046&SUBSYS_409C0E11&REV_01\6&3B7713C5&0&2008
Memory Address 0xD0080000-0xD0081FFF
I/O Port 0x0000A000-0x0000BFFF
Memory Address 0xD0000000-0xDFFFFFFF
IRQ Channel IRQ 191
Driver c:\windows\system32\drivers\hpqcissb.sys (5.15.64.64 built by: WinDDK, 113.00 KB (115,712 bytes), 11/8/2004 6:12 PM)

Name Smart Array 6400 Controller (Non-Miniport)
Manufacturer Hewlett-Packard
Status OK
PNP Device ID PCI\VEN_0E11&DEV_0046&SUBSYS_409C0E11&REV_01\6&1A6A6711&0&2008
Memory Address 0xF0080000-0xF0081FFF
I/O Port 0x0000E000-0x0000FFFF
Memory Address 0xF0000000-0xFFFFFFFF
IRQ Channel IRQ 213
Driver c:\windows\system32\drivers\hpqcissb.sys (5.15.64.64 built by: WinDDK, 113.00 KB (115,712 bytes), 11/8/2004 6:12 PM)

Name LSI Logic 53C1010-66 Device
Manufacturer LSI Logic Inc.
Status OK
PNP Device ID PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&194FB0DF&0&10
I/O Port 0x00000500-0x000005FF
Memory Address 0xC001A000-0xC001A3FF
Memory Address 0xC0010000-0xC0011FFF
IRQ Channel IRQ 232
Driver c:\windows\system32\drivers\sym_u3.sys (5.09.06.00 (NT.041001-1408), 73.00 KB (74,752 bytes), 3/29/2005 2:44 PM)

Name LSI Logic 53C1010-66 Device
Manufacturer LSI Logic Inc.
Status OK
PNP Device ID PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&194FB0DF&0&11
I/O Port 0x00000600-0x000006FF
Memory Address 0xC001B000-0xC001B3FF
Memory Address 0xC0012000-0xC0013FFF
IRQ Channel IRQ 233
Driver c:\windows\system32\drivers\sym_u3.sys (5.09.06.00 (NT.041001-1408), 73.00 KB (74,752 bytes), 3/29/2005 2:44 PM)

Name LSI Logic 53C1010-66 Device
Manufacturer LSI Logic Inc.
Status OK
PNP Device ID PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&194FB0DF&0&18
I/O Port 0x00000700-0x000007FF
Memory Address 0xC001C000-0xC001C3FF
Memory Address 0xC0014000-0xC0015FFF
IRQ Channel IRQ 234
Driver c:\windows\system32\drivers\sym_u3.sys (5.09.06.00 (NT.041001-1408), 73.00 KB (74,752 bytes), 3/29/2005 2:44 PM)

Name LSI Logic 53C1010-66 Device
Manufacturer LSI Logic Inc.

Status OK
PNP Device ID
PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&194FB0DF&0&19
I/O Port 0x00000800-0x000008FF
Memory Address 0xC001D000-0xC001D3FF
Memory Address 0xC0016000-0xC0017FFF
IRQ Channel IRQ 235
Driver
c:\windows\system32\drivers\sym_u3.sys (5.09.06.00 (NT.041001-1408), 73.00 KB (74,752 bytes), 3/29/2005 2:44 PM)

Name Smart Array 6400 Controller (Non-Miniport)
Manufacturer Hewlett-Packard
Status OK
PNP Device ID
PCI\VEN_0E11&DEV_0046&SUBSYS_409C0E11&REV_01\6&6AA0D5F&0&2008
Memory Address 0xE0080000-0xE0081FFF
I/O Port 0x00004000-0x00005FFF
Memory Address 0xE0000000-0xEFFFFFFF
IRQ Channel IRQ 262
Driver
c:\windows\system32\drivers\hpqcissb.sys (5.15.64.64 built by: WinDDK, 113.00 KB (115,712 bytes), 11/8/2004 6:12 PM)

Name Smart Array 6400 Controller (Non-Miniport)
Manufacturer Hewlett-Packard
Status OK
PNP Device ID
PCI\VEN_0E11&DEV_0046&SUBSYS_409C0E11&REV_01\6&20162027&0&2008
Memory Address 0xD0080000-0xD0081FFF
I/O Port 0x0000A000-0x0000BFFF
Memory Address 0xD0000000-0xDFFFFFFF
IRQ Channel IRQ 295
Driver
c:\windows\system32\drivers\hpqcissb.sys (5.15.64.64 built by: WinDDK, 113.00 KB (115,712 bytes), 11/8/2004 6:12 PM)

Name Smart Array 6400 Controller (Non-Miniport)
Manufacturer Hewlett-Packard
Status OK
PNP Device ID
PCI\VEN_0E11&DEV_0046&SUBSYS_409C0E11&REV_01\6&11924964&0&2008
Memory Address 0xF0080000-0xF0081FFF
I/O Port 0x0000E000-0x0000FFFF
Memory Address 0xF0000000-0xFFFFFFFF
IRQ Channel IRQ 317
Driver
c:\windows\system32\drivers\hpqcissb.sys (5.15.64.64 built by: WinDDK, 113.00 KB (115,712 bytes), 11/8/2004 6:12 PM)

Name LSI Logic 53C1010-66 Device
Manufacturer LSI Logic Inc.
Status OK
PNP Device ID
PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&14C294CC&0&10
I/O Port 0x00000500-0x000005FF
Memory Address 0xC001A000-0xC001A3FF
Memory Address 0xC0010000-0xC0011FFF
IRQ Channel IRQ 336
Driver
c:\windows\system32\drivers\sym_u3.sys (5.09.06.00 (NT.041001-1408), 73.00 KB (74,752 bytes), 3/29/2005 2:44 PM)

Name LSI Logic 53C1010-66 Device
Manufacturer LSI Logic Inc.
Status OK
PNP Device ID
PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&14C294CC&0&11
I/O Port 0x00000600-0x000006FF
Memory Address 0xC001B000-0xC001B3FF
Memory Address 0xC0012000-0xC0013FFF
IRQ Channel IRQ 337
Driver
c:\windows\system32\drivers\sym_u3.sys (5.09.06.00 (NT.041001-1408), 73.00 KB (74,752 bytes), 3/29/2005 2:44 PM)

Name LSI Logic 53C1010-66 Device
Manufacturer LSI Logic Inc.
Status OK
PNP Device ID
PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&14C294CC&0&18
I/O Port 0x00000700-0x000007FF
Memory Address 0xC001C000-0xC001C3FF
Memory Address 0xC0014000-0xC0015FFF
IRQ Channel IRQ 338
Driver
c:\windows\system32\drivers\sym_u3.sys (5.09.06.00 (NT.041001-1408), 73.00 KB (74,752 bytes), 3/29/2005 2:44 PM)

Name LSI Logic 53C1010-66 Device
Manufacturer LSI Logic Inc.
Status OK
PNP Device ID
PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&14C294CC&0&19
I/O Port 0x00000800-0x000008FF
Memory Address 0xC001D000-0xC001D3FF
Memory Address 0xC0016000-0xC0017FFF
IRQ Channel IRQ 339
Driver
c:\windows\system32\drivers\sym_u3.sys (5.09.06.00 (NT.041001-1408), 73.00 KB (74,752 bytes), 3/29/2005 2:44 PM)

Name Smart Array 6400 Controller (Non-Miniport)
Manufacturer Hewlett-Packard
Status OK
PNP Device ID
PCI\VEN_0E11&DEV_0046&SUBSYS_409C0E11&REV_01\6&3B940DB4&0&2008
Memory Address 0xE0080000-0xE0081FFF
I/O Port 0x00004000-0x00005FFF
Memory Address 0xE0000000-0xEFFFFFFF
IRQ Channel IRQ 366
Driver
c:\windows\system32\drivers\hpqcissb.sys (5.15.64.64 built by: WinDDK, 113.00 KB (115,712 bytes), 11/8/2004 6:12 PM)

Name Smart Array 6400 Controller (Non-Miniport)
Manufacturer Hewlett-Packard
Status OK
PNP Device ID
PCI\VEN_0E11&DEV_0046&SUBSYS_409C0E11&REV_01\6&25554B4&0&2008
Memory Address 0xD0080000-0xD0081FFF
I/O Port 0x0000A000-0x0000BFFF
Memory Address 0xD0000000-0xDFFFFFFF
IRQ Channel IRQ 399
Driver
c:\windows\system32\drivers\hpqcissb.sys (5.15.64.64 built by: WinDDK, 113.00 KB (115,712 bytes), 11/8/2004 6:12 PM)

Name Smart Array 6400 Controller (Non-Miniport)
Manufacturer Hewlett-Packard
Status OK
PNP Device ID
PCI\VEN_0E11&DEV_0046&SUBSYS_409C0E11&REV_01\6&1F9325B&0&2008
Memory Address 0xF0080000-0xF0081FFF
I/O Port 0x0000E000-0x0000FFFF
Memory Address 0xF0000000-0xFFFFFFFF
IRQ Channel IRQ 421
Driver
c:\windows\system32\drivers\hpqcissb.sys (5.15.64.64 built by: WinDDK, 113.00 KB (115,712 bytes), 11/8/2004 6:12 PM)

[IDE]

Item Value

[Printing]

Name Driver Port Name Server Name

[Problem Devices]

Device PNP Device ID Error Code
Not Available
ACPI\HWP1000\A56E04371033
The drivers for this device are not installed.
Not Available
ACPI\HWP1000\A56E04371034
The drivers for this device are not installed.
Not Available
ACPI\HWP1000\A56E04399796
The drivers for this device are not installed.
Not Available
ACPI\HWP1000\A56E04399967
The drivers for this device are not installed.
Not Available
ACPI\HWP1000\A56E04399778
The drivers for this device are not installed.
Not Available
ACPI\HWP1000\A56E04409963
The drivers for this device are not installed.
Not Available
ACPI\HWP1000\A56E04409961
The drivers for this device are not installed.
Not Available
ACPI\HWP1000\A56E04410178
The drivers for this device are not installed.
Not Available
ACPI\HWP1000\A56E04399862
The drivers for this device are not installed.
Not Available
ACPI\HWP1000\A56E04399859
The drivers for this device are not installed.
Not Available
ACPI\HWP1000\A56E04399686
The drivers for this device are not installed.
Not Available
ACPI\HWP1000\A56E04399827
The drivers for this device are not installed.
Not Available
ACPI\HWP1000\A56E04399888
The drivers for this device are not installed.
Not Available
ACPI\HWP1000\A56E04409964
The drivers for this device are not installed.
Not Available
ACPI\HWP1000\A56E04409899
The drivers for this device are not installed.
Not Available
ACPI\HWP1000\A56E04410051
The drivers for this device are not installed.

[USB]

Device PNP Device ID
NEC PCI to USB Open Host Controller
PCI\VEN_1033&DEV_0035&SUBSYS_1293103C&REV_41\6&35C9EA34&0&2008
NEC PCI to USB Open Host Controller
PCI\VEN_1033&DEV_0035&SUBSYS_AA55103C&REV_41\6&35C9EA34&0&2108
NEC PCI to USB Enhanced Host Controller (B1)
PCI\VEN_1033&DEV_00E0&SUBSYS_AA55103C&REV_02\6&35C9EA34&0&2208

[Software Environment]

[System Drivers]

Name Description File
Type Started Start Mode
State Status Error
Control Accept Pause Accept Stop
abiosdsk Abiosdsk Not Available
Kernel Driver No
Disabled Stopped OK
Ignore No No
acpi Microsoft ACPI Driver
c:\windows\system32\drivers\acpi.sys
Kernel Driver Yes
Boot Running OK
Normal No Yes
acpiec ACPIEC
c:\windows\system32\drivers\acpiec.sys
Kernel Driver No
Disabled Stopped OK
Normal No No
adpu160m adpu160m Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
adpu320 adpu320 Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
afcnt afcnt Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
afd AFD
c:\windows\system32\drivers\afd.sys
Kernel Driver Yes
System Running OK
Normal No Yes
aic78u2 aic78u2 Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
aic78xx aic78xx Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
aliide AliIde Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
arc arc Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
asyncmac RAS Asynchronous Media Driver
c:\windows\system32\drivers\asyncmac.sys
Kernel Driver No
Manual Stopped OK
Normal No No
atapi atapi
c:\windows\system32\drivers\atapi.sys
Kernel Driver No
Disabled Stopped OK
Normal No No
atdisk Atdisk Not Available
Kernel Driver No
Disabled Stopped OK
Ignore No No
atmarpc ATM ARP Client Protocol
c:\windows\system32\drivers\atmarpc.sys
Kernel Driver No
Manual Stopped OK
Normal No No
audstub Audio Stub Driver
c:\windows\system32\drivers\audstub.sys
Kernel Driver Yes
Manual Running OK
Normal No Yes
b57nd Broadcom NetXtreme Gigabit Ethernet
c:\windows\system32\drivers\b57xp64.sys
Kernel Driver Yes
Manual Running OK
Normal No Yes
beep Beep
c:\windows\system32\drivers\beep.sys
Kernel Driver Yes
System Running OK
Normal No Yes
cbidf2k cbidf2k
c:\windows\system32\drivers\cbidf2k.sys
Kernel Driver No
Disabled Stopped OK
Normal No No
cdfs Cdfs
c:\windows\system32\drivers\cdfs.sys
File System Driver Yes
Disabled Running OK
Normal No Yes
cdrom CD-ROM Driver
c:\windows\system32\drivers\cdrom.sys
Kernel Driver Yes
System Running OK
Normal No Yes
changer Changer Not Available
Kernel Driver No
System Stopped OK
Ignore No No
clusdisk Cluster Disk Driver
c:\windows\system32\drivers\clusdisk.sys
Kernel Driver No
Disabled Stopped OK
Normal No No
cmdide CmdIde Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
cpqarry2 cpqarry2 Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
cpqcissm cpqcissm
c:\windows\system32\drivers\cpqcissm.sys
Kernel Driver Yes
Boot Running OK
Normal No Yes
cpqfcalm cpqfcalm Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
crcdisk CRC Disk Filter Driver
c:\windows\system32\drivers\crcdisk.sys
Kernel Driver Yes
Boot Running OK
Normal No Yes
dfsdriver DfsDriver
c:\windows\system32\drivers\dfs.

sys File System Driver Yes
Boot Running OK
Normal No Yes
disk Disk Driver
c:\windows\system32\drivers\dis
k.sys Kernel Driver Yes
Boot Running OK
Normal No Yes
dmboot dmboot
c:\windows\system32\drivers\dm
boot.sys Kernel Driver No
Disabled Stopped OK
Normal No No
dmio Logical Disk Manager Driver
c:\windows\system32\drivers\dm
io.sys Kernel Driver Yes
Boot Running OK
Normal No Yes
dmload dmload
c:\windows\system32\drivers\dm
load.sys Kernel Driver Yes
Boot Running OK
Normal No Yes
dpti2o dpti2o Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
e1000 Intel(R) PRO/1000 Adapter
Driver
c:\windows\system32\drivers\e10
00645.sys Kernel Driver No
Manual Stopped OK
Normal No No
elxstor elxstor Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
fastfat Fastfat
c:\windows\system32\drivers\fast
fat.sys File System Driver Yes
Disabled Running OK
Normal No Yes
fdc Fdc
c:\windows\system32\drivers\fdc
.sys Kernel Driver No
System Stopped OK
Ignore No No
fips Fips
c:\windows\system32\drivers\fips
.sys Kernel Driver Yes
System Running OK
Normal No Yes
flpydisk Flpydisk
c:\windows\system32\drivers\flp
ydisk.sys Kernel Driver No
System Stopped OK
Ignore No No
fltmgr FltMgr
c:\windows\system32\drivers\flt
mgr.sys File System Driver Yes
Boot Running OK
Normal No Yes
ftdisk Volume Manager Driver
c:\windows\system32\drivers\ftdi
sk.sys Kernel Driver Yes
Boot Running OK
Normal No Yes
gpc Generic Packet Classifier
c:\windows\system32\drivers\ms
gpc.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
hidusb Microsoft HID Class Driver
c:\windows\system32\drivers\hid
usb.sys Kernel Driver No
Manual Stopped OK
Ignore No No
hpcisss hpcisss Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
hphlth HP Baseboard Management
Controller Interface Driver
c:\windows\system32\drivers\hph
lth.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
hpmpser HP MP Driver
c:\windows\system32\drivers\hp
mpser.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
hpn hpn Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
hpqcissb Smart Array Controllers Non-
Miniport Bus Driver
c:\windows\system32\drivers\hpq
cissb.sys Kernel Driver Yes
Boot Running OK
Normal No Yes
hpqcissd Smart Array Controllers Non-
Miniport Disk Driver
c:\windows\system32\drivers\hpq
cissd.sys Kernel Driver Yes
Boot Running OK
Normal No Yes
http HTTP
c:\windows\system32\drivers\htt
p.sys Kernel Driver No
Manual Stopped OK
Normal No No
i2omgmt i2omgmt Not Available
Kernel Driver No
System Stopped OK
Normal No No
iirsp iirsp Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
imapi CD-Burning Filter Driver
c:\windows\system32\drivers\ima
pi.sys Kernel Driver No
System Stopped OK
Normal No No
intelide IntelIde Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
ip6fw IPv6 Windows Firewall Driver
c:\windows\system32\drivers\ip6
fw.sys Kernel Driver No
Manual Stopped OK
Normal No No
ipfilterdriver IP Traffic Filter
Driver
c:\windows\system32\drivers\ipfl
tdrv.sys Kernel Driver No
Manual Stopped OK
Normal No No
ipinip IP in IP Tunnel Driver
c:\windows\system32\drivers\ipi
nip.sys Kernel Driver No
Manual Stopped OK
Normal No No
ipnat IP Network Address Translator
c:\windows\system32\drivers\ipn
at.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
ipsec IPSEC driver
c:\windows\system32\drivers\ips
ec.sys Kernel Driver Yes
System Running OK
Normal No Yes
isapnp isapnp Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
kbdclass Keyboard Class Driver
c:\windows\system32\drivers\kbd
class.sys Kernel Driver Yes
System Running OK
Normal No Yes
kbdhid Keyboard HID Driver
c:\windows\system32\drivers\kbd
hid.sys Kernel Driver No
System Stopped OK
Ignore No No
ksecdd KSecDD
c:\windows\system32\drivers\kse
cdd.sys Kernel Driver Yes
Boot Running OK
Normal No Yes
ksthunk Kernel Streaming WOW64
Thunk Service
c:\windows\system32\drivers\kst
hunk.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
lp6nds35 lp6nds35
c:\windows\system32\drivers\lp6
nds35.sys Kernel Driver Yes
Boot Running OK
Normal No Yes
lpxftr lpxftr
c:\windows\system32\drivers\lpx
ftr.sys Kernel Driver Yes
Boot Running OK
Normal No Yes
lpxnds lpxnds
c:\windows\system32\drivers\lpx
nds.sys Kernel Driver Yes
Boot Running OK
Normal No Yes
mnmdd mnmdd Not Available
Kernel Driver No
System Stopped OK
Ignore No No
modem Modem
c:\windows\system32\drivers\mo
dem.sys Kernel Driver No
Manual Stopped OK
Ignore No No
mouclass Mouse Class Driver
c:\windows\system32\drivers\mo
uclass.sys Kernel Driver Yes
System Running OK
Normal No Yes
mountmgr Mount Point Manager
c:\windows\system32\drivers\mo
untmgr.sys Kernel Driver Yes
Boot Running OK
Normal No Yes
mraid35x mraid35x Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
mrxdav WebDav Client Redirector
c:\windows\system32\drivers\mr
xdav.sys File System Driver No
Manual Stopped OK
Normal No No

mrxsmb MRXSMB
c:\windows\system32\drivers\mr
xsmb.sys File System Driver Yes
System Running OK
Normal No Yes
msfs Msfs
c:\windows\system32\drivers\msf
s.sys File System Driver Yes
System Running OK
Normal No Yes
mssmbios Microsoft System Management
BIOS Driver
c:\windows\system32\drivers\ms
smbios.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
mup Mup
c:\windows\system32\drivers\mu
p.sys File System Driver Yes
Boot Running OK
Normal No Yes
ndis NDIS System Driver
c:\windows\system32\drivers\ndi
s.sys Kernel Driver Yes
Boot Running OK
Normal No Yes
ndistapi Remote Access NDIS TAPI
Driver
c:\windows\system32\drivers\ndi
stapi.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
ndisuio NDIS Usermode I/O Protocol
c:\windows\system32\drivers\ndi
suio.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
ndiswan Remote Access NDIS WAN
Driver
c:\windows\system32\drivers\ndi
swan.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
ndproxy NDIS Proxy
c:\windows\system32\drivers\ndp
roxy.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
netbios NetBIOS Interface
c:\windows\system32\drivers\net
bios.sys File System Driver Yes
System Running OK
Normal No Yes
netbt NetBios over Tcpip
c:\windows\system32\drivers\net
bt.sys Kernel Driver Yes
System Running OK
Normal No Yes
nfrd960 nfrd960 Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
npfs Npfs
c:\windows\system32\drivers\npf
s.sys File System Driver Yes
System Running OK
Normal No Yes
ntfs Ntfs
c:\windows\system32\drivers\ntfs
.sys File System Driver Yes
Disabled Running OK
Normal No Yes
null Null
c:\windows\system32\drivers\nul
l.sys Kernel Driver Yes
System Running OK
Normal No Yes
nwlnkflt IPX Traffic Filter Driver
c:\windows\system32\drivers\nwl
nkflt.sys Kernel Driver No
Manual Stopped OK
Normal No No
nwlnkfwd IPX Traffic Forwarder Driver
c:\windows\system32\drivers\nwl
nkfwd.sys Kernel Driver No
Manual Stopped OK
Normal No No
partmgr Partition Manager
c:\windows\system32\drivers\par
tmgr.sys Kernel Driver Yes
Boot Running OK
Normal No Yes
pci PCI Bus Driver
c:\windows\system32\drivers\pci.
sys Kernel Driver Yes
Boot Running OK
Critical No Yes
pciide PCIIde Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
pcmcia Pcmcia
c:\windows\system32\drivers\pc
mcia.sys Kernel Driver No
Disabled Stopped OK
Normal No No
pdcomp PDCOMP Not Available
Kernel Driver No
Manual Stopped OK
Ignore No No
pdframe PDFRAME Not
Available Kernel Driver No
Manual Stopped OK
Ignore No No
pdreli PDRELI Not Available
Kernel Driver No
Manual Stopped OK
Ignore No No
pdrframe PDRFRAME Not
Available Kernel Driver No
Manual Stopped OK
Ignore No No
pptpminiport WAN Miniport
(PPTP)
c:\windows\system32\drivers\ras
pptp.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
processor Processor Driver
c:\windows\system32\drivers\pro
cessr.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
ptilink Direct Parallel Link Driver
c:\windows\system32\drivers\ptil
ink.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
ql1080 ql1080 Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
ql12160 ql12160 Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
ql1240 ql1240 Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
ql1280 ql1280 Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
ql2200 ql2200 Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
ql2300 ql2300 Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
rasacd Remote Access Auto Connection
Driver
c:\windows\system32\drivers\ras
acd.sys Kernel Driver Yes
System Running OK
Normal No Yes
rasl2tp WAN Miniport (L2TP)
c:\windows\system32\drivers\rasl
2tp.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
raspppoe Remote Access PPPOE Driver
c:\windows\system32\drivers\ras
pppoe.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
raspti Direct Parallel
c:\windows\system32\drivers\ras
pti.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
rdbss Rdbss
c:\windows\system32\drivers\rdb
ss.sys File System Driver Yes
System Running OK
Normal No Yes
rdpcdd RDPCDD
c:\windows\system32\drivers\rdp
cdd.sys Kernel Driver Yes
System Running OK
Ignore No Yes
rdpdr Terminal Server Device
Redirector Driver
c:\windows\system32\drivers\rdp
dr.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
rdpwd RDPWD
c:\windows\system32\drivers\rdp
wd.sys Kernel Driver Yes
Manual Running OK
Ignore No Yes
redbook Digital CD Audio Playback Filter
Driver
c:\windows\system32\drivers\red
book.sys Kernel Driver Yes
System Running OK
Normal No Yes
serenum Serenum Filter Driver
c:\windows\system32\drivers\ser
enum.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
serial Serial
c:\windows\system32\drivers\seri
al.sys Kernel Driver No
Auto Stopped OK
Ignore No No
sfloppy Sfloppy
c:\windows\system32\drivers\sflo
ppy.sys Kernel Driver No
System Stopped OK
Ignore No No

simbad Simbad Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
srv Srv
c:\windows\system32\drivers\srv.
sys File System Driver Yes
Manual Running OK
Normal No Yes
swenum Software Bus Driver
c:\windows\system32\drivers\sw
enum.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
symc8xx symc8xx Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
symmpi symmpi Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
sym_hi sym_hi Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
sym_u3 sym_u3
c:\windows\system32\drivers\sy
m_u3.sys Kernel Driver Yes
Boot Running OK
Normal No Yes
tcpip TCP/IP Protocol Driver
c:\windows\system32\drivers\tcpi
p.sys Kernel Driver Yes
System Running OK
Normal No Yes
tdpipe TDPIPE
c:\windows\system32\drivers\tdp
ipe.sys Kernel Driver No
Manual Stopped OK
Ignore No No
tdtcp TDTCP
c:\windows\system32\drivers\tdtc
p.sys Kernel Driver Yes
Manual Running OK
Ignore No Yes
termdd Terminal Device Driver
c:\windows\system32\drivers\ter
mdd.sys Kernel Driver Yes
System Running OK
Normal No Yes
toside TosIde Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
udfs Udfs
c:\windows\system32\drivers\udf
s.sys File System Driver No
Disabled Stopped OK
Normal No No
usbehci Microsoft USB 2.0 Enhanced
Host Controller Miniport Driver
c:\windows\system32\drivers\usb
ehci.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
usbhub USB2 Enabled Hub
c:\windows\system32\drivers\usb
hub.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
usbohci Microsoft USB Open Host
Controller Miniport Driver
c:\windows\system32\drivers\usb
ohci.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
vga vga
c:\windows\system32\drivers\vga
pnp.sys Kernel Driver Yes
Manual Running OK
Ignore No Yes
vgasave VGA Display Controller.
c:\windows\system32\drivers\vga
.sys Kernel Driver Yes
System Running OK
Ignore No Yes
viaide ViaIde Not Available
Kernel Driver No
Disabled Stopped OK
Normal No No
volsnap Storage volumes
c:\windows\system32\drivers\vol
snap.sys Kernel Driver Yes
Boot Running OK
Normal No Yes
wanarp Remote Access IP ARP Driver
c:\windows\system32\drivers\wa
narp.sys Kernel Driver Yes
Manual Running OK
Normal No Yes
wdica WDICA Not Available
Kernel Driver No
Manual Stopped OK
Ignore No No
wlbs Network Load Balancing
c:\windows\system32\drivers\wlb
s.sys Kernel Driver No
Manual Stopped OK
Normal No No

[Signed Drivers]

Device Name Signed Device
Class Driver Version Driver
Date Manufacturer INF Name
Driver Name Device ID
Microsoft System Management BIOS Driver
Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not
Available ROOT\SYSTEM\0001
Plug and Play Software Device Enumerator
Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not
Available ROOT\SYSTEM\0000
Terminal Server Mouse Driver Yes
SYSTEM 5.2.3790.1828
10/1/2002 (Standard system
devices) machine.inf Not
Available ROOT\RDP_MOU\0000
Terminal Server Keyboard Driver
Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not
Available ROOT\RDP_KBD\0000
Terminal Server Device Redirector
Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not
Available ROOT\RDPDR\0000
Direct Parallel Yes NET
5.2.3790.1828 10/1/2002
Microsoft netrasa.inf Not
Available
ROOT\MS_PTIMINIPORT\000
0
WAN Miniport (PPTP) Yes
NET 5.2.3790.1828
10/1/2002 Microsoft netrasa.inf
Not Available
ROOT\MS_PPTPMINIPORT\00
00
WAN Miniport (PPPOE) Yes
NET 5.2.3790.1828
10/1/2002 Microsoft netrasa.inf
Not Available
ROOT\MS_PPPOEMINIPORT\
0000
WAN Miniport (IP) Yes NET
5.2.3790.1828 10/1/2002
Microsoft netrasa.inf Not
Available ROOT\MS_NDISWANIP\0000
WAN Miniport (L2TP) Yes
NET 5.2.3790.1828
10/1/2002 Microsoft netrasa.inf
Not Available
ROOT\MS_L2TPMINIPORT\00
00
Video Codecs Yes MEDIA
5.2.3790.0 10/1/2002 (Standard
system devices) wave.inf Not
Available ROOT\MEDIA\MS_MMVID
Legacy Video Capture Devices Yes
MEDIA 5.2.3790.0 10/1/2002
(Standard system devices)
wave.inf Not Available
ROOT\MEDIA\MS_MMVCD
Media Control Devices Yes
MEDIA 5.2.3790.0 10/1/2002
(Standard system devices)
wave.inf Not Available
ROOT\MEDIA\MS_MMMCI
Legacy Audio Drivers Yes MEDIA
5.2.3790.0 10/1/2002 (Standard
system devices) wave.inf Not
Available ROOT\MEDIA\MS_MMDRV
Audio Codecs Yes MEDIA
5.2.3790.0 10/1/2002 (Standard
system devices) wave.inf Not
Available ROOT\MEDIA\MS_MMACM
Remote Access IP ARP Driver Not
Available LEGACYDRIVER Not
Available Not Available Not
Available Not Available Not
Available
ROOT\LEGACY_WANARP\00
00
volsnap Not Available
LEGACYDRIVER Not
Available Not Available Not
Available Not Available Not
Available
ROOT\LEGACY_VOLSNAP\00
00
VGA Display Controller. Not
Available LEGACYDRIVER Not
Available Not Available Not
Available Not Available Not
Available
ROOT\LEGACY_VGASAVE\0
000
TDTCP Not Available
LEGACYDRIVER Not
Available Not Available Not
Available Not Available Not
Available ROOT\LEGACY_TDTCP\0000
TCP/IP Protocol Driver Not
Available LEGACYDRIVER Not
Available Not Available Not

```
Available  Not Available  Not
Available  ROOT\LEGACY_TCPIP\0000
sacdrv  Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available
          ROOT\LEGACY_SACDRV\000
0
RDPWD  Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available  ROOT\LEGACY_RDPWD\0000
RDPCDD  Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available
          ROOT\LEGACY_RDPCDD\000
0
Remote Access Auto Connection Driver
          Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available
          ROOT\LEGACY_RASACD\000
0
Partition Manager  Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available
          ROOT\LEGACY_PARTMGR\0
000
Null  Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available  ROOT\LEGACY_NULL\0000
NetBios over Tcpip  Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available  ROOT\LEGACY_NETBT\0000
NDProxy  Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available
          ROOT\LEGACY_NDPROXY\0
000
NDIS Usermode I/O Protocol  Not
Available  LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available
          ROOT\LEGACY_NDISUIO\000
0
Remote Access NDIS TAPI Driver
          Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available
          ROOT\LEGACY_NDISTAPI\00
00
NDIS System Driver  Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available  ROOT\LEGACY_NDIS\0000
mountmgr  Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available
          ROOT\LEGACY_MOUNTMGR
\0000
lp6nds35  Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available
          ROOT\LEGACY_LP6NDS35\0
000
ksecdd  Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available
          ROOT\LEGACY_KSECDD\000
0
IPSEC driver  Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available  ROOT\LEGACY_IPSEC\0000
IP Network Address Translator  Not
Available  LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available  ROOT\LEGACY_IPNAT\0000
Generic Packet Classifier  Not
Available  LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available  ROOT\LEGACY_GPC\0000
Fips  Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available  ROOT\LEGACY_FIPS\0000
dmload  Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available
          ROOT\LEGACY_DMLOAD\00
00
dmboot  Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available
          ROOT\LEGACY_DMBOOT\00
00
CRC Disk Filter Driver  Not
Available  LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available
          ROOT\LEGACY_CRCDISK\00
00
cpqcissm  Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available
          ROOT\LEGACY_CPQCISSM\0
000
Beep  Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available  ROOT\LEGACY_BEEP\0000
AFD  Not Available
          LEGACYDRIVER  Not
Available  Not Available  Not
Available  Not Available  Not
Available  ROOT\LEGACY_AFD\0000
Generic volume  Yes  VOLUME
          5.2.3790.1828  10/1/2002
          Microsoft  volume.inf  Not
Available
          STORAGE\VOLUME\1&30A96
598&0&GPTPARTITION{EDC9F27C-
FB17-47E2-AD55-4DE9801B6FD8}
Generic volume  Yes  VOLUME
          5.2.3790.1828  10/1/2002
          Microsoft  volume.inf  Not
Available
          STORAGE\VOLUME\1&30A96
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Generic volume Yes VOLUME 5.2.3790.1828 10/1/2002 Microsoft volume.inf Not Available
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Generic volume Yes VOLUME 5.2.3790.1828 10/1/2002 Microsoft volume.inf Not

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STORAGE\VOLUME\1&30A96598&0&GPTPARTITION{2DDB98D0-000A-466F-9528-FBC207BC1F2B}
Generic volume Yes VOLUME 5.2.3790.1828 10/1/2002 Microsoft volume.inf Not Available
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Generic volume Yes VOLUME 5.2.3790.1828 10/1/2002 Microsoft volume.inf Not Available
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Generic volume Yes VOLUME 5.2.3790.1828 10/1/2002 Microsoft volume.inf Not Available
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Available
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Generic volume Yes VOLUME 5.2.3790.1828 10/1/2002 Microsoft volume.inf Not Available
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Generic volume Yes VOLUME 5.2.3790.1828 10/1/2002 Microsoft volume.inf Not Available
STORAGE\VOLUME\1&30A96598&0&GPTPARTITION{8D14E58D-4EA9-4E86-879F-81D91B92CE62}
Generic volume Yes VOLUME 5.2.3790.1828 10/1/2002 Microsoft volume.inf Not Available
STORAGE\VOLUME\1&30A96598&0&GPTPARTITION{E730A4E2-9D65-4A33-B427-22BCE7634D59}
Volume Manager Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ROOT\FTDISK\0000
Logical Disk Manager Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ROOT\DMIO\0000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available
HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&277E4F99&0&0400004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available
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Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available
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Smart Array 6400 Controller (Non-Miniport) No SCSIADAPTER 5.6.59.64 4/8/2003 Hewlett-Packard oem5.inf Not Available
PCI\VEN_0E11&DEV_0046&SUBSYS_409C0E11&REV_01\6&1F9325B&0&2008
PCI standard PCI-to-PCI bridge Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available
PCI\VEN_1014&DEV_01A7&SUBSYS_00000000&REV_02\5&2D6138E4&0&08
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\7C
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\78
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available
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Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard

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4/8/2003 Hewlett-Packard
oem6.inf Not Available
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4/8/2003 Hewlett-Packard
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4/8/2003 Hewlett-Packard
oem6.inf Not Available
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Smart Array 6400 Controller (Non-Miniport) No SCSIADAPTER
5.6.59.64 4/8/2003 Hewlett-Packard oem5.inf Not Available
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PCI bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not Available ACPI\HWP0002\74
PCI bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not Available ACPI\HWP0002\70
Generic Bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not Available ACPI\HWP0004\301
PCI bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not Available ACPI\HWP0002\6C
Smart Array Logical Volume No
DISKDRIVE 5.6.56.64
4/8/2003 Hewlett-Packard
oem6.inf Not Available
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Smart Array Logical Volume No
DISKDRIVE 5.6.56.64
4/8/2003 Hewlett-Packard
oem6.inf Not Available
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Smart Array Logical Volume No
DISKDRIVE 5.6.56.64
4/8/2003 Hewlett-Packard
oem6.inf Not Available
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DISKDRIVE 5.6.56.64
4/8/2003 Hewlett-Packard
oem6.inf Not Available
HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&1937325D&0&0000004000000000
Smart Array 6400 Controller (Non-Miniport) No SCSIADAPTER
5.6.59.64 4/8/2003 Hewlett-Packard oem5.inf Not Available
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PCI standard PCI-to-PCI bridge Yes
SYSTEM 5.2.3790.1828
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PCI bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not Available ACPI\HWP0002\68
PCI bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not Available ACPI\HWP0002\64
PCI bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not Available ACPI\HWP0002\62
LSI Logic 53C1010-66 Device Yes
SCSIADAPTER
5.2.3790.1828 10/1/2002
LSI Logic Inc. pnpscsi.inf
Not Available
PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&14C294CC&0&19
LSI Logic 53C1010-66 Device Yes
SCSIADAPTER
5.2.3790.1828 10/1/2002
LSI Logic Inc. pnpscsi.inf
Not Available
PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&14C294CC&0&18
LSI Logic 53C1010-66 Device Yes
SCSIADAPTER
5.2.3790.1828 10/1/2002
LSI Logic Inc. pnpscsi.inf
Not Available
PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&14C294CC&0&11
LSI Logic 53C1010-66 Device Yes
SCSIADAPTER
5.2.3790.1828 10/1/2002
LSI Logic Inc. pnpscsi.inf
Not Available
PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&14C294CC&0&10
Broadcom NetXtreme Gigabit Ethernet
Yes NET 2.91.0.0
10/1/2002 Broadcom
netb57xp.inf Not Available
PCI\VEN_14E4&DEV_1645&SUBSYS_12C1103C&REV_15\5&14C294CC&0&08
HP Management Processor Yes
SYSTEM 5.0.3790.0 7/10/2003
Hewlett-Packard Co oem2.inf
Not Available
PCI\VEN_103C&DEV_1048&SUBSYS_1282103C&REV_03\5&14C294CC&0&01
HP MP Serial AUX/UPS Port Yes
PORTS 5.0.3663.16
12/12/2002 Hewlett
Packard Co. oem0.inf Not Available
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PCI bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not Available ACPI\HWP0002\60
Generic Bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not Available ACPI\HWP0004\300
Generic Bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not Available ACPI\HWP0005\3
Processor Yes PROCESSOR
5.2.3790.1828 10/1/2002
(Standard processor types)
cpu.inf Not Available
ACPI\GENUINEINTEL_-_IA64_FAMILY_31_MODEL_2\15
Processor Yes PROCESSOR
5.2.3790.1828 10/1/2002
(Standard processor types)
cpu.inf Not Available
ACPI\GENUINEINTEL_-_IA64_FAMILY_31_MODEL_2\14
Processor Yes PROCESSOR
5.2.3790.1828 10/1/2002
(Standard processor types)
cpu.inf Not Available
ACPI\GENUINEINTEL_-_IA64_FAMILY_31_MODEL_2\13
Processor Yes PROCESSOR
5.2.3790.1828 10/1/2002
(Standard processor types)
cpu.inf Not Available
ACPI\GENUINEINTEL_-_IA64_FAMILY_31_MODEL_2\12
Smart Array Logical Volume No
DISKDRIVE 5.6.56.64
4/8/2003 Hewlett-Packard
oem6.inf Not Available
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Smart Array Logical Volume No
DISKDRIVE 5.6.56.64
4/8/2003 Hewlett-Packard
oem6.inf Not Available

HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&31523533&0&0200004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available
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Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available
HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&31523533&0&0000004000000000
Smart Array 6400 Controller (Non-Miniport) No SCSIADAPTER 5.6.59.64 4/8/2003 Hewlett-Packard oem5.inf Not Available
PCI\VEN_0E11&DEV_0046&SUBSYS_409C0E11&REV_01\6&11924964&0&2008
PCI standard PCI-to-PCI bridge Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available
PCI\VEN_1014&DEV_01A7&SUBSYS_00000000&REV_02\5&B10CC7&0&08
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\5C
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\58
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available
HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&75911A7&0&0300004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available
HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&75911A7&0&0200004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available
HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&75911A7&0&0100004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available
HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&75911A7&0&0000004000000000
Smart Array 6400 Controller (Non-Miniport) No SCSIADAPTER 5.6.59.64 4/8/2003 Hewlett-Packard oem5.inf Not Available
PCI\VEN_0E11&DEV_0046&SUBSYS_409C0E11&REV_01\6&20162027&0&2008
PCI standard PCI-to-PCI bridge Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available
PCI\VEN_1014&DEV_01A7&SUBSYS_00000000&REV_02\5&19926672&0&08
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\54
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\50
Generic Bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0004\201
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\4C
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available
HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&9D53582&0&0300004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available
HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&9D53582&0&0200004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available
HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&9D53582&0&0100004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available
HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&9D53582&0&0000004000000000
Smart Array 6400 Controller (Non-Miniport) No SCSIADAPTER 5.6.59.64 4/8/2003 Hewlett-Packard oem5.inf Not Available
PCI\VEN_0E11&DEV_0046&SUBSYS_409C0E11&REV_01\6&6AA0D5F&0&2008
PCI standard PCI-to-PCI bridge Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available
PCI\VEN_1014&DEV_01A7&SUBSYS_00000000&REV_02\5&548403B&0&08
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\48
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\44
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\42
LSI Logic 53C1010-66 Device Yes SCSIADAPTER 5.2.3790.1828 10/1/2002 LSI Logic Inc. pnpscsi.inf Not Available
PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&194FB0DF&0&19
LSI Logic 53C1010-66 Device Yes SCSIADAPTER 5.2.3790.1828 10/1/2002 LSI Logic Inc. pnpscsi.inf Not Available
PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&194FB0DF&0&18
LSI Logic 53C1010-66 Device Yes SCSIADAPTER 5.2.3790.1828 10/1/2002 LSI Logic Inc. pnpscsi.inf Not Available
PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&194FB0DF&0&11
LSI Logic 53C1010-66 Device Yes SCSIADAPTER 5.2.3790.1828 10/1/2002 LSI Logic Inc. pnpscsi.inf Not Available
PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&194FB0DF&0&10
Broadcom NetXtreme Gigabit Ethernet Yes NET 2.91.0.0 10/1/2002 Broadcom netb57xp.inf Not Available
PCI\VEN_14E4&DEV_1645&SUBSYS_12C1103C&REV_15\5&194FB0DF&0&08
HP Management Processor Yes SYSTEM 5.0.3790.0 7/10/2003 Hewlett-Packard Co oem2.inf Not Available
PCI\VEN_103C&DEV_1048&SUBSYS_1282103C&REV_03\5&194FB0DF&0&01
HP MP Serial AUX/UPS Port Yes PORTS 5.0.3663.16 12/12/2002 Hewlett Packard Co. oem0.inf Not Available
PCI\VEN_103C&DEV_1290&SUBSYS_1291103C&REV_01\5&194FB0DF&0&00
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\40
Generic Bus Yes SYSTEM 5.2.3790.1828 10/1/2002

(Standard system devices) machine.inf Not Available ACPI\HWP0004\200
Generic Bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0005\2
Processor Yes PROCESSOR 5.2.3790.1828 10/1/2002 (Standard processor types) cpu.inf Not Available ACPI\GENUINEINTEL_-_IA64_FAMILY_31_MODEL_2\11
Processor Yes PROCESSOR 5.2.3790.1828 10/1/2002 (Standard processor types) cpu.inf Not Available ACPI\GENUINEINTEL_-_IA64_FAMILY_31_MODEL_2\10
Processor Yes PROCESSOR 5.2.3790.1828 10/1/2002 (Standard processor types) cpu.inf Not Available ACPI\GENUINEINTEL_-_IA64_FAMILY_31_MODEL_2_9
Processor Yes PROCESSOR 5.2.3790.1828 10/1/2002 (Standard processor types) cpu.inf Not Available ACPI\GENUINEINTEL_-_IA64_FAMILY_31_MODEL_2_8
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&783B22F&0&0300004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&783B22F&0&0200004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&783B22F&0&0100004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&783B22F&0&0000004000000000
Smart Array 6400 Controller (Non-Miniport) No SCSIADAPTER 5.6.59.64 4/8/2003 Hewlett-Packard oem5.inf Not Available PCI\VEN_0E11&DEV_0046&SUBSYS_409C0E11&REV_01\6&1A6A6711&0&2008
PCI standard PCI-to-PCI bridge Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available PCI\VEN_1014&DEV_01A7&SUBSYS_00000000&REV_02\5&1E6C4F79&0&08
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\3C
Default Monitor Yes MONITOR 5.1.2001.0 6/6/2001 (Standard monitor types) monitor.inf Not Available DISPLAY\DEFAULT_MONITOR\7&32AB824A&0&12345678&39&05
Standard VGA Graphics Adapter Yes DISPLAY 5.2.3790.0 10/1/2002 (Standard display types) display.inf Not Available PCI\VEN_1002&DEV_5159&SUBSYS_1292103C&REV_00\6&35C9EA34&0&2808
USB Root Hub Yes USB 5.2.3790.1828 10/1/2002 (Standard USB Host Controller) usbport.inf Not Available USB\ROOT_HUB20\7&6B89C6&0
NEC PCI to USB Enhanced Host Controller (B1) Yes USB 5.2.3790.1828 10/1/2002 NEC usbport.inf Not Available PCI\VEN_1033&DEV_00E0&SUBSYS_AA55103C&REV_02\6&35C9EA34&0&2208
USB Root Hub Yes USB 5.2.3790.1828 10/1/2002 (Standard USB Host Controller) usbport.inf Not Available USB\ROOT_HUB\7&4BB20E3&0
NEC PCI to USB Open Host Controller Yes USB 5.2.3790.1828 10/1/2002 NEC usbport.inf Not Available PCI\VEN_1033&DEV_0035&SUBSYS_AA55103C&REV_41\6&35C9EA34&0&2108
USB Root Hub Yes USB 5.2.3790.1828 10/1/2002 (Standard USB Host Controller) usbport.inf Not Available USB\ROOT_HUB\7&2C117902&0
NEC PCI to USB Open Host Controller Yes USB 5.2.3790.1828 10/1/2002 NEC usbport.inf Not Available PCI\VEN_1033&DEV_0035&SUBSYS_1293103C&REV_41\6&35C9EA34&0&2008
Intel 21154 PCI to PCI bridge Yes SYSTEM 5.2.3790.1828 10/1/2002 Intel machine.inf Not Available PCI\VEN_8086&DEV_B154&SUBSYS_00000000&REV_00\5&3858B390&0&08
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\38
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&67CF7FF&0&0300004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&67CF7FF&0&0200004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&67CF7FF&0&0100004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&67CF7FF&0&0000004000000000
Smart Array 6400 Controller (Non-Miniport) No SCSIADAPTER 5.6.59.64 4/8/2003 Hewlett-Packard oem5.inf Not Available PCI\VEN_0E11&DEV_0046&SUBSYS_409C0E11&REV_01\6&3B7713C5&0&2008
PCI standard PCI-to-PCI bridge Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available PCI\VEN_1014&DEV_01A7&SUBSYS_00000000&REV_02\5&58AF5CE&0&08
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\34
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\30
Generic Bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0004\101
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\2C
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&1121A5ED&0&0300004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available HPQCISS\DISK&VEN_HP&PR

OD_LOGICAL_VOLUME\7&1121A5ED&0&0200004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&1121A5ED&0&0100004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&1121A5ED&0&0000004000000000
Smart Array 6400 Controller (Non-Miniport) No SCSIADAPTER 5.6.59.64 4/8/2003 Hewlett-Packard oem5.inf Not Available PCI\VEN_0E11&DEV_0046&SUBSYS_409C0E11&REV_01\6&3533F53F&0&2008
PCI standard PCI-to-PCI bridge Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available PCI\VEN_1014&DEV_01A7&SUBSYS_00000000&REV_02\5&28CA0570&0&08
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\28
Disk drive Yes DISKDRIVE 5.2.3790.0 10/1/2002 (Standard disk drives) disk.inf Not Available SCSI\DISK&VEN_COMPAQ&PROD_MSA1000_VOLUME&REV_2.39\6&27996EEB&0&17C1
HP MSA1000 Yes SYSTEM 5.2.3790.1828 10/1/2002 Compaq scsidev.inf Not Available SCSI\ARRAY&VEN_COMPAQ&PROD_MSA1000&REV_2.39\6&27996EEB&0&17C0
Emulex Simulate Device Yes SYSTEM 5.1.0.0 2/26/2003 Emulex oem8.inf Not Available SCSI\ASCIT8&VEN_EMULEX&PROD_UTILITY_IFC_DEV.&REV_EMU2\6&27996EEB&0&27F0
Emulex LightPulse PCI Fibre Channel HBA (with adjunct driver) Yes SCSIADAPTER 6.5.10.9 2/2/2004 Emulex oem7.inf Not Available PCI\VEN_10DF&DEV_F098&SUBSYS_F09810DF&REV_01\5&3815FDFD&0&08
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\24
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\22
LSI Logic 53C1010-66 Device Yes SCSIADAPTER 5.2.3790.1828 10/1/2002 LSI Logic Inc. pnpscsi.inf Not Available PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&5CDAB61&0&19
LSI Logic 53C1010-66 Device Yes SCSIADAPTER 5.2.3790.1828 10/1/2002 LSI Logic Inc. pnpscsi.inf Not Available PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&5CDAB61&0&18
CD-ROM Drive Yes CDROM 5.2.3790.0 10/1/2002 (Standard CD-ROM drives) cdrom.inf Not Available SCSI\CDROM&VEN_HP&PROD_DVD-ROM_305&REV_1.01\6&3EABE99&0&020
LSI Logic 53C1010-66 Device Yes SCSIADAPTER 5.2.3790.1828 10/1/2002 LSI Logic Inc. pnpscsi.inf Not Available PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&5CDAB61&0&11
Disk drive Yes DISKDRIVE 5.2.3790.0 10/1/2002 (Standard disk drives) disk.inf Not Available SCSI\DISK&VEN_HP_36.4G&PROD_ST336706LC&REV_HP05\6&16A46F3E&0&060
LSI Logic 53C1010-66 Device Yes SCSIADAPTER 5.2.3790.1828 10/1/2002 LSI Logic Inc. pnpscsi.inf Not Available PCI\VEN_1000&DEV_0021&SUBSYS_1350103C&REV_01\5&5CDAB61&0&10
Broadcom NetXtreme Gigabit Ethernet Yes NET 2.91.0.0 10/1/2002 Broadcom netb57xp.inf Not Available PCI\VEN_14E4&DEV_1645&SUBSYS_12C1103C&REV_15\5&5CDAB61&0&08
HP Management Processor Yes SYSTEM 5.0.3790.0 7/10/2003 Hewlett-Packard Co oem2.inf Not Available PCI\VEN_103C&DEV_1048&SUBSYS_1282103C&REV_03\5&5CDAB61&0&01
HP MP Serial AUX/UPS Port Yes PORTS 5.0.3663.16 12/12/2002 Hewlett Packard Co. oem0.inf Not Available PCI\VEN_103C&DEV_1290&SUBSYS_1291103C&REV_01\5&5CDAB61&0&00
PCI bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0002\20
Generic Bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0004\100
Generic Bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0005\1
Processor Yes PROCESSOR 5.2.3790.1828 10/1/2002 (Standard processor types) cpu.inf Not Available ACPI\GENUINEINTEL_-_IA64_FAMILY_31_MODEL_2_7
Processor Yes PROCESSOR 5.2.3790.1828 10/1/2002 (Standard processor types) cpu.inf Not Available ACPI\GENUINEINTEL_-_IA64_FAMILY_31_MODEL_2_6
Processor Yes PROCESSOR 5.2.3790.1828 10/1/2002 (Standard processor types) cpu.inf Not Available ACPI\GENUINEINTEL_-_IA64_FAMILY_31_MODEL_2_5
Processor Yes PROCESSOR 5.2.3790.1828 10/1/2002 (Standard processor types) cpu.inf Not Available ACPI\GENUINEINTEL_-_IA64_FAMILY_31_MODEL_2_4
ACPI Fixed Feature Button Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\FIXEDBUTTON\2&DABA3FF&0
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&2BB8080F&0&0300004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&2BB8080F&0&0200004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&2BB8080F&0&0100004000000000
Smart Array Logical Volume No DISKDRIVE 5.6.56.64 4/8/2003 Hewlett-Packard oem6.inf Not Available HPQCISS\DISK&VEN_HP&PROD_LOGICAL_VOLUME\7&2BB8080F&0&0000004000000000
Smart Array 6400 Controller (Non-Miniport) No SCSIADAPTER 5.6.59.64 4/8/2003 Hewlett-Packard oem5.inf Not Available PCI\VEN_0E11&DEV_0046&S

UBSYS_409C0E11&REV_01\6&2640A37
&0&2008
PCI standard PCI-to-PCI bridge Yes
SYSTEM 5.2.3790.1828
10/1/2002 (Standard system
devices) machine.inf Not
Available
PCI\VEN_1014&DEV_01A7&S
UBSYS_00000000&REV_02\5&FA5F632
&0&08
PCI bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not
Available ACPI\HWP0002\1C
PCI bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not
Available ACPI\HWP0002\18
Smart Array Logical Volume No
DISKDRIVE 5.6.56.64
4/8/2003 Hewlett-Packard
oem6.inf Not Available
HPQCISS\DISK&VEN_HP&PR
OD_LOGICAL_VOLUME\7&10F6212B&
0&0300004000000000
Smart Array Logical Volume No
DISKDRIVE 5.6.56.64
4/8/2003 Hewlett-Packard
oem6.inf Not Available
HPQCISS\DISK&VEN_HP&PR
OD_LOGICAL_VOLUME\7&10F6212B&
0&0200004000000000
Smart Array Logical Volume No
DISKDRIVE 5.6.56.64
4/8/2003 Hewlett-Packard
oem6.inf Not Available
HPQCISS\DISK&VEN_HP&PR
OD_LOGICAL_VOLUME\7&10F6212B&
0&0100004000000000
Smart Array Logical Volume No
DISKDRIVE 5.6.56.64
4/8/2003 Hewlett-Packard
oem6.inf Not Available
HPQCISS\DISK&VEN_HP&PR
OD_LOGICAL_VOLUME\7&10F6212B&
0&0000004000000000
Smart Array 6400 Controller (Non-
Miniport) No SCSIADAPTER
5.6.59.64 4/8/2003 Hewlett-
Packard oem5.inf Not Available
PCI\VEN_0E11&DEV_0046&S
UBSYS_409C0E11&REV_01\6&F1453BC
&0&2008
PCI standard PCI-to-PCI bridge Yes
SYSTEM 5.2.3790.1828
10/1/2002 (Standard system
devices) machine.inf Not
Available
PCI\VEN_1014&DEV_01A7&S
UBSYS_00000000&REV_02\5&28874FD
D&0&08
PCI bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not
Available ACPI\HWP0002\14
PCI bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not
Available ACPI\HWP0002\10
Generic Bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not
Available ACPI\HWP0004\1
PCI bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not
Available ACPI\HWP0002\C
Smart Array Logical Volume No
DISKDRIVE 5.6.56.64
4/8/2003 Hewlett-Packard
oem6.inf Not Available
HPQCISS\DISK&VEN_HP&PR
OD_LOGICAL_VOLUME\7&AD4AAFD
&0&0300004000000000
Smart Array Logical Volume No
DISKDRIVE 5.6.56.64
4/8/2003 Hewlett-Packard
oem6.inf Not Available
HPQCISS\DISK&VEN_HP&PR
OD_LOGICAL_VOLUME\7&AD4AAFD
&0&0200004000000000
Smart Array Logical Volume No
DISKDRIVE 5.6.56.64
4/8/2003 Hewlett-Packard
oem6.inf Not Available
HPQCISS\DISK&VEN_HP&PR
OD_LOGICAL_VOLUME\7&AD4AAFD
&0&0100004000000000
Smart Array Logical Volume No
DISKDRIVE 5.6.56.64
4/8/2003 Hewlett-Packard
oem6.inf Not Available
HPQCISS\DISK&VEN_HP&PR
OD_LOGICAL_VOLUME\7&AD4AAFD
&0&0000004000000000
Smart Array 6400 Controller (Non-
Miniport) No SCSIADAPTER
5.6.59.64 4/8/2003 Hewlett-
Packard oem5.inf Not Available
PCI\VEN_0E11&DEV_0046&S
UBSYS_409C0E11&REV_01\6&266093A
2&0&2008
PCI standard PCI-to-PCI bridge Yes
SYSTEM 5.2.3790.1828
10/1/2002 (Standard system
devices) machine.inf Not
Available
PCI\VEN_1014&DEV_01A7&S
UBSYS_00000000&REV_02\5&29A1C50
A&0&08
PCI bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not
Available ACPI\HWP0002\8
PCI bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not
Available ACPI\HWP0002\4
PCI bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not
Available ACPI\HWP0002\2
HP Baseboard Management Controller
Interface Driver Yes SYSTEM
7.1.3790.0 3/18/2004 Hewlett
Packard Co. oem4.inf Not
Available ACPI\IPI0001\0
LSI Logic 53C1010-66 Device Yes
SCSIADAPTER
5.2.3790.1828 10/1/2002
LSI Logic Inc. pnpscsi.inf
Not Available
PCI\VEN_1000&DEV_0021&S
UBSYS_1350103C&REV_01\5&4F5EBC7
&0&19
LSI Logic 53C1010-66 Device Yes
SCSIADAPTER
5.2.3790.1828 10/1/2002
LSI Logic Inc. pnpscsi.inf
Not Available
PCI\VEN_1000&DEV_0021&S
UBSYS_1350103C&REV_01\5&4F5EBC7
&0&18
CD-ROM Drive Yes CDROM
5.2.3790.0 10/1/2002 (Standard
CD-ROM drives) cdrom.inf Not
Available
SCSI\CDROM&VEN_HP&PRO
D_DVD-
ROM_305&REV_1.01\6&16CD2462&0&0
20
LSI Logic 53C1010-66 Device Yes
SCSIADAPTER
5.2.3790.1828 10/1/2002
LSI Logic Inc. pnpscsi.inf
Not Available
PCI\VEN_1000&DEV_0021&S
UBSYS_1350103C&REV_01\5&4F5EBC7
&0&11
Disk drive Yes DISKDRIVE
5.2.3790.0 10/1/2002 (Standard
disk drives) disk.inf Not
Available
SCSI\DISK&VEN_HP_36.4G&
PROD_MAS3367NC&REV_HPC3\6&413
73BD&0&060
LSI Logic 53C1010-66 Device Yes
SCSIADAPTER
5.2.3790.1828 10/1/2002
LSI Logic Inc. pnpscsi.inf
Not Available
PCI\VEN_1000&DEV_0021&S
UBSYS_1350103C&REV_01\5&4F5EBC7
&0&10
Broadcom NetXtreme Gigabit Ethernet
Yes NET 2.91.0.0
10/1/2002 Broadcom
netb57xp.inf Not
Available
PCI\VEN_14E4&DEV_1645&S
UBSYS_12C1103C&REV_15\5&4F5EBC7
&0&08
HP Management Processor Yes
SYSTEM 5.0.3790.0 7/10/2003
Hewlett-Packard Co oem2.inf
Not Available
PCI\VEN_103C&DEV_1048&S
UBSYS_1282103C&REV_03\5&4F5EBC7
&0&01
HP MP Serial AUX/UPS Port Yes
PORTS 5.0.3663.16
12/12/2002 Hewlett
Packard Co. oem0.inf Not
Available
PCI\VEN_103C&DEV_1290&S
UBSYS_1291103C&REV_01\5&4F5EBC7
&0&00
PCI bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)
machine.inf Not
Available ACPI\HWP0002\0
Generic Bus Yes SYSTEM
5.2.3790.1828 10/1/2002
(Standard system devices)

machine.inf Not Available ACPI\HWP0004\0
Generic Bus Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\HWP0005\0
Processor Yes PROCESSOR 5.2.3790.1828 10/1/2002 (Standard processor types) cpu.inf Not Available ACPI\GENUINEINTEL_-_IA64_FAMILY_31_MODEL_2_3
Processor Yes PROCESSOR 5.2.3790.1828 10/1/2002 (Standard processor types) cpu.inf Not Available ACPI\GENUINEINTEL_-_IA64_FAMILY_31_MODEL_2_2
Processor Yes PROCESSOR 5.2.3790.1828 10/1/2002 (Standard processor types) cpu.inf Not Available ACPI\GENUINEINTEL_-_IA64_FAMILY_31_MODEL_2_1
Processor Yes PROCESSOR 5.2.3790.1828 10/1/2002 (Standard processor types) cpu.inf Not Available ACPI\GENUINEINTEL_-_IA64_FAMILY_31_MODEL_2_0
Not Available Not Available Not Available Not Available Not Available Not Available Not Available ACPI\HWP1000\A56E04410051
Not Available Not Available Not Available Not Available Not Available Not Available Not Available ACPI\HWP1000\A56E04409899
Not Available Not Available Not Available Not Available Not Available Not Available Not Available ACPI\HWP1000\A56E04409964
Not Available Not Available Not Available Not Available Not Available Not Available Not Available ACPI\HWP1000\A56E04399888
Not Available Not Available Not Available Not Available Not Available Not Available Not Available ACPI\HWP1000\A56E04399827
Not Available Not Available Not Available Not Available Not Available Not Available Not Available ACPI\HWP1000\A56E04399686
Not Available Not Available Not Available Not Available Not Available Not Available Not Available ACPI\HWP1000\A56E04399859
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Not Available Not Available Not Available Not Available Not Available Not Available Not Available ACPI\HWP1000\A56E04399796
Not Available Not Available Not Available Not Available Not Available Not Available Not Available ACPI\HWP1000\A56E04371034
Not Available Not Available Not Available Not Available Not Available Not Available Not Available ACPI\HWP1000\A56E04371033
Temporary HP CSR OpRegion Driver Yes SYSTEM 2.0.0.0 5/24/2004 Hewlett-Packard oem3.inf Not Available ACPI\HWP5003\2&DABA3FF&0
ACPI Power Button Yes SYSTEM 5.2.3790.1828 10/1/2002 (Standard system devices) machine.inf Not Available ACPI\PNP0C0C\2&DABA3FF&0
Microsoft ACPI-Compliant System Yes SYSTEM 5.2.3790.0 10/1/2002 Microsoft acpi.inf Not Available ACPI_HAL\PNP0C08\0
ACPI IA64-based PC Not Available COMPUTER Not Available Not Available (Standard computers)Not Available Not Available ROOT\ACPI_HAL\0000
Not Available Not Available Not Available Not Available Not Available Not Available Not Available HTREE\ROOT\0

[Environment Variables]

Variable Value User Name
_NT_SYMBOL_PATH S:\Symbols\1289 <SYSTEM>
ClusterLog C:\WINDOWS\Cluster\cluster.log <SYSTEM>
ComSpec %SystemRoot%\system32\cmd.exe <SYSTEM>
FP_NO_HOST_CHECK NO <SYSTEM>
NUMBER_OF_PROCESSORS 16 <SYSTEM>
OS Windows_NT <SYSTEM>
Path %SystemRoot%\system32;%SystemRoot%;%SystemRoot%\system32\WBEM;C:\Program Files\Microsoft SQL Server\MSSQL.1\MSSQL\Binn;C:\Program Files\Microsoft SQL Server\90\Tools <SYSTEM>
PATHEXT .COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH <SYSTEM>
PROCESSOR_ARCHITECTURE IA64 <SYSTEM>
PROCESSOR_IDENTIFIER ia64 Family 31 Model 2 Stepping 1, GenuineIntel <SYSTEM>
PROCESSOR_LEVEL 31 <SYSTEM>
PROCESSOR_REVISION 0201 <SYSTEM>
TEMP %SystemRoot%\TEMP <SYSTEM>
TMP %SystemRoot%\TEMP <SYSTEM>
windir %SystemRoot% <SYSTEM>
TEMP %USERPROFILE%\Local Settings\Temp NT AUTHORITY\SYSTEM
TMP %USERPROFILE%\Local Settings\Temp NT AUTHORITY\SYSTEM
TEMP %USERPROFILE%\Local Settings\Temp NT AUTHORITY\LOCAL SERVICE
TMP %USERPROFILE%\Local Settings\Temp NT AUTHORITY\LOCAL SERVICE
TEMP %USERPROFILE%\Local Settings\Temp NT AUTHORITY\NETWORK SERVICE
TMP %USERPROFILE%\Local Settings\Temp NT AUTHORITY\NETWORK SERVICE
TEMP %USERPROFILE%\Local Settings\Temp SQLOLY2\Administrator
TMP %USERPROFILE%\Local Settings\Temp SQLOLY2\Administrator

[Print Jobs]

Document Size Owner Notify Status Time Submitted Start Time Until Time Elapsed Time Pages Printed Job ID Priority Parameters Driver Print Processor Host Print Queue Data Type Name

[Network Connections]

Local Name Remote Name Type Status User Name

[Running Tasks]

Name Path Process ID Priority Min Working Set Max Working Set Start Time Version Size File Date
system idle process Not Available 0 0 Not Available Not Available Not Available Not Available Not Available
system Not Available 4 8 0 2826240 Not Available Not Available Not Available Not Available
smss.exe Not Available 676 11 409600 2826240 5/26/2005 12:14 PM Not Available Not Available Not Available
csrss.exe Not Available 1492 13 Not Available Not Available 5/26/2005 12:14 PM Not Available Not Available
winlogon.exe c:\windows\system32\winlogon.exe 1876 13 409600 2826240 5/26/2005 12:14 PM 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 664.50 KB (680,448 bytes) 3/29/2005 2:45 PM
services.exe c:\windows\system32\services.exe 2016 9 409600 2826240 5/26/2005 12:14 PM 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 300.00 KB (307,200 bytes) 3/29/2005 2:44 PM
lsass.exe c:\windows\system32\lsass.exe 224 9 409600 2826240 5/26/2005 12:14 PM 5.2.3790.0 (srv03_rtm.030324-2048) 15.00 KB (15,360 bytes) 3/29/2005 2:44 PM
svchost.exe c:\windows\system32\svchost.exe 616 8 409600 2826240 5/26/2005 12:14 PM 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 36.00 KB (36,864 bytes) 3/29/2005 2:44 PM
svchost.exe Not Available 800 8 Not Available Not Available 5/26/2005 12:14 PM Not Available Not Available
svchost.exe Not Available 936 8 Not Available Not Available 5/26/2005 12:14 PM Not Available Not Available
svchost.exe Not Available 960 8 Not Available Not Available 5/26/2005 12:14 PM Not Available Not Available
svchost.exe c:\windows\system32\svchost.exe 1052 8 409600 2826240 5/26/2005 12:14 PM 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 36.00 KB (36,864 bytes) 3/29/2005 2:44 PM
spoolsv.exe c:\windows\system32\spoolsv.exe 1124 8 409600 2826240 5/26/2005 12:15 PM 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 144.00 KB (147,456 bytes) 3/29/2005 2:44 PM
msdtc.exe Not Available 1076 8 Not Available Not Available 5/26/2005 12:15 PM Not Available Not Available
svchost.exe c:\windows\system32\svchost.exe 1360 8 409600 2826240 5/26/2005 12:15 PM 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 36.00 KB (36,864 bytes) 3/29/2005 2:44 PM
svchost.exe Not Available 1404 8 Not Available Not Available 5/26/2005 12:15 PM Not Available Not Available
svchost.exe c:\windows\system32\svchost.exe 1036 8 409600 2826240 5/26/2005 12:15 PM 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 36.00 KB (36,864 bytes) 3/29/2005 2:44 PM
alg.exe Not Available 1988 8 Not Available Not Available 5/26/2005 12:15 PM Not Available Not Available
wmiprvse.exe Not Available 2040 8 Not Available Not Available 5/26/2005 12:15 PM Not Available Not Available
csrss.exe Not Available 1372 13 Not Available Not Available 5/26/2005 12:17 PM Not Available Not Available
winlogon.exe c:\windows\system32\winlogon.exe 1320 13 409600 2826240 5/26/2005 12:17 PM 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 664.50 KB (680,448 bytes) 3/29/2005 2:45 PM
rdpclip.exec:\windows\system32\rdpclip.exe 868 8 409600 2826240 5/26/2005 12:18 PM 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 211.00 KB (216,064 bytes) 12/10/2004 1:54 PM
explorer.exe c:\windows\explorer.exe 1760 8 409600 2826240 5/26/2005 12:18 PM 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 1.64 MB (1,720,320 bytes) 3/29/2005 2:44 PM
logon.scr Not Available 1148 4 Not Available Not Available 5/26/2005 12:25 PM Not Available Not Available
mmc.exe c:\windows\system32\mmc.exe 3860 8 409600 2826240 5/26/2005 5:48 PM 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 2.51 MB (2,631,168 bytes) 3/29/2005 2:44 PM
vds.exe c:\windows\system32\vds.exe 2788 8 409600 2826240 5/26/2005 5:48 PM 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 744.00 KB (761,856 bytes) 3/29/2005 2:45 PM
dmadmin.exe c:\windows\system32\dmadmin.exe 2312 8 409600 2826240 5/26/2005 5:48 PM 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 724.50 KB (741,888 bytes) 3/29/2005 2:43 PM
helpctr.exe c:\windows\pchealth\helpctr\binaries\helpctr.exe 3332 8 409600 2826240 5/26/2005 5:49 PM 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 2.01 MB (2,105,344 bytes) 12/10/2004 1:56 PM
wmiprvse.exe Not Available 3528 8 Not Available Not Available 5/26/2005 5:49 PM Not Available Not Available
helpsvc.exe c:\windows\pchealth\helpctr\binaries\helpsvc.exe 1600 8 409600 2826240 5/26/2005 5:49 PM 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 2.21 MB (2,320,384 bytes) 12/10/2004 1:56 PM

[Loaded Modules]

Name Version Size File Date Manufacturer Path
winlogon 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 664.50 KB (680,448 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\winlogon.exe
ntdll 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.56 MB (1,638,400 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\ntdll.dll
kernel32 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.87 MB (1,965,056 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\kernel32.dll
msvcrt 7.0.3790.1828 (srv03_sp1_rtm.050321-2020) 932.00 KB (954,368 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\msvcrt.dll
advapi32 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.41 MB (1,482,752 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\advapi32.dll
rpcrt4 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 2.34 MB (2,457,600 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\rpcrt4.dll

user32 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.41 MB (1,476,096 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\user32.dll
gdi32 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 882.00 KB (903,168 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\gdi32.dll
userenv 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.49 MB (1,563,648 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\userenv.dll
nddeapi 5.2.3790.0 (srv03_rtm.030324-2048) 39.50 KB (40,448 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\nddeapi.dll
crypt32 5.131.3790.1828 (srv03_sp1_rtm.050321-2020) 1.68 MB (1,759,232 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\crypt32.dll
msasn1 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 179.50 KB (183,808 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\msasn1.dll
secur32 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 186.00 KB (190,464 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\secur32.dll
winsta 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 143.50 KB (146,944 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\winsta.dll
netapi32 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 885.50 KB (906,752 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\netapi32.dll
profmap 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 59.50 KB (60,928 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\profmap.dll
regapi 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 141.50 KB (144,896 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\regapi.dll
ws2_32 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 248.00 KB (253,952 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\ws2_32.dll
ws2help 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 51.00 KB (52,224 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\ws2help.dll
msgina 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.40 MB (1,465,344 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\msgina.dll
shsvcs 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 354.50 KB (363,008 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\shsvcs.dll
shlwapi 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 804.00 KB (823,296 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\shlwapi.dll
sfc 5.2.3790.0 (srv03_rtm.030324-2048) 7.50 KB (7,680 bytes)3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\sfc.dll
sfc_os 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 273.00 KB (279,552 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\sfc_os.dll
wintrust 5.131.3790.1828 (srv03_sp1_rtm.050321-2020) 459.50 KB (470,528 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\wintrust.dll
imagehlp 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 140.50 KB (143,872 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\imagehlp.dll
ole32 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 3.81 MB (3,992,064 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\ole32.dll
comctl32 6.0 (srv03_sp1_rtm.050321-2020) 2.50 MB (2,622,976 bytes) 3/29/2005 6:55 AM Microsoft Corporation c:\windows\winsxs\ia64_microsoft.windows.common-controls_6595b64144ccf1df_6.0.3790.1828_x-ww_aa3d7338\comctl32.dll
version 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 51.00 KB (52,224 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\version.dll
winscard 5.2.3790.0 (srv03_rtm.030324-2048) 291.50 KB (298,496 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\winscard.dll
wtsapi32 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 54.00 KB (55,296 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\wtsapi32.dll
sxs 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.82 MB (1,904,640 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\sxs.dll
shell32 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 12.63 MB (13,243,392 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\shell32.dll
setupapi 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.99 MB (2,086,400 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\setupapi.dll
wldap32 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 441.50 KB (452,096 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\wldap32.dll
cscdll 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 207.00 KB (211,968 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\cscdll.dll
dimsntfy 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 51.50 KB (52,736 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\dimsntfy.dll
wlnotify 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 239.50 KB (245,248 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\wlnotify.dll
winmm 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 428.00 KB (438,272 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\winmm.dll
winspool 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 400.50 KB (410,112 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\winspool.drv
mpr 5.2.3790.0 (srv03_rtm.030324-2048) 163.00 KB (166,912 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\mpr.dll
oleaut32 5.2.3790.1828 3.75 MB (3,930,624 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\oleaut32.dll
comctl32 5.82 (srv03_sp1_rtm.050321-2020) 1.72 MB (1,806,336 bytes) 3/29/2005 6:55 AM Microsoft Corporation c:\windows\winsxs\ia64_microsoft.windows.common-controls_6595b64144ccf1df_5.82.3790.1828_x-ww_4ac92db3\comctl32.dll
uxtheme 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 543.00 KB (556,032 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\uxtheme.dll
clbcatq 2001.12.4720.1828 (srv03_sp1_rtm.050321-2020) 1.30 MB (1,359,360 bytes) 12/10/2004 1:54 PM Microsoft Corporation c:\windows\system32\clbcatq.dll
comres 2001.12.4720.0 (srv03_rtm.030324-2048) 779.50 KB (798,208 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\comres.dll
wbemprox 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 65.00 KB (66,560 bytes) 12/10/2004 1:53 PM Microsoft Corporation c:\windows\system32\wbem\wbemprox.dll

wbemcomn 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 665.50 KB (681,472 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\wbem\wbemcomn.dll
xpsp2res 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 2.76 MB (2,897,920 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\xpsp2res.dll
wbemsvc 5.2.3790.0 (srv03_rtm.030324-2048) 62.50 KB (64,000 bytes) 12/10/2004 1:54 PM Microsoft Corporation c:\windows\system32\wbem\wbemsvc.dll
fastprox 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.63 MB (1,710,592 bytes) 12/10/2004 1:53 PM Microsoft Corporation c:\windows\system32\wbem\fastprox.dll
msvcp60 6.10.2240.8 941.50 KB (964,096 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\msvcp60.dll
ntdsapi 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 204.50 KB (209,408 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\ntdsapi.dll
dnsapi 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 428.00 KB (438,272 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\dnsapi.dll
services 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 300.00 KB (307,200 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\services.exe
scesrv 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 806.50 KB (825,856 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\scesrv.dll
authz 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 220.50 KB (225,792 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\authz.dll
umpnpmgr 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 323.50 KB (331,264 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\umpnpmgr.dll
ncobjapi 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 121.00 KB (123,904 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\ncobjapi.dll
eventlog 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 180.00 KB (184,320 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\eventlog.dll
psapi 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 53.00 KB (54,272 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\psapi.dll
netevent 5.2.3790.0 (srv03_rtm.030324-2048) 223.50 KB (228,864 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\netevent.dll
lsass 5.2.3790.0 (srv03_rtm.030324-2048) 15.00 KB (15,360 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\lsass.exe
lsasrv 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 2.07 MB (2,166,784 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\lsasrv.dll
samlib 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 106.50 KB (109,056 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\samlib.dll
samsrv 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.09 MB (1,142,784 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\samsrv.dll
cryptdll 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 68.50 KB (70,144 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\cryptdll.dll
msprivs 5.2.3790.0 (srv03_rtm.030324-2048) 46.00 KB (47,104 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\msprivs.dll
kerberos 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 932.00 KB (954,368 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\kerberos.dll
msv1_0 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 380.00 KB (389,120 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\msv1_0.dll
iphlpapi 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 254.50 KB (260,608 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\iphlpapi.dll
netlogon 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 956.00 KB (978,944 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\netlogon.dll
w32time 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 565.00 KB (578,560 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\w32time.dll
schannel 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 456.00 KB (466,944 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\schannel.dll
wdigest 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 210.00 KB (215,040 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\wdigest.dll
rsaenh 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 415.98 KB (425,960 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\rsaenh.dll
rassfm 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 68.50 KB (70,144 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\rassfm.dll
kdcsvc 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 596.00 KB (610,304 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\kdcsvc.dll
ntdsa 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 4.04 MB (4,239,360 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\ntdsa.dll
esent 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 2.65 MB (2,776,064 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\esent.dll
ntdsatq 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 79.50 KB (81,408 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\ntdsatq.dll
mswsock 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 763.00 KB (781,312 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\mswsock.dll
scecli 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 459.50 KB (470,528 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\scecli.dll
ws03res 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 792.50 KB (811,520 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\ws03res.dll
hnetcfg 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.04 MB (1,094,144 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\hnetcfg.dll
wshtcpip 5.2.3790.0 (srv03_rtm.030324-2048) 38.00 KB (38,912 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\wshtcpip.dll
ipsecsvc 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 465.00 KB (476,160 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\ipsecsvc.dll
oakley 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 516.50 KB (528,896 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\oakley.dll

winipsec 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 83.00 KB (84,992 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\winipsec.dll
pstorsvc 5.2.3790.0 (srv03_rtm.030324-2048) 56.00 KB (57,344 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\pstorsvc.dll
psbase 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 167.50 KB (171,520 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\psbase.dll
dssenh 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 363.98 KB (372,712 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\dssenh.dll
wlbsctrl 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 207.00 KB (211,968 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\wlbsctrl.dll
svchost 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 36.00 KB (36,864 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\svchost.exe
rpcss 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 823.50 KB (843,264 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\rpcss.dll
ntmarta 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 366.00 KB (374,784 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\ntmarta.dll
wzcsvc 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 818.00 KB (837,632 bytes) 3/21/2005 3:29 PM Microsoft Corporation c:\windows\system32\wzcsvc.dll
rtutils 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 91.50 KB (93,696 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\rtutils.dll
wmi 5.2.3790.0 (srv03_rtm.030324-2048) 5.00 KB (5,120 bytes)3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\wmi.dll
dhcpcsvc 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 299.50 KB (306,688 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\dhcpcsvc.dll
atl 3.00.2282 348.00 KB (356,352 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\atl.dll
rastls 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 426.00 KB (436,224 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\rastls.dll
cryptui 5.131.3790.1828 (srv03_sp1_rtm.050321-2020) 1.11 MB (1,159,168 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\cryptui.dll
mprapi 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 265.00 KB (271,360 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\mprapi.dll
activeds 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 581.50 KB (595,456 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\activeds.dll
adsldpc 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 326.00 KB (333,824 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\adsldpc.dll
credui 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 311.00 KB (318,464 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\credui.dll
rasapi32 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 632.50 KB (647,680 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\rasapi32.dll
rasman 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 170.00 KB (174,080 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\rasman.dll
tapi32 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 518.00 KB (530,432 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\tapi32.dll
raschap 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 226.50 KB (231,936 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\raschap.dll
schedsvc 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 567.00 KB (580,608 bytes) 12/10/2004 1:55 PM Microsoft Corporation c:\windows\system32\schedsvc.dll
msidle 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 11.50 KB (11,776 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\msidle.dll
wkssvc 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 315.50 KB (323,072 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\wkssvc.dll
wiarpc 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 76.00 KB (77,824 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\wiarpc.dll
aelupsvc 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 55.50 KB (56,832 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\aelupsvc.dll
apphelp 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 301.50 KB (308,736 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\apphelp.dll
cryptsvc 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 139.00 KB (142,336 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\cryptsvc.dll
certcli 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 580.00 KB (593,920 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\certcli.dll
vssapi 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.57 MB (1,642,496 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\vssapi.dll
dmserver 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 52.00 KB (53,248 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\dmserver.dll
es 2001.12.4720.1828 (srv03_sp1_rtm.050321-2020) 685.50 KB (701,952 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\es.dll
pchsvc 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 113.00 KB (115,712 bytes) 12/10/2004 1:56 PM Microsoft Corporation c:\windows\pchealth\helpctr\binaries\pchsvc.dll
srvsvc 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 197.50 KB (202,240 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\srvsvc.dll
netman 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 706.50 KB (723,456 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\netman.dll
netshell 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 2.95 MB (3,094,528 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\netshell.dll
clusapi 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 158.00 KB (161,792 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\clusapi.dll
wininet 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 1.62 MB (1,697,280 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\wininet.dll
wzcsapi 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 86.50 KB (88,576 bytes) 3/21/2005 3:29 PM Microsoft Corporation c:\windows\system32\wzcsapi.dll
sacsvr 5.2.3790.0 (srv03_rtm.030324-2048) 27.50 KB (28,160 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\sacsvr.dll
seclogon 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 47.00 KB (48,128 bytes) 3/29/2005 2:44 PM Microsoft Corporation

c:\windows\system32\seclogon.dll
trkwks 5.2.3790.0 (srv03_rtm.030324-2048) 246.00 KB (251,904 bytes) 3/29/2005 2:45 PM Microsoft Corporation
c:\windows\system32\trkwks.dll
wmisvc 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 445.50 KB (456,192 bytes) 12/10/2004 1:53 PM Microsoft Corporation
c:\windows\system32\wbem\wmisvc.dll
wuauserv 5.7.3790.1828 (srv03_sp1_rtm.050321-2020) 24.50 KB (25,088 bytes) 12/10/2004 1:56 PM Microsoft Corporation
c:\windows\system32\wuauserv.dll
sens 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 98.00 KB (100,352 bytes) 3/29/2005 2:44 PM Microsoft Corporation
c:\windows\system32\sens.dll
wuaueng 5.7.3790.1828 (srv03_sp1_rtm.050321-2020) 3.08 MB (3,225,088 bytes) 12/10/2004 1:56 PM Microsoft Corporation
c:\windows\system32\wuaueng.dll
advpack 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 259.50 KB (265,728 bytes) 3/29/2005 2:43 PM Microsoft Corporation
c:\windows\system32\advpack.dll
shfolder 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 42.50 KB (43,520 bytes) 3/29/2005 2:44 PM Microsoft Corporation
c:\windows\system32\shfolder.dll
winhttp 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 995.00 KB (1,018,880 bytes) 3/29/2005 6:55 AM Microsoft Corporation
c:\windows\winsxs\ia64_microsoft.windows.winhttp_6595b64144ccf1df_5.1.3790.1828_x-ww_a36ef564\winhttp.dll
cabinet 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 250.50 KB (256,512 bytes) 3/29/2005 2:43 PM Microsoft Corporation
c:\windows\system32\cabinet.dll
mspatcha 5.2.3790.0 (srv03_rtm.030324-2048) 80.00 KB (81,920 bytes) 3/29/2005 2:44 PM Microsoft Corporation
c:\windows\system32\mspatcha.dll
ipnathlp 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 945.50 KB (968,192 bytes) 3/29/2005 2:44 PM Microsoft Corporation
c:\windows\system32\ipnathlp.dll
browser 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 200.50 KB (205,312 bytes) 3/29/2005 2:43 PM Microsoft Corporation
c:\windows\system32\browser.dll
rasadhlp 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 18.00 KB (18,432 bytes) 3/29/2005 2:44 PM Microsoft Corporation
c:\windows\system32\rasadhlp.dll
wbemcore 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.94 MB (2,038,784 bytes) 12/10/2004 1:53 PM Microsoft Corporation
c:\windows\system32\wbem\wbemcore.dll
esscli 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.01 MB (1,057,280 bytes) 12/10/2004 1:53 PM Microsoft Corporation
c:\windows\system32\wbem\esscli.dll
wmiutils 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 302.00 KB (309,248 bytes) 12/10/2004 1:53 PM Microsoft Corporation
c:\windows\system32\wbem\wmiutils.dll
repdrvfs 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 649.00 KB (664,576 bytes) 12/10/2004 1:53 PM Microsoft Corporation
c:\windows\system32\wbem\repdrvfs.dll
wmiprvsd 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.39 MB (1,454,592 bytes) 12/10/2004 1:53 PM Microsoft Corporation
c:\windows\system32\wbem\wmiprvsd.dll
wbemess 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.02 MB (1,070,080 bytes) 12/10/2004 1:53 PM Microsoft Corporation
c:\windows\system32\wbem\wbemess.dll
ncprov 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 146.00 KB (149,504 bytes) 12/10/2004 1:53 PM Microsoft Corporation
c:\windows\system32\wbem\ncprov.dll
netrap 5.2.3790.0 (srv03_rtm.030324-2048) 30.00 KB (30,720 bytes) 3/29/2005 2:44 PM Microsoft Corporation
c:\windows\system32\netrap.dll
rasdlg 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.44 MB (1,509,888 bytes) 3/29/2005 2:44 PM Microsoft Corporation
c:\windows\system32\rasdlg.dll
ntlsapi 5.2.3790.0 (srv03_rtm.030324-2048) 14.50 KB (14,848 bytes) 3/29/2005 2:44 PM Microsoft Corporation
c:\windows\system32\ntlsapi.dll
netcfgx 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 2.01 MB (2,104,320 bytes) 3/29/2005 2:44 PM Microsoft Corporation
c:\windows\system32\netcfgx.dll
wbemcons 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 154.50 KB (158,208 bytes) 12/10/2004 1:53 PM Microsoft Corporation
c:\windows\system32\wbem\wbemcons.dll
spoolsv 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 144.00 KB (147,456 bytes) 3/29/2005 2:44 PM Microsoft Corporation
c:\windows\system32\spoolsv.exe
spoolss 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 246.50 KB (252,416 bytes) 3/29/2005 2:44 PM Microsoft Corporation
c:\windows\system32\spoolss.dll
localspl 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 943.50 KB (966,144 bytes) 3/29/2005 2:44 PM Microsoft Corporation
c:\windows\system32\localspl.dll
cnbjmon 5.2.3790.1224 (dnsrv(skatari).040514-1058) 100.00 KB (102,400 bytes) 3/21/2005 3:09 PM Microsoft Corporation
c:\windows\system32\cnbjmon.dll
pjlmon 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 42.50 KB (43,520 bytes) 3/21/2005 3:18 PM Microsoft Corporation
c:\windows\system32\pjlmon.dll
tcpmon 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 143.00 KB (146,432 bytes) 3/29/2005 2:45 PM Microsoft Corporation
c:\windows\system32\tcpmon.dll
wsnmp32 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 128.50 KB (131,584 bytes) 3/29/2005 2:45 PM Microsoft Corporation
c:\windows\system32\wsnmp32.dll
tcpmib 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 47.00 KB (48,128 bytes) 3/29/2005 2:45 PM Microsoft Corporation
c:\windows\system32\tcpmib.dll
wsock32 5.2.3790.0 (srv03_rtm.030324-2048) 23.00 KB (23,552 bytes) 3/29/2005 2:45 PM Microsoft Corporation
c:\windows\system32\wsock32.dll
mgmtapi 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 47.00 KB (48,128 bytes) 3/29/2005 2:44 PM Microsoft Corporation
c:\windows\system32\mgmtapi.dll
snmpapi 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 61.00 KB (62,464 bytes) 3/29/2005 2:44 PM Microsoft Corporation
c:\windows\system32\snmpapi.dll
usbmon 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 49.00 KB (50,176 bytes) 3/29/2005 2:45 PM Microsoft Corporation
c:\windows\system32\usbmon.dll
winrnr 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 47.50 KB (48,640 bytes) 3/29/2005 2:45 PM Microsoft Corporation
c:\windows\system32\winrnr.dll
win32spl 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 276.00 KB (282,624 bytes) 3/29/2005 2:45 PM Microsoft Corporation
c:\windows\system32\win32spl.dll
inetpp 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 214.50 KB

(219,648 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\inetpp.dll
icmp 5.2.3790.0 (srv03_rtm.030324-2048) 2.50 KB (2,560 bytes)3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\icmp.dll
ersvc 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 66.50 KB (68,096 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\ersvc.dll
termsrv 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 680.00 KB (696,320 bytes) 12/10/2004 1:54 PM Microsoft Corporation c:\windows\system32\termsrv.dll
icaapi 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 33.50 KB (34,304 bytes) 12/10/2004 1:54 PM Microsoft Corporation c:\windows\system32\icaapi.dll
mstlsapi 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 340.50 KB (348,672 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\mstlsapi.dll
rdpwsx 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 325.13 KB (332,936 bytes) 12/10/2004 1:54 PM Microsoft Corporation c:\windows\system32\rdpwsx.dll
rdpsnd 5.2.3790.0 (srv03_rtm.030324-2048) 63.00 KB (64,512 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\rdpsnd.dll
scredir 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 69.00 KB (70,656 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\scredir.dll
cscui 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 628.00 KB (643,072 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\cscui.dll
msacm32 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 87.00 KB (89,088 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\msacm32.drv
msacm32 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 276.50 KB (283,136 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\msacm32.dll
printui 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.13 MB (1,186,304 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\printui.dll
cfgmgr32 5.2.3790.0 (srv03_rtm.030324-2048) 16.00 KB (16,384 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\cfgmgr32.dll
imaadp32 5.2.3790.0 (srv03_rtm.030324-2048) 55.00 KB (56,320 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\imaadp32.acm
drprov 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 32.50 KB (33,280 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\drprov.dll
ntlanman 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 117.00 KB (119,808 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\ntlanman.dll
netui0 5.2.3790.0 (srv03_rtm.030324-2048) 181.50 KB (185,856 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\netui0.dll
netui1 5.2.3790.0 (srv03_rtm.030324-2048) 482.00 KB (493,568 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\netui1.dll
davclnt 5.2.3790.0 (srv03_rtm.030324-2048) 59.00 KB (60,416 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\davclnt.dll
msadp32 5.2.3790.0 (srv03_rtm.030324-2048) 49.00 KB (50,176 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\msadp32.acm
msg711 5.2.3790.0 (srv03_rtm.030324-2048) 33.00 KB (33,792 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\msg711.acm
msgsm32 5.2.3790.0 (srv03_rtm.030324-2048) 66.50 KB (68,096 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\msgsm32.acm
tssoft32 1.01 29.00 KB (29,696 bytes) 3/29/2005 2:45 PM DSP GROUP, INC. c:\windows\system32\tssoft32.acm
tsd32 1.03 38.00 KB (38,912 bytes) 3/29/2005 2:45 PM DSP GROUP, INC. c:\windows\system32\tsd32.dll
rdpclip 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 211.00 KB (216,064 bytes) 12/10/2004 1:54 PM Microsoft Corporation c:\windows\system32\rdpclip.exe
urlmon 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 1.53 MB (1,600,000 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\urlmon.dll
explorer 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 1.64 MB (1,720,320 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\explorer.exe
browseui 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 2.42 MB (2,542,592 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\browseui.dll
shdocvw 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 3.49 MB (3,658,240 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\shdocvw.dll
themeui 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 891.00 KB (912,384 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\themeui.dll
msimg32 5.2.3790.0 (srv03_rtm.030324-2048) 7.00 KB (7,168 bytes)3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\msimg32.dll
linkinfo 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 46.50 KB (47,616 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\linkinfo.dll
ntshrui 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 244.00 KB (249,856 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\ntshrui.dll
browselc 6.00.3790.0 (srv03_rtm.030324-2048) 61.50 KB (62,976 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\browselc.dll
mlang 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 813.50 KB (833,024 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\mlang.dll
shdoclc 6.00.3790.0 (srv03_rtm.030324-2048) 588.00 KB (602,112 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\shdoclc.dll
webcheck 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 699.00 KB (715,776 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\webcheck.dll
stobject 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 175.00 KB (179,200 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\stobject.dll
batmeter 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 61.00 KB (62,464 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\batmeter.dll
powrprof 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 44.00 KB (45,056 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\powrprof.dll
mydocs 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 130.50 KB (133,632 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\mydocs.dll
mmc 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 2.51 MB (2,631,168 bytes) 3/29/2005 2:44 PM

Microsoft Corporation
c:\windows\system32\mmc.exe
mfc42u 6.50.4245.0 3.35 MB (3,510,272 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\mfc42u.dll
oleacc 4.2.5406.0 (srv03_rtm.030324-2048) 485.00 KB (496,640 bytes)
3/29/2005 2:44 PM Microsoft Corporation
c:\windows\system32\oleacc.dll
mmcbase 5.2.3790.0 (srv03_rtm.030324-2048) 139.00 KB (142,336 bytes)
3/29/2005 2:44 PM Microsoft Corporation
c:\windows\system32\mmcbase.dll
comdlg32 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 745.50 KB (763,392 bytes) 3/29/2005 2:43 PM
Microsoft Corporation
c:\windows\system32\comdlg32.dll
mmcndmgr 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 3.18 MB (3,331,584 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\mmcndmgr.dll
msxml3 8.80.1006.0 3.32 MB (3,481,600 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\msxml3.dll
cmprops 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 492.00 KB (503,808 bytes) 12/10/2004 1:53 PM
Microsoft Corporation
c:\windows\system32\cmprops.dll
mmfutil 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 28.00 KB (28,672 bytes) 12/10/2004 1:53 PM
Microsoft Corporation
c:\windows\system32\mmfutil.dll
ntmsmgr 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.21 MB (1,268,224 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\ntmsmgr.dll
ntmsapi 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 128.00 KB (131,072 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\ntmsapi.dll
els 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 520.50 KB (532,992 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\els.dll
dfrgsnap 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 107.00 KB (109,568 bytes) 3/29/2005 2:43 PM
Microsoft Corp. and Executive Software International, Inc.
c:\windows\system32\dfrgsnap.dll
dfrgres 5.2.3790.0 (srv03_rtm.030324-2048) 50.00 KB (51,200 bytes)
3/29/2005 2:43 PM Microsoft Corp. and Executive Software International, Inc. c:\windows\system32\dfrgres.dll
mycomput 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 267.50 KB (273,920 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\mycomput.dll
filemgmt 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 928.00 KB (950,272 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\filemgmt.dll
wbemcntl 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 549.50 KB (562,688 bytes) 12/10/2004 1:53 PM
Microsoft Corporation
c:\windows\system32\wbem\wbemcntl.dll
localsec 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 644.50 KB (659,968 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\localsec.dll
smlogcfg 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.01 MB (1,056,256 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\smlogcfg.dll
pdh 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 807.00 KB (826,368 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\pdh.dll
odbc32 3.526.1828.0 (srv03_sp1_rtm.050321-2020) 704.00 KB (720,896 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\odbc32.dll
odbcbcp 2000.086.1828.00 (srv03_sp1_rtm.050321-2020) 52.00 KB (53,248 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\odbcbcp.dll
odbcint 3.526.1828.0 (srv03_sp1_rtm.050321-2020) 88.00 KB (90,112 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\odbcint.dll
snmpsnap 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 565.00 KB (578,560 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\snmpsnap.dll
dmdskmgr 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 542.00 KB (555,008 bytes) 3/29/2005 2:43 PM
Microsoft Corporation
c:\windows\system32\dmdskmgr.dll
dmutil 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 73.00 KB (74,752 bytes) 3/21/2005 3:12 PM
Microsoft Corporation
c:\windows\system32\dmutil.dll
dmdskres 5.2.3790.0 (srv03_rtm.030324-2048) 115.00 KB (117,760 bytes)
3/29/2005 2:43 PM Microsoft Corporation
c:\windows\system32\dmdskres.dll
devmgr 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 628.00 KB (643,072 bytes) 3/29/2005 2:43 PM
Microsoft Corporation
c:\windows\system32\devmgr.dll
rasuser 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 513.50 KB (525,824 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\rasuser.dll
dsprop 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 361.50 KB (370,176 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\dsprop.dll
dsuiext 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 241.00 KB (246,784 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\dsuiext.dll
mprsnap 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 2.84 MB (2,979,328 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\mprsnap.dll
rtrfiltr 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 240.00 KB (245,760 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\rtrfiltr.dll
servdeps 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 151.50 KB (155,136 bytes) 12/10/2004 1:53 PM
Microsoft Corporation
c:\windows\system32\servdeps.dll
riched32 5.2.3790.0 (srv03_rtm.030324-2048) 5.00 KB (5,120 bytes)3/29/2005 2:44 PM Microsoft Corporation
c:\windows\system32\riched32.dll
riched20 5.31.23.1224 1.38 MB (1,451,008 bytes) 3/29/2005 2:44 PM
Microsoft Corporation
c:\windows\system32\riched20.dll
adsnt 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 753.50 KB (771,584 bytes) 3/29/2005 2:43 PM
Microsoft Corporation
c:\windows\system32\adsnt.dll
dmdlgs 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 686.00 KB (702,464 bytes) 3/29/2005 2:43 PM
Microsoft Corporation
c:\windows\system32\dmdlgs.dll
dmview 5.2.3790.0 (srv03_rtm.030324-2048) 207.00 KB (211,968 bytes)
3/29/2005 2:43 PM Microsoft Corporation
c:\windows\system32\dmview.ocx
vds_ps 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 33.00 KB (33,792 bytes) 3/29/2005 2:45 PM
Microsoft Corporation
c:\windows\system32\vds_ps.dll
dmvdsitf 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 360.00 KB (368,640 bytes) 3/29/2005 2:43 PM
Microsoft Corporation
c:\windows\system32\dmvdsitf.dll
vds 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 744.00 KB (761,856 bytes) 3/29/2005 2:45 PM
Microsoft Corporation
c:\windows\system32\vds.exe

osuninst 5.2.3790.0 (srv03_rtm.030324-2048) 6.50 KB (6,656 bytes)3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\osuninst.dll
vdsutil 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 137.50 KB (140,800 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\vdsutil.dll
vdsbas 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 469.50 KB (480,768 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\vdsbas.dll
fmifs 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 61.50 KB (62,976 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\fmifs.dll
ulib 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 477.50 KB (488,960 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\ulib.dll
ifsutil 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 250.50 KB (256,512 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\ifsutil.dll
vdsdyndr 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 743.00 KB (760,832 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\vdsdyndr.dll
dmintf 5.2.3790.0 (srv03_rtm.030324-2048) 25.00 KB (25,600 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\dmintf.dll
dmadmin 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 724.50 KB (741,888 bytes) 3/29/2005 2:43 PM Microsoft Corporation c:\windows\system32\dmadmin.exe
helpctr 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 2.01 MB (2,105,344 bytes) 12/10/2004 1:56 PM Microsoft Corporation c:\windows\pchealth\helpctr\binaries\helpctr.exe
hcappres 5.2.3790.0 (srv03_rtm.030324-2048) 6.00 KB (6,144 bytes) 12/10/2004 1:56 PM Microsoft Corporation c:\windows\pchealth\helpctr\binaries\hcappres.dll
itss 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 410.00 KB (419,840 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\itss.dll
pchshell 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 290.50 KB (297,472 bytes) 12/10/2004 1:56 PM Microsoft Corporation c:\windows\pchealth\helpctr\binaries\pchshell.dll
mshtml 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 8.85 MB (9,282,048 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\mshtml.dll
msls31 3.10.349.0 502.50 KB (514,560 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\msls31.dll
msimtf 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 586.50 KB (600,576 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\msimtf.dll
msctf 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 983.50 KB (1,007,104 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\msctf.dll
jscript 5.6.0.8827 1.24 MB (1,304,576 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\jscript.dll
imm32 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 322.50 KB (330,240 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\imm32.dll
mshtmled 6.00.3790.1828 (srv03_sp1_rtm.050321-2020) 1.46 MB (1,531,392 bytes) 3/29/2005 2:44 PM Microsoft Corporation c:\windows\system32\mshtmled.dll
vbscript 5.6.0.8827 1.07 MB (1,118,208 bytes) 3/29/2005 2:45 PM Microsoft Corporation c:\windows\system32\vbscript.dll
msinfo 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 1.26 MB (1,321,472 bytes) 12/10/2004 1:56 PM Microsoft Corporation c:\windows\pchealth\helpctr\binaries\msinfo.dll
helpsvc 5.2.3790.1828 (srv03_sp1_rtm.050321-2020) 2.21 MB (2,320,384 bytes) 12/10/2004 1:56 PM Microsoft Corporation c:\windows\pchealth\helpctr\binaries\helpsvc.exe

[Services]

Display Name Name State Start ModeService Type Path Error Control Start Name Tag ID
Application Experience Lookup Service AeLookupSvc Running Auto Share Process c:\windows\system32\svchost.exe -k netsvcs Normal LocalSystem 0
Alerter Alerter Stopped Disabled Share Process c:\windows\system32\svchost.exe -k localservice Normal NT AUTHORITY\LocalService 0
Application Layer Gateway Service ALG Running Manual Own Process c:\windows\system32\alg.exe Normal NT AUTHORITY\LocalService 0
Application Management AppMgmt Stopped Manual Share Process c:\windows\system32\svchost.exe -k netsvcs Normal LocalSystem 0
ASP.NET State Service aspnet_state Stopped Manual Own Process c:\windows\microsoft.net\framework64\v2.0.50215\aspnet_state.exe Normal NT AUTHORITY\NetworkService 0
Windows Audio AudioSrv Stopped Disabled Share Process c:\windows\system32\svchost.exe -k netsvcs Normal LocalSystem 0
Background Intelligent Transfer Service BITS Stopped Manual Share Process c:\windows\system32\svchost.exe -k netsvcs Normal LocalSystem 0
Computer Browser Browser Running Auto Share Process c:\windows\system32\svchost.exe -k netsvcs Normal LocalSystem 0
Indexing Service CiSvc Stopped Disabled Share Process c:\windows\system32\cisvc.exe Normal LocalSystem 0
ClipBook ClipSrv Stopped Disabled Own Process c:\windows\system32\clipsrv.exe Normal LocalSystem 0
.NET Runtime Optimization Service v2.0.50215_X86 clr_optimization_v2.0.50215_32 Stopped Manual Own Process c:\windows\microsoft.net\framework\v2.0.50215\mscorsvw.exe Ignore LocalSystem 0
.NET Runtime Optimization Service v2.0.50215_I64 clr_optimization_v2.0.50215_64 Stopped Manual Own Process c:\windows\microsoft.net\framework64\v2.0.50215\mscorsvw.exe Ignore LocalSystem 0
COM+ System Application COMSysApp Stopped Manual Own Process c:\windows\system32\dllhost.exe /processid:{02d4b3f1-fd88-11d1-960d-00805fc79235} Normal LocalSystem 0
Cryptographic Services CryptSvc Running Auto Share Process c:\windows\system32\svchost.exe -k netsvcs Normal LocalSystem 0
DCOM Server Process Launcher DcomLaunch Running Auto Share Process c:\windows\system32\svchost.exe -k dcomlaunch Normal LocalSystem 0
Distributed File System Dfs Stopped Manual Own Process c:\windows\system32\dfssvc.exe Normal LocalSystem 0

DHCP Client Dhcp Running
Auto Share Process
c:\windows\system32\svchost.ex
e -k networkservice Normal NT
AUTHORITY\NetworkService 0
Logical Disk Manager Administrative
Service dmadmin Running Manual
Share Process
c:\windows\system32\dmadmin.e
xe /com Normal LocalSystem
0
Logical Disk Manager dmserver Running
Auto Share Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
DNS Client Dnscache Running
Auto Share Process
c:\windows\system32\svchost.ex
e -k networkservice Normal NT
AUTHORITY\NetworkService 0
Error Reporting Service ERSvc
Running Auto Share
Process
c:\windows\system32\svchost.ex
e -k winerr Ignore LocalSystem
0
Event Log Eventlog Running Auto
Share Process
c:\windows\system32\services.ex
e Normal LocalSystem
0
COM+ Event System EventSystem
Running Auto Share
Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
Help and Support helpsvc Running
Auto Share Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
Human Interface Device Access HidServ
Stopped Disabled Share
Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
HTTP SSL HTTPFilter Stopped
Manual Share Process
c:\windows\system32\lsass.exe
Normal LocalSystem
0
IAS Jet Database Access IASJet
Stopped Manual Share
Process
c:\windows\syswow64\svchost.e
xe -k iasjet Normal LocalSystem
0
IMAPI CD-Burning COM Service
ImapiService Stopped
Disabled Own Process
c:\windows\system32\imapi.exe
Normal LocalSystem
0
Intersite Messaging IsmServ Stopped
Disabled Own Process
c:\windows\system32\ismserv.ex
e Normal LocalSystem
0
Kerberos Key Distribution Center
kdc Stopped Disabled
Share Process
c:\windows\system32\lsass.exe
Normal LocalSystem
0
Server lanmanserver Running
Auto Share Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
Workstation lanmanworkstation
Running Auto Share
Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
License Logging LicenseService
Stopped Disabled Own
Process c:\windows\system32\llssrv.exe
Normal NT
AUTHORITY\NetworkService 0
TCP/IP NetBIOS Helper LmHosts
Running Auto Share
Process
c:\windows\system32\svchost.ex
e -k localservice Normal NT
AUTHORITY\LocalService 0
Messenger Messenger Stopped Disabled
Share Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
NetMeeting Remote Desktop Sharing
mnmsrvc Stopped Manual
Own Process
c:\windows\system32\mnmsrvc.e
xe Normal LocalSystem
0
Distributed Transaction Coordinator
MSDTC Running Auto
Own Process
c:\windows\system32\msdtc.exe
Normal NT
AUTHORITY\NetworkService 1
msftesql msftesql Stopped Manual
Own Process
"c:\program files\microsoft sql
server\mssql.1\mssql\binn\msftesql.exe" -
s:mssql.1 -f:mssqlserver Normal
LocalSystem 0
Windows Installer MSIServer Stopped
Manual Share Process
c:\windows\system32\msiexec.ex
e /v Normal LocalSystem
0
SQL Server (MSSQLSERVER)
MSSQLSERVER Stopped
Manual Own Process
"c:\program files\microsoft sql
server\mssql.1\mssql\binn\sqlservr.exe" -
smssqlserver Normal
LocalSystem 0
MSSQLServerADHelper
MSSQLServerADHelper
Stopped Manual Own
Process "c:\program files\microsoft sql
server\90\shared\sqladhlp90.exe" Normal
LocalSystem 0
Network DDE NetDDE Stopped
Disabled Share Process
c:\windows\system32\netdde.exe
Normal LocalSystem
0
Network DDE DSDM NetDDEdsdm
Stopped Disabled Share
Process c:\windows\system32\netdde.exe
Normal LocalSystem
0
Net Logon Netlogon Stopped Manual
Share Process
c:\windows\system32\lsass.exe
Normal LocalSystem
0
Network Connections Netman Running
Manual Share Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
Network Location Awareness (NLA)
Nla Running Manual
Share Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
File Replication NtFrs Stopped
Manual Own Process
c:\windows\system32\ntfrs.exe
Ignore LocalSystem
0
NT LM Security Support Provider
NtLmSsp Stopped Manual
Share Process
c:\windows\system32\lsass.exe
Normal LocalSystem
0
Removable Storage NtmsSvc Stopped
Manual Share Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
Plug and Play PlugPlay Running
Auto Share Process
c:\windows\system32\services.ex
e Normal LocalSystem
0
IPSEC Services PolicyAgent
Running Auto Share
Process c:\windows\system32\lsass.exe
Normal LocalSystem
0
Protected Storage ProtectedStorage
Running Auto Share
Process c:\windows\system32\lsass.exe
Normal LocalSystem
0
Remote Access Auto Connection Manager
RasAuto Stopped Manual
Share Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
Remote Access Connection Manager
RasMan Stopped Manual
Share Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
Remote Desktop Help Session Manager
RDSessMgr Stopped
Manual Own Process
c:\windows\system32\sessmgr.ex
e Normal LocalSystem
0
Routing and Remote Access
RemoteAccess Stopped
Disabled Share Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
Remote Registry RemoteRegistry
Running Auto Share
Process
c:\windows\system32\svchost.ex

e -k regsvc Normal NT
AUTHORITY\LocalService 0
Remote Procedure Call (RPC) Locator
RpcLocator Stopped
Manual Own Process
c:\windows\system32\locator.exe
Normal NT
AUTHORITY\NetworkService 0
Remote Procedure Call (RPC) RpcSs
Running Auto Share
Process
c:\windows\system32\svchost.ex
e -k rpcss Normal NT
AUTHORITY\NetworkService 0
Resultant Set of Policy Provider RSoPProv
Stopped Manual Share
Process
c:\windows\system32\rsopprov.e
xe Normal LocalSystem
0
Special Administration Console Helper
sacsvr Running Manual
Share Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
Security Accounts Manager SamSs
Running Auto Share
Process c:\windows\system32\lsass.exe
Normal LocalSystem
0
Smart Card SCardSvr Stopped
Manual Share Process
c:\windows\system32\scardsvr.ex
e Ignore NT
AUTHORITY\LocalService 0
Task Scheduler Schedule Running
Auto Share Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
Secondary Logon seclogon Running
Auto Share Process
c:\windows\system32\svchost.ex
e -k netsvcs Ignore
LocalSystem 0
System Event Notification SENS
Running Auto Share
Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
Windows Firewall/Internet Connection
Sharing (ICS) SharedAccess
Running Auto Share
Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
Shell Hardware Detection
ShellHWDetection Running
Auto Share Process
c:\windows\system32\svchost.ex
e -k netsvcs Ignore
LocalSystem 0
Print Spooler Spooler Running
Auto Own Process
c:\windows\system32\spoolsv.ex
e Normal LocalSystem
0
SQL Browser SQLBrowser
Stopped Manual Own
Process "c:\program files\microsoft sql
server\90\shared\sqlbrowser.exe" Normal
LocalSystem 0
SQL Server Agent (MSSQLSERVER)
SQLSERVERAGENT
Stopped Manual Own
Process "c:\program files\microsoft sql
server\mssql.1\mssql\binn\sqlagent90.exe" -i
mssqlserver Normal
LocalSystem 0
SQL Writer SQLWriterStopped
Manual Own Process
"c:\program files\microsoft sql
server\90\shared\sqlwriter.exe" Normal
LocalSystem 0
Windows Image Acquisition (WIA)
stisvc Stopped Disabled
Share Process
c:\windows\system32\svchost.ex
e -k imgsvc Normal NT
AUTHORITY\LocalService 0
Microsoft Software Shadow Copy Provider
swprv Stopped Manual
Own Process
c:\windows\system32\svchost.ex
e -k swprv Normal LocalSystem
0
Performance Logs and Alerts
SysmonLog Stopped
Manual Own Process
c:\windows\system32\smlogsvc.e
xe Normal NT
Authority\NetworkService 0
Telephony TapiSrv Stopped Manual
Share Process
c:\windows\system32\svchost.ex
e -k tapisrvNormal LocalSystem
0
Terminal Services TermService
Running Manual Share
Process
c:\windows\system32\svchost.ex
e -k termsvcs Normal
LocalSystem 0
Themes Themes Stopped Disabled
Share Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
Telnet TlntSvr Stopped Disabled
Own Process
c:\windows\system32\tlntsvr.exe
Normal NT
AUTHORITY\LocalService 0
Distributed Link Tracking Server TrkSvr
Stopped Disabled Share
Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
Distributed Link Tracking Client TrkWks
Running Auto Share
Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
Terminal Services Session Directory
Tssdis Stopped Disabled
Own Process
c:\windows\system32\tssdis.exe
Normal LocalSystem
0
Uninterruptible Power Supply UPS
Stopped Manual Own
Process c:\windows\system32\ups.exe
Normal NT
AUTHORITY\LocalService 0
Virtual Disk Service vds Running
Manual Own Process
c:\windows\system32\vds.exe
Normal LocalSystem
0
Volume Shadow Copy VSS
Stopped Auto Own
Process c:\windows\system32\vssvc.exe
Normal LocalSystem
0
Windows Time W32Time Running
Auto Share Process
c:\windows\system32\svchost.ex
e -k localservice Normal NT
AUTHORITY\LocalService 0
WebClient WebClient Stopped Disabled
Share Process
c:\windows\system32\svchost.ex
e -k localservice Normal NT
AUTHORITY\LocalService 0
WinHTTP Web Proxy Auto-Discovery
Service WinHttpAutoProxySvc
Stopped Manual Share
Process
c:\windows\system32\svchost.ex
e -k localservice Normal NT
AUTHORITY\LocalService 0
Windows Management Instrumentation
winmgmt Running Auto
Share Process
c:\windows\system32\svchost.ex
e -k netsvcs Ignore
LocalSystem 0
Windows Management Instrumentation
Driver Extensions Wmi Stopped
Manual Share Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
WMI Performance Adapter
WmiApSrv Stopped
Manual Own Process
c:\windows\system32\wbem\wmi
apsrv.exe Normal LocalSystem
0
Automatic Updates wuauserv Running
Auto Share Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
Wireless Configuration WZCSVC
Running Auto Share
Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0
Network Provisioning Service xmlprov
Stopped Manual Share
Process
c:\windows\system32\svchost.ex
e -k netsvcs Normal
LocalSystem 0

[Program Groups]

Group Name Name User
Name
Accessories Default
User:Accessories Default User
Accessories\Accessibility Default
User:Accessories\Accessibility Default
User
Accessories\Entertainment Default
User:Accessories\Entertainment Default
User

Startup Default User:Startup Default User
Accessories All Users:Accessories All Users
Accessories\Accessibility All Users:Accessories\Accessibility All Users
Accessories\Communications All Users:Accessories\Communications All Users
Accessories\Entertainment All Users:Accessories\Entertainment All Users
Accessories\System Tools All Users:Accessories\System Tools All Users
Administrative Tools All Users:Administrative Tools All Users
Debugging Tools for Windows 64-bit All Users:Debugging Tools for Windows 64-bit All Users
Microsoft SQL Server 2005 CTP All Users:Microsoft SQL Server 2005 CTP All Users
Microsoft SQL Server 2005 CTP\Configuration Tools All Users:Microsoft SQL Server 2005 CTP\Configuration Tools All Users
Startup All Users:Startup All Users
Accessories NT AUTHORITY\SYSTEM:Accessories NT AUTHORITY\SYSTEM
Accessories\Accessibility NT AUTHORITY\SYSTEM:Accessories\Accessibility NT AUTHORITY\SYSTEM
Accessories\Entertainment NT AUTHORITY\SYSTEM:Accessories\Entertainment NT AUTHORITY\SYSTEM
Startup NT AUTHORITY\SYSTEM:Startup NT AUTHORITY\SYSTEM
Accessories SQLOLY2\Administrator:Accessories SQLOLY2\Administrator
Accessories\Accessibility SQLOLY2\Administrator:Accessories\Accessibility SQLOLY2\Administrator
Accessories\Entertainment SQLOLY2\Administrator:Accessories\Entertainment SQLOLY2\Administrator
Administrative Tools SQLOLY2\Administrator:Administrative Tools SQLOLY2\Administrator
Startup SQLOLY2\Administrator:Startup SQLOLY2\Administrator

[Startup Programs]

Program Command User Name Location
desktop desktop.iniNT AUTHORITY\SYSTEM Startup
desktop desktop.ini SQLOLY2\Administrator Startup
desktop desktop.ini.DEFAULT Startup
desktop desktop.iniAll Users Common Startup

[OLE Registration]

Object Local Server
Sound (OLE2) sndrec32.exe
Media Clip mplay32.exe
Video Clipmplay32.exe /avi
MIDI Sequence mplay32.exe /mid
Sound Not Available
Media Clip Not Available
WordPad Document "%programfiles%\windows nt\accessories\wordpad.exe"
Bitmap Image mspaint.exe

[Windows Error Reporting]

Time Type Details

[Internet Settings]

[Internet Explorer]

[Following are sub-categories of this main category]
[Summary]

Item Value
Version 6.0.3790.1828
Build 63790.1828
Application Path C:\Program Files\Internet Explorer
Language English (United States)
Active Printer Not Available

Cipher Strength 128-bit
Content Advisor Disabled
IEAK Install No

[File Versions]

File Version Size Date Path Company
actxprxy.dll 6.0.3790.1828 237 KB 3/22/2005 12:32:37 AM C:\WINDOWS\system32 Microsoft Corporation
advpack.dll 6.0.3790.1828 260 KB 3/22/2005 12:32:38 AM C:\WINDOWS\system32 Microsoft Corporation
asctrls.ocx 6.0.3790.0 219 KB 3/25/2003 2:18:37 PM C:\WINDOWS\system32 Microsoft Corporation
browselc.dll 6.0.3790.0 62 KB 3/25/2003 2:16:19 PM C:\WINDOWS\system32 Microsoft Corporation
browseui.dll 6.0.3790.1828 2,483 KB 3/22/2005 12:32:43 AM C:\WINDOWS\system32 Microsoft Corporation
cdfview.dll 6.0.3790.1828 307 KB 3/22/2005 12:32:44 AM C:\WINDOWS\system32 Microsoft Corporation
comctl32.dll 5.82.3790.1828 1,764 KB 3/22/2005 12:32:47 AM C:\WINDOWS\system32 Microsoft Corporation
dxtrans.dll 6.3.3790.1828 618 KB 3/22/2005 12:32:57 AM C:\WINDOWS\system32 Microsoft Corporation
dxtmsft.dll 6.3.3790.1828 986 KB 3/22/2005 12:32:57 AM C:\WINDOWS\system32 Microsoft Corporation
iecont.dll <File Missing> Not Available Not Available Not Available Not Available
iecontlc.dll <File Missing> Not Available Not Available Not Available Not Available
iedkcs32.dll 16.0.3790.1828 702 KB 3/22/2005 12:33:04 AM C:\WINDOWS\system32 Microsoft Corporation
iepeers.dll 6.0.3790.1828 701 KB 3/22/2005 12:33:05 AM C:\WINDOWS\system32 Microsoft Corporation
iesetup.dll 6.0.3790.1828 98 KB 3/22/2005 12:33:05 AM C:\WINDOWS\system32 Microsoft Corporation
ieuinit.inf Not Available 24 KB 3/21/2005 10:02:27 PM C:\WINDOWS\system32 Not Available
iexplore.exe 6.0.3790.1828 108 KB 3/21/2005 10:59:45 PM C:\Program Files\Internet Explorer Microsoft Corporation
imgutil.dll 6.0.3790.1828 114 KB 3/22/2005 12:33:06 AM C:\WINDOWS\system32 Microsoft Corporation
inetcpl.cpl 6.0.3790.1828 666 KB 3/22/2005 12:33:06 AM C:\WINDOWS\system32 Microsoft Corporation
inetcplc.dll 6.0.3790.0 108 KB 3/25/2003 2:17:29 PM C:\WINDOWS\system32 Microsoft Corporation
inseng.dll 6.0.3790.1828 276 KB 3/22/2005 12:33:06 AM C:\WINDOWS\system32 Microsoft Corporation
mlang.dll 6.0.3790.1828 814 KB 3/22/2005 12:33:11 AM C:\WINDOWS\system32 Microsoft Corporation
msencode.dll <File Missing> Not Available Not Available Not Available
mshta.exe 6.0.3790.1828 68 KB 3/21/2005 10:56:54 PM C:\WINDOWS\system32 Microsoft Corporation
mshtml.dll 6.0.3790.1828 9,065 KB 3/22/2005 12:33:17 AM C:\WINDOWS\system32 Microsoft Corporation
mshtml.tlb 6.0.3790.1828 1,319 KB 3/21/2005 9:57:20 PM C:\WINDOWS\system32 Microsoft Corporation
mshtmled.dll 6.0.3790.1828 1,496 KB 3/22/2005 12:33:17 AM C:\WINDOWS\system32 Microsoft Corporation
mshtmler.dll 6.0.3790.1828 56 KB 3/21/2005 9:57:24 PM C:\WINDOWS\system32 Microsoft Corporation
msident.dll 6.0.3790.1828 144 KB 3/22/2005 12:33:18 AM C:\WINDOWS\system32 Microsoft Corporation

msidntld.dll 6.0.3790.0 14 KB 3/25/2003 2:17:49 PM C:\WINDOWS\system32 Microsoft Corporation
msieftp.dll 6.0.3790.1828 579 KB 3/22/2005 12:33:18 AM C:\WINDOWS\system32 Microsoft Corporation
msrating.dll 6.0.3790.1828 415 KB 3/22/2005 12:33:20 AM C:\WINDOWS\system32 Microsoft Corporation
mstime.dll 6.0.3790.1828 1,800 KB 3/22/2005 12:33:20 AM C:\WINDOWS\system32 Microsoft Corporation
occache.dll 6.0.3790.1828 218 KB 3/22/2005 12:33:24 AM C:\WINDOWS\system32 Microsoft Corporation
proctexe.ocx <File Missing> Not Available Not Available Not Available
sendmail.dll 6.0.3790.1828 109 KB 3/22/2005 12:33:33 AM C:\WINDOWS\system32 Microsoft Corporation
shdoclc.dll 6.0.3790.0 588 KB 3/25/2003 9:45:14 AM C:\WINDOWS\system32 Microsoft Corporation
shdocvw.dll 6.0.3790.1828 3,573 KB 3/22/2005 12:33:33 AM C:\WINDOWS\system32 Microsoft Corporation
shfolder.dll 6.0.3790.1828 43 KB 3/22/2005 12:33:34 AM C:\WINDOWS\system32 Microsoft Corporation
shlwapi.dll 6.0.3790.1828 804 KB 3/22/2005 12:33:34 AM C:\WINDOWS\system32 Microsoft Corporation
tdc.ocx 1.3.0.3130 177 KB 3/25/2003 2:18:38 PM C:\WINDOWS\system32 Microsoft Corporation
url.dll 6.0.3790.1828 49 KB 3/22/2005 12:33:37 AM C:\WINDOWS\system32 Microsoft Corporation
urlmon.dll 6.0.3790.1828 1,563 KB 3/22/2005 12:33:38 AM C:\WINDOWS\system32 Microsoft Corporation
webcheck.dll 6.0.3790.1828 699 KB 3/22/2005 12:33:38 AM C:\WINDOWS\system32 Microsoft Corporation
wininet.dll 6.0.3790.1828 1,658 KB 3/22/2005 12:33:38 AM C:\WINDOWS\system32 Microsoft Corporation

SQL Server

SQL install: The installation followed the default options. For the sort order Latin1_General_binary was chosen. Client tools and development tools were not installed on the server. Mixed mode authentication was used.

SQL Startup parameters: -c -x - E -T697

-x Disable the Keeping of CPU time and cache-hit ratio statistics.
-c Start SQL Server independently of Windows NT Service Control Manager
-E Increase the number of consecutive extents allocated per file to 4
-T697 This trace flag turns on behavior that will be a default behavior in the released version of SQL Server 2005

The following parameters were changed from their default values:

name	minimum	maximum	config_value	run_value
affinity mask	-2147483648	2147483647	65535	65535
allow updates	0	1	1	1
lightweight pooling	0	1	1	1
max server memory (MB) 16		2147483647	60000	60000
min server memory (MB) 0		2147483647	55000	55000
network packet size (B)	512	32767	32767	32767
recovery interval (min)	0	32767	32767	32767
show advanced options	0	1	1	1
query wait	-1	2147483647	2147483647	2147483647

Appendix B: Database Build Scripts

Create Database

```
if exists (select name from sysdatabases where name = 'tpch1000g')
drop database tpch1000g

CREATE DATABASE tpch1000g
ON PRIMARY
(       NAME            = TpchRoot,
        FILENAME        = "g:\database\TpchRoot.mdf",
        SIZE            = 8MB,
        FILEGROWTH      = 1MB),

FILEGROUP       LINEITEM_FG

(NAME=li_1, FILENAME= "g:\mnt\li\1\", SIZE=88000MB),
(NAME=li_2, FILENAME= "g:\mnt\li\2\", SIZE=88000MB),
(NAME=li_3, FILENAME= "g:\mnt\li\3\", SIZE=88000MB),
(NAME=li_4, FILENAME= "g:\mnt\li\4\", SIZE=88000MB),
(NAME=li_5, FILENAME= "g:\mnt\li\5\", SIZE=88000MB),
(NAME=li_6, FILENAME= "g:\mnt\li\6\", SIZE=88000MB),
(NAME=li_7, FILENAME= "g:\mnt\li\7\", SIZE=88000MB),
(NAME=li_8, FILENAME= "g:\mnt\li\8\", SIZE=88000MB),
(NAME=li_9, FILENAME= "g:\mnt\li\9\", SIZE=88000MB),
(NAME=li_10,FILENAME="g:\mnt\li\10\",SIZE=88000MB),
(NAME=li_11,FILENAME="g:\mnt\li\11\",SIZE=88000MB),
(NAME=li_12,FILENAME="g:\mnt\li\12\",SIZE=88000MB),
(NAME=li_13,FILENAME="g:\mnt\li\13\",SIZE=88000MB),
(NAME=li_14,FILENAME="g:\mnt\li\14\",SIZE=88000MB),
(NAME=li_15,FILENAME="g:\mnt\li\15\",SIZE=88000MB),
(NAME=li_16,FILENAME="g:\mnt\li\16\",SIZE=88000MB),
(NAME=li_17,FILENAME="g:\mnt\li\17\",SIZE=88000MB),
(NAME=li_18,FILENAME="g:\mnt\li\18\",SIZE=88000MB),
(NAME=li_19,FILENAME="g:\mnt\li\19\",SIZE=88000MB),
(NAME=li_20,FILENAME="g:\mnt\li\20\",SIZE=88000MB),
(NAME=li_21,FILENAME="g:\mnt\li\21\",SIZE=88000MB),
(NAME=li_22,FILENAME="g:\mnt\li\22\",SIZE=88000MB),
(NAME=li_23,FILENAME="g:\mnt\li\23\",SIZE=88000MB),
(NAME=li_24,FILENAME="g:\mnt\li\24\",SIZE=88000MB),
FILEGROUP       GENERAL_FG

(NAME=gen_1, FILENAME="g:\mnt\gen\1\", SIZE=32000MB),
(NAME=gen_2, FILENAME="g:\mnt\gen\2\", SIZE=32000MB),
(NAME=gen_3, FILENAME="g:\mnt\gen\3\", SIZE=32000MB),
(NAME=gen_4, FILENAME="g:\mnt\gen\4\", SIZE=32000MB),
(NAME=gen_5, FILENAME="g:\mnt\gen\5\", SIZE=32000MB),
(NAME=gen_6, FILENAME="g:\mnt\gen\6\", SIZE=32000MB),
(NAME=gen_7, FILENAME="g:\mnt\gen\7\", SIZE=32000MB),
(NAME=gen_8, FILENAME="g:\mnt\gen\8\", SIZE=32000MB),
(NAME=gen_9, FILENAME="g:\mnt\gen\9\", SIZE=32000MB),
(NAME=gen_10,FILENAME="g:\mnt\gen\10\",SIZE=32000MB),
(NAME=gen_11,FILENAME="g:\mnt\gen\11\",SIZE=32000MB),
(NAME=gen_12,FILENAME="g:\mnt\gen\12\",SIZE=32000MB),
(NAME=gen_13,FILENAME="g:\mnt\gen\13\",SIZE=32000MB),
(NAME=gen_14,FILENAME="g:\mnt\gen\14\",SIZE=32000MB),
(NAME=gen_15,FILENAME="g:\mnt\gen\15\",SIZE=32000MB),
(NAME=gen_16,FILENAME="g:\mnt\gen\16\",SIZE=32000MB),
(NAME=gen_17,FILENAME="g:\mnt\gen\17\",SIZE=32000MB),
(NAME=gen_18,FILENAME="g:\mnt\gen\18\",SIZE=32000MB),
(NAME=gen_19,FILENAME="g:\mnt\gen\19\",SIZE=32000MB),
(NAME=gen_20,FILENAME="g:\mnt\gen\20\",SIZE=32000MB),
(NAME=gen_21,FILENAME="g:\mnt\gen\21\",SIZE=32000MB),
(NAME=gen_22,FILENAME="g:\mnt\gen\22\",SIZE=32000MB),
(NAME=gen_23,FILENAME="g:\mnt\gen\23\",SIZE=32000MB),
(NAME=gen_24,FILENAME="g:\mnt\gen\24\",SIZE=32000MB)

LOG ON
(NAME=tpchlog, FILENAME="L:\\",SIZE=325000MB,
FILEGROWTH=10MB)
```

Create Base Tables

```
--  CREATETABLES.SQL
--  Microsoft TPC-H Benchmark Kit Ver. 1.00
--  Copyright Microsoft, 1999

create table PART
        (P_PARTKEY      int             not null,
         P_NAME varchar(55)             not null,
         P_MFGR char(25)                not null,
         P_BRAND        char(10)        not null,
         P_TYPE  varchar(25)            not null,
         P_SIZE         int             not null,
         P_CONTAINER    char(10)        not null,
         P_RETAILPRICE float            not null,
         P_COMMENT      varchar(23)     not null)
on GENERAL_FG

create table SUPPLIER
        (S_SUPPKEY      int             not null,
         S_NAME char(25)                not null,
         S_ADDRESS      varchar(40)     not null,
         S_NATIONKEY    int             not null,
         S_PHONE        char(15)        not null,
         S_ACCTBAL      float           not null,
         S_COMMENT      varchar(101)    not null)
on GENERAL_FG

create table PARTSUPP
        (PS_PARTKEY             int     not null,
         PS_SUPPKEY             int     not null,
create table ORDERS
        (O_ORDERKEY             bigint      not null,
         O_CUSTKEY              int         not null,
         O_ORDERSTATUS          char(1)     not null,
         O_TOTALPRICE           float       not null,
         O_ORDERDATE            datetime    not null,
         O_ORDERPRIORITY        char(15)    not null,
         O_CLERK                char(15)    not null,
         O_SHIPPRIORITY         int         not null,
         O_COMMENT              varchar(79) not null)
on GENERAL_FG

create table REGION
        (R_REGIONKEY            int         not null,
         R_NAME                 char(25)    not null,
         R_COMMENT              varchar(152) not null)
on GENERAL_FG
create table LINEITEM
        (L_ORDERKEY             bigint      not null,
         L_PARTKEY              int         not null,
         L_SUPPKEY              int         not null,
         L_LINENUMBER           int         not null,
         L_QUANTITY             float       not null,
         L_EXTENDEDPRICE        float       not null,
         L_DISCOUNT             float       not null,
         L_TAX                  float       not null,
         L_RETURNFLAG           char(1)     not null,
         L_LINESTATUS           char(1)     not null,
         L_SHIPDATE             datetime    not null,
```

```
        PS_AVAILQTY          int          not null,
        PS_SUPPLYCOST float  not null,
        PS_COMMENT           varchar(199) not null)
on GENERAL_FG

create table CUSTOMER
       (C_CUSTKEY            int          not null,
        C_NAME               varchar(25)  not null,
        C_ADDRESS            varchar(40)  not null,
        C_NATIONKEY          int          not null,
        C_PHONE              char(15)     not null,
        C_ACCTBAL            float        not null,
        C_MKTSEGMENT char(10) not null,
        C_COMMENT            varchar(117) not null)
on GENERAL_FG
```

```
        L_COMMITDATE         datetime     not null,
        L_RECEIPTDATE        datetime     not null,
        L_SHIPINSTRUCT       char(25)     not null,
        L_SHIPMODE           char(10)     not null,
        L_COMMENT            varchar(44)  not null)
on LINEITEM_FG

create table NATION
       (N_NATIONKEY          int          not null,
        N_NAME               char(25)     not null,
        N_REGIONKEY          int          not null,
        N_COMMENT            varchar(152) not null)
on GENERAL_FG
```

Create Indexes

```
create index L_SUPPKEY_IDX
        on LINEITEM(L_SUPPKEY)
        with fillfactor = 95,SORT_IN_TEMPDB
        on LINEITEM_FG

create index O_CUSTKEY_IDX
        on ORDERS(O_CUSTKEY)
        with fillfactor=95, SORT_IN_TEMPDB
        on GENERAL_FG

alter table ORDERS add constraint PK_O_ORDERKEY      primary
key (O_ORDERKEY)
        WITH (FILLFACTOR = 95)
        ON GENERAL_FG

create index PS_SUPPKEY_IDX
        on PARTSUPP(PS_SUPPKEY)
        with fillfactor=100, SORT_IN_TEMPDB
        on GENERAL_FG
```

```
create index N_REGIONKEY_IDX
        on NATION(N_REGIONKEY)
        with fillfactor=100, SORT_IN_TEMPDB
        on GENERAL_FG

create index S_NATIONKEY_IDX
        on SUPPLIER(S_NATIONKEY)
        with fillfactor=100, SORT_IN_TEMPDB
        on GENERAL_FG

create index L_ORDERKEY_IDX
        on LINEITEM(L_ORDERKEY)
        with FILLFACTOR=95,SORT_IN_TEMPDB
        on LINEITEM_FG

create index L_PARTKEY_IDX
        on LINEITEM(L_PARTKEY)
        with FILLFACTOR=95,SORT_IN_TEMPDB
        on LINEITEM_FG
```

Foreign Keys

```
alter table SUPPLIER add constraint FK_S_NATIONKEY foreign key (S_NATIONKEY) references NATION(N_NATIONKEY)

alter table PARTSUPP add constraint FK_PS_PARTKEY foreign key (PS_PARTKEY) references PART(P_PARTKEY)

alter table PARTSUPP add constraint FK_PS_SUPPKEY foreign key (PS_SUPPKEY) references SUPPLIER(S_SUPPKEY)

alter table CUSTOMER add constraint FK_C_NATIONKEY foreign key (C_NATIONKEY) references NATION (N_NATIONKEY)

alter table ORDERS add constraint FK_O_CUSTKEY foreign key (O_CUSTKEY)  references CUSTOMER (C_CUSTKEY)

alter table LINEITEM add constraint FK_L_ORDERKEY foreign key (L_ORDERKEY)  references ORDERS (O_ORDERKEY)

alter table LINEITEM add constraint FK_L_PARTKEY foreign key (L_PARTKEY)  references PART (P_PARTKEY)

alter table LINEITEM add constraint FK_L_SUPPKEY foreign key (L_SUPPKEY)  references SUPPLIER (S_SUPPKEY)

alter table LINEITEM add constraint FK_L_PARTKEY_SUPPKEY foreign key (L_PARTKEY,L_SUPPKEY) references
        PARTSUPP(PS_PARTKEY, PS_SUPPKEY)

alter table NATION add constraint FK_N_REGIONKEY foreign key (N_REGIONKEY)  references REGION (R_REGIONKEY)
```

TempDB

```
alter database tempdb modify file  (name='tempdev',filename='g:\mnt\temp\1\')
alter database tempdb modify file  (name='templog',filename='g:\mnt\temp\24\')
alter database tempdb modify file (NAME = tempdev,size = 88000MB, filegrowth = 0)
alter database tempdb modify file (NAME = templog,size = 50000MB,  filegrowth = 1GB)
alter database tempdb add file

        (NAME=tempdev_2,FILENAME= 'g:\mnt\temp\2\' , SIZE=88000MB, filegrowth = 0),
        (NAME=tempdev_3,FILENAME= 'g:\mnt\temp\3\' , SIZE=88000MB, filegrowth = 0),
        (NAME=tempdev_4,FILENAME= 'g:\mnt\temp\4\' , SIZE=88000MB, filegrowth = 0),
        (NAME=tempdev_5,FILENAME= 'g:\mnt\temp\5\' , SIZE=88000MB, filegrowth = 0),
        (NAME=tempdev_6,FILENAME= 'g:\mnt\temp\6\' , SIZE=88000MB, filegrowth = 0),
        (NAME=tempdev_7,FILENAME= 'g:\mnt\temp\7\' , SIZE=88000MB, filegrowth = 0),
        (NAME=tempdev_8,FILENAME= 'g:\mnt\temp\8\' , SIZE=88000MB, filegrowth = 0)

alter database tempdb add file

        (NAME=tempdev_9, FILENAME='g:\mnt\temp\9\' , SIZE=88000MB, filegrowth = 0),
        (NAME=tempdev_10,FILENAME='g:\mnt\temp\10\', SIZE=88000MB, filegrowth = 0),
        (NAME=tempdev_11,FILENAME='g:\mnt\temp\11\', SIZE=88000MB, filegrowth = 0),
        (NAME=tempdev_12,FILENAME='g:\mnt\temp\12\', SIZE=88000MB, filegrowth = 0),
        (NAME=tempdev_13,FILENAME='g:\mnt\temp\13\', SIZE=88000MB, filegrowth = 0),
        (NAME=tempdev_14,FILENAME='g:\mnt\temp\14\', SIZE=88000MB, filegrowth = 0),
        (NAME=tempdev_15,FILENAME='g:\mnt\temp\15\', SIZE=88000MB, filegrowth = 0),
        (NAME=tempdev_16,FILENAME='g:\mnt\temp\16\', SIZE=88000MB, filegrowth = 0)

alter database tempdb add file

        (NAME=tempdev_17,FILENAME='g:\mnt\temp\17\', SIZE=88000MB, filegrowth = 0),
        (NAME=tempdev_18,FILENAME='g:\mnt\temp\18\', SIZE=88000MB, filegrowth = 0),
        (NAME=tempdev_19,FILENAME='g:\mnt\temp\19\', SIZE=88000MB, filegrowth = 0),
        (NAME=tempdev_20,FILENAME='g:\mnt\temp\20\', SIZE=88000MB, filegrowth = 0),
        (NAME=tempdev_21,FILENAME='g:\mnt\temp\21\', SIZE=88000MB, filegrowth = 0),
        (NAME=tempdev_22,FILENAME='g:\mnt\temp\22\', SIZE=88000MB, filegrowth = 0),
        (NAME=tempdev_23,FILENAME='g:\mnt\temp\23\', SIZE=88000MB, filegrowth = 0)
```

Backup & Restore

```
-- Backup Database

backup database tpch1000g to

disk='G:\mnt\ntfs\1\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\3\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\5\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\7\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\9\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\11\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\13\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\15\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\17\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\19\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\21\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\23\backup\tpch1000g.bak',

with init,maxtransfersize=1048576,BUFFERCOUNT=1000,stats = 1
```

```
-- Restore Database
if exists (select name from sysdatabases where name = 'tpch1000g')
drop database tpch1000g

restore database tpch1000g from

disk='G:\mnt\ntfs\1\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\3\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\5\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\7\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\9\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\11\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\13\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\15\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\17\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\19\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\21\backup\tpch1000g.bak',
disk='G:\mnt\ntfs\23\backup\tpch1000g.bak'

with replace, maxtransfersize=1048576, stats = 1,
BUFFERCOUNT=1000
```

Appendix C: Query Text and Output

Using Standard Substitutions

/* TPC_H Query 1 - Pricing Summary Report */

```
SELECT L_RETURNFLAG, L_LINESTATUS, SUM(L_QUANTITY) AS SUM_QTY, SUM(L_EXTENDEDPRICE)
        AS SUM_BASE_PRICE, SUM(L_EXTENDEDPRICE*(1-L_DISCOUNT)) AS SUM_DISC_PRICE,
        SUM(L_EXTENDEDPRICE*(1-L_DISCOUNT)*(1+L_TAX)) AS SUM_CHARGE, AVG(L_QUANTITY) AS AVG_QTY,
        AVG(L_EXTENDEDPRICE) AS AVG_PRICE, AVG(L_DISCOUNT) AS AVG_DISC, COUNT(*) AS COUNT_ORDER
FROM LINEITEM
WHERE  L_SHIPDATE <= dateadd(dd, -90, '1998-12-01') GROUP  BY L_RETURNFLAG, L_LINESTATUS
ORDER  BY L_RETURNFLAG, L_LINESTATUS
```

```
L_RETURNFLAG L_LINESTATUS SUM_QTY              SUM_BASE_PRICE         SUM_DISC_PRICE         SUM_CHARGE
AVG_QTY              AVG_PRICE             AVG_DISC              COUNT_ORDER
------------ ------------ ---------------------- ---------------------- ---------------------- ---------------------- ----------------------
- ------------------------ -----------
A            F            37734107.000000        56586554400.730103     53758257134.870117     55909065222.827591     25.522006
38273.129735           0.049985              1478493
N            F            991417.000000          1487504710.380002      1413082168.054098      1469649223.194373      25.516472
38284.467761           0.050093              38854
N            O            74476040.000000        111701729697.739760    106118230307.605420    110367043872.497220    25.502227
38249.117989           0.049997              2920374
R            F            37719753.000000        56568041380.900032     53741292684.604073     55889619119.831902     25.505794
38250.854626           0.050009              1478870

(4 row(s) affected)
```

/* TPC_H Query 2 - Minimum Cost Supplier */

```
SELECT TOP 100 S_ACCTBAL, S_NAME, N_NAME, P_PARTKEY, P_MFGR, S_ADDRESS, S_PHONE, S_COMMENT
FROM PART, SUPPLIER, PARTSUPP,NATION, REGION
WHERE P_PARTKEY = PS_PARTKEY AND S_SUPPKEY = PS_SUPPKEY AND P_SIZE = 15 AND
        P_TYPE LIKE '%%BRASS' AND S_NATIONKEY = N_NATIONKEY AND N_REGIONKEY = R_REGIONKEY AND
        R_NAME = 'EUROPE' AND
        PS_SUPPLYCOST = (SELECT MIN(PS_SUPPLYCOST) FROM PARTSUPP, SUPPLIER, NATION, REGION
        WHERE P_PARTKEY = PS_PARTKEY AND S_SUPPKEY = PS_SUPPKEY
        AND S_NATIONKEY= N_NATIONKEY AND N_REGIONKEY = R_REGIONKEY AND R_NAME = 'EUROPE')
ORDER BY S_ACCTBAL DESC, N_NAME, S_NAME, P_PARTKEY
```

```
S_ACCTBAL              S_NAME                 N_NAME                 P_PARTKEY   P_MFGR                 S_ADDRESS
S_PHONE        S_COMMENT
---------------------- ---------------------- ---------------------- ----------- ---------------------- ---------------------------------------- ---------------
 ------------------------------------------------------------------------------------------------------
9938.530000            Supplier#000005359     UNITED KINGDOM         185358      Manufacturer#4         QKuHYh,vZGiwu2FWEJoLDx04
33-429-790-6131 blithely silent pinto beans are furiously. slyly final deposits acros
9937.840000            Supplier#000005969     ROMANIA                108438      Manufacturer#1
ANDENSOSmk,miq23Xfb5RWt6dvUcvt6Qa      29-520-692-3537 carefully slow deposits use furiously. slyly ironic platelets above the ironic
9936.220000            Supplier#000005250     UNITED KINGDOM         249         Manufacturer#4         B3rqp0xbSEim4Mpy2RH J
33-320-228-2957 blithely special packages are. stealthily express deposits across the closely final instructi
9923.770000            Supplier#000002324     GERMANY                29821       Manufacturer#4         y3OD9UywSTOk
17-779-299-1839 quickly express packages breach quiet pinto beans. requ
9871.220000            Supplier#000006373     GERMANY                43868       Manufacturer#5         J8fcXWsTqM
17-813-485-8637 never silent deposits integrate furiously blit
9870.780000            Supplier#000001286     GERMANY                81285       Manufacturer#2
YKA,E2fjiVd7eUrzp2Ef8j1QxGo2DFnosaTEH   17-516-924-4574 final theodolites cajole slyly special,
9870.780000            Supplier#000001286     GERMANY                181285      Manufacturer#4
YKA,E2fjiVd7eUrzp2Ef8j1QxGo2DFnosaTEH   17-516-924-4574 final theodolites cajole slyly special,
9852.520000            Supplier#000008973     RUSSIA                 18972       Manufacturer#2         t5L67YdBYYH6o,Vz24jpDyQ9
32-188-594-7038 quickly regular instructions wake-- carefully unusual braids into the expres
9847.830000            Supplier#000008097     RUSSIA                 130557      Manufacturer#2         xMe97bpE69NzdwLoX
32-375-640-3593 slyly regular dependencies sleep slyly furiously express dep
9847.570000            Supplier#000006345     FRANCE                 86344       Manufacturer#1
VSt3rzk3qG698u6ld8HhOByvrTcSTSvQlDQDag  16-886-766-7945 silent pinto beans should have to snooze carefully along the final reques
.
.
7843.520000            Supplier#000006683     FRANCE                 11680       Manufacturer#4         2Z0JGkiv01Y00oCFwUGfviIbhzCdy
16-464-517-8943 carefully bold accounts doub
(100 row(s) affected)
```

/* TPC_H Query 3 - Shipping Priority */

```
SELECT TOP 10 L_ORDERKEY, SUM(L_EXTENDEDPRICE*(1-L_DISCOUNT)) AS REVENUE, O_ORDERDATE, O_SHIPPRIORITY
FROM CUSTOMER, ORDERS, LINEITEM
WHERE C_MKTSEGMENT = 'BUILDING' AND C_CUSTKEY = O_CUSTKEY AND L_ORDERKEY = O_ORDERKEY AND
        O_ORDERDATE < '1995-03-15' AND L_SHIPDATE > '1995-03-15'
GROUP BY L_ORDERKEY, O_ORDERDATE, O_SHIPPRIORITY
ORDER BY REVENUE DESC, O_ORDERDATE
```

L_ORDERKEY	REVENUE	O_ORDERDATE	O_SHIPPRIORITY
2456423	406181.011100	1995-03-05 00:00:00.000	0
3459808	405838.698900	1995-03-04 00:00:00.000	0
492164	390324.061000	1995-02-19 00:00:00.000	0
1188320	384537.935900	1995-03-09 00:00:00.000	0
2435712	378673.055800	1995-02-26 00:00:00.000	0
4878020	378376.795200	1995-03-12 00:00:00.000	0
5521732	375153.921500	1995-03-13 00:00:00.000	0
2628192	373133.309400	1995-02-22 00:00:00.000	0
993600	371407.459500	1995-03-05 00:00:00.000	0
2300070	367371.145200	1995-03-13 00:00:00.000	0

(10 row(s) affected)

/* TPC_H Query 4 - Order Priority Checking */

```
SELECT  O_ORDERPRIORITY, COUNT(*) AS ORDER_COUNT  FROM ORDERS
        WHERE O_ORDERDATE >= '1993-07-01' AND O_ORDERDATE < dateadd (mm, 3, '1993-07-01') AND
        EXISTS (SELECT * FROM     LINEITEM WHERE L_ORDERKEY = O_ORDERKEY AND
        L_COMMITDATE < L_RECEIPTDATE)
GROUP BY O_ORDERPRIORITY
ORDER BY O_ORDERPRIORITY
```

O_ORDERPRIORITY	ORDER_COUNT
1-URGENT	10594
2-HIGH	10476
3-MEDIUM	10410
4-NOT SPECIFIED	10556
5-LOW	10487

(5 row(s) affected)

/* TPC_H Query 5 - Local Supplier Volume */

```
SELECT  N_NAME, SUM(L_EXTENDEDPRICE*(1-L_DISCOUNT)) AS REVENUE
        FROM CUSTOMER, ORDERS, LINEITEM, SUPPLIER, NATION, REGION
WHERE C_CUSTKEY = O_CUSTKEY AND L_ORDERKEY = O_ORDERKEY AND L_SUPPKEY = S_SUPPKEY AND
        C_NATIONKEY = S_NATIONKEY AND S_NATIONKEY = N_NATIONKEY AND N_REGIONKEY = R_REGIONKEY
        AND R_NAME = 'ASIA' AND O_ORDERDATE >= '1994-01-01' AND O_ORDERDATE < DATEADD(YY, 1, '1994-01-01')
GROUP BY N_NAME
ORDER BY REVENUE DESC
```

N_NAME	REVENUE
INDONESIA	55502041.169700
VIETNAM	55295086.996700
CHINA	53724494.256600
INDIA	52035512.000200
JAPAN	45410175.695400

(5 row(s) affected)

/* TPC_H Query 6 - Forecasting Revenue Change */

```
SELECT  SUM(L_EXTENDEDPRICE*L_DISCOUNT) AS REVENUE
FROM LINEITEM
WHERE L_SHIPDATE >= '1994-01-01' AND L_SHIPDATE < dateadd (yy, 1, '1994-01-01') AND L_DISCOUNT BETWEEN .06 - 0.01
        AND .06 + 0.01 AND L_QUANTITY < 24
```

REVENUE
123141078.228300

(1 row(s) affected)

/* TPC_H Query 7 - Volume Shipping */

```
SELECT  SUPP_NATION, CUST_NATION, L_YEAR, SUM(VOLUME) AS REVENUE
FROM ( SELECT N1.N_NAME AS SUPP_NATION, N2.N_NAME AS CUST_NATION, datepart(yy, L_SHIPDATE) AS
L_YEAR,
        L_EXTENDEDPRICE*(1-L_DISCOUNT) AS VOLUME
        FROM SUPPLIER, LINEITEM, ORDERS, CUSTOMER, NATION N1, NATION N2
        WHERE S_SUPPKEY = L_SUPPKEY AND O_ORDERKEY = L_ORDERKEY AND C_CUSTKEY = O_CUSTKEY
        AND S_NATIONKEY = N1.N_NATIONKEY AND C_NATIONKEY = N2.N_NATIONKEY AND
                ((N1.N_NAME = 'FRANCE' AND N2.N_NAME = 'GERMANY') OR
                (N1.N_NAME = 'GERMANY' AND N2.N_NAME = 'FRANCE')) AND
                L_SHIPDATE BETWEEN '1995-01-01' AND '1996-12-31' )
        AS SHIPPING
GROUP BY SUPP_NATION, CUST_NATION, L_YEAR
ORDER BY SUPP_NATION, CUST_NATION, L_YEAR

SUPP_NATION            CUST_NATION            L_YEAR      REVENUE
---------------------- ---------------------- ----------- ----------------------
FRANCE                 GERMANY                1995        54639732.733600
FRANCE                 GERMANY                1996        54633083.307600
GERMANY                FRANCE                 1995        52531746.669700
GERMANY                FRANCE                 1996        52520549.022400

(4 row(s) affected)
```

/* TPC_H Query 8 - National Market Share */

```
SELECT O_YEAR, SUM(CASE WHEN NATION = 'BRAZIL' THEN VOLUME ELSE 0 END) / SUM(VOLUME) AS MKT_SHARE
FROM (SELECT datepart(yy, O_ORDERDATE) AS O_YEAR, L_EXTENDEDPRICE * (1-L_DISCOUNT) AS VOLUME,
        N2.N_NAME AS NATION
        FROM PART, SUPPLIER,      LINEITEM, ORDERS, CUSTOMER, NATION N1, NATION N2, REGION
        WHERE P_PARTKEY = L_PARTKEY AND S_SUPPKEY = L_SUPPKEY AND L_ORDERKEY = O_ORDERKEY
         AND O_CUSTKEY = C_CUSTKEY AND C_NATIONKEY = N1.N_NATIONKEY AND
        N1.N_REGIONKEY = R_REGIONKEY AND R_NAME = 'AMERICA' AND
        S_NATIONKEY = N2.N_NATIONKEY AND O_ORDERDATE  BETWEEN '1995-01-01' AND
        '1996-12-31' AND P_TYPE= 'ECONOMY ANODIZED STEEL') AS ALL_NATIONS
GROUP BY O_YEAR
ORDER BY O_YEAR

O_YEAR      MKT_SHARE
----------- ------------------------
1995        0.034436
1996        0.041486

(2 row(s) affected)
```

/* TPC_H Query 9 - Product Type Profit Measure */

```
SELECT  NATION, O_YEAR, SUM(AMOUNT) AS SUM_PROFIT
FROM (SELECT N_NAME AS NATION, datepart(yy, O_ORDERDATE)             AS O_YEAR,
        L_EXTENDEDPRICE*(1-L_DISCOUNT)-PS_SUPPLYCOST*L_QUANTITY AS AMOUNT
        FROM PART, SUPPLIER,      LINEITEM, PARTSUPP, ORDERS,       NATION
        WHERE S_SUPPKEY = L_SUPPKEY AND PS_SUPPKEY= L_SUPPKEY AND PS_PARTKEY = L_PARTKEY AND
        P_PARTKEY= L_PARTKEY AND O_ORDERKEY = L_ORDERKEY AND S_NATIONKEY   = N_NATIONKEY AND
        P_NAME LIKE '%%green%%') AS PROFIT
GROUP BY NATION, O_YEAR
ORDER BY NATION, O_YEAR DESC

NATION                 O_YEAR      SUM_PROFIT
---------------------- ----------- ----------------------
ALGERIA                1998        31342867.234500
ALGERIA                1997        57138193.023300
ALGERIA                1996        56140140.133000
ALGERIA                1995        53051469.653400
ALGERIA                1994        53867582.128600
ALGERIA                1993        54942718.132400
ALGERIA                1992        54628034.712700
ARGENTINA              1998        30211185.708100
.
.
VIETNAM                1992        49613838.315100

(175 row(s) affected)
```

/* TPC_H Query 10 - Returned Item Reporting */

```
SELECT TOP 20 C_CUSTKEY, C_NAME, SUM(L_EXTENDEDPRICE*(1-L_DISCOUNT)) AS REVENUE, C_ACCTBAL,
                N_NAME, C_ADDRESS, C_PHONE, C_COMMENT
FROM CUSTOMER, ORDERS, LINEITEM, NATION
WHERE C_CUSTKEY = O_CUSTKEY AND L_ORDERKEY = O_ORDERKEY AND O_ORDERDATE>= '1993-10-01 AND
        O_ORDERDATE < dateadd(mm, 3, '1993-10-01') AND
        L_RETURNFLAG = 'R' AND C_NATIONKEY= N_NATIONKEY
GROUP BY C_CUSTKEY, C_NAME, C_ACCTBAL, C_PHONE, N_NAME, C_ADDRESS, C_COMMENT
ORDER BY REVENUE DESC

C_CUSTKEY   C_NAME                 REVENUE               C_ACCTBAL             N_NAME                C_ADDRESS
                        C_PHONE         C_COMMENT
----------- ------------------------ ---------------------- ---------------------- -------------------------- ----------------------------------------
--------------- ----------------------------------------------------------------------------------------------------------------------------------
57040       Customer#000057040       734235.245500          632.870000             JAPAN                 Eioyzjf4pp
                        22-895-641-3466 requests sleep blithely about the furiously i
143347      Customer#000143347       721002.694800          2557.470000            EGYPT                 1aReFYv,Kw4
14-742-935-3718 fluffily bold excuses haggle finally after the u
60838       Customer#000060838       679127.307700          2454.770000            BRAZIL
 64EaJ5vMAHWJlBOxJklpNc2RJiWE           12-913-494-9813 furiously even pinto beans integrate under the ruthless foxes;
ironic, even dolphins across the slyl
101998      Customer#000101998       637029.566700          3790.890000            UNITED KINGDOM
01c9CILnNtfOQYmZj                   33-593-865-6378 accounts doze blithely! enticing, final deposits sleep blithely special
accounts. slyly express accounts pla
.
.
23431       Customer#000023431       554269.536000          3381.860000            ROMANIA               HgiV0phqhaIa9aydNoIlb
29-915-458-2654 instructions nag quickly. furiously bold accounts cajol

(20 row(s) affected)
```

/* TPC_H Query 11 - Important Stock Indentification */

```
SELECT PS_PARTKEY, SUM(PS_SUPPLYCOST*PS_AVAILQTY) AS VALUE
FROM PARTSUPP, SUPPLIER, NATION
WHERE PS_SUPPKEY = S_SUPPKEY AND S_NATIONKEY = N_NATIONKEY AND N_NAME = 'GERMANY'
GROUP BY PS_PARTKEY
HAVING SUM(PS_SUPPLYCOST*PS_AVAILQTY) > (SELECT SUM(PS_SUPPLYCOST*PS_AVAILQTY) * 0.0001000000
        FROM PARTSUPP, SUPPLIER, NATION
WHERE PS_SUPPKEY = S_SUPPKEY AND S_NATIONKEY = N_NATIONKEY AND N_NAME = 'GERMANY')
ORDER BY VALUE DESC

PS_PARTKEY  VALUE
----------- ------------------------
129760      17538456.860000
166726      16503353.920000
191287      16474801.970000
161758      16101755.540000
.
.
72073       7877736.110000
5182        7874521.730000

(1048 row(s) affected)
```

/* TPC_H Query 12 - Shipping Modes and Order Priority */

```
SELECT L_SHIPMODE,
        SUM(CASE WHEN O_ORDERPRIORITY  = '1-URGENT' OR  O_ORDERPRIORITY  = '2-HIGH' THEN 1 ELSE 0 END)
        AS HIGH_LINE_COUNT, SUM(CASE WHEN O_ORDERPRIORITY <> '1-URGENT' AND O_ORDERPRIORITY <> '2-HIGH'
        THEN 1 ELSE 0 END) AS LOW_LINE_COUNT
FROM ORDERS, LINEITEM
WHERE O_ORDERKEY = L_ORDERKEY AND L_SHIPMODE IN ('MAIL','SHIP') AND L_COMMITDATE < L_RECEIPTDATE AND
        L_SHIPDATE < L_COMMITDATE AND L_RECEIPTDATE >= '1994-01-01' AND L_RECEIPTDATE < dateadd(yy, 1, '1994-01-01')
GROUP BY L_SHIPMODE
ORDER BY L_SHIPMODE

L_SHIPMODE HIGH_LINE_COUNT LOW_LINE_COUNT
---------- --------------- --------------
MAIL       6202            9324
SHIP       6200            9262

(2 row(s) affected)
```

```
/* TPC_H  Query 13 - Customer Distribution */
SELECT  C_COUNT, COUNT(*) AS CUSTDIST
FROM (SELECT C_CUSTKEY, COUNT(O_ORDERKEY)
            FROM CUSTOMER left outer join ORDERS on C_CUSTKEY = O_CUSTKEY
            AND O_COMMENT not like '%%special%%requests%%'
            GROUP BY C_CUSTKEY) AS C_ORDERS (C_CUSTKEY, C_COUNT)
GROUP BY C_COUNT
ORDER BY CUSTDIST DESC, C_COUNT DESC

C_COUNT     CUSTDIST
----------- -----------
0           50004
9           6641
10          6566
11          6058
8           5949
12          5553
13          4989
19          4748
7           4707
18          4625
.
.
39          2
41          1

(42 row(s) affected)

/* TPC_H  Query 14 - Promotion Effect */
SELECT 100.00 * SUM (CASE WHEN P_TYPE LIKE 'PROMO%% THEN L_EXTENDEDPRICE*(1-L_DISCOUNT)
            ELSE 0 END) / SUM(L_EXTENDEDPRICE*(1-L_DISCOUNT)) AS PROMO_REVENUE
FROM LINEITEM, PART
WHERE L_PARTKEY = P_PARTKEY AND L_SHIPDATE >= '1995-09-01' AND L_SHIPDATE < dateadd(mm, 1, '1995-09-01')

PROMO_REVENUE
-------------------------
16.380779

(1 row(s) affected)

/* TPC_H  Query 15 - Create View for Top Supplier Query */
CREATE VIEW REVENUE0 (SUPPLIER_NO, TOTAL_REVENUE) AS
            SELECT L_SUPPKEY, SUM(L_EXTENDEDPRICE*(1-L_DISCOUNT))  FROM LINEITEM
            WHERE L_SHIPDATE >= '1996-01-01' AND L_SHIPDATE < dateadd(mm, 3, '1996-01-01')
GROUP BY L_SUPPKEY
GO

/* TPC_H  Query 15 - Top Supplier */

SELECT  S_SUPPKEY,
            S_NAME,
            S_ADDRESS,
            S_PHONE,
            TOTAL_REVENUE
FROM    SUPPLIER, REVENUE0
WHERE S_SUPPKEY = SUPPLIER_NO AND TOTAL_REVENUE = ( SELECT MAX(TOTAL_REVENUE) FROM REVENUE0)
ORDER BY S_SUPPKEY

DROP VIEW REVENUE0

S_SUPPKEY   S_NAME                 S_ADDRESS                          S_PHONE        TOTAL_REVENUE
----------- ------------------------ ---------------------------------------- --------------- ----------------------
8449        Supplier#000008449       Wp34zim9qYFbVctdW                  20-469-856-8873 1772627.208700

(1 row(s) affected)
```

/* TPC_H Query 16 - Parts/Supplier Relationship */

```
SELECT  P_BRAND, P_TYPE, P_SIZE, COUNT(DISTINCT PS_SUPPKEY) AS SUPPLIER_CNT
        FROM PARTSUPP, PART
WHERE P_PARTKEY = PS_PARTKEY AND P_BRAND <> 'Brand#45' AND P_TYPE NOT LIKE 'MEDIUM POLISHED%%'
        AND P_SIZE IN (49, 14, 23, 45, 19, 3, 36, 9) AND PS_SUPPKEY NOT IN (SELECT S_SUPPKEY FROM SUPPLIER
                WHERE S_COMMENT LIKE '%%Customer%%Complaints%%')
GROUP BY P_BRAND, P_TYPE, P_SIZE
ORDER BY SUPPLIER_CNT DESC, P_BRAND, P_TYPE, P_SIZE

P_BRAND    P_TYPE                 P_SIZE      SUPPLIER_CNT
---------- ---------------------- ----------- ------------
Brand#41   MEDIUM BRUSHED TIN       3           28
Brand#54   STANDARD BRUSHED COPPER  14          27
Brand#11   STANDARD BRUSHED TIN     23          24
Brand#11   STANDARD BURNISHED BRASS 36          24
Brand#15   MEDIUM ANODIZED NICKEL   3           24

.
Brand#55   STANDARD PLATED TIN      49          3

(18314 row(s) affected)
```

/* TPC_H Query 17 - Small-Quantity-Order Revenue */

```
SELECT SUM(L_EXTENDEDPRICE)/7.0 AS AVG_YEARLY FROM LINEITEM, PART
WHERE P_PARTKEY = L_PARTKEY AND P_BRAND = 'Brand#23' AND P_CONTAINER = 'MED BOX'
AND L_QUANTITY<(SELECT 0.2 * AVG(L_QUANTITY) FROM LINEITEM WHERE L_PARTKEY = P_PARTKEY)

AVG_YEARLY
------------------------
348406.054286

(1 row(s) affected)
```

/* TPC_H Query 18 - Large Volume Customer */

```
SELECT TOP 100 C_NAME, C_CUSTKEY, O_ORDERKEY, O_ORDERDATE, O_TOTALPRICE,
        SUM(L_QUANTITY)
FROM CUSTOMER, ORDERS, LINEITEM
WHERE O_ORDERKEY IN (SELECT L_ORDERKEY FROM LINEITEM GROUP BY L_ORDERKEY HAVING
        SUM(L_QUANTITY) > 300) AND C_CUSTKEY = O_CUSTKEY AND O_ORDERKEY = L_ORDERKEY
GROUP BY C_NAME, C_CUSTKEY, O_ORDERKEY, O_ORDERDATE, O_TOTALPRICE
ORDER BY O_TOTALPRICE DESC, O_ORDERDATE

C_NAME                 C_CUSTKEY   O_ORDERKEY          O_ORDERDATE            O_TOTALPRICE
---------------------- ----------- ------------------- ---------------------- ------------------------
Customer#000128120       128120     4722021            1994-04-07 00:00:00.000 544089.090000          323.000000
Customer#000144617       144617     3043270            1997-02-12 00:00:00.000 530604.440000          317.000000
Customer#000013940       13940      2232932            1997-04-13 00:00:00.000 522720.610000          304.000000
Customer#000066790       66790      2199712            1996-09-30 00:00:00.000 515531.820000          327.000000
.
Customer#000088703       88703      2995076            1994-01-30 00:00:00.000 363812.120000          302.000000

(57 row(s) affected)
```

/* TPC_H Query 19 - Discounted Revenue */

```
SELECT SUM(L_EXTENDEDPRICE* (1 - L_DISCOUNT)) AS REVENUE
FROM LINEITEM, PART
WHERE (P_PARTKEY = L_PARTKEY AND P_BRAND = 'Brand#12' AND P_CONTAINER IN ( 'SM CASE', 'SM BOX',
         'SM PACK', 'SM PKG') AND L_QUANTITY >= 1 AND L_QUANTITY <= 1 + 10 AND P_SIZE BETWEEN 1 AND 5
        AND L_SHIPMODE IN ('AIR', 'AIR REG') AND L_SHIPINSTRUCT = 'DELIVER IN PERSON')
        OR (P_PARTKEY = L_PARTKEY AND P_BRAND = 'Brand#23' AND P_CONTAINER IN ( 'MED BAG', 'MED BOX',
        'MED PKG', 'MED PACK') AND L_QUANTITY >= 10 AND L_QUANTITY <= 10 + 10 AND P_SIZE BETWEEN 1
        AND 10 AND L_SHIPMODE IN ('AIR', 'AIR REG') AND L_SHIPINSTRUCT = 'DELIVER IN PERSON') OR
        (P_PARTKEY = L_PARTKEY AND P_BRAND = 'Brand#34'  AND P_CONTAINER IN ( 'LG CASE', 'LG BOX',
        'LG PACK', 'LG PKG') AND L_QUANTITY >= 20 AND L_QUANTITY <= 20 + 10 AND P_SIZE BETWEEN 1 AND 15
        AND L_SHIPMODE IN ('AIR', 'AIR REG') AND L_SHIPINSTRUCT = 'DELIVER IN PERSON')

REVENUE
------------------------
3083843.057800
(1 row(s) affected)
```

/* TPC_H Query 20 - Potential Part Promotion */

```
SELECT S_NAME, S_ADDRESS FROM SUPPLIER, NATION
WHERE S_SUPPKEY IN ( SELECT PS_SUPPKEY FROM PARTSUPP
        WHERE PS_PARTKEY in (SELECT P_PARTKEY FROM PART WHERE P_NAME like 'forest%%') AND
        PS_AVAILQTY (SELECT 0.5 * sum(L_QUANTITY) FROM LINEITEM WHERE L_PARTKEY = PS_PARTKEY AND
        L_SUPPKEY  = PS_SUPPKEY AND L_SHIPDATE >= '1994-01-01' AND
        L_SHIPDATE < dateadd(yy,1,'1994-01-01')) AND S_NATIONKEY = N_NATIONKEY AND N_NAME = 'CANADA'
ORDER BY S_NAME
```

```
S_NAME                 S_ADDRESS
---------------------- ----------------------------------------
Supplier#000000020     iybAE,RmTymrZVYaFZva2SH,j
Supplier#000000091     YV45D7TkfdQanOOZ7q9QxkyGUapU1oOWU6q3
Supplier#000000197     YC2Acon6kjY3zj3Fbxs2k4Vdf7X0cd2F
Supplier#000000226     83qOdU2EYRdPQAQhEtn GRZEd
Supplier#000000285     Br7e1nnt1yxrw6ImgpJ7YdhFDjuBf
Supplier#000000378     FfbhyCxWvcPrO8ltp9
.
.
Supplier#000009899     7XdpAHrzr1t,UQFZE
Supplier#000009974     7wJ,J5DKcxSU4Kp1cQLpbcAvB5AsvKT

(204 row(s) affected)
```

/* TPC_H Query 21 - Suppliers Who Kept Orders Waiting */

```
SELECT TOP 100 S_NAME, COUNT(*) AS NUMWAIT
FROM SUPPLIER, LINEITEM L1, ORDERS, NATION WHERE S_SUPPKEY = L1.L_SUPPKEY AND
        O_ORDERKEY = L1.L_ORDERKEY AND O_ORDERSTATUS = 'F' AND L1.L_RECEIPTDATE> L1.L_COMMITDATE
        AND EXISTS (SELECT * FROM LINEITEM L2 WHERE L2.L_ORDERKEY = L1.L_ORDERKEY
        AND L2.L_SUPPKEY <> L1.L_SUPPKEY) AND
        NOT EXISTS (SELECT * FROM LINEITEM L3 WHERE L3.L_ORDERKEY = L1.L_ORDERKEY AND
        L3.L_SUPPKEY <> L1.L_SUPPKEY AND L3.L_RECEIPTDATE > L3.L_COMMITDATE) AND
        S_NATIONKEY = N_NATIONKEY AND N_NAME = 'SAUDI ARABIA'
GROUP BY S_NAME
ORDER BY NUMWAIT DESC, S_NAME
```

```
S_NAME                 NUMWAIT
---------------------- -----------
Supplier#000002829     20
Supplier#000005808     18
Supplier#000000262     17
Supplier#000000496     17
Supplier#000002160     17
.
Supplier#000002357     12
Supplier#000002483     12

(100 row(s) affected)
```

/* TPC_H Query 22 - Global Sales Opportunity */

```
SELECT CNTRYCODE, COUNT(*) AS NUMCUST, SUM(C_ACCTBAL) AS TOTACCTBAL
FROM (SELECT SUBSTRING(C_PHONE,1,2) AS CNTRYCODE, C_ACCTBAL
        FROM CUSTOMER WHERE SUBSTRING(C_PHONE,1,2) IN ('13', '31', '23', '29', '30', '18', '17') AND
                C_ACCTBAL > (SELECT AVG(C_ACCTBAL) FROM CUSTOMER WHERE C_ACCTBAL > 0.00 AND
                SUBSTRING(C_PHONE,1,2) IN ('13', '31', '23', '29', '30', '18', '17')) AND
                NOT EXISTS ( SELECT * FROM ORDERS  WHERE O_CUSTKEY = C_CUSTKEY)) AS CUSTSALE
GROUP BY CNTRYCODE
ORDER BY CNTRYCODE
```

```
CNTRYCODE NUMCUST     TOTACCTBAL
--------- ----------- -------------------------
13        888         6737713.990000
17        861         6460573.720000
18        964         7236687.400000
23        892         6701457.950000
29        948         7158866.630000
30        909         6808436.130000
31        922         6806670.180000
(7 row(s) affected)
```

Appendix D: Seeds and Query Substitution Parameters

Stream0 Substitution Parameters Seed 522174743	
14	1995-10-01
2	47 COPPER AMERICA
9	powder
20	ivory 1995-01-01 BRAZIL
6	1994-01-01 0.02 24
17	Brand#35 SM DRUM
18	315
8	CANADA AMERICA ECONOMY BURNISHED STEEL
21	KENYA
13	express accounts
3	HOUSEHOLD 1995-03-09
22	13 30 23 12 29 24 24
16	Brand#13 PROMO BURNISHED 7 21 45 49 20 19 10 1
4	1994-05-01
11	KENYA 0.0000001000
15	1994-08-01
1	103
10	1994-08-01
19	Brand#13 Brand#31 Brand#33 1 1 12
5	MIDDLE EAST 1994-01-01
7	ARGENTINA CANADA
12	REG AIR SHIP 1995-01-01

Stream1 Substitution Parameters Seed 522174744	
21	FRANCE
3	BUILDING 1995-03-26
18	313
5	AFRICA 1995-01-01
11	BRAZIL 0.0000001000
7	SAUDI ARABIA CHINA
6	1995-01-01 0.07 25
20	seashell 1994-01-01 PERU
17	Brand#32 LG BAG
12	SHIP MAIL 1997-01-01
16	Brand#53 SMALL POLISHED 17 9 1 36 16 22 28 49
15	1997-03-01
13	express accounts
10	1993-05-01
2	35 STEEL MIDDLE EAST
8	SAUDI ARABIA MIDDLE EAST LARGE BRUSHED STEEL
14	1996-01-01
19	Brand#25 Brand#24 Brand#33 6 6 13
9	pale
22	13 21 22 14 12 32 32
1	111
4	1996-12-01

Stream2 Substitution Parameters Seed 522174745	
6	1995-01-01 0.05 24
17	Brand#34 LG PKG
14	1996-04-01
16	Brand#33 LARGE BRUSHED 2 24 6 16 22 14 15 23
19	Brand#22 Brand#52 Brand#22 1 1 14
10	1994-02-01
9	moccasin
2	22 BRASS AMERICA
15	1994-12-01
8	JAPAN ASIA LARGE PLATED STEEL
5	AMERICA 1995-01-01
22	24 26 28 29 11 27 27
12	MAIL SHIP 1996-01-01
7	JAPAN IRAN
13	express accounts
18	314
1	119
4	1994-09-01
20	dim 1997-01-01 GERMANY
3	HOUSEHOLD 1995-03-11
11	MOROCCO 0.0000001000
21	UNITED KINGDOM

Stream3 Substitution Parameters Seed 522174746	
8	EGYPT MIDDLE EAST LARGE ANODIZED STEEL
5	ASIA 1995-01-01
4	1997-04-01
6	1995-01-01 0.02 24
17	Brand#31 LG DRUM
7	EGYPT BRAZIL
1	66
18	312
22	32 11 16 19 21 30 30
14	1996-08-01
9	maroon
10	1994-11-01
15	1997-06-01
11	CANADA 0.0000001000
20	papaya 1996-01-01 RUSSIA
2	10 TIN MIDDLE EAST
21	MOROCCO
19	Brand#24 Brand#45 Brand#21 6 6 15
13	special accounts
16	Brand#13 STANDARD BURNISHED 47 34 17 15 37 14 23 29
12	TRUCK REG AIR 1996-01-01
3	AUTOMOBILE 1995-03-28

Stream4 Substitution Parameters Seed 522174747	
5	EUROPE 1995-01-01
21	INDIA
14	1996-11-01
19	Brand#31 Brand#23 Brand#25 2 2 16
15	1995-03-01
17	Brand#33 MED BAG
12	RAIL REG AIR 1996-01-01
6	1995-01-01 0.08 25
4	1995-01-01
9	lawn
8	VIETNAM ASIA MEDIUM POLISHED COPPER
16	Brand#53 MEDIUM PLATED 24 14 20 1 12 23 28 29
11	MOZAMBIQUE 0.0000001000
2	48 COPPER ASIA
10	1993-08-01
18	313
1	74
13	special deposits
7	VIETNAM ROMANIA
22	21 26 29 19 24 27 27
3	FURNITURE 1995-03-13
20	blue 1994-01-01 IRAQ

Stream5 Substitution Parameters Seed 522174748	
21	ALGERIA
15	1997-10-01
4	1997-08-01
6	1996-01-01 0.05 25
7	JORDAN IRAQ
16	Brand#33 ECONOMY BRUSHED 28 36 35 4 9 23 33 7
19	Brand#33 Brand#11 Brand#15 7 7 17
18	315
14	1997-02-01
22	11 10 21 26 13 18 18
11	EGYPT 0.0000001000
13	special deposits
3	AUTOMOBILE 1995-03-30
1	82
2	36 STEEL MIDDLE EAST
5	MIDDLE EAST 1996-01-01
8	JORDAN MIDDLE EAST MEDIUM BURNISHED COPPER
20	linen 1993-01-01 ARGENTINA
12	AIR REG AIR 1997-01-01
17	Brand#35 MED PKG
10	1994-06-01
9	hot

Stream6 Substitution Parameters Seed 522174749	
10	1993-03-01
3	FURNITURE 1995-03-15
15	1995-07-01
13	special deposits
6	1996-01-01 0.03 24
8	ETHIOPIA AFRICA SMALL BRUSHED COPPER
9	gainsboro
7	ETHIOPIA CANADA
4	1995-05-01
11	PERU 0.0000001000
22	15 31 29 14 18 26 26
18	312
12	REG AIRSHIP 1995-01-01
1	90
5	AFRICA 1996-01-01
16	Brand#13 SMALL ANODIZED 7 47 25 13 23 39 9 38
2	24 BRASS ASIA
14	1997-05-01
19	Brand#35 Brand#44 Brand#14 2 2 18
20	tan 1996-01-01 MOZAMBIQUE
17	Brand#31 MED DRUM
21	PERU

Stream7 Substitution Parameters Seed 522174750	
18	314
8	RUSSIA EUROPE SMALL PLATED COPPER
20	ghost 1994-01-01 ETHIOPIA
21	INDONESIA
2	11 NICKEL AFRICA
4	1993-02-01
22	23 29 19 27 16 26 26
17	Brand#33 JUMBO BAG
1	98
11	ETHIOPIA 0.0000001000
9	dodger
19	Brand#42 Brand#22 Brand#13 8 8 19
3	MACHINERY 1995-03-01
13	special deposits
5	AMERICA 1996-01-01
7	RUSSIA SAUDI ARABIA
10	1993-12-01
16	Brand#53 LARGE PLATED 39 19 44 23 4 24 36 43
6	1996-01-01 0.08 25
14	1997-08-01
15	1993-03-01
12	SHIP AIR 1997-01-01

Appendix E: Refresh Function Source Code

RF1

```
-- File:    CREATERF1PROC.SQL
--          Microsoft TPC-H Benchmark Kit Ver. 1.00
--          Copyright Microsoft, 1999
--

if exists (select name from sysobjects where name = 'RF1') drop procedure RF1
GO
--
-- Create a stored Refresh Insert procedure which will catch the deadlock
-- victim abort and restart the insert transaction.
--
CREATE PROCEDURE RF1
     @current_execution INTEGER, @insert_sets INTEGER, @parallel_executions INTEGER, @total_executions INTEGER
AS
BEGIN

DECLARE @startdate DATETIME
DECLARE @enddate DATETIME
DECLARE @edate DATETIME
DECLARE @rangeStart INTEGER
DECLARE @rangeSize INTEGER
DECLARE @range INTEGER

declare @index integer
declare @div integer
declare @mod integer
declare @skip integer
declare @i integer
declare @rangeSum integer
declare @totRangeSize integer
declare @stmt nchar(1000)
declare @orderSql nchar(1000)
declare @liSql nchar(1000)

set @skip = @total_executions/@parallel_executions
set @div = (@current_execution - 1)/@parallel_executions
set @mod = (@current_execution - 1) - @div * @parallel_executions
set @index = @mod*@skip + @div + 1

--
-- Get the range for this execution
--
set @stmt = N'select @sdate = dateadd(day,-1,min(O_ORDERDATE)), @edate = max(O_ORDERDATE)
                    from NEWORDERS'
exec sp_executesql @stmt,N'@sdate datetime output, @edate datetime output',@startdate output, @enddate output

if (@total_executions > @parallel_executions)
          begin
          set @div = (@index-1)/@skip
          set @mod = (@index-1) - @div * @skip
          set @rangeSize = datediff(day, @startdate, @enddate)/@parallel_executions + 1
          set @totRangeSize = @rangeSize
          set @rangeSum = 0
          set @rangeStart = @div * @rangeSize
          set @i = @mod
          while (@i > 0)
                    begin
                    set @rangeSize = (@totRangeSize - @rangeSum)/2
                    set @rangeSum = @rangeSum + @rangeSize
                    set @rangeStart = @rangeStart + @rangeSize
                    set @insert_sets = @insert_sets/2
                    set @i = @i - 1
                    end
```

```
		if (@mod + 1 = @skip) set @rangeSize = @totRangeSize - @rangeSum
		else
		set @rangeSize = (@totRangeSize - @rangeSum)/2
		if (@rangeSize < 0) set @rangeSize = 0
		if (@insert_sets <= 0) set @insert_sets = 1
		end
else
		begin
		set @rangeSize = datediff(day, @startdate, @enddate)/@total_executions
		set @rangeStart = @rangeSize * (@index - 1)
		end

set @startdate = dateadd(day, @rangeStart, @startdate)
if (@index < @total_executions) set @enddate = dateadd(day, @rangeSize, @startdate)
-- print @startdate
-- print @enddate

SET @range = datediff(day, @startdate, @enddate) / @insert_sets
--
--  This handles the case when the max-min/insert_sets is less that 1
--
IF @range = 0 SET @range = 1
--
--  Loop through the order keys only inserting a sets into the
--  ORDERS and LINTEITEM tables
--
SET @edate = dateadd(day, @range, @startdate)
SET @orderSql = N'insert into ORDERS (O_ORDERKEY, O_CUSTKEY, O_ORDERSTATUS, O_TOTALPRICE,  O_ORDERDATE,
		O_ORDERPRIORITY, O_CLERK, O_SHIPPRIORITY, O_COMMENT) (select O_ORDERKEY, O_CUSTKEY,
		O_ORDERSTATUS, O_TOTALPRICE,  O_ORDERDATE, O_ORDERPRIORITY, O_CLERK, O_SHIPPRIORITY,
		O_COMMENT  from NEWORDERS
		 where O_ORDERDATE > @startdate AND O_ORDERDATE <= @edate) '
SET @liSql = N'insert into LINEITEM (L_ORDERKEY,L_PARTKEY,L_SUPPKEY,L_LINENUMBER,L_QUANTITY,
		L_EXTENDEDPRICE, L_DISCOUNT, L_TAX, L_RETURNFLAG, L_LINESTATUS,
		L_SHIPDATE, L_COMMITDATE, L_RECEIPTDATE, L_SHIPINSTRUCT, L_SHIPMODE, L_COMMENT)
		(select L_ORDERKEY,L_PARTKEY,L_SUPPKEY,L_LINENUMBER,L_QUANTITY, L_EXTENDEDPRICE, L_DISCOUNT,
		L_TAX, L_RETURNFLAG, L_LINESTATUS, L_SHIPDATE, L_COMMITDATE, L_RECEIPTDATE, L_SHIPINSTRUCT,
		L_SHIPMODE, L_COMMENT  from NEWLINEITEM, NEWORDERS
		where L_ORDERKEY = O_ORDERKEY AND O_ORDERDATE > @startdate AND O_ORDERDATE <= @edate)'

WHILE @startdate < @enddate
		BEGIN
		INSERT_TRANS:
		begin transaction
		exec sp_executesql @orderSql, N'@startdate datetime, @edate datetime', @startdate, @edate
		if (@@error = 1205)
			begin
		print 'Insert deadlock - restarting RF2_' + RTRIM(CONVERT(varchar(30),@current_execution)) + ' transaction'
		rollback transaction
		goto INSERT_TRANS
		end
		exec sp_executesql @liSql, N'@startdate datetime, @edate datetime', @startdate, @edate
		if (@@error = 1205)
			begin
		print 'Insert deadlock - restarting RF2_' + RTRIM(CONVERT(varchar(30),@current_execution)) + ' transaction'
		rollback transaction
		goto INSERT_TRANS
		end
		commit transaction
		set @startdate = @edate
		set @edate = dateadd(day, @range, @edate)
		if (@edate > @enddate)
		set @edate = @enddate
		END
END
GO
```

RF2

```
-- File:    CREATERF2PROC.SQL
--          Microsoft TPC-H Benchmark Kit Ver. 1.00
--          Copyright Microsoft, 1999

if exists (select name from sysobjects where name = 'RF2') drop procedure RF2
GO

--
--  Create a stored Refresh Delete procedure which will catch the deadlock
--  victim abort and restart the delete transaction.
--
CREATE PROCEDURE RF2
      @current_execution INTEGER, @delete_sets INTEGER, @parallel_executions INTEGER, @total_executions INTEGER
AS
BEGIN

DECLARE @startdate DATETIME
DECLARE @enddate DATETIME
DECLARE @edate DATETIME
DECLARE @rangeStart INTEGER
DECLARE @rangeSize INTEGER
DECLARE @range INTEGER

declare @index integer
declare @div integer
declare @mod integer
declare @skip integer
declare @i integer
declare @rangeSum integer
declare @totRangeSize integer
declare @sql nchar(1000)
declare @orderSql nchar(1000)
declare @liSql nchar(1000)

set @skip = @total_executions/@parallel_executions
set @div = floor((@current_execution-1)/@parallel_executions)
set @mod = (@current_execution - 1) - @div * @parallel_executions
set @index = @mod*@skip + @div + 1

set @sql = N'select @sdate = dateadd(day,-1,min(O_ORDERDATE)), @edate = max(O_ORDERDATE)
                  from MOD_OLDORDERS'
exec sp_executesql @sql,N'@sdate datetime output, @edate datetime output',@startdate output, @enddate output

if (@total_executions > @parallel_executions)
            begin
            set @div = (@index-1)/@skip
            set @mod = (@index-1) - @div * @skip
            set @rangeSize = datediff(day, @startdate, @enddate)/@parallel_executions + 1
            set @totRangeSize = @rangeSize
            set @rangeSum = 0
            set @rangeStart = @div * @rangeSize
            set @i = @mod
            while (@i > 0)
                        begin
                        set @rangeSize = (@totRangeSize - @rangeSum)/2
                        set @rangeSum = @rangeSum + @rangeSize
                        set @rangeStart = @rangeStart + @rangeSize
                        set @delete_sets = @delete_sets/2
                        set @i = @i - 1
                        end
            if (@mod + 1 = @skip) --  last allocation  set @rangeSize = @totRangeSize - @rangeSum
            else
                        set @rangeSize = (@totRangeSize - @rangeSum)/2
            if (@rangeSize < 0)  set @rangeSize = 0
            if (@delete_sets <= 0) set @delete_sets = 1
            end
```

```
else
        begin
        set @rangeSize = datediff(day, @startdate, @enddate)/@total_executions
        set @rangeStart = @rangeSize * (@index - 1)
        end

set @startdate = dateadd(day, @rangeStart, @startdate)
if (@index < @total_executions) set @enddate = dateadd(day, @rangeSize, @startdate)

SET @range = datediff(day, @startdate, @enddate) / @delete_sets
--
--  This handles the case when the max-min/delete_sets is less that 1
--
IF @range = 0 SET @range = 1

--
--  Loop through the order keys only deleting sets from orders
--  and lineitem tables
--
SET @edate = dateadd(day, @range, @startdate)
SET @liSql = N'delete from LINEITEM where L_ORDERKEY in (select O_ORDERKEY from MOD_OLDORDERS
                WHERE O_ORDERDATE > @startdate AND O_ORDERDATE <= @edate)'

SET @orderSql = N'delete from ORDERS where O_ORDERKEY in  (select O_ORDERKEY from MOD_OLDORDERS
                WHERE O_ORDERDATE > @startdate AND O_ORDERDATE <= @edate)'

WHILE @startdate < @enddate
BEGIN
--
--  Delete from ORDERS and LINEITEM table
--
  DELETE_TRANS:
  begin transaction

    exec sp_executesql @liSql, N'@startdate datetime, @edate datetime', @startdate, @edate

    --
    --  If deadlock victim abort then restart the transaction
    --
    if (@@error = 1205)
      begin
        print 'Delete deadlock - restarting RF2_' + RTRIM(CONVERT(varchar(30),@current_execution)) +
              'transaction'
        rollback transaction
        goto DELETE_TRANS
      end

    exec sp_executesql @orderSql, N'@startdate datetime, @edate datetime', @startdate, @edate

    --
    --  If deadlock victim abort then restart the transaction
    --
    if (@@error = 1205)
      begin
        print 'Delete deadlock - restarting RF2_' + RTRIM(CONVERT(varchar(30),@current_execution)) + 'transaction'
        rollback transaction
        goto DELETE_TRANS
      end

  commit transaction

  set @startdate = @edate
  set @edate = dateadd(day, @range, @edate)

  if (@edate > @enddate) set @edate = @enddate

  END
END
GO
```

Appendix F: Implementation Specific Layer and Source Code

```
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cArrConstraints"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:      cArrConstraints.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
'  PURPOSE:    Implements an array of
cConstraint objects.
'             Type-safe wrapper around
cNodeCollections.
'             Also contains additional functions
that determine all the
'             constraints for a step, all
constraints in a workspace,
'             validation functions, etc.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private mcarrConstraints As
cNodeCollections

' Used to indicate the source module name
when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cArrConstraints."
Public Sub SaveWspConstraints(ByVal
lngWorkspace As Long)
    ' Calls a procedure to commit all changes
to the constraints
    ' in the passed in workspace.

    Call
mcarrConstraints.Save(lngWorkspace)

End Sub
Public Property Set ConstraintDB(vdata As
Database)

    Set mcarrConstraints.NodeDB = vdata

End Property
Public Property Get ConstraintDB() As
Database

    Set ConstraintDB =
mcarrConstraints.NodeDB

End Property

Public Sub Modify(cConsToUpdate As
cConstraint)

    ' Modify the constraint record
    Call
mcarrConstraints.Modify(cConsToUpdate)

End Sub
Public Sub
CreateNewConstraintVersion(ByVal lngStepId
As Long, _
        ByVal strNewVersion As String, _
        ByVal strOldVersion As String, _
        ByVal intStepType As Integer)

    ' Does all the processing needed to create
new versions of
    ' all the constraints for a given step
    ' It inserts new constraint records in the
database with
    ' the new version numbers on them
    ' It also updates the version number on all
constraints
    ' for the step in the array to the new version
passed in
    ' Since it handles both global and
manager/worker steps,
    ' it checks for the step_id or global_step_id
fields,
    ' depending on the type of step

    Dim lngIndex As Long
    Dim cUpdateConstraint As cConstraint

    On Error GoTo
CreateNewConstraintVersionErr
    mstrSource = mstrModuleName &
"CreateNewConstraintVersion"

    ' Update the version/global version on
Constraint with the
    ' passed in step/global step id
    For lngIndex = 0 To mcarrConstraints.Count
- 1
        Set cUpdateConstraint =
mcarrConstraints(lngIndex)
        If intStepType = gintGlobalStep Then
            If cUpdateConstraint.GlobalStepId =
lngStepId And _
                cUpdateConstraint.IndOperation
<> DeleteOp Then
                cUpdateConstraint.GlobalVersionNo
= strNewVersion

                ' Set the operation to indicate an
insert
                cUpdateConstraint.IndOperation =
InsertOp
            End If
        Else
            If cUpdateConstraint.StepId =
lngStepId And _
                cUpdateConstraint.IndOperation
<> DeleteOp Then
                cUpdateConstraint.VersionNo =
strNewVersion

                ' Set the operation to indicate an
insert
                cUpdateConstraint.IndOperation =
InsertOp
            End If
        End If
    Next lngIndex

    Exit Sub
CreateNewConstraintVersionErr:
    LogErrors Errors
    gstrSource = mstrModuleName &
"CreateNewConstraintVersion"
    On Error GoTo 0
    Err.Raise vbObjectError +
errCreateNewConstraintVersionFailed, _
            mstrSource, _

LoadResString(errCreateNewConstraintVersionFail
ed)

End Sub
Private Sub Class_Initialize()

    Set mcarrConstraints = New cNodeCollections
    BugMessage "cArrConstraints: Initialize event -
setting Constraint count to 0"

End Sub

Private Sub Class_Terminate()

    Set mcarrConstraints = Nothing
    BugMessage "cArrConstraints: Terminate event
triggered"

End Sub

Public Sub Add(ByVal cConstraintToAdd As
cConstraint)

    Set cConstraintToAdd.NodeDB =
mcarrConstraints.NodeDB

    ' Retrieve a unique constraint identifier
    cConstraintToAdd.ConstraintId =
cConstraintToAdd.NextIdentifier

    ' Call a procedure to load the constraint record in
the array
    Call mcarrConstraints.Add(cConstraintToAdd)

End Sub
Public Sub Delete(ByVal cOldConstraint As
cConstraint)

    Dim lngDeleteElement As Long
    Dim cConsToDelete As cConstraint

    lngDeleteElement =
QueryConstraintIndex(cOldConstraint.ConstraintId)
    Set cConsToDelete =
mcarrConstraints(lngDeleteElement)

    Call
mcarrConstraints.Delete(cConsToDelete.Position)

    Set cConsToDelete = Nothing

End Sub
Private Function
QueryConstraintIndex(lngConstraintId As Long) _
        As Long

    Dim lngIndex As Integer

    ' Find the element in the array to be deleted
    For lngIndex = 0 To mcarrConstraints.Count - 1

        ' Note: The constraint id is not a primary key
field in
```

```
      ' the database - there can be multiple
records with the
      ' same constraint_id but for different
versions of a step
      ' However, since we'll always load the
constraint information
      ' for the latest version of a step, we'll
have just one
      ' constraint record with a given
constraint_id
      If
mcarrConstraints(lngIndex).ConstraintId =
lngConstraintId Then
         QueryConstraintIndex = lngIndex
         Exit Function
      End If

   Next lngIndex

   ' Raise error that Constraint has not been
found
   ShowError errConstraintNotFound
   On Error GoTo 0
   Err.Raise vbObjectError +
errConstraintNotFound, mstrSource, _
      LoadResString(errConstraintNotFound)

End Function

Public Function QueryConstraint(ByVal
lngConstraintId As Long) _
   As cConstraint

   ' Returns a cConstraint object with the
property values
   ' corresponding to the Constraint
Identifier, lngConstraintId

   Dim lngQueryElement As Long

   lngQueryElement =
QueryConstraintIndex(lngConstraintId)

   ' Set the return value to the queried
Constraint
   Set QueryConstraint =
mcarrConstraints(lngQueryElement)

End Function

Public Sub LoadConstraints(ByVal
lngWorkspaceId As Long, rstStepsInWsp
As Recordset)

   ' Loads the constraints array with all the
constraints
   ' for the workspace
   Dim recConstraints As Recordset
   Dim qyCons As DAO.QueryDef
   Dim strSql As String
   Dim dtStart As Date

   On Error GoTo LoadConstraintsErr
   mstrSource = mstrModuleName &
"LoadConstraints"

   If rstStepsInWsp.RecordCount = 0 Then
      Exit Sub
   End If

   ' First check if the database object has
been set
   If mcarrConstraints.NodeDB Is Nothing
Then
      On Error GoTo 0
      Err.Raise vbObjectError +
errSetDBBeforeLoad, _
            mstrSource, _

LoadResString(errSetDBBeforeLoad)
   End If

   dtStart = Now

   ' Select based on the global step id since
there might
   ' be constraints for a global step that run are
executed
   ' for the workspace
   ' This method has the advantage that if the
steps are queried right, everything else follows
   strSql = "Select a.constraint_id, a.step_id,
a.version_no, " & _
      " a.constraint_type, a.global_step_id,
a.global_version_no, " & _
      " a.sequence_no, b.workspace_id " & _
      " from step_constraints a, att_steps b " &
_
      " where a.global_step_id = b.step_id " &
_
      " and a.global_version_no = b.version_no
" & _
      " and a.global_step_id = [g_s_id] " & _
      " and a.global_version_no = [g_ver_no] "
& _
      " and b.archived_flag = [archived] "

   ' Find the highest X-component of the
version number
   strSql = strSql & " AND ( a.step_id = 0 or (
cint( mid( a.version_no, 1, instr( a.version_no,
" & gstrDQ & gstrVerSeparator & gstrDQ & "
) - 1 ) ) = " & _
      " ( select max( cint( mid( version_no, 1,
instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) - 1 ) ) ) " & _
      " from att_steps AS d " & _
      " WHERE a.step_id = d.step_id " & _
      " and d.archived_flag = [archived] ) "

   ' Find the highest Y-component of the
version number for the highest X-component
   strSql = strSql & " AND cint( mid(
a.version_no, instr( a.version_no, " & gstrDQ
& gstrVerSeparator & gstrDQ & " ) + 1 ) ) = "
& _
      " ( select max( cint( mid( version_no,
instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) + 1 ) ) ) " &
_
      " from att_steps AS y " & _
      " Where a.step_id = y.step_id " & _
      " AND cint( mid( version_no, 1, instr(
version_no, " & gstrDQ & gstrVerSeparator &
gstrDQ & " ) - 1 ) ) = " & _
      " ( select max( cint( mid( version_no, 1,
instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) - 1 ) ) ) " & _
      " from att_steps AS c " & _
      " WHERE y.step_id = c.step_id " & _
      " and c.archived_flag = [archived] ) ) ) ) "

   ' Order the constraints by sequence within a
given step
   strSql = strSql & " order by a.sequence_no "

   Set qyCons =
mcarrConstraints.NodeDB.CreateQueryDef(gst
rEmptyString, strSql)
   qyCons.Parameters("archived").Value = False

   rstStepsInWsp.MoveFirst

   While Not rstStepsInWsp.EOF

      If Not (rstStepsInWsp!global_flag) Then
         qyCons.Close
         BugMessage "Query constraints Read +
load took: " & CStr(DateDiff("s", dtStart, Now))
         Exit Sub
      End If

      qyCons.Parameters("g_s_id").Value =
rstStepsInWsp!step_id
      qyCons.Parameters("g_ver_no").Value =
rstStepsInWsp!version_no

      Set recConstraints =
qyCons.OpenRecordset(dbOpenSnapshot)

      Call
LoadRecordsetInConstraintArray(recConstraints)
      recConstraints.Close

      rstStepsInWsp.MoveNext
   Wend

   qyCons.Close
   BugMessage "Query constraints Read + load
took: " & CStr(DateDiff("s", dtStart, Now))

   Exit Sub

LoadConstraintsErr:
   LogErrors Errors
   gstrSource = mstrModuleName &
"LoadConstraints"
   On Error GoTo 0
   Err.Raise vbObjectError + errLoadDataFailed, _
         mstrSource, _
         LoadResString(errLoadDataFailed)

End Sub
Public Sub UnloadStepConstraints(ByVal lngStepId
As Long)

   ' Unloads all the constraints for the workspace
from
   ' the constraints array

   Dim lngIndex As Long

   ' Find all constraints in the array with a matching
step id
   ' It is important to step in reverse order through
the array,
   ' since we delete constraint records!
   For lngIndex = mcarrConstraints.Count - 1 To 0
Step -1
      If mcarrConstraints(lngIndex).GlobalStepId =
lngStepId Then

         ' Unload the constraint from the array
         Call mcarrConstraints.Unload(lngIndex)

      End If
   Next lngIndex

End Sub
Public Sub UnloadConstraint(cOldConstraint As
cConstraint)
   ' Unloads the constraint from the constraints array

   Dim lngDeleteElement As Long
```

```
    lngDeleteElement =
QueryConstraintIndex(cOldConstraint.Const
raintId)

    Call
mcarrConstraints.Unload(lngDeleteElement)

End Sub
Private Sub
LoadRecordsetInConstraintArray(ByVal
recConstraints As Recordset)
    ' Loads all the constraint records in the
passed in
    ' recordset into the array

    Dim cNewConstraint As cConstraint

    On Error GoTo
LoadRecordsetInConsArrayErr
    mstrSource = mstrModuleName &
"LoadRecordsetInConstraintArray"

    If recConstraints.RecordCount = 0 Then
        Exit Sub
    End If

    recConstraints.MoveFirst
    While Not recConstraints.EOF
        Set cNewConstraint = New cConstraint

        ' Initialize Constraint values
        cNewConstraint.ConstraintId =
CLng(ErrorOnNullField(recConstraints,
"Constraint_id"))
        cNewConstraint.StepId =
CLng(ErrorOnNullField(recConstraints,
"step_id"))
        cNewConstraint.VersionNo =
CStr(ErrorOnNullField(recConstraints,
"version_no"))

        cNewConstraint.GlobalStepId =
CLng(ErrorOnNullField(recConstraints,
"global_step_id"))
        cNewConstraint.GlobalVersionNo =
CStr(ErrorOnNullField(recConstraints,
"global_version_no"))
        cNewConstraint.SequenceNo =
CInt(ErrorOnNullField(recConstraints,
"sequence_no"))

        cNewConstraint.WorkspaceId =
CLng(ErrorOnNullField(recConstraints,
FLD_ID_WORKSPACE))
        cNewConstraint.ConstraintType =
CInt(ErrorOnNullField(recConstraints,
"constraint_type"))

        ' Add this record to the array of
Constraints
        mcarrConstraints.Load cNewConstraint

        Set cNewConstraint = Nothing
        recConstraints.MoveNext
    Wend

    Exit Sub

LoadRecordsetInConsArrayErr:
    LogErrors Errors
    gstrSource = mstrModuleName &
"LoadRecordsetInConstraintArray"
    On Error GoTo 0
    Err.Raise vbObjectError +
errLoadRsInArrayFailed, _
        mstrSource, _

LoadResString(errLoadRsInArrayFailed)

End Sub

Public Function ConstraintsForStep( _
    ByVal lngStepId As Long, _
    ByVal strVersionNo As String, _
    Optional ByVal intConstraintType As
ConstraintType = 0, _
    Optional ByVal blnSort As Boolean =
True, _
    Optional ByVal blnGlobal As Boolean =
False, _
    Optional ByVal
blnGlobalConstraintsOnly As Boolean = False)
_
    As Variant

    ' Returns a variant containing an array of
cConstraint objects,
    ' containing all the constraints that have been
defined for the
    ' given step. If the Global flag is set to true,
the
    ' search will be made for all the constraints
that have
    ' a matching global_step_id

    Dim lngIndex As Long
    Dim cStepConstraint() As cConstraint
    Dim lngConstraintCount As Long
    Dim cTempConstraint As cConstraint

    On Error GoTo ConstraintsForStepErr
    mstrSource = mstrModuleName &
"ConstraintsForStep"

    lngConstraintCount = 0

    ' Find each element in the constraints array
    For lngIndex = 0 To mcarrConstraints.Count
- 1
        ' If a constraint type has been specified
then check
        ' if the constraint type for the record
matches the
        ' passed in type
        Set cTempConstraint =
mcarrConstraints(lngIndex)
        If Not blnGlobal Then
            If cTempConstraint.StepId = lngStepId
And _
                cTempConstraint.VersionNo =
strVersionNo And _
                cTempConstraint.IndOperation <>
DeleteOp And _
                (intConstraintType = 0 Or _
                cTempConstraint.ConstraintType
= intConstraintType) Then
                ' We have a matching constraint for
the given step
                AddArrayElement cStepConstraint, _
                    cTempConstraint,
lngConstraintCount
            End If
        Else
            If cTempConstraint.GlobalStepId =
lngStepId And _

cTempConstraint.GlobalVersionNo =
strVersionNo And _
                cTempConstraint.IndOperation <>
DeleteOp Then
                If blnGlobalConstraintsOnly = False Or _
                    (blnGlobalConstraintsOnly And _
                    cTempConstraint.StepId = 0 And _
                    cTempConstraint.VersionNo =
gstrMinVersion) Then

                    ' We have a matching constraint for the
global step
                    AddArrayElement cStepConstraint, _
                        cTempConstraint,
lngConstraintCount
                End If
            End If
        End If

    Next lngIndex

    ' Set the return value of the function to the array
of
    ' constraints that has been built above
    If lngConstraintCount = 0 Then
        ConstraintsForStep = Empty
    Else
        ConstraintsForStep = cStepConstraint()
    End If

    ' Sort the constraints
    If blnSort Then
        Call QuickSort(ConstraintsForStep)
    End If

    Exit Function

ConstraintsForStepErr:
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError +
errConstraintsForStepFailed, _
        mstrSource, _

LoadResString(errConstraintsForStepFailed)

End Function
Private Sub AddArrayElement(ByRef arrNodes()
As cConstraint, _
    ByVal objToAdd As cConstraint, _
    ByRef lngCount As Long)
    ' Adds the passed in object to the array

    ' Increase the array dimension and add the object
to it
    ReDim Preserve arrNodes(lngCount)
    Set arrNodes(lngCount) = objToAdd
    lngCount = lngCount + 1

End Sub

Public Function ConstraintsForWsp( _
    ByVal lngWorkspaceId As Long, _
    Optional ByVal intConstraintType As Integer
= 0, _
    Optional ByVal blnSort As Boolean = True, _
    Optional ByVal blnGlobalConstraintsOnly As
Boolean = False) _
    As Variant

    ' Returns a variant containing an array of
cConstraint objects,
    ' containing all the constraints that have been
defined for the
    ' given workspace.

    Dim lngIndex As Long
```

```
    Dim cWspConstraint() As cConstraint
    Dim lngConstraintCount As Long
    Dim cTempConstraint As cConstraint

    On Error GoTo ConstraintsForWspErr
    mstrSource = mstrModuleName &
"ConstraintsForWsp"

    lngConstraintCount = 0

    ' Find each element in the constraints
array
    For lngIndex = 0 To
mcarrConstraints.Count - 1
        ' If a constraint type has been specified
then check
        ' if the constraint type for the record
matches the
        ' passed in type
        Set cTempConstraint =
mcarrConstraints(lngIndex)
        If cTempConstraint.WorkspaceId =
lngWorkspaceId And _
            cTempConstraint.IndOperation <>
DeleteOp And _
            (intConstraintType = 0 Or _
            cTempConstraint.ConstraintType
= intConstraintType) Then

            If blnGlobalConstraintsOnly = False
Or _
                (blnGlobalConstraintsOnly And
_
                cTempConstraint.StepId = 0
And _
                cTempConstraint.VersionNo =
gstrMinVersion) Then

                ' We have a matching constraint
for the workspace
                AddArrayElement
cWspConstraint, _
                    cTempConstraint,
lngConstraintCount
            End If
        End If
    Next lngIndex

    ' Set the return value of the function to the
array of
    ' constraints that has been built above
    If lngConstraintCount = 0 Then
        ConstraintsForWsp = Empty
    Else
        ConstraintsForWsp = cWspConstraint()
    End If

    ' Sort the constraints
    If blnSort Then
        Call QuickSort(ConstraintsForWsp)
    End If

    Exit Function

ConstraintsForWspErr:
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError +
errConstraintsForWspFailed, _
            mstrSource, _

LoadResString(errConstraintsForWspFailed
)

End Function

Public Function PreConstraintsForStep( _
        ByVal lngStepId As Long, _
        ByVal strVersionNo As String, _
        Optional ByVal blnSort As Boolean) As
Variant

    ' Returns a variant containing an array of
cConstraint objects,
    ' containing all the pre-execution constraints
that have
    ' been defined for the given step_id and
version

    ' Call a function that will return a variant
containing
    ' all the constraints of the passed in type
    PreConstraintsForStep =
ConstraintsForStep(lngStepId, _
            strVersionNo, gintPreStep, blnSort)

End Function
Public Function PostConstraintsForStep( _
        ByVal lngStepId As Long, _
        ByVal strVersionNo As String, _
        Optional ByVal blnSort As Boolean) As
Variant

    ' Returns a variant containing an array of
cConstraint objects,
    ' containing all the Post-execution
constraints that have
    ' been defined for the given step_id and
version

    ' Call a function that will return a variant
containing
    ' all the constraints of the passed in type
    PostConstraintsForStep =
ConstraintsForStep(lngStepId, _
            strVersionNo, gintPostStep, blnSort)

End Function
Public Function PostConstraintsForWsp( _
        ByVal lngWorkspaceId As Long, _
        Optional ByVal blnSort As Boolean) As
Variant

    ' Returns a variant containing an array of
cConstraint objects,
    ' containing all the Post-execution globals
that have
    ' been defined for the workspace

    ' Call a function that will return a variant
containing
    ' all the constraints of the passed in type
    PostConstraintsForWsp =
ConstraintsForWsp(lngWorkspaceId, _
            gintPostStep, blnSort, True)

End Function
Public Function PreConstraintsForWsp( _
        ByVal lngWorkspaceId As Long, _
        Optional ByVal blnSort As Boolean) As
Variant

    ' Returns a variant containing an array of
cConstraint objects,
    ' containing all the Pre-execution globals that
have
    ' been defined for the workspace

    ' Call a function that will return a variant
containing
    ' all the constraints of the passed in type
    PreConstraintsForWsp =
ConstraintsForWsp(lngWorkspaceId, _
            gintPreStep, blnSort, True)

End Function
Public Property Get ConstraintCount() As Long

    ConstraintCount = mcarrConstraints.Count

End Property

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cArrParameters"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cArrParameters.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Implements an array of cParameter
objects.
'              Type-safe wrapper around
cNodeCollections.
'              Also contains additional functions to
determine parameter
'              values, validation functions, etc.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private mcarrParameters As cNodeCollections

' Used to indicate the source module name when
errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cArrParameters."

Public Sub InitBuiltInsForRun(lWspId As Long,
lRunId As Long)

    Dim cParamRec As cParameter

    ' Initialize the values of the run_id and output_dir
built-in parameters and save them
    ' to the database
    Set cParamRec = GetParameterValue(lWspId,
PARAM_RUN_ID)
    cParamRec.ParameterValue = CStr(lRunId)
    Call Modify(cParamRec)

    Set cParamRec = GetParameterValue(lWspId,
PARAM_OUTPUT_DIR)
    cParamRec.ParameterValue =
GetDefaultDir(lWspId, Me)
    cParamRec.ParameterValue =
cParamRec.ParameterValue & gstrFileSeparator &
CStr(lRunId)
    Call Modify(cParamRec)

    Call SaveParametersInWsp(lWspId)

End Sub
```

```
Public Property Set ParamDatabase(vdata
As Database)

   Set mcarrParameters.NodeDB = vdata

End Property
Public Sub Modify(cModifiedParam As
cParameter)

   ' First check if the parameter record is
valid
   Call
CheckDupParamName(cModifiedParam)

   Call
mcarrParameters.Modify(cModifiedParam)

End Sub
Public Sub Load(ByRef cParamToAdd As
cParameter)

   Call
mcarrParameters.Load(cParamToAdd)

End Sub
Public Sub Add(ByRef cParamToAdd As
cParameter)

   Set cParamToAdd.NodeDB =
mcarrParameters.NodeDB

   ' First check if the parameter record is
valid
   Call Validate(cParamToAdd)

   ' Retrieve a unique parameter identifier
   cParamToAdd.ParameterId =
cParamToAdd.NextIdentifier

   Call
mcarrParameters.Add(cParamToAdd)

End Sub

Public Sub Unload(lngParamToDelete As
Long)

   Dim lngDeleteElement As Long

   lngDeleteElement =
QueryIndex(lngParamToDelete)

   Call
mcarrParameters.Unload(lngDeleteElement)

End Sub

Public Sub SaveParametersInWsp(ByVal
lngWorkspace As Long)
   ' Calls a procedure to commit all changes
to the parameters
   ' for the passed in workspace.

   ' Call a procedure to save all parameter
records for the
   ' workspace
   Call
mcarrParameters.Save(lngWorkspace)

End Sub
Public Function GetParameterValue(ByVal
lngWorkspace As Long, _
      ByVal strParamName As String) As
cParameter
   ' Returns the value for the passed in
workspace parameter

   Dim cParamRec As cParameter
   Dim lngIndex As Long

   On Error GoTo GetParameterValueErr

   ' Find all parameters in the array with a
matching workspace id
   For lngIndex = 0 To mcarrParameters.Count
- 1
      Set cParamRec =
mcarrParameters(lngIndex)
      If cParamRec.WorkspaceId =
lngWorkspace And _
            cParamRec.ParameterName =
strParamName Then

         Set GetParameterValue = cParamRec
         Exit For
      End If
   Next lngIndex

   If lngIndex > mcarrParameters.Count - 1
Then
      ' The parameter has not been defined for
the workspace
      ' Raise an error
      On Error GoTo 0
      Err.Raise vbObjectError +
errParamNameInvalid, _
            mstrModuleName &
"GetParameterValue", _

LoadResString(errParamNameInvalid)
   End If

   Exit Function

GetParameterValueErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   gstrSource = mstrModuleName &
"GetParameterValue"
   On Error GoTo 0
   Err.Raise vbObjectError +
errGetParamValueFailed, _
         gstrSource, _

LoadResString(errGetParamValueFailed)

End Function
Public Sub Delete(lngParamToDelete As
Long)
   ' Delete the passed in parameter

   Dim lngDeleteElement As Long

   lngDeleteElement =
QueryIndex(lngParamToDelete)
   Call
mcarrParameters.Delete(lngDeleteElement)

End Sub
Private Function QueryIndex(lngParameterId
As Long) As Long

   Dim lngIndex As Long

   ' Find the matching parameter record in the
array
   For lngIndex = 0 To mcarrParameters.Count
- 1
      If mcarrParameters(lngIndex).ParameterId =
lngParameterId And _
            mcarrParameters(lngIndex).IndOperation
<> DeleteOp Then
         QueryIndex = lngIndex
         Exit Function
      End If
   Next lngIndex

   ' Raise error that parameter has not been found
   On Error GoTo 0
   Err.Raise vbObjectError + errParamNotFound,
"cArrParameters.QueryIndex", _
      LoadResString(errParamNotFound)

End Function

Public Function QueryParameter(lngParameterId
As Long) _
      As cParameter

   Dim lngQueryElement As Long

   lngQueryElement = QueryIndex(lngParameterId)

   ' Return the queried parameter object
   Set QueryParameter =
mcarrParameters(lngQueryElement)

End Function
Public Property Get ParameterCount() As Long

   ParameterCount = mcarrParameters.Count

End Property
Public Property Get Item(lngIndex As Long) As
cParameter
Attribute Item.VB_UserMemId = 0

   Set Item = mcarrParameters(lngIndex)

End Property

Public Sub Validate(ByVal cParamToValidate As
cParameter)
   ' This procedure is necessary since the class
cannot validate
   ' all the parameter properties on it's own. This is
'coz we
   ' might have created new parameters in the
workspace, but not
   ' saved them to the database yet - hence the
duplicate check
   ' has to be repeated in the array

   Dim lngIndex As Long
   Dim cTempParam As cParameter

   On Error GoTo ValidateErr

   ' Check if the parameter name already exists in
the workspace
   For lngIndex = 0 To mcarrParameters.Count - 1
      Set cTempParam = mcarrParameters(lngIndex)
      If cTempParam.WorkspaceId =
cParamToValidate.WorkspaceId And _
            cTempParam.ParameterName =
cParamToValidate.ParameterName And _
            cTempParam.IndOperation <> DeleteOp
Then
         On Error GoTo 0
         Err.Raise vbObjectError +
errDuplicateParameterName, _
            mstrSource,
LoadResString(errDuplicateParameterName)
```

```
    End If
  Next lngIndex

  Exit Sub

ValidateErr:
  LogErrors Errors
  mstrSource = mstrModuleName &
"Validate"
  On Error GoTo 0
  Err.Raise vbObjectError +
errValidateFailed, _
    mstrSource,
LoadResString(errValidateFailed)

End Sub
Public Sub CheckDupParamName(ByVal
cParamToValidate As cParameter)

  Dim lngIndex As Long
  Dim cTempParam As cParameter

  ' Check if the parameter name already
exists in the workspace
  For lngIndex = 0 To
mcarrParameters.Count - 1
    Set cTempParam =
mcarrParameters(lngIndex)
    If cTempParam.WorkspaceId =
cParamToValidate.WorkspaceId And _
      cTempParam.ParameterName =
cParamToValidate.ParameterName And _
      cTempParam.ParameterId <>
cParamToValidate.ParameterId And _
      cTempParam.IndOperation <>
DeleteOp Then
      ShowError
errDuplicateParameterName
      On Error GoTo 0
      Err.Raise vbObjectError +
errDuplicateParameterName, _
        mstrSource,
LoadResString(errDuplicateParameterName
)
    End If
  Next lngIndex

End Sub

Private Sub Class_Initialize()

  'bugmessage "cArrParameters: Initialize
event - setting parameter count to 0"
  Set mcarrParameters = New
cNodeCollections

End Sub


Private Sub Class_Terminate()

  Set mcarrParameters = Nothing

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cArrSteps"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cArrSteps.cls
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
'  PURPOSE:    Implements an array of cStep
objects.
'            Type-safe wrapper around
cNodeCollections.
'            Also contains additional functions to
update parent version
'            on substeps, validation functions, etc.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private mcarrSteps As cNodeCollections

' Used to indicate the source module name
when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cArrSteps."

Public Sub Unload(lngStepToDelete As Long)

  Dim lngDeleteElement As Long
  Dim cUnloadStep As cStep

  lngDeleteElement =
QueryStepIndex(lngStepToDelete)
  Set cUnloadStep =
QueryStep(lngStepToDelete)

  ' First unload all iterators for the step
  Call cUnloadStep.UnloadIterators

  ' Unload the step from the collection
  Call mcarrSteps.Unload(lngDeleteElement)

End Sub
Public Sub Modify(cModifiedStep As cStep)

  Dim iAppend As Integer
  Dim sLabel As String

  On Error GoTo ModifyErr

  iAppend = 0
  sLabel = cModifiedStep.StepLabel

  Validate cModifiedStep

  Call mcarrSteps.Modify(cModifiedStep)

  Exit Sub

ModifyErr:
  ' If the error raised by the add function is due
to a duplication
  ' of the step label, then try to generate a
unique label
  If Err.Number - vbObjectError =
errStepLabelUnique Then
    iAppend = iAppend + 1
    cModifiedStep.StepLabel = sLabel &
CStr(iAppend)
    ' Try to insert the step record again
    Resume
  End If

  ' Log the error code raised by Visual Basic
  Call LogErrors(Errors)
  On Error GoTo 0
  Err.Raise vbObjectError + errModifyStepFailed,
_
    gstrSource, _
    LoadResString(errModifyStepFailed)

End Sub
Public Sub UpdateParentVersion(ByVal lngStepId
As Long, _
    ByVal strNewVersion As String, _
    ByVal strOldVersion As String, _
    ByVal intStepType As Integer)

  ' Does all the processing needed to update the
parent version
  ' number on all the sub-steps for a given step
  ' It updates the parent version no in the database
for all
  ' sub-steps of the passed in step id
  ' It also updates the parent version number on all
sub-steps
  ' in the array to the new version passed in

  Dim lngIndex As Long
  Dim cUpdateStep As cStep

  On Error GoTo UpdateParentVersionErr

  If intStepType <> gintManagerStep Then
    ' Only a manager can have sub-steps - if the
passed
    ' in step is not a manager, exit
    Exit Sub
  End If

  ' For all steps in the array
  For lngIndex = 0 To mcarrSteps.Count - 1

    Set cUpdateStep = mcarrSteps(lngIndex)

    ' If the current step is a sub-step of the passed
in step
    If cUpdateStep.ParentStepId = lngStepId And
_
      cUpdateStep.ParentVersionNo =
strOldVersion And _
      Not cUpdateStep.ArchivedFlag Then

      ' Update the parent version number for the
sub-step
      ' in the array
      cUpdateStep.ParentVersionNo =
strNewVersion

      ' Update the parent version number for the
sub-step
      ' in the array
      Call Modify(cUpdateStep)

    End If
  Next lngIndex

  Exit Sub

UpdateParentVersionErr:
  LogErrors Errors
  mstrSource = mstrModuleName &
"UpdateParentVersion"
  On Error GoTo 0
  Err.Raise vbObjectError +
errUpdateParentVersionFailed, _
    mstrSource, _

LoadResString(errUpdateParentVersionFailed)

End Sub
```

```
Private Sub Validate(cCheckStep As cStep)

   ' Step validations that depend on other
steps in the collection

   Dim lngIndex As Long

   ' Ensure that the step label is unique in the
workspace
   For lngIndex = 0 To mcarrSteps.Count - 1

      ' If the current step is a sub-step of the
passed in step
      If mcarrSteps(lngIndex).WorkspaceId
= cCheckStep.WorkspaceId And _
            mcarrSteps(lngIndex).StepLabel =
cCheckStep.StepLabel And _
            mcarrSteps(lngIndex).StepId <>
cCheckStep.StepId And _

mcarrSteps(lngIndex).IndOperation <>
DeleteOp Then
         On Error GoTo 0
         Err.Raise vbObjectError +
errStepLabelUnique, _
               mstrModuleName &
"Validate", _

LoadResString(errStepLabelUnique)
      End If
   Next lngIndex

End Sub

Public Sub ValidateStep(cCheckStep As
cStep)

   On Error GoTo ValidateStepErr

   'Public wrapper for Validate function (2
many Validates)
   Call Validate(cCheckStep)

   Exit Sub

ValidateStepErr:
   ShowError errStepLabelUnique
   On Error GoTo 0
   Err.Raise vbObjectError +
errValidateFailed, _
         gstrSource, _
         LoadResString(errValidateFailed)
End Sub

Private Sub Class_Initialize()

   BugMessage "cArrSteps: Initialize event -
setting step count to 0"
   Set mcarrSteps = New cNodeCollections

End Sub

Private Sub Class_Terminate()

   BugMessage "cArrSteps: Terminate event
triggered"
   Set mcarrSteps = Nothing

End Sub

Public Sub Add(ByVal cStepToAdd As
cStep)

   Dim iAppend As Integer
   Dim sLabel As String

   On Error GoTo AddErr

   iAppend = 0
   sLabel = cStepToAdd.StepLabel

   Set cStepToAdd.NodeDB =
mcarrSteps.NodeDB

   ' Retrieve a unique step identifier
   cStepToAdd.StepId =
cStepToAdd.NextStepId

   Validate cStepToAdd

   ' Call a procedure to add the step record
   Call mcarrSteps.Add(cStepToAdd)

   ' Call a procedure to add all iterators for the
step
   cStepToAdd.AddAllIterators

   Exit Sub

AddErr:
   ' If the error raised by the add function is due
to a duplication
   ' of the step label, then try to generate a
unique label
   If Err.Number - vbObjectError =
errStepLabelUnique Then
      iAppend = iAppend + 1
      cStepToAdd.StepLabel = sLabel &
CStr(iAppend)
      ' Try to insert the step record again
      Resume
   End If

   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errInsertStepFailed, _
         gstrSource, _
         LoadResString(errInsertStepFailed)

End Sub
Public Sub Load(cStepToLoad As cStep)

   Call mcarrSteps.Load(cStepToLoad)

End Sub
Public Sub SaveStepsInWsp(ByVal
lngWorkspace As Long)
   ' Calls a procedure to commit all changes to
the steps
   ' in the passed in workspace.

   Dim lngIndex As Integer

   ' Find all steps in the array with a matching
workspace id
   ' It is important to step in reverse order
through the array,
   ' since we delete step records sometimes!
   For lngIndex = mcarrSteps.Count - 1 To 0
Step -1
      If mcarrSteps(lngIndex).WorkspaceId =
lngWorkspace Then

         ' Call a procedure to commit all
changes to the
         ' Step record, if any
         Call
CommitStep(mcarrSteps(lngIndex), lngIndex)
      End If
   Next lngIndex

End Sub
Private Sub CommitStep(ByVal cCommitStep As
cStep, _
      ByVal intIndex As Integer)
   ' This procedure checks if any changes have been
made to the
   ' passed in Step. If so, it calls the step methods to
commit
   ' the changes.

   ' First commit all changes to the iterator records
for
   ' the step
   cCommitStep.SaveIterators

   Call mcarrSteps.Commit(cCommitStep, intIndex)

End Sub
Public Sub Delete(lngStepToDelete As Long)

   Dim lngDeleteElement As Long

   lngDeleteElement =
QueryStepIndex(lngStepToDelete)
   Call mcarrSteps.Delete(lngDeleteElement)

End Sub
Public Function QueryStepIndex(lngStepId As
Long) As Long

   Dim lngIndex As Long

   ' Find the element in the array that corresponds to
the
   ' passed in step id - note that while there will be
multiple
   ' versions of a step in the database, only one
version will
   ' be currently loaded in the array - meaning that
the stepid
   ' is enough to uniquely identify a step
   For lngIndex = 0 To mcarrSteps.Count - 1
      If mcarrSteps(lngIndex).StepId = lngStepId
Then
         QueryStepIndex = lngIndex
         Exit Function
      End If
   Next lngIndex

   ' Raise error that step has not been found
   On Error GoTo 0
   Err.Raise vbObjectError + errStepNotFound,
mstrSource, _
      LoadResString(errStepNotFound)

End Function

Public Function QueryStep(ByVal lngStepId As
Long) As cStep

   ' Populates the passed in cStep object with the
property
   ' values corresponding to the Step Identifier,
lngStepId

   Dim lngQueryElement As Integer

   lngQueryElement = QueryStepIndex(lngStepId)

   ' Initialize the passed in step object to the queried
step
```

```
   Set QueryStep =
mcarrSteps(lngQueryElement)

End Function
Public Property Get Item(ByVal Position As
Long) As cStep
Attribute Item.VB_UserMemId = 0

   ' Returns the element at the passed in
position in the array
   If Position >= 0 And Position <
mcarrSteps.Count Then
      Set Item = mcarrSteps(Position)
   Else
      On Error GoTo 0
      Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _

LoadResString(errItemDoesNotExist)
   End If

End Property
Public Property Set Item(ByVal Position As
Long, _
      ByVal cStepRec As cStep)

   ' Returns the element at the passed in
position in the array
   If Position >= 0 And Position <
mcarrSteps.Count Then
      Set mcarrSteps(Position) = cStepRec
   Else
      On Error GoTo 0
      Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _

LoadResString(errItemDoesNotExist)
   End If

End Property
Public Property Set StepDB(vdata As
Database)

   Set mcarrSteps.NodeDB = vdata

End Property
Public Function SubSteps(ByVal lngStepId
As Long, _
      ByVal strVersionNo As String) As
Variant

   ' Returns a variant containing an array of
all the substeps
   ' for the passed in step

   Dim intIndex As Integer
   Dim cSubSteps() As cStep
   Dim lngStepCount As Long
   Dim cQueryStep As cStep

   On Error GoTo SubStepsErr

   lngStepCount = 0

   Set cQueryStep = QueryStep(lngStepId)

   ' Only a manager can have sub-steps
   If cQueryStep.StepType =
gintManagerStep Then

      ' For each element in the Steps array
      For intIndex = 0 To mcarrSteps.Count -
1
         ' Check if the parent step id and
parent version number
         ' match the passed in step
         If mcarrSteps(intIndex).ParentStepId =
lngStepId And _

mcarrSteps(intIndex).ParentVersionNo =
strVersionNo And _

mcarrSteps(intIndex).IndOperation <>
DeleteOp Then

            ' Increase the array dimension and
add the step
            ' to it
            ReDim Preserve
cSubSteps(lngStepCount)
            Set cSubSteps(lngStepCount) =
mcarrSteps(intIndex)
            lngStepCount = lngStepCount + 1

         End If
      Next intIndex

   End If

   ' Set the return value of the function to the
array of
   ' Steps that has been built above
   If lngStepCount = 0 Then
      SubSteps = Empty
   Else
      SubSteps = cSubSteps()
   End If

   Exit Function

SubStepsErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"SubSteps"
   On Error GoTo 0
   Err.Raise vbObjectError +
errSubStepsFailed, _
         mstrSource, _
         LoadResString(errSubStepsFailed)

End Function

Public Property Get StepCount() As Integer

   StepCount = mcarrSteps.Count

End Property

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cAsyncShell"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'--------------------------------------------------------
-----------------------
' Copyright © 1997 Microsoft Corporation. All
rights reserved.
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reproduce and distribute the
' Sample Application Files (and/or any
modified version) in any way you find
' useful, provided that you agree that Microsoft
has no warranty, obligations or
' liability for any Sample Application Files.
'--------------------------------------------------------
-----------------

Option Explicit

' Used to indicate the source module name when
errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cAsyncShell."

Public Event Terminated()

Private WithEvents moTimer As cTimerSM
Attribute moTimer.VB_VarHelpID = -1
Private proc As PROCESS_INFORMATION
Private mfShelling As Boolean


'--------------------------------------------------------
-----------------
'Initialization and cleanup:

Private Sub Class_Initialize()
   Set moTimer = New cTimerSM
End Sub

Private Sub Class_Terminate()
   If mfShelling Then CloseHandle proc.hProcess
End Sub

'--------------------------------------------------------
-----------------
'Shelling:

Public Sub Shell(CommandLine As String,
Optional PollingInterval As Long = 1000)
   Dim Start As STARTUPINFO

   If mfShelling Then
      On Error GoTo 0
      Err.Raise vbObjectError + errInstanceInUse, _
            mstrSource, _
            LoadResString(errInstanceInUse)
   End If
   mfShelling = True

   ' Initialize the STARTUPINFO structure:
   Start.cb = Len(Start)
   Start.dwFlags =
STARTF_USESHOWWINDOW
   Start.wShowWindow =
SW_SHOWMINNOACTIVE

   ' Start the shelled application:
   CreateProcessA 0&, CommandLine, 0&, 0&,
1&, _
      NORMAL_PRIORITY_CLASS, 0&, 0&,
Start, proc

   With moTimer
      If PollingInterval > 0 Then
         .Interval = PollingInterval
      Else
         .Interval = 1000
      End If
      .Enabled = True
   End With
End Sub
'--------------------------------------------------------
-----------------
'Aborting:
Public Sub Abort()
   Dim nCode As Long
```

```
'   Dim X As Integer
'   Dim ReturnVal As Integer

   On Error GoTo AbortErr

   If Not mfShelling Then
      Call WriteError(errProgramError,
mstrSource)
   Else
'      If IsWindow(proc.hProcess) = False
Then Exit Sub
'
'      If (GetWindowLong(proc.hProcess,
GWL_STYLE) And WS_DISABLED)
Then Exit Sub
'
'      If IsWindow(proc.hProcess) Then
'         If Not
(GetWindowLong(proc.hProcess,
GWL_STYLE) And WS_DISABLED)
Then
'            X = PostMessage(proc.hProcess,
WM_CANCELMODE, 0, 0&)
'            X = PostMessage(proc.hProcess,
WM_CLOSE, 0, 0&)
'         End If
'      End If

      If TerminateProcess(proc.hProcess,
0&) = 0 Then
         Debug.Print "Unable to terminate
process: " & proc.hProcess
         Call
WriteError(errTerminateProcessFailed,
mstrSource, _
               ApiError(GetLastError()))
      Else
         ' Should always come here!
         GetExitCodeProcess proc.hProcess,
nCode
         If nCode = STILL_ACTIVE Then
            ' Write an error and close the
handles to the
            ' process anyway
            Call
WriteError(errTerminateProcessFailed,
mstrSource)
         End If
      End If

      ' Close all open handles to the shelled
process, even
      ' if any of the above calls error out
      CloseHandle proc.hProcess
      moTimer.Enabled = False
      mfShelling = False
      RaiseEvent Terminated

   End If

   Exit Sub

AbortErr:
   Call LogErrors(Errors)
   mstrSource = mstrModuleName &
"Abort"
   On Error GoTo 0
   Err.Raise vbObjectError +
errProgramError, _
      mstrSource, _
      LoadResString(errProgramError)

End Sub
Private Sub moTimer_Timer()
   Dim nCode As Long

   GetExitCodeProcess proc.hProcess, nCode
   If nCode <> STILL_ACTIVE Then
      CloseHandle proc.hProcess
      moTimer.Enabled = False
      mfShelling = False
      RaiseEvent Terminated
   End If
End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cConnDtl"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:       cConnDtl.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    Encapsulates the properties
and methods of a connection.
'             Contains functions to insert, update
and delete
'             connection_dtls records from the
database.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit
Option Base 0

' Local variable(s) to hold property value(s)
Public WorkspaceId As Long
Public ConnNameId As Long
Public ConnName As String
Public ConnectionString As String
Public ConnType As ConnectionType
Public Position As Long
Public NodeDB As Database

Private mintOperation As Operation

' Used to indicate the source module name
when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cConnDtl."

' The cSequence class is used to generate
unique Connection identifiers
Private mConnectionSeq As cSequence

' The StringSM class is used to carry out string
operations
Private mFieldValue As cStringSM

Private Sub AssignParameters(qyExec As
DAO.QueryDef)
   ' Assigns values to the parameters in the
querydef object
   ' The parameter names are cryptic to
differentiate them from the field names.
   ' When the parameter names are the same as
the field names, parameters in the where
   ' clause do not get created.

   Dim prmParam As DAO.Parameter

   On Error GoTo AssignParametersErr

   For Each prmParam In qyExec.Parameters
      Select Case prmParam.Name
         Case "[w_id]"
            prmParam.Value = WorkspaceId

         Case "[c_id]"
            prmParam.Value = ConnNameId

         Case "[c_name]"
            prmParam.Value = ConnName

         Case "[c_str]"
            prmParam.Value = ConnectionString

         Case "[c_type]"
            prmParam.Value = ConnType

         Case Else
            ' Write the parameter name that is faulty
            WriteError errInvalidParameter,
mstrSource, prmParam.Name
            On Error GoTo 0
            Err.Raise errInvalidParameter,
mstrModuleName & "AssignParameters", _
                  LoadResString(errInvalidParameter)
      End Select
   Next prmParam

   Exit Sub

AssignParametersErr:

   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errAssignParametersFailed, _
      mstrModuleName & "AssignParameters",
LoadResString(errAssignParametersFailed)

End Sub

Public Function Clone() As cConnDtl

   ' Creates a copy of a given Connection

   Dim cCloneConn As cConnDtl

   On Error GoTo CloneErr

   Set cCloneConn = New cConnDtl

   ' Copy all the Connection properties to the newly
created Connection
   cCloneConn.WorkspaceId = WorkspaceId
   cCloneConn.ConnNameId = ConnNameId
   cCloneConn.ConnName = ConnName
   cCloneConn.ConnectionString =
ConnectionString
   cCloneConn.ConnType = ConnType
   cCloneConn.IndOperation = mintOperation
   cCloneConn.Position = Position

   ' And set the return value to the newly created
Connection
   Set Clone = cCloneConn
   Set cCloneConn = Nothing

   Exit Function

CloneErr:
   LogErrors Errors
   mstrSource = mstrModuleName & "Clone"
   On Error GoTo 0
```

```
    Err.Raise vbObjectError +
errCloneFailed, mstrSource,
LoadResString(errCloneFailed)

End Function
Private Sub CheckDupConnectionName()
    ' Check if the Connection name already
exists in the workspace

    Dim rstConnection As Recordset
    Dim strSql As String
    Dim qy As DAO.QueryDef

    On Error GoTo
CheckDupConnectionNameErr
    mstrSource = mstrModuleName &
"CheckDupConnectionName"

    ' Create a recordset object to retrieve the
count of all Connections
    ' for the workspace with the same name
    strSql = "Select count(*) as
Connection_count " & _
        " from " &
TBL_CONNECTION_DTLS & _
        " where " & FLD_ID_WORKSPACE
& " = [w_id]" & _
        " and " &
FLD_CONN_DTL_CONNECTION_NAM
E & " = [c_name]" & _
        " and " & FLD_ID_CONN_NAME & "
<> [c_id]"

    Set qy =
dbsAttTool.CreateQueryDef(gstrEmptyStrin
g, strSql)
    Call AssignParameters(qy)

    Set rstConnection =
qy.OpenRecordset(dbOpenForwardOnly)

    If rstConnection![Connection_count] > 0
Then
        rstConnection.Close
        qy.Close
        ShowError errDupConnDtlName
        On Error GoTo 0
        Err.Raise vbObjectError +
errDupConnDtlName, _
            mstrSource,
LoadResString(errDupConnDtlName)
    End If

    rstConnection.Close
    qy.Close

    Exit Sub

CheckDupConnectionNameErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"CheckDupConnectionName"
    On Error GoTo 0
    Err.Raise vbObjectError +
errProgramError, _
        mstrSource,
LoadResString(errProgramError)

End Sub
Public Property Let IndOperation(ByVal
vdata As Operation)

    ' The valid operations are define in the
cOperations
    ' class. Check if the operation is valid
    Select Case vdata
        Case QueryOp, InsertOp, UpdateOp,
DeleteOp
            mintOperation = vdata

        Case Else
            BugAssert True
    End Select

End Property
Public Sub Validate()
    ' Each distinct object will have a Validate
method which
    ' will check if the class properties are valid.
This method
    ' will be used to check interdependant
properties that
    ' cannot be validated by the let procedures.
    ' It should be called by the add and modify
methods of the class

    If ConnName = gstrEmptyString Then

        ShowError
errConnectionNameMandatory
        On Error GoTo 0
        ' Propogate this error back to the caller
        Err.Raise vbObjectError +
errConnectionNameMandatory, _
            mstrSource,
LoadResString(errConnectionNameMandatory
)
    End If

    ' Raise an error if the Connection name
already exists in the workspace
    Call CheckDupConnectionName

End Sub
Public Sub Add()

    Dim strInsert As String
    Dim qy As DAO.QueryDef

    On Error GoTo AddErr

    ' Validate the record before trying to insert
the record
    Call Validate

    ' Create a temporary querydef object
    strInsert = "insert into " &
TBL_CONNECTION_DTLS & _
            "( " & FLD_ID_WORKSPACE & _
            ", " & FLD_ID_CONN_NAME & _
            ", " &
FLD_CONN_DTL_CONNECTION_NAME
& _
            ", " &
FLD_CONN_DTL_CONNECTION_STRING
& _
            ", " &
FLD_CONN_DTL_CONNECTION_TYPE &
" ) " & _
            " values ( [w_id], [c_id], " & _
            " [c_name], [c_str], [c_type] ) "

    Set qy =
dbsAttTool.CreateQueryDef(gstrEmptyString,
strInsert)

    ' Call a procedure to assign the Connection
values
    Call AssignParameters(qy)
    qy.Execute dbFailOnError
    qy.Close

    Exit Sub

AddErr:

    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError + errInsertFailed, _
        mstrModuleName & "Add",
LoadResString(errInsertFailed)

End Sub
Public Sub Delete()

    Dim strDelete As String
    Dim qy As DAO.QueryDef

    On Error GoTo DeleteErr

    strDelete = "delete from " &
TBL_CONNECTION_DTLS & _
        " where " & FLD_ID_CONN_NAME & " =
[c_id]"
    Set qy =
dbsAttTool.CreateQueryDef(gstrEmptyString,
strDelete)

    Call AssignParameters(qy)
    qy.Execute dbFailOnError

    qy.Close

    Exit Sub

DeleteErr:
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError + errDeleteFailed, _
        mstrModuleName & "Delete",
LoadResString(errDeleteFailed)

End Sub

Public Sub Modify()

    Dim strUpdate As String
    Dim qy As QueryDef

    On Error GoTo ModifyErr

    ' Validate the updated values before trying to
modify the db
    Call Validate

    ' Create a temporary querydef object with the
modify string
    strUpdate = "update " &
TBL_CONNECTION_DTLS & _
        " set " & FLD_ID_WORKSPACE & " =
[w_id], " & _

FLD_CONN_DTL_CONNECTION_NAME & " =
[c_name], " & _

FLD_CONN_DTL_CONNECTION_STRING & "
= [c_str], " & _
        FLD_CONN_DTL_CONNECTION_TYPE
& " = [c_type] " & _
        " where " & FLD_ID_CONN_NAME & " =
[c_id]"
    Set qy =
dbsAttTool.CreateQueryDef(gstrEmptyString,
strUpdate)
```

```
    ' Call a procedure to assign the
Connection values to the
    ' querydef object
    Call AssignParameters(qy)
    qy.Execute dbFailOnError

    qy.Close

    Exit Sub

ModifyErr:

    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errModifyFailed, _
        mstrModuleName & "Modify",
LoadResString(errModifyFailed)

End Sub
Public Property Get NextIdentifier() As
Long

    Dim lngNextId As Long

    On Error GoTo NextIdentifierErr

    ' Retrieve the next identifier using the
sequence class
    Set mConnectionSeq = New cSequence
    Set mConnectionSeq.IdDatabase =
dbsAttTool
    mConnectionSeq.IdentifierColumn =
FLD_ID_CONN_NAME
    lngNextId = mConnectionSeq.Identifier
    Set mConnectionSeq = Nothing

    NextIdentifier = lngNextId
    Exit Property

NextIdentifierErr:
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError + errIdGetFailed,
_
        mstrModuleName & "NextIdentifier",
LoadResString(errIdGetFailed)

End Property
Public Property Get IndOperation() As
Operation

    IndOperation = mintOperation

End Property

Private Sub Class_Initialize()

    Set mFieldValue = New cStringSM

    ' Initialize the operation indicator variable
to Query
    ' It will be modified later by the collection
class when
    ' inserts, updates or deletes are performed
    mintOperation = QueryOp

    ConnType = giDefaultConnType

End Sub

Private Sub Class_Terminate()

    Set mFieldValue = Nothing

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cConnDtls"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:      cConnDtls.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
'  PURPOSE:    Implements an array of
cConnDtl objects.
'             Type-safe wrapper around
cNodeCollections.
'             Also contains additional functions to
determine the connection
'             string value, validation functions, etc.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private mcarrConnDtls As cNodeCollections

' Used to indicate the source module name
when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cConnDtls."

Public Property Set ConnDb(vdata As
Database)

    Set mcarrConnDtls.NodeDB = vdata

End Property
Public Sub Modify(cModifiedConn As
cConnDtl)

    ' First check if the parameter record is valid
    Call CheckDupConnName(cModifiedConn)

    Call
mcarrConnDtls.Modify(cModifiedConn)

End Sub
Public Sub Load(ByRef cConnToAdd As
cConnDtl)

    Call mcarrConnDtls.Load(cConnToAdd)

End Sub
Public Sub Add(ByRef cConnToAdd As
cConnDtl)

    ' First check if the record is valid
    Call Validate(cConnToAdd)

    ' Retrieve a unique identifier
    cConnToAdd.ConnNameId =
cConnToAdd.NextIdentifier

    Call mcarrConnDtls.Add(cConnToAdd)

End Sub

Public Sub Unload(lConnNameId As Long)

    Dim lngDeleteElement As Long

    lngDeleteElement = QueryIndex(lConnNameId)

    Call mcarrConnDtls.Unload(lngDeleteElement)

End Sub

Public Sub SaveConnDtlsInWsp(ByVal
lngWorkspace As Long)
    ' Call a procedure to save all connection details
records for the workspace
    Call mcarrConnDtls.Save(lngWorkspace)

End Sub
Public Function GetConnectionDtl(ByVal
lngWorkspace As Long, _
        ByVal strConnectionName As String) As
cConnDtl
    ' Returns the connection dtl for the passed in
connection name

    Dim lngIndex As Long

    ' Find all parameters in the array with a matching
workspace id
    For lngIndex = 0 To mcarrConnDtls.Count - 1
        If mcarrConnDtls(lngIndex).WorkspaceId =
lngWorkspace And _
            mcarrConnDtls(lngIndex).ConnName =
strConnectionName Then

            Set GetConnectionDtl =
mcarrConnDtls(lngIndex)
            Exit For
        End If
    Next lngIndex

    If lngIndex > mcarrConnDtls.Count - 1 Then
        ' The parameter has not been defined for the
workspace
        ' Raise an error
        On Error GoTo 0
        Err.Raise vbObjectError +
errConnNameInvalid, mstrModuleName &
"GetConnection", _
            LoadResString(errConnNameInvalid)
    End If

End Function
Public Sub Delete(lConnNameId As Long)
    ' Delete the passed in parameter

    Dim lngDeleteElement As Long

    lngDeleteElement = QueryIndex(lConnNameId)
    Call mcarrConnDtls.Delete(lngDeleteElement)

End Sub
Private Function QueryIndex(lConnNameId As
Long) As Long

    Dim lngIndex As Long

    ' Find the matching parameter record in the array
    For lngIndex = 0 To mcarrConnDtls.Count - 1
        If mcarrConnDtls(lngIndex).ConnNameId =
lConnNameId And _
            mcarrConnDtls(lngIndex).IndOperation
<> DeleteOp Then
            QueryIndex = lngIndex
            Exit Function
        End If
    Next lngIndex
```

```
   ' Raise error that parameter has not been
found
   On Error GoTo 0
   Err.Raise vbObjectError +
errQueryIndexFailed,
"cArrParameters.QueryIndex", _
      LoadResString(errQueryIndexFailed)

End Function

Public Function
QueryConnDtl(lConnNameId As Long) As
cConnDtl

   Dim lngQueryElement As Long

   lngQueryElement =
QueryIndex(lConnNameId)

   ' Return the queried connection object
   Set QueryConnDtl =
mcarrConnDtls(lngQueryElement)

End Function
Public Property Get Count() As Long

   Count = mcarrConnDtls.Count

End Property
Public Property Get Item(lngIndex As Long)
As cConnDtl
Attribute Item.VB_UserMemId = 0

   Set Item = mcarrConnDtls(lngIndex)

End Property

Private Sub Validate(ByVal
cConnToValidate As cConnDtl)
   ' This procedure is necessary since the
class cannot validate
   ' all the connection_dtl properties on it's
own. This is 'coz we
   ' might have created new connections in
the workspace, but not
   ' saved them to the database yet - hence
the duplicate check
   ' has to be repeated in the array

   Dim lngIndex As Long
   Dim cTempParam As cConnDtl

   ' Check if the parameter name already
exists in the workspace
   For lngIndex = 0 To
mcarrConnDtls.Count - 1
      Set cTempParam =
mcarrConnDtls(lngIndex)
      If cTempParam.WorkspaceId =
cConnToValidate.WorkspaceId And _
         cTempParam.ConnName =
cConnToValidate.ConnName And _
         cTempParam.IndOperation <>
DeleteOp Then
         On Error GoTo 0
         Err.Raise vbObjectError +
errDupConnDtlName, _
         mstrSource,
LoadResString(errDupConnDtlName)
      End If
   Next lngIndex

End Sub

Private Sub CheckDupConnName(ByVal
cConnToValidate As cConnDtl)

   Dim lngIndex As Long
   Dim cTempParam As cConnDtl

   ' Check if the parameter name already exists
in the workspace
   For lngIndex = 0 To mcarrConnDtls.Count -
1
      Set cTempParam =
mcarrConnDtls(lngIndex)
      If cTempParam.WorkspaceId =
cConnToValidate.WorkspaceId And _
         cTempParam.ConnName =
cConnToValidate.ConnName And _
         cTempParam.ConnNameId <>
cConnToValidate.ConnNameId And _
         cTempParam.IndOperation <>
DeleteOp Then
         ShowError errDupConnDtlName
         On Error GoTo 0
         Err.Raise vbObjectError +
errDupConnDtlName, _
         mstrSource,
LoadResString(errDupConnDtlName)
      End If
   Next lngIndex

End Sub

Private Sub Class_Initialize()

   Set mcarrConnDtls = New cNodeCollections

End Sub

Private Sub Class_Terminate()

   Set mcarrConnDtls = Nothing

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cConnection"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cConnection.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Encapsulates the properties
and methods of a connection string.
'              Contains functions to insert, update
and delete
'              workspace_connections records from
the database.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit
Option Base 0

' Local variable(s) to hold property value(s)
Public WorkspaceId As Long
Public ConnectionId As Long
Public ConnectionValue As String
Public Description As String
Public NodeDB As Database
Public Position As Long
Public NoCountDisplay As Boolean
Public NoExecute As Boolean
Public ParseQueryOnly As Boolean
Public QuotedIdentifiers As Boolean
Public AnsiNulls As Boolean
Public ShowQueryPlan As Boolean
Public ShowStatsTime As Boolean
Public ShowStatsIO As Boolean
Public ParseOdbcMsg As Boolean
Public RowCount As Long
Public TsqlBatchSeparator As String
Public QueryTimeOut As Long
Public ServerLanguage As String
Public CharacterTranslation As Boolean
Public RegionalSettings As Boolean

Private mstrConnectionName As String
Private mintOperation As Operation

' Used to indicate the source module name when
errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cConnection."

' The cSequence class is used to generate unique
Connection identifiers
Private mConnectionSeq As cSequence

' The StringSM class is used to carry out string
operations
Private mFieldValue As cStringSM

Private Sub AssignParameters(qyExec As
DAO.QueryDef)
   ' Assigns values to the parameters in the querydef
object
   ' The parameter names are cryptic to differentiate
them from the field names.
   ' When the parameter names are the same as the
field names, parameters in the where
   ' clause do not get created.

   Dim prmParam As DAO.Parameter

   On Error GoTo AssignParametersErr

   For Each prmParam In qyExec.Parameters
      Select Case prmParam.Name
         Case "[w_id]"
            prmParam.Value = WorkspaceId

         Case "[c_id]"
            prmParam.Value = ConnectionId

         Case "[c_name]"
            prmParam.Value = mstrConnectionName

         Case "[c_value]"
            prmParam.Value = ConnectionValue

         Case "[desc]"
            prmParam.Value = Description

         Case "[no_count]"
            prmParam.Value = NoCountDisplay

         Case "[no_exec]"
            prmParam.Value = NoExecute

         Case "[parse_only]"
            prmParam.Value = ParseQueryOnly
```

```
        Case "[quoted_id]"
            prmParam.Value =
QuotedIdentifiers

        Case "[a_nulls]"
            prmParam.Value = AnsiNulls

        Case "[show_qp]"
            prmParam.Value =
ShowQueryPlan

        Case "[stats_tm]"
            prmParam.Value =
ShowStatsTime

        Case "[stats_io]"
            prmParam.Value = ShowStatsIO

        Case "[parse_odbc]"
            prmParam.Value = ParseOdbcMsg

        Case "[row_cnt]"
            prmParam.Value = RowCount

        Case "[batch_sep]"
            prmParam.Value =
TsqlBatchSeparator

        Case "[qry_tmout]"
            prmParam.Value = QueryTimeOut

        Case "[lang]"
            prmParam.Value =
ServerLanguage

        Case "[char_trans]"
            prmParam.Value =
CharacterTranslation

        Case "[reg_settings]"
            prmParam.Value =
RegionalSettings

        Case Else
            ' Write the parameter name that is
faulty
            WriteError errInvalidParameter,
mstrSource, prmParam.Name
            On Error GoTo 0
            Err.Raise errInvalidParameter,
mstrModuleName & "AssignParameters", _

LoadResString(errInvalidParameter)
      End Select
   Next prmParam

   Exit Sub

AssignParametersErr:

   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errAssignParametersFailed, _
      mstrModuleName &
"AssignParameters",
LoadResString(errAssignParametersFailed)

End Sub

Public Function Clone() As cConnection

   ' Creates a copy of a given Connection

   Dim cCloneConn As cConnection

   On Error GoTo CloneErr

   Set cCloneConn = New cConnection

   ' Copy all the Connection properties to the
newly
   ' created Connection
   Set cCloneConn.NodeDB = NodeDB
   cCloneConn.WorkspaceId = WorkspaceId
   cCloneConn.ConnectionId = ConnectionId
   cCloneConn.ConnectionName =
mstrConnectionName
   cCloneConn.ConnectionValue =
ConnectionValue
   cCloneConn.Description = Description
   cCloneConn.IndOperation = mintOperation
   cCloneConn.Position = Position
   cCloneConn.NoCountDisplay =
NoCountDisplay
   cCloneConn.NoExecute = NoExecute
   cCloneConn.ParseQueryOnly =
ParseQueryOnly
   cCloneConn.QuotedIdentifiers =
QuotedIdentifiers
   cCloneConn.AnsiNulls = AnsiNulls
   cCloneConn.ShowQueryPlan =
ShowQueryPlan
   cCloneConn.ShowStatsTime =
ShowStatsTime
   cCloneConn.ShowStatsIO = ShowStatsIO
   cCloneConn.ParseOdbcMsg =
ParseOdbcMsg
   cCloneConn.RowCount = RowCount
   cCloneConn.TsqlBatchSeparator =
TsqlBatchSeparator
   cCloneConn.QueryTimeOut =
QueryTimeOut
   cCloneConn.ServerLanguage =
ServerLanguage
   cCloneConn.CharacterTranslation =
CharacterTranslation
   cCloneConn.RegionalSettings =
RegionalSettings

   ' And set the return value to the newly
created Connection
   Set Clone = cCloneConn
   Set cCloneConn = Nothing

   Exit Function

CloneErr:
   LogErrors Errors
   mstrSource = mstrModuleName & "Clone"
   On Error GoTo 0
   Err.Raise vbObjectError + errCloneFailed,
mstrSource, LoadResString(errCloneFailed)

End Function
Private Sub CheckDupConnectionName()
   ' Check if the Connection name already
exists in the workspace

   Dim rstConnection As Recordset
   Dim strSql As String
   Dim qy As DAO.QueryDef

   On Error GoTo
CheckDupConnectionNameErr
   mstrSource = mstrModuleName &
"CheckDupConnectionName"

   ' Create a recordset object to retrieve the
count of all Connections
   ' for the workspace with the same name
   strSql = "Select count(*) as Connection_count "
& _
      " from workspace_connections " & _
      " where workspace_id = [w_id]" & _
      " and connection_name = [c_name]" & _
      " and connection_id <> [c_id]"

   Set qy =
NodeDB.CreateQueryDef(gstrEmptyString, strSql)
   Call AssignParameters(qy)

   Set rstConnection =
qy.OpenRecordset(dbOpenForwardOnly)

   If rstConnection![Connection_count] > 0 Then
      rstConnection.Close
      qy.Close
      ShowError errDuplicateConnectionName
      On Error GoTo 0
      Err.Raise vbObjectError +
errDuplicateConnectionName, _
         mstrSource,
LoadResString(errDuplicateConnectionName)
   End If

   rstConnection.Close
   qy.Close

   Exit Sub

CheckDupConnectionNameErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"CheckDupConnectionName"
   On Error GoTo 0
   Err.Raise vbObjectError + errProgramError, _
      mstrSource, LoadResString(errProgramError)

End Sub
Private Sub CheckDB()
   ' Check if the database object has been initialized

   If NodeDB Is Nothing Then
      On Error GoTo 0
      Err.Raise vbObjectError + errInvalidDB, _
         mstrModuleName & "CheckDB",
LoadResString(errInvalidDB)
   End If

End Sub
Public Property Let ConnectionName(vdata As
String)

   If vdata = gstrEmptyString Then

      ShowError errConnectionNameMandatory
      On Error GoTo 0
      ' Propogate this error back to the caller
      Err.Raise vbObjectError +
errConnectionNameMandatory, _
         mstrSource,
LoadResString(errConnectionNameMandatory)
   Else
      mstrConnectionName = vdata
   End If

End Property

Public Property Let IndOperation(ByVal vdata As
Operation)

   ' The valid operations are define in the
cOperations
   ' class. Check if the operation is valid
```

```
    Select Case vdata
        Case QueryOp, InsertOp, UpdateOp,
DeleteOp
            mintOperation = vdata

        Case Else
            BugAssert True
    End Select

End Property
Public Sub Validate()
    ' Each distinct object will have a Validate
method which
    ' will check if the class properties are
valid. This method
    ' will be used to check interdependant
properties that
    ' cannot be validated by the let
procedures.
    ' It should be called by the add and
modify methods of the class

    ' Check if the db object is valid
    Call CheckDB

    ' Raise an error if the Connection name
already exists in the workspace
    Call CheckDupConnectionName

End Sub
Public Sub Add()

    Dim strInsert As String
    Dim qy As DAO.QueryDef

    On Error GoTo AddErr

    ' Validate the record before trying to
insert the record
    Call Validate

    ' Create a temporary querydef object
    strInsert = "insert into
workspace_connections " & _
            "( workspace_id, connection_id, " &
_
            "connection_name,
connection_value, " & _
            "description, no_count_display, " &
_
            "no_execute, parse_query_only, " &
_
            "ANSI_quoted_identifiers,
ANSI_nulls, " & _
            "show_query_plan,
show_stats_time, " & _
            "show_stats_io,
parse_odbc_msg_prefixes, " & _
            "row_count, tsql_batch_separator, "
& _
            "query_time_out, server_language, "
& _
            "character_translation,
regional_settings ) " & _
            " values ( [w_id], [c_id], [c_name],
[c_value], " & _
            " [desc], [no_count], [no_exec],
[parse_only], " & _
            " [quoted_id], [a_nulls], [show_qp],
[stats_tm], " & _
            " [stats_io], [parse_odbc], [row_cnt],
[batch_sep], " & _
            " [qry_tmout], [lang], [char_trans],
[reg_settings] ) "
    Set qy =
NodeDB.CreateQueryDef(gstrEmptyString,
strInsert)

    ' Call a procedure to assign the Connection
values
    Call AssignParameters(qy)

    qy.Execute dbFailOnError
    qy.Close

    Exit Sub

AddErr:

    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError + errInsertFailed, _
        mstrModuleName & "Add",
LoadResString(errInsertFailed)

End Sub
Public Sub Delete()

    Dim strDelete As String
    Dim qy As DAO.QueryDef

    On Error GoTo DeleteErr

    ' Check if the db object is valid
    Call CheckDB

    strDelete = "delete from
workspace_connections " & _
            " where connection_id = [c_id]"
    Set qy =
NodeDB.CreateQueryDef(gstrEmptyString,
strDelete)

    Call AssignParameters(qy)
    qy.Execute dbFailOnError

    qy.Close

    Exit Sub

DeleteErr:
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError + errDeleteFailed, _
            mstrModuleName & "Delete",
LoadResString(errDeleteFailed)

End Sub

Public Sub Modify()

    Dim strUpdate As String
    Dim qy As QueryDef

    On Error GoTo ModifyErr

    ' Validate the updated values before trying to
modify the db
    Call Validate

    ' Create a temporary querydef object with
the modify string
    strUpdate = "update workspace_connections
" & _
            " set workspace_id = [w_id], " & _
            "connection_name = [c_name], " & _
            "connection_value = [c_value], " & _
            "description = [desc], " & _
            "no_count_display = [no_count], " & _
            "no_execute = [no_exec], " & _
            "parse_query_only = [parse_only], " & _
            "ANSI_quoted_identifiers = [quoted_id], "
& _
            "ANSI_nulls = [a_nulls], " & _
            "show_query_plan = [show_qp], " & _
            "show_stats_time = [stats_tm], " & _
            "show_stats_io = [stats_io], " & _
            "parse_odbc_msg_prefixes = [parse_odbc],
" & _
            "row_count = [row_cnt], " & _
            "tsql_batch_separator = [batch_sep], " & _
            "query_time_out = [qry_tmout], " & _
            "server_language = [lang], " & _
            "character_translation = [char_trans], " & _
            "regional_settings = [reg_settings] " & _
            " where connection_id = [c_id]"
    Set qy =
NodeDB.CreateQueryDef(gstrEmptyString,
strUpdate)

    ' Call a procedure to assign the Connection values
to the
    ' querydef object
    Call AssignParameters(qy)
    qy.Execute dbFailOnError

    qy.Close

    Exit Sub

ModifyErr:

    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError + errModifyFailed, _
        mstrModuleName & "Modify",
LoadResString(errModifyFailed)

End Sub
Public Property Get ConnectionName() As String

    ConnectionName = mstrConnectionName

End Property

Public Property Get NextIdentifier() As Long

    Dim lngNextId As Long

    On Error GoTo NextIdentifierErr

    ' First check if the database object is valid
    Call CheckDB

    ' Retrieve the next identifier using the sequence
class
    Set mConnectionSeq = New cSequence
    Set mConnectionSeq.IdDatabase = NodeDB
    mConnectionSeq.IdentifierColumn =
"connection_id"
    lngNextId = mConnectionSeq.Identifier
    Set mConnectionSeq = Nothing

    NextIdentifier = lngNextId
    Exit Property

NextIdentifierErr:
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError + errIdGetFailed, _
        mstrModuleName & "NextIdentifier",
LoadResString(errIdGetFailed)

End Property
```

```
Public Property Get IndOperation() As
Operation

    IndOperation = mintOperation

End Property

Private Sub Class_Initialize()

    Set mFieldValue = New cStringSM

    ' Initialize the operation indicator variable
to Query
    ' It will be modified later by the collection
class when
    ' inserts, updates or deletes are performed
    mintOperation = QueryOp

    ' Initialize connection properties to their
default values
    NoCountDisplay =
DEF_NO_COUNT_DISPLAY
    NoExecute = DEF_NO_EXECUTE
    ParseQueryOnly =
DEF_PARSE_QUERY_ONLY
    QuotedIdentifiers =
DEF_ANSI_QUOTED_IDENTIFIERS
    AnsiNulls = DEF_ANSI_NULLS
    ShowQueryPlan =
DEF_SHOW_QUERY_PLAN
    ShowStatsTime =
DEF_SHOW_STATS_TIME
    ShowStatsIO = DEF_SHOW_STATS_IO
    ParseOdbcMsg =
DEF_PARSE_ODBC_MSG_PREFIXES
    RowCount = DEF_ROW_COUNT
    TsqlBatchSeparator =
DEF_TSQL_BATCH_SEPARATOR
    QueryTimeOut =
DEF_QUERY_TIME_OUT
    ServerLanguage =
DEF_SERVER_LANGUAGE
    CharacterTranslation =
DEF_CHARACTER_TRANSLATION
    RegionalSettings =
DEF_REGIONAL_SETTINGS

End Sub

Private Sub Class_Terminate()

    Set NodeDB = Nothing
    Set mFieldValue = Nothing

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cConnections"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:       cConnections.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    Implements an array of
cConnection objects.
'             Type-safe wrapper around
cNodeCollections.
'             Also contains validation functions,
etc.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private mcarrConnections As
cNodeCollections

' Used to indicate the source module name
when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cConnections."

Public Property Set ConnDb(vdata As
Database)

    Set mcarrConnections.NodeDB = vdata

End Property
Public Sub Modify(cModifiedConn As
cConnection)

    ' First check if the parameter record is valid
    Call CheckDupConnName(cModifiedConn)

    Call
mcarrConnections.Modify(cModifiedConn)

End Sub
Public Sub Load(ByRef cConnToAdd As
cConnection)

    Call mcarrConnections.Load(cConnToAdd)

End Sub
Public Sub Add(ByRef cConnToAdd As
cConnection)

    Set cConnToAdd.NodeDB =
mcarrConnections.NodeDB

    ' First check if the record is valid
    Call Validate(cConnToAdd)

    ' Retrieve a unique identifier
    cConnToAdd.ConnectionId =
cConnToAdd.NextIdentifier

    Call mcarrConnections.Add(cConnToAdd)

End Sub

Public Sub Unload(lngConnId As Long)

    Dim lngDeleteElement As Long

    lngDeleteElement = QueryIndex(lngConnId)

    Call
mcarrConnections.Unload(lngDeleteElement)

End Sub

Public Sub SaveConnectionsInWsp(ByVal
lngWorkspace As Long)
    ' Call a procedure to save all connection
records for the workspace
    Call mcarrConnections.Save(lngWorkspace)

End Sub

Public Function GetConnection(ByVal
lngWorkspace As Long, _
      ByVal strConnectionName As String) As
cConnection
    ' Returns the connection string for the passed in
connection name

    Dim lngIndex As Long

    ' Find all parameters in the array with a matching
workspace id
    For lngIndex = 0 To mcarrConnections.Count - 1
       If mcarrConnections(lngIndex).WorkspaceId =
lngWorkspace And _

mcarrConnections(lngIndex).ConnectionName =
strConnectionName Then

          Set GetConnection =
mcarrConnections(lngIndex)
          Exit For
       End If
    Next lngIndex

    If lngIndex > mcarrConnections.Count - 1 Then
       ' The parameter has not been defined for the
workspace
       ' Raise an error
       On Error GoTo 0
       Err.Raise vbObjectError +
errConnNameInvalid, mstrModuleName &
"GetConnection", _
             LoadResString(errConnNameInvalid)
    End If

End Function
Public Sub Delete(lngConnId As Long)
    ' Delete the passed in parameter

    Dim lngDeleteElement As Long

    lngDeleteElement = QueryIndex(lngConnId)
    Call
mcarrConnections.Delete(lngDeleteElement)

End Sub
Private Function QueryIndex(lngConnId As Long)
As Long

    Dim lngIndex As Long

    ' Find the matching parameter record in the array
    For lngIndex = 0 To mcarrConnections.Count - 1
       If mcarrConnections(lngIndex).ConnectionId =
lngConnId And _

mcarrConnections(lngIndex).IndOperation <>
DeleteOp Then
          QueryIndex = lngIndex
          Exit Function
       End If
    Next lngIndex

    ' Raise error that parameter has not been found
    On Error GoTo 0
    Err.Raise vbObjectError + errQueryIndexFailed,
"cArrParameters.QueryIndex", _
       LoadResString(errQueryIndexFailed)

End Function

Public Function QueryConnection(lngConnId As
Long) As cConnection

    Dim lngQueryElement As Long
```

```
   lngQueryElement =
QueryIndex(lngConnId)

   ' Return the queried connection object
   Set QueryConnection =
mcarrConnections(lngQueryElement)

End Function
Public Property Get Count() As Long

   Count = mcarrConnections.Count

End Property
Public Property Get Item(lngIndex As Long)
As cConnection
Attribute Item.VB_UserMemId = 0

   Set Item = mcarrConnections(lngIndex)

End Property

Public Sub Validate(ByVal
cConnToValidate As cConnection)
   ' This procedure is necessary since the
class cannot validate
   ' all the parameter properties on it's own.
This is 'coz we
   ' might have created new parameters in
the workspace, but not
   ' saved them to the database yet - hence
the duplicate check
   ' has to be repeated in the array

   Dim lngIndex As Long
   Dim cTempParam As cConnection

   ' Check if the parameter name already
exists in the workspace
   For lngIndex = 0 To
mcarrConnections.Count - 1
      Set cTempParam =
mcarrConnections(lngIndex)
      If cTempParam.WorkspaceId =
cConnToValidate.WorkspaceId And _
            cTempParam.ConnectionName =
cConnToValidate.ConnectionName And _
            cTempParam.IndOperation <>
DeleteOp Then
         On Error GoTo 0
         Err.Raise vbObjectError +
errDuplicateConnectionName, _
            mstrSource,
LoadResString(errDuplicateConnectionNam
e)
      End If
   Next lngIndex

End Sub
Public Sub CheckDupConnName(ByVal
cConnToValidate As cConnection)

   Dim lngIndex As Long
   Dim cTempParam As cConnection

   ' Check if the parameter name already
exists in the workspace
   For lngIndex = 0 To
mcarrConnections.Count - 1
      Set cTempParam =
mcarrConnections(lngIndex)
      If cTempParam.WorkspaceId =
cConnToValidate.WorkspaceId And _
            cTempParam.ConnectionName =
cConnToValidate.ConnectionName And _
            cTempParam.ConnectionId <>
cConnToValidate.ConnectionId And _
            cTempParam.IndOperation <>
DeleteOp Then
         ShowError
errDuplicateConnectionName
         On Error GoTo 0
         Err.Raise vbObjectError +
errDuplicateConnectionName, _
            mstrSource,
LoadResString(errDuplicateConnectionName)
      End If
   Next lngIndex

End Sub

Private Sub Class_Initialize()

   Set mcarrConnections = New
cNodeCollections

End Sub

Private Sub Class_Terminate()

   Set mcarrConnections = Nothing

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cConstraint"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cConstraint.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Encapsulates the properties
and methods of a constraint.
'              Contains functions to insert, update
and delete
'              step_constraints records from the
database.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Module level variables to store the property
values
Private mlngConstraintId As Long
Private mlngStepId As Long
Private mstrVersionNo As String
Private mintConstraintType As Integer
Private mlngGlobalStepId As Long
Private mstrGlobalVersionNo As String
Private mintSequenceNo As Integer
Private mdbsConstraintDB As Database
Private mlngWorkspaceId As Integer
Private mintOperation As Operation
Private mlngPosition As Long

' The cSequence class is used to generate
unique step identifiers
Private mConstraintSeq As cSequence

Private Const mstrModuleName As String =
".cConstraint."
Private mstrSource As String

Public Enum ConstraintType
   gintPreStep = 1
   gintPostStep = 2
End Enum

Private Const mstrSQ As String = """
Public Property Get WorkspaceId() As Long
   WorkspaceId = mlngWorkspaceId
End Property
Public Property Let WorkspaceId(ByVal vdata As
Long)
   mlngWorkspaceId = vdata
End Property

Public Property Get IndOperation() As Operation

   IndOperation = mintOperation

End Property
Public Property Let IndOperation(ByVal vdata As
Operation)

   On Error GoTo IndOperationErr
   mstrSource = mstrModuleName &
"IndOperation"

   ' The valid operations are define in the
cOperations
   ' class. Check if the operation is valid
   Select Case vdata
      Case QueryOp, InsertOp, UpdateOp, DeleteOp
         mintOperation = vdata

      Case Else
         On Error GoTo 0
         Err.Raise vbObjectError +
errInvalidOperation, _
            mstrSource,
LoadResString(errInvalidOperation)
   End Select

   Exit Property

IndOperationErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"IndOperation"
   On Error GoTo 0
   Err.Raise vbObjectError +
errLetOperationFailed, _
      mstrSource,
LoadResString(errLetOperationFailed)

End Property

Public Function Clone() As cConstraint

   ' Creates a copy of a given constraint

   Dim cConsClone As cConstraint

   On Error GoTo CloneErr
   mstrSource = mstrModuleName & "Clone"

   Set cConsClone = New cConstraint

   ' Copy all the workspace properties to the newly
   ' created workspace
   cConsClone.ConstraintId = mlngConstraintId
   cConsClone.StepId = mlngStepId
   cConsClone.VersionNo = mstrVersionNo
   cConsClone.ConstraintType =
mintConstraintType
   cConsClone.GlobalStepId = mlngGlobalStepId
```

```
   cConsClone.GlobalVersionNo =
mstrGlobalVersionNo
   cConsClone.SequenceNo =
mintSequenceNo
   cConsClone.WorkspaceId =
mlngWorkspaceId
   cConsClone.IndOperation =
mintOperation

   ' And set the return value to the newly
created constraint
   Set Clone = cConsClone

   Exit Function

CloneErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"Clone"
   On Error GoTo 0
   Err.Raise vbObjectError +
errCloneFailed, _
         mstrSource,
LoadResString(errCloneFailed)

End Function

Public Property Get SequenceNo() As
Integer

   SequenceNo = mintSequenceNo

End Property

Public Property Let SequenceNo(ByVal
vdata As Integer)
   mintSequenceNo = vdata
End Property

Public Sub Add()
   ' Inserts a new step constraint into the
database

   Dim strInsert As String
   Dim qy As DAO.QueryDef

   On Error GoTo AddErr

   ' First check if the database object is valid
   Call CheckDB

   ' Any record validations
   Call Validate

   ' Create a temporary querydef object
   strInsert = "insert into step_constraints "
& _
         "( constraint_id, step_id, version_no,
" & _
         " constraint_type, global_step_id,
global_version_no, sequence_no ) " & _
         " values ( [cons_id], [s_id], [ver_no],
" & _
         " [cons_type], [g_step_id],
[g_ver_no], " & _
         " [seq_no] )"
   Set qy =
mdbsConstraintDB.CreateQueryDef(gstrEm
ptyString, strInsert)

   ' Call a procedure to execute the Querydef
object
   Call AssignParameters(qy)

   qy.Execute dbFailOnError
   qy.Close

'   strInsert = "insert into step_constraints " &
_
'         "( constraint_id, step_id, version_no, " &
_
'         " constraint_type, global_step_id,
global_version_no, sequence_no ) " & _
'         " values ( " & _
'         Str(mlngConstraintId) & ", " &
Str(mlngStepId) & ", " & _
'         mstrSQ & mstrVersionNo & mstrSQ & ",
" & Str(mintConstraintType) & ", " & _
'         Str(mlngGlobalStepId) & ", " & mstrSQ
& mstrGlobalVersionNo & mstrSQ & ", " & _
'         Str(mintSequenceNo) & " ) "
'
'   BugMessage strInsert
'   mdbsConstraintDB.Execute strInsert,
dbFailOnError
   Exit Sub

AddErr:
   LogErrors Errors
   mstrSource = mstrModuleName & "Add"
   On Error GoTo 0
   Err.Raise vbObjectError +
errAddConstraintFailed, _
         mstrSource, _

LoadResString(errAddConstraintFailed)
End Sub
Private Sub AssignParameters(qyExec As
DAO.QueryDef)
   ' Assigns values to the parameters in the
querydef object
   ' The parameter names are cryptic to make
them different
   ' from the field names. When the parameter
names are
   ' the same as the field names, parameters in
the where
   ' clause do not get created.

   Dim prmParam As DAO.Parameter

   On Error GoTo AssignParametersErr
   mstrSource = mstrModuleName &
"AssignParameters"

   For Each prmParam In qyExec.Parameters
      Select Case prmParam.Name
         Case "[cons_id]"
            prmParam.Value = mlngConstraintId

         Case "[s_id]"
            prmParam.Value = mlngStepId

         Case "[ver_no]"
            prmParam.Value = mstrVersionNo

         Case "[cons_type]"
            prmParam.Value =
mintConstraintType

         Case "[g_step_id]"
            prmParam.Value =
mlngGlobalStepId

         Case "[g_ver_no]"
            prmParam.Value =
mstrGlobalVersionNo

         Case "[seq_no]"
            prmParam.Value = mintSequenceNo

         Case Else
            ' Write the parameter name that is faulty
            WriteError errInvalidParameter,
mstrSource, _
                  prmParam.Name
            On Error GoTo 0
            Err.Raise errInvalidParameter,
mstrSource, _
                  LoadResString(errInvalidParameter)
      End Select
   Next prmParam

   Exit Sub

AssignParametersErr:

   mstrSource = mstrModuleName &
"AssignParameters"
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errAssignParametersFailed, _
      mstrSource,
LoadResString(errAssignParametersFailed)

End Sub
Public Property Get NextIdentifier() As Long

   Dim lngNextId As Long

   On Error GoTo NextIdentifierErr

   ' First check if the database object is valid
   Call CheckDB

   ' Retrieve the next constraint identifier using the
   ' sequence class
   Set mConstraintSeq = New cSequence
   Set mConstraintSeq.IdDatabase =
mdbsConstraintDB
   mConstraintSeq.IdentifierColumn =
"constraint_id"
   lngNextId = mConstraintSeq.Identifier
   Set mConstraintSeq = Nothing

   NextIdentifier = lngNextId
   Exit Property

NextIdentifierErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"NextIdentifier"
   On Error GoTo 0
   Err.Raise vbObjectError + errStepIdGetFailed, _
      mstrSource,
LoadResString(errStepIdGetFailed)

End Property

Private Sub CheckDB()
   ' Check if the database object has been initialized

   If mdbsConstraintDB Is Nothing Then
      ShowError errInvalidDB
      On Error GoTo 0
      Err.Raise vbObjectError + errInvalidDB, _
         mstrModuleName,
LoadResString(errInvalidDB)
   End If

End Sub

Public Sub Delete()
```

```
   ' Deletes the step constraint record from
the database

   Dim strDelete As String
   Dim qy As DAO.QueryDef

   On Error GoTo DeleteErr
   mstrSource = mstrModuleName &
"Delete"

   ' There can be multiple constraints for a
step,
   ' meaning that there can be multiple
constraint records
   ' with the same constraint_id. Only a
combination
   ' of the step_id, version and constraint_id
will be
   ' unique
   strDelete = "delete from step_constraints
" & _
          " where constraint_id = [cons_id]" &
_
          " and step_id = [s_id] " & _
          " and version_no = [ver_no] "
   Set qy =
mdbsConstraintDB.CreateQueryDef(gstrEm
ptyString, strDelete)

   Call AssignParameters(qy)
   qy.Execute dbFailOnError

   qy.Close

'   strDelete = "Delete from step_constraints
" & _
'          " where constraint_id = " &
Str(mlngConstraintId) & _
'          " and step_id = " & Str(mlngStepId)
& _
'          " and version_no = " & mstrSQ &
mstrVersionNo & mstrSQ
'
'   'BugMessage strDelete
'   mdbsConstraintDB.Execute strDelete,
dbFailOnError

   Exit Sub

DeleteErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"Delete"
   On Error GoTo 0
   Err.Raise vbObjectError +
errDeleteConstraintFailed, _
          mstrSource, _

LoadResString(errDeleteConstraintFailed)
End Sub
Public Sub Modify()
   ' Updates the sequence no of the step
constraint record
   ' in the database

   Dim strUpdate As String
   Dim qy As QueryDef

   On Error GoTo Modify

   ' First check if the database object is valid
   Call CheckDB

   ' Any record validations
   Call Validate

   ' There can be multiple constraints for a step,
   ' meaning that there can be multiple
constraint records
   ' with the same constraint_id. Only a
combination
   ' of the step_id, version and constraint_id
will be
   ' unique
   ' Create a temporary querydef object with
the modify string
   strUpdate = "Update step_constraints " & _
          " set sequence_no = [seq_no] " & _
          " where constraint_id = [cons_id] " & _
          " and step_id = [s_id] " & _
          " and version_no = [ver_no] "
   Set qy =
mdbsConstraintDB.CreateQueryDef(gstrEmpt
yString, strUpdate)

   ' Call a procedure to assign the parameter
values to the
   ' querydef object
   Call AssignParameters(qy)
   qy.Execute dbFailOnError

   qy.Close

'   strUpdate = "Update step_constraints " & _
'          " set sequence_no = " &
Str(mintSequenceNo) & _
'          " where constraint_id = " &
Str(mlngConstraintId) & _
'          " and step_id = " & Str(mlngStepId) &
_
'          " and version_no = " & mstrSQ &
mstrVersionNo & mstrSQ
'
'   'BugMessage strUpdate
'   mdbsConstraintDB.Execute strUpdate,
dbFailOnError
   Exit Sub

Modify:
   LogErrors Errors
   mstrSource = mstrModuleName & "Modify"
   On Error GoTo 0
   Err.Raise vbObjectError +
errUpdateConstraintFailed, _
          mstrSource, _

LoadResString(errUpdateConstraintFailed)
End Sub
Public Property Get Position() As Long

   Position = mlngPosition

End Property
Public Property Let Position(ByVal RHS As
Long)

   mlngPosition = RHS

End Property

Public Sub Validate()
   ' Each distinct object will have a Validate
method which
   ' will check if the class properties are valid.
This method
   ' will be used to check interdependant
properties that
   ' cannot be validated by the let procedures.
   ' It should be called by the add and modify
methods of the class

   ' No validations are necessary for the constraint
object

End Sub

Public Property Set NodeDB(vdata As Database)

   Set mdbsConstraintDB = vdata

End Property

Public Property Get NodeDB() As Database

   Set NodeDB = mdbsConstraintDB

End Property

Public Property Get GlobalVersionNo() As String

   GlobalVersionNo = mstrGlobalVersionNo

End Property

Public Property Let GlobalVersionNo(ByVal vdata
As String)

   mstrGlobalVersionNo = vdata

End Property

Public Property Get GlobalStepId() As Long

   GlobalStepId = mlngGlobalStepId

End Property

Public Property Get ConstraintId() As Long

   ConstraintId = mlngConstraintId

End Property

Public Property Get VersionNo() As String

   VersionNo = mstrVersionNo

End Property

Public Property Get StepId() As Long

   StepId = mlngStepId

End Property

Public Property Let VersionNo(ByVal vdata As
String)

   mstrVersionNo = vdata

End Property

Public Property Let StepId(ByVal vdata As Long)

   mlngStepId = vdata

End Property

Public Property Let ConstraintId(ByVal vdata As
Long)
   On Error GoTo ConstraintIdErr
   mstrSource = mstrModuleName &
"ConstraintId"

   If (vdata > 0) Then
```

```
      mlngConstraintId = vdata
   Else
      ' Propogate this error back to the caller
      On Error GoTo 0
      Err.Raise vbObjectError +
errConstraintIdInvalid, _
         mstrSource,
LoadResString(errConstraintIdInvalid)
   End If

   Exit Property

ConstraintIdErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"ConstraintId"
   On Error GoTo 0
   Err.Raise vbObjectError +
errConstraintIdSetFailed, _
      mstrSource,
LoadResString(errConstraintIdSetFailed)

End Property

Public Property Let GlobalStepId(ByVal
vdata As Long)

   On Error GoTo GlobalStepIdErr
   mstrSource = mstrModuleName &
"GlobalStepId"

   If (vdata > 0) Then
      mlngGlobalStepId = vdata
   Else
      ' Propogate this error back to the caller
      On Error GoTo 0
      Err.Raise vbObjectError +
errGlobalStepIdInvalid, _
         mstrSource,
LoadResString(errGlobalStepIdInvalid)
   End If

   Exit Property

GlobalStepIdErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"GlobalStepId"
   On Error GoTo 0
   Err.Raise vbObjectError +
errGlobalStepIdSetFailed, _
      mstrSource,
LoadResString(errGlobalStepIdSetFailed)

End Property

Public Property Let ConstraintType(ByVal
vdata As ConstraintType)

   On Error GoTo ConstraintTypeErr

   ' A global step can be either a pre- or a
post-execution step.
   ' These constants have been defined in the
enumeration,
   ' ConstraintType, which is exposed
   Select Case vdata
      Case gintPreStep, gintPostStep
         mintConstraintType = vdata

      Case Else
         On Error GoTo 0
         Err.Raise vbObjectError +
errConstraintTypeInvalid, _
            mstrSource,
LoadResString(errConstraintTypeInvalid)
   End Select

   Exit Property

ConstraintTypeErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"ConstraintType"
   On Error GoTo 0
   Err.Raise vbObjectError +
errConstraintTypeLetFailed, _
      mstrSource,
LoadResString(errConstraintTypeLetFailed)

End Property

Public Property Get ConstraintType() As
ConstraintType

   ConstraintType = mintConstraintType

End Property

Private Sub Class_Initialize()

   ' Initialize the operation indicator variable to
Query
   ' It will be modified later by the collection
class when
   ' inserts, updates or deletes are performed
   mintOperation = QueryOp

End Sub


VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cFailedStep"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:       cFailedStep.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    Properties of a step execution
failure.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Public InstanceId As Long
Public StepId As Long
Public ParentStepId As Long
Public ContCriteria As ContinuationCriteria
Public EndTime As Currency
Public AskResponse As Long
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cFailedSteps"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:       cFailedSteps.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    This module encapsulates a
collection of failed steps. It
'             also determines whether sub-steps of a
passed in step need
'             to be skipped due to a failure.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private mcFailedSteps As cVector
Public Function ExecuteSubStep(lParentStepId As
Long) As Boolean
   ' Returns False if there is any condition that
prevents sub-steps of the passed
   ' in instance from being executed
   Dim lIndex As Long

   ExecuteSubStep = True

   For lIndex = 0 To Count() - 1
      If mcFailedSteps(lIndex).ContCriteria =
gintOnFailureCompleteSiblings And _
         lParentStepId <>
mcFailedSteps(lIndex).ParentStepId Then
         ExecuteSubStep = False
         Exit For
      End If

      If mcFailedSteps(lIndex).ContCriteria =
gintOnFailureAbortSiblings And _
         lParentStepId =
mcFailedSteps(lIndex).ParentStepId Then
         ExecuteSubStep = False
         Exit For
      End If

      If mcFailedSteps(lIndex).ContCriteria =
gintOnFailureSkipSiblings And _
         lParentStepId =
mcFailedSteps(lIndex).ParentStepId Then
         ExecuteSubStep = False
         Exit For
      End If

      If mcFailedSteps(lIndex).ContCriteria =
gintOnFailureAbort Then
         ExecuteSubStep = False
         Exit For
      End If

   Next lIndex

End Function
Public Sub Add(ByVal objItem As cFailedStep)

   mcFailedSteps.Add objItem

End Sub
Public Function Delete(ByVal lPosition As Long)
As cFailedStep

   Set Delete = mcFailedSteps.Delete(lPosition)

End Function

Public Sub Clear()

   mcFailedSteps.Clear
```

```
End Sub
Public Function Count() As Long

   Count = mcFailedSteps.Count

End Function
Public Property Get Item(ByVal Position As
Long) As cFailedStep
Attribute Item.VB_UserMemId = 0

   Set Item = mcFailedSteps.Item(Position)

End Property

Public Function StepFailed(lStepId As
Long) As Boolean

   ' Returns True if a failure record already
exists for the passed in step
   Dim lIndex As Long

   StepFailed = False

   For lIndex = 0 To Count() - 1
      If mcFailedSteps(lIndex).StepId =
lStepId Then
         StepFailed = True
         Exit For
      End If
   Next lIndex

End Function

Private Sub Class_Initialize()

   Set mcFailedSteps = New cVector

End Sub

Private Sub Class_Terminate()

   Set mcFailedSteps = Nothing

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cFileInfo"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cFileInfo.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    File Properties viz. name,
handle, etc.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private mstrFileName As String
Private mintFileHandle As Integer
Private mdbsNodeDb As Database ' Since it
is used to form a cNodeCollection
Private mlngPosition As Long ' Since it is
used to form a cNodeCollection
Public Property Get FileName() As String

   FileName = mstrFileName

End Property
Public Property Let FileName(ByVal vdata As
String)

   mstrFileName = vdata

End Property
Public Property Let FileHandle(ByVal vdata
As Integer)

   mintFileHandle = vdata

End Property
Public Property Set NodeDB(vdata As
Database)

   Set mdbsNodeDb = vdata

End Property

Public Property Get NodeDB() As Database

   Set NodeDB = mdbsNodeDb

End Property
Public Property Get Position() As Long

   Position = mlngPosition

End Property
Public Property Let Position(ByVal vdata As
Long)

   mlngPosition = vdata

End Property

Public Property Get FileHandle() As Integer

   FileHandle = mintFileHandle

End Property

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cFileSM"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
Attribute VB_Ext_KEY =
"SavedWithClassBuilder" ,"Yes"
Attribute VB_Ext_KEY = "Top_Level" ,"Yes"
'  FILE:       cFileSM.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Encapsulates functions to open
a file and write to it.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this class
Private Const mstrModuleName As String =
"cFileSM."
Private mstrSource As String

Private mstrFileName As String
Private mintHFile As Integer
Private mstrFileHeader As String
Private mstrProjectName As String

Public Sub CloseFile()

   ' Close the file
   If mintHFile > 0 Then
      Call CloseFileSM(mstrFileName)
      mintHFile = 0
   End If

End Sub

Public Property Let ProjectName(ByVal vdata As
String)
   ' An optional field - will be appended to the file
   ' header string if specified

   Const strProjectHdr As String = "Project Name:"

   mstrProjectName = vdata
   mstrFileHeader = mstrFileHeader & _
         Space$(1) & strProjectHdr & Space$(1) & _
         gstrSQ & vdata & gstrSQ

End Property
Public Property Get ProjectName() As String

   ProjectName = mstrProjectName

End Property
Public Property Get FileName() As String

   FileName = mstrFileName

End Property
Public Property Let FileName(ByVal vdata As
String)

   mstrFileName = vdata

End Property
Public Sub WriteLine(strMsg As String)

   ' Writes the passed in string to the file
   Call WriteToFile(strMsg, False)

End Sub

Public Sub WriteField(strMsg As String)

   ' Writes the passed in string to the file
   Call WriteToFile(strMsg, True)

End Sub

Private Sub WriteToFile(strMsg As String, _
      blnContinue As Boolean)
   ' Writes the passed in string to the file - the
   ' Continue flag indicates whether the next line
will
   ' be continued on the same line or printed on a
new one

   On Error GoTo WriteToFileErr

   ' Open the file if it hasn't been already
   If mintHFile = 0 Then

      ' If the filename has not been initialized, do not
      ' attempt to open it
      If mstrFileName <> gstrEmptyString Then
```

```
        mintHFile =
OpenFileSM(mstrFileName)

        If mintHFile = 0 Then
          ' The Open File command failed
for some reason
          ' No point in trying to write the
file header
        Else
          ' Print a file header, if a header
string has been
          ' initialized
          If mstrFileHeader <>
gstrEmptyString Then
            Print #mintHFile,
            Print #mintHFile,
mstrFileHeader
            Print #mintHFile,
          End If
        End If
      End If
    End If

    If mintHFile <> 0 Then
      If strMsg = gstrEmptyString Then
        Print #mintHFile,
      Else
        If blnContinue Then
          ' Write the message to the file -
continue
          ' all subsequent characters on the
same line
          Print #mintHFile, strMsg;
        Else
          ' Write the message to the file
          Print #mintHFile, strMsg
        End If
      End If
    Else
      ' Display the string to the user instead
of
      ' trying to write it to the file
      ' This could be the project error log that
we were
      ' trying to open! Play it safe and display
errors - do
      ' not try to log them.
      MsgBox strMsg, vbOKOnly
    End If

    Exit Sub

WriteToFileErr:
    ' Log the error code raised by Visual
Basic
    Call DisplayErrors(Errors)

    ' Display the string to the user instead of
    ' trying to write it to the file
    MsgBox strMsg, vbOKOnly

End Sub
Public Property Let FileHeader(ByVal vdata
As String)

    mstrFileHeader = vdata

End Property
Public Property Get FileHeader() As String

    FileHeader = mstrFileHeader

End Property
Private Sub Class_Terminate()

    ' Close the file opened by this instance
    Call CloseFile

End Sub


VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cGlobalStep"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cGlobalStep.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Encapsulates the properties
and methods of a global step.
'              Implements the cStep class - carries
out initializations
'              and validations that are specific to
global steps.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Implements cStep

' Object variable to keep the reference in
Private mcStep As cStep

' Used to indicate the source module name
when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cGlobalStep."

Private Sub cStep_AddAllIterators()

    Call mcStep.AddAllIterators

End Sub

Private Sub cStep_AddIterator(cItRecord As
cIterator)

    Call mcStep.AddIterator(cItRecord)

End Sub

Private Property Let
cStep_ArchivedFlag(ByVal RHS As Boolean)

    mcStep.ArchivedFlag = RHS

End Property

Private Property Get cStep_ArchivedFlag() As
Boolean

    cStep_ArchivedFlag = mcStep.ArchivedFlag

End Property

Private Sub Class_Initialize()

    ' Create the object
    Set mcStep = New cStep

    ' Initialize the object with valid values for a
global step
    ' The global flag should be the first field to be
initialized
    ' since subsequent validations might try to check
if the
    ' step being created is global
    mcStep.GlobalFlag = True
    mcStep.StepType = gintGlobalStep

    ' A global step cannot have any sub-steps
associated with it
    ' Hence, it will always be at Step Level 0
    mcStep.ParentStepId = 0
    mcStep.ParentVersionNo = gstrMinVersion
    mcStep.StepLevel = 0

    ' The enabled flag must be False for all global
steps
    ' Global steps can be of two types
    ' a. Those that are run globally within a
workspace either
    '    before every step, after every step or during
the entire
    '    run, depending on the global run method
    ' b. Those that are not run globally, but qualify to
be either
    '    pre or post-execution steps for other steps in
the workspace.
    '    Whether or not such a step will be executed
depends on
    '    whether the step for which it is defined as a
pre/post
    '    step will be executed
    mcStep.EnabledFlag = False

    mcStep.ContinuationCriteria = gintNoOption
    mcStep.DegreeParallelism =
gstrGlobalParallelism

End Sub
Private Sub Class_Terminate()

    ' Remove the step object
    Set mcStep = Nothing

End Sub

Private Sub cStep_Add()

    ' Call a private procedure to see if the step text
has been
    ' entered - since a global step actually executes a
step, entry
    ' of the text is mandatory
    Call StepTextOrFileEntered

    ' Call the Add method of the step class to carry
out the insert
    mcStep.Add

End Sub

Private Function cStep_Clone(Optional cCloneStep
As cStep) As cStep

    Dim cNewGlobal As cGlobalStep

    Set cNewGlobal = New cGlobalStep
    Set cStep_Clone = mcStep.Clone(cNewGlobal)

End Function
```

```
Private Property Get
cStep_ContinuationCriteria() As
ContinuationCriteria

   cStep_ContinuationCriteria =
mcStep.ContinuationCriteria

End Property

Private Property Let
cStep_ContinuationCriteria(ByVal RHS As
ContinuationCriteria)

   ' The continuation criteria field will
always be empty for a
   ' global step
   mcStep.ContinuationCriteria = 0

End Property

Private Property Let
cStep_DegreeParallelism(ByVal RHS As
String)

   ' Will always be zero for a global step
   mcStep.DegreeParallelism =
gstrGlobalParallelism

End Property

Private Property Get
cStep_DegreeParallelism() As String

   cStep_DegreeParallelism =
mcStep.DegreeParallelism

End Property

Private Sub cStep_DeleteIterator(cItRecord
As cIterator)

   Call mcStep.DeleteIterator(cItRecord)

End Sub

Private Sub cStep_Delete()

   mcStep.Delete

End Sub

Private Property Get cStep_EnabledFlag()
As Boolean

   cStep_EnabledFlag =
mcStep.EnabledFlag

End Property

Private Property Let
cStep_EnabledFlag(ByVal RHS As
Boolean)

   ' The enabled flag must be False for all
global steps
   ' Global steps can be of two types
   ' a. Those that are run globally within a
workspace either
   '    before every step, after every step or
during the entire
   '    run, depending on the global run
method
   ' b. Those that are not run globally, but
qualify to be either
   '    pre or post-execution steps for other steps
in the workspace.
   '    Whether or not such a step will be
executed depends on
   '    whether the step for which it is defined as
a pre/post
   '    step will be executed
   mcStep.EnabledFlag = False

End Property

Private Property Let cStep_ErrorFile(ByVal
RHS As String)

   mcStep.ErrorFile = RHS

End Property

Private Property Get cStep_ErrorFile() As
String

   cStep_ErrorFile = mcStep.ErrorFile

End Property

Private Property Let
cStep_ExecutionMechanism(ByVal RHS As
ExecutionMethod)

   ' Whether or not the Execution Mechanism
is valid will be
   ' checked by the Step class
   mcStep.ExecutionMechanism = RHS

End Property

Private Property Get
cStep_ExecutionMechanism() As
ExecutionMethod

   cStep_ExecutionMechanism =
mcStep.ExecutionMechanism

End Property

Private Property Let
cStep_FailureDetails(ByVal RHS As String)

   ' Whether or not the Failure Details are valid
for the
   ' selected failure criteria will be checked by
the Step class
   mcStep.FailureDetails = RHS

End Property

Private Property Get cStep_FailureDetails() As
String

   cStep_FailureDetails =
mcStep.FailureDetails

End Property

Private Property Get cStep_GlobalFlag() As
Boolean

   cStep_GlobalFlag = mcStep.GlobalFlag

End Property

Private Property Let cStep_GlobalFlag(ByVal
RHS As Boolean)

   ' Set the global flag to true
   mcStep.GlobalFlag = True

End Property

Private Function cStep_IncVersionX() As String

   cStep_IncVersionX = mcStep.IncVersionX

End Function

Private Function cStep_IncVersionY() As String

   cStep_IncVersionY = mcStep.IncVersionY

End Function


'Private Property Let
cStep_GlobalRunMethod(ByVal RHS As Integer)
'
'    ' Whether or not the Global Run Method is valid
for the step
'    ' will be checked by the Step class
'    mcStep.GlobalRunMethod = RHS
'
'End Property
'
'Private Property Get cStep_GlobalRunMethod() As
Integer
'
'    cStep_GlobalRunMethod =
mcStep.GlobalRunMethod
'
'End Property
'
Private Property Get cStep_IndOperation() As
Operation

   cStep_IndOperation = mcStep.IndOperation

End Property

Private Property Let cStep_IndOperation(ByVal
RHS As Operation)

   mcStep.IndOperation = RHS

End Property

Private Sub cStep_InsertIterator(cItRecord As
cIterator)

   Call mcStep.InsertIterator(cItRecord)

End Sub

Private Function cStep_IsNewVersion() As
Boolean
   cStep_IsNewVersion = mcStep.IsNewVersion
End Function

Private Function cStep_IteratorCount() As Long

   cStep_IteratorCount = mcStep.IteratorCount

End Function

Private Property Let cStep_IteratorName(ByVal
RHS As String)

   mcStep.IteratorName = RHS

End Property
```

```
Private Property Get cStep_IteratorName() As String

   cStep_IteratorName = mcStep.IteratorName

End Property

Private Function cStep_Iterators() As Variant

   cStep_Iterators = mcStep.Iterators

End Function

Private Sub cStep_LoadIterator(cItRecord As cIterator)

   Call mcStep.LoadIterator(cItRecord)

End Sub

'Private Property Let cStep_LogFile(ByVal RHS As String)
'
'    mcStep.LogFile = RHS
'
'End Property
'
'Private Property Get cStep_LogFile() As String
'
'    cStep_LogFile = mcStep.LogFile
'
'End Property

Private Sub cStep_ModifyIterator(cItRecord As cIterator)

   Call mcStep.ModifyIterator(cItRecord)

End Sub

Private Sub cStep_Modify()

   ' Call a private procedure to see if the step text has been
   ' entered - since a global step actually executes a step,
   ' entry of the text is mandatory
   Call StepTextOrFileEntered

   ' Call the Modify method of the step class to carry out the update
   mcStep.Modify

End Sub

Private Property Get cStep_NextStepId() As Long

   cStep_NextStepId = mcStep.NextStepId

End Property

Private Property Set cStep_NodeDB(RHS As DAO.Database)

   Set mcStep.NodeDB = RHS

End Property

Private Property Get cStep_NodeDB() As DAO.Database

   Set cStep_NodeDB = mcStep.NodeDB

End Property

Private Function cStep_OldVersionNo() As String
   cStep_OldVersionNo = mcStep.OldVersionNo
End Function

Private Property Let cStep_OutputFile(ByVal RHS As String)

   mcStep.OutputFile = RHS

End Property

Private Property Get cStep_OutputFile() As String

   cStep_OutputFile = mcStep.OutputFile

End Property

Private Property Let cStep_ParentStepId(ByVal RHS As Long)

   ' A global step cannot have any sub-steps associated with it
   ' Hence, the parent step id and parent version number will be zero
   mcStep.ParentStepId = 0

End Property

Private Property Get cStep_ParentStepId() As Long

   cStep_ParentStepId = mcStep.ParentStepId

End Property

Private Property Let cStep_ParentVersionNo(ByVal RHS As String)

   ' A global step cannot have any sub-steps associated with it
   ' Hence, the parent step id and parent version number will be zero
   mcStep.ParentVersionNo = gstrMinVersion

End Property

Private Property Get cStep_ParentVersionNo() As String

   cStep_ParentVersionNo = mcStep.ParentVersionNo

End Property

Private Property Let cStep_Position(ByVal RHS As Long)

   mcStep.Position = RHS

End Property

Private Property Get cStep_Position() As Long

   cStep_Position = mcStep.Position

End Property

Private Sub cStep_RemoveIterator(cItRecord As cIterator)

   Call mcStep.RemoveIterator(cItRecord)

End Sub

Private Sub cStep_SaveIterators()

   Call mcStep.SaveIterators

End Sub

Private Property Let cStep_SequenceNo(ByVal RHS As Integer)

   mcStep.SequenceNo = RHS

End Property

Private Property Get cStep_SequenceNo() As Integer

   cStep_SequenceNo = mcStep.SequenceNo

End Property

Private Property Let cStep_StepId(ByVal RHS As Long)

   mcStep.StepId = RHS

End Property
Private Property Get cStep_StepId() As Long

   cStep_StepId = mcStep.StepId

End Property


Private Property Let cStep_StepLabel(ByVal RHS As String)

   mcStep.StepLabel = RHS

End Property

Private Property Get cStep_StepLabel() As String

   cStep_StepLabel = mcStep.StepLabel

End Property

Private Property Let cStep_StartDir(ByVal RHS As String)

   mcStep.StartDir = RHS

End Property

Private Property Get cStep_StartDir() As String

   cStep_StartDir = mcStep.StartDir

End Property

Private Property Let cStep_StepLevel(ByVal RHS As Integer)

   ' A global step cannot have any sub-steps associated with it
   ' Hence, it will always be at step level 0
   mcStep.StepLevel = 0
```

```
End Property

Private Property Get cStep_StepLevel() As
Integer

   cStep_StepLevel = mcStep.StepLevel

End Property

Private Property Let cStep_StepText(ByVal
RHS As String)

   mcStep.StepText = RHS

End Property

Private Property Get cStep_StepText() As
String

   cStep_StepText = mcStep.StepText

End Property

Private Property Let
cStep_StepTextFile(ByVal RHS As String)

   mcStep.StepTextFile = RHS

End Property

Private Property Get cStep_StepTextFile()
As String

   cStep_StepTextFile =
mcStep.StepTextFile

End Property

Private Property Let cStep_StepType(RHS
As gintStepType)

   mcStep.StepType = gintGlobalStep

End Property

Private Property Get cStep_StepType() As
gintStepType

   cStep_StepType = mcStep.StepType

End Property

Private Sub cStep_UnloadIterators()

   Call mcStep.UnloadIterators

End Sub

Private Sub cStep_UpdateIterator(cItRecord
As cIterator)

   Call mcStep.UpdateIterator(cItRecord)

End Sub

Private Sub cStep_UpdateIteratorVersion()

   Call mcStep.UpdateIteratorVersion

End Sub

Private Sub cStep_Validate()
   ' The validate routines for each of the
steps will
   ' carry out the specific validations for the
type and
   ' call the generic validation routine

   On Error GoTo cStep_ValidateErr
   mstrSource = mstrModuleName &
"cStep_Validate"

   ' Validations specific to global steps

   ' Check if the step text or a file name has
been
   ' specified
   Call StepTextOrFileEntered

   ' The step level must be zero for all globals
   If mcStep.StepLevel <> 0 Then
      ShowError errStepLevelZeroForGlobal
      On Error GoTo 0
      Err.Raise vbObjectError +
errValidateFailed, _
            gstrSource, _
            LoadResString(errValidateFailed)
   End If

   If mcStep.EnabledFlag Then
      ShowError errEnabledFlagFalseForGlobal
      On Error GoTo 0
      Err.Raise vbObjectError +
errValidateFailed, _
            gstrSource, _
            LoadResString(errValidateFailed)
   End If

   If mcStep.DegreeParallelism > 0 Then
      ShowError
errDegParallelismNullForGlobal
      On Error GoTo 0
      Err.Raise vbObjectError +
errValidateFailed, _
            gstrSource, _
            LoadResString(errValidateFailed)
   End If

   If mcStep.ContinuationCriteria > 0 Then
      ShowError errContCriteriaNullForGlobal
      On Error GoTo 0
      Err.Raise vbObjectError +
errValidateFailed, _
            gstrSource, _
            LoadResString(errValidateFailed)
   End If

   mcStep.Validate

   Exit Sub

cStep_ValidateErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"cStep_Validate"
   On Error GoTo 0
   Err.Raise vbObjectError +
errValidateFailed, _
         mstrSource, _
         LoadResString(errValidateFailed)
End Sub
Private Sub StepTextOrFileEntered()
   ' Checks if either the step text or the name of
the file containing
   ' the text has been entered
   ' If both of them are null or both of them are
not null,
   ' the global step is invalid and an error is
raised

   If StringEmpty(mcStep.StepText) And
StringEmpty(mcStep.StepTextFile) Then
      ShowError errStepTextAndFileNull
      On Error GoTo 0
      Err.Raise vbObjectError +
errStepTextAndFileNull, _
         mstrSource,
LoadResString(errStepTextAndFileNull)
   ElseIf Not StringEmpty(mcStep.StepText) And
Not StringEmpty(mcStep.StepTextFile) Then
      ShowError errStepTextOrFile
      On Error GoTo 0
      Err.Raise vbObjectError + errStepTextOrFile,
_
         mstrSource,
LoadResString(errStepTextOrFile)
   End If

End Sub

Private Property Let cStep_VersionNo(ByVal RHS
As String)

   mcStep.VersionNo = RHS

End Property

Private Property Get cStep_VersionNo() As String

   cStep_VersionNo = mcStep.VersionNo

End Property

Private Property Let cStep_WorkspaceId(ByVal
RHS As Long)

   mcStep.WorkspaceId = RHS

End Property

Private Property Get cStep_WorkspaceId() As Long

   cStep_WorkspaceId = mcStep.WorkspaceId

End Property
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cInstance"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cInstance.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Encapsulates the properties and
methods of an instance.
'              An instance is created when a step is
executed for a
'              particular iterator value (if applicable) at
'run' time.
'              Contains functions to determine if an
instance is running,
'              complete, and so on.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit
```

```
' Used to indicate the source module name when errors
' are raised by this class
Private Const mstrModuleName As String = "cInstance."
Private mstrSource As String

Private mcStep As cStep
Public Key As String ' Node key for the step being executed
Public InstanceId As Long
Public ParentInstanceId As Long ' The parent instance
Private mblnNoMoreToStart As Boolean
Private mblnComplete As Boolean
Public StartTime As Currency
Public EndTime As Currency
Public ElapsedTime As Currency
Private mintStatus As InstanceStatus
Public DegreeParallelism As Integer
Private mcIterators As cRunColIt

' A collection of all the sub-steps for this step
Private mcSubSteps As cSubSteps
Public Sub UpdateStartTime(lStepId As Long, Optional ByVal StartTm As Currency = gdtmEmpty, _
    Optional ByVal EndTm As Currency = gdtmEmpty, _
    Optional ByVal Elapsed As Currency = 0)
  ' We do not maintain start and end timestamps for the constraint
  ' of a step. Hence we check if the process that just started/
  ' terminated is the worker step that is being executed. If so,
  ' we update the start/end time and status on the instance record.

  BugAssert (StartTm <> gdtmEmpty) Or (EndTm <> gdtmEmpty), "Mandatory parameter missing."

  ' Make sure that we are executing the actual step and not
  ' a pre or post-execution constraint
  If mcStep.StepId = lStepId Then
    If StartTm <> 0 Then
      StartTime = StartTm
      mintStatus = gintRunning
    Else
      EndTime = EndTm
      ElapsedTime = Elapsed
      mintStatus = gintComplete
    End If
  End If

End Sub
Public Function ValidForIteration(cParentInstance As cInstance, _
    ByVal intConsType As ConstraintType) As Boolean
  ' Returns true if the instance passed in is the first or
  ' last iteration for the step, depending on the constraint type

  Dim cSubStepRec As cSubStep
  Dim vntIterators As Variant

  On Error GoTo ValidForIterationErr

  If cParentInstance Is Nothing Then
    ' This will only be true for the dummy instance, which
    ' cannot have any iterators defined for it
    ValidForIteration = True
    Exit Function
  End If

  vntIterators = mcStep.Iterators

  If Not StringEmpty(mcStep.IteratorName) And Not IsEmpty(vntIterators) Then

    Set cSubStepRec = cParentInstance.QuerySubStep(mcStep.StepId)

    If intConsType = gintPreStep Then
      ' Pre-execution constraints will only be executed
      ' before the first iteration
      If cSubStepRec.LastIterator.IteratorType = gintValue Then
        ValidForIteration = (cSubStepRec.LastIterator.Sequence = _
            gintMinIteratorSequence)
      Else
        ValidForIteration = (cSubStepRec.LastIterator.Value = _

cSubStepRec.LastIterator.RangeFrom)
      End If
    Else
      ' Post-execution constraints will only be executed
      ' after the last iteration - check if there are any
      ' pending iterations
      ValidForIteration = cSubStepRec.NextIteration(mcStep) Is Nothing
    End If
  Else
    ValidForIteration = True
  End If

  Exit Function

ValidForIterationErr:
  ' Log the error code raised by Visual Basic
  Call LogErrors(Errors)
  On Error GoTo 0
  mstrSource = mstrModuleName & "ValidForIteration"
  Err.Raise vbObjectError + errExecInstanceFailed, _
      mstrSource, LoadResString(errExecInstanceFailed)

End Function

Public Sub CreateSubStep(cSubStepDtls As cStep, RunParams As cArrParameters)

  Dim cNewSubStep As cSubStep

  On Error GoTo CreateSubStepErr

  Set cNewSubStep = New cSubStep

  cNewSubStep.StepId = cSubStepDtls.StepId
  cNewSubStep.TasksComplete = 0
  cNewSubStep.TasksRunning = 0

  ' Initialize the iterator for the instance
  Set cNewSubStep.LastIterator = New cRunItDetails
  Call cNewSubStep.InitializeIt(cSubStepDtls, RunParams)

  ' Add add the substep to the collection
  mcSubSteps.Add cNewSubStep

  Set cNewSubStep = Nothing

  Exit Sub

CreateSubStepErr:
  ' Log the error code raised by Visual Basic
  Call LogErrors(Errors)
  On Error GoTo 0
  mstrSource = mstrModuleName & "CreateSubStep"
  Err.Raise vbObjectError + errProgramError, mstrSource, _
      LoadResString(errProgramError)

End Sub

Public Function QuerySubStep(ByVal SubStepId As Long) As cSubStep
  ' Retrieves the sub-step record for the passed in sub-step id

  Dim lngIndex As Long

  On Error GoTo QuerySubStepErr

  ' Find the sub-step node with the matching step id
  For lngIndex = 0 To mcSubSteps.Count - 1
    If mcSubSteps(lngIndex).StepId = SubStepId Then
      Set QuerySubStep = mcSubSteps(lngIndex)
      Exit For
    End If
  Next lngIndex

  Exit Function

QuerySubStepErr:
  ' Log the error code raised by Visual Basic
  Call LogErrors(Errors)
  On Error GoTo 0
  mstrSource = mstrModuleName & "QuerySubStep"
  Err.Raise vbObjectError + errNavInstancesFailed, _
      mstrSource, LoadResString(errNavInstancesFailed)

End Function
Public Property Let AllStarted(ByVal vdata As Boolean)

  'bugmessage "Set All Started to " & vData & " for : " & _
    mstrKey

  mblnNoMoreToStart = vdata

End Property
Public Property Get AllStarted() As Boolean

  AllStarted = mblnNoMoreToStart

End Property
Public Property Let AllComplete(ByVal vdata As Boolean)
```

```
    'bugmessage "Set All Complete to " &
vData & " for : " & _
        mstrKey

    mblnComplete = vdata

End Property

Public Property Get AllComplete() As
Boolean

    AllComplete = mblnComplete

End Property

Public Sub ChildExecuted(mlngStepId As
Long)
    ' This procedure is called when a sub-step
executes.

    Dim lngIndex As Long

    On Error GoTo ChildExecutedErr

    BugAssert mcStep.StepType =
gintManagerStep

    For lngIndex = 0 To mcSubSteps.Count -
1
        If mcSubSteps(lngIndex).StepId =
mlngStepId Then

mcSubSteps(lngIndex).TasksRunning = _

mcSubSteps(lngIndex).TasksRunning + 1
'           BugMessage "Tasks Running for
Step Id : " & _
'
CStr(mcSubSteps(lngIndex).StepId) & _
'                   " Instance Id: " & InstanceId &
_
'                   " = " &
mcSubSteps(lngIndex).TasksRunning
            Exit For
        End If
    Next lngIndex

    If lngIndex > mcSubSteps.Count - 1 Then
        ' The child step wasn't found - raise an
error
        On Error GoTo 0
        Err.Raise vbObjectError +
errInvalidChild, mstrModuleName, _
                LoadResString(errInvalidChild)
    End If

    Exit Sub

ChildExecutedErr:
    ' Log the error code raised by Visual
Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errInstanceOpFailed, mstrModuleName &
"ChildExecuted", _
            LoadResString(errInstanceOpFailed)

End Sub
Public Sub ChildTerminated(mlngStepId As
Long)
    ' This procedure is called when any sub-
step process
    ' terminates. Note: The TasksComplete
field will be
    ' updated only when all the instances for a
sub-step
    ' complete execution.
    Dim lngIndex As Long

    On Error GoTo ChildTerminatedErr

    BugAssert mcStep.StepType =
gintManagerStep

    For lngIndex = 0 To mcSubSteps.Count - 1

        If mcSubSteps(lngIndex).StepId =
mlngStepId Then
            mcSubSteps(lngIndex).TasksRunning =
_

mcSubSteps(lngIndex).TasksRunning - 1
'           BugMessage "Tasks Running for Step
Id : " & _
'
CStr(mcSubSteps(lngIndex).StepId) & _
'                   " Instance Id: " & InstanceId & _
'                   " = " &
mcSubSteps(lngIndex).TasksRunning

            BugAssert
mcSubSteps(lngIndex).TasksRunning >= 0, _
                "Tasks running for " &
CStr(mlngStepId) & _
                " Instance Id " & InstanceId & " is
less than 0."
            Exit For
        End If
    Next lngIndex

    If lngIndex > mcSubSteps.Count - 1 Then
        ' The child step wasn't found - raise an
error
        On Error GoTo 0
        Err.Raise errInvalidChild,
mstrModuleName & "ChildTerminated", _
                LoadResString(errInvalidChild)
    End If

    Exit Sub

ChildTerminatedErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    mstrSource = mstrModuleName &
"ChildTerminated"
    Err.Raise vbObjectError +
errInstanceOpFailed, mstrSource, _
            LoadResString(errInstanceOpFailed)

End Sub
Public Sub ChildCompleted(mlngStepId As
Long)
    ' This procedure is called when any a sub-
step completes
    ' execution. Note: The TasksComplete field
will be
    ' incremented.
    Dim lngIndex As Long

    On Error GoTo ChildCompletedErr

    BugAssert mcStep.StepType =
gintManagerStep

    For lngIndex = 0 To mcSubSteps.Count - 1
        BugAssert
mcSubSteps(lngIndex).TasksComplete >= 0, _
                "Tasks complete for " &
CStr(mcSubSteps(lngIndex).StepId) & _
                " Instance Id " & InstanceId & " is less
than 0."

        If mcSubSteps(lngIndex).StepId = mlngStepId
Then
            mcSubSteps(lngIndex).TasksComplete = _
                mcSubSteps(lngIndex).TasksComplete
+ 1
'           BugMessage "Tasks Complete for Step Id :
" & _
'                   CStr(mcSubSteps(lngIndex).StepId) &
_
'                   " Instance Id: " & InstanceId & _
'                   " = " &
mcSubSteps(lngIndex).TasksComplete
            Exit For
        End If
    Next lngIndex

    If lngIndex > mcSubSteps.Count - 1 Then
        ' The child step wasn't found - raise an error
        On Error GoTo 0
        Err.Raise errInvalidChild, mstrModuleName, _
                LoadResString(errInvalidChild)
    End If

    Exit Sub

ChildCompletedErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError + errInstanceOpFailed,
mstrModuleName & "ChildCompleted", _
            LoadResString(errInstanceOpFailed)

End Sub
Public Sub ChildDeleted(mlngStepId As Long)
    ' This procedure is called when a sub-step needs
to be re-executed
    ' Note: The TasksComplete field is decremented.
We needn't worry about
    ' the TasksRunning field since no steps are
currently running.
    Dim lngIndex As Long

    On Error GoTo ChildDeletedErr

    BugAssert mcStep.StepType = gintManagerStep

    For lngIndex = 0 To mcSubSteps.Count - 1

        If mcSubSteps(lngIndex).StepId = mlngStepId
Then
            mcSubSteps(lngIndex).TasksRunning = _
                mcSubSteps(lngIndex).TasksRunning -
1

            BugAssert
mcSubSteps(lngIndex).TasksRunning >= 0, _
                "Tasks running for " &
CStr(mcSubSteps(lngIndex).StepId) & _
                " Instance Id " & InstanceId & " is less
than 0."
            Exit For
        End If
    Next lngIndex

    If lngIndex > mcSubSteps.Count - 1 Then
        ' The child step wasn't found - raise an error
        On Error GoTo 0
        Err.Raise errInvalidChild, mstrModuleName, _
                LoadResString(errInvalidChild)
```

```
    End If

    Exit Sub

ChildDeletedErr:
    ' Log the error code raised by Visual
Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errInstanceOpFailed, mstrModuleName &
"ChildDeleted", _
          LoadResString(errInstanceOpFailed)

End Sub
Private Sub RaiseErrForWorker()

    If mcStep.StepType <> gintManagerStep
Then
        On Error GoTo 0
        mstrSource = mstrModuleName &
"RaiseErrForWorker"
        Err.Raise vbObjectError +
errInvalidForWorker, _
              mstrSource, _

LoadResString(errInvalidForWorker)
    End If

End Sub

Public Property Get Step() As cStep

    Set Step = mcStep

End Property
Public Property Get Iterators() As cRunColIt

    Set Iterators = mcIterators

End Property
Public Property Get SubSteps() As
cSubSteps

    Call RaiseErrForWorker

    Set SubSteps = mcSubSteps

End Property
Public Property Set Step(cRunStep As
cStep)

    Set mcStep = cRunStep

End Property

Public Property Set Iterators(cIts As
cRunColIt)

    Set mcIterators = cIts

End Property
Public Property Get IsPending() As Boolean
    ' Returns true if the step has any substeps
that need
    ' execution
    Dim lngIndex As Long
    Dim lngRunning As Long

    Call RaiseErrForWorker

    If Not mblnComplete And Not
mblnNoMoreToStart Then
        ' Get a count of all the substeps that are
already being
        ' executed
        lngRunning = 0
        For lngIndex = 0 To mcSubSteps.Count -
1
            lngRunning = lngRunning +
mcSubSteps(lngIndex).TasksRunning
        Next lngIndex

        IsPending = (lngRunning <
DegreeParallelism)
    Else
        ' This should be sufficient to prove that
there r no
        ' more sub-steps to be executed.
        ' mblnComplete: Handles the case where
all steps have
        ' been executed
        ' mblnNoMoreToStart: Handles the case
where the step
        ' has a degree of parallelism greater than
the total
        ' number of sub-steps available to execute
        IsPending = False
    End If

End Property
Public Property Get IsRunning() As Boolean
    ' Returns true if the any one of the substeps
is still
    ' executing
    Dim lngIndex As Long

    Call RaiseErrForWorker

    IsRunning = False

    ' If a substep has no currently executing
tasks and
    ' the tasks completed is greater than zero,
then we can
    ' assume that it has completed execution
(otherwise we
    ' would've run a new task the moment one
completed!)
    For lngIndex = 0 To mcSubSteps.Count - 1
        If mcSubSteps(lngIndex).TasksRunning >
0 Then
            IsRunning = True
            Exit For
        End If
    Next lngIndex

End Property
Public Property Get TotalRunning() As Long
    ' Returns the total number of substeps that
are executing
    Dim lngTotalProcesses As Long
    Dim lngIndex As Long

    Call RaiseErrForWorker

    lngTotalProcesses = 0
    For lngIndex = 0 To mcSubSteps.Count - 1
        BugAssert
mcSubSteps(lngIndex).TasksRunning >= 0, _
              "Tasks running for " &
CStr(mcSubSteps(lngIndex).StepId) & _
              " is less than 0."
        lngTotalProcesses = lngTotalProcesses +
mcSubSteps(lngIndex).TasksRunning
    Next lngIndex

    TotalRunning = lngTotalProcesses
End Property
Public Property Get RunningForStep(lngSubStepId
As Long) As Long
    ' Returns the total number of instances of the
substep
    ' that are executing
    Dim lngIndex As Long

    Call RaiseErrForWorker

    For lngIndex = 0 To mcSubSteps.Count - 1
        BugAssert
mcSubSteps(lngIndex).TasksRunning >= 0, _
              "Tasks running for " &
CStr(mcSubSteps(lngIndex).StepId) & _
              " is less than 0."

        If mcSubSteps(lngIndex).StepId =
lngSubStepId Then
            RunningForStep =
mcSubSteps(lngIndex).TasksRunning
            Exit For
        End If
    Next lngIndex

    If lngIndex > mcSubSteps.Count - 1 Then
        ' The child step wasn't found - raise an error
        On Error GoTo 0
        Err.Raise errInvalidChild, mstrSource, _
              LoadResString(errInvalidChild)
    End If

End Property

Public Property Let Status(ByVal vdata As
InstanceStatus)

    mintStatus = vdata

End Property

Public Property Get Status() As InstanceStatus

    Status = mintStatus

End Property
Private Sub Class_Initialize()

    Set mcSubSteps = New cSubSteps

    mblnNoMoreToStart = False
    mblnComplete = False
    StartTime = gdtmEmpty
    EndTime = gdtmEmpty

End Sub

Private Sub Class_Terminate()

    mcSubSteps.Clear
    Set mcSubSteps = Nothing

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cInstances"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cInstances.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
```

```
'
'
' PURPOSE:    Implements a collection of
cInstance objects.
'             Type-safe wrapper around cVector.
'             Also contains additional functions
to query an instance, etc.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this class
Private Const mstrModuleName As String =
"cInstance."
Private mstrSource As String

Private mcInstances As cVector

Public Function QueryInstance(ByVal
InstanceId As Long) As cInstance
   ' Retrieves the record for the passed in
instance from
   ' the collection

   Dim lngIndex As Long

   On Error GoTo QueryInstanceErr

   ' Check for valid values of the instance id
   If InstanceId > 0 Then
      ' Find the run node with the matching
step id
      For lngIndex = 0 To Count() - 1
         If mcInstances(lngIndex).InstanceId
= InstanceId Then
            Set QueryInstance =
mcInstances(lngIndex)
            Exit For
         End If
      Next lngIndex

      If lngIndex > mcInstances.Count - 1
Then
         On Error GoTo 0
         Err.Raise vbObjectError +
errQueryFailed, mstrSource, _
               LoadResString(errQueryFailed)
      End If
   Else
      On Error GoTo 0
      Err.Raise vbObjectError +
errQueryFailed, mstrSource, _
            LoadResString(errQueryFailed)
   End If

   Exit Function

QueryInstanceErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   mstrSource = mstrModuleName &
"QueryInstance"
   Err.Raise vbObjectError +
errQueryFailed, _
         mstrSource,
LoadResString(errQueryFailed)

End Function
Public Function QueryPendingInstance(ByVal
ParentInstanceId As Long, _
      ByVal lngSubStepId As Long) As
cInstance
   ' Retrieves a pending instance for the passed
in substep
   ' and the given parent instance id.

   Dim lngIndex As Long

   On Error GoTo QueryPendingInstanceErr

   ' Find the run node with the matching step id
   For lngIndex = 0 To Count() - 1
      If mcInstances(lngIndex).ParentInstanceId
= ParentInstanceId And _
            mcInstances(lngIndex).Step.StepId =
lngSubStepId Then
         ' Put in a separate if condition since the
IsPending
         ' property is valid only for manager
steps. If the
         ' calling procedure does not pass a
manager step
         ' identifier, the procedure will error out.
         If mcInstances(lngIndex).IsPending
Then
            Set QueryPendingInstance =
mcInstances(lngIndex)
            Exit For
         End If
      End If
   Next lngIndex

   Exit Function

QueryPendingInstanceErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   mstrSource = mstrModuleName &
"QueryPendingInstance"
   Err.Raise vbObjectError + errQueryFailed, _
         mstrSource,
LoadResString(errQueryFailed)

End Function
Public Function InstanceAborted(cSubStepRec
As cSubStep) As Boolean

   Dim lIndex As Long

   InstanceAborted = False

   For lIndex = 0 To Count() - 1
      If mcInstances(lIndex).Step.StepId =
cSubStepRec.StepId And _
            mcInstances(lIndex).Status =
gintAborted Then
         InstanceAborted = True
         Exit For
      End If
   Next lIndex

End Function
Public Function
CompletedInstanceExists(lParentInstance As
Long, _
      cSubStepDtls As cStep) As Boolean
   ' Checks if there is a completed instance of
the passed in step

   Dim lngIndex As Long

   CompletedInstanceExists = False

   If cSubStepDtls.StepType = gintManagerStep
Then
      ' Find the run node with the matching step id
      For lngIndex = 0 To Count() - 1
         If mcInstances(lngIndex).ParentInstanceId =
lParentInstance And _
               mcInstances(lngIndex).Step.StepId =
cSubStepDtls.StepId Then
            ' Put in a separate if condition since the
IsPending
            ' property is valid only for manager steps.
            BugAssert (Not
mcInstances(lngIndex).IsPending), "Pending
instance exists!"

            CompletedInstanceExists = True
            Exit Function
         End If
      Next lngIndex
   End If

End Function
Public Sub Add(ByVal objItem As cInstance)

   mcInstances.Add objItem

End Sub


Public Sub Clear()

   mcInstances.Clear

End Sub


Public Function Count() As Long

   Count = mcInstances.Count

End Function


Public Function Delete(ByVal lngDelete As Long)
As cInstance

   Set Delete = mcInstances.Delete(lngDelete)

End Function


Public Property Set Item(Optional ByVal Position
As Long, _
      RHS As cInstance)

   If Position = -1 Then
      Position = 0
   End If
   Set mcInstances(Position) = RHS

End Property

Public Property Get Item(Optional ByVal Position
As Long = -1) _
      As cInstance
Attribute Item.VB_UserMemId = 0

   If Position = -1 Then
      Position = 0
   End If
   Set Item = mcInstances.Item(Position)

End Property
```

```
Private Sub Class_Initialize()

   Set mcInstances = New cVector

End Sub


Private Sub Class_Terminate()

   Set mcInstances = Nothing

End Sub


VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cIterator"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cIterator.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Encapsulates the properties
and methods of an iterator.
'              Contains functions to insert,
update and delete
'              iterator_values records from the
database.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Implements cNode

' Module level variables to store the property
values
Private mintType As Integer
Private mintSequenceNo As Integer
Private mstrValue As String
Private mdbsIteratorDB As Database
Private mintOperation As Integer
Private mlngPosition As Long

Private Const mstrModuleName As String =
"cIterator."
Private mstrSource As String

Public Enum ValueType
   gintFrom = 1
   gintTo
   gintStep
   gintValue
End Enum
Public Property Get Value() As String

   Value = mstrValue

End Property
Public Property Let Value(ByVal vdata As
String)

   mstrValue = vdata

End Property

Public Property Get IndOperation() As
Operation

   IndOperation = mintOperation

End Property
Public Property Let IndOperation(ByVal vdata
As Operation)

   On Error GoTo IndOperationErr
   mstrSource = mstrModuleName &
"IndOperation"

   ' The valid operations are define in the
cOperations
   ' class. Check if the operation is valid
   Select Case vdata
      Case QueryOp, InsertOp, UpdateOp,
DeleteOp
         mintOperation = vdata

      Case Else
         On Error GoTo 0
         Err.Raise vbObjectError +
errInvalidOperation, _
               mstrSource,
LoadResString(errInvalidOperation)
   End Select

   Exit Property

IndOperationErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"IndOperation"
   On Error GoTo 0
   Err.Raise vbObjectError +
errLetOperationFailed, _
      mstrSource,
LoadResString(errLetOperationFailed)

End Property

Public Function Clone() As cIterator

   ' Creates a copy of a given Iterator

   Dim cItClone As cIterator

   On Error GoTo CloneErr

   Set cItClone = New cIterator

   ' Copy all the iterator properties to the newly
   ' created object
   cItClone.IteratorType = mintType
   cItClone.SequenceNo = mintSequenceNo
   cItClone.IndOperation = mintOperation
   cItClone.Value = mstrValue

   ' And set the return value to the newly
created Iterator
   Set Clone = cItClone

   Exit Function

CloneErr:
   LogErrors Errors
   mstrSource = mstrModuleName & "Clone"
   On Error GoTo 0
   Err.Raise vbObjectError + errCloneFailed, _
         mstrSource,
LoadResString(errCloneFailed)

End Function
Public Property Get SequenceNo() As Integer

   SequenceNo = mintSequenceNo

End Property

Public Property Let SequenceNo(ByVal vdata As
Integer)
   mintSequenceNo = vdata
End Property

Public Sub Add(ByVal lngStepId As Long, _
      strVersion As String)
   ' Inserts a new iterator values record into the
database

   Dim strInsert As String
   Dim qy As DAO.QueryDef

   On Error GoTo AddIteratorErr

   ' First check if the database object is valid
   Call CheckDB

   ' Create a temporary querydef object
   strInsert = "insert into iterator_values " & _
         "( step_id, version_no, type, " & _
         " iterator_value, sequence_no ) " & _
         " values ( [st_id], [ver_no], [it_typ], " & _
         " [it_val], [seq_no] )"
   Set qy =
mdbsIteratorDB.CreateQueryDef(gstrEmptyString,
strInsert)

   ' Call a procedure to execute the Querydef object
   Call AssignParameters(qy, lngStepId, strVersion)

   qy.Execute dbFailOnError
   qy.Close

   Exit Sub

AddIteratorErr:
   LogErrors Errors
   mstrSource = mstrModuleName & "AddIterator"
   On Error GoTo 0
   Err.Raise vbObjectError + errInsertIteratorFailed,
_
         mstrSource, _
         LoadResString(errInsertIteratorFailed)
End Sub

Private Sub AssignParameters(qyExec As
DAO.QueryDef, _
      ByVal lngStepId As Long, _
      strVersion As String)
   ' Assigns values to the parameters in the querydef
object
   ' The parameter names are cryptic to make them
different
   ' from the field names. When the parameter
names are
   ' the same as the field names, parameters in the
where
   ' clause do not get created.

   Dim prmParam As DAO.Parameter

   On Error GoTo AssignParametersErr
   mstrSource = mstrModuleName &
"AssignParameters"

   For Each prmParam In qyExec.Parameters
      Select Case prmParam.Name
         Case "[st_id]"
            prmParam.Value = lngStepId
```

```
        Case "[ver_no]"
            prmParam.Value = strVersion

        Case "[it_typ]"
            prmParam.Value = mintType

        Case "[it_val]"
            prmParam.Value = mstrValue

        Case "[seq_no]"
            prmParam.Value =
mintSequenceNo

        Case Else
            ' Write the parameter name that is
faulty
            WriteError errInvalidParameter,
mstrSource, _
                prmParam.Name
            On Error GoTo 0
            Err.Raise errInvalidParameter,
mstrSource, _

LoadResString(errInvalidParameter)
        End Select
    Next prmParam

    Exit Sub

AssignParametersErr:

    mstrSource = mstrModuleName &
"AssignParameters"
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errAssignParametersFailed, _
        mstrSource,
LoadResString(errAssignParametersFailed)

End Sub
Private Sub CheckDB()
    ' Check if the database object has been
initialized

    If mdbsIteratorDB Is Nothing Then
        ShowError errInvalidDB
        On Error GoTo 0
        Err.Raise vbObjectError +
errInvalidDB, _
            mstrModuleName,
LoadResString(errInvalidDB)
    End If

End Sub

Public Sub Delete(ByVal lngStepId As
Long, _
        strVersion As String)
    ' Deletes the step iterator record from the
database

    Dim strDelete As String
    Dim qy As DAO.QueryDef

    On Error GoTo DeleteIteratorErr
    mstrSource = mstrModuleName &
"DeleteIterator"

    ' There can be multiple iterators for a step.
    ' However the values that an iterator for a
step can
    ' assume will be unique, meaning that a
combination of
    ' the iterator_id and value will be unique.
    strDelete = "delete from iterator_values " &
_
            " where step_id = [st_id]" & _
            " and version_no = [ver_no]" & _
            " and iterator_value = [it_val] "
    Set qy =
mdbsIteratorDB.CreateQueryDef(gstrEmptyStr
ing, strDelete)

    Call AssignParameters(qy, lngStepId,
strVersion)
    qy.Execute dbFailOnError

    qy.Close

    Exit Sub

DeleteIteratorErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"DeleteIterator"
    On Error GoTo 0
    Err.Raise vbObjectError +
errDeleteIteratorFailed, _
        mstrSource, _
        LoadResString(errDeleteIteratorFailed)
End Sub
Public Sub Update(ByVal lngStepId As Long,
strVersion As String)
    ' Updates the sequence no of the step iterator
record
    ' in the database

    Dim strUpdate As String
    Dim qy As QueryDef

    On Error GoTo UpdateErr

    ' First check if the database object is valid
    Call CheckDB

    If mintType = gintValue Then
        ' If the iterator is of type value, only the
sequence of the values can get updated
        strUpdate = "Update iterator_values " & _
            " set sequence_no = [seq_no] " & _
            " where step_id = [st_id]" & _
            " and version_no = [ver_no]" & _
            " and iterator_value = [it_val] "
    Else
        ' If the iterator is of type range, only the
values can get updated
        strUpdate = "Update iterator_values " & _
            " set iterator_value = [it_val] " & _
            " where step_id = [st_id]" & _
            " and version_no = [ver_no]" & _
            " and type = [it_typ] "
    End If

    Set qy =
mdbsIteratorDB.CreateQueryDef(gstrEmptyStr
ing, strUpdate)

    ' Call a procedure to assign the parameter
values to the
    ' querydef object
    Call AssignParameters(qy, lngStepId,
strVersion)
    qy.Execute dbFailOnError

    qy.Close

    Exit Sub

UpdateErr:
    LogErrors Errors
    mstrSource = mstrModuleName & "Update"
    On Error GoTo 0
    Err.Raise vbObjectError +
errUpdateConstraintFailed, _
        mstrSource, _
        LoadResString(errUpdateConstraintFailed)

End Sub
Public Property Set NodeDB(vdata As Database)

    Set mdbsIteratorDB = vdata

End Property

Public Property Get NodeDB() As Database

    Set NodeDB = mdbsIteratorDB

End Property
Public Property Get Position() As Long

    Position = mlngPosition

End Property
Public Property Let Position(ByVal vdata As Long)

    mlngPosition = vdata

End Property

Public Property Let IteratorType(ByVal vdata As
ValueType)

    On Error GoTo TypeErr
    mstrSource = mstrModuleName & "Type"

    ' These constants have been defined in the
enumeration,
    ' Type, which is exposed
    Select Case vdata
        Case gintFrom, gintTo, gintStep, gintValue
            mintType = vdata

        Case Else
            On Error GoTo 0
            Err.Raise vbObjectError + errTypeInvalid, _
                mstrSource,
LoadResString(errTypeInvalid)
    End Select

    Exit Property

TypeErr:
    LogErrors Errors
    mstrSource = mstrModuleName & "Type"
    On Error GoTo 0
    Err.Raise vbObjectError + errTypeInvalid, _
        mstrSource, LoadResString(errTypeInvalid)

End Property

Public Property Get IteratorType() As ValueType

    IteratorType = mintType

End Property
Public Sub Validate()

    ' No validations necessary for the iterator class

End Sub

Private Sub Class_Initialize()
```

```
    ' Initialize the operation indicator variable to Query
    ' It will be modified later by the collection class when
    ' inserts, updates or deletes are performed
    mintOperation = QueryOp

End Sub


Private Property Let cNode_IndOperation(ByVal vdata As Operation)

    On Error GoTo IndOperationErr
    mstrSource = mstrModuleName & "IndOperation"

    ' The valid operations are define in the cOperations
    ' class. Check if the operation is valid
    Select Case vdata
        Case QueryOp, InsertOp, UpdateOp, DeleteOp
            mintOperation = vdata

        Case Else
            On Error GoTo 0
            Err.Raise vbObjectError + errInvalidOperation, _
                mstrSource, LoadResString(errInvalidOperation)
    End Select

    Exit Property

IndOperationErr:
    LogErrors Errors
    mstrSource = mstrModuleName & "IndOperation"
    On Error GoTo 0
    Err.Raise vbObjectError + errLetOperationFailed, _
        mstrSource, LoadResString(errLetOperationFailed)

End Property

Private Property Get cNode_IndOperation() As Operation

    IndOperation = mintOperation

End Property

Private Property Set cNode_NodeDB(RHS As DAO.Database)

    Set mdbsIteratorDB = RHS

End Property

Private Property Get cNode_NodeDB() As DAO.Database

    Set cNode_NodeDB = mdbsIteratorDB

End Property


Private Property Let cNode_Position(ByVal vdata As Long)

    mlngPosition = vdata

End Property


Private Property Get cNode_Position() As Long

    cNode_Position = mlngPosition

End Property


Private Sub cNode_Validate()

    ' No validations necessary for the iterator class

End Sub


Private Property Let cNode_Value(ByVal vdata As String)

    mstrValue = vdata

End Property

Private Property Get cNode_Value() As String

    Value = mstrValue

End Property
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cManager"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cManager.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Encapsulates the properties and methods of a manager step.
'              Implements the cStep class - carries out initializations
'              and validations that are specific to manager steps.
'  Contact:    Reshma Tharamal (reshmat@microsoft.com)
'
Option Explicit

Implements cStep

' Object variable to keep the step reference in
Private mcStep As cStep

' Used to indicate the source module name when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String = "cManager."
Private Sub cStep_AddAllIterators()

    Call mcStep.AddAllIterators

End Sub


Private Property Let cStep_StartDir(ByVal RHS As String)

    mcStep.StartDir = RHS

End Property

Private Property Get cStep_StartDir() As String

    cStep_StartDir = mcStep.StartDir

End Property
Private Sub cStep_Delete()

    Call mcStep.Delete

End Sub

Private Property Set cStep_NodeDB(RHS As DAO.Database)

    Set mcStep.NodeDB = RHS

End Property

Private Function cStep_IncVersionY() As String

    cStep_IncVersionY = mcStep.IncVersionY

End Function
Private Function cStep_IsNewVersion() As Boolean
    cStep_IsNewVersion = mcStep.IsNewVersion
End Function
Private Function cStep_OldVersionNo() As String
    cStep_OldVersionNo = mcStep.OldVersionNo
End Function

Private Function cStep_IncVersionX() As String

    cStep_IncVersionX = mcStep.IncVersionX

End Function
Private Sub cStep_UpdateIteratorVersion()

    Call mcStep.UpdateIteratorVersion

End Sub

Private Function cStep_IteratorCount() As Long

    cStep_IteratorCount = mcStep.IteratorCount

End Function

Private Sub cStep_UnloadIterators()

    Call mcStep.UnloadIterators

End Sub

Private Sub cStep_DeleteIterator(cItRecord As cIterator)

    Call mcStep.DeleteIterator(cItRecord)

End Sub
Private Property Get cStep_IteratorName() As String

    cStep_IteratorName = mcStep.IteratorName

End Property
Private Property Let cStep_IteratorName(ByVal RHS As String)
```

```
    mcStep.IteratorName = RHS

End Property

Private Sub cStep_SaveIterators()

    Call mcStep.SaveIterators

End Sub
Private Sub cStep_LoadIterator(cItRecord
As cIterator)

    Call mcStep.LoadIterator(cItRecord)

End Sub

Private Property Let cStep_Position(ByVal
RHS As Long)

    mcStep.Position = RHS

End Property
Private Sub cStep_InsertIterator(cItRecord
As cIterator)

    Call mcStep.InsertIterator(cItRecord)

End Sub
Private Function cStep_Iterators() As
Variant

    cStep_Iterators = mcStep.Iterators

End Function
Private Sub cStep_ModifyIterator(cItRecord
As cIterator)

    Call mcStep.ModifyIterator(cItRecord)

End Sub
Private Sub
cStep_RemoveIterator(cItRecord As
cIterator)

    Call mcStep.RemoveIterator(cItRecord)

End Sub
Private Sub cStep_UpdateIterator(cItRecord
As cIterator)

    Call mcStep.UpdateIterator(cItRecord)

End Sub
Private Sub cStep_AddIterator(cItRecord As
cIterator)

    Call mcStep.AddIterator(cItRecord)

End Sub

Private Property Get cStep_Position() As
Long

    cStep_Position = mcStep.Position

End Property

Private Function cStep_Clone(Optional
cCloneStep As cStep) As cStep

    Dim cNewManager As cManager

    Set cNewManager = New cManager

    Set cStep_Clone =
mcStep.Clone(cNewManager)

End Function

Private Property Get cStep_IndOperation() As
Operation

    cStep_IndOperation = mcStep.IndOperation

End Property

Private Property Let
cStep_IndOperation(ByVal RHS As
Operation)

    mcStep.IndOperation = RHS

End Property

Private Property Get cStep_NextStepId() As
Long

    cStep_NextStepId = mcStep.NextStepId

End Property

Private Property Let cStep_OutputFile(ByVal
RHS As String)

    mcStep.OutputFile = RHS

End Property

Private Property Get cStep_OutputFile() As
String

    cStep_OutputFile = mcStep.OutputFile

End Property

Private Property Let cStep_ErrorFile(ByVal
RHS As String)

    mcStep.ErrorFile = RHS

End Property

Private Property Get cStep_ErrorFile() As
String

    cStep_ErrorFile = mcStep.ErrorFile

End Property
'Private Property Let cStep_LogFile(ByVal
RHS As String)
'
'    mcStep.LogFile = RHS
'
'End Property
'
'Private Property Get cStep_LogFile() As
String
'
'    cStep_LogFile = mcStep.LogFile
'
'End Property

Private Property Let
cStep_ArchivedFlag(ByVal RHS As Boolean)

    mcStep.ArchivedFlag = RHS

End Property

Private Property Get cStep_ArchivedFlag() As
Boolean

    cStep_ArchivedFlag = mcStep.ArchivedFlag

End Property

Private Property Get cStep_NodeDB() As
DAO.Database

    Set cStep_NodeDB = mcStep.NodeDB

End Property

Private Sub Class_Initialize()

    ' Create the object
    Set mcStep = New cStep

    ' Initialize the object with valid values for a
manager step
    ' The global flag should be the first field to be
initialized
    ' since subsequent validations might try to check
if the
    ' step being created is global
    mcStep.GlobalFlag = False
'    mcStep.GlobalRunMethod = gintNoOption
    mcStep.StepType = gintManagerStep

    ' Since the manager step does not take any action,
the step
    ' text and file name will always be empty
    mcStep.StepText = gstrEmptyString
    mcStep.StepTextFile = gstrEmptyString

    ' Since the manager step does not take any action,
execution
    ' properties for the step will be empty
    mcStep.ExecutionMechanism = gintNoOption
    mcStep.FailureDetails = gstrEmptyString
    mcStep.ContinuationCriteria = gintNoOption

End Sub
Private Sub Class_Terminate()

    ' Remove the step object
    Set mcStep = Nothing

End Sub
Private Sub cStep_Add()

    ' Call the Add method of the step class to carry
out the insert
    mcStep.Add

End Sub
Private Property Get cStep_ContinuationCriteria()
As ContinuationCriteria

    cStep_ContinuationCriteria =
mcStep.ContinuationCriteria

End Property

Private Property Let
cStep_ContinuationCriteria(ByVal RHS As
ContinuationCriteria)

    ' Since a manager step cannot take any action, the
continuation
    ' criteria property does not apply to it
    mcStep.ContinuationCriteria = gintNoOption

End Property
```

```
Private Property Let
cStep_DegreeParallelism(ByVal RHS As
String)

   mcStep.DegreeParallelism = RHS

End Property

Private Property Get
cStep_DegreeParallelism() As String

   cStep_DegreeParallelism =
mcStep.DegreeParallelism

End Property

Private Sub cStep_DeleteStep()

   On Error GoTo cStep_DeleteStepErr
   mstrSource = mstrModuleName &
"cStep_DeleteStep"

   mcStep.Delete
   Exit Sub

cStep_DeleteStepErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"cStep_DeleteStep"
   On Error GoTo 0
   Err.Raise vbObjectError +
errDeleteStepFailed, _
         mstrSource, _
         LoadResString(errDeleteStepFailed)

End Sub

Private Property Get cStep_EnabledFlag()
As Boolean

   cStep_EnabledFlag =
mcStep.EnabledFlag

End Property

Private Property Let
cStep_EnabledFlag(ByVal RHS As
Boolean)

   mcStep.EnabledFlag = RHS

End Property

Private Property Let
cStep_ExecutionMechanism(ByVal RHS As
ExecutionMethod)

   ' Since a manager step cannot take any
action, the Execution
   ' Mechanism property does not apply to it
   mcStep.ExecutionMechanism =
gintNoOption

End Property

Private Property Get
cStep_ExecutionMechanism() As
ExecutionMethod

   cStep_ExecutionMechanism =
mcStep.ExecutionMechanism

End Property

Private Property Let
cStep_FailureDetails(ByVal RHS As String)

   ' Since a manager step cannot take any
action, the Failure
   ' Details property does not apply to it
   mcStep.FailureDetails = gstrEmptyString

End Property

Private Property Get cStep_FailureDetails() As
String

   cStep_FailureDetails =
mcStep.FailureDetails

End Property

Private Property Get cStep_GlobalFlag() As
Boolean

   cStep_GlobalFlag = mcStep.GlobalFlag

End Property

Private Property Let cStep_GlobalFlag(ByVal
RHS As Boolean)

   ' Set the global flag to false - this flag is
initialized when
   ' an instance of the class is created. Just
making sure that
   ' nobody changes the value inadvertently
   mcStep.GlobalFlag = False

End Property
Private Sub cStep_Modify()

   ' Call the Modify method of the step class to
carry out the update
   mcStep.Modify

End Sub

Private Property Let
cStep_ParentStepId(ByVal RHS As Long)

   mcStep.ParentStepId = RHS

End Property

Private Property Get cStep_ParentStepId() As
Long

   cStep_ParentStepId = mcStep.ParentStepId

End Property

Private Property Let
cStep_ParentVersionNo(ByVal RHS As
String)

   mcStep.ParentVersionNo = RHS

End Property

Private Property Get cStep_ParentVersionNo()
As String

   cStep_ParentVersionNo =
mcStep.ParentVersionNo

End Property

Private Property Let cStep_SequenceNo(ByVal
RHS As Integer)

   mcStep.SequenceNo = RHS

End Property

Private Property Get cStep_SequenceNo() As
Integer

   cStep_SequenceNo = mcStep.SequenceNo

End Property

Private Property Let cStep_StepId(ByVal RHS As
Long)

   mcStep.StepId = RHS

End Property

Private Property Get cStep_StepId() As Long

   cStep_StepId = mcStep.StepId

End Property


Private Property Let cStep_StepLabel(ByVal RHS
As String)

   mcStep.StepLabel = RHS

End Property

Private Property Get cStep_StepLabel() As String

   cStep_StepLabel = mcStep.StepLabel

End Property


Private Property Let cStep_StepLevel(ByVal RHS
As Integer)

   mcStep.StepLevel = RHS

End Property

Private Property Get cStep_StepLevel() As Integer

   cStep_StepLevel = mcStep.StepLevel

End Property

Private Property Let cStep_StepText(ByVal RHS
As String)

   ' Since the manager step does not take any action,
the step
   ' text and file name will always be empty
   mcStep.StepText = gstrEmptyString

End Property

Private Property Get cStep_StepText() As String

   cStep_StepText = mcStep.StepText

End Property

Private Property Let cStep_StepTextFile(ByVal
RHS As String)
```

```
    ' Since the manager step does not take any
action, the step
    ' text and file name will always be empty
    mcStep.StepTextFile = gstrEmptyString

End Property

Private Property Get cStep_StepTextFile()
As String

    cStep_StepTextFile =
mcStep.StepTextFile

End Property

Private Property Let cStep_StepType(RHS
As gintStepType)

    mcStep.StepType = gintManagerStep

End Property

Private Property Get cStep_StepType() As
gintStepType

    cStep_StepType = mcStep.StepType

End Property

Private Sub cStep_Validate()
    ' The validate routines for each of the
steps will
    ' carry out the specific validations for the
type and
    ' call the generic validation routine

    On Error GoTo cStep_ValidateErr
    mstrSource = mstrModuleName &
"cStep_Validate"

    ' Validations specific to manager steps

    ' Check if the step text or a file name has
been
    ' specified
    If Not StringEmpty(mcStep.StepText) Or
Not StringEmpty(mcStep.StepTextFile)
Then
        ShowError
errTextAndFileNullForManager
        On Error GoTo 0
        Err.Raise vbObjectError +
errValidateFailed, _
            gstrSource, _
            LoadResString(errValidateFailed)
    End If

    If mcStep.ExecutionMechanism <>
gintNoOption Then
        ShowError
errExecutionMechanismInvalid
        On Error GoTo 0
        Err.Raise vbObjectError +
errValidateFailed, _
            gstrSource, _
            LoadResString(errValidateFailed)
    End If

    If mcStep.FailureDetails <>
gstrEmptyString Then
        ShowError
errFailureDetailsNullForMgr
        On Error GoTo 0
        Err.Raise vbObjectError +
errValidateFailed, _
            gstrSource, _
            LoadResString(errValidateFailed)
    End If

    If mcStep.ContinuationCriteria <>
gintNoOption Then
        ShowError errContCriteriaInvalid
        On Error GoTo 0
        Err.Raise vbObjectError +
errValidateFailed, _
            gstrSource, _
            LoadResString(errValidateFailed)
    End If

    mcStep.Validate

    Exit Sub

cStep_ValidateErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"cStep_Validate"
    On Error GoTo 0
    Err.Raise vbObjectError +
errValidateFailed, _
        mstrSource, _
        LoadResString(errValidateFailed)
End Sub

Private Property Let cStep_VersionNo(ByVal
RHS As String)

    mcStep.VersionNo = RHS

End Property

Private Property Get cStep_VersionNo() As
String

    cStep_VersionNo = mcStep.VersionNo

End Property

Private Property Let
cStep_WorkspaceId(ByVal RHS As Long)

    mcStep.WorkspaceId = RHS

End Property

Private Property Get cStep_WorkspaceId() As
Long

    cStep_WorkspaceId = mcStep.WorkspaceId

End Property
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cNode"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cNode.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Defines the properties that an
object has to implement.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Public Property Get IndOperation() As Operation
End Property
Public Property Let IndOperation(ByVal vdata As
Operation)
End Property
Public Sub Validate()
End Sub
Public Property Get Value() As String
End Property
Public Property Let Value(ByVal vdata As String)
End Property

Public Property Get NodeDB() As Database
End Property
Public Property Set NodeDB(vdata As Database)
End Property

Public Property Get Position() As Long
End Property
Public Property Let Position(ByVal vdata As Long)
End Property

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cNodeCollections"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cNodeCollections.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Implements an array of objects.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Node counter
Private mlngNodeCount As Long
Private mdbsNodeDb As Database
Private mcarrNodes() As Object

' Used to indicate the source module name when
errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cNodeCollections."

Public Property Set Item(ByVal Position As Long,
_
        ByVal objNode As Object)

    ' Returns the element at the passed in position in
the array
    If Position >= 0 And Position < mlngNodeCount
Then
        Set mcarrNodes(Position) = objNode
    Else
        On Error GoTo 0
        Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _
            LoadResString(errItemDoesNotExist)
    End If

End Property
```

```
Public Property Get Item(ByVal Position As
Long) As Object
Attribute Item.VB_UserMemId = 0

   ' Returns the element at the passed in
position in the array
   If Position >= 0 And Position <
mlngNodeCount Then
      Set Item = mcarrNodes(Position)
   Else
      On Error GoTo 0
      Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _

LoadResString(errItemDoesNotExist)
   End If

End Property

Public Sub Commit(ByVal cSaveObj As
Object, _
      ByVal lngIndex As Long)
   ' This procedure checks if any changes
have been made to the
   ' passed in object. If so, it calls the
corresponding method
   ' to commit the changes.

   On Error GoTo CommitErr
   mstrSource = mstrModuleName &
"Commit"

   Select Case cSaveObj.IndOperation
      Case QueryOp
         ' No changes were made to the
queried parameter.
         ' Do nothing

      Case InsertOp
         cSaveObj.Add
         cSaveObj.IndOperation = QueryOp

      Case UpdateOp
         cSaveObj.Modify
         cSaveObj.IndOperation = QueryOp

      Case DeleteOp
         cSaveObj.Delete
         ' Now we can remove the record
from the array
         Call Unload(lngIndex)

   End Select

   Exit Sub

CommitErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"Commit"
   On Error GoTo 0
   Err.Raise vbObjectError +
errCommitFailed, _
         mstrSource, _
         LoadResString(errCommitFailed)

End Sub
Public Sub Save(ByVal lngWorkspace As
Long)
   ' Calls a procedure to commit all changes
for the passed
   ' in workspace.

   Dim lngIndex As Long

   On Error GoTo SaveErr

   ' Find all parameters in the array with a
matching workspace id
   ' It is important to step backwards through
the array, since
   ' we delete parameter records as we go
along!
   For lngIndex = mlngNodeCount - 1 To 0
Step -1
      If mcarrNodes(lngIndex).WorkspaceId =
lngWorkspace Then

         ' Call a procedure to commit all
changes to the
         ' parameter record, if any
         Call Commit(mcarrNodes(lngIndex),
lngIndex)

      End If
   Next lngIndex

   Exit Sub

SaveErr:
   LogErrors Errors
   mstrSource = mstrModuleName & "Save"
   On Error GoTo 0
   Err.Raise vbObjectError + errSaveFailed, _
         mstrSource, _
         LoadResString(errSaveFailed)

End Sub
Public Property Get Count() As Long

   Count = mlngNodeCount

End Property

Public Property Get NodeDB() As Database

   Set NodeDB = mdbsNodeDb

End Property
Public Property Set NodeDB(vdata As
Database)

   Set mdbsNodeDb = vdata

End Property

Public Sub Load(cNodeToLoad As Object)
   ' Adds the passed in object to the array

   On Error GoTo LoadErr

   ' If this procedure is called by the add to
array procedure,
   ' the database object has already been
initialized
   If cNodeToLoad.NodeDB Is Nothing Then

      ' All the Nodes will be initialized with the
database
      ' objects before being added to the array
      Set cNodeToLoad.NodeDB =
mdbsNodeDb

   End If

   ReDim Preserve
mcarrNodes(mlngNodeCount)

   ' Set the newly added element in the array to
the passed in Node
   cNodeToLoad.Position = mlngNodeCount
   Set mcarrNodes(mlngNodeCount) =
cNodeToLoad

   mlngNodeCount = mlngNodeCount + 1

   Exit Sub

LoadErr:
   LogErrors Errors
   On Error GoTo 0
   Err.Raise vbObjectError + errLoadFailed,
mstrModuleName & "Load", _
         LoadResString(errLoadFailed)

End Sub
Public Sub Unload(lngDeletePosition As Long)
   ' Unloads the passed in object from the array

   On Error GoTo UnloadErr

   If lngDeletePosition < (mlngNodeCount - 1)
Then

      ' Set the Node at the position being deleted to
      ' the last Node in the Node array
      Set mcarrNodes(lngDeletePosition) =
mcarrNodes(mlngNodeCount - 1)
      mcarrNodes(lngDeletePosition).Position =
lngDeletePosition
   End If

   ' Delete the last Node from the array
   mlngNodeCount = mlngNodeCount - 1
   If mlngNodeCount > 0 Then
      ReDim Preserve mcarrNodes(0 To
mlngNodeCount - 1)
   Else
      ReDim mcarrNodes(0)
   End If

   Exit Sub

UnloadErr:
   LogErrors Errors
   mstrSource = mstrModuleName & "Unload"
   On Error GoTo 0
   Err.Raise vbObjectError + errUnloadFailed, _
         mstrSource, _
         LoadResString(errUnloadFailed)

End Sub
Public Sub Delete(lngDeletePosition As Long)
   ' Deletes the object at the specified position in the
   ' array

   Dim cDeleteObj As Object

   On Error GoTo DeleteErr
   mstrSource = mstrModuleName & "Delete"

   Set cDeleteObj = mcarrNodes(lngDeletePosition)

   If cDeleteObj.IndOperation = InsertOp Then
      ' If we are deleting a record that has just been
inserted,
      ' blow it away
      Call Unload(lngDeletePosition)
   Else
      ' Set the operation for the deleted object to
indicate a
      ' delete - we actually delete the element only at
the time
      ' of a save operation
      cDeleteObj.IndOperation = DeleteOp
```

```
    End If

    Exit Sub

DeleteErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"Delete"
    On Error GoTo 0
    Err.Raise vbObjectError +
errDeleteFailed, _
            mstrSource, _
            LoadResString(errDeleteFailed)

End Sub
Public Sub Modify(cModifiedNode As
Object)
    ' Sets the object at the passed in position
to the
    ' modified object passed in

    On Error GoTo ModifyErr

    ' First check if the record is valid - all
objects that
    ' use this collection class must have a
Validate routine
    cModifiedNode.Validate

    ' If we are updating a record that hasn't yet
been inserted,
    ' do not change the operation indicator -
or we try to update
    ' a non-existant record
    If cModifiedNode.IndOperation <>
InsertOp Then
        ' Set the operations to indicate an
update
        cModifiedNode.IndOperation =
UpdateOp
    End If

    ' Modify the object at the queried position
- the Position
    ' will be maintained by this class
    Set mcarrNodes(cModifiedNode.Position)
= cModifiedNode

    Exit Sub

ModifyErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"Modify"
    On Error GoTo 0
    Err.Raise vbObjectError +
errModifyFailed, _
            mstrSource, _
            LoadResString(errModifyFailed)

End Sub
Public Sub Add(cNodeToAdd As Object)

    On Error GoTo AddErr

    Set cNodeToAdd.NodeDB =
mdbsNodeDb

    ' First check if the record is valid
    cNodeToAdd.Validate

    ' Set the operation to indicate an insert
    cNodeToAdd.IndOperation = InsertOp

    ' Call a procedure to load the record in the
array
    Call Load(cNodeToAdd)

    Exit Sub

AddErr:
    LogErrors Errors
    mstrSource = mstrModuleName & "Add"
    On Error GoTo 0
    Err.Raise vbObjectError + errAddFailed, _
            mstrSource, _
            LoadResString(errAddFailed)

End Sub

Private Sub Class_Terminate()

    ReDim mcarrNodes(0)
    mlngNodeCount = 0

End Sub


Attribute VB_Name = "Common"
'  FILE:      Common.bas
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
'  PURPOSE:    Module containing common
functionality throughout
'              StepMaster
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private Const mstrModuleName As String =
"Common."

' Used to separate the variable data from the
constant error
' message being raised when a context-sensitive
error is displayed
Private Const mintDelimiter As String = " : "
Private Const mstrFormatString = "mmddyy"

' Identifiers for the different labels that need to
be loaded
' into the tree view for each workspace
Public Const mstrWorkspacePrefix = "W"
Public Const mstrParameterPrefix = "P"
Public Const mstrParamConnectionPrefix =
"C"
Public Const mstrConnectionDtlPrefix = "N"
Public Const mstrParamExtensionPrefix = "E"
Public Const mstrParamBuiltInPrefix = "B"
Public Const gstrGlobalStepPrefix = "G"
Public Const gstrManagerStepPrefix = "M"
Public Const gstrWorkerStepPrefix = "S"
Public Const gstrDummyPrefix = "D"
Public Const mstrLabelPrefix = "L"
Public Const mstrInstancePrefix = "I"
Public Function
LabelStep(lngWorkspaceIdentifier As Long)
As String
    ' Returns the step label for the workspace
identifier passed in
    ' Basically this is a wrapper around the
MakeKeyValid function

    LabelStep = MakeKeyValid(gintStepLabel,
gintStepLabel, lngWorkspaceIdentifier)

End Function


Public Function JulianDateToString(dt64Bit As
Currency) As String

    Dim lYear As Long
    Dim lMonth As Long
    Dim lDay As Long
    Dim lHour As Long
    Dim lMin As Long
    Dim lSec As Long
    Dim lMs As Long

    Call JulianToTime(dt64Bit, lYear, lMonth, lDay,
lHour, lMin, lSec, lMs)
    JulianDateToString = Format$(lYear,
gsYearFormat) & gsDateSeparator & _
            Format$(lMonth, gsDtFormat) &
gsDateSeparator & _
            Format$(lDay, gsDtFormat) & gstrBlank &
_
            Format$(lHour, gsTmFormat) &
gsTimeSeparator & _
            Format$(lMin, gsTmFormat) &
gsTimeSeparator & _
            Format$(lSec, gsTmFormat) &
gsMsSeparator & _
            Format$(lMs, gsMSecondFormat)

End Function
Public Sub DeleteFile(strFile As String, Optional
ByVal bCheckIfEmpty As Boolean = False)

    ' Ensure that there is only a single file of the
name before delete, since
    ' Kill supports wildcards and can potentially
delete a number of files
    Dim strTemp As String

    If CheckFileExists(strFile) Then
        If bCheckIfEmpty Then
            If FileLen(strFile) = 0 Then
                Kill strFile
            End If
        Else
            Kill strFile
        End If
    End If

End Sub
Public Function CheckFileExists(strFile As String)
As Boolean

    ' Returns true if the passed in file exists
    ' Raises an error if multiple files are found
(filename contains a wildcard)
    CheckFileExists = False

    If Not StringEmpty(Dir(strFile)) Then
        If Not StringEmpty(Dir()) Then
            On Error GoTo 0
            Err.Raise vbObjectError +
errDeleteSingleFile, _
                mstrModuleName & "DeleteFile",
LoadResString(errDeleteSingleFile)
        End If

        CheckFileExists = True
    End If

End Function

Public Function GetVersionString() As String
```

```
GetVersionString = "Version " & gsVersion
End Function

Function IsLabel(strKey As String) As
Boolean

   ' The tree view control on frmMain can
contain two types of
   ' nodes -
   ' 1. Nodes that contain data for the
workspace - this could
   ' be data for the different types of steps or
parameters
   ' 2. Nodes that display static data - these
kind of nodes
   ' are referred to as label nodes e.g.
"Global Steps" is a
   ' label node
   ' This function returns True if the passed
in key corresponds
   ' to a label node

   IsLabel = InStr(strKey, mstrLabelPrefix)
> 0

End Function

Function MakeKeyValid(lngIdentifier As
Long, _
   intTypeOfNode As Integer, _
   Optional ByVal WorkspaceId As Long =
0, _
   Optional ByVal InstanceId As Long = 0)
As String

   ' We use a numbering scheme while
loading the tree view with
   ' all node data, since it needs a unique key
and we want to
   ' use the key to identify the data it
contains.
   ' Moreover, add a character to the
beginning of the identifier
   ' so that the tree view control accepts it as
a valid string,
   ' viz. "456" doesn't work, so change it to
"W456"
   ' The general scheme is to concatenate a
Label with the Identifier
   ' e.g A Global Step Node will have the
Label, G and the Step Id
   ' concatenated to form the unique key
   ' The list of all such node types is given
below
   ' 1. "W" + Workspace_Id for Workspace
nodes
   ' 2. "P" + Parameter_Id for Parameter
nodes
   ' 3. "M" + Step_Id for Manager Step
nodes
   ' 4. "S" + Step_Id for Worker Step nodes
   ' 5. "G" + Step_Id for Global Step nodes
   ' 6. Instance_id + "I" + Step_Id for
Instance nodes
   ' 7. Workspace_id + "L" + the label
identifier = node type for all Label nodes
   ' Since the manager, worker and global
steps are stored in the
   ' same table and the step identifiers will
always be unique, we
   ' can use the same character as the prefix,
but this is a
   ' convenient way to know the type of step
being processed.
   ' The workspace id is appended to the label
identifier to make
   ' it unique, since multiple workspaces may
be open during a session
   ' Strip the prefix characters off while saving
the Ids to the db

   Dim strPrefixChar As String

   On Error GoTo MakeKeyValidErr
   gstrSource = mstrModuleName &
"MakeKeyValid"

   Select Case intTypeOfNode
      Case gintWorkspace
         strPrefixChar = mstrWorkspacePrefix
      Case gintGlobalStep
         strPrefixChar = gstrGlobalStepPrefix
      Case gintManagerStep
         strPrefixChar = gstrManagerStepPrefix
      Case gintWorkerStep
         strPrefixChar = gstrWorkerStepPrefix
      Case gintRunManager, gintRunWorker
         If InstanceId = 0 Then
            On Error GoTo 0
            Err.Raise vbObjectError +
errMandatoryParameterMissing, _
               gstrSource, _

LoadResString(errMandatoryParameterMissin
g)
         End If
         ' Concatenate the instance identifier and
the step
         ' identifier to form a unique key
         strPrefixChar =
Trim$(Str$(InstanceId)) & mstrInstancePrefix
      Case gintParameter
         strPrefixChar = mstrParameterPrefix
      Case gintNodeParamConnection
         strPrefixChar =
mstrParamConnectionPrefix
      Case gintConnectionDtl
         strPrefixChar =
mstrConnectionDtlPrefix
      Case gintNodeParamExtension
         strPrefixChar =
mstrParamExtensionPrefix
      Case gintNodeParamBuiltIn
         strPrefixChar = mstrParamBuiltInPrefix
      Case gintGlobalsLabel,
gintParameterLabel,
gintParamConnectionLabel, _
            gintConnDtlLabel, _
            gintParamExtensionLabel,
gintParamBuiltInLabel, gintGlobalStepLabel, _
            gintStepLabel
         If WorkspaceId = 0 Then
            ' The Workspace Id has to be
specified for a label node
            ' Otherwise it will not be possible to
generate unique label
            ' identifiers if multiple workspaces
are open
            On Error GoTo 0
            Err.Raise vbObjectError +
errWorkspaceIdMandatory, _
               gstrSource, _

LoadResString(errWorkspaceIdMandatory)
         End If
         ' For all labels, the workspace identifier
and the
         ' label prefix are concatenated to form
the key
         strPrefixChar = Trim$(Str$(WorkspaceId))
& mstrLabelPrefix
      Case Else
         On Error GoTo 0
         Err.Raise vbObjectError +
errInvalidNodeType, _
            gstrSource, _
            LoadResString(errInvalidNodeType)
   End Select

   MakeKeyValid = strPrefixChar &
Trim$(Str$(lngIdentifier))

   Exit Function

MakeKeyValidErr:
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errMakeKeyValidFailed, _
      gstrSource, _
      LoadResString(errMakeKeyValidFailed)

End Function

Function MakeIdentifierValid(strKey As String) As
Long

   ' Returns the Identifier corresponding to the
passed in key
   ' (Reverse of what was done in MakeKeyValid)

   On Error GoTo MakeIdentifierValidErr

   If IsLabel(strKey) Then
      ' If the key corresponds to a label node, the
identifier
      ' appears to the right of the label prefix
      MakeIdentifierValid = Val(Mid(strKey,
InStr(strKey, mstrLabelPrefix) + 1))
   ElseIf InStr(strKey, mstrInstancePrefix) = 0 Then
      ' For all other nodes, stripping the first
character off
      ' returns a valid Id
      MakeIdentifierValid = Val(Mid(strKey, 2))
   Else
      ' Instance node - strip of all characters till the
      ' instance prefix
      MakeIdentifierValid = Val(Mid(strKey,
InStr(strKey, mstrInstancePrefix) + 1))
   End If

   Exit Function

MakeIdentifierValidErr:
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errMakeIdentifierValidFailed, _
      mstrModuleName & "MakeIdentifierValid",
_

LoadResString(errMakeIdentifierValidFailed)

End Function
Public Function IsInstanceNode(strNodeKey As
String) As Boolean

   ' Returns true if the passed in node key
corresponds to a step instance
   IsInstanceNode = InStr(strNodeKey,
mstrInstancePrefix) > 0

End Function
```

```
Public Function IsBuiltInLabel(strNodeKey
As String) As Boolean

   ' Returns true if the passed in node key
corresponds to a step instance
   IsBuiltInLabel = (IsLabel(strNodeKey)
And _
      (MakeIdentifierValid(strNodeKey) =
gintParamBuiltInLabel))

End Function

Public Sub ShowBusy()
   ' Modifies the mousepointer to indicate
that the
   ' application is busy

   On Error Resume Next

   Screen.MousePointer = vbHourglass

End Sub
Public Sub ShowFree()
   ' Modifies the mousepointer to indicate
that the
   ' application has finished processing and
is ready
   ' to accept user input

   On Error Resume Next

   Screen.MousePointer = vbDefault

End Sub

Public Function InstrR(strMain As String, _
      strSearch As String) As Integer
   ' Finds the last occurrence of the passed in
string

   Dim intPos As Integer
   Dim intPrev As Integer

   On Error GoTo InstrRErr

   intPrev = intPos
   intPos = InStr(1, strMain, strSearch)

   Do While intPos > 0
      intPrev = intPos
      intPos = InStr(intPos + 1, strMain,
strSearch)
   Loop
   InstrR = intPrev

   Exit Function

InstrRErr:
   Call LogErrors(Errors)
   gstrSource = mstrModuleName &
"InstrR"
   On Error GoTo 0
   Err.Raise vbObjectError +
errInstrRFailed, _
      gstrSource, _
      LoadResString(errInstrRFailed)

End Function

Public Function GetDefaultDir(lWspId As
Long, WspParameters As cArrParameters)
As String

   Dim sDir As String
   sDir = SubstituteParameters( _
         gstrEnvVarSeparator &
PARAM_DEFAULT_DIR &
gstrEnvVarSeparator, _
         lWspId,
WspParameters:=WspParameters)
   MakePathValid (sDir & gstrFileSeparator &
"a.txt")
   GetDefaultDir = GetShortName(sDir)
   If StringEmpty(GetDefaultDir) Then
      GetDefaultDir = App.Path
   End If

End Function

Public Sub AddArrayElement(ByRef
arrNodes() As Object, _
      ByVal objToAdd As Object, _
      ByRef lngCount As Long)
   ' Adds the passed in object to the array

   On Error GoTo AddArrayElementErr

   ' Increase the array dimension and add the
object to it
   ReDim Preserve arrNodes(lngCount)
   Set arrNodes(lngCount) = objToAdd
   lngCount = lngCount + 1

   Exit Sub

AddArrayElementErr:
   LogErrors Errors
   gstrSource = mstrModuleName &
"AddArrayElement"
   On Error GoTo 0
   Err.Raise vbObjectError +
errAddArrayElementFailed, _
         gstrSource, _

LoadResString(errAddArrayElementFailed)

End Sub


Public Function CheckForNullField(rstRecords
As Recordset, strFieldName As String) As
String

   ' Returns an empty string if a given field is
null
   On Error GoTo CheckForNullFieldErr

   If IsNull(rstRecords.Fields(strFieldName))
Then
      CheckForNullField = gstrEmptyString
   Else
      CheckForNullField =
rstRecords.Fields(strFieldName)
   End If
   Exit Function

CheckForNullFieldErr:
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errCheckForNullFieldFailed, _
         mstrModuleName &
"CheckForNullField", _

LoadResString(errCheckForNullFieldFailed)

End Function

Public Function ErrorOnNullField(rstRecords As
Recordset, strFieldName As String) As Variant

   ' If a given field is null, raises an error
   ' Else, returns the field value in a variant
   ' The calling function must convert the return
value to the
   ' appropriate type
   On Error GoTo ErrorOnNullFieldErr
   gstrSource = mstrModuleName &
"ErrorOnNullField"

   If IsNull(rstRecords.Fields(strFieldName)) Then
      On Error GoTo 0
      Err.Raise vbObjectError +
errMandatoryFieldNull, _
         gstrSource, _
         strFieldName & mintDelimiter &
LoadResString(errMandatoryFieldNull)
   Else
      ErrorOnNullField =
rstRecords.Fields(strFieldName)
   End If
   Exit Function

ErrorOnNullFieldErr:
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errUnableToCheckNull, _
      gstrSource, _
      strFieldName & mintDelimiter &
LoadResString(errUnableToCheckNull)

End Function
Public Function StringEmpty(strCheckString As
String) As Boolean

   StringEmpty = (strCheckString =
gstrEmptyString)

End Function
Public Function GetIteratorValue(cStepIterators As
cRunColIt, _
      ByVal strItName As String)

   Dim lngIndex As Long
   Dim strValue As String

   On Error GoTo GetIteratorValueErr
   gstrSource = mstrModuleName &
"GetIteratorValue"

   ' Find the iterator in the Iterators collection
   For lngIndex = 0 To cStepIterators.Count - 1
      If cStepIterators(lngIndex).IteratorName =
strItName Then
         strValue = cStepIterators(lngIndex).Value
         Exit For
      End If
   Next lngIndex

   If lngIndex > cStepIterators.Count - 1 Then
      ' The iterator has not been defined for the
branch
      ' Raise an error
      On Error GoTo 0
      Err.Raise vbObjectError +
errParamNameInvalid, _
            gstrSource, _
            LoadResString(errParamNameInvalid)
   End If

   GetIteratorValue = strValue
   Exit Function
```

```
GetIteratorValueErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   gstrSource = mstrModuleName &
"GetIteratorValue"
   On Error GoTo 0
   Err.Raise vbObjectError +
errGetParamValueFailed, _
         gstrSource, _

LoadResString(errGetParamValueFailed)

End Function
Public Function SubstituteParameters(ByVal
strComString As String, _
      ByVal lngWorkspaceId As Long, _
      Optional StepIterators As cRunColIt =
Nothing, _
      Optional WspParameters As
cArrParameters = Nothing) As String
   ' This function substitutes all parameter
names and
   ' environment variables in the passed in
string with
   ' their values. It also substitutes the value
for the
   ' iterators, if any.
   ' Since the syntax is to enclose parameter
names and
   ' environment variables in "%", we check
if a given
   ' variable is a parameter - if so, we
substitute the
   ' parameter value - else we try to get the
value from
   ' the environment

   Dim intPos As Integer
   Dim intEndPos As Integer
   Dim strEnvVariable As String
   Dim strValue As String
   Dim strCommand As String
   Dim cTempStr As cStringSM

   ' Initialize the return value of the function
to the
   ' passed in command
   strCommand = strComString

   If WspParameters Is Nothing Then Set
WspParameters = gcParameters

   Set cTempStr = New cStringSM

   intPos = InStr(strCommand,
gstrEnvVarSeparator)
   Do While intPos <> 0
      If Mid(strCommand, intPos + 1, 1) =
gstrEnvVarSeparator Then
         ' Wildcard character - to be
substituted by a single % - later!
         intPos = intPos + 2
         If intPos > Len(strCommand) Then
Exit Do
      Else
         ' Extract the environment variable
from the passed
         ' in string
         intEndPos = InStr(intPos + 1,
strCommand, gstrEnvVarSeparator)

         If intEndPos > 0 Then
            strEnvVariable = Mid(strCommand,
intPos + 1, intEndPos - intPos - 1)
         Else
            On Error GoTo 0
            Err.Raise vbObjectError +
errParamSeparatorMissing, _
                  gstrSource, _

LoadResString(errParamSeparatorMissing)
         End If
         strValue = gstrEmptyString

         ' Get the value of the variable and call a
function
         ' to replace the variable with it's value
         strValue = GetValue(strEnvVariable,
lngWorkspaceId, StepIterators,
WspParameters)
         ' The function raises an error if the
variable is
         ' not found
         strCommand =
cTempStr.ReplaceSubString(strCommand, _
               gstrEnvVarSeparator &
strEnvVariable & gstrEnvVarSeparator, _
               strValue)
      End If

      intPos = InStr(intPos, strCommand,
gstrEnvVarSeparator)
   Loop

   strCommand =
cTempStr.ReplaceSubString(strCommand, _
         gstrEnvVarSeparator &
gstrEnvVarSeparator, gstrEnvVarSeparator)

   Set cTempStr = Nothing
   SubstituteParameters = strCommand

End Function
Private Function GetValue(ByVal strParameter
As String, _
      ByVal lngWorkspaceId As Long, _
      cStepIterators As cRunColIt, _
      WspParameters As cArrParameters) As
String
   ' This function returns the value for the
passed in
   ' parameter - it may be a workspace
parameter, an
   ' environment variable or an iterator

   Dim intPos As Integer
   Dim intEndPos As Integer
   Dim strVariable As String
   Dim strValue As String
   Dim cParamRec As cParameter

   On Error GoTo GetValueErr

   ' Initialize the return value of the function to
the
   ' empty
   strValue = gstrEmptyString

   intPos = InStr(strParameter,
gstrEnvVarSeparator)
   If intPos > 0 Then
      ' Extract the variable from the passed in
string
      intEndPos = InStr(intPos + 1,
strParameter, gstrEnvVarSeparator)
      If intEndPos = 0 Then
         intEndPos = Len(strParameter)
      End If

      strVariable = Mid(strParameter, intPos + 1,
intEndPos - intPos - 1)
   Else
      ' The separator charactor has not been passed
in -
      ' try to find the value of the passed in
parameter
      strVariable = strParameter
   End If

   If Not StringEmpty(strVariable) Then
      ' Check if this is the timestamp parameter first
      If strVariable = gstrTimeStamp Then
         strValue = Format$(Now, mstrFormatString,
_
               vbUseSystemDayOfWeek,
vbUseSystem)
      Else
         ' Try to find a parameter for the workspace
with
         ' the same name
         Set cParamRec =
WspParameters.GetParameterValue(lngWorkspaceI
d, _
               strVariable)
         If cParamRec Is Nothing Then
            If Not cStepIterators Is Nothing Then
               ' If the string is not a parameter, then
check
               ' if it is an iterator
               strValue =
GetIteratorValue(cStepIterators, strVariable)
            End If

            If StringEmpty(strValue) Then
               ' Neither - Check if it is an environment
variable
               strValue = Environ$(strVariable)
               If StringEmpty(strValue) Then
                  On Error GoTo 0
                  WriteError errSubValuesFailed, _
                        OptArgs:="Invalid parameter: "
& gstrSQ & strVariable & gstrSQ
                  Err.Raise vbObjectError +
errSubValuesFailed, _
                        mstrModuleName &
"GetValue", _

LoadResString(errSubValuesFailed) & "Invalid
parameter: " & gstrSQ & strVariable & gstrSQ
               End If
            End If
         Else
            strValue = cParamRec.ParameterValue
         End If
      End If
   End If

   GetValue = strValue

   Exit Function

GetValueErr:
   If Err.Number = vbObjectError +
errParamNameInvalid Then
      ' If the parameter has not been defined for the
      ' workspace then check if it is an environment
      ' variable
      Resume Next
   End If

   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
```

```
    gstrSource = mstrModuleName &
"GetValue"
    WriteError errSubValuesFailed,
gstrSource, "Parameter: " & gstrSQ &
strVariable & gstrSQ
    On Error GoTo 0
    Err.Raise vbObjectError +
errSubValuesFailed, _
            gstrSource, _
            LoadResString(errSubValuesFailed)
& "Parameter: " & gstrSQ & strVariable &
gstrSQ

End Function
Public Function SQLFixup(strField As
String) As String
    ' Returns a string that can be executed by
SQL Server

    Dim cMyStr As New cStringSM
    Dim strTemp As String

    On Error GoTo SQLFixupErr

    strTemp = strField
    SQLFixup = strTemp

    ' Single-quotes have to be replaced by two
single-quotes,
    ' since a single-quote is the identifier
delimiter
    ' character - call a procedure to do the
replace
'    SQLFixup =
cMyStr.ReplaceSubString(strTemp, gstrDQ,
"\" & gstrDQ)

    ' Replace pipe characters with the
corresponding chr function
    ' SQLFixup =
cMyStr.ReplaceSubString(strTemp, gstrDQ,
gstrDQ & gstrDQ)

    Exit Function

SQLFixupErr:
    gstrSource = mstrModuleName &
"SQLFixup"
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError +
errMakeFieldValidFailed, _
            gstrSource,
LoadResString(errMakeFieldValidFailed)

End Function
Public Function TranslateStepLabel(sLabel
As String) As String
    ' Translates the passed in step label to a
valid file name
    ' All characters in the label that are invalid
for filenames (viz. \ / : * ? " < > |)
    ' and spaces are substituted with
underscores - also ensure that the resulting
filename
    ' is not greater than 255 characters
    Dim cTempStr As New cStringSM
    TranslateStepLabel =
cTempStr.ReplaceSubString(sLabel,
gstrFileSeparator, "_")
    TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepL
abel, "/", gstrUnderscore)
    TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepLab
el, ":", gstrUnderscore)
    TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepLab
el, "*", gstrUnderscore)
    TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepLab
el, "?", gstrUnderscore)
    TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepLab
el, gstrDQ, gstrUnderscore)
    TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepLab
el, "<", gstrUnderscore)
    TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepLab
el, ">", gstrUnderscore)
    TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepLab
el, "|", gstrUnderscore)
    TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepLab
el, gstrBlank, gstrUnderscore)

    ' Commas are substituted with underscores
since the command shell uses a comma to
    ' delimit commands
    TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepLab
el, ",", gstrUnderscore)

    If Len(TranslateStepLabel) > MAX_PATH
Then
        TranslateStepLabel =
Mid(TranslateStepLabel, 1, MAX_PATH)
    End If

End Function

Public Function TypeOfObject(ByVal objNode
As Object) As Integer
    ' Determines the type of object that is passed
in

    On Error GoTo TypeOfObjectErr
    gstrSource = mstrModuleName &
"TypeOfObject"

    Select Case TypeName(objNode)
        Case "cWorkspace"
            TypeOfObject = gintWorkspace

        Case "cParameter"
            TypeOfObject = gintParameter

        Case "cConnection"
            TypeOfObject = gintParameterConnect

        Case "cConnDtl"
            TypeOfObject = gintConnectionDtl

        Case "cGlobalStep"
            TypeOfObject = gintGlobalStep

        Case "cManager"
            TypeOfObject = gintManagerStep

        Case "cWorker"
            TypeOfObject = gintWorkerStep

        Case "cStep"
            ' If a step record is passed in, call a
function
            ' to determine the type of step
            TypeOfObject =
TypeOfStep(StepClass:=objNode)

        Case Else
            WriteError errTypeOfObjectFailed,
gstrSource, _
                TypeName(objNode)
            On Error GoTo 0
            Err.Raise vbObjectError +
errTypeOfObjectFailed, _
                gstrSource, _

LoadResString(errTypeOfObjectFailed)
    End Select

    Exit Function

TypeOfObjectErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errTypeOfObjectFailed, _
            gstrSource, _
            LoadResString(errTypeOfObjectFailed)

End Function
Attribute VB_Name = "ConnDtlCommon"
'  FILE:       ConnDtlCommon.bas
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Contains functionality common
across StepMaster and
'              SMRunOnly, pertaining to connections
'              Specifically, functions to load connections
in an array
'              and so on.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name when
errors
' are raised by this module
Private Const mstrModuleName As String =
"ConnDtlCommon."

Public Sub LoadRSInConnDtlArray(rstConns As
Recordset, cConns As cConnDtls)

    Dim cNewConnDtl As cConnDtl

    On Error GoTo LoadRSInConnDtlArrayErr

    If rstConns.RecordCount = 0 Then
        Exit Sub
    End If

    rstConns.MoveFirst
    While Not rstConns.EOF

        Set cNewConnDtl = New cConnDtl

        ' Initialize ConnDtl values
        ' Call a procedure to raise an error if mandatory
fields are null.
        cNewConnDtl.ConnNameId =
ErrorOnNullField(rstConns,
FLD_ID_CONN_NAME)
```

```
        cNewConnDtl.WorkspaceId =
ErrorOnNullField(rstConns,
FLD_ID_WORKSPACE)
        cNewConnDtl.ConnName =
CStr(ErrorOnNullField(rstConns,
FLD_CONN_DTL_CONNECTION_NAM
E))
        cNewConnDtl.ConnectionString =
CheckForNullField(rstConns,
FLD_CONN_DTL_CONNECTION_STRI
NG)
        cNewConnDtl.ConnType =
CheckForNullField(rstConns,
FLD_CONN_DTL_CONNECTION_TYPE)

        cConns.Load cNewConnDtl

        Set cNewConnDtl = Nothing
        rstConns.MoveNext
    Wend

    Exit Sub

LoadRSInConnDtlArrayErr:
    LogErrors Errors
    gstrSource = mstrModuleName &
"LoadRSInConnDtlArray"
    On Error GoTo 0
    Err.Raise vbObjectError +
errLoadRsInArrayFailed, gstrSource, _

LoadResString(errLoadRsInArrayFailed)
End Sub
Attribute VB_Name =
"ConnectionCommon"
' FILE:      ConnnectionCommon.bas
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:   Contains functionality
common across StepMaster and
'            SMRunOnly, pertaining to
connection strings
'            Specifically, functions to load
connections strings
'            in an array and so on.
' Contact:   Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this module
Private Const mstrModuleName As String =
"ConnectionCommon."

Public Sub
LoadRecordsetInConnectionArray(rstConns
As Recordset, cConns As cConnections)

    Dim cNewConnection As cConnection

    On Error GoTo
LoadRecordsetInConnectionArrayErr

    If rstConns.RecordCount = 0 Then
        Exit Sub
    End If

    rstConns.MoveFirst
    While Not rstConns.EOF

        Set cNewConnection = New cConnection

        ' Initialize Connection values
        ' Call a procedure to raise an error if
mandatory fields are null.
        cNewConnection.ConnectionId =
ErrorOnNullField(rstConns, "connection_id")
        cNewConnection.WorkspaceId =
CStr(ErrorOnNullField(rstConns,
FLD_ID_WORKSPACE))
        cNewConnection.ConnectionName =
CStr(ErrorOnNullField(rstConns,
"connection_name"))
        cNewConnection.ConnectionValue =
CheckForNullField(rstConns,
"connection_value")
        cNewConnection.Description =
CheckForNullField(rstConns, "description")

        cNewConnection.NoCountDisplay =
CheckForNullField(rstConns,
"no_count_display")
        cNewConnection.NoExecute =
CheckForNullField(rstConns, "no_execute")
        cNewConnection.ParseQueryOnly =
CheckForNullField(rstConns,
"parse_query_only")
        cNewConnection.QuotedIdentifiers =
CheckForNullField(rstConns,
"ANSI_quoted_identifiers")
        cNewConnection.AnsiNulls =
CheckForNullField(rstConns, "ANSI_nulls")
        cNewConnection.ShowQueryPlan =
CheckForNullField(rstConns,
"show_query_plan")
        cNewConnection.ShowStatsTime =
CheckForNullField(rstConns,
"show_stats_time")
        cNewConnection.ShowStatsIO =
CheckForNullField(rstConns, "show_stats_io")
        cNewConnection.ParseOdbcMsg =
CheckForNullField(rstConns,
"parse_odbc_msg_prefixes")
        cNewConnection.RowCount =
CheckForNullField(rstConns, "row_count")
        cNewConnection.TsqlBatchSeparator =
CheckForNullField(rstConns,
"tsql_batch_separator")
        cNewConnection.QueryTimeOut =
CheckForNullField(rstConns,
"query_time_out")
        cNewConnection.ServerLanguage =
CheckForNullField(rstConns,
"server_language")
        cNewConnection.CharacterTranslation =
CheckForNullField(rstConns,
"character_translation")
        cNewConnection.RegionalSettings =
CheckForNullField(rstConns,
"regional_settings")

        cConns.Load cNewConnection

        Set cNewConnection = Nothing
        rstConns.MoveNext
    Wend

    Exit Sub

LoadRecordsetInConnectionArrayErr:
    LogErrors Errors
    gstrSource = mstrModuleName &
"LoadRecordsetInConnectionArray"
    On Error GoTo 0
    Err.Raise vbObjectError +
errLoadRsInArrayFailed, gstrSource, _
        LoadResString(errLoadRsInArrayFailed)
End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cParameter"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:       cParameter.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    Encapsulates the properties and
methods of a parameter.
'             Contains functions to insert, update and
delete
'             workspace_parameters records from the
database.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit
Option Base 0

' Local variable(s) to hold property value(s)
Private mlngWorkspaceId As Long
Private mlngParameterId As Long
Private mstrParameterName As String
Private mstrParameterValue As String
Private mstrDescription As String
Private mintParameterType As Integer
Private mdbsStepMaster As Database
Private mintOperation As Operation
Private mlngPosition As Long

' Used to indicate the source module name when
errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cParameter."

' The cSequence class is used to generate unique
parameter identifiers
Private mParameterSeq As cSequence

' The StringSM class is used to carry out string
operations
Private mFieldValue As cStringSM

' Parameter types
Public Enum ParameterType
    gintParameterGeneric = 0
    gintParameterConnect
    gintParameterApplication
    gintParameterBuiltIn
End Enum


Private Sub AssignParameters(qyExec As
DAO.QueryDef)
    ' Assigns values to the parameters in the querydef
object
    ' The parameter names are cryptic to make them
different
    ' from the field names. When the parameter
names are
```

```
    ' the same as the field names, parameters
in the where
    ' clause do not get created.

    Dim prmParam As DAO.Parameter

    On Error GoTo AssignParametersErr

    For Each prmParam In
qyExec.Parameters
        Select Case prmParam.Name
            Case "[w_id]"
                prmParam.Value =
mlngWorkspaceId

            Case "[p_id]"
                prmParam.Value =
mlngParameterId

            Case "[p_name]"
                prmParam.Value =
mstrParameterName

            Case "[p_value]"
                prmParam.Value =
mstrParameterValue

            Case "[desc]"
                prmParam.Value =
mstrDescription

            Case "[p_type]"
                prmParam.Value =
mintParameterType

            Case Else
                ' Write the parameter name that is
faulty
                WriteError errInvalidParameter,
mstrSource, _
                    prmParam.Name
                On Error GoTo 0
                Err.Raise errInvalidParameter,
mstrModuleName & "AssignParameters", _

LoadResString(errInvalidParameter)
        End Select
    Next prmParam

'    qyExec.Parameters("w_id").Value =
mlngWorkspaceId
'    qyExec.Parameters("p_id").Value =
mlngParameterId
'    qyExec.Parameters("p_name").Value =
mstrParameterName
'    qyExec.Parameters("p_value").Value =
mstrParameterValue
'

    Exit Sub

AssignParametersErr:

    mstrSource = mstrModuleName &
"AssignParameters"
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errAssignParametersFailed, _
        mstrSource,
LoadResString(errAssignParametersFailed)

End Sub
Public Property Let Position(ByVal RHS As
Long)

    mlngPosition = RHS

End Property

Public Property Get Position() As Long

    Position = mlngPosition

End Property

Public Function Clone() As cParameter

    ' Creates a copy of a given parameter

    Dim cCloneParam As cParameter

    On Error GoTo CloneErr
    mstrSource = mstrModuleName & "Clone"

    Set cCloneParam = New cParameter

    ' Copy all the parameter properties to the
newly
    ' created parameter
    Set cCloneParam.NodeDB =
mdbsStepMaster
    cCloneParam.WorkspaceId =
mlngWorkspaceId
    cCloneParam.ParameterId =
mlngParameterId
    cCloneParam.ParameterName =
mstrParameterName
    cCloneParam.ParameterValue =
mstrParameterValue
    cCloneParam.Description = mstrDescription
    cCloneParam.ParameterType =
mintParameterType
    cCloneParam.IndOperation = mintOperation
    cCloneParam.Position = mlngPosition

    ' And set the return value to the newly
created parameter
    Set Clone = cCloneParam
    Set cCloneParam = Nothing

    Exit Function

CloneErr:
    LogErrors Errors
    mstrSource = mstrModuleName & "Clone"
    On Error GoTo 0
    Err.Raise vbObjectError + errCloneFailed, _
        mstrSource,
LoadResString(errCloneFailed)

End Function
Public Property Set NodeDB(vdata As
Database)

    Set mdbsStepMaster = vdata

End Property
Public Property Get NodeDB() As Database

    Set NodeDB = mdbsStepMaster

End Property

Private Sub CheckDupParameterName()
    ' Check if the parameter name already exists
in the workspace
    Dim rstParameter As Recordset
    Dim strSql As String
    Dim qy As DAO.QueryDef

    On Error GoTo CheckDupParameterNameErr
    mstrSource = mstrModuleName &
"CheckDupParameterName"

    ' Create a recordset object to retrieve the count of
all parameters
    ' for the workspace with the same name
    strSql = "Select count(*) as parameter_count " &
_
        " from workspace_parameters " & _
        " where workspace_id = [w_id]" & _
        " and parameter_name = [p_name]" & _
        " and parameter_id <> [p_id]"

    Set qy =
mdbsStepMaster.CreateQueryDef(gstrEmptyString,
strSql)
    Call AssignParameters(qy)

    Set rstParameter =
qy.OpenRecordset(dbOpenForwardOnly)

    If rstParameter![parameter_count] > 0 Then
        rstParameter.Close
        qy.Close
        ShowError errDuplicateParameterName
        On Error GoTo 0
        Err.Raise vbObjectError +
errDuplicateParameterName, _
            mstrSource,
LoadResString(errDuplicateParameterName)
    End If

    rstParameter.Close
    qy.Close

    Exit Sub

CheckDupParameterNameErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"CheckDupParameterName"
    On Error GoTo 0
    Err.Raise vbObjectError +
errCheckDupParameterNameFailed, _
        mstrSource,
LoadResString(errCheckDupParameterNameFailed
)

End Sub
Private Sub CheckDB()
    ' Check if the database object has been initialized

    If mdbsStepMaster Is Nothing Then
        On Error GoTo 0
        Err.Raise vbObjectError + errInvalidDB, _
            mstrModuleName & "CheckDB",
LoadResString(errInvalidDB)
    End If

End Sub
Public Property Let ParameterValue(vdata As
String)

    mstrParameterValue = vdata

End Property
Public Property Let Description(vdata As String)

    mstrDescription = vdata
```

```
End Property
Public Property Let ParameterType(vdata
As ParameterType)

   mintParameterType = vdata

End Property

Public Property Let ParameterName(vdata
As String)

   If vdata = gstrEmptyString Then

      ShowError
errParameterNameMandatory
      On Error GoTo 0
      ' Propogate this error back to the caller
      Err.Raise vbObjectError +
errParameterNameMandatory, _
         mstrSource,
LoadResString(errParameterNameMandator
y)
   Else
      mstrParameterName = vdata
   End If

End Property

Public Property Let ParameterId(vdata As
Long)
   mlngParameterId = vdata
End Property

Public Property Let IndOperation(ByVal
vdata As Operation)

   ' The valid operations are define in the
cOperations
   ' class. Check if the operation is valid
   Select Case vdata
      Case QueryOp, InsertOp, UpdateOp,
DeleteOp
         mintOperation = vdata

      Case Else
         On Error GoTo 0
         Err.Raise vbObjectError +
errInvalidOperation, _
            mstrSource,
LoadResString(errInvalidOperation)
   End Select

End Property
Public Sub Validate()
   ' Each distinct object will have a Validate
method which
   ' will check if the class properties are
valid. This method
   ' will be used to check interdependant
properties that
   ' cannot be validated by the let
procedures.
   ' It should be called by the add and
modify methods of the class

   On Error GoTo ValidateErr

   ' Check if the db object is valid
   Call CheckDB

   ' Call procedure to raise an error if the
parameter name
   ' already exists in the workspace -
   ' if there are duplicates, we don't know
what value for the
   ' parameter to use at runtime
   Call CheckDupParameterName

   Exit Sub

ValidateErr:

   mstrSource = mstrModuleName &
"Validate"
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errValidateFailed, _
      mstrSource,
LoadResString(errValidateFailed)

End Sub
Public Property Let WorkspaceId(vdata As
Long)

   mlngWorkspaceId = vdata

End Property

Public Sub Add()

   Dim strInsert As String
   Dim qy As DAO.QueryDef

   On Error GoTo AddErr

   ' Validate the record before trying to insert
the record
   Call Validate

   ' Create a temporary querydef object
   strInsert = "insert into
workspace_parameters " & _
         "( workspace_id, parameter_id, " & _
         " parameter_name, parameter_value, "
& _
         " description, parameter_type ) " & _
         " values ( [w_id], [p_id], [p_name],
[p_value], [desc], [p_type] ) "
   Set qy =
mdbsStepMaster.CreateQueryDef(gstrEmptySt
ring, strInsert)

   ' Call a procedure to assign the parameter
values
   Call AssignParameters(qy)

   qy.Execute dbFailOnError
   qy.Close

'    strInsert = "insert into
workspace_parameters " & _
'          "( workspace_id, parameter_id, " & _
'          " parameter_name, parameter_value ) "
& _
'          " values ( " & _
'          Str(mlngWorkspaceId) & ", " &
Str(mlngParameterId) & _
'          ", " &
mFieldValue.MakeStringFieldValid(mstrPara
meterName) & _
'          ", " &
mFieldValue.MakeStringFieldValid(mstrPara
meterValue) & " ) "
'    mdbsStepMaster.Execute strInsert,
dbFailOnError + dbSQLPassThrough

   Exit Sub

AddErr:

   mstrSource = mstrModuleName & "Add"
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errParameterInsertFailed, _
      mstrSource,
LoadResString(errParameterInsertFailed)

End Sub
Public Sub Delete()

   Dim strDelete As String
   Dim qy As DAO.QueryDef

   On Error GoTo DeleteErr

   ' Check if the db object is valid
   Call CheckDB

   strDelete = "delete from workspace_parameters "
& _
         " where parameter_id = [p_id]"
   Set qy =
mdbsStepMaster.CreateQueryDef(gstrEmptyString,
strDelete)

   Call AssignParameters(qy)
   qy.Execute dbFailOnError

   qy.Close

   Exit Sub

DeleteErr:
   LogErrors Errors
   mstrSource = mstrModuleName & "Delete"
   On Error GoTo 0
   Err.Raise vbObjectError +
errDeleteParameterFailed, _
         mstrSource, _
         LoadResString(errDeleteParameterFailed)

End Sub

Public Sub Modify()

   Dim strUpdate As String
   Dim qy As QueryDef

   On Error GoTo ModifyErr

   ' Validate the updated values before trying to
modify the db
   Call Validate

   ' Create a temporary querydef object with the
modify string
   strUpdate = "update workspace_parameters " & _
         " set workspace_id = [w_id], " & _
         "parameter_name = [p_name], " & _
         "parameter_value = [p_value], " & _
         "description = [desc], " & _
         "parameter_type = [p_type] " & _
         " where parameter_id = [p_id]"
   Set qy =
mdbsStepMaster.CreateQueryDef(gstrEmptyString,
strUpdate)

   ' Call a procedure to assign the parameter values
to the
   ' querydef object
   Call AssignParameters(qy)
   qy.Execute dbFailOnError
```

```
    qy.Close

'   mdbsStepMaster.Execute strUpdate,
dbFailOnError
'
    Exit Sub

ModifyErr:

    mstrSource = mstrModuleName &
"Modify"
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errParameterUpdateFailed, _
        mstrSource,
LoadResString(errParameterUpdateFailed)

End Sub
Public Property Get ParameterName() As
String

    ParameterName = mstrParameterName

End Property

Public Property Get ParameterId() As Long

    ParameterId = mlngParameterId

End Property
Public Property Get NextIdentifier() As
Long

    Dim lngNextId As Long

    On Error GoTo NextIdentifierErr

    ' First check if the database object is valid
    Call CheckDB

    ' Retrieve the next identifier using the
sequence class
    Set mParameterSeq = New cSequence
    Set mParameterSeq.IdDatabase =
mdbsStepMaster
    mParameterSeq.IdentifierColumn =
FLD_ID_PARAMETER
    lngNextId = mParameterSeq.Identifier
    Set mParameterSeq = Nothing

    NextIdentifier = lngNextId
    Exit Property

NextIdentifierErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"NextIdentifier"
    On Error GoTo 0
    Err.Raise vbObjectError + errIdGetFailed,
_
        mstrSource,
LoadResString(errIdGetFailed)

End Property
Public Property Get IndOperation() As
Operation

    IndOperation = mintOperation

End Property

Public Property Get WorkspaceId() As Long

    WorkspaceId = mlngWorkspaceId

End Property

Public Property Get ParameterValue() As
String

    ParameterValue = mstrParameterValue

End Property
Public Property Get Description() As String

    Description = mstrDescription

End Property
Public Property Get ParameterType() As
ParameterType

    ParameterType = mintParameterType

End Property


Private Sub Class_Initialize()

    Set mFieldValue = New cStringSM

    ' Initialize the operation indicator variable to
Query
    ' It will be modified later by the collection
class when
    ' inserts, updates or deletes are performed
    mintOperation = QueryOp

End Sub

Private Sub Class_Terminate()

    Set mdbsStepMaster = Nothing
    Set mFieldValue = Nothing

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cRunColIt"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cRunColIt.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This module implements a
stack of Iterator nodes.
'              Ensures that only cRunItNode
objects are stored in the stack.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this class
Private Const mstrModuleName As String =
"cRunColIt."
Private mstrSource As String

Private mcIterators As cStack
Public Sub Clear()

    mcIterators.Clear

End Sub

Private Sub Class_Initialize()

    Set mcIterators = New cStack

End Sub

Private Sub Class_Terminate()

    Set mcIterators = Nothing

End Sub


Public Function Value(strItName As String) As
String

    Dim lngIndex As Long

    For lngIndex = 0 To mcIterators.Count - 1
        If mcIterators(lngIndex).IteratorName =
strItName Then
            Value = mcIterators(lngIndex).Value
            Exit For
        End If
    Next lngIndex

End Function

Public Property Get Item(ByVal Position As Long)
As cRunItNode
Attribute Item.VB_UserMemId = 0

    Set Item = mcIterators(Position)

End Property


Public Function Count() As Long

    Count = mcIterators.Count

End Function

Public Function Pop() As cRunItNode

    Set Pop = mcIterators.Pop

End Function

Public Sub Push(objToPush As cRunItNode)

    Call mcIterators.Push(objToPush)

End Sub


VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
  Persistable = 0  'NotPersistable
  DataBindingBehavior = 0  'vbNone
  DataSourceBehavior  = 0  'vbNone
  MTSTransactionMode  = 0  'NotAnMTSObject
END
Attribute VB_Name = "cRunInst"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cRunColIt.cls
'              Microsoft TPC-H Kit Ver. 1.00
```

```
'           Copyright Microsoft, 1999
'           All Rights Reserved
'
'
' PURPOSE:    This module controls the
run processing. It runs a branch
'           at a time and raises events when
each step completes execution.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this class
Private Const mstrModuleName As String =
"cRunInst."
Private mstrSource As String

' Local variable(s) to hold property value(s)
Private mstrRootKey As String
Public WspId As Long
Private mcParameters As cArrParameters
Private mcRunSteps As cArrSteps
Private mcRunConstraints As
cArrConstraints
Public RunConnections As cConnections
Public RunConnDtls As cConnDtls
Private mcvntWspPreCons As Variant
Private mcvntWspPostCons As Variant
Private mcNavSteps As cStepTree

Private mcInstances As cInstances
Private mcFreeSteps As cVectorLng
Private mcFailures As cFailedSteps
Private mblnAsk As Boolean   ' Set to True
when the a step with continuation
criteria=Ask fails
Private mblnAbort As Boolean ' Set to True
when the run is aborted
Private msAbortDtls As String
Private mbarrFree() As Byte
Private WithEvents mcTermSteps As
cTermSteps
Attribute mcTermSteps.VB_VarHelpID = -1
Public RunId As Long
Public CreateInputFiles As Boolean
Private Enum WspLogEvents
   mintRunStart
   mintRunComplete
   mintStepStart
   mintStepComplete
End Enum

Private mcWspLog As cFileSM
Private mstrCurBranchRoot As String
Private mcDummyRootInstance As
cInstance
' Key for the dummy root instance - Should
be a key that is invalid for an actual step
record
Private Const mstrDummyRootKey As
String = "D"
' Public events to notify the calling function
of the
' start and end time for each step
Public Event RunStart(dtmStartTime As
Currency, strWspLog As String)
Public Event RunComplete(dtmEndTime As
Currency)
Public Event StepStart(cStepRecord As
cStep, dtmStartTime As Currency, _
      lngInstanceId As Long, lParentInstanceId
As Long, sPath As String, _
      sIts As String, sItValue As String)
Public Event StepComplete(cStepRecord As
cStep, dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)
Public Event ProcessStart(cStepRecord As
cStep, strCommand As String, _
      dtmStartTime As Currency, lngInstanceId
As Long, lParentInstanceId As Long, _
      sItValue As String)
Public Event ProcessComplete(cStepRecord
As cStep, dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)
' The class that will execute each step - we trap
the events
' that are raised by it when a step
starts/completes
' execution
Private WithEvents cExecStep1 As cRunStep
Attribute cExecStep1.VB_VarHelpID = -1
Private WithEvents cExecStep2 As cRunStep
Attribute cExecStep2.VB_VarHelpID = -1
Private WithEvents cExecStep3 As cRunStep
Attribute cExecStep3.VB_VarHelpID = -1
Private WithEvents cExecStep4 As cRunStep
Attribute cExecStep4.VB_VarHelpID = -1
Private WithEvents cExecStep5 As cRunStep
Attribute cExecStep5.VB_VarHelpID = -1
Private WithEvents cExecStep6 As cRunStep
Attribute cExecStep6.VB_VarHelpID = -1
Private WithEvents cExecStep7 As cRunStep
Attribute cExecStep7.VB_VarHelpID = -1
Private WithEvents cExecStep8 As cRunStep
Attribute cExecStep8.VB_VarHelpID = -1
Private WithEvents cExecStep9 As cRunStep
Attribute cExecStep9.VB_VarHelpID = -1

Private WithEvents cExecStep10 As cRunStep
Attribute cExecStep10.VB_VarHelpID = -1
Private WithEvents cExecStep11 As cRunStep
Attribute cExecStep11.VB_VarHelpID = -1
Private WithEvents cExecStep12 As cRunStep
Attribute cExecStep12.VB_VarHelpID = -1
Private WithEvents cExecStep13 As cRunStep
Attribute cExecStep13.VB_VarHelpID = -1
Private WithEvents cExecStep14 As cRunStep
Attribute cExecStep14.VB_VarHelpID = -1
Private WithEvents cExecStep15 As cRunStep
Attribute cExecStep15.VB_VarHelpID = -1
Private WithEvents cExecStep16 As cRunStep
Attribute cExecStep16.VB_VarHelpID = -1
Private WithEvents cExecStep17 As cRunStep
Attribute cExecStep17.VB_VarHelpID = -1
Private WithEvents cExecStep18 As cRunStep
Attribute cExecStep18.VB_VarHelpID = -1
Private WithEvents cExecStep19 As cRunStep
Attribute cExecStep19.VB_VarHelpID = -1

Private WithEvents cExecStep20 As cRunStep
Attribute cExecStep20.VB_VarHelpID = -1
Private WithEvents cExecStep21 As cRunStep
Attribute cExecStep21.VB_VarHelpID = -1
Private WithEvents cExecStep22 As cRunStep
Attribute cExecStep22.VB_VarHelpID = -1
Private WithEvents cExecStep23 As cRunStep
Attribute cExecStep23.VB_VarHelpID = -1
Private WithEvents cExecStep24 As cRunStep
Attribute cExecStep24.VB_VarHelpID = -1
Private WithEvents cExecStep25 As cRunStep
Attribute cExecStep25.VB_VarHelpID = -1
Private WithEvents cExecStep26 As cRunStep
Attribute cExecStep26.VB_VarHelpID = -1
Private WithEvents cExecStep27 As cRunStep
Attribute cExecStep27.VB_VarHelpID = -1
Private WithEvents cExecStep28 As cRunStep
Attribute cExecStep28.VB_VarHelpID = -1
Private WithEvents cExecStep29 As cRunStep
Attribute cExecStep29.VB_VarHelpID = -1

Private WithEvents cExecStep30 As cRunStep
Attribute cExecStep30.VB_VarHelpID = -1
Private WithEvents cExecStep31 As cRunStep
Attribute cExecStep31.VB_VarHelpID = -1
Private WithEvents cExecStep32 As cRunStep
Attribute cExecStep32.VB_VarHelpID = -1
Private WithEvents cExecStep33 As cRunStep
Attribute cExecStep33.VB_VarHelpID = -1
Private WithEvents cExecStep34 As cRunStep
Attribute cExecStep34.VB_VarHelpID = -1
Private WithEvents cExecStep35 As cRunStep
Attribute cExecStep35.VB_VarHelpID = -1
Private WithEvents cExecStep36 As cRunStep
Attribute cExecStep36.VB_VarHelpID = -1
Private WithEvents cExecStep37 As cRunStep
Attribute cExecStep37.VB_VarHelpID = -1
Private WithEvents cExecStep38 As cRunStep
Attribute cExecStep38.VB_VarHelpID = -1
Private WithEvents cExecStep39 As cRunStep
Attribute cExecStep39.VB_VarHelpID = -1

Private WithEvents cExecStep40 As cRunStep
Attribute cExecStep40.VB_VarHelpID = -1
Private WithEvents cExecStep41 As cRunStep
Attribute cExecStep41.VB_VarHelpID = -1
Private WithEvents cExecStep42 As cRunStep
Attribute cExecStep42.VB_VarHelpID = -1
Private WithEvents cExecStep43 As cRunStep
Attribute cExecStep43.VB_VarHelpID = -1
Private WithEvents cExecStep44 As cRunStep
Attribute cExecStep44.VB_VarHelpID = -1
Private WithEvents cExecStep45 As cRunStep
Attribute cExecStep45.VB_VarHelpID = -1
Private WithEvents cExecStep46 As cRunStep
Attribute cExecStep46.VB_VarHelpID = -1
Private WithEvents cExecStep47 As cRunStep
Attribute cExecStep47.VB_VarHelpID = -1
Private WithEvents cExecStep48 As cRunStep
Attribute cExecStep48.VB_VarHelpID = -1
Private WithEvents cExecStep49 As cRunStep
Attribute cExecStep49.VB_VarHelpID = -1

Private WithEvents cExecStep50 As cRunStep
Attribute cExecStep50.VB_VarHelpID = -1
Private WithEvents cExecStep51 As cRunStep
Attribute cExecStep51.VB_VarHelpID = -1
Private WithEvents cExecStep52 As cRunStep
Attribute cExecStep52.VB_VarHelpID = -1
Private WithEvents cExecStep53 As cRunStep
Attribute cExecStep53.VB_VarHelpID = -1
Private WithEvents cExecStep54 As cRunStep
Attribute cExecStep54.VB_VarHelpID = -1
Private WithEvents cExecStep55 As cRunStep
Attribute cExecStep55.VB_VarHelpID = -1
Private WithEvents cExecStep56 As cRunStep
Attribute cExecStep56.VB_VarHelpID = -1
Private WithEvents cExecStep57 As cRunStep
Attribute cExecStep57.VB_VarHelpID = -1
Private WithEvents cExecStep58 As cRunStep
Attribute cExecStep58.VB_VarHelpID = -1
Private WithEvents cExecStep59 As cRunStep
Attribute cExecStep59.VB_VarHelpID = -1

Private WithEvents cExecStep60 As cRunStep
Attribute cExecStep60.VB_VarHelpID = -1
Private WithEvents cExecStep61 As cRunStep
Attribute cExecStep61.VB_VarHelpID = -1
Private WithEvents cExecStep62 As cRunStep
Attribute cExecStep62.VB_VarHelpID = -1
Private WithEvents cExecStep63 As cRunStep
```

```
Attribute cExecStep63.VB_VarHelpID = -1
Private WithEvents cExecStep64 As
cRunStep
Attribute cExecStep64.VB_VarHelpID = -1
Private WithEvents cExecStep65 As
cRunStep
Attribute cExecStep65.VB_VarHelpID = -1
Private WithEvents cExecStep66 As
cRunStep
Attribute cExecStep66.VB_VarHelpID = -1
Private WithEvents cExecStep67 As
cRunStep
Attribute cExecStep67.VB_VarHelpID = -1
Private WithEvents cExecStep68 As
cRunStep
Attribute cExecStep68.VB_VarHelpID = -1
Private WithEvents cExecStep69 As
cRunStep
Attribute cExecStep69.VB_VarHelpID = -1

Private WithEvents cExecStep70 As
cRunStep
Attribute cExecStep70.VB_VarHelpID = -1
Private WithEvents cExecStep71 As
cRunStep
Attribute cExecStep71.VB_VarHelpID = -1
Private WithEvents cExecStep72 As
cRunStep
Attribute cExecStep72.VB_VarHelpID = -1
Private WithEvents cExecStep73 As
cRunStep
Attribute cExecStep73.VB_VarHelpID = -1
Private WithEvents cExecStep74 As
cRunStep
Attribute cExecStep74.VB_VarHelpID = -1
Private WithEvents cExecStep75 As
cRunStep
Attribute cExecStep75.VB_VarHelpID = -1
Private WithEvents cExecStep76 As
cRunStep
Attribute cExecStep76.VB_VarHelpID = -1
Private WithEvents cExecStep77 As
cRunStep
Attribute cExecStep77.VB_VarHelpID = -1
Private WithEvents cExecStep78 As
cRunStep
Attribute cExecStep78.VB_VarHelpID = -1
Private WithEvents cExecStep79 As
cRunStep
Attribute cExecStep79.VB_VarHelpID = -1

Private WithEvents cExecStep80 As
cRunStep
Attribute cExecStep80.VB_VarHelpID = -1
Private WithEvents cExecStep81 As
cRunStep
Attribute cExecStep81.VB_VarHelpID = -1
Private WithEvents cExecStep82 As
cRunStep
Attribute cExecStep82.VB_VarHelpID = -1
Private WithEvents cExecStep83 As
cRunStep
Attribute cExecStep83.VB_VarHelpID = -1
Private WithEvents cExecStep84 As
cRunStep
Attribute cExecStep84.VB_VarHelpID = -1
Private WithEvents cExecStep85 As
cRunStep
Attribute cExecStep85.VB_VarHelpID = -1
Private WithEvents cExecStep86 As
cRunStep
Attribute cExecStep86.VB_VarHelpID = -1
Private WithEvents cExecStep87 As
cRunStep
Attribute cExecStep87.VB_VarHelpID = -1
Private WithEvents cExecStep88 As cRunStep
Attribute cExecStep88.VB_VarHelpID = -1
Private WithEvents cExecStep89 As cRunStep
Attribute cExecStep89.VB_VarHelpID = -1

Private WithEvents cExecStep90 As cRunStep
Attribute cExecStep90.VB_VarHelpID = -1
Private WithEvents cExecStep91 As cRunStep
Attribute cExecStep91.VB_VarHelpID = -1
Private WithEvents cExecStep92 As cRunStep
Attribute cExecStep92.VB_VarHelpID = -1
Private WithEvents cExecStep93 As cRunStep
Attribute cExecStep93.VB_VarHelpID = -1
Private WithEvents cExecStep94 As cRunStep
Attribute cExecStep94.VB_VarHelpID = -1
Private WithEvents cExecStep95 As cRunStep
Attribute cExecStep95.VB_VarHelpID = -1
Private WithEvents cExecStep96 As cRunStep
Attribute cExecStep96.VB_VarHelpID = -1
Private WithEvents cExecStep97 As cRunStep
Attribute cExecStep97.VB_VarHelpID = -1
Private WithEvents cExecStep98 As cRunStep
Attribute cExecStep98.VB_VarHelpID = -1
Private WithEvents cExecStep99 As cRunStep
Attribute cExecStep99.VB_VarHelpID = -1

Private Const msIt As String = " Iterator: "
Private Const msItValue As String = " Value: "
Public Sub Abort()

  On Error GoTo AbortErr

  ' Make sure that we don't execute any more
steps
  Call StopRun

  If cExecStep1 Is Nothing And cExecStep2 Is
Nothing And cExecStep3 Is Nothing And
cExecStep4 Is Nothing And cExecStep5 Is
Nothing And cExecStep6 Is Nothing And
cExecStep7 Is Nothing And cExecStep8 Is
Nothing And cExecStep9 Is Nothing And _
    cExecStep10 Is Nothing And cExecStep11
Is Nothing And cExecStep12 Is Nothing And
cExecStep13 Is Nothing And cExecStep14 Is
Nothing And cExecStep15 Is Nothing And
cExecStep16 Is Nothing And cExecStep17 Is
Nothing And cExecStep18 Is Nothing And
cExecStep19 Is Nothing And _
    cExecStep20 Is Nothing And cExecStep21
Is Nothing And cExecStep22 Is Nothing And
cExecStep23 Is Nothing And cExecStep24 Is
Nothing And cExecStep25 Is Nothing And
cExecStep26 Is Nothing And cExecStep27 Is
Nothing And cExecStep28 Is Nothing And
cExecStep29 Is Nothing And _
    cExecStep30 Is Nothing And cExecStep31
Is Nothing And cExecStep32 Is Nothing And
cExecStep33 Is Nothing And cExecStep34 Is
Nothing And cExecStep35 Is Nothing And
cExecStep36 Is Nothing And cExecStep37 Is
Nothing And cExecStep38 Is Nothing And
cExecStep39 Is Nothing And _
    cExecStep40 Is Nothing And cExecStep41
Is Nothing And cExecStep42 Is Nothing And
cExecStep43 Is Nothing And cExecStep44 Is
Nothing And cExecStep45 Is Nothing And
cExecStep46 Is Nothing And cExecStep47 Is
Nothing And cExecStep48 Is Nothing And
cExecStep49 Is Nothing And _
    cExecStep50 Is Nothing And cExecStep51
Is Nothing And cExecStep52 Is Nothing And
cExecStep53 Is Nothing And cExecStep54 Is
Nothing And cExecStep55 Is Nothing And
cExecStep56 Is Nothing And cExecStep57 Is
Nothing And cExecStep58 Is Nothing And
cExecStep59 Is Nothing And _
    cExecStep60 Is Nothing And cExecStep61 Is
Nothing And cExecStep62 Is Nothing And
cExecStep63 Is Nothing And cExecStep64 Is
Nothing And cExecStep65 Is Nothing And
cExecStep66 Is Nothing And cExecStep67 Is
Nothing And cExecStep68 Is Nothing And
cExecStep69 Is Nothing And _
    cExecStep70 Is Nothing And cExecStep71 Is
Nothing And cExecStep72 Is Nothing And
cExecStep73 Is Nothing And cExecStep74 Is
Nothing And cExecStep75 Is Nothing And
cExecStep76 Is Nothing And cExecStep77 Is
Nothing And cExecStep78 Is Nothing And
cExecStep79 Is Nothing And _
    cExecStep80 Is Nothing And cExecStep81 Is
Nothing And cExecStep82 Is Nothing And
cExecStep83 Is Nothing And cExecStep84 Is
Nothing And cExecStep85 Is Nothing And
cExecStep86 Is Nothing And cExecStep87 Is
Nothing And cExecStep88 Is Nothing And
cExecStep89 Is Nothing And _
    cExecStep90 Is Nothing And cExecStep91 Is
Nothing And cExecStep92 Is Nothing And
cExecStep93 Is Nothing And cExecStep94 Is
Nothing And cExecStep95 Is Nothing And
cExecStep96 Is Nothing And cExecStep97 Is
Nothing And cExecStep98 Is Nothing And
cExecStep99 Is Nothing Then
    ' Then...
    WriteToWspLog (mintRunComplete)
    RaiseEvent
RunComplete(Determine64BitTime())
  Else
    ' Abort each of the steps that is currently
executing.
    If Not cExecStep1 Is Nothing Then
      cExecStep1.Abort
    End If
    If Not cExecStep2 Is Nothing Then
      cExecStep2.Abort
    End If
    If Not cExecStep3 Is Nothing Then
      cExecStep3.Abort
    End If
    If Not cExecStep4 Is Nothing Then
      cExecStep4.Abort
    End If
    If Not cExecStep5 Is Nothing Then
      cExecStep5.Abort
    End If
    If Not cExecStep6 Is Nothing Then
      cExecStep6.Abort
    End If
    If Not cExecStep7 Is Nothing Then
      cExecStep7.Abort
    End If
    If Not cExecStep8 Is Nothing Then
      cExecStep8.Abort
    End If
    If Not cExecStep9 Is Nothing Then
      cExecStep9.Abort
    End If
    If Not cExecStep10 Is Nothing Then
      cExecStep10.Abort
    End If
    If Not cExecStep11 Is Nothing Then
      cExecStep11.Abort
    End If
    If Not cExecStep12 Is Nothing Then
      cExecStep12.Abort
    End If
    If Not cExecStep13 Is Nothing Then
      cExecStep13.Abort
```

```
    End If

    If Not cExecStep14 Is Nothing Then
      cExecStep14.Abort
    End If

    If Not cExecStep15 Is Nothing Then
      cExecStep15.Abort
    End If

    If Not cExecStep16 Is Nothing Then
      cExecStep16.Abort
    End If

    If Not cExecStep17 Is Nothing Then
      cExecStep17.Abort
    End If

    If Not cExecStep18 Is Nothing Then
      cExecStep18.Abort
    End If

    If Not cExecStep19 Is Nothing Then
      cExecStep19.Abort
    End If

    If Not cExecStep20 Is Nothing Then
      cExecStep20.Abort
    End If

    If Not cExecStep21 Is Nothing Then
      cExecStep21.Abort
    End If

    If Not cExecStep22 Is Nothing Then
      cExecStep22.Abort
    End If

    If Not cExecStep23 Is Nothing Then
      cExecStep23.Abort
    End If

    If Not cExecStep24 Is Nothing Then
      cExecStep24.Abort
    End If

    If Not cExecStep25 Is Nothing Then
      cExecStep25.Abort
    End If

    If Not cExecStep26 Is Nothing Then
      cExecStep26.Abort
    End If

    If Not cExecStep27 Is Nothing Then
      cExecStep27.Abort
    End If

    If Not cExecStep28 Is Nothing Then
      cExecStep28.Abort
    End If

    If Not cExecStep29 Is Nothing Then
      cExecStep29.Abort
    End If

    ' ============== 30 - 39
==============
    If Not cExecStep30 Is Nothing Then
      cExecStep30.Abort
    End If

    If Not cExecStep31 Is Nothing Then
      cExecStep31.Abort
    End If

    If Not cExecStep32 Is Nothing Then
      cExecStep32.Abort
    End If

    If Not cExecStep33 Is Nothing Then
      cExecStep33.Abort
    End If

    If Not cExecStep34 Is Nothing Then
      cExecStep34.Abort
    End If

    If Not cExecStep35 Is Nothing Then
      cExecStep35.Abort
    End If

    If Not cExecStep36 Is Nothing Then
      cExecStep36.Abort
    End If

    If Not cExecStep37 Is Nothing Then
      cExecStep37.Abort
    End If

    If Not cExecStep38 Is Nothing Then
      cExecStep38.Abort
    End If

    If Not cExecStep39 Is Nothing Then
      cExecStep39.Abort
    End If

    ' ============== 40 - 49
==============
    If Not cExecStep40 Is Nothing Then
      cExecStep40.Abort
    End If

    If Not cExecStep41 Is Nothing Then
      cExecStep41.Abort
    End If

    If Not cExecStep42 Is Nothing Then
      cExecStep42.Abort
    End If

    If Not cExecStep43 Is Nothing Then
      cExecStep43.Abort
    End If

    If Not cExecStep44 Is Nothing Then
      cExecStep44.Abort
    End If

    If Not cExecStep45 Is Nothing Then
      cExecStep45.Abort
    End If

    If Not cExecStep46 Is Nothing Then
      cExecStep46.Abort
    End If

    If Not cExecStep47 Is Nothing Then
      cExecStep47.Abort
    End If

    If Not cExecStep48 Is Nothing Then
      cExecStep48.Abort
    End If

    If Not cExecStep49 Is Nothing Then
      cExecStep49.Abort
    End If

    ' ============== 50 - 59
==============
    If Not cExecStep50 Is Nothing Then
      cExecStep50.Abort
    End If

    If Not cExecStep51 Is Nothing Then
      cExecStep51.Abort
    End If

    If Not cExecStep52 Is Nothing Then
      cExecStep52.Abort
    End If

    If Not cExecStep53 Is Nothing Then
      cExecStep53.Abort
    End If

    If Not cExecStep54 Is Nothing Then
      cExecStep54.Abort
    End If

    If Not cExecStep55 Is Nothing Then
      cExecStep55.Abort
    End If

    If Not cExecStep56 Is Nothing Then
      cExecStep56.Abort
    End If

    If Not cExecStep57 Is Nothing Then
      cExecStep57.Abort
    End If

    If Not cExecStep58 Is Nothing Then
      cExecStep58.Abort
    End If

    If Not cExecStep59 Is Nothing Then
      cExecStep59.Abort
    End If

    ' ============== 60 - 69
==============
    If Not cExecStep60 Is Nothing Then
      cExecStep60.Abort
    End If

    If Not cExecStep61 Is Nothing Then
      cExecStep61.Abort
    End If

    If Not cExecStep62 Is Nothing Then
      cExecStep62.Abort
    End If

    If Not cExecStep63 Is Nothing Then
      cExecStep63.Abort
    End If

    If Not cExecStep64 Is Nothing Then
      cExecStep64.Abort
    End If

    If Not cExecStep65 Is Nothing Then
      cExecStep65.Abort
    End If

    If Not cExecStep66 Is Nothing Then
      cExecStep66.Abort
    End If

    If Not cExecStep67 Is Nothing Then
      cExecStep67.Abort
    End If
```

```
    If Not cExecStep68 Is Nothing Then
      cExecStep68.Abort
    End If

    If Not cExecStep69 Is Nothing Then
      cExecStep69.Abort
    End If

    ' ============== 70 - 79
==============
    If Not cExecStep70 Is Nothing Then
      cExecStep70.Abort
    End If

    If Not cExecStep71 Is Nothing Then
      cExecStep71.Abort
    End If

    If Not cExecStep72 Is Nothing Then
      cExecStep72.Abort
    End If

    If Not cExecStep73 Is Nothing Then
      cExecStep73.Abort
    End If

    If Not cExecStep74 Is Nothing Then
      cExecStep74.Abort
    End If

    If Not cExecStep75 Is Nothing Then
      cExecStep75.Abort
    End If

    If Not cExecStep76 Is Nothing Then
      cExecStep76.Abort
    End If

    If Not cExecStep77 Is Nothing Then
      cExecStep77.Abort
    End If

    If Not cExecStep78 Is Nothing Then
      cExecStep78.Abort
    End If

    If Not cExecStep79 Is Nothing Then
      cExecStep79.Abort
    End If

    ' ============== 80 - 89
==============
    If Not cExecStep80 Is Nothing Then
      cExecStep80.Abort
    End If

    If Not cExecStep81 Is Nothing Then
      cExecStep81.Abort
    End If

    If Not cExecStep82 Is Nothing Then
      cExecStep82.Abort
    End If

    If Not cExecStep83 Is Nothing Then
      cExecStep83.Abort
    End If

    If Not cExecStep84 Is Nothing Then
      cExecStep84.Abort
    End If

    If Not cExecStep85 Is Nothing Then
      cExecStep85.Abort
    End If

    If Not cExecStep86 Is Nothing Then
      cExecStep86.Abort
    End If

    If Not cExecStep87 Is Nothing Then
      cExecStep87.Abort
    End If

    If Not cExecStep88 Is Nothing Then
      cExecStep88.Abort
    End If

    If Not cExecStep89 Is Nothing Then
      cExecStep89.Abort
    End If

    ' ============== 90 - 99
==============
    If Not cExecStep90 Is Nothing Then
      cExecStep90.Abort
    End If

    If Not cExecStep91 Is Nothing Then
      cExecStep91.Abort
    End If

    If Not cExecStep92 Is Nothing Then
      cExecStep92.Abort
    End If

    If Not cExecStep93 Is Nothing Then
      cExecStep93.Abort
    End If

    If Not cExecStep94 Is Nothing Then
      cExecStep94.Abort
    End If

    If Not cExecStep95 Is Nothing Then
      cExecStep95.Abort
    End If

    If Not cExecStep96 Is Nothing Then
      cExecStep96.Abort
    End If

    If Not cExecStep97 Is Nothing Then
      cExecStep97.Abort
    End If

    If Not cExecStep98 Is Nothing Then
      cExecStep98.Abort
    End If

    If Not cExecStep99 Is Nothing Then
      cExecStep99.Abort
    End If

  End If

  Exit Sub

AbortErr:
  Call LogErrors(Errors)
  On Error GoTo 0
  ShowError errAbortFailed
  ' Try to abort the remaining steps, if any
  Resume Next

End Sub
Public Sub AbortSiblings(cTermInstance As
cInstance)

  On Error GoTo AbortSiblingsErr

  ' Abort each of the steps that is currently
executing.
  If Not cExecStep1 Is Nothing Then
    If cExecStep1.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
      cExecStep1.Abort
    End If
  End If

  If Not cExecStep2 Is Nothing Then
    If cExecStep2.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
      cExecStep2.Abort
    End If
  End If

  If Not cExecStep3 Is Nothing Then
    If cExecStep3.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
      cExecStep3.Abort
    End If
  End If

  If Not cExecStep4 Is Nothing Then
    If cExecStep4.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
      cExecStep4.Abort
    End If
  End If

  If Not cExecStep5 Is Nothing Then
    If cExecStep5.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
      cExecStep5.Abort
    End If
  End If

  If Not cExecStep6 Is Nothing Then
    If cExecStep6.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
      cExecStep6.Abort
    End If
  End If

  If Not cExecStep7 Is Nothing Then
    If cExecStep7.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
      cExecStep7.Abort
    End If
  End If

  If Not cExecStep8 Is Nothing Then
    If cExecStep8.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
      cExecStep8.Abort
    End If
  End If

  If Not cExecStep9 Is Nothing Then
    If cExecStep9.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
      cExecStep9.Abort
    End If
  End If

  If Not cExecStep10 Is Nothing Then
    If cExecStep10.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
      cExecStep10.Abort
    End If
  End If

  If Not cExecStep11 Is Nothing Then
```

```
      If
cExecStep11.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep11.Abort
      End If
   End If

   If Not cExecStep12 Is Nothing Then
      If
cExecStep12.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep12.Abort
      End If
   End If

   If Not cExecStep13 Is Nothing Then
      If
cExecStep13.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep13.Abort
      End If
   End If

   If Not cExecStep14 Is Nothing Then
      If
cExecStep14.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep14.Abort
      End If
   End If

   If Not cExecStep15 Is Nothing Then
      If
cExecStep15.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep15.Abort
      End If
   End If

   If Not cExecStep16 Is Nothing Then
      If
cExecStep16.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep16.Abort
      End If
   End If

   If Not cExecStep17 Is Nothing Then
      If
cExecStep17.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep17.Abort
      End If
   End If

   If Not cExecStep18 Is Nothing Then
      If
cExecStep18.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep18.Abort
      End If
   End If

   If Not cExecStep19 Is Nothing Then
      If
cExecStep19.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep19.Abort
      End If
   End If

   If Not cExecStep20 Is Nothing Then
      If
cExecStep20.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep20.Abort
      End If
   End If

   If Not cExecStep21 Is Nothing Then
      If cExecStep21.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep21.Abort
      End If
   End If

   If Not cExecStep22 Is Nothing Then
      If cExecStep22.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep22.Abort
      End If
   End If

   If Not cExecStep23 Is Nothing Then
      If cExecStep23.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep23.Abort
      End If
   End If

   If Not cExecStep24 Is Nothing Then
      If cExecStep24.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep24.Abort
      End If
   End If

   If Not cExecStep25 Is Nothing Then
      If cExecStep25.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep25.Abort
      End If
   End If

   If Not cExecStep26 Is Nothing Then
      If cExecStep26.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep26.Abort
      End If
   End If

   If Not cExecStep27 Is Nothing Then
      If cExecStep27.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep27.Abort
      End If
   End If

   If Not cExecStep28 Is Nothing Then
      If cExecStep28.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep28.Abort
      End If
   End If

   If Not cExecStep29 Is Nothing Then
      If cExecStep29.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep29.Abort
      End If
   End If

   ' ============ 30
=================
   If Not cExecStep30 Is Nothing Then
      If cExecStep30.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep30.Abort
      End If
   End If

   If Not cExecStep31 Is Nothing Then
      If cExecStep31.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep31.Abort
      End If
   End If

   If Not cExecStep32 Is Nothing Then
      If cExecStep32.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep32.Abort
      End If
   End If

   If Not cExecStep33 Is Nothing Then
      If cExecStep33.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep33.Abort
      End If
   End If

   If Not cExecStep34 Is Nothing Then
      If cExecStep34.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep34.Abort
      End If
   End If

   If Not cExecStep35 Is Nothing Then
      If cExecStep35.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep35.Abort
      End If
   End If

   If Not cExecStep36 Is Nothing Then
      If cExecStep36.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep36.Abort
      End If
   End If

   If Not cExecStep37 Is Nothing Then
      If cExecStep37.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep37.Abort
      End If
   End If

   If Not cExecStep38 Is Nothing Then
      If cExecStep38.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep38.Abort
      End If
   End If

   If Not cExecStep39 Is Nothing Then
      If cExecStep39.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep39.Abort
      End If
   End If

   ' ============ 40 =================
   If Not cExecStep40 Is Nothing Then
      If cExecStep40.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep40.Abort
      End If
   End If

   If Not cExecStep41 Is Nothing Then
      If cExecStep41.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
```

```
            cExecStep41.Abort
        End If
    End If

    If Not cExecStep42 Is Nothing Then
        If
cExecStep42.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep42.Abort
        End If
    End If

    If Not cExecStep43 Is Nothing Then
        If
cExecStep43.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep43.Abort
        End If
    End If

    If Not cExecStep44 Is Nothing Then
        If
cExecStep44.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep44.Abort
        End If
    End If

    If Not cExecStep45 Is Nothing Then
        If
cExecStep45.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep45.Abort
        End If
    End If

    If Not cExecStep46 Is Nothing Then
        If
cExecStep46.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep46.Abort
        End If
    End If

    If Not cExecStep47 Is Nothing Then
        If
cExecStep47.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep47.Abort
        End If
    End If

    If Not cExecStep48 Is Nothing Then
        If
cExecStep48.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep48.Abort
        End If
    End If

    If Not cExecStep49 Is Nothing Then
        If
cExecStep49.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep49.Abort
        End If
    End If

    ' ============ 50
==================
    If Not cExecStep50 Is Nothing Then
        If
cExecStep50.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep50.Abort
        End If
    End If

    If Not cExecStep51 Is Nothing Then
        If cExecStep51.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep51.Abort
        End If
    End If

    If Not cExecStep52 Is Nothing Then
        If cExecStep52.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep52.Abort
        End If
    End If

    If Not cExecStep53 Is Nothing Then
        If cExecStep53.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep53.Abort
        End If
    End If

    If Not cExecStep54 Is Nothing Then
        If cExecStep54.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep54.Abort
        End If
    End If

    If Not cExecStep55 Is Nothing Then
        If cExecStep55.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep55.Abort
        End If
    End If

    If Not cExecStep56 Is Nothing Then
        If cExecStep56.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep56.Abort
        End If
    End If

    If Not cExecStep57 Is Nothing Then
        If cExecStep57.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep57.Abort
        End If
    End If

    If Not cExecStep58 Is Nothing Then
        If cExecStep58.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep58.Abort
        End If
    End If

    If Not cExecStep59 Is Nothing Then
        If cExecStep59.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep59.Abort
        End If
    End If

    ' ============ 60
==================
    If Not cExecStep60 Is Nothing Then
        If cExecStep60.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep60.Abort
        End If
    End If

    If Not cExecStep61 Is Nothing Then
        If cExecStep61.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep61.Abort
        End If
    End If

    If Not cExecStep62 Is Nothing Then
        If cExecStep62.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep62.Abort
        End If
    End If

    If Not cExecStep63 Is Nothing Then
        If cExecStep63.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep63.Abort
        End If
    End If

    If Not cExecStep64 Is Nothing Then
        If cExecStep64.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep64.Abort
        End If
    End If

    If Not cExecStep65 Is Nothing Then
        If cExecStep65.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep65.Abort
        End If
    End If

    If Not cExecStep66 Is Nothing Then
        If cExecStep66.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep66.Abort
        End If
    End If

    If Not cExecStep67 Is Nothing Then
        If cExecStep67.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep67.Abort
        End If
    End If

    If Not cExecStep68 Is Nothing Then
        If cExecStep68.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep68.Abort
        End If
    End If

    If Not cExecStep69 Is Nothing Then
        If cExecStep69.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep69.Abort
        End If
    End If

    ' ============ 70 ==================
    If Not cExecStep70 Is Nothing Then
        If cExecStep70.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep70.Abort
        End If
    End If

    If Not cExecStep71 Is Nothing Then
        If cExecStep71.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep71.Abort
```

```
      End If
   End If

   If Not cExecStep72 Is Nothing Then
      If
cExecStep72.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep72.Abort
      End If
   End If

   If Not cExecStep73 Is Nothing Then
      If
cExecStep73.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep73.Abort
      End If
   End If

   If Not cExecStep74 Is Nothing Then
      If
cExecStep74.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep74.Abort
      End If
   End If

   If Not cExecStep75 Is Nothing Then
      If
cExecStep75.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep75.Abort
      End If
   End If

   If Not cExecStep76 Is Nothing Then
      If
cExecStep76.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep76.Abort
      End If
   End If

   If Not cExecStep77 Is Nothing Then
      If
cExecStep77.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep77.Abort
      End If
   End If

   If Not cExecStep78 Is Nothing Then
      If
cExecStep78.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep78.Abort
      End If
   End If

   If Not cExecStep79 Is Nothing Then
      If
cExecStep79.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep79.Abort
      End If
   End If

   ' ============ 80
=================
   If Not cExecStep80 Is Nothing Then
      If
cExecStep80.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep80.Abort
      End If
   End If

   If Not cExecStep81 Is Nothing Then
      If cExecStep81.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep81.Abort
      End If
   End If

   If Not cExecStep82 Is Nothing Then
      If cExecStep82.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep82.Abort
      End If
   End If

   If Not cExecStep83 Is Nothing Then
      If cExecStep83.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep83.Abort
      End If
   End If

   If Not cExecStep84 Is Nothing Then
      If cExecStep84.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep84.Abort
      End If
   End If

   If Not cExecStep85 Is Nothing Then
      If cExecStep85.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep85.Abort
      End If
   End If

   If Not cExecStep86 Is Nothing Then
      If cExecStep86.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep86.Abort
      End If
   End If

   If Not cExecStep87 Is Nothing Then
      If cExecStep87.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep87.Abort
      End If
   End If

   If Not cExecStep88 Is Nothing Then
      If cExecStep88.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep88.Abort
      End If
   End If

   If Not cExecStep89 Is Nothing Then
      If cExecStep89.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep89.Abort
      End If
   End If

   ' ============ 90
=================
   If Not cExecStep90 Is Nothing Then
      If cExecStep90.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep90.Abort
      End If
   End If

   If Not cExecStep91 Is Nothing Then
      If cExecStep91.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep91.Abort
      End If
   End If

   If Not cExecStep92 Is Nothing Then
      If cExecStep92.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep92.Abort
      End If
   End If

   If Not cExecStep93 Is Nothing Then
      If cExecStep93.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep93.Abort
      End If
   End If

   If Not cExecStep94 Is Nothing Then
      If cExecStep94.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep94.Abort
      End If
   End If

   If Not cExecStep95 Is Nothing Then
      If cExecStep95.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep95.Abort
      End If
   End If

   If Not cExecStep96 Is Nothing Then
      If cExecStep96.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep96.Abort
      End If
   End If

   If Not cExecStep97 Is Nothing Then
      If cExecStep97.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep97.Abort
      End If
   End If

   If Not cExecStep98 Is Nothing Then
      If cExecStep98.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep98.Abort
      End If
   End If

   If Not cExecStep99 Is Nothing Then
      If cExecStep99.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep99.Abort
      End If
   End If

   Exit Sub

AbortSiblingsErr:
   Call LogErrors(Errors)
   On Error GoTo 0
   ShowError errAbortFailed
   ' Try to abort the remaining steps, if any
   Resume Next

End Sub
Private Sub ExecutionFailed(cTermStep As
cRunStep)
```

```
    ' Called when execution of a step fails for
any reason - ensure that execution
    ' continues

    On Error GoTo ExecutionFailedErr

    Call AddFreeProcess(cTermStep.Index)

    Call RunBranch(mstrCurBranchRoot)

    Exit Sub

ExecutionFailedErr:
    ' Log the error code raised by Visual
Basic - do not raise an error here!
    Call LogErrors(Errors)

End Sub
Private Sub FreeExecStep(lngIndex As
Long)
    ' Frees an instance of a cExecuteSM
object depending on the index
    On Error GoTo FreeExecStepErr

    Select Case lngIndex + 1
        Case 1
            Set cExecStep1 = Nothing
        Case 2
            Set cExecStep2 = Nothing
        Case 3
            Set cExecStep3 = Nothing
        Case 4
            Set cExecStep4 = Nothing
        Case 5
            Set cExecStep5 = Nothing
        Case 6
            Set cExecStep6 = Nothing
        Case 7
            Set cExecStep7 = Nothing
        Case 8
            Set cExecStep8 = Nothing
        Case 9
            Set cExecStep9 = Nothing
        Case 10
            Set cExecStep10 = Nothing
        Case 11
            Set cExecStep11 = Nothing
        Case 12
            Set cExecStep12 = Nothing
        Case 13
            Set cExecStep13 = Nothing
        Case 14
            Set cExecStep14 = Nothing
        Case 15
            Set cExecStep15 = Nothing
        Case 16
            Set cExecStep16 = Nothing
        Case 17
            Set cExecStep17 = Nothing
        Case 18
            Set cExecStep18 = Nothing
        Case 19
            Set cExecStep19 = Nothing
        Case 20
            Set cExecStep20 = Nothing
        Case 21
            Set cExecStep21 = Nothing
        Case 22
            Set cExecStep22 = Nothing
        Case 23
            Set cExecStep23 = Nothing
        Case 24
            Set cExecStep24 = Nothing
        Case 25
            Set cExecStep25 = Nothing
        Case 26
            Set cExecStep26 = Nothing
        Case 27
            Set cExecStep27 = Nothing
        Case 28
            Set cExecStep28 = Nothing
        Case 29
            Set cExecStep29 = Nothing
        Case 30
            Set cExecStep30 = Nothing
        Case 31
            Set cExecStep31 = Nothing
        Case 32
            Set cExecStep32 = Nothing
        Case 33
            Set cExecStep33 = Nothing
        Case 34
            Set cExecStep34 = Nothing
        Case 35
            Set cExecStep35 = Nothing
        Case 36
            Set cExecStep36 = Nothing
        Case 37
            Set cExecStep37 = Nothing
        Case 38
            Set cExecStep38 = Nothing
        Case 39
            Set cExecStep39 = Nothing
        Case 40
            Set cExecStep40 = Nothing
        Case 41
            Set cExecStep41 = Nothing
        Case 42
            Set cExecStep42 = Nothing
        Case 43
            Set cExecStep43 = Nothing
        Case 44
            Set cExecStep44 = Nothing
        Case 45
            Set cExecStep45 = Nothing
        Case 46
            Set cExecStep46 = Nothing
        Case 47
            Set cExecStep47 = Nothing
        Case 48
            Set cExecStep48 = Nothing
        Case 49
            Set cExecStep49 = Nothing
        Case 50
            Set cExecStep50 = Nothing
        Case 51
            Set cExecStep51 = Nothing
        Case 52
            Set cExecStep52 = Nothing
        Case 53
            Set cExecStep53 = Nothing
        Case 54
            Set cExecStep54 = Nothing
        Case 55
            Set cExecStep55 = Nothing
        Case 56
            Set cExecStep56 = Nothing
        Case 57
            Set cExecStep57 = Nothing
        Case 58
            Set cExecStep58 = Nothing
        Case 59
            Set cExecStep59 = Nothing
        Case 60
            Set cExecStep60 = Nothing
        Case 61
            Set cExecStep61 = Nothing
        Case 62
            Set cExecStep62 = Nothing
        Case 63
            Set cExecStep63 = Nothing
        Case 64
            Set cExecStep64 = Nothing
        Case 65
            Set cExecStep65 = Nothing
        Case 66
            Set cExecStep66 = Nothing
        Case 67
            Set cExecStep67 = Nothing
        Case 68
            Set cExecStep68 = Nothing
        Case 69
            Set cExecStep69 = Nothing
        Case 70
            Set cExecStep70 = Nothing
        Case 71
            Set cExecStep71 = Nothing
        Case 72
            Set cExecStep72 = Nothing
        Case 73
            Set cExecStep73 = Nothing
        Case 74
            Set cExecStep74 = Nothing
        Case 75
            Set cExecStep75 = Nothing
        Case 76
            Set cExecStep76 = Nothing
        Case 77
            Set cExecStep77 = Nothing
        Case 78
            Set cExecStep78 = Nothing
        Case 79
            Set cExecStep79 = Nothing
        Case 80
            Set cExecStep80 = Nothing
        Case 81
            Set cExecStep81 = Nothing
        Case 82
            Set cExecStep82 = Nothing
        Case 83
            Set cExecStep83 = Nothing
        Case 84
            Set cExecStep84 = Nothing
        Case 85
            Set cExecStep85 = Nothing
        Case 86
            Set cExecStep86 = Nothing
        Case 87
            Set cExecStep87 = Nothing
        Case 88
            Set cExecStep88 = Nothing
        Case 89
            Set cExecStep89 = Nothing
        Case 90
            Set cExecStep90 = Nothing
        Case 91
            Set cExecStep91 = Nothing
        Case 92
            Set cExecStep92 = Nothing
        Case 93
            Set cExecStep93 = Nothing
        Case 94
            Set cExecStep94 = Nothing
        Case 95
            Set cExecStep95 = Nothing
        Case 96
            Set cExecStep96 = Nothing
        Case 97
            Set cExecStep97 = Nothing
        Case 98
            Set cExecStep98 = Nothing
        Case 99
            Set cExecStep99 = Nothing
        Case Else
```

```
        BugAssert False, "FreeExecStep: Invalid index value!"
    End Select

    Exit Sub

FreeExecStepErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)

End Sub
Private Sub ProcessAskFailures()
    ' This procedure is called when a step with a continuation criteria = Ask has failed.
    ' Wait for all running processes to complete before displaying an Abort/Retry/Fail
    ' message to the user. We process every Ask step that has failed and use a simple
    ' algorithm to determine what to do next.
    ' 1. An abort response to any failure results in an immediate abort of the run
    ' 2. A continue means the run continues - this failure is popped off the failure list.
    ' 3. A retry means that the execution details for the instance are cleared and the
    '    step is re-executed.
    Dim lIndex As Long
    Dim cStepRec As cStep
    Dim cNextInst As cInstance
    Dim cFailureRec As cFailedStep

    On Error GoTo ProcessAskFailuresErr

    ' Display a popup message for all steps that have failed with a continuation
    ' criteria of Ask
    For lIndex = mcFailures.Count - 1 To 0 Step -1

        Set cFailureRec = mcFailures(lIndex)

        If cFailureRec.ContCriteria = gintOnFailureAsk Then
            Set cStepRec = mcRunSteps.QueryStep(cFailureRec.StepId)
            ' Ask the user whether to abort/retry/continue
            #If RUN_ONLY Then
                cFailureRec.AskResponse = ShowMessageBox(0, _
                    "Step '" & GetStepNodeText(cStepRec) & "' failed. " & _
                    "Select Abort to abort run and Ignore to continue. " & _
                    "Select Retry to re-execute the failed step.", _
                    "Step Failure", _
                    MB_ABORTRETRYIGNORE + MB_APPLMODAL + MB_ICONEXCLAMATION)
            #Else
                cFailureRec.AskResponse = ShowMessageBox(frmRunning.hWnd, _
                    "Step '" & GetStepNodeText(cStepRec) & "' failed. " & _
                    "Select Abort to abort run and Ignore to continue. " & _
                    "Select Retry to re-execute the failed step.", _
                    "Step Failure", _
                    MB_ABORTRETRYIGNORE + MB_APPLMODAL + MB_ICONEXCLAMATION)
            #End If

            ' Process an abort response immediately
            If cFailureRec.AskResponse = IDABORT Then
                mblnAbort = True
                Set cNextInst = mcInstances.QueryInstance(cFailureRec.InstanceId)
                Call RunPendingSiblings(cNextInst, cFailureRec.EndTime)
                Exit For
            End If
        End If

    Next lIndex

    ' Process all failed steps for which we have Ignore and Retry responses.
    If Not mblnAbort Then
        ' Navigate in reverse order since we'll be deleting items from the collection
        For lIndex = mcFailures.Count - 1 To 0 Step -1
            If mcFailures(lIndex).ContCriteria = gintOnFailureAsk Then
                mblnAsk = False
                Set cFailureRec = mcFailures.Delete(lIndex)

                Select Case cFailureRec.AskResponse
                    Case IDABORT
                        BugAssert True

                    Case IDRETRY
                        ' Delete all instances for the failed step and re-try
                        ' Returns a parent instance reference
                        Set cNextInst = ProcessRetryStep(cFailureRec)
                        Call RunPendingStepInBranch(mstrCurBranchRoot, cNextInst)

                    Case IDIGNORE
                        Set cNextInst = mcInstances.QueryInstance(cFailureRec.InstanceId)
                        Call RunPendingSiblings(cNextInst, cFailureRec.EndTime)

                End Select
            End If
        Next lIndex
    End If

    Exit Sub

ProcessAskFailuresErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    Err.Raise vbObjectError + errExecuteBranchFailed, mstrModuleName, _
        LoadResString(errExecuteBranchFailed)

End Sub
Private Function ProcessRetryStep(cFailureRec As cFailedStep) As cInstance
    ' This procedure is called when a step with a continuation criteria = Ask has failed
    ' and the user wants to re-execute the step.
    ' We delete all existing instances for the step and reset the iterator, if
    ' any on the parent instance - this way we ensure that the step will be executed
    ' in the next pass.
    Dim lIndex As Long
    Dim cParentInstance As cInstance
    Dim cSubStepRec As cSubStep
    Dim cStepRec As cStep

    On Error GoTo ProcessRetryStepErr

    ' Navigate in reverse order since we'll be deleting items from the collection
    For lIndex = mcInstances.Count - 1 To 0 Step -1

        If mcInstances(lIndex).Step.StepId = cFailureRec.StepId Then
            Set cParentInstance = mcInstances.QueryInstance(mcInstances(lIndex).ParentInstanceId)
            Set cSubStepRec = cParentInstance.QuerySubStep(cFailureRec.StepId)
            Set cStepRec = mcRunSteps.QueryStep(cFailureRec.StepId)

            ' Decrement the child count on the parent instance and reset the
            ' step iterators on the sub-step record, if any -
            ' all the iterations of the step will be re-executed.
            cParentInstance.ChildDeleted cFailureRec.StepId
            cParentInstance.AllComplete = False
            cParentInstance.AllStarted = False

            cSubStepRec.InitializeIt cStepRec, mcParameters

            ' Now delete the current instance
            Set ProcessRetryStep = mcInstances.Delete(lIndex)
        End If
    Next lIndex

    Exit Function

ProcessRetryStepErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    Err.Raise vbObjectError + errExecuteBranchFailed, mstrModuleName, _
        LoadResString(errExecuteBranchFailed)

End Function


Private Sub RunNextStep(ByVal dtmCompleteTime As Currency, ByVal lngIndex As Long, _
    ByVal InstanceId As Long, ByVal ExecutionStatus As InstanceStatus)
    ' Checks if there are any steps remaining to be
    ' executed in the current branch. If so, it executes
    ' the step.
    Dim cTermInstance As cInstance
    Dim cFailure As cFailedStep

    On Error GoTo RunNextStepErr
```

```
   BugMessage "RunNextStep: cExecStep"
& CStr(lngIndex + 1) & " has completed."

   Call mcTermSteps.Delete
   Call FreeExecStep(lngIndex)

   ' Call a procedure to add the freed up
object to the list
   Call AddFreeProcess(lngIndex)

   Set cTermInstance =
mcInstances.QueryInstance(InstanceId)
   cTermInstance.Status = ExecutionStatus

   If ExecutionStatus = gintFailed Then
      If
cTermInstance.Step.ContinuationCriteria =
gintOnFailureAbortSiblings Then
         Call AbortSiblings(cTermInstance)
      End If

      If Not
mcFailures.StepFailed(cTermInstance.Step.
StepId) Then
         Set cFailure = New cFailedStep
         cFailure.InstanceId =
cTermInstance.InstanceId
         cFailure.StepId =
cTermInstance.Step.StepId
         cFailure.ParentStepId =
cTermInstance.Step.ParentStepId
         cFailure.ContCriteria =
cTermInstance.Step.ContinuationCriteria
         cFailure.EndTime =
dtmCompleteTime
         mcFailures.Add cFailure
         Set cFailure = Nothing
      End If
   End If

   If ExecutionStatus = gintFailed And
cTermInstance.Step.ContinuationCriteria =
gintOnFailureAbort Then
      If StringEmpty(msAbortDtls) Then
         ' Initialize the abort message
         msAbortDtls = "Step '" &
GetStepNodeText(cTermInstance.Step) & "'
failed. " & _
               "Aborting execution. Please
check the error file for details."
      End If
      Call Abort
   ElseIf ExecutionStatus = gintFailed And
cTermInstance.Step.ContinuationCriteria =
gintOnFailureAsk Then
      mblnAsk = True

      ' If the step failed due to a Cancel
operation (Abort), abort the run
      If mblnAbort Then
         Call
RunPendingSiblings(cTermInstance,
dtmCompleteTime)
      End If
   Else
      Call
RunPendingSiblings(cTermInstance,
dtmCompleteTime)
   End If

   If mblnAbort Then
      If Not AnyStepRunning(mcFreeSteps,
mbarrFree) And Not
StringEmpty(msAbortDtls) Then
         ' Display an error only if the abort is
due to a failure
         ' We had to abort since a step failed -
since no other steps are currently
         ' running, we can display a message to
the user saying that we had to abort
         #If RUN_ONLY Then
            Call ShowMessageBox(0,
msAbortDtls, "Run Aborted", _
                  MB_APPLMODAL + MB_OK
+ MB_ICONEXCLAMATION)
         #Else
            Call
ShowMessageBox(frmRunning.hWnd,
msAbortDtls, "Run Aborted", _
                  MB_APPLMODAL + MB_OK
+ MB_ICONEXCLAMATION)
         #End If
'          MsgBox msAbortDtls, vbOKOnly,
"Run Aborted"
      End If
   ElseIf mblnAsk Then
      If Not AnyStepRunning(mcFreeSteps,
mbarrFree) Then
         ' Ask the user whether to
abort/retry/ignore failed steps
         Call ProcessAskFailures
      End If
   End If

   Exit Sub

RunNextStepErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   WriteError errExecuteBranchFailed,
mstrSource
   Call ResetForm(lngIndex)

End Sub
Public Sub StopRun()

   ' Setting the Abort flag to True will ensure
that we
   ' don't execute any more steps
   mblnAbort = True

End Sub

Private Sub CreateDummyInstance(strRootKey
As String)

   Dim cNewInstance As cInstance
   Dim cSubStepDtls  As cStep
   Dim lngSubStepId As Long

   On Error GoTo CreateDummyInstanceErr

   ' Create a new instance of the step
   ' initialize substeps for the step
   Set cNewInstance = New cInstance

   ' There can be multiple iterations of the top
level nodes
   ' running at the same time, but only one
branch at any
   ' time - so enforce a degree of parallelism of
1 on this
   ' node!
   Set cNewInstance.Step = New cStep
   cNewInstance.DegreeParallelism = 1
   cNewInstance.Key = mstrDummyRootKey

   cNewInstance.InstanceId = NewInstanceId
   cNewInstance.ParentInstanceId = 0
   lngSubStepId =
MakeIdentifierValid(strRootKey)

   Set cSubStepDtls =
mcRunSteps.QueryStep(lngSubStepId)
   If cSubStepDtls.EnabledFlag Then
      ' Create a child node for the step corresponding
to
      ' the root node of the branch being currently
executed,
      ' only if it has been enabled
      Call
cNewInstance.CreateSubStep(cSubStepDtls,
mcParameters)
   End If

   mcInstances.Add cNewInstance
   Set cNewInstance.Iterators =
DetermineIterators(cNewInstance)

   ' Set a reference to the newly created dummy
instance
   Set mcDummyRootInstance = cNewInstance

   Set cNewInstance = Nothing

   Exit Sub

CreateDummyInstanceErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   mstrSource = mstrModuleName &
"CreateDummyInstance"
   Err.Raise vbObjectError +
errCreateInstanceFailed, _
         mstrSource,
LoadResString(errCreateInstanceFailed)

End Sub
Private Function CreateInstance(cExecStep As
cStep, _
      cParentInstance As cInstance) As cInstance
   ' Creates a new instance of the passed in step.
Returns
   ' a reference to the newly created instance object.

   Dim cNewInstance As cInstance
   Dim nodChild As cStep
   Dim lngSubStepId As Long

   On Error GoTo CreateInstanceErr

   ' Create a new instance of the step
   ' initialize substeps for the step
   Set cNewInstance = New cInstance
   Set cNewInstance.Step = cExecStep
   cNewInstance.Key =
MakeKeyValid(cExecStep.StepId,
cExecStep.StepType)
   cNewInstance.ParentInstanceId =
cParentInstance.InstanceId
   cNewInstance.InstanceId = NewInstanceId
   ' Validate the degree of parallelism field before
assigning it to the instance -
   ' (the parameter value might have been set to an
invalid value at runtime)
   Call
ValidateParallelism(cExecStep.DegreeParallelism,
_
         cExecStep.WorkspaceId,
ParamsInWsp:=mcParameters)
```

```
    cNewInstance.DegreeParallelism =
SubstituteParameters(cExecStep.DegreePara
llelism, _
            cExecStep.WorkspaceId,
WspParameters:=mcParameters)

    If
mcNavSteps.HasChild(StepKey:=cNewInsta
nce.Key) Then
        Set nodChild =
mcNavSteps.ChildStep(StepKey:=cNewInst
ance.Key)
        Do
            If nodChild.EnabledFlag Then
                ' Create nodes for all it's substeps
only
                ' if the substeps have been enabled
                Call
cNewInstance.CreateSubStep(nodChild,
mcParameters)
            End If

            Set nodChild =
mcNavSteps.NextStep(StepId:=nodChild.St
epId)
        Loop While (Not nodChild Is Nothing)
    End If

    mcInstances.Add cNewInstance
    Set cNewInstance.Iterators =
DetermineIterators(cNewInstance)

    ' Increment the number of executing steps
on the parent
    cParentInstance.ChildExecuted
(cExecStep.StepId)

    Set CreateInstance = cNewInstance

    Exit Function

CreateInstanceErr:
    ' Log the error code raised by Visual
Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    mstrSource = mstrModuleName &
"CreateInstance"
    Err.Raise vbObjectError +
errCreateInstanceFailed, _
            mstrSource,
LoadResString(errCreateInstanceFailed)

End Function
Private Function
DetermineIterators(cInstanceRec As
cInstance) As cRunColIt
    ' Returns a collection of all the iterator
values for this
    ' instance - since an iterator that is defined
at a
    ' particular level can be used in all it's
substeps, we
    ' need to navigate the step tree all the way
to the root

    Dim cRunIts As cRunColIt
    Dim cRunIt As cRunItNode
    Dim cStepIt As cIterator
    Dim cParentInst As cInstance
    Dim cSubStepRec As cSubStep
    Dim cSubStepDtls As cStep
    Dim lngSubStepId As Long
    Dim lngIndex As Long

    On Error GoTo DetermineIteratorsErr

    Set cRunIts = New cRunColIt

    If cInstanceRec.ParentInstanceId > 0 Then
        ' The last iterator for an instance of a step
is stored
        ' on it's parent! So navigate up before
beginning the
        ' search for iterator values.
        Set cParentInst =
mcInstances.QueryInstance(cInstanceRec.Pare
ntInstanceId)

        ' Get the sub-step record for the current
step
        ' on it's parent's instance!
        lngSubStepId = cInstanceRec.Step.StepId
        Set cSubStepRec =
cParentInst.QuerySubStep(lngSubStepId)
        Set cSubStepDtls =
mcRunSteps.QueryStep(lngSubStepId)

        ' And determine the next iteration value
for the
        ' substep in this instance
        Set cStepIt =
cSubStepRec.NewIteration(cSubStepDtls)

        If Not cStepIt Is Nothing Then
            ' Add the iterator details to the
collection since
            ' an iterator has been defined for the
step
            Set cRunIt = New cRunItNode
            cRunIt.IteratorName =
cSubStepDtls.IteratorName
            cRunIt.Value =
SubstituteParameters(cStepIt.Value,
cSubStepDtls.WorkspaceId,
WspParameters:=mcParameters)
            cRunIt.StepId = cSubStepRec.StepId
            cRunIts.Push cRunIt
        End If

        ' Since the parent instance has all the
iterators upto
        ' that level, read them and push them on to
the stack for
        ' this instance
        For lngIndex = 0 To
cParentInst.Iterators.Count - 1
            Set cRunIt =
cParentInst.Iterators(lngIndex)
            cRunIts.Push cRunIt
        Next lngIndex
    End If

    Set DetermineIterators = cRunIts

    Exit Function

DetermineIteratorsErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    mstrSource = mstrModuleName &
"DetermineIterators"
    Err.Raise vbObjectError +
errExecInstanceFailed, _
            mstrSource,
LoadResString(errExecInstanceFailed)

End Function
Private Function
DetermineConstraints(cInstanceRec As cInstance, _
        intConsType As ConstraintType) As Variant
    ' Returns a collection of all the constraints for this
    ' instance of the passed in type - all the
constraints defined
    ' for the manager are executed first, followed by
those defined
    ' for the step. If a step has an iterator defined for
it, each
    ' constraint is executed only once.

    Dim cParentInst As cInstance
    Dim cTempInst As cInstance
    Dim vntConstraints As Variant
    Dim vntTempCons As Variant
    Dim cColConstraints() As Variant
    Dim lngConsCount As Long

    On Error GoTo DetermineConstraintsErr

    Set cTempInst = cInstanceRec
    lngConsCount = 0

    ' Go all the way to the root
    Do
        If cTempInst.ParentInstanceId > 0 Then
            Set cParentInst =
mcInstances.QueryInstance(cTempInst.ParentInstan
ceId)
        Else
            Set cParentInst = Nothing
        End If

        ' Check if the step has an iterator defined for it
        If cTempInst.ValidForIteration(cParentInst,
intConsType) Then
            vntTempCons =
mcRunConstraints.ConstraintsForStep( _
                cTempInst.Step.StepId,
cTempInst.Step.VersionNo, _
                intConsType, blnSort:=True, _
                blnGlobal:=False,
blnGlobalConstraintsOnly:=False)

            If Not IsEmpty(vntTempCons) Then
                ReDim Preserve
cColConstraints(lngConsCount)
                cColConstraints(lngConsCount) =
vntTempCons
                lngConsCount = lngConsCount + 1
            End If
        End If

        Set cTempInst = cParentInst

    Loop While Not cTempInst Is Nothing

    If lngConsCount > 0 Then
        vntTempCons =
OrderConstraints(cColConstraints, intConsType)
    End If

    DetermineConstraints = vntTempCons

    Exit Function

DetermineConstraintsErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    mstrSource = mstrModuleName &
"DetermineConstraints"
    Err.Raise vbObjectError +
errExecInstanceFailed, _
```

```
        mstrSource,
LoadResString(errExecInstanceFailed)

End Function
Private Function
GetInstanceToExecute(cParentNode As
cInstance, _
      cSubStepRec As cSubStep, _
      cSubStepDtls As cStep) As cInstance

   Dim cSubStepInst As cInstance

   On Error GoTo GetInstanceToExecuteErr

   BugAssert Not (cParentNode Is Nothing
Or _
         cSubStepRec Is Nothing Or _
         cSubStepDtls Is Nothing), _
         "GetInstanceToExecute: Input
invalid"

   ' Check if it has iterators
   If cSubStepDtls.IteratorCount = 0 Then
      ' Check if the step has been executed
      If cSubStepRec.TasksRunning = 0 And
cSubStepRec.TasksComplete = 0 And _
            Not
mcInstances.CompletedInstanceExists(cPare
ntNode.InstanceId, cSubStepDtls) Then
         ' The sub-step hasn't been executed
yet.
         ' Create an instance for it and exit
         Set cSubStepInst =
CreateInstance(cSubStepDtls, cParentNode)
      Else
         Set cSubStepInst = Nothing
      End If
   Else
      ' Check if there are pending iterations
for the sub-step
      If Not
cSubStepRec.NextIteration(cSubStepDtls) Is
Nothing Then
         ' Pending iterations exist - create an
instance for the sub-step and exit
         Set cSubStepInst =
CreateInstance(cSubStepDtls, cParentNode)
      Else
         ' No more iterations - continue with
the next substep
         Set cSubStepInst = Nothing
      End If
   End If

   Set GetInstanceToExecute = cSubStepInst
   Exit Function

GetInstanceToExecuteErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   mstrSource = mstrModuleName &
"GetInstanceToExecute"
   Err.Raise vbObjectError +
errNavInstancesFailed, _
         mstrSource,
LoadResString(errNavInstancesFailed)

End Function

Public Function InstancesForStep(lngStepId
As Long, ByRef StepStatus As
InstanceStatus) As cInstances
   ' Returns an array of all the instances for a
step
   Dim lngIndex As Long
   Dim cTempInst As cInstance
   Dim cStepInstances As cInstances
   Dim cStepRec As cStep

   On Error GoTo InstancesForStepErr

   Set cStepInstances = New cInstances

   For lngIndex = 0 To mcInstances.Count - 1
      Set cTempInst = mcInstances(lngIndex)

      If cTempInst.Step.StepId = lngStepId
Then
         cStepInstances.Add cTempInst
      End If
   Next lngIndex

   If cStepInstances.Count = 0 Then
      Set cStepRec =
mcRunSteps.QueryStep(lngStepId)
      If Not
mcFailures.ExecuteSubStep(cStepRec.ParentSt
epId) Then
         StepStatus = gintAborted
      End If
      Set cStepRec = Nothing
   End If

   ' Set the return value of the function to the
array of
   ' constraints that has been built above
   Set InstancesForStep = cStepInstances

   Set cStepInstances = Nothing
   Exit Function

InstancesForStepErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   mstrSource = mstrModuleName &
"InstancesForStep"
   Err.Raise vbObjectError +
errNavInstancesFailed, mstrSource, _
         LoadResString(errNavInstancesFailed)

End Function
Private Sub
RemoveFreeProcess(lngRunningProcess As
Long)
   ' Removes the passed in element from the
collection of
   ' free objects

   ' Confirm that the last element in the array is
the one
   ' we need to delete
   If mcFreeSteps(mcFreeSteps.Count - 1) =
lngRunningProcess Then
      mcFreeSteps.Delete
Position:=mcFreeSteps.Count - 1
   Else
      ' Ask the class to find the element and
delete it
      mcFreeSteps.Delete
Item:=lngRunningProcess
   End If

End Sub
Private Sub
AddFreeProcess(lngTerminatedProcess As
Long)
   ' Adds the passed in element to the collection of
   ' free objects

   mcFreeSteps.Add lngTerminatedProcess

End Sub

Private Sub ResetForm(Optional ByVal lngIndex
As Long)

   Dim lngTemp As Long

   On Error GoTo ResetFormErr

   ' Check if there are any running instances to wait
for
   If mcFreeSteps.Count <>
glngNumConcurrentProcesses Then

      For lngTemp = 0 To mcFreeSteps.Count - 1
         If mcFreeSteps(lngTemp) = lngIndex Then
            Exit For
         End If
      Next lngTemp

      If lngTemp <= mcFreeSteps.Count - 1 Then
         ' This process that just completed did not
exist in the list of
         ' free processes
         Call AddFreeProcess(lngIndex)
      End If

      If Not AnyStepRunning(mcFreeSteps,
mbarrFree) Then
         WriteToWspLog (mintRunComplete)
         ' All steps are complete
         RaiseEvent
RunComplete(Determine64BitTime())
      End If
   Else
      WriteToWspLog (mintRunComplete)
      RaiseEvent
RunComplete(Determine64BitTime())
   End If

   Exit Sub

ResetFormErr:

End Sub
Private Function NewInstanceId() As Long
   ' Will return new instance id's - uses a static
counter
   ' that it increments each time
   Static lngInstance As Long

   lngInstance = lngInstance + 1
   NewInstanceId = lngInstance

End Function

Private Function
RunPendingStepInBranch(strCurBranchRoot As
String, _
      Optional cExecInstance As cInstance =
Nothing) As cInstance
   ' Runs a worker step in the branch being
executed, if
   ' there are any pending execution
   ' This function is also called when a step has just
completed
   ' execution - in which case the terminated
instance is
   ' passed in as the optional parameter. When that
happens,
```

```
    ' we first try to execute the siblings of the terminated
    ' step if any are pending execution.
    ' If the terminated instance has not been passed in, we
    ' start with the dummy root instance and navigate down,
    ' trying to find a pending worker step.

    Dim cExecSubStep As cStep
    Dim cParentInstance As cInstance
    Dim cNextInst As cInstance

    On Error GoTo RunPendingStepInBranchErr

    If Not cExecInstance Is Nothing Then
        ' Called when an instance has terminated
        ' When a worker step terminates, then we need to
        ' decremement the number of running steps on it's
        ' manager
        Set cParentInstance = _
mcInstances.QueryInstance(cExecInstance.ParentInstanceId)

    Else
        If StringEmpty(strCurBranchRoot) Or mcDummyRootInstance Is Nothing Then
            ' Run complete - event raised by Run method
            Set RunPendingStepInBranch = Nothing
            Exit Function
        End If

        ' If there are no pending steps on the root instance,
        ' then there are no steps within the branch that need
        ' to be executed
        If mcDummyRootInstance.AllComplete Or mcDummyRootInstance.AllStarted Then
            Set RunPendingStepInBranch = Nothing
            Exit Function
        End If

        Set cParentInstance = mcDummyRootInstance
    End If

    Do
        Set cNextInst = GetSubStepToExecute(cParentInstance)
        If cNextInst Is Nothing Then
            ' There are no steps within the branch that can
            ' be executed - If we are at the dummy instance,
            ' this branch has completed executing
            If cParentInstance.Key = mstrDummyRootKey Then
                Set cNextInst = Nothing
                Exit Do
            Else
                ' Go to the parent instance and try to find
                ' some other sibling is pending execution
                Set cNextInst = mcInstances.QueryInstance(cParentInstance.ParentInstanceId)

                If cParentInstance.SubSteps.Count = 0 Then
                    cNextInst.ChildTerminated cParentInstance.Step.StepId
                End If
            End If
        End If

        BugAssert Not cNextInst Is Nothing
        Set cParentInstance = cNextInst

    Loop While cNextInst.Step.StepType <> gintWorkerStep

    If Not cNextInst Is Nothing Then
        Call ExecuteStep(cNextInst)
    End If

    Set RunPendingStepInBranch = cNextInst

    Exit Function

RunPendingStepInBranchErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError + errNavInstancesFailed, _
        mstrModuleName & "RunPendingStepInBranch", LoadResString(errNavInstancesFailed)

End Function
Private Function RunPendingSibling(cTermInstance As cInstance, _
    dtmCompleteTime As Currency) As cInstance
    ' This process is called when a step terminates. Tries to
    ' run a sibling of the terminated step, if one is pending
    ' execution.

    Dim cParentInstance As cInstance
    Dim cNextInst As cInstance

    On Error GoTo RunPendingSiblingErr

    If StringEmpty(mstrCurBranchRoot) Or mcDummyRootInstance Is Nothing Then
        ' Run complete - event raised by Run method
        Set RunPendingSibling = Nothing
        Exit Function
    End If

    BugAssert cTermInstance.ParentInstanceId > 0, "Orphaned instance in array!"

    ' When a worker step terminates, then we need to
    ' decremement the number of running steps on it's
    ' manager
    Set cParentInstance = mcInstances.QueryInstance(cTermInstance.ParentInstanceId)

    ' Decrement the number of running processes on the
    ' parent by 1
    Call cParentInstance.ChildTerminated(cTermInstance.Step.StepId)

    ' The first step that terminates has to be a worker
    ' If it is complete, update the completed steps on the
    ' parent by 1.
    Call cParentInstance.ChildCompleted(cTermInstance.Step.StepId)
    cParentInstance.AllStarted = False

    Do
        Set cNextInst = GetSubStepToExecute(cParentInstance, dtmCompleteTime)
        If cNextInst Is Nothing Then
            If cParentInstance.Key = mstrDummyRootKey Then
                Set cNextInst = Nothing
                Exit Do
            Else
                ' Go to the parent instance and try to find
                ' some other sibling is pending execution
                Set cNextInst = mcInstances.QueryInstance(cParentInstance.ParentInstanceId)
                If cParentInstance.IsRunning Then
                    cNextInst.AllStarted = True
                Else
                    ' No more sub-steps to execute
                    Call cNextInst.ChildCompleted(cParentInstance.Step.StepId)
                    Call cNextInst.ChildTerminated(cParentInstance.Step.StepId)
                    cNextInst.AllStarted = False
                End If
            End If
        End If

        BugAssert Not cNextInst Is Nothing
        Set cParentInstance = cNextInst

    Loop While cNextInst.Step.StepType <> gintWorkerStep

    If Not cNextInst Is Nothing Then
        Call ExecuteStep(cNextInst)
    End If

    Set RunPendingSibling = cNextInst

    Exit Function

RunPendingSiblingErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    mstrSource = mstrModuleName & "RunPendingSibling"
    Err.Raise vbObjectError + errNavInstancesFailed, mstrSource, _
        LoadResString(errNavInstancesFailed)

End Function
Private Sub RunPendingSiblings(cTermInstance As cInstance, _
    dtmCompleteTime As Currency)
    ' This process is called when a step terminates. Tries to
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    ' run siblings of the terminated step, if they are pending
    ' execution.

    Dim cExecInst As cInstance

    On Error GoTo RunPendingSiblingsErr
    BugMessage "In RunPendingSiblings"

    ' Call a procedure to run the sibling of the terminated
    ' step, if any. This procedure will also update the
    ' number of complete/running tasks on the manager steps.
    Set cExecInst = RunPendingSibling(cTermInstance, dtmCompleteTime)

    If Not cExecInst Is Nothing Then
        Do
            ' Execute any other pending steps in the branch.
            ' The step that has just terminated might be
            ' the last one that was executing in a sub-branch.
            ' That would mean that we can execute another
            ' sub-branch that might involve more than 1 step.
            ' Pass the just executed step as a parameter.
            Set cExecInst = RunPendingStepInBranch(mstrCurBranchRoot, cExecInst)
        Loop While Not cExecInst Is Nothing
    Else
        If Not mcDummyRootInstance.IsRunning Then
            ' All steps have been executed in the branch - run
            ' a new branch
            Call RunNewBranch
        Else
            ' There are no more steps to execute in the current
            ' branch but we have running processes.
        End If
    End If

    Exit Sub

RunPendingSiblingsErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    mstrSource = mstrModuleName & "RunPendingSiblings"
    Err.Raise vbObjectError + errNavInstancesFailed, _
            mstrSource, LoadResString(errNavInstancesFailed)

End Sub

Private Sub NoSubStepsToExecute(cMgrInstance As cInstance, Optional dtmCompleteTime As Currency = gdtmEmpty)
    ' Called when we cannot find any more substeps to run for
    ' manager step - set the allcomplete or allstarted
    ' properties to true

    If cMgrInstance.IsRunning() Then
        cMgrInstance.AllStarted = True
    Else
        cMgrInstance.AllComplete = True
        If dtmCompleteTime <> gdtmEmpty Then
            ' Update the end time on the manager step
            Call TimeCompleteUpdateForStep(cMgrInstance, dtmCompleteTime)
        End If
    End If

End Sub

Private Function GetSubStepToExecute(cParentNode As cInstance, _
        Optional dtmCompleteTime As Currency = 0) As cInstance
    ' Returns the child of the passed in node that is to be
    ' executed next. Checks if we are in the middle of an instance
    ' being executed in which case it returns the pending
    ' instance. Creates a new instance if there are pending
    ' instances for a sub-step.

    Dim lngIndex As Long
    Dim cSubStepRec As cSubStep
    Dim cSubStepDtls As cStep
    Dim cSubStepInst As cInstance

    On Error GoTo GetSubStepToExecuteErr

    ' There are a number of cases that need to be accounted
    ' for here.
    ' 1. While traversing through all enabled nodes for the
    ' first time - instance records may not exist for the
    ' substeps.
    ' 2. Instance records exist, and there are processes
    ' that need to be executed for a sub-step
    ' 3. There are no more processes that need to be currently
    ' executed (till a process completes)
    ' 4. There are no more processes that need to be executed
    ' (All substeps have completed execution)

    ' This is the only point where we check the Abort flag -
    ' since this is the heart of the navigation routine that
    ' selects processes to execute. Also, when a step terminates
    ' selection of the next process goes through here.
    If mblnAbort Then
        Set GetSubStepToExecute = Nothing
        cParentNode.Status = gintAborted
        Exit Function
    End If

    If mblnAsk Then
        Set GetSubStepToExecute = Nothing
        Exit Function
    End If

    If Not mcFailures.ExecuteSubStep(cParentNode.Step.StepId) Then
        Set GetSubStepToExecute = Nothing
        cParentNode.Status = gintAborted
        Exit Function
    End If

    ' First check if there are pending steps for the parent!
    If cParentNode.IsPending Then
        ' Loop through all the sub-steps for the parent node
        For lngIndex = 0 To cParentNode.SubSteps.Count - 1
            Set cSubStepRec = cParentNode.SubSteps(lngIndex)
            Set cSubStepDtls = mcRunSteps.QueryStep(cSubStepRec.StepId)
            If Not mcInstances.InstanceAborted(cSubStepRec) Then
                ' Check if the sub-step is a worker
                If cSubStepDtls.StepType = gintWorkerStep Then
                    ' Find/create an instance to execute
                    Set cSubStepInst = GetInstanceToExecute( _
                            cParentNode, cSubStepRec, cSubStepDtls)
                    If Not cSubStepInst Is Nothing Then
                        Exit For
                    Else
                        ' Continue w/ the next sub-step
                    End If
                Else
                    ' The sub-step is a manager step
                    ' Check if there are any pending instances for
                    ' the manager
                    Set cSubStepInst = mcInstances.QueryPendingInstance( _
                            cParentNode.InstanceId, cSubStepRec.StepId)
                    If cSubStepInst Is Nothing Then
                        ' Find/create an instance to execute
                        Set cSubStepInst = GetInstanceToExecute( _
                                cParentNode, cSubStepRec, cSubStepDtls)
                        If Not cSubStepInst Is Nothing Then
                            Exit For
                        Else
                            ' Continue w/ the next sub-step
                        End If
                    Else
                        ' We have found a pending instance for the
                        ' sub-step (manager) - exit the loop
                        Exit For
                    End If
                End If
            End If
        Next lngIndex

        If lngIndex > cParentNode.SubSteps.Count - 1 Or cParentNode.SubSteps.Count = 0 Then
            ' If we could not find any sub-steps to execute,
            ' mark the parent node as complete/all started
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```
        Call
NoSubStepsToExecute(cParentNode,
dtmCompleteTime)
        Set cSubStepInst = Nothing
      End If
   End If

   Set GetSubStepToExecute = cSubStepInst
   Exit Function

GetSubStepToExecuteErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   mstrSource = mstrModuleName &
"GetSubStepToExecute"
   Err.Raise vbObjectError +
errNavInstancesFailed, mstrSource, _
      LoadResString(errNavInstancesFailed)

End Function

Private Sub
TimeCompleteUpdateForStep(cMgrInstance
As cInstance, ByVal EndTime As Currency)

   ' Called when there are no more sub-steps
to execute for
   ' the manager step. It updates the end time
and status on
   ' the manager.
   Dim lElapsed As Long

   On Error GoTo
TimeCompleteUpdateForStepErr

   If cMgrInstance.Key <>
mstrDummyRootKey Then
      cMgrInstance.EndTime = EndTime
      cMgrInstance.Status = gintComplete
      lElapsed = (EndTime -
cMgrInstance.StartTime) * 10000
      cMgrInstance.ElapsedTime = lElapsed
      RaiseEvent
StepComplete(cMgrInstance.Step, EndTime,
cMgrInstance.InstanceId, lElapsed)
   End If

   Exit Sub

TimeCompleteUpdateForStepErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   WriteError errUpdateDisplayFailed,
mstrModuleName &
"TimeCompleteUpdateForStep"

End Sub

Private Function GetFreeObject() As Long

   ' Check the array of free objects and
retrieve the first one
   If mcFreeSteps.Count > 0 Then
      GetFreeObject =
mcFreeSteps(mcFreeSteps.Count - 1)
   Else
      mstrSource = mstrModuleName &
"GetFreeObject"
      ShowError errMaxProcessesExceeded
      On Error GoTo 0
      Err.Raise vbObjectError +
errMaxProcessesExceeded, _
         mstrSource, _

LoadResString(errMaxProcessesExceeded)
   End If

End Function
Private Function
StepTerminated(cCompleteStep As cStep,
ByVal dtmCompleteTime As Currency, _
      ByVal lngIndex As Long, ByVal
InstanceId As Long, ByVal ExecutionStatus
As InstanceStatus) As cStep
   ' This procedure is called whenever a step
terminates.
   Dim cTermRec As cTermStep
   Dim cInstRec As cInstance
   Dim cStartInst As cInstance
   Dim lElapsed As Long
   Dim sLogLabel As String
   Dim LogLabels As New cVectorStr
   Dim iItIndex As Long

   On Error GoTo StepTerminatedErr

   Set cInstRec =
mcInstances.QueryInstance(InstanceId)
   If dtmCompleteTime <> 0 And
cInstRec.StartTime <> 0 Then
      ' Convert to milliseconds since that is the
default precision
      lElapsed = (dtmCompleteTime -
cInstRec.StartTime) * 10000
   Else
      lElapsed = 0
   End If

   Set cStartInst = cInstRec
   iItIndex = 0
   Do While cInstRec.Key <>
mstrDummyRootKey
      sLogLabel = gstrSQ &
cInstRec.Step.StepLabel & gstrSQ

      If iItIndex < cInstRec.Iterators.Count
Then
         If cStartInst.Iterators(iItIndex).StepId =
cInstRec.Step.StepId Then
            sLogLabel = sLogLabel & msIt &
gstrSQ &
cStartInst.Iterators(iItIndex).IteratorName &
gstrSQ & _
               msItValue & gstrSQ &
cStartInst.Iterators(iItIndex).Value & gstrSQ
            iItIndex = iItIndex + 1
         End If
      End If

      If cInstRec.Key = cStartInst.Key Then
         ' Append the execution status
         sLogLabel = sLogLabel & " Status: " &
gstrSQ & gsExecutionStatus(ExecutionStatus)
& gstrSQ
         If ExecutionStatus = gintFailed Then
            ' Append the continuation criteria for
the step since it failed
            sLogLabel = sLogLabel & "
Continuation Criteria: " & gstrSQ &
gsContCriteria(cInstRec.Step.ContinuationCrit
eria) & gstrSQ
         End If
      End If
      LogLabels.Add sLogLabel
      Set cInstRec =
mcInstances.QueryInstance(cInstRec.ParentInstanc
eId)
   Loop

   Call WriteToWspLog(mintStepComplete,
LogLabels, dtmCompleteTime)
   Set LogLabels = Nothing

   ' Adds the terminated step details to a queue.
   Set cTermRec = New cTermStep
   cTermRec.ExecutionStatus = ExecutionStatus
   cTermRec.Index = lngIndex
   cTermRec.InstanceId = InstanceId
   cTermRec.TimeComplete = dtmCompleteTime
   Call mcTermSteps.Add(cTermRec)
   Set cTermRec = Nothing

   RaiseEvent StepComplete(cCompleteStep,
dtmCompleteTime, InstanceId, lElapsed)

   Exit Function

StepTerminatedErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   WriteError errExecuteBranchFailed, mstrSource
   Call ResetForm(lngIndex)

End Function
Public Property Let RootKey(ByVal vdata As
String)

   mstrRootKey = vdata

End Property

Public Property Get RootKey() As String
   RootKey = mstrRootKey
End Property

Private Function InitExecStep() As cRunStep
   ' Since arrays of objects cannot be declared as
WithEvents,
   ' we use a limited number of objects and set a
maximum
   ' on the number of steps that can run in parallel
   ' This is a wrapper that will create an instance of
   ' a cExecuteSM object depending on the index
   Dim lngIndex As Long

   On Error GoTo InitExecStepErr

   lngIndex = GetFreeObject

   Select Case lngIndex + 1
      Case 1
         Set cExecStep1 = New cRunStep
         Set InitExecStep = cExecStep1
      Case 2
         Set cExecStep2 = New cRunStep
         Set InitExecStep = cExecStep2
      Case 3
         Set cExecStep3 = New cRunStep
         Set InitExecStep = cExecStep3
      Case 4
         Set cExecStep4 = New cRunStep
         Set InitExecStep = cExecStep4
      Case 5
         Set cExecStep5 = New cRunStep
         Set InitExecStep = cExecStep5
      Case 6
         Set cExecStep6 = New cRunStep
         Set InitExecStep = cExecStep6
      Case 7
```

```
    Set cExecStep7 = New cRunStep
    Set InitExecStep = cExecStep7
Case 8
    Set cExecStep8 = New cRunStep
    Set InitExecStep = cExecStep8
Case 9
    Set cExecStep9 = New cRunStep
    Set InitExecStep = cExecStep9
Case 10
    Set cExecStep10 = New cRunStep
    Set InitExecStep = cExecStep10
Case 11
    Set cExecStep11 = New cRunStep
    Set InitExecStep = cExecStep11
Case 12
    Set cExecStep12 = New cRunStep
    Set InitExecStep = cExecStep12
Case 13
    Set cExecStep13 = New cRunStep
    Set InitExecStep = cExecStep13
Case 14
    Set cExecStep14 = New cRunStep
    Set InitExecStep = cExecStep14
Case 15
    Set cExecStep15 = New cRunStep
    Set InitExecStep = cExecStep15
Case 16
    Set cExecStep16 = New cRunStep
    Set InitExecStep = cExecStep16
Case 17
    Set cExecStep17 = New cRunStep
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    Set cExecStep30 = New cRunStep
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    Set cExecStep31 = New cRunStep
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Case 60
    Set cExecStep60 = New cRunStep
    Set InitExecStep = cExecStep60
Case 61
    Set cExecStep61 = New cRunStep
    Set InitExecStep = cExecStep61
Case 62
    Set cExecStep62 = New cRunStep
    Set InitExecStep = cExecStep62
Case 63
    Set cExecStep63 = New cRunStep
    Set InitExecStep = cExecStep63
Case 64
    Set cExecStep64 = New cRunStep
    Set InitExecStep = cExecStep64
Case 65
    Set cExecStep65 = New cRunStep
    Set InitExecStep = cExecStep65
Case 66
    Set cExecStep66 = New cRunStep
    Set InitExecStep = cExecStep66
Case 67
    Set cExecStep67 = New cRunStep
    Set InitExecStep = cExecStep67
Case 68
    Set cExecStep68 = New cRunStep
    Set InitExecStep = cExecStep68
Case 69
    Set cExecStep69 = New cRunStep
    Set InitExecStep = cExecStep69
Case 70
    Set cExecStep70 = New cRunStep
    Set InitExecStep = cExecStep70
Case 71
    Set cExecStep71 = New cRunStep
    Set InitExecStep = cExecStep71
Case 72
    Set cExecStep72 = New cRunStep
    Set InitExecStep = cExecStep72
Case 73
    Set cExecStep73 = New cRunStep
    Set InitExecStep = cExecStep73
Case 74
    Set cExecStep74 = New cRunStep
    Set InitExecStep = cExecStep74
Case 75
    Set cExecStep75 = New cRunStep
    Set InitExecStep = cExecStep75
Case 76
    Set cExecStep76 = New cRunStep
    Set InitExecStep = cExecStep76
Case 77
    Set cExecStep77 = New cRunStep
    Set InitExecStep = cExecStep77
Case 78
    Set cExecStep78 = New cRunStep
    Set InitExecStep = cExecStep78
Case 79
    Set cExecStep79 = New cRunStep
    Set InitExecStep = cExecStep79
Case 80
    Set cExecStep80 = New cRunStep
    Set InitExecStep = cExecStep80
Case 81
    Set cExecStep81 = New cRunStep
    Set InitExecStep = cExecStep81
Case 82
```

```
        Set cExecStep82 = New cRunStep
        Set InitExecStep = cExecStep82
      Case 83
        Set cExecStep83 = New cRunStep
        Set InitExecStep = cExecStep83
      Case 84
        Set cExecStep84 = New cRunStep
        Set InitExecStep = cExecStep84
      Case 85
        Set cExecStep85 = New cRunStep
        Set InitExecStep = cExecStep85
      Case 86
        Set cExecStep86 = New cRunStep
        Set InitExecStep = cExecStep86
      Case 87
        Set cExecStep87 = New cRunStep
        Set InitExecStep = cExecStep87
      Case 88
        Set cExecStep88 = New cRunStep
        Set InitExecStep = cExecStep88
      Case 89
        Set cExecStep89 = New cRunStep
        Set InitExecStep = cExecStep89
      Case 90
        Set cExecStep90 = New cRunStep
        Set InitExecStep = cExecStep90
      Case 91
        Set cExecStep91 = New cRunStep
        Set InitExecStep = cExecStep91
      Case 92
        Set cExecStep92 = New cRunStep
        Set InitExecStep = cExecStep92
      Case 93
        Set cExecStep93 = New cRunStep
        Set InitExecStep = cExecStep93
      Case 94
        Set cExecStep94 = New cRunStep
        Set InitExecStep = cExecStep94
      Case 95
        Set cExecStep95 = New cRunStep
        Set InitExecStep = cExecStep95
      Case 96
        Set cExecStep96 = New cRunStep
        Set InitExecStep = cExecStep96
      Case 97
        Set cExecStep97 = New cRunStep
        Set InitExecStep = cExecStep97
      Case 98
        Set cExecStep98 = New cRunStep
        Set InitExecStep = cExecStep98
      Case 99
        Set cExecStep99 = New cRunStep
        Set InitExecStep = cExecStep99
    Case Else
        Set InitExecStep = Nothing
  End Select

  BugMessage "Sending cExecStep" &
(lngIndex + 1) & "!"

  If Not InitExecStep Is Nothing Then
    InitExecStep.Index = lngIndex

    ' Remove this element from the
collection of free objects
    Call RemoveFreeProcess(lngIndex)
  End If

  Exit Function

InitExecStepErr:
  ' Log the error code raised by Visual
Basic
  Call LogErrors(Errors)
  Set InitExecStep = Nothing

End Function
Public Sub Run()
  ' Calls procedures to build a list of all the
steps that
  ' need to be executed and to execute them
  ' Determines whether the run has
started/terminated and
  ' raises the Run Start and Complete events.
  Dim cTempStep As cStep

  On Error GoTo RunErr

  If StringEmpty(mstrRootKey) Then
    Call ShowError(errExecuteBranchFailed)
    On Error GoTo 0
    Err.Raise vbObjectError +
errExecuteBranchFailed, mstrModuleName &
"Run", _

LoadResString(errExecuteBranchFailed)
  Else
    ' Execute the first branch
    WriteToWspLog (mintRunStart)
    RaiseEvent
RunStart(Determine64BitTime(),
mcWspLog.FileName)

    If
mcNavSteps.HasChild(StepKey:=mstrRootKe
y) Then
      Set cTempStep =
mcNavSteps.ChildStep(StepKey:=mstrRootKe
y)
      mstrCurBranchRoot =
MakeKeyValid(cTempStep.StepId,
cTempStep.StepType)

      Call
CreateDummyInstance(mstrCurBranchRoot)

      ' Run all pending steps in the branch
      If Not RunBranch(mstrCurBranchRoot)
Then
        ' Execute a new branch if there aren't
any
        ' steps to run
        Call RunNewBranch
      End If
    Else
      WriteToWspLog (mintRunComplete)
      ' No children to execute - the run is
complete
      RaiseEvent
RunComplete(Determine64BitTime())
    End If
  End If

  Exit Sub

RunErr:
  ' Log the error code raised by Visual Basic
  Call LogErrors(Errors)
  Call ShowError(errExecuteBranchFailed,
OptArgs:=mstrCurBranchRoot)
  Call ResetForm

End Sub
Private Sub RunNewBranch()
  ' We will build a tree of all instances that
occur and
  ' the count of the sub-steps that are running
will be
  ' stored at each node in the tree (maintained
internally
  ' as an array). Since there can be multiple
iterations
  ' of the top level nodes running at the same time,
we
  ' create a dummy node at the root that keeps a
record of
  ' the instances of the top level node.

  ' Determines whether the run has
started/terminated and
  ' raises the Run Start and Complete events.
  Dim cNextStep As cStep
  Dim bRunComplete As Boolean

  On Error GoTo RunNewBranchErr

  bRunComplete = False

  Do
    If StringEmpty(mstrCurBranchRoot) Then
      Exit Do
'     On Error GoTo 0
'     Err.Raise vbObjectError +
errExecuteBranchFailed, mstrSource, _
'       LoadResString(errExecuteBranchFailed)
    Else
      Set cNextStep =
mcNavSteps.NextStep(StepKey:=mstrCurBranchRo
ot)
      If cNextStep Is Nothing Then
        mstrCurBranchRoot = gstrEmptyString
        bRunComplete = True
        Exit Do
      Else
        ' Starting execution of a new branch -
initialize the
        ' module-level variable
        mstrCurBranchRoot =
MakeKeyValid(cNextStep.StepId,
cNextStep.StepType)
        Call
CreateDummyInstance(mstrCurBranchRoot)
      End If
    End If
    Debug.Print "Running new branch: " &
mstrCurBranchRoot

  ' Loop until we find a branch that has steps to
execute
  Loop While Not
RunBranch(mstrCurBranchRoot)

  If bRunComplete Then
    WriteToWspLog (mintRunComplete)
    ' Run is complete
    RaiseEvent
RunComplete(Determine64BitTime())
  End If

  Exit Sub

RunNewBranchErr:
  ' Log the error code raised by Visual Basic
  Call LogErrors(Errors)
  Call ShowError(errExecuteBranchFailed,
OptArgs:=mstrCurBranchRoot)
  On Error GoTo 0
  mstrSource = mstrModuleName &
"RunNewBranch"
  Err.Raise vbObjectError +
errExecuteBranchFailed, mstrSource, _
    LoadResString(errExecuteBranchFailed)

End Sub
```

```
Private Function RunBranch(strRootNode
As String) As Boolean
   ' This procedure is called to run all the
necessary steps
   ' in a branch. It can also be called when a
step terminates,
   ' in which case the terminated step is
passed in as the
   ' optional parameter. When a step
terminates, we need to
   ' either wait for some other steps to
terminate before
   ' we execute more steps or run as many
steps as necessary
   ' Returns True if there are steps currently
executing
   ' in the branch, else returns False
   Dim cRunning As cInstance

   On Error GoTo RunBranchErr

   If Not StringEmpty(strRootNode) Then
      ' Call a procedure to execute all the
enabled steps
      ' in the branch - will return the step
node that is
      ' being executed - nothing means 'No
more steps to
      ' execute in the branch'.
      Do
         Set cRunning =
RunPendingStepInBranch(strRootNode,
cRunning)

      Loop While Not cRunning Is Nothing

      RunBranch =
mcDummyRootInstance.IsRunning
   End If

   Exit Function

RunBranchErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   mstrSource = mstrModuleName &
"RunBranch"
   Err.Raise vbObjectError +
errExecuteBranchFailed, _
         mstrSource,
LoadResString(errExecuteBranchFailed)

End Function
Private Sub
TimeUpdateForProcess(StepRecord As
cStep, _
      ByVal InstanceId As Long, _
      Optional ByVal StartTime As Currency
= 0, _
      Optional ByVal EndTime As Currency
= 0, _
      Optional ByVal ElapsedTime As Long
= 0, _
      Optional Command As String)
   ' We do not maintain start and end
timestamps for the constraint
   ' of a step. Hence we check if the process
that just started/
   ' terminated is the worker step that is
being executed. If so,
   ' we update the start/end time and status
on the instance record.
   Dim cInstanceRec As cInstance
   Dim sItVal As String

   On Error GoTo TimeUpdateForProcessErr

   Set cInstanceRec =
mcInstances.QueryInstance(InstanceId)

   If StartTime = 0 Then
      RaiseEvent ProcessComplete(StepRecord,
EndTime, InstanceId, ElapsedTime)
   Else
      sItVal =
GetInstanceItValue(cInstanceRec)
      RaiseEvent ProcessStart(StepRecord,
Command, StartTime, InstanceId, _
            cInstanceRec.ParentInstanceId,
sItVal)
   End If

   Call
cInstanceRec.UpdateStartTime(StepRecord.Ste
pId, StartTime, EndTime, ElapsedTime)

   Exit Sub

TimeUpdateForProcessErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   WriteError errUpdateDisplayFailed,
mstrModuleName & "TimeUpdateForProcess"

End Sub
Private Sub
TimeStartUpdateForStep(StepRecord As
cStep, _
      ByVal InstanceId As Long, _
      ByVal StartTime As Currency)

   ' Called when a step starts execution. Checks
if this is the
   ' first enabled child of the manager step. If
so, updates
   ' the start time and status on the manager.
   ' Also raises the Step Start event for the
completed step.

   Dim cStartInst As cInstance
   Dim cInstanceRec As cInstance
   Dim LogLabels As New cVectorStr
   Dim iItIndex As Long
   Dim sLogLabel As String
   Dim sPath As String
   Dim sIt As String
   Dim sItVal As String

   On Error GoTo TimeStartUpdateForStepErr

   Set cStartInst =
mcInstances.QueryInstance(InstanceId)

   ' Determine the step path and iterator values
for the step and raise a step start event
   Set cInstanceRec = cStartInst
   Do While cInstanceRec.Key <>
mstrDummyRootKey
      If Not StringEmpty(sPath) Then
         sPath = sPath & gstrFileSeparator
      End If
      sPath = sPath & gstrSQ &
cInstanceRec.Step.StepLabel & gstrSQ
      Set cInstanceRec =
mcInstances.QueryInstance(cInstanceRec.Pare
ntInstanceId)
   Loop

   For iItIndex = cStartInst.Iterators.Count - 1 To 0
Step -1
      If Not StringEmpty(sIt) Then
         sIt = sIt & gstrFileSeparator
      End If
      sIt = sIt & gstrSQ &
cStartInst.Iterators(iItIndex).Value & gstrSQ
   Next iItIndex

   sItVal = GetInstanceItValue(cStartInst)
   RaiseEvent StepStart(StepRecord, StartTime,
InstanceId, cStartInst.ParentInstanceId, _
         sPath, sIt, sItVal)

   iItIndex = 0
   Set cInstanceRec = cStartInst
   ' Raise a StepStart event for the manager step, if
this is it's first sub-step being executed
   Do While cInstanceRec.Key <>
mstrDummyRootKey

      sLogLabel = gstrSQ &
cInstanceRec.Step.StepLabel & gstrSQ
      If iItIndex < cStartInst.Iterators.Count Then
         If cStartInst.Iterators(iItIndex).StepId =
cInstanceRec.Step.StepId Then
            sLogLabel = sLogLabel & msIt & gstrSQ
& cStartInst.Iterators(iItIndex).IteratorName &
gstrSQ & _
                  msItValue & gstrSQ &
cStartInst.Iterators(iItIndex).Value & gstrSQ
            iItIndex = iItIndex + 1
         End If
      End If
      LogLabels.Add sLogLabel

      If cInstanceRec.Key <> cStartInst.Key And
cInstanceRec.StartTime = 0 Then
         cInstanceRec.StartTime = StartTime
         cInstanceRec.Status = gintRunning
         sItVal = GetInstanceItValue(cInstanceRec)
         ' The step path and iterator values are not
needed for manager steps, since
         ' they are primarily used by the run status
form
         RaiseEvent StepStart(cInstanceRec.Step,
StartTime, cInstanceRec.InstanceId, _
               cInstanceRec.ParentInstanceId,
gstrEmptyString, gstrEmptyString, _
               sItVal)
      End If

      Set cInstanceRec =
mcInstances.QueryInstance(cInstanceRec.ParentIns
tanceId)
   Loop

   Call WriteToWspLog(mintStepStart, LogLabels,
StartTime)
   Set LogLabels = Nothing

   Exit Sub

TimeStartUpdateForStepErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   WriteError errUpdateDisplayFailed,
mstrModuleName & "TimeStartUpdateForStep"

End Sub
Private Sub WriteToWspLog(iLogEvent As
WspLogEvents, Optional StepDtls As cVectorStr, _
      Optional dtStamp As Currency = gdtmEmpty)
```

```
    ' Writes to the workspace log that is generated for the run. The last three
    ' parameters are valid only for Step Start and Step Complete events.
    Static bError As Boolean
    Dim sLabel As String
    Dim lIndex As Long
    Dim bHdr As Boolean
    Dim cTempConn As cConnection

    On Error GoTo WriteToWspLogErr

    Select Case iLogEvent
        Case mintRunStart
            Set mcWspLog = New cFileSM
            mcWspLog.FileName = GetDefaultDir(WspId, mcParameters) & gstrFileSeparator & _
                Trim(Str(RunId)) & gstrFileSeparator & "SMLog-"& Format(Now, FMT_WSP_LOG_FILE) & gstrLogFileSuffix
            mcWspLog.WriteLine (JulianDateToString(Determine64BitTime()) & " Start Run: " & vbTab & gstrSQ & GetWorkspaceDetails(WorkspaceId:=WspId)) & gstrSQ

            ' Write all current parameter values to the log
            bHdr = False
            For lIndex = 0 To mcParameters.ParameterCount - 1
                If mcParameters(lIndex).ParameterType <> gintParameterApplication Then
                    If Not bHdr Then
                        mcWspLog.WriteField JulianDateToString(Determine64BitTime()) & " Parameters: "
                        bHdr = True
                    Else
                        mcWspLog.WriteField vbTab & vbTab & vbTab
                    End If
                    mcWspLog.WriteLine vbTab & gstrSQ & mcParameters(lIndex).ParameterName & gstrSQ & vbTab & vbTab & gstrSQ & mcParameters(lIndex).ParameterValue & gstrSQ
                End If
            Next lIndex

            ' Write all connection properties to the log
            For lIndex = 0 To RunConnections.Count - 1
                Set cTempConn = RunConnections(lIndex)
                If lIndex = 0 Then
                    mcWspLog.WriteField JulianDateToString(Determine64BitTime()) & " Connections: "
                Else
                    mcWspLog.WriteField vbTab & vbTab & vbTab
                End If
                mcWspLog.WriteLine vbTab & gstrSQ & cTempConn.ConnectionName & gstrSQ & _
                    vbTab & vbTab & gstrSQ & cTempConn.ConnectionValue & gstrSQ & _
                    vbTab & "No Count: " & gstrSQ & cTempConn.NoCountDisplay & gstrSQ & gstrBlank & _
                    "No Execute: " & gstrSQ & cTempConn.NoExecute & gstrSQ & gstrBlank & _
                    "Parse Query Only: " & gstrSQ & cTempConn.ParseQueryOnly & gstrSQ & gstrBlank & _
                    "Quoted Identifiers: " & gstrSQ & cTempConn.QuotedIdentifiers & gstrSQ & gstrBlank & _
                    "ANSI Nulls: " & gstrSQ & cTempConn.AnsiNulls & gstrSQ & gstrBlank & _
                    "Show Query Plan: " & gstrSQ & cTempConn.ShowQueryPlan & gstrSQ & gstrBlank & _
                    "Show Stats Time: " & gstrSQ & cTempConn.ShowStatsTime & gstrSQ & gstrBlank & _
                    "Show Stats IO: " & gstrSQ & cTempConn.ShowStatsIO & gstrSQ & gstrBlank & _
                    "Row Count" & gstrSQ & cTempConn.RowCount & gstrSQ & gstrBlank & _
                    "Query Timeout" & gstrSQ & cTempConn.QueryTimeOut & gstrSQ
            Next lIndex

        Case mintRunComplete
            BugAssert Not mcWspLog Is Nothing
            mcWspLog.WriteLine (JulianDateToString(Determine64BitTime()) & " Comp. Run: " & vbTab & gstrSQ & GetWorkspaceDetails(WorkspaceId:=WspId)) & gstrSQ
            Set mcWspLog = Nothing

        Case mintStepStart
            For lIndex = StepDtls.Count - 1 To 0 Step -1
                sLabel = StepDtls(lIndex)
                If lIndex = StepDtls.Count - 1 Then
                    mcWspLog.WriteLine JulianDateToString(dtStamp) & " Start Step: " & vbTab & sLabel
                Else
                    mcWspLog.WriteLine vbTab & vbTab & vbTab & vbTab & sLabel
                End If
            Next lIndex

        Case mintStepComplete
            For lIndex = StepDtls.Count - 1 To 0 Step -1
                sLabel = StepDtls(lIndex)
                If lIndex = StepDtls.Count - 1 Then
                    mcWspLog.WriteLine JulianDateToString(dtStamp) & " Comp. Step: " & vbTab & sLabel
                Else
                    mcWspLog.WriteLine vbTab & vbTab & vbTab & vbTab & sLabel
                End If
            Next lIndex

    End Select

    Exit Sub

WriteToWspLogErr:
    If Not bError Then
        bError = True
    End If

End Sub
'Private Sub WriteToWspLog(iLogEvent As WspLogEvents, Optional StepDtls As cVectorStr, _
'       Optional dtStamp As Date = gdtmEmpty)
'
'   This function uses the LogWriter dll - memory corruption problems since the vb exe
'   and the vc Execute Dll both use the same dll to write.
'    ' Writes to the workspace log that is generated for the run. The last three
'    ' parameters are valid only for StepStart and StepComplete events.
'    Static bError As Boolean
'    Static sFile As String
'    Dim sLabel As String
'    Dim lIndex As Long
'    Dim bHdr As Boolean
'
'    On Error GoTo WriteToWspLogErr
'
'    Select Case iLogEvent
'        Case mintRunStart
'            Set mcWspLog = New LOGWRITERLib.SMLog
'            sFile = App.Path & "\" & "SMLog-" & Format(Now, FMT_WSP_LOG_FILE) & gstrLogFileSuffix
'            mcWspLog.FileName = sFile
'            mcWspLog.Init
'            mcWspLog.WriteLine (Format(Now, FMT_WSP_LOG_DATE) & " Start Run: " & vbTab & gstrSQ & GetWorkspaceDetails(WorkspaceId:=WspId)) & gstrSQ
'
'            ' Write all current parameter values to the log
'            bHdr = False
'            For lIndex = 0 To mcParameters.ParameterCount - 1
'                If mcParameters(lIndex).ParameterType <> gintParameterApplication Then
'                    If Not bHdr Then
'                        'mcWspLog.WriteLine Format(Now, FMT_WSP_LOG_DATE) & " Parameters: " & vbTab & gstrSQ & mcParameters(lIndex).ParameterName & gstrSQ & vbTab & vbTab & gstrSQ & mcParameters(lIndex).ParameterValue & gstrSQ
'                        bHdr = True
'                    Else
'                        'mcWspLog.WriteLine vbTab & vbTab & vbTab & vbTab & gstrSQ & mcParameters(lIndex).ParameterName & gstrSQ & vbTab & vbTab & gstrSQ & mcParameters(lIndex).ParameterValue & gstrSQ
'                    End If
'                End If
'            Next lIndex
'
'        Case mintRunComplete
'            BugAssert Not mcWspLog Is Nothing
'            mcWspLog.WriteLine (Format(Now, FMT_WSP_LOG_DATE) & " Comp. Run: " & vbTab & gstrSQ & GetWorkspaceDetails(WorkspaceId:=WspId)) & gstrSQ
'            Set mcWspLog = Nothing
'
'        Case mintStepStart
'            For lIndex = StepDtls.Count - 1 To 0 Step -1
```

```
'            sLabel = StepDtls(lIndex)
'            If lIndex = StepDtls.Count - 1
Then
'               mcWspLog.WriteLine
Format(dtStamp, FMT_WSP_LOG_DATE)
& " Start Step: " & vbTab & sLabel
'            Else
'               mcWspLog.WriteLine vbTab
& vbTab & vbTab & vbTab & sLabel
'            End If
'         Next lIndex
'
'      Case mintStepComplete
'         For lIndex = StepDtls.Count - 1 To
0 Step -1
'            sLabel = StepDtls(lIndex)
'            If lIndex = StepDtls.Count - 1
Then
'               mcWspLog.WriteLine
Format(dtStamp, FMT_WSP_LOG_DATE)
& " Comp. Step: " & vbTab & sLabel
'            Else
'               mcWspLog.WriteLine vbTab
& vbTab & vbTab & vbTab & sLabel
'            End If
'         Next lIndex
'
'   End Select
'
'   Exit Sub
'
'WriteToWspLogErr:
'   If Not bError Then
'      bError = True
'   End If
'
'End Sub
'
Public Property Get WspPreExecution() As
Variant
   WspPreExecution = mcvntWspPreCons
End Property
Public Property Let
WspPreExecution(ByVal vdata As Variant)
   mcvntWspPreCons = vdata
End Property

Public Property Get WspPostExecution() As
Variant
   WspPostExecution = mcvntWspPostCons
End Property
Public Property Let
WspPostExecution(ByVal vdata As Variant)
   mcvntWspPostCons = vdata
End Property

Private Sub ExecuteStep(cCurStep As
cInstance)
   ' Initializes a cRunStep object with all the
properties
   ' corresponding to the step to be executed
and calls it's
   ' execute method to execute the step

   Dim cExecStep As cRunStep

   On Error GoTo ExecuteStepErr
   mstrSource = mstrModuleName &
"ExecuteStep"

   ' Confirm that the step is a worker
   If cCurStep.Step.StepType <>
gintWorkerStep Then
      On Error GoTo 0
      Err.Raise vbObjectError +
errExecInstanceFailed, mstrSource, _

LoadResString(errExecInstanceFailed)
   End If

   Set cExecStep = InitExecStep()
   ' Exceeded the number of processes that we
can run simultaneously
   If cExecStep Is Nothing Then
      ' Raise an error
      On Error GoTo 0
      Err.Raise vbObjectError +
errProgramError, mstrSource, _
         LoadResString(errProgramError)
   End If
   ' Initialize the instance id - not needed for
step execution
   ' but necessary to identify later which
instance completed
   cExecStep.InstanceId = cCurStep.InstanceId

   Set cExecStep.ExecuteStep = cCurStep.Step
   Set cExecStep.Iterators = cCurStep.Iterators
   Set cExecStep.Globals = mcRunSteps
   Set cExecStep.WspParameters =
mcParameters
   Set cExecStep.WspConnections =
RunConnections
   Set cExecStep.WspConnDtls =
RunConnDtls

   ' Initialize all the pre and post-execution
constraints that
   ' have been defined globally for the
workspace
   cExecStep.WspPreCons =
mcvntWspPreCons
   cExecStep.WspPostCons =
mcvntWspPostCons

   ' Initialize all the pre and post-execution
constraints for
   ' the step being executed
   cExecStep.PreCons =
DetermineConstraints(cCurStep, gintPreStep)
   cExecStep.PostCons =
DetermineConstraints(cCurStep, gintPostStep)

   cExecStep.RunId = RunId
   cExecStep.CreateInputFiles =
CreateInputFiles

   ' Call the execute method to execute the step
   cExecStep.Execute

   Set cExecStep = Nothing

   Exit Sub

ExecuteStepErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   Call ExecutionFailed(cExecStep)

End Sub

Public Property Set Steps(cRunSteps As
cArrSteps)

   Set mcRunSteps = cRunSteps
   Set mcNavSteps.StepRecords = cRunSteps

End Property
Public Property Set Parameters(cParameters As
cArrParameters)
   ' A reference to the parameter array - we use it to
   ' substitute parameter values in the step text

   Set mcParameters = cParameters

End Property
Public Property Get Steps() As cArrSteps

   Set Steps = mcRunSteps

End Property
Public Property Get Constraints() As
cArrConstraints

   Set Constraints = mcRunConstraints

End Property
Public Property Set Constraints(vdata As
cArrConstraints)

   Set mcRunConstraints = vdata

End Property


Private Sub
cExecStep1_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub cExecStep1_ProcessStart(cStepRecord
As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep1_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep1.Index, InstanceId, Status)

End Sub

Private Sub cExecStep1_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub
```

```
Private Sub
cExecStep9_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep9_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep9_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep9.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep9_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep10_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep10_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep10_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep10.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep10_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep11_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep11_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep11_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep11.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep11_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub
Private Sub
cExecStep12_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep12_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep12_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep12.Index, InstanceId, Status)

End Sub

Private Sub cExecStep12_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub
Private Sub
cExecStep13_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep13_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep13_StepComplete(cStepRecord As cStep,
_
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    dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep13.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep13_StepStart(cStepRecord As
cStep, _
    dtmStartTime As Currency, InstanceId
As Long)

  Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub
Private Sub
cExecStep14_ProcessComplete(cStepRecor
d As cStep, _
    dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

  Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep14_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

  Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep14_StepComplete(cStepRecord
As cStep, _
    dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep14.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep14_StepStart(cStepRecord As
cStep, _
    dtmStartTime As Currency, InstanceId
As Long)

  Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub
Private Sub
cExecStep15_ProcessComplete(cStepRecor
d As cStep, _
    dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep15_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep15_StepComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep15.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep15_StepStart(cStepRecord As cStep,
_
    dtmStartTime As Currency, InstanceId As
Long)

  Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub
Private Sub
cExecStep16_ProcessComplete(cStepRecord
As cStep, _
    dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep16_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep16_StepComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep16.Index, InstanceId, Status)

End Sub

Private Sub cExecStep16_StepStart(cStepRecord
As cStep, _
    dtmStartTime As Currency, InstanceId As
Long)

  Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub
Private Sub
cExecStep17_ProcessComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep17_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep17_StepComplete(cStepRecord As cStep,
_
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep17.Index, InstanceId, Status)

End Sub

Private Sub cExecStep17_StepStart(cStepRecord
As cStep, _
    dtmStartTime As Currency, InstanceId As
Long)

  Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep18_ProcessComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub
```

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Private Sub
cExecStep18_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep18_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep18.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep18_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep19_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep19_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep19_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep19.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep19_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep20_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep20_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep20_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep20.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep20_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep21_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep21_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep21_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep21.Index, InstanceId, Status)

End Sub

Private Sub cExecStep21_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep22_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep22_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep22_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep22.Index, InstanceId, Status)

End Sub

Private Sub cExecStep22_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)
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End Sub

Private Sub
cExecStep23_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep23_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep23_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep23.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep23_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep24_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep24_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep24_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep24.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep24_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep25_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep25_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep25_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep25.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep25_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep26_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep26_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep26_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep26.Index, InstanceId, Status)

End Sub

Private Sub cExecStep26_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep27_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep27_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep27_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep27.Index, InstanceId, Status)
```

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End Sub

Private Sub
cExecStep27_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep28_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep28_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep28_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep28.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep28_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep29_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep29_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep29_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep29.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep29_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep30_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep30_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep30_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep30.Index, InstanceId,
Status)

End Sub

Private Sub cExecStep30_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep31_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep31_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep31_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep31.Index, InstanceId, Status)

End Sub

Private Sub cExecStep31_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep32_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep32_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)
```

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End Sub

Private Sub
cExecStep32_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep32.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep32_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep33_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep33_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep33_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep33.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep33_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep34_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep34_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep34_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep34.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep34_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep35_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep35_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep35_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep35.Index, InstanceId, Status)

End Sub

Private Sub cExecStep35_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep36_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep36_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep36_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep36.Index, InstanceId, Status)

End Sub

Private Sub cExecStep36_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep37_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub
```

```
Private Sub
cExecStep37_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep37_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep37.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep37_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep38_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep38_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep38_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep38.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep38_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep39_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep39_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep39_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep39.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep39_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep40_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep40_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep40_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep40.Index, InstanceId, Status)

End Sub

Private Sub cExecStep40_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep41_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep41_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep41_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep41.Index, InstanceId, Status)

End Sub

Private Sub cExecStep41_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep42_ProcessComplete(cStepRecord As
cStep, _
```

```
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep42_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep42_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep42.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep42_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep43_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep43_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep43_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep43.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep43_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep44_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep44_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep44_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep44.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep44_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep45_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep45_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep45_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep45.Index, InstanceId, Status)

End Sub

Private Sub cExecStep45_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep46_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep46_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep46_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep46.Index, InstanceId, Status)

End Sub

Private Sub cExecStep46_StepStart(cStepRecord
As cStep, _
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```
    dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep47_ProcessComplete(cStepRecor
d As cStep, _
    dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep47_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep47_StepComplete(cStepRecord
As cStep, _
    dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep47.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep47_StepStart(cStepRecord As
cStep, _
    dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep48_ProcessComplete(cStepRecor
d As cStep, _
    dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep48_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep48_StepComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep48.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep48_StepStart(cStepRecord As cStep,
_
    dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep49_ProcessComplete(cStepRecord
As cStep, _
    dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep49_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep49_StepComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep49.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep49_StepStart(cStepRecord As cStep,
_
    dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep50_ProcessComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep50_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep50_StepComplete(cStepRecord As cStep,
_
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep50.Index, InstanceId, Status)

End Sub

Private Sub cExecStep50_StepStart(cStepRecord
As cStep, _
    dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep51_ProcessComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep51_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep51_StepComplete(cStepRecord As cStep,
_
```

```
    dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep51.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep51_StepStart(cStepRecord As
cStep, _
    dtmStartTime As Currency, InstanceId
As Long)

  Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep52_ProcessComplete(cStepRecor
d As cStep, _
    dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

  Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep52_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

  Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep52_StepComplete(cStepRecord
As cStep, _
    dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep52.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep52_StepStart(cStepRecord As
cStep, _
    dtmStartTime As Currency, InstanceId
As Long)

  Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep53_ProcessComplete(cStepRecor
d As cStep, _
    dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep53_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep53_StepComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep53.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep53_StepStart(cStepRecord As cStep,
_
    dtmStartTime As Currency, InstanceId As
Long)

  Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep54_ProcessComplete(cStepRecord
As cStep, _
    dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep54_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep54_StepComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep54.Index, InstanceId, Status)

End Sub

Private Sub cExecStep54_StepStart(cStepRecord
As cStep, _
    dtmStartTime As Currency, InstanceId As
Long)

  Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep55_ProcessComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep55_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep55_StepComplete(cStepRecord As cStep,
_
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep55.Index, InstanceId, Status)

End Sub

Private Sub cExecStep55_StepStart(cStepRecord
As cStep, _
    dtmStartTime As Currency, InstanceId As
Long)

  Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep56_ProcessComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep56_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)
```

```
    Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep56_StepComplete(cStepRecord
As cStep, _
        dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep56.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep56_StepStart(cStepRecord As
cStep, _
        dtmStartTime As Currency, InstanceId
As Long)

    Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep57_ProcessComplete(cStepRecor
d As cStep, _
        dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

    Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep57_ProcessStart(cStepRecord As
cStep, _
        strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

    Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep57_StepComplete(cStepRecord
As cStep, _
        dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep57.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep57_StepStart(cStepRecord As
cStep, _
        dtmStartTime As Currency, InstanceId
As Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep58_ProcessComplete(cStepRecord
As cStep, _
        dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep58_ProcessStart(cStepRecord As
cStep, _
        strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep58_StepComplete(cStepRecord As
cStep, _
        dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep58.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep58_StepStart(cStepRecord As cStep,
_
        dtmStartTime As Currency, InstanceId As
Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep59_ProcessComplete(cStepRecord
As cStep, _
        dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep59_ProcessStart(cStepRecord As
cStep, _
        strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep59_StepComplete(cStepRecord As cStep,
_
        dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep59.Index, InstanceId, Status)

End Sub

Private Sub cExecStep59_StepStart(cStepRecord
As cStep, _
        dtmStartTime As Currency, InstanceId As
Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep60_ProcessComplete(cStepRecord As
cStep, _
        dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep60_ProcessStart(cStepRecord As cStep, _
        strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep60_StepComplete(cStepRecord As cStep,
_
        dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep60.Index, InstanceId, Status)

End Sub

Private Sub cExecStep60_StepStart(cStepRecord
As cStep, _
        dtmStartTime As Currency, InstanceId As
Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep61_ProcessComplete(cStepRecord As
cStep, _
        dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)
```

```
    Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep61_ProcessStart(cStepRecord As
cStep, _
        strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

    Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep61_StepComplete(cStepRecord
As cStep, _
        dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep61.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep61_StepStart(cStepRecord As
cStep, _
        dtmStartTime As Currency, InstanceId
As Long)

    Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep62_ProcessComplete(cStepRecor
d As cStep, _
        dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

    Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep62_ProcessStart(cStepRecord As
cStep, _
        strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

    Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep62_StepComplete(cStepRecord
As cStep, _
        dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep62.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep62_StepStart(cStepRecord As cStep,
_
        dtmStartTime As Currency, InstanceId As
Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep63_ProcessComplete(cStepRecord
As cStep, _
        dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep63_ProcessStart(cStepRecord As
cStep, _
        strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep63_StepComplete(cStepRecord As
cStep, _
        dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep63.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep63_StepStart(cStepRecord As cStep,
_
        dtmStartTime As Currency, InstanceId As
Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep64_ProcessComplete(cStepRecord
As cStep, _
        dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep64_ProcessStart(cStepRecord As cStep, _
        strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep64_StepComplete(cStepRecord As cStep,
_
        dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep64.Index, InstanceId, Status)

End Sub

Private Sub cExecStep64_StepStart(cStepRecord
As cStep, _
        dtmStartTime As Currency, InstanceId As
Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep65_ProcessComplete(cStepRecord As
cStep, _
        dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep65_ProcessStart(cStepRecord As cStep, _
        strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep65_StepComplete(cStepRecord As cStep,
_
        dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep65.Index, InstanceId, Status)

End Sub

Private Sub cExecStep65_StepStart(cStepRecord
As cStep, _
        dtmStartTime As Currency, InstanceId As
Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)
```

```
End Sub

Private Sub
cExecStep66_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep66_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep66_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep66.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep66_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep67_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep67_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep67_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep67.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep67_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep68_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep68_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep68_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep68.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep68_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep69_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep69_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep69_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep69.Index, InstanceId, Status)

End Sub

Private Sub cExecStep69_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep70_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep70_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep70_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep70.Index, InstanceId, Status)
```

```
End Sub

Private Sub
cExecStep70_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep71_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep71_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep71_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep71.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep71_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep72_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep72_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep72_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep72.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep72_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep73_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep73_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep73_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep73.Index, InstanceId,
Status)

End Sub

Private Sub cExecStep73_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep74_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep74_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep74_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep74.Index, InstanceId, Status)

End Sub

Private Sub cExecStep74_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep75_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep75_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)
```

```
End Sub

Private Sub
cExecStep75_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep75.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep75_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep76_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep76_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep76_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep76.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep76_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep77_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep77_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep77_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep77.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep77_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep78_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep78_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep78_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep78.Index, InstanceId, Status)

End Sub

Private Sub cExecStep78_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep79_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep79_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep79_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep79.Index, InstanceId, Status)

End Sub

Private Sub cExecStep79_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep80_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub
```

```
Private Sub
cExecStep80_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep80_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep80.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep80_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep81_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep81_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep81_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep81.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep81_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep82_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep82_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep82_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep82.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep82_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep83_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep83_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep83_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep83.Index, InstanceId, Status)

End Sub

Private Sub cExecStep83_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep84_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep84_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep84_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep84.Index, InstanceId, Status)

End Sub

Private Sub cExecStep84_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep85_ProcessComplete(cStepRecord As
cStep, _
```

```
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep85_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep85_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep85.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep85_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep86_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep86_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep86_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep86.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep86_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep87_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep87_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep87_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep87.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep87_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep88_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep88_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep88_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep88.Index, InstanceId, Status)

End Sub

Private Sub cExecStep88_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep89_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep89_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep89_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep89.Index, InstanceId, Status)

End Sub

Private Sub cExecStep89_StepStart(cStepRecord
As cStep, _
```

```
    dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep90_ProcessComplete(cStepRecor
d As cStep, _
    dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep90_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep90_StepComplete(cStepRecord
As cStep, _
    dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep90.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep90_StepStart(cStepRecord As
cStep, _
    dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep91_ProcessComplete(cStepRecor
d As cStep, _
    dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep91_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep91_StepComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep91.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep91_StepStart(cStepRecord As cStep,
_
    dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep92_ProcessComplete(cStepRecord
As cStep, _
    dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep92_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep92_StepComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep92.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep92_StepStart(cStepRecord As cStep,
_
    dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep93_ProcessComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep93_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep93_StepComplete(cStepRecord As cStep,
_
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep93.Index, InstanceId, Status)

End Sub

Private Sub cExecStep93_StepStart(cStepRecord
As cStep, _
    dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep94_ProcessComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep94_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep94_StepComplete(cStepRecord As cStep,
_
```

```
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep94.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep94_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep95_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep95_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep95_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep95.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep95_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep96_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep96_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep96_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep96.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep96_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep97_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep97_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep97_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep97.Index, InstanceId, Status)

End Sub

Private Sub cExecStep97_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep98_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep98_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep98_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep98.Index, InstanceId, Status)

End Sub

Private Sub cExecStep98_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep99_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep99_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)
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```
    Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep99_StepComplete(cStepRecord
As cStep, _
        dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep99.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep99_StepStart(cStepRecord As
cStep, _
        dtmStartTime As Currency, InstanceId
As Long)

    Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep2_ProcessComplete(cStepRecord
As cStep, _
        dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

    Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep2_ProcessStart(cStepRecord As
cStep, _
        strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

    Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep2_StepComplete(cStepRecord As
cStep, _
        dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep2.Index, _
          InstanceId, Status)

End Sub

Private Sub
cExecStep2_StepStart(cStepRecord As
cStep, _
        dtmStartTime As Currency, InstanceId As
Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub


Private Sub
cExecStep3_ProcessComplete(cStepRecord As
cStep, _
        dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep3_ProcessStart(cStepRecord As
cStep, _
        strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep3_StepComplete(cStepRecord As
cStep, _
        dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep3.Index, _
          InstanceId, Status)

End Sub

Private Sub
cExecStep3_StepStart(cStepRecord As cStep,
_
        dtmStartTime As Currency, InstanceId As
Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub


Private Sub
cExecStep4_ProcessComplete(cStepRecord As
cStep, _
        dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep4_ProcessStart(cStepRecord As
cStep, _
        strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep4_StepComplete(cStepRecord As cStep,
_
        dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep4.Index, _
          InstanceId, Status)

End Sub


Private Sub cExecStep4_StepStart(cStepRecord As
cStep, _
        dtmStartTime As Currency, InstanceId As
Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep5_ProcessComplete(cStepRecord As
cStep, _
        dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub cExecStep5_ProcessStart(cStepRecord
As cStep, _
        strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep5_StepComplete(cStepRecord As cStep,
_
        dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep5.Index, _
          InstanceId, Status)

End Sub

Private Sub cExecStep5_StepStart(cStepRecord As
cStep, _
        dtmStartTime As Currency, InstanceId As
Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub
```

```
Private Sub
cExecStep6_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep6_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep6_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep6.Index, _
         InstanceId, Status)

End Sub

Private Sub
cExecStep6_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep7_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep7_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep7_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep7.Index, _
         InstanceId, Status)

End Sub

Private Sub
cExecStep7_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep8_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep8_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep8_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep8.Index, _
         InstanceId, Status)

End Sub

Private Sub
cExecStep8_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub Class_Initialize()

   Dim lngCount As Long
   Dim lngTemp As Long

   On Error GoTo InitializeErr

   Set mcFreeSteps = New cVectorLng
   ' Initialize the array of free objects with all
elements
   ' for now
   For lngCount = 0 To
glngNumConcurrentProcesses - 1 Step 1
      mcFreeSteps.Add lngCount
   Next lngCount

   ' Initialize a byte array with the number of free
processes. It will
   ' be used later to determine if any step is running
   ' Each element in the array can represent 8 steps,
1 for each bit
   ReDim mbarrFree(glngNumConcurrentProcesses
\ gintBitsPerByte)

   ' Initialize each element in the byte array w/ all
1's
   ' (upto glngNumConcurrentProcesses)
   For lngCount = LBound(mbarrFree) To
UBound(mbarrFree) Step 1
      lngTemp = IIf( _
            glngNumConcurrentProcesses -
(gintBitsPerByte * lngCount) > gintBitsPerByte, _
            gintBitsPerByte, _
            glngNumConcurrentProcesses -
(gintBitsPerByte * lngCount))

      mbarrFree(lngCount) = (2 ^ lngTemp) - 1
   Next lngCount

   Set mcInstances = New cInstances
   Set mcFailures = New cFailedSteps
   Set mcNavSteps = New cStepTree
   Set mcTermSteps = New cTermSteps

   ' Initialize the Abort flag to False
   mblnAbort = False
   mblnAsk = False

   Exit Sub

InitializeErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError + errInitializeFailed,
mstrModuleName & "Initialize", _
         LoadResString(errInitializeFailed)

End Sub
Private Sub Class_Terminate()

   On Error GoTo Class_TerminateErr

   mcFreeSteps.Clear
   Set mcFreeSteps = Nothing
   ReDim mbarrFree(0)

   mcInstances.Clear
   Set mcInstances = Nothing

   Set mcFailures = Nothing
   Set mcNavSteps = Nothing
   Set mcTermSteps = Nothing

   Exit Sub

Class_TerminateErr:
   Call LogErrors(Errors)
```

```
End Sub

Private Sub
mcTermSteps_TermStepExists(cStepDetails
As cTermStep)

   Call
RunNextStep(cStepDetails.TimeComplete,
cStepDetails.Index, _
         cStepDetails.InstanceId,
cStepDetails.ExecutionStatus)

End Sub

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cRunItDetails"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cRunItDetails.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This module encapsulates
the properties of iterator values
'              that are used by the step being
executed at runtime.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'

Option Explicit

' Used to indicate the source module name
when errors
' are raised by this class
Private Const mstrModuleName As String =
"cRunItDetails."
Private mstrSource As String

Private mstrIteratorName As String
Private mintType As ValueType
Private mlngSequence As Long
Private mlngFrom As Long
Private mlngTo As Long
Private mlngStep As Long
Private mstrValue As String

Public Property Get RangeTo() As Long

   RangeTo = mlngTo

End Property
Public Property Let RangeTo(ByVal vdata
As Long)

   mlngTo = vdata

End Property

Public Property Get RangeFrom() As Long

   RangeFrom = mlngFrom

End Property
Public Property Get Sequence() As Long

   Sequence = mlngSequence

End Property

Public Property Get RangeStep() As Long

   RangeStep = mlngStep

End Property
Public Property Let RangeStep(vdata As Long)

   mlngStep = vdata

End Property

Public Property Let RangeFrom(ByVal vdata
As Long)

   mlngFrom = vdata

End Property
Public Property Let Sequence(ByVal vdata As
Long)

   mlngSequence = vdata

End Property

Public Property Get IteratorType() As
ValueType

   IteratorType = mintType

End Property
Public Property Let IteratorType(ByVal vdata
As ValueType)

   On Error GoTo TypeErr
   mstrSource = mstrModuleName & "Type"

   ' These constants have been defined in the
enumeration,
   ' Type, which is exposed
   Select Case vdata
      Case gintFrom, gintTo, gintStep,
gintValue
         mintType = vdata

      Case Else
         On Error GoTo 0
         Err.Raise vbObjectError +
errTypeInvalid, _
            mstrSource,
LoadResString(errTypeInvalid)
   End Select

   Exit Property

TypeErr:
   LogErrors Errors
   mstrSource = mstrModuleName & "Type"
   On Error GoTo 0
   Err.Raise vbObjectError + errTypeInvalid, _
      mstrSource,
LoadResString(errTypeInvalid)

End Property
Private Sub IsList()

   If mintType <> gintValue Then
      On Error GoTo 0
      Err.Raise vbObjectError +
errInvalidProperty, mstrSource, _
            LoadResString(errInvalidProperty)
   End If

End Sub

Private Sub IsRange()

   If mintType = gintValue Then
      On Error GoTo 0
      Err.Raise vbObjectError + errInvalidProperty,
mstrSource, _
            LoadResString(errInvalidProperty)
   End If

End Sub

Public Property Get Value() As String

   Value = mstrValue

End Property
Public Property Let Value(vdata As String)

   mstrValue = vdata

End Property


Public Property Get IteratorName() As String

   IteratorName = mstrIteratorName

End Property
Public Property Let IteratorName(ByVal vdata As
String)

   mstrIteratorName = vdata

End Property

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cRunItNode"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' An iterator class containing the properties that are
used
' by the stpe being executed.
' These iterators might actually come from steps that
are at
' a higher level than the step actually being executed
(viz.
' direct ascendants of the step at any level).

Option Explicit

Public IteratorName As String
Public Value As String
Public StepId As Long

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cRunOnly"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
Option Explicit

Public Event Done()
Private WithEvents mcRunWsp As
cRunWorkspace
Attribute mcRunWsp.VB_VarHelpID = -1
```

```
Public WspName As String
Public WorkspaceId As Long
Public WspLog As String

Public Sub RunWsp()

   On Error GoTo RunWspErr

   Set mcRunWsp = New cRunWorkspace
   Set mcRunWsp.LoadDb = dbsAttTool
   mcRunWsp.WorkspaceId = WorkspaceId
   mcRunWsp.CreateInputFiles = True
   mcRunWsp.RunWorkspace

   Exit Sub

RunWspErr:
   ' Log the VB error code
   LogErrors Errors

End Sub

Private Sub
mcRunWsp_RunComplete(dtmEndTime As
Currency)

   MsgBox "Completed executing
workspace: " & gstrSQ & WspName &
gstrSQ & " at " & _
         JulianDateToString(dtmEndTime) &
"." & vbCrLf & vbCrLf & _
         "The log file for the run is: " &
gstrSQ & WspLog & gstrSQ & "."
   RaiseEvent Done

End Sub

Private Sub
mcRunWsp_RunStart(dtmStartTime As
Currency, strWspLog As String, lRunId As
Long)
   WspLog = strWspLog
End Sub


VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cRunStep"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cRunStep.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This class executes the step
that is assigned to the
'              ExecuteStep property. It executes
the pre-execution constraints
'              in sequence and then the step
itself. At the end it executes
'              the post-execution constraints.
Since these steps should always
'              be executed in sequence, each step
is only fired on the
'              completion of the previous step.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this class
Private Const mstrModuleName As String =
"cRunStep."
Private mstrSource As String

' Local variable(s) to hold property value(s)
Private mcStep As cStep
Private mcGlobals As cArrSteps
Private mcvntWspPreCons As Variant
Private mcvntWspPostCons As Variant
Private mcvntPreCons As Variant
Private mcvntPostCons As Variant
Private mcIterators As cRunColIt
Private mlngInstanceId As Long ' Identifier for
the current instance
Private mlngIndex As Long ' Index value for
the current instance
Private mstrCommand As String ' The
command string
Private msRunStepDtl As String ' Step text/file
name that will go into the run_step_details
table
Private mblnAbort As Boolean   ' Set to True
when the user aborts the run
Private msOutputFile As String
Private msErrorFile As String
Private miStatus As InstanceStatus
Private mcVBErr As cVBErrorsSM
Public WspParameters As cArrParameters
Public WspConnections As cConnections
Public WspConnDtls As cConnDtls

Private WithEvents mcTermProcess As
cTermProcess
Attribute mcTermProcess.VB_VarHelpID = -1
Public RunId As Long
Public CreateInputFiles As Boolean
Private msOutputDir As String

' Object that will execute the step
Private WithEvents mcExecObj As
EXECUTEDLLLib.Execute
Attribute mcExecObj.VB_VarHelpID = -1

' Holds the step that is currently being executed
(constraint or
' worker step)
Private mcExecStep As cStep

Private Const msCompareExe As String =
"\diff.exe"

Private Enum NextNodeType
   mintWspPreConstraint = 1
   mintPreConstraint
   mintStep
   mintWspPostConstraint
   mintPostConstraint
End Enum

' Public events to notify the calling function of
the
' start and end time for each step
Public Event StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)
Public Event StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)
Public Event ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, _
      InstanceId As Long)
Public Event ProcessComplete(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId As
Long, lElapsed As Long)

Private Function AppendDiffErrors(sDiffFile As
String)
   ' The file containing the errors generated by the
diff utility is passed in
   ' These errors are appended to the error file for
the step

   Dim sTemp As String
   Dim InputFile As Integer

   If Not StringEmpty(sDiffFile) Then

      InputFile = FreeFile
      Open sDiffFile For Input Access Read As
InputFile

      Do While Not EOF(InputFile)        ' Loop
until end of file.
         Line Input #InputFile, sTemp    ' Read line
into variable.
         mcVBErr.LogMessage sTemp
      Loop

      Close InputFile
   End If

End Function

Private Sub CreateStepTextFile()
   ' Creates a file containing the step text being
executed
   On Error GoTo CreateStepTextFileErr

   Dim sInputFile As String

   If mcExecStep.ExecutionMechanism =
gintExecuteShell Then
      sInputFile = GetOutputFile(gsCmdFileSuffix)
   Else
      sInputFile = GetOutputFile(gsSqlFileSuffix)
   End If

   ' Generate a file containing the step text being
executed
   If Not StringEmpty(mcExecStep.StepTextFile)
Or mcExecStep.ExecutionMechanism =
gintExecuteShell Then
      FileCopy mstrCommand, sInputFile
   Else
      Call WriteCommandToFile(mstrCommand,
sInputFile)
   End If

   Exit Sub

CreateStepTextFileErr:

   mcVBErr.LogVBErrors

End Sub
Private Function GetOutputFile(strFileExt As
String) As String
   ' This function generates the output file name for
the step currently being executed
   ' The value of the built-in parameter 'DefaultDir'
is appended with the run identifier
```

```
    ' for the file location
    ' The step label is used for the file name
and a combination of all iterator values
    ' for the step is used to make the output
files unique for each instance
    Dim sFile As String
    Dim sIt As String
    Dim lIt As Long

    On Error GoTo GetOutputFileErr

    sFile =
SubstituteParametersIfPossible(mcExecStep
.StepLabel)

    sFile = TranslateStepLabel(sFile)

    If mcExecStep Is mcStep Then
        ' Use iterators that have been defined
for the worker or any of it's managers
        ' to make the error/log file unique for
this instance
        For lIt = mcIterators.Count - 1 To 0
Step -1
            sIt = sIt & gsExtSeparator &
mcIterators(lIt).Value
        Next lIt
    End If
    sIt = sIt & strFileExt

    ' Ensure that the length of the complete
path does not exceed 255 characters
    If Len(msOutputDir) + Len(sFile) +
Len(sIt) > MAX_PATH Then
        sFile = Mid(sFile, 1, MAX_PATH -
Len(sIt) - Len(msOutputDir))
    End If
    GetOutputFile = msOutputDir & sFile &
sIt
    Exit Function

GetOutputFileErr:

    ' Does not make sense to log error to the
error file yet. Write to the project
    ' log and return the step label as default
    GetOutputFile = mcExecStep.StepLabel
& gsExtSeparator & strFileExt

End Function


Private Sub HandleExecutionError()

    On Error GoTo HandleExecutionError

    ' Log the error code raised by Visual
Basic
    miStatus = gintFailed
    mcVBErr.LogVBErrors
    Call
mcVBErr.WriteError(errExecuteStepFailed,
_
            OptArgs:="Continuation criteria for
the step is: " &
gsContCriteria(mcStep.ContinuationCriteria
))

HandleExecutionError:

    ' Logging failed - return

End Sub

Public Property Get Index() As Long

    Index = mlngIndex

End Property
Public Property Let Index(ByVal vdata As
Long)

    mlngIndex = vdata

End Property
Private Function InitializeExecStatus() As
InstanceStatus
    Dim sCompareFile As String

    On Error GoTo InitializeExecStatusErr

    InitializeExecStatus =
mcExecObj.StepStatus

    If InitializeExecStatus = gintComplete Then
        If Not
StringEmpty(mcExecStep.FailureDetails) Then
            ' Compare output to determine whether
the step failed
            sCompareFile =
GetShortName(SubstituteParameters( _
                    mcExecStep.FailureDetails,
mcExecStep.WorkspaceId, mcIterators, _
                WspParameters))
            InitializeExecStatus =
IIf(CompareOutput(sCompareFile,
msOutputFile), gintComplete, gintFailed)
        End If
    End If

    Exit Function

InitializeExecStatusErr:
    mcVBErr.LogVBErrors
'    Call LogErrors(Errors)
    InitializeExecStatus =
mcExecObj.StepStatus

End Function
Private Function
CompareOutput(sCompareFile As String,
sOutputFile As String) As Boolean

    Dim sCmpOutput As String
    Dim sDiffOutput As String

    On Error GoTo CompareOutputErr

    ' Create temporary files to store the file
compare output and
    ' the errors generated by the compare
function
    sCmpOutput = CreateTempFile()
    sDiffOutput = CreateTempFile()

    ' Run the compare utility and redirect it's
output and errors
    SyncShell ("cmd /c " & _
            GetShortName(App.Path &
msCompareExe) & gstrBlank & _
            sCompareFile & gstrBlank &
sOutputFile & _
            " > " & sCmpOutput & " 2> " &
sDiffOutput)

    If FileLen(sDiffOutput) > 0 Then
        ' The compare generated errors - append
error msgs to the error file
        Call AppendDiffErrors(sDiffOutput)
        CompareOutput = False
    Else
        CompareOutput = (FileLen(sCmpOutput) = 0)
    End If

    If Not CompareOutput Then
        mcVBErr.WriteError errDiffFailed
    End If

    ' Delete the temporary files used to store the
output of the compare and
    ' the errors generated by the compare
    Kill sDiffOutput
    Kill sCmpOutput

    Exit Function

CompareOutputErr:
    mcVBErr.LogVBErrors
    CompareOutput = False

End Function
Public Property Get InstanceId() As Long

    InstanceId = mlngInstanceId

End Property
Public Property Let InstanceId(ByVal vdata As
Long)

    mlngInstanceId = vdata

End Property

Private Function ExecuteConstraint(vntConstraints
As Variant, _
        ByRef intLoopIndex As Integer) As Boolean

    ' Returns True if there is a constraint in the
passed in
    ' array that remains to be executed

    If IsArray(vntConstraints) And Not
IsEmpty(vntConstraints) Then
        ExecuteConstraint = (LBound(vntConstraints)
<= intLoopIndex) And (intLoopIndex <=
UBound(vntConstraints))
    Else
        ExecuteConstraint = False
    End If

End Function
Private Function NextStep() As cStep

    ' Determines which is the next step to be executed
- it could
    ' be either a pre-execution step, the worker step
itself
    ' or a post-execution step

    Dim cConsRec As cConstraint
    Dim cNextStepRec As cStep
    Dim vntStepConstraints As Variant

    ' Static variable to remember exactly where we
are in the
    ' processing
    Static intIndex As Integer
    Static intNextStepType As NextNodeType

    On Error GoTo NextStepErr

    If mblnAbort = True Then
        ' The user has aborted the run - do not run any
more
        ' processes for the step
```

```
      Set NextStep = Nothing
      Exit Function
   End If

   If intNextStepType = 0 Then
      ' First time through this function - set
the Index and
      ' node type to initial values
      intNextStepType =
mintWspPreConstraint
      intIndex = 0
      RaiseEvent StepStart(mcStep,
Determine64BitTime(), mlngInstanceId)
   End If

   Do
      Select Case intNextStepType
         Case mintWspPreConstraint
            vntStepConstraints =
mcvntWspPreCons

         Case mintPreConstraint
            vntStepConstraints =
mcvntPreCons

         Case mintStep
            ' CONS:
            If mcStep.StepType =
gintWorkerStep Then
               Set cNextStepRec = mcStep
            End If

         Case mintWspPostConstraint
            vntStepConstraints =
mcvntWspPostCons

         Case mintPostConstraint
            vntStepConstraints =
mcvntPostCons

      End Select

      If intNextStepType <> mintStep Then
         ' Check if there is a constraint to be
executed
         If
ExecuteConstraint(vntStepConstraints,
intIndex) Then
            ' Get the corresponding step record
to be executed
            ' Query the global step record for
the current
            ' constraint
            Set cConsRec =
vntStepConstraints(intIndex)

            Set cNextStepRec =
mcGlobals.QueryStep(cConsRec.GlobalStep
Id)
            intIndex = intIndex + 1
         Else
            If intNextStepType =
mintPostConstraint Then
               ' No more stuff to be executed
for the step
               ' Raise a Done event
               Set cNextStepRec = Nothing

               ' Set the next step type to an
invalid value
               intNextStepType = -1
            Else
               Call
NextType(intNextStepType, intIndex)
            End If
         End If
      Else
         ' Increment the step type so we look at
the post-
         ' execution steps the next time through
         Call NextType(intNextStepType,
intIndex)
      End If

   Loop Until (Not cNextStepRec Is Nothing)
Or _
         intNextStepType = -1

   Set NextStep = cNextStepRec

   Exit Function

NextStepErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   mstrSource = mstrModuleName &
"NextStep"
   Err.Raise vbObjectError +
errNextStepFailed, mstrSource, _
      LoadResString(errNextStepFailed)

End Function
Public Sub Execute()
   ' This procedure is the method that executes
the step that
   ' is assigned to the ExecuteStep property. It
call a procedure
   ' to determine the next step to be executed.
   ' Then it initializes all the properties of the
cExecuteSM object
   ' and calls it's run method to execute it.
   Dim cConn As cConnection
   Dim cRunConnDtl As cConnDtl

   On Error GoTo ExecuteErr

   ' If this procedure is called after a step has
completed,
   ' we would have to check if we created any
temporary files
   ' while executing that step
   If Not mcExecStep Is Nothing Then
      If Not
StringEmpty(mcExecStep.StepTextFile) Or
mcExecStep.ExecutionMechanism =
gintExecuteShell Then
         ' Remove the temporary file that we
created while
         ' running this command
         Kill mstrCommand
      End If

      Call StepCompleted

      ' The VB errors class stores a reference to
the Execute class since it uses
      ' a method of the class to write errors to
the error log. Hence,
      ' release all references to the Execute
object before destroying it.
      Set mcVBErr.ErrorFile = Nothing
      Set mcExecObj = Nothing

      ' Delete empty output and error files
(generated by shell commands)
      ' (Can be done only after cleaning up
cExecObj)
      Call DeleteEmptyOutputFiles
   Else
      ' First time through - initialize the location of
output files
      msOutputDir =
GetDefaultDir(mcStep.WorkspaceId,
WspParameters)
      msOutputDir = msOutputDir &
gstrFileSeparator & Trim(Str(RunId)) &
gstrFileSeparator
      ' Dummy file since the function expects a file
name
      MakePathValid (msOutputDir & "a.txt")
   End If

   ' Call a procedure to determine the next step to be
executed
   ' - could be a constraint or the step itself
   ' Initialize a module-level variable to the step
being
   ' executed
   Set mcExecStep = NextStep
   If mcExecStep Is Nothing Then
      RaiseEvent StepComplete(mcStep,
Determine64BitTime(), mlngInstanceId, miStatus)
      ' No more stuff to execute
      Exit Sub
   End If

   Dim sStartDir As String

   Set mcExecObj = New
EXECUTEDLLLib.Execute

   ' The VB errors class uses the WriteError method
of the Execute class to write
   ' all VB errors to the error file for the step (this
prevents a clash when the
   ' VB errors and Execution errors have to be
written to the same log). Hence, store
   ' a reference to the Execute object in mcVBErr
   msErrorFile = GetOutputFile(gsErrorFileSuffix)
   mcExecObj.ErrorFile = msErrorFile
   Call DeleteFile(msErrorFile,
bCheckIfEmpty:=False)
   Set mcVBErr.ErrorFile = mcExecObj

   If mcExecStep.ExecutionMechanism =
gintExecuteShell Then
      sStartDir =
Trim$(GetShortName(SubstituteParameters( _
            mcExecStep.StartDir,
mcExecStep.WorkspaceId, mcIterators,
WspParameters:=WspParameters)))
      ' Dummy connection object
      Set cConn = New cConnection
      Set cRunConnDtl = New cConnDtl
   Else
      ' Find the connection string value and
substitute parameter values in it
      Set cRunConnDtl =
WspConnDtls.GetConnectionDtl(mcExecStep.Wor
kspaceId, mcExecStep.StartDir)
      Set cConn =
WspConnections.GetConnection(mcExecStep.Wor
kspaceId, cRunConnDtl.ConnectionString)
      sStartDir =
Trim$(SubstituteParameters(cConn.ConnectionVal
ue, _
         mcExecStep.WorkspaceId, mcIterators,
WspParameters:=WspParameters))
   End If

   msOutputFile =
GetOutputFile(gsOutputFileSuffix)
   Call DeleteFile(msOutputFile,
bCheckIfEmpty:=False)
```

```
    mcExecObj.OutputFile = msOutputFile
'   mcExecObj.LogFile =
GetShortName(SubstituteParameters( _
'           mcExecStep.LogFile,
mcExecStep.WorkspaceId, mcIterators,
WspParameters:=WspParameters))
    If mcExecStep.ExecutionMechanism =
gintExecuteODBC And _
          cRunConnDtl.ConnType =
ConnTypeDynamic Then
        Call
mcExecObj.DoExecute(BuildCommandStri
ng(), sStartDir,
mcExecStep.ExecutionMechanism, _
              cConn.NoCountDisplay,
cConn.NoExecute, cConn.ParseQueryOnly,
cConn.QuotedIdentifiers, _
              cConn.AnsiNulls,
cConn.ShowQueryPlan,
cConn.ShowStatsTime,
cConn.ShowStatsIO, _
              cConn.RowCount,
cConn.QueryTimeOut, gstrEmptyString)
    Else
        Call
mcExecObj.DoExecute(BuildCommandStri
ng(), sStartDir,
mcExecStep.ExecutionMechanism, _
              cConn.NoCountDisplay,
cConn.NoExecute, cConn.ParseQueryOnly,
cConn.QuotedIdentifiers, _
              cConn.AnsiNulls,
cConn.ShowQueryPlan,
cConn.ShowStatsTime,
cConn.ShowStatsIO, _
              cConn.RowCount,
cConn.QueryTimeOut,
mcExecStep.StartDir)
    End If

    Exit Sub

ExecuteErr:
    Call HandleExecutionError

    ' We can assume that if we are in this
function, a StepStart event has been
triggered already.
    RaiseEvent StepComplete(mcStep,
Determine64BitTime(), mlngInstanceId,
miStatus)

End Sub
Private Function BuildCommandString() As
String
    ' Process text to be executed - either from
the text
    ' field or read it from a file.
    ' This function will always return the
command text for ODBC commands
    ' and a file name for Shell commands
    Dim sFile As String
    Dim sCommand As String
    Dim sTemp As String

    On Error GoTo BuildCommandStringErr

    If Not
StringEmpty(mcExecStep.StepTextFile)
Then
        ' Substitute parameter values and
environment variables
        ' in the filename
        msRunStepDtl =
SubstituteParameters(mcExecStep.StepTextFil
e, _
              mcExecStep.WorkspaceId,
mcIterators, WspParameters:=WspParameters)

        sFile = GetShortName(msRunStepDtl)

        mstrCommand =
SubstituteParametersInText(sFile,
mcExecStep.WorkspaceId)

        If mcExecStep.ExecutionMechanism =
gintExecuteODBC Then
            ' Read the contents of the file and pass
it to ODBC
            BuildCommandString =
ReadCommandFromFile(mstrCommand)
        Else
            BuildCommandString = mstrCommand
        End If
    Else
        ' Substitute parameter values and
environment variables
        ' in the step text
        msRunStepDtl =
SubstituteParameters(mcExecStep.StepText, _
              mcExecStep.WorkspaceId,
mcIterators, WspParameters:=WspParameters)
        mstrCommand = msRunStepDtl

        If mcExecStep.ExecutionMechanism =
gintExecuteShell Then
            ' Write the command to a temp file
(enables us to execute multiple
            ' commands via the command
interpreter)
            mstrCommand =
WriteCommandToFile(msRunStepDtl)
            BuildCommandString = mstrCommand
        Else
            BuildCommandString =
SQLFixup(msRunStepDtl)
        End If
    End If

    If CreateInputFiles Then
        Call CreateStepTextFile
    End If

    Exit Function

BuildCommandStringErr:
    ' Log the error code raised by the Execute
procedure
'   Call LogErrors(Errors)
    mcVBErr.LogVBErrors

    On Error GoTo 0
    mstrSource = mstrModuleName &
"Execute"
    Err.Raise vbObjectError +
errExecuteStepFailed, mstrSource, _
        LoadResString(errExecuteStepFailed) &
mstrCommand

End Function
Public Sub Abort()

    On Error GoTo AbortErr

    ' Setting the Abort flag to True will ensure
that we
    ' don't execute any more processes for this
step
    mblnAbort = True

    If Not mcExecObj Is Nothing Then
        mcExecObj.Abort
    Else
        ' We are not in the middle of execution yet
    End If

    Exit Sub

AbortErr:
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError + errProgramError, _
        mstrModuleName & "Abort", _
        LoadResString(errProgramError)

End Sub
Private Sub NextType(ByRef StepType As
NextNodeType, _
        ByRef Position As Integer)

    StepType = StepType + 1
    Position = 0

End Sub
Private Sub StepCompleted()

    On Error GoTo StepCompletedErr

    If Not mcExecStep Is Nothing Then
        If mcExecStep Is mcStep Then
            miStatus = InitializeExecStatus
            If miStatus = gintFailed Then
                ' Create input files if the step failed
execution and one hasn't been created already
                If Not CreateInputFiles Then
CreateStepTextFile
                Call
mcVBErr.WriteError(errExecuteStepFailed, _
                    OptArgs:="Continuation criteria for
the step is: " &
gsContCriteria(mcStep.ContinuationCriteria))
            End If
        End If
    End If

    Exit Sub

StepCompletedErr:
    ' Log the error code raised by Visual Basic
    miStatus = gintFailed
    mcVBErr.LogVBErrors
    Call mcVBErr.WriteError(errExecuteStepFailed,
_
        OptArgs:="Continuation criteria for the step
is: " &
gsContCriteria(mcStep.ContinuationCriteria))

End Sub
Private Sub DeleteEmptyOutputFiles()

    On Error GoTo DeleteEmptyOutputFilesErr

    ' Delete empty output and error files
    If Not mcExecStep Is Nothing Then
        Call DeleteFile(msErrorFile,
bCheckIfEmpty:=True)
        Call DeleteFile(msOutputFile,
bCheckIfEmpty:=True)
    End If

    Exit Sub

DeleteEmptyOutputFilesErr:
```

```
    ' Not a critical error - continue

End Sub
Private Function
ReadCommandFromFile(strFileName As
String) As String

    ' Returns the contents of the passed in file

    Dim sCommand As String
    Dim sTemp As String
    Dim InputFile As Integer

    On Error GoTo
ReadCommandFromFileErr

    If Not StringEmpty(strFileName) Then

        InputFile = FreeFile
        Open strFileName For Input Access
Read As InputFile

        Line Input #InputFile, sCommand '
Read line into variable.

        Do While Not EOF(InputFile) ' Loop
until end of file.
            Line Input #InputFile, sTemp ' Read
line into variable.
            sCommand = sCommand & vbCrLf
& sTemp
        Loop

        Close InputFile
    End If

    ReadCommandFromFile = sCommand

    Exit Function

ReadCommandFromFileErr:

    ' Log the error code raised by Visual
Basic
    Call LogErrors(Errors)
    mstrSource = mstrModuleName &
"ReadCommandFromFile"
    On Error GoTo 0
    Err.Raise vbObjectError +
errSubValuesFailed, _
            gstrSource, _
            LoadResString(errSubValuesFailed)

End Function
Private Function
SubstituteParametersIfPossible(strLabel As
String)

    On Error GoTo
SubstituteParametersIfPossibleErr

    SubstituteParametersIfPossible =
SubstituteParameters(strLabel, _
            mcExecStep.WorkspaceId,
mcIterators,
WspParameters:=WspParameters)
    Exit Function

SubstituteParametersIfPossibleErr:
    SubstituteParametersIfPossible = strLabel

End Function
Private Function
SubstituteParametersInText(strFileName As
String, _
        lngWorkspace As Long) As String

    ' Reads each line in the passed in file,
substitutes parameter
    ' values in the line and writes out the
modified line to a
    ' temporary file that we create. The
temporary file will be
    ' removed once the step completes
execution.
    ' Returns the name of the newly created
temporary file.

    Dim strTempFile As String
    Dim strTemp As String
    Dim strOutput As String
    Dim InputFile As Integer
    Dim OutputFile As Integer

    On Error GoTo
SubstituteParametersInTextErr

    strTempFile = CreateTempFile()

    If Not StringEmpty(strFileName) Then

        InputFile = FreeFile
        Open strFileName For Input Access Read
As InputFile

        OutputFile = FreeFile
        Open strTempFile For Output Access
Write As OutputFile

        Do While Not EOF(InputFile) ' Loop until
end of file.
            Line Input #InputFile, strTemp ' Read
line into variable.
            strOutput =
SubstituteParameters(strTemp, lngWorkspace,
mcIterators, WspParameters:=WspParameters)

            If mcExecStep.ExecutionMechanism =
gintExecuteODBC Then strOutput =
SQLFixup(strOutput)

            Print #OutputFile, strOutput
            BugMessage strOutput
        Loop

    End If

    Close InputFile
    Close OutputFile

    SubstituteParametersInText = strTempFile

    Exit Function

SubstituteParametersInTextErr:

    ' Log the error code raised by Visual Basic
'    Call LogErrors(Errors)
    mcVBErr.LogVBErrors
    mstrSource = mstrModuleName &
"SubstituteParametersInText"
    On Error GoTo 0
    Err.Raise vbObjectError +
errSubValuesFailed, _
            gstrSource, _
            LoadResString(errSubValuesFailed)

End Function
Private Function WriteCommandToFile(sCommand
As String, Optional sFile As String =
gstrEmptyString) As String

    ' Writes the command text to a temporary file
    ' Returns the name of the temporary file

    Dim OutputFile As Integer

    On Error GoTo WriteCommandToFileErr

    If StringEmpty(sFile) Then
        sFile = CreateTempFile()
    End If

    OutputFile = FreeFile
    Open sFile For Output Access Write As
OutputFile

    Print #OutputFile, sCommand

    Close OutputFile

    WriteCommandToFile = sFile

    Exit Function

WriteCommandToFileErr:

    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    mstrSource = mstrModuleName &
"WriteCommandToFile"
    On Error GoTo 0
    Err.Raise vbObjectError + errSubValuesFailed, _
            gstrSource, _
            LoadResString(errSubValuesFailed)

End Function


Public Property Get WspPreCons() As Variant
    WspPreCons = mcvntWspPreCons
End Property
Public Property Let WspPreCons(ByVal vdata As
Variant)
    mcvntWspPreCons = vdata
End Property

Public Property Get WspPostCons() As Variant
    WspPostCons = mcvntWspPostCons
End Property
Public Property Let WspPostCons(ByVal vdata As
Variant)
    mcvntWspPostCons = vdata
End Property

Public Property Get PreCons() As Variant
    PreCons = mcvntPreCons
End Property
Public Property Let PreCons(ByVal vdata As
Variant)
    mcvntPreCons = vdata
End Property

Public Property Get PostCons() As Variant
    PostCons = mcvntPostCons
End Property
Public Property Let PostCons(ByVal vdata As
Variant)
    mcvntPostCons = vdata
End Property

Public Property Set Globals(cRunSteps As
cArrSteps)
```

```
    Set mcGlobals = cRunSteps

End Property
Public Property Set ExecuteStep(cRunStep
As cStep)

    Set mcStep = cRunStep

End Property
Public Property Get Globals() As cArrSteps

    Set Globals = mcGlobals

End Property
Public Property Get ExecuteStep() As cStep

    Set ExecuteStep = mcStep

End Property
Public Property Set Iterators(vdata As
cRunColIt)

    Set mcIterators = vdata

End Property
Private Sub Class_Initialize()

    ' Initialize the Abort flag to False
    mblnAbort = False
    Set mcVBErr = New cVBErrorsSM
    Set mcTermProcess = New cTermProcess

End Sub

Private Sub Class_Terminate()

    On Error GoTo Class_TerminateErr

    Set mcExecObj = Nothing
    Set mcVBErr = Nothing
    Set mcTermProcess = Nothing

    Exit Sub

Class_TerminateErr:
    Call LogErrors(Errors)

End Sub

Private Sub mcExecObj_Start(ByVal
StartTime As Currency)
    ' Raise an event indicating that the step
has begun execution
    RaiseEvent ProcessStart(mcExecStep,
msRunStepDtl, StartTime, mlngInstanceId)
End Sub

Private Sub mcExecObj_Complete(ByVal
EndTime As Currency, ByVal Elapsed As
Long)

    On Error GoTo mcExecObj_CompleteErr

    Debug.Print Elapsed
    RaiseEvent
ProcessComplete(mcExecStep, EndTime,
mlngInstanceId, Elapsed)
    mcTermProcess.ProcessTerminated

    Exit Sub

mcExecObj_CompleteErr:
    Call LogErrors(Errors)
End Sub

Private Sub
mcTermProcess_TermProcessExists()

    On Error GoTo TermProcessExistsErr

    ' Call a procedure to execute the next step, if
any
    Call Execute

    Exit Sub

TermProcessExistsErr:
    ' Log the error code raised by the Execute
procedure
    Call LogErrors(Errors)

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cRunWorkspace"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cRunWorkspace.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This class loads all the
information necessary to
'              execute a workspace and calls
cRunInst to execute the workspace.
'              It also propagates Step start and
complete and
'              Run start and complete events.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this module
Private Const mstrModuleName As String =
"cRunWorkspace."
Private mstrSource As String

Private mcRunSteps As cArrSteps
Private mcRunParams As cArrParameters
Private mcRunConstraints As cArrConstraints
Private mcRunConnections As cConnections
Private mcRunConnDtls As cConnDtls
Private mcvntWspPreCons As Variant
Private mcvntWspPostCons As Variant
Private mdbsLoadDb As Database
Private mlngRunId As Long
Private mlngWorkspaceId As Long
Private mField As cStringSM
Public CreateInputFiles As Boolean

Private WithEvents mcRun As cRunInst
Attribute mcRun.VB_VarHelpID = -1

Public Event RunStart(dtmStartTime As
Currency, strWspLog As String, lRunId As
Long)
Public Event RunComplete(dtmEndTime As
Currency)
Public Event StepStart(cStepRecord As cStep,
dtmStartTime As Currency, lngInstanceId As Long,
_
    sPath As String, sIts As String)
Public Event StepComplete(cStepRecord As cStep,
dtmEndTime As Currency, lngInstanceId As Long)
Public Event ProcessStart(cStepRecord As cStep,
strCommand As String, _
    dtmStartTime As Currency, lngInstanceId As
Long)
Public Event ProcessComplete(cStepRecord As
cStep, dtmEndTime As Currency, lngInstanceId As
Long)
Public Function InstancesForStep(lngStepId As
Long, iStatus As InstanceStatus) As cInstances
    ' Returns an array of all the instances for a step

    If mcRun Is Nothing Then
        Set InstancesForStep = Nothing
    Else
        Set InstancesForStep =
mcRun.InstancesForStep(lngStepId, iStatus)
    End If

End Function
Private Sub InsertRunDetail(cStepRecord As cStep,
_
    strCommand As String, dtmStartTime As
Currency, _
    lngInstanceId As Long, lParentInstanceId As
Long, sItValue As String)
    ' Inserts a new run detail record into the database

    Dim strInsert As String
    Dim qy As QueryDef

    On Error GoTo InsertRunDetailErr
    mstrSource = mstrModuleName &
"InsertRunDetail"

    strInsert = "insert into run_step_details " & _
        "( run_id, step_id, version_no, instance_id,
parent_instance_id, " & _
        " command, start_time, iterator_value ) " &
_
        " values ( "

#If USE_JET Then

    strInsert = strInsert & " [r_id], [s_id], [ver_no],
[i_id], [p_i_id], " & _
        " [com], [s_date], [it_val] )"

    Set qy = mdbsLoadDb.CreateQueryDef( _
        gstrEmptyString, strInsert)

    ' Call a procedure to assign the Querydef
parameters
    Call AssignParameters(qy,
StartTime:=dtmStartTime, _
        StepId:=cStepRecord.StepId, _
        Version:=cStepRecord.VersionNo, _
        InstanceId:=lngInstanceId, _
        Command:=strCommand)

    qy.Execute dbFailOnError
    qy.Close

#Else

    strInsert = strInsert & Str(mlngRunId) _
      & ", " & Str(cStepRecord.StepId) _
      & ", " &
mField.MakeStringFieldValid(cStepRecord.Version
No) _
```

```
      & ", " & Str(lngInstanceId) _
      & ", " & Str(lParentInstanceId) _
      & ", " &
mField.MakeStringFieldValid(strCommand)
_
      & ", " & Str(dtmStartTime) _
      & ", " &
mField.MakeStringFieldValid(sItValue)

   strInsert = strInsert & " ) "

   mdbsLoadDb.Execute strInsert,
dbFailOnError

#End If

   Exit Sub

InsertRunDetailErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"InsertRunDetail"
   On Error GoTo 0
   Err.Raise vbObjectError +
errUpdateRunDataFailed, _
         mstrSource, _

LoadResString(errUpdateRunDataFailed)

End Sub
Private Sub UpdateRunDetail(cStepRecord
As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)
   ' Updates the run detail record in the
database

   Dim strUpdate As String
   Dim qy As QueryDef

   On Error GoTo UpdateRunDetailErr

   strUpdate = "update run_step_details " &
_
         " set end_time = [e_date],
elapsed_time = [elapsed] " & _
         " where run_id = [r_id] " & _
         " and step_id = [s_id] " & _
         " and version_no = [ver_no] " & _
         " and instance_id = [i_id] "

   Set qy = mdbsLoadDb.CreateQueryDef( _
         gstrEmptyString, strUpdate)

   ' Call a procedure to assign the Querydef
parameters
   Call AssignParameters(qy,
EndTime:=dtmEndTime, _
         StepId:=cStepRecord.StepId, _
         Version:=cStepRecord.VersionNo, _
         InstanceId:=lngInstanceId,
Elapsed:=lElapsed)

   qy.Execute dbFailOnError
   qy.Close

   Exit Sub

UpdateRunDetailErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"UpdateRunDetail"
   On Error GoTo 0
   Err.Raise vbObjectError +
errUpdateRunDataFailed, _
         mstrSource, _

LoadResString(errUpdateRunDataFailed)

End Sub
Private Function
InsertRunHeader(dtmStartTime As Currency)
As Long
   ' Inserts a new run header record into the
database
   ' and returns the id for the run

   Dim strInsert As String
   Dim qy As QueryDef

   On Error GoTo InsertRunHeaderErr

   strInsert = "insert into run_header " & _
      "( run_id, workspace_id, start_time ) " &
_
      " values ( " & _
      " [r_id], [w_id], [s_date] )"

   Set qy = mdbsLoadDb.CreateQueryDef( _
         gstrEmptyString, strInsert)

   ' Call a procedure to execute the Querydef
object
   Call AssignParameters(qy,
StartTime:=dtmStartTime)

   qy.Execute dbFailOnError
   qy.Close

   InsertRunHeader = mlngRunId
   Exit Function

InsertRunHeaderErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"InsertRunHeader"
   On Error GoTo 0
   Err.Raise vbObjectError +
errUpdateRunDataFailed, _
         mstrSource, _

LoadResString(errUpdateRunDataFailed)

End Function
Private Sub
InsertRunParameters(dtmStartTime As
Currency)
   ' Inserts a new run header record into the
database
   ' and returns the id for the run

   Dim strInsert As String
   Dim qy As QueryDef
   Dim cParamRec As cParameter
   Dim lngIndex As Long

   On Error GoTo InsertRunParametersErr

   strInsert = "insert into run_parameters " & _
      "( run_id, parameter_name,
parameter_value ) " & _
      " values ( " & _
      " [r_id], [p_name], [p_value] )"

   Set qy = mdbsLoadDb.CreateQueryDef( _
         gstrEmptyString, strInsert)
   qy.Parameters("r_id").Value = mlngRunId

   For lngIndex = 0 To
mcRunParams.ParameterCount - 1
      Set cParamRec = mcRunParams(lngIndex)

      qy.Parameters("p_name").Value =
cParamRec.ParameterName
      qy.Parameters("p_value").Value =
cParamRec.ParameterValue
      qy.Execute dbFailOnError

   Next lngIndex

   qy.Close

   Exit Sub

InsertRunParametersErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"InsertRunParameters"
   On Error GoTo 0
   Err.Raise vbObjectError +
errUpdateRunDataFailed, _
         mstrSource, _
         LoadResString(errUpdateRunDataFailed)

End Sub
Private Sub AssignParameters(qyExec As
DAO.QueryDef, _
      Optional StartTime As Currency = 0, _
      Optional EndTime As Currency = 0, _
      Optional StepId As Long = 0, _
      Optional Version As String = gstrEmptyString,
_
      Optional InstanceId As Long = 0, _
      Optional ParentInstanceId As Long = 0, _
      Optional Command As String =
gstrEmptyString, _
      Optional Elapsed As Long = 0, _
      Optional ItValue As String = gstrEmptyString)
   ' Assigns values to the parameters in the querydef
object

   Dim prmParam As DAO.Parameter

   On Error GoTo AssignParametersErr
   mstrSource = mstrModuleName &
"AssignParameters"

   For Each prmParam In qyExec.Parameters
      Select Case prmParam.Name
         Case "[w_id]"
            prmParam.Value = mlngWorkspaceId

         Case "[r_id]"
            prmParam.Value = mlngRunId

         Case "[s_id]"
            BugAssert StepId <> 0
            prmParam.Value = StepId

         Case "[ver_no]"
            BugAssert Not StringEmpty(Version)
            prmParam.Value = Version

         Case "[i_id]"
            BugAssert InstanceId <> 0
            prmParam.Value = InstanceId

         Case "[p_i_id]"
            prmParam.Value = ParentInstanceId

         Case "[com]"
            BugAssert Not StringEmpty(Command)
            prmParam.Value = Command

         Case "[s_date]"
```

```
            BugAssert StartTime <> 0
            prmParam.Value = StartTime

        Case "[e_date]"
            BugAssert EndTime <> 0
            prmParam.Value = EndTime

        Case "[elapsed]"
            prmParam.Value = Elapsed

        Case "[it_val]"
            prmParam.Value = ItValue

        Case Else
            ' Write the parameter name that is
faulty
            WriteError errInvalidParameter,
mstrSource, _
                prmParam.Name
            On Error GoTo 0
            Err.Raise errInvalidParameter,
mstrSource, _

LoadResString(errInvalidParameter)
    End Select
  Next prmParam

  Exit Sub

AssignParametersErr:

  mstrSource = mstrModuleName &
"AssignParameters"
  Call LogErrors(Errors)
  On Error GoTo 0
  Err.Raise vbObjectError +
errAssignParametersFailed, _
      mstrSource,
LoadResString(errAssignParametersFailed)

End Sub
Private Sub
RunStartProcessing(dtmStartTime As
Currency)

  On Error GoTo RunStartProcessingErr

  ' Insert the run header into the database
  Call InsertRunHeader(dtmStartTime)

  ' Insert the run parameters into the
database
  Call InsertRunParameters(dtmStartTime)

  Exit Sub

RunStartProcessingErr:
  ' Log the error code raised by Visual
Basic
  Call LogErrors(Errors)
  mstrSource = mstrModuleName &
"RunStartProcessing"
  ShowError errUpdateRunDataFailed
  WriteError errUpdateRunDataFailed,
mstrSource

End Sub
Private Sub
ProcessStartProcessing(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long, _
    lParentInstanceId As Long, sItValue As
String)

  On Error GoTo ProcessStartProcessingErr

  ' Insert the run detail into the database
  Call InsertRunDetail(cStepRecord,
strCommand, dtmStartTime, lngInstanceId, _
      lParentInstanceId, sItValue)

  Exit Sub

ProcessStartProcessingErr:
  ' Log the error code raised by Visual Basic
  Call LogErrors(Errors)
  mstrSource = mstrModuleName &
"ProcessStartProcessing"
  ShowError errUpdateRunDataFailed
  WriteError errUpdateRunDataFailed,
mstrSource

End Sub
Private Sub StepStartProcessing(cStepRecord
As cStep, dtmStartTime As Currency, _
    lngInstanceId As Long, lParentInstanceId
As Long, sItValue As String)

  On Error GoTo StepStartProcessingErr

  ' Since ProcessStart events won't be
triggered for manager steps
  If cStepRecord.StepType = gintManagerStep
Then
    ' Insert the run detail into the database
    Call InsertRunDetail(cStepRecord,
cStepRecord.StepLabel, _
        dtmStartTime, lngInstanceId,
lParentInstanceId, sItValue)
  End If

  Exit Sub

StepStartProcessingErr:
  ' Log the error code raised by Visual Basic
  Call LogErrors(Errors)
  mstrSource = mstrModuleName &
"StepStartProcessing"
  ShowError errUpdateRunDataFailed

End Sub
Private Sub
ProcessCompleteProcessing(cStepRecord As
cStep, _
    dtmStartTime As Currency, lngInstanceId
As Long, lElapsed As Long)

  On Error GoTo
ProcessCompleteProcessingErr

  ' Insert the run detail into the database
  Call UpdateRunDetail(cStepRecord,
dtmStartTime, lngInstanceId, lElapsed)

  Exit Sub

ProcessCompleteProcessingErr:
  ' Log the error code raised by Visual Basic
  Call LogErrors(Errors)
  mstrSource = mstrModuleName &
"ProcessCompleteProcessing"
  ShowError errUpdateRunDataFailed

End Sub
Private Sub
StepCompleteProcessing(cStepRecord As
cStep, _
    dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

  On Error GoTo StepCompleteProcessingErr

  ' Since ProcessComplete events won't be
triggered for manager steps
  If cStepRecord.StepType = gintManagerStep
Then
    ' Update the run detail in the database
    Call UpdateRunDetail(cStepRecord,
dtmEndTime, lngInstanceId, lElapsed)
  End If

  Exit Sub

StepCompleteProcessingErr:
  ' Log the error code raised by Visual Basic
  Call LogErrors(Errors)
  ShowError errUpdateRunDataFailed

End Sub
Private Sub RunCompleteProcessing(dtmEndTime
As Currency)

  On Error GoTo RunCompleteProcessingErr

  ' Update the header record with the end time for
the run
  Call UpdateRunHeader(dtmEndTime)

  Exit Sub

RunCompleteProcessingErr:
  ' Log the error code raised by Visual Basic
  Call LogErrors(Errors)
  ShowError errUpdateRunDataFailed

End Sub

Private Sub UpdateRunHeader(ByVal dtmEndTime
As Currency)
  ' Updates the run header record with the end date

  Dim strUpdate As String
  Dim qy As QueryDef

  On Error GoTo UpdateRunHeaderErr

  strUpdate = "update run_header " & _
      " set end_time = [e_date] " & _
      " where run_id = [r_id] "

  Set qy = mdbsLoadDb.CreateQueryDef( _
      gstrEmptyString, strUpdate)

  ' Call a procedure to execute the Querydef object
  Call AssignParameters(qy,
EndTime:=dtmEndTime)

  qy.Execute dbFailOnError
  qy.Close

  Exit Sub

UpdateRunHeaderErr:
  LogErrors Errors
  mstrSource = mstrModuleName &
"UpdateRunHeader"
  On Error GoTo 0
  Err.Raise vbObjectError +
errUpdateRunDataFailed, _
      mstrSource, _
      LoadResString(errUpdateRunDataFailed)

End Sub
```

```
Public Property Let WorkspaceId(ByVal
vdata As Long)
   mlngWorkspaceId = vdata
End Property
Public Property Get WorkspaceId() As Long
   WorkspaceId = mlngWorkspaceId
End Property
Public Sub RunWorkspace()

   Dim cRunSeq As cSequence

   On Error GoTo RunWorkspaceErr

   ' Call a procedure to load the module-
level structures
   ' with all the step and parameter data for
the run
   If LoadRunData = False Then
      ' Error handled by the function already
      Exit Sub
   End If

   ' Retrieve the next run identifier using the
sequence class
   Set cRunSeq = New cSequence
   Set cRunSeq.IdDatabase = dbsAttTool
   cRunSeq.IdentifierColumn = "run_id"
   mlngRunId = cRunSeq.Identifier
   Set cRunSeq = Nothing

   Call
mcRunParams.InitBuiltInsForRun(mlngWor
kspaceId, mlngRunId)

   Set mcRun.Constraints =
mcRunConstraints
   mcRun.WspPreExecution =
mcvntWspPreCons
   mcRun.WspPostExecution =
mcvntWspPostCons

   Set mcRun.Steps = mcRunSteps
   Set mcRun.Parameters = mcRunParams
   Set mcRun.RunConnections =
mcRunConnections
   Set mcRun.RunConnDtls =
mcRunConnDtls

   mcRun.WspId = mlngWorkspaceId
   mcRun.RootKey =
LabelStep(mlngWorkspaceId)
   mcRun.RunId = mlngRunId
   mcRun.CreateInputFiles =
CreateInputFiles

   mcRun.Run

   Exit Sub

RunWorkspaceErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)

End Sub
Public Property Get LoadDb() As Database

   Set LoadDb = mdbsLoadDb

End Property
Public Property Set LoadDb(vdata As
Database)

   Set mdbsLoadDb = vdata
End Property
Private Function LoadRunData() As Boolean

   ' Loads the step, parameter and constraint
arrays
   ' with all the data for the workspace. Returns
False
   ' if a failure occurs

   Dim strWorkspaceName As String
   Dim recWspSteps As Recordset
   Dim qySteps As DAO.QueryDef
   Dim recWspParams As Recordset
   Dim qyParams As DAO.QueryDef
   Dim recWspConns As Recordset
   Dim qyConns As DAO.QueryDef
   Dim recWspConnDtls As Recordset
   Dim qyConnDtls As DAO.QueryDef

   On Error GoTo LoadRunDataErr

   Set mcRunSteps.StepDB = mdbsLoadDb
   Set mcRunParams.ParamDatabase =
mdbsLoadDb
   Set mcRunConstraints.ConstraintDB =
mdbsLoadDb
   Set mcRunConnections.ConnDb =
mdbsLoadDb
   Set mcRunConnDtls.ConnDb =
mdbsLoadDb

   ' Read all the step and parameter data for the
workspace
   Call
ReadWorkspaceData(mlngWorkspaceId,
mcRunSteps, _
         mcRunParams, mcRunConstraints,
mcRunConnections, mcRunConnDtls, _
         recWspSteps, qySteps, recWspParams,
qyParams, recWspConns, qyConns, _
         recWspConnDtls, qyConnDtls)

   ' Load all the pre- and post-execution
constraints that
   ' have been defined for the workspace
   mcvntWspPreCons =
mcRunConstraints.ConstraintsForWsp( _
      mlngWorkspaceId, _
      gintPreStep, _
      blnSort:=True, _
      blnGlobalConstraintsOnly:=True)
   mcvntWspPostCons =
mcRunConstraints.ConstraintsForWsp( _
      mlngWorkspaceId, _
      gintPostStep, _
      blnSort:=True, _
      blnGlobalConstraintsOnly:=True)

   On Error Resume Next
   recWspSteps.Close
   qySteps.Close
   recWspParams.Close
   qyParams.Close
   recWspConns.Close
   qyConns.Close

   LoadRunData = True

   Exit Function

LoadRunDataErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   ShowError errLoadRunDataFailed
   LoadRunData = False

End Function
Public Sub StopRun()

   On Error GoTo StopRunErr

   If mcRun Is Nothing Then
      ' We haven't been the run yet, so do nothing
   Else
      mcRun.StopRun
   End If

   Exit Sub

StopRunErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   ' Errors would have been displayed by the called
process

End Sub
Public Sub AbortRun()

   On Error GoTo AbortRunErr

   If mcRun Is Nothing Then
      ' We haven't been the run yet, so do nothing
   Else
      mcRun.Abort
   End If

   Exit Sub

AbortRunErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   ' Errors would have been displayed by the called
process

End Sub

Private Sub Class_Initialize()

   ' Create instances of the step, parameter and
constraint arrays
   Set mcRunSteps = New cArrSteps
   Set mcRunParams = New cArrParameters
   Set mcRunConstraints = New cArrConstraints
   Set mcRunConnections = New cConnections
   Set mcRunConnDtls = New cConnDtls
   Set mcRun = New cRunInst
   Set mField = New cStringSM

End Sub
Private Sub Class_Terminate()

   On Error GoTo UnLoadRunDataErr

   ' Clears the step, parameter and constraint arrays
   Set mcRunSteps = Nothing
   Set mcRunParams = Nothing
   Set mcRunConstraints = Nothing
   Set mcRunConnections = Nothing
   Set mcRunConnDtls = Nothing

   Set mcRun = Nothing
   Set mdbsLoadDb = Nothing
   Set mField = Nothing

   Exit Sub

UnLoadRunDataErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   ' Not a critical error - continue
```

```
    Resume Next

End Sub

Private Sub
mcRun_ProcessComplete(cStepRecord As
cStep, _
        dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

    RaiseEvent
ProcessComplete(cStepRecord,
dtmEndTime, lngInstanceId)
    Call
ProcessCompleteProcessing(cStepRecord,
dtmEndTime, lngInstanceId, lElapsed)

End Sub

Private Sub
mcRun_ProcessStart(cStepRecord As cStep,
_
        strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long, _
        lParentInstanceId As Long, sItValue As
String)

    RaiseEvent ProcessStart(cStepRecord,
strCommand, dtmStartTime, lngInstanceId)
    Call ProcessStartProcessing(cStepRecord,
strCommand, dtmStartTime, lngInstanceId,
_
          lParentInstanceId, sItValue)

End Sub

Private Sub
mcRun_RunComplete(dtmEndTime As
Currency)

    Debug.Print "Run ended at: " &
CStr(dtmEndTime)
    Call
RunCompleteProcessing(dtmEndTime)

    RaiseEvent RunComplete(dtmEndTime)

End Sub
Private Sub mcRun_RunStart(dtmStartTime
As Currency, strWspLog As String)

    RaiseEvent RunStart(dtmStartTime,
strWspLog, mlngRunId)
    Debug.Print "Run started at: " &
CStr(dtmStartTime)

    Call RunStartProcessing(dtmStartTime)

End Sub
Private Sub
mcRun_StepComplete(cStepRecord As
cStep, _
        dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

    RaiseEvent StepComplete(cStepRecord,
dtmEndTime, lngInstanceId)
'    BugMessage "Step: " &
cStepRecord.StepLabel & " has completed!"

    Call
StepCompleteProcessing(cStepRecord,
dtmEndTime, lngInstanceId, lElapsed)

End Sub
Private Sub mcRun_StepStart(cStepRecord As
cStep, dtmStartTime As Currency, _
        lngInstanceId As Long, lParentInstanceId
As Long, sPath As String, sIts As String,
sItValue As String)

    RaiseEvent StepStart(cStepRecord,
dtmStartTime, lngInstanceId, sPath, sIts)
    'bugmessage "Step: " &
cStepRecord.StepLabel & " has started."

    Call StepStartProcessing(cStepRecord,
dtmStartTime, lngInstanceId,
lParentInstanceId, sItValue)

End Sub

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cSequence"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cSequence.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:     This class uses the
att_identifiers table to generate unique
'               identifiers.
'  Contact:     Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private mlngIdentifier As Long
Private mstrIdentifierColumn As String
Private mrecIdentifiers As Recordset
Private mdbsDatabase As Database

Private Const mstrEmptyString = ""

' Used to indicate the source module name
when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cSequence."

Private Sub CreateIdRecord()
    ' Creates a record with all identifiers having
an initial value of 1

    Dim sSql As String
    Dim pId As DAO.Parameter
    Dim qyId As DAO.QueryDef

    sSql = "insert into att_identifiers (" & _
           " workspace_id, parameter_id, step_id,
" & _
           " constraint_id, run_id, connection_id "
& _
           ", " & FLD_ID_CONN_NAME & _
           " ) values ( " & _
           "[w_id], [p_id], [s_id], [c_id], [r_id],
[conn_id], [conn_dtl_id] )"
    Set qyId =
mdbsDatabase.CreateQueryDef(gstrEmptyStri
ng, sSql)
    For Each pId In qyId.Parameters
        pId.Value = glMinId
    Next pId
    qyId.Execute dbFailOnError
    qyId.Close

End Sub
Private Sub CreateIdRecordset()

    Dim strSql As String

    ' Initialize the recordset with all identifiers
    strSql = "select * from att_identifiers"
    Set mrecIdentifiers =
mdbsDatabase.OpenRecordset(strSql,
dbOpenForwardOnly)

    If mrecIdentifiers.RecordCount = 0 Then
        CreateIdRecord
        Set mrecIdentifiers =
mdbsDatabase.OpenRecordset(strSql,
dbOpenForwardOnly)
    End If

    BugAssert mrecIdentifiers.RecordCount <> 0

End Sub

Public Property Set IdDatabase(vdata As Database)

    Set mdbsDatabase = vdata

End Property

Public Property Let IdentifierColumn(vdata As
String)

    Dim intIndex As Integer

    On Error GoTo IdentifierColumnErr

    ' Initialize the return value to an empty string
    mstrIdentifierColumn = mstrEmptyString
    Call CreateIdRecordset

    For intIndex = 0 To mrecIdentifiers.Fields.Count
- 1

        If
LCase(Trim(mrecIdentifiers.Fields(intIndex).Name
)) = _
            LCase(Trim(vdata)) Then

            ' Valid column name
            mstrIdentifierColumn = vdata
            Exit Property
        End If

    Next intIndex

    BugAssert True, "Invalid column name!"

    Exit Property

IdentifierColumnErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"IdentifierColumn"
    On Error GoTo 0
    Err.Raise vbObjectError +
errIdentifierColumnFailed, _
          mstrSource, _
          LoadResString(errIdentifierColumnFailed)

End Property
Public Property Get Identifier() As Long
```

```
    Dim strSql As String

    On Error GoTo GetIdentifierErr

    BugAssert mstrIdentifierColumn <>
mstrEmptyString

    ' Increment the identifier column by 1
    strSql = "update att_identifiers " & _
        " set " & mstrIdentifierColumn & _
        " = " & mstrIdentifierColumn & " + 1"
    mdbsDatabase.Execute strSql,
dbFailOnError

    ' Refresh the recordset with identifier
values
    Call CreateIdRecordset

    mlngIdentifier =
mrecIdentifiers.Fields(mstrIdentifierColumn
).Value

    Identifier = mlngIdentifier

    Exit Property

GetIdentifierErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"Identifier"
    On Error GoTo 0
    Err.Raise vbObjectError +
errGetIdentifierFailed, _
          mstrSource, _

LoadResString(errGetIdentifierFailed)

End Property
Private Sub Class_Terminate()

    mrecIdentifiers.Close

End Sub

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cStack"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cStack.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This class implements a
stack of objects.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this class
Private Const mstrModuleName As String =
"cStack."
Private mstrSource As String

Private mcVector As cVector
Private mlngCount As Long

Public Property Get Item(ByVal Position As
Long) As Object
Attribute Item.VB_UserMemId = 0

    Set Item = mcVector(Position)

End Property

Public Sub Push(objToPush As Object)

    mcVector.Add objToPush

End Sub
Public Sub Clear()

    mcVector.Clear

End Sub

Public Function Pop() As Object

    If mcVector.Count > 0 Then
        Set Pop =
mcVector.Delete(mcVector.Count - 1)
    Else
        Set Pop = Nothing
    End If

End Function
Public Function Count() As Long

    Count = mcVector.Count

End Function


Private Sub Class_Initialize()

    Set mcVector = New cVector

End Sub


Private Sub Class_Terminate()

    Set mcVector = Nothing

End Sub


VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cStep"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
Attribute VB_Ext_KEY =
"SavedWithClassBuilder" ,"Yes"
Attribute VB_Ext_KEY = "Top_Level" ,"Yes"
'  FILE:       cStep.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Encapsulates the properties
and methods of a step.
'              Contains functions to insert, update
and delete
'              att_steps records from the database.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Local variable(s) to hold property value(s)
Private mlngStepId As Long
Private mstrVersionNo As String
Private mstrStepLabel As String
Private mstrStepTextFile As String
Private mstrStepText As String
Private mstrStartDir As String
Private mlngWorkspaceId As Integer
Private mlngParentStepId As Integer
Private mstrParentVersionNo As String
Private mintSequenceNo As Integer
Private mintStepLevel As Integer
Private mblnEnabledFlag As Boolean
Private mstrDegreeParallelism As String
Private mintExecutionMechanism As Integer
Private mstrFailureDetails As String
Private mintContinuationCriteria As Integer
Private mblnGlobalFlag As Boolean
Private mblnArchivedFlag As Boolean
Private mstrOutputFile As String
'Private mstrLogFile As String
Private mstrErrorFile As String
Private mdbsDatabase As Database
Private mintStepType As Integer
Private mintOperation As Operation
Private mlngPosition As Long
Private mstrIteratorName As String
Private mcIterators As cNodeCollections
Private mbIsNewVersion As Boolean
Private msOldVersion As String

' The following constants are used throughout the
project to
' indicate the different options selected by the user
' The options are presented to the user as control
arrays of
' option buttons. These constants have to be in sync
with the
' indexes of the option buttons.
' All the control arrays have an lbound of 1. The
value 0 is
' used to indicate that the property being represented
by the
' control array is not valid for the step
' Public enums are used since we cannot expose
public constants
' in class modules. gintNoOption is applicable to all
enums,
' but declared in the Execution method enum, since
we cannot
' declare it more than once.

' Is here as a comment
' Has been defined in public.bas with the other
object types
'Public Enum gintStepType
'    gintGlobalStep = 3
'    gintManagerStep
'    gintWorkerStep
'End Enum

' Execution Method options
Public Enum ExecutionMethod
    gintNoOption = 0
    gintExecuteODBC
    gintExecuteShell
End Enum

' Failure criteria options
Public Enum FailureCriteria
    gintFailureODBC = 1
    gintFailureTextCompare
```

```
End Enum

' Continuation criteria options
' Note: Update the initialization of
gsContCriteria in Initialize() if the
' continuation criteria are modified
Public Enum ContinuationCriteria
   gintOnFailureAbort = 1
   gintOnFailureContinue
   gintOnFailureCompleteSiblings
   gintOnFailureAbortSiblings
   gintOnFailureSkipSiblings
   gintOnFailureAsk
End Enum

' The initial version #
Private Const mstrMinVersion As String =
"0.0"

' End of constants for option button control
arrays
' Used to indicate the source module name
when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cStep."

' The cSequence class is used to generate
unique step identifiers
Private mStepSeq As cSequence

' The StringSM class is used to carry out
string operations
Private mFieldValue As cStringSM
Private Sub NewVersion()

mbIsNewVersion = True
msOldVersion = mstrVersionNo

End Sub
Public Function IsNewVersion() As Boolean
   IsNewVersion = mbIsNewVersion
End Function

Public Function OldVersionNo() As String
   OldVersionNo = msOldVersion
End Function

Public Sub SaveIterators()
   ' This procedure checks if any changes
have been made
   ' to the iterators for the step. If so, it calls
the
   ' methods of the iterator class to commit
the changes
   Dim cItRec As cIterator
   Dim lngIndex As Long

   On Error GoTo SaveIteratorsErr

   For lngIndex = 0 To mcIterators.Count - 1
      Set cItRec = mcIterators(lngIndex)

      Select Case cItRec.IndOperation
         Case QueryOp
            ' No changes were made to the
queried Step.
            ' Do nothing

         Case InsertOp
            cItRec.Add mlngStepId,
mstrVersionNo
            cItRec.IndOperation = QueryOp

         Case UpdateOp
            cItRec.Update mlngStepId,
mstrVersionNo
            cItRec.IndOperation = QueryOp

         Case DeleteOp
            cItRec.Delete mlngStepId,
mstrVersionNo
            ' Remove the record from the
collection
            mcIterators.Delete lngIndex

      End Select
   Next lngIndex

   Exit Sub

SaveIteratorsErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"SaveIterators"
   On Error GoTo 0
   Err.Raise vbObjectError + errSaveFailed, _
         mstrSource, _
         LoadResString(errSaveFailed)

End Sub
Public Property Get IndOperation() As
Operation

   IndOperation = mintOperation

End Property
Public Property Let IndOperation(ByVal vdata
As Operation)

   BugAssert vdata = QueryOp Or vdata =
InsertOp Or vdata = UpdateOp Or vdata =
DeleteOp, "Invalid operation"
   mintOperation = vdata

End Property

Public Function Iterators() As Variant
   ' Returns a variant containing all the iterators
that
   ' have been defined for the step

   Dim cStepIterators() As cIterator
   Dim cTempIt As cIterator
   Dim lngIndex As Long
   Dim lngItCount As Long

   On Error GoTo IteratorsErr

   lngItCount = 0
   For lngIndex = 0 To mcIterators.Count - 1
      ' Increase the array dimension and add the
constraint
      ' to it
      Set cTempIt = mcIterators(lngIndex)

      If cTempIt.IndOperation <> DeleteOp
Then
         ReDim Preserve
cStepIterators(lngItCount)
         Set cStepIterators(lngItCount) =
cTempIt
         lngItCount = lngItCount + 1
      End If

   Next lngIndex

   If lngItCount = 0 Then
      Iterators = Empty
   Else
      Iterators = cStepIterators()
   End If

   Call QuickSort(Iterators)

   Exit Function

IteratorsErr:
   LogErrors Errors
   On Error GoTo 0
   Err.Raise vbObjectError + errIteratorsFailed, _
         mstrModuleName & "Iterators", _
         LoadResString(errIteratorsFailed)

End Function
Public Function IteratorCount() As Long
   ' Returns a count of all the iterators for the step

   Dim lngItCount As Long
   Dim lngIndex As Long
   Dim cTempIt As cIterator

   On Error GoTo IteratorsErr

   lngItCount = 0
   For lngIndex = 0 To mcIterators.Count - 1

      If mcIterators(lngIndex).IndOperation <>
DeleteOp Then
         lngItCount = lngItCount + 1
      End If

   Next lngIndex

   IteratorCount = lngItCount

   Exit Function

IteratorsErr:
   LogErrors Errors
   On Error GoTo 0
   Err.Raise vbObjectError + errIteratorsFailed, _
         mstrSource, _
         LoadResString(errIteratorsFailed)

End Function
Public Sub Validate()
   ' Each distinct object will have a Validate method
which
   ' will check if the class properties are valid. This
method
   ' will be used to check interdependant properties
that
   ' cannot be validated by the let procedures.
   ' It should be called by the add and modify
methods of the class

   ' Check if the step label has been specified
   If StringEmpty(mstrStepLabel) Then
      ShowError errStepLabelMandatory
      On Error GoTo 0
      Err.Raise vbObjectError + errValidateFailed, _
            "Validate",
LoadResString(errValidateFailed)
   End If

   If Not IsStringEmpty(mstrStepText) And Not
IsStringEmpty(mstrStepTextFile) Then
      ShowError errStepTextOrFile
      On Error GoTo 0
      Err.Raise vbObjectError + errStepTextOrFile,
_
            "Validate",
LoadResString(errStepTextOrFile)
```

```
    End If

End Sub

Public Function IncVersionY() As String
    ' The version number for a step is stored
in the x.y
    ' format where x is the parent component
and y is the
    ' child component of the step. This
function will increment
    ' the y component of the step by 1

    On Error GoTo IncVersionYErr

    ' Store the old version number for the step
    Call NewVersion

    mstrVersionNo =
Trim$(Str$(GetX(mstrVersionNo))) &
gstrVerSeparator & _
        Trim$(Str(GetY(mstrVersionNo) +
1))
    IncVersionY = mstrVersionNo

    Exit Function

IncVersionYErr:
    ' Log the error code raised by Visual
Basic
    Call LogErrors(Errors)
    gstrSource = mstrModuleName &
"IncVersionY"
    On Error GoTo 0
    Err.Raise vbObjectError +
errIncVersionYFailed, _
        gstrSource, _

LoadResString(errIncVersionYFailed)

End Function
Public Function IncVersionX() As String
    ' The version number for a step is stored
in the x.y
    ' format where x is the parent component
and y is the
    ' child component of the step. This
function will increment
    ' the y component of the step by 1 and
reset the x component
    ' to 0

    On Error GoTo IncVersionXErr

    ' Store the old version number for the step
    Call NewVersion

    mstrVersionNo =
Trim$(Str$(GetX(mstrVersionNo) + 1)) &
gstrVerSeparator & "0"
    IncVersionX = mstrVersionNo

    Exit Function

IncVersionXErr:
    ' Log the error code raised by Visual
Basic
    Call LogErrors(Errors)
    gstrSource = mstrModuleName &
"IncVersionX"
    On Error GoTo 0
    Err.Raise vbObjectError +
errIncVersionXFailed, _
        gstrSource, _
        LoadResString(errIncVersionXFailed)

End Function


Private Function GetY(strVersion As String)
As Long
    ' The version number for a step is stored in
the x.y
    ' format where x is the parent component and
y is the
    ' child component of the step. Given an
argument of type
    ' x.y, it returns y

    ' Truncate the fractional part to get the parent
component
    ' of the version number (x.y)
    GetY = Val(Mid(strVersion,
InStr(strVersion, gstrVerSeparator) + 1))

End Function
Private Function GetX(strVersion As String)
As Long
    ' The version number for a step is stored in
the x.y
    ' format where x is the parent component and
y is the
    ' child component of the step. Given an
argument of type
    ' x.y, it returns x

    ' Truncate the fractional part to get the parent
component
    ' of the version number (x.y)
    GetX = Val(Left(strVersion,
InStr(strVersion, gstrVerSeparator) - 1))

End Function

Public Function Clone(Optional cCloneStep As
cStep) As cStep

    ' Creates a copy of a given step

    Dim lngIndex As Long
    Dim cItRec As cIterator
    Dim cItClone As cIterator

    On Error GoTo CloneErr

    If cCloneStep Is Nothing Then
        Set cCloneStep = New cStep
    End If

    ' Copy all the step properties to the newly
created step
    ' Initialize the global flag first since
subsequent
    ' validations might depend on it
    cCloneStep.GlobalFlag = mblnGlobalFlag
'   cCloneStep.GlobalRunMethod =
mintGlobalRunMethod

    cCloneStep.StepType = mintStepType
    cCloneStep.StepId = mlngStepId
    cCloneStep.VersionNo = mstrVersionNo
    cCloneStep.StepLabel = mstrStepLabel
    cCloneStep.StepTextFile = mstrStepTextFile
    cCloneStep.StepText = mstrStepText
    cCloneStep.StartDir = mstrStartDir
    cCloneStep.WorkspaceId =
mlngWorkspaceId
    cCloneStep.ParentStepId =
mlngParentStepId
    cCloneStep.ParentVersionNo =
mstrParentVersionNo
    cCloneStep.StepLevel = mintStepLevel
    cCloneStep.SequenceNo = mintSequenceNo
    cCloneStep.EnabledFlag = mblnEnabledFlag
    cCloneStep.DegreeParallelism =
mstrDegreeParallelism
    cCloneStep.ExecutionMechanism =
mintExecutionMechanism
    cCloneStep.FailureDetails = mstrFailureDetails
    cCloneStep.ContinuationCriteria =
mintContinuationCriteria
    cCloneStep.ArchivedFlag = mblnArchivedFlag
    cCloneStep.OutputFile = mstrOutputFile
'   cCloneStep.LogFile = mstrLogFile
    cCloneStep.ErrorFile = mstrErrorFile
    cCloneStep.IteratorName = mstrIteratorName

    cCloneStep.IndOperation = mintOperation
    cCloneStep.Position = mlngPosition

    Set cCloneStep.NodeDB = mdbsDatabase

    ' Clone all the iterators for the step
    For lngIndex = 0 To mcIterators.Count - 1
        Set cItRec = mcIterators(lngIndex)
        Set cItClone = cItRec.Clone
        cCloneStep.LoadIterator cItClone
    Next lngIndex

    ' And set the return value to the newly created
step
    Set Clone = cCloneStep

    Exit Function

CloneErr:
    LogErrors Errors
    mstrSource = mstrModuleName & "Clone"
    On Error GoTo 0
    Err.Raise vbObjectError + errCloneFailed, _
        mstrSource, LoadResString(errCloneFailed)

End Function
'End Sub
'
Public Property Let OutputFile(ByVal vdata As
String)

    mstrOutputFile = vdata

End Property

Public Property Get OutputFile() As String

    OutputFile = mstrOutputFile

End Property

'Public Property Let LogFile(ByVal vdata As
String)
'
'   mstrLogFile = vdata
'
'End Property
'
'Public Property Get LogFile() As String
'
'   LogFile = mstrLogFile
'
'End Property

Public Property Let ErrorFile(ByVal vdata As
String)
```

```
    mstrErrorFile = vdata

End Property
Public Property Let IteratorName(ByVal
vdata As String)

    mstrIteratorName = vdata

End Property

Public Property Get ErrorFile() As String

    ErrorFile = mstrErrorFile

End Property
Public Property Get IteratorName() As
String

    IteratorName = mstrIteratorName

End Property

Public Property Set NodeDB(vdata As
Database)

    Set mdbsDatabase = vdata
    Set mcIterators.NodeDB = vdata

End Property
Public Property Get NodeDB() As Database

    Set NodeDB = mdbsDatabase

End Property

Private Function IsStringEmpty(strToCheck
As String) As Boolean

    IsStringEmpty = (strToCheck =
gstrEmptyString)

End Function

Public Property Let EnabledFlag(ByVal
vdata As Boolean)

    ' The enabled flag must be False for all
global steps.
    ' This check must be made by the global
step class. Only
    ' generic step validations will be carried
out by this
    ' class
    mblnEnabledFlag = vdata

End Property

Public Property Let GlobalFlag(ByVal vdata
As Boolean)

    mblnGlobalFlag = vdata

End Property
Public Property Get EnabledFlag() As
Boolean

    EnabledFlag = mblnEnabledFlag

End Property

Public Property Let ArchivedFlag(ByVal
vdata As Boolean)

    mblnArchivedFlag = vdata

End Property

Public Property Get ArchivedFlag() As
Boolean

    ArchivedFlag = mblnArchivedFlag

End Property

Public Property Get GlobalFlag() As Boolean

    GlobalFlag = mblnGlobalFlag

End Property

Public Sub Add()
    ' Inserts a step record into the database - it
initializes
    ' the necessary properties for the step and
calls InsertStepRec
    ' to do the database work

    On Error GoTo AddErr

    ' A new record would have the deleted_flag
turned off!
    mblnArchivedFlag = False

    Call InsertStepRec

    ' If a new version of a step has been created,
reset the old version info, since
    ' it's already been saved to the db
    If IsNewVersion() Then
        mbIsNewVersion = False
        msOldVersion = gstrEmptyString
    End If

    Exit Sub

AddErr:
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError +
errAddStepFailed, _
            mstrModuleName & "Add",
LoadResString(errAddStepFailed)
End Sub
Private Sub InsertStepRec()
    ' Inserts a step record into the database
    ' It first generates the insert statement using
the different
    ' step properties and then executes it

    Dim strInsert As String
    Dim qy As DAO.QueryDef

    On Error GoTo InsertStepRecErr

    ' First check if the database object is valid
    Call CheckDB

    ' Check if the step record is valid
    Call Validate

    If IsNewVersion() Then
        Call UpdOldVersionsArchFlg
    End If

    ' Create a temporary querydef object
    strInsert = "insert into att_steps " & _
        "( workspace_id, step_id, version_no, " &
_
        " step_label, step_file_name, step_text,
start_directory, " & _
        " parent_step_id, parent_version_no,
sequence_no, " & _
        " enabled_flag, step_level, " & _
        " degree_parallelism, execution_mechanism, "
& _
        " failure_details, " & _
        " continuation_criteria, global_flag, " & _
        " archived_flag, " & _
        " output_file_name, error_file_name, " & _
        " iterator_name ) values ( "

    ' log_file_name,

#If USE_JET Then

    strInsert = strInsert & " [w_id], [s_id], [ver_no], "
& _
        " [s_label], [s_file_name], [s_text],
[s_start_dir], " & _
        " [p_step_id], [p_version_no], [seq_no], " & _
        " [enabled], [s_level], [deg_parallelism], " & _
        " [exec_mechanism], [fail_dtls], " & _
        " [cont_criteria], [global], [archived], " & _
        " [output_file], [error_file], " & _
        " [it_name] ) "

    ' [log_file],

    Set qy =
mdbsDatabase.CreateQueryDef(gstrEmptyString,
strInsert)

    ' Call a procedure to execute the Querydef object
    Call AssignParameters(qy)

    qy.Execute dbFailOnError
    qy.Close
#Else

        strInsert = strInsert & Str(mlngWorkspaceId)
& ", " & Str(mlngStepId) & _
        ", " &
mFieldValue.MakeStringFieldValid(mstrVersionNo
)

    ' For fields that may be null, call a function to
determine
    ' the string to be appended to the insert statement
    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrStepLabel)
    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrStepTextF
ile)
    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrStepText)
    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrStartDir)

    strInsert = strInsert & ", " &
Str(mlngParentStepId) & _
        ", " &
mFieldValue.MakeStringFieldValid(mstrParentVer
sionNo) & _
        ", " & Str(mintSequenceNo) & _
        ", " & Str(mblnEnabledFlag) & ", " &
Str(mintStepLevel)

    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrDegreePar
allelism)
    strInsert = strInsert & ", " &
Str(mintExecutionMechanism)
```

```
    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrFai
lureDetails) & _
        ", " & Str(mintContinuationCriteria) &
_
        ", " & Str(mblnGlobalFlag) & _
        ", " & Str(mblnArchivedFlag)

    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrOu
tputFile)
'    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrLo
gFile)
    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrErr
orFile)
    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrIter
atorName)

    strInsert = strInsert & " ) "

    BugMessage strInsert
    mdbsDatabase.Execute strInsert,
dbFailOnError

#End If

    Exit Sub

InsertStepRecErr:
    mstrSource = mstrModuleName &
"InsertStepRec"
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError +
errInsertStepFailed, _
            mstrSource,
LoadResString(errInsertStepFailed)
End Sub
Private Sub UpdOldVersionsArchFlg()
    ' Updates the archived flag on all old
version for the step to True

    Dim sUpdate As String
    Dim qy As DAO.QueryDef

    On Error GoTo
UpdOldVersionsArchFlgErr
    mstrSource = mstrModuleName &
"UpdOldVersionsArchFlg"

#If USE_JET Then

    sUpdate = "update att_steps " & _
        " set archived_flag = True "

    ' Append the Where clause
    sUpdate = sUpdate & " where step_id =
[s_id] " & _
        " and version_no <> [ver_no]"

    Set qy =
mdbsDatabase.CreateQueryDef(gstrEmptyS
tring, sUpdate)

    ' Call a procedure to execute the Querydef
object
    Call AssignParameters(qy)
    qy.Execute dbFailOnError

    If qy.RecordsAffected = 0 Then
        On Error GoTo 0
        Err.Raise vbObjectError +
errModifyStepFailed, _
                mstrSource,
LoadResString(errModifyStepFailed)
    End If

    qy.Close

#Else

    sUpdate = "update att_steps " & _
        " set archived_flag = True "

    sUpdate = sUpdate & " where step_id = " &
Str(mlngStepId) & _
        " and version_no <> " &
mFieldValue.MakeStringFieldValid(mstrVersi
onNo)

    BugMessage sUpdate
    mdbsDatabase.Execute sUpdate,
dbFailOnError
#End If

    Exit Sub

UpdOldVersionsArchFlgErr:
    mstrSource = mstrModuleName &
"UpdOldVersionsArchFlg"
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError +
errModifyStepFailed, _
            mstrSource,
LoadResString(errModifyStepFailed)
End Sub
Public Sub InsertIterator(cItRecord As
cIterator)
    ' Inserts the iterator record into the database

    Call cItRecord.Add(mlngStepId,
mstrVersionNo)

End Sub
Public Sub UpdateIterator(cItRecord As
cIterator)
    ' Updates the iterator record in the database

    Call cItRecord.Update(mlngStepId,
mstrVersionNo)

End Sub
Public Sub UpdateIteratorVersion()
    ' Updates the iterator record in the database

    Dim lngIndex As Long
    Dim cTempIt As cIterator

    On Error GoTo UpdateIteratorVersionErr

    For lngIndex = 0 To mcIterators.Count - 1
        ' Increase the array dimension and add the
constraint
        ' to it
        Set cTempIt = mcIterators(lngIndex)

        If cTempIt.IndOperation <> DeleteOp
Then
            ' Set the operation to indicate an insert
            cTempIt.IndOperation = InsertOp
        End If

    Next lngIndex

    Exit Sub

UpdateIteratorVersionErr:
    mstrSource = mstrModuleName &
"UpdateIteratorVersion"
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError + errUpdateFailed, _
            mstrSource,
LoadResString(errUpdateFailed)

End Sub
Public Sub AddIterator(cItRecord As cIterator)
    ' Adds the iterator record to the collection of
iterators
    ' for the step

    Call mcIterators.Add(cItRecord)

End Sub
Public Sub AddAllIterators()
    ' Sets the indicator variable for all iterators to
insert

    Dim lngIndex As Long

    For lngIndex = 0 To mcIterators.Count - 1
        mcIterators(lngIndex).Validate
        mcIterators(lngIndex).IndOperation = InsertOp
    Next lngIndex

End Sub

Public Sub LoadIterator(cItRecord As cIterator)
    ' Adds the iterator record to the collection of
iterators
    ' for the step

    Call mcIterators.Load(cItRecord)

End Sub
Public Sub UnloadIterators()
    ' Unloads all iterator records for the step

    Dim lngIndex As Long

    For lngIndex = mcIterators.Count - 1 To 0 Step -
1
        ' Calls the collection method to unload the
node
        ' from the array
        mcIterators.Unload lngIndex
    Next lngIndex

End Sub
Public Sub ModifyIterator(cItRecord As cIterator)
    ' Modifies the iterator record in the collection

    Call mcIterators.Modify(cItRecord)

End Sub
Public Sub DeleteIterator(cItRecord As cIterator)
    ' Deletes the iterator record from the database

    Call cItRecord.Delete(mlngStepId,
mstrVersionNo)

End Sub
Public Sub RemoveIterator(cItRecord As cIterator)
    ' Marks the iterator record in the collection to
    ' indicate a delete

    Call mcIterators.Delete(cItRecord.Position)

End Sub
```

```
Private Sub AssignParameters(qyExec As
DAO.QueryDef)
   ' Assigns values to the parameters in the
querydef object
   ' The parameter names are cryptic to make
them different
   ' from the actual field names. When the
parameter names
   ' are the same as the field names,
parameters in the
   ' where clause do not get created.

   Dim prmParam As DAO.Parameter

   On Error GoTo AssignParametersErr
   mstrSource = mstrModuleName &
"AssignParameters"

   For Each prmParam In
qyExec.Parameters
      Select Case prmParam.Name
         Case "[w_id]"
            prmParam.Value =
mlngWorkspaceId
         Case "[s_id]"
            prmParam.Value = mlngStepId
         Case "[ver_no]"
            prmParam.Value =
mstrVersionNo
         Case "[s_label]"
            prmParam.Value = mstrStepLabel
         Case "[s_file_name]"
            prmParam.Value =
mstrStepTextFile
         Case "[s_text]"
            prmParam.Value = mstrStepText
         Case "[s_start_dir]"
            prmParam.Value = mstrStartDir
         Case "[p_step_id]"
            prmParam.Value =
mlngParentStepId
         Case "[p_version_no]"
            prmParam.Value =
mstrParentVersionNo
         Case "[seq_no]"
            prmParam.Value =
mintSequenceNo
         Case "[enabled]"
            prmParam.Value =
mblnEnabledFlag
         Case "[s_level]"
            prmParam.Value = mintStepLevel
         Case "[deg_parallelism]"
            prmParam.Value =
mstrDegreeParallelism
         Case "[exec_mechanism]"
            prmParam.Value =
mintExecutionMechanism
         Case "[fail_dtls]"
            prmParam.Value =
mstrFailureDetails
         Case "[cont_criteria]"
            prmParam.Value =
mintContinuationCriteria
         Case "[global]"
            prmParam.Value =
mblnGlobalFlag
         Case "[archived]"
            prmParam.Value =
mblnArchivedFlag
         Case "[output_file]"
            prmParam.Value = mstrOutputFile
'        Case "[log_file]"
'           prmParam.Value = mstrLogFile
         Case "[error_file]"
            prmParam.Value = mstrErrorFile
         Case "[it_name]"
            prmParam.Value = mstrIteratorName
         Case Else
            ' Write the parameter name that is
faulty
            WriteError errInvalidParameter,
mstrSource, _
                  prmParam.Name
            On Error GoTo 0
            Err.Raise errInvalidParameter,
mstrSource, _

LoadResString(errInvalidParameter)
      End Select
   Next prmParam

   If qyExec.Parameters("s_id") = 0 Or
StringEmpty(qyExec.Parameters("ver_no"))
Then
      WriteError errInvalidParameter,
mstrSource
      On Error GoTo 0
      Err.Raise errInvalidParameter,
mstrSource,
LoadResString(errInvalidParameter)
   End If

   Exit Sub

AssignParametersErr:

   mstrSource = mstrModuleName &
"AssignParameters"
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errAssignParametersFailed, _
      mstrSource,
LoadResString(errAssignParametersFailed)

End Sub

Public Sub Modify()

   Dim strUpdate As String
   Dim qy As QueryDef

   On Error GoTo ModifyErr
   mstrSource = mstrModuleName & "Modify"

   ' Check if the database object is valid
   Call CheckDB

   ' Check if the step record is valid
   Call Validate

   ' The step_id and version_no will never be
updated -
   ' whenever a step is modified a copy of the
old step will
   ' be created with an incremented version_no

#If USE_JET Then

   strUpdate = "update att_steps " & _
      " set step_label = [s_label] " & _
      " , step_file_name = [s_file_name] " & _
      " , step_text = [s_text] " & _
      " , start_directory = [s_start_dir] " & _
      " , workspace_id = [w_id] " & _
      " , parent_step_id = [p_step_id] " & _
      " , parent_version_no = [p_version_no] "
& _
      " , sequence_no = [seq_no] " & _
      " , step_level = [s_level] " & _
      " , enabled_flag = [enabled] " & _
      " , degree_parallelism = [deg_parallelism] " &
_
      " , execution_mechanism = [exec_mechanism]
" & _
      " , failure_details = [fail_dtls] " & _
      " , continuation_criteria = [cont_criteria] " & _
      " , global_flag = [global] " & _
      " , archived_flag = [archived] " & _
      " , output_file_name = [output_file] " & _
      " , error_file_name = [error_file] " & _
      " , iterator_name = [it_name] "

      ' " , log_file_name = [log_file] " & _

   ' Append the Where clause
   strUpdate = strUpdate & " where step_id = [s_id]
" & _
      " and version_no = [ver_no]"

   Set qy =
mdbsDatabase.CreateQueryDef(gstrEmptyString,
strUpdate)

   ' Call a procedure to execute the Querydef object
   Call AssignParameters(qy)
   qy.Execute dbFailOnError

   If qy.RecordsAffected = 0 Then
      On Error GoTo 0
      Err.Raise vbObjectError +
errModifyStepFailed, _
            mstrSource,
LoadResString(errModifyStepFailed)
   End If

   qy.Close

#Else

   strUpdate = "update att_steps " & _
      " set step_label = "

   ' For fields that may be null, call a function to
determine
   ' the string to be appended to the update statement
   strUpdate = strUpdate &
mFieldValue.MakeStringFieldValid(mstrStepLabel)

   strUpdate = strUpdate & " , step_file_name = " &
mFieldValue.MakeStringFieldValid(mstrStepTextF
ile)
   strUpdate = strUpdate & " , step_text = " &
mFieldValue.MakeStringFieldValid(mstrStepText)
   strUpdate = strUpdate & " , start_directory = " &
mFieldValue.MakeStringFieldValid(mstrStartDir)

   strUpdate = strUpdate & " , workspace_id = " &
Str(mlngWorkspaceId) & _
      " , parent_step_id = " & Str(mlngParentStepId)
& _
      " , parent_version_no = " &
mFieldValue.MakeStringFieldValid(mstrParentVer
sionNo) & _
      " , sequence_no = " & Str(mintSequenceNo) &
_
      " , step_level = " & Str(mintStepLevel) & _
      " , enabled_flag = " & Str(mblnEnabledFlag)
& _
      " , degree_parallelism = " &
mFieldValue.MakeStringFieldValid(mstrDegreePar
allelism) & _
```

```
      " , execution_mechanism = " &
Str(mintExecutionMechanism) & _
      " , failure_details = " &
mFieldValue.MakeStringFieldValid(mstrFai
lureDetails) & _
      " , continuation_criteria = " &
Str(mintContinuationCriteria) & _
      " , global_flag = " &
Str(mblnGlobalFlag) & _
      " , archived_flag = " &
Str(mblnArchivedFlag) & _
      " , output_file_name = " &
mFieldValue.MakeStringFieldValid(mstrOu
tputFile) & _
      " , error_file_name = " &
mFieldValue.MakeStringFieldValid(mstrErr
orFile) & _
      " , iterator_name = " &
mFieldValue.MakeStringFieldValid(mstrIter
atorName)

'       " , log_file_name = " &
mFieldValue.MakeStringFieldValid(mstrLo
gFile) & _

   strUpdate = strUpdate & " where step_id
= " & Str(mlngStepId) & _
      " and version_no = " &
mFieldValue.MakeStringFieldValid(mstrVe
rsionNo)

   BugMessage strUpdate
   mdbsDatabase.Execute strUpdate,
dbFailOnError
#End If

   Exit Sub

ModifyErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"Modify"
   On Error GoTo 0
   Err.Raise vbObjectError +
errModifyStepFailed, _
         mstrSource,
LoadResString(errModifyStepFailed)
End Sub
Private Sub CheckDB()
   ' Check if the database object has been
initialized

   If mdbsDatabase Is Nothing Then
      ShowError errInvalidDB
      On Error GoTo 0
      Err.Raise vbObjectError +
errInvalidDB, _
         mstrModuleName,
LoadResString(errInvalidDB)
   End If

End Sub

Public Sub Delete()

   Dim strDelete As String
   Dim qy As DAO.QueryDef

   On Error GoTo DeleteErr

   Call CheckDB

   strDelete = "delete from att_steps " & _
         " where step_id = [s_id] " & _
         " and version_no = [ver_no] "

'    mdbsDatabase.Execute strDelete,
dbFailOnError
   Set qy =
mdbsDatabase.CreateQueryDef(gstrEmptyStri
ng, strDelete)

   Call AssignParameters(qy)
   qy.Execute dbFailOnError

   qy.Close

   Exit Sub

DeleteErr:
   LogErrors Errors
   On Error GoTo 0
   Err.Raise vbObjectError +
errDeleteStepFailed, _
         mstrModuleName & "Delete",
LoadResString(errDeleteStepFailed)
End Sub
Public Property Get DegreeParallelism() As
String

   DegreeParallelism = mstrDegreeParallelism

End Property
Public Property Get Position() As Long

   Position = mlngPosition

End Property

Public Property Let DegreeParallelism(ByVal
vdata As String)

   ' The degree of parallelism must be zero for
all global steps
   ' This check must be made by the global step
class. Only
   ' generic step validations will be carried out
by this
   ' class
   mstrDegreeParallelism = vdata

End Property

Public Property Let
ExecutionMechanism(ByVal vdata As
ExecutionMethod)

   BugAssert vdata = gintExecuteODBC Or
vdata = gintExecuteShell Or vdata =
gintNoOption, _
         "Execution mechanism invalid"
   mintExecutionMechanism = vdata

End Property

Public Property Let FailureDetails(ByVal
vdata As String)

   mstrFailureDetails = vdata

End Property
Public Property Let SequenceNo(ByVal vdata
As Integer)
   mintSequenceNo = vdata
End Property

Public Property Let Position(ByVal vdata As
Long)
   mlngPosition = vdata
End Property

Public Property Let ParentStepId(ByVal vdata As
Long)
   mlngParentStepId = vdata
End Property

Public Property Get SequenceNo() As Integer

   SequenceNo = mintSequenceNo

End Property

Public Property Get StepLevel() As Integer
   StepLevel = mintStepLevel
End Property

Public Property Get ParentVersionNo() As String
   ParentVersionNo = mstrParentVersionNo
End Property

Public Property Let ParentVersionNo(ByVal vdata
As String)
   mstrParentVersionNo = vdata
End Property

Public Property Get ParentStepId() As Long
   ParentStepId = mlngParentStepId
End Property

Public Property Let WorkspaceId(ByVal vdata As
Long)
   mlngWorkspaceId = vdata
End Property

Public Property Let VersionNo(ByVal vdata As
String)
   ' The version number of a step is stored in the x.y
format where
   ' x represents a change to the step as a result of
modifications
   ' to any of the step properties
   ' y represents a change to the step as a result of
modifications
   ' to the sub-steps associated with it. Hence the y-
component
   ' of the version will be incremented when a sub-
step is added,
   ' modified or deleted
   ' x will be referred to throughout this code as the
parent
   ' component of the version and y will be referred
to as the
   ' child component of the version
   ' The version information for a step is maintained
by the
   ' calling function

   mstrVersionNo = vdata

End Property

Public Property Get StepType() As gintStepType

   On Error GoTo StepTypeErr

   If mintStepType = 0 Then
      ' The step type variable has not been initialized
-
      If mblnGlobalFlag Then
         mintStepType = gintGlobalStep
      ElseIf IsStringEmpty(mstrStepText) And _
            IsStringEmpty(mstrStepTextFile) Then
         mintStepType = gintManagerStep
      Else
         mintStepType = gintWorkerStep
      End If
```

```
    End If

    StepType = mintStepType

    Exit Property

StepTypeErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"StepType"
    On Error GoTo 0
    Err.Raise vbObjectError +
errGetStepTypeFailed, _
            mstrSource, _

LoadResString(errGetStepTypeFailed)

End Property

Public Property Let StepType(vdata As
gintStepType)

    On Error GoTo StepTypeErr

    Select Case vdata
        Case gintGlobalStep, gintManagerStep,
gintWorkerStep
            mintStepType = vdata

        Case Else
            On Error GoTo 0
            Err.Raise vbObjectError +
errStepTypeInvalid, _
                mstrModuleName &
"StepType",
LoadResString(errStepTypeInvalid)
    End Select
    Exit Property

StepTypeErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"StepType"
    On Error GoTo 0
    Err.Raise vbObjectError +
errLetStepTypeFailed, _
            mstrSource, _

LoadResString(errLetStepTypeFailed)

End Property

Public Property Get WorkspaceId() As Long
    WorkspaceId = mlngWorkspaceId
End Property

Public Property Get ContinuationCriteria()
As ContinuationCriteria

    ContinuationCriteria =
mintContinuationCriteria

End Property

Public Property Let
ContinuationCriteria(ByVal vdata As
ContinuationCriteria)

    ' The Continuation criteria must be null
for all global steps
    ' and non-null for all manager and worker
steps
    ' These checks will have to be made by
the corresponding
    ' classes - only generic step validations will
be made
    ' by this class
    BugAssert vdata =
gintOnFailureAbortSiblings Or vdata =
gintOnFailureCompleteSiblings _
                Or vdata =
gintOnFailureSkipSiblings Or vdata =
gintOnFailureAbort _
                Or vdata = gintOnFailureContinue
Or vdata = gintOnFailureAsk _
                Or vdata = gintNoOption, _
                "Invalid continuation criteria"
    mintContinuationCriteria = vdata

End Property
Public Property Get ExecutionMechanism() As
ExecutionMethod

    ExecutionMechanism =
mintExecutionMechanism

End Property


Public Property Get FailureDetails() As String

    FailureDetails = mstrFailureDetails

End Property

Public Property Let StepText(ByVal vdata As
String)
    ' Has to be null for manager steps
    ' The check will have to be made by the user
interface or
    ' by the manager step class
    mstrStepText = vdata
End Property
Public Property Let StepLevel(ByVal vdata As
Integer)

    ' The step level must be zero for all global
steps
    ' This check must be made in the global step
class
    mintStepLevel = vdata

End Property
Public Property Get StepText() As String
    StepText = mstrStepText
End Property

Public Property Let StepTextFile(ByVal vdata
As String)
    ' Has to be null for manager steps
    ' The check will have to be made by the user
interface and
    ' by the manager step class
    mstrStepTextFile = vdata
End Property

Public Property Get StepTextFile() As String
    StepTextFile = mstrStepTextFile
End Property

Public Property Let StepLabel(ByVal vdata As
String)
    ' Cannot be null for manager steps
    ' But this check cannot be made here since
we do not know
    ' at this point if the step being created is a
manager
    ' or a worker step
    ' The check will have to be made by the user
interface and
    ' by the manager step class
    mstrStepLabel = vdata
End Property

Public Property Get StepLabel() As String
    StepLabel = mstrStepLabel
End Property

Public Property Let StartDir(ByVal vdata As
String)
    mstrStartDir = vdata
End Property

Public Property Get StartDir() As String
    StartDir = mstrStartDir
End Property

Public Property Get VersionNo() As String
    ' The version number of a step is stored in the x.y
format where
    ' x represents a change to the step as a result of
modifications
    ' to any of the step properties
    ' y represents a change to the step as a result of
modifications
    ' to the sub-steps associated with it. Hence the y-
component
    ' of the version will be incremented when a sub-
step is added,
    ' modified or deleted
    ' x will be referred to throughout this code as the
parent
    ' component of the version and y will be referred
to as the
    ' child component of the version
    ' The version information for a step is maintained
by the
    ' calling function

    VersionNo = mstrVersionNo

End Property

Public Property Get StepId() As Long

    StepId = mlngStepId

End Property
Public Property Get NextStepId() As Long

    Dim lngNextId As Long

    On Error GoTo NextStepIdErr

    ' First check if the database object is valid
    Call CheckDB

    ' Retrieve the next identifier using the sequence
class
    Set mStepSeq = New cSequence
    Set mStepSeq.IdDatabase = mdbsDatabase
    mStepSeq.IdentifierColumn = "step_id"
    lngNextId = mStepSeq.Identifier
    Set mStepSeq = Nothing

    NextStepId = lngNextId
    Exit Property

NextStepIdErr:
    LogErrors Errors
    mstrSource = mstrModuleName & "NextStepId"
    On Error GoTo 0
    Err.Raise vbObjectError + errStepIdGetFailed, _
```

```
      mstrSource,
LoadResString(errStepIdGetFailed)

End Property
Public Property Let StepId(ByVal vdata As
Long)

   mlngStepId = vdata

End Property

Private Sub Class_Initialize()

   ' Initialize the operation indicator variable
to Query
   ' It will be modified later by the collection
class when
   ' inserts, updates or deletes are performed
   mintOperation = QueryOp
   mbIsNewVersion = False
   msOldVersion = gstrEmptyString

   Set mFieldValue = New cStringSM
   Set mcIterators = New cNodeCollections

End Sub

Private Sub Class_Terminate()

   Set mFieldValue = Nothing
   Set mcIterators = Nothing

End Sub


VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cStepTree"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cStepTree.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Implements step navigation
functions such as determining
'              the child of a step and so on.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this class
Private Const mstrModuleName As String =
"cStepTree."
Private mstrSource As String

Public StepRecords As cArrSteps
Public Property Get HasChild(Optional
ByVal StepKey As String, _
      Optional ByVal StepId As Long = 0)
As Boolean

   Dim lTemp As Long

   HasChild = False
   StepId = GetStepId(StepKey, StepId)

   For lTemp = 0 To StepRecords.StepCount -
1
      If StepRecords(lTemp).StepType <>
gintGlobalStep And
StepRecords(lTemp).ParentStepId = StepId
Then
         HasChild = True
         Exit For
      End If
   Next lTemp

End Property
Public Property Get ChildStep(Optional ByVal
StepKey As String, _
      Optional ByVal StepId As Long = 0) As
cStep

   Dim lTemp As Long

   Set ChildStep = Nothing
   StepId = GetStepId(StepKey, StepId)

   For lTemp = 0 To StepRecords.StepCount -
1
      If StepRecords(lTemp).StepType <>
gintGlobalStep And
StepRecords(lTemp).ParentStepId = StepId
And _
            StepRecords(lTemp).SequenceNo =
gintMinSequenceNo Then
         Set ChildStep = StepRecords(lTemp)
         Exit For
      End If
   Next lTemp

End Property
Public Property Get NextStep(Optional ByVal
StepKey As String, _
      Optional ByVal StepId As Long = 0) As
cStep

   Dim lTemp As Long
   Dim cChildStep As cStep

   Set NextStep = Nothing
   StepId = GetStepId(StepKey, StepId)
   Set cChildStep =
StepRecords.QueryStep(StepId)

   For lTemp = 0 To StepRecords.StepCount -
1
      If StepRecords(lTemp).StepType <>
gintGlobalStep And _
            StepRecords(lTemp).ParentStepId =
cChildStep.ParentStepId And _
            StepRecords(lTemp).SequenceNo =
cChildStep.SequenceNo + 1 Then
         Set NextStep = StepRecords(lTemp)
         Exit For
      End If
   Next lTemp

End Property
Private Function GetStepId(Optional ByVal
StepKey As String, _
      Optional ByVal StepId As Long = 0) As
Long
   If StepId = 0 Then
      If StringEmpty(StepKey) Then
         Err.Raise vbObjectError +
errMandatoryParameterMissing, _
               mstrModuleName & "GetStepId",
LoadResString(errMandatoryParameterMissin
g)
      Else
         GetStepId = IIf(IsLabel(StepKey), 0,
MakeIdentifierValid(StepKey))
      End If
   Else
      GetStepId = StepId
   End If
End Function
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cStringSM"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cStringSM.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This module contains common
procedures that can be used
'              to manipulate strings
'              It is called StringSM, since String is a
Visual Basic keyword
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name when
errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cStringSM."

Private mstrText As String

Private Const mstrNullValue = "null"
Private Const mstrSQ = """
Private Const mstrEnvVarSeparator = "%"
Public Function InsertEnvVariables( _
      Optional ByVal strComString As String) As
String
   ' This function replaces all environment variables
in
   ' the passed in string with their values - they are
   ' enclosed by "%"

   Dim intPos As Integer
   Dim intEndPos As Integer
   Dim strEnvVariable As String
   Dim strValue As String
   Dim strCommand As String

   On Error GoTo InsertEnvVariablesErr
   mstrSource = mstrModuleName &
"InsertEnvVariables"

   ' Initialize the return value of the function to the
   ' passed in command
   If IsStringEmpty(strComString) Then
      strCommand = mstrText
   Else
      strCommand = strComString
   End If

   intPos = InStr(strCommand,
mstrEnvVarSeparator)
   Do While intPos <> 0
```

```
    ' Extract the environment variable from the passed
    ' in string
    intEndPos = InStr(intPos + 1, strCommand, mstrEnvVarSeparator)
    strEnvVariable = Mid(strCommand, intPos + 1, intEndPos - intPos - 1)

    ' Get the value of the variable and call a function
    ' to replace the variable with it's value
    strValue = Environ$(strEnvVariable)
    strCommand = ReplaceSubString(strCommand, _
        mstrEnvVarSeparator & strEnvVariable & mstrEnvVarSeparator, _
        strValue)

    intPos = InStr(strCommand, mstrEnvVarSeparator)
  Loop

  InsertEnvVariables = strCommand
  Exit Function

InsertEnvVariablesErr:
  ' Log the error code raised by Visual Basic
  Call LogErrors(Errors)
  ' Return an empty string
  InsertEnvVariables = gstrEmptyString

End Function
Public Function MakeStringFieldValid( _
    Optional strField As String = gstrEmptyString) As String
  ' Returns a string that can be appended to any insert
  ' or modify (sql) statement
  ' If an argument is not passed to this function, the
  ' default text property is used

  Dim strTemp As String

  On Error GoTo MakeStringFieldValidErr

  If IsStringEmpty(strField) Then
    strTemp = mstrText
  Else
    strTemp = strField
  End If

  ' It checks whether the text is empty
  ' If so, it returns the string, "null"
  If IsStringEmpty(strTemp) Then
    MakeStringFieldValid = mstrNullValue
  Else
    ' Single-quotes have to be replaced by two single-quotes,
    ' since a single-quote is the identifier delimiter
    ' character - call a procedure to do the replace
    strTemp = ReplaceSubString(strTemp, mstrSQ, mstrSQ & mstrSQ)

    ' Replace pipe characters with the corresponding chr function
    strTemp = ReplaceSubString(strTemp, "|", "' & Chr(124) & "')

    ' Enclose the string in single quotes
    MakeStringFieldValid = mstrSQ & strTemp & mstrSQ

  End If

  Exit Function

MakeStringFieldValidErr:
  mstrSource = mstrModuleName & "MakeStringFieldValid"
  LogErrors Errors
  On Error GoTo 0
  Err.Raise vbObjectError + errMakeFieldValidFailed, _
      mstrSource, LoadResString(errMakeFieldValidFailed)

End Function
Public Function MakeDateFieldValid( _
    Optional dtmField As Date = gdtmEmpty) As String
  ' Returns a string that can be appended to any insert
  ' or modify (sql) statement

  ' Enclose the date in single quotes
  MakeDateFieldValid = mstrSQ & dtmField & mstrSQ

End Function

Private Function IsStringEmpty(strToCheck As String) As Boolean

  If strToCheck = gstrEmptyString Then
    IsStringEmpty = True
  Else
    IsStringEmpty = False
  End If

End Function
Public Function ReplaceSubString(ByVal MainString As String, _
    ByVal ReplaceString As String, _
    ByVal ReplaceWith As String) As String

  ' Replaces all occurrences of ReplaceString in MainString with ReplaceWith

  Dim intPos As Integer
  Dim strTemp As String

  On Error GoTo ReplaceSubStringErr

  strTemp = MainString

  intPos = InStr(strTemp, ReplaceString)
  Do While intPos <> 0
    strTemp = Left(strTemp, intPos - 1) & ReplaceWith & _
        Mid(strTemp, intPos + Len(ReplaceString))
    intPos = InStr(intPos + Len(ReplaceString) + 1, strTemp, ReplaceString)
  Loop
  ReplaceSubString = strTemp

  Exit Function

ReplaceSubStringErr:
  Call LogErrors(Errors)
  mstrSource = mstrModuleName & "ReplaceSubString"
  On Error GoTo 0
  Err.Raise vbObjectError + errParseStringFailed, _
    mstrSource, _
    LoadResString(errParseStringFailed)

End Function

Public Property Get Text() As String
Attribute Text.VB_UserMemId = 0
  Text = mstrText
End Property

Public Property Let Text(ByVal vdata As String)
  mstrText = vdata
End Property

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cSubStep"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cSubStep.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This module encapsulates the properties of sub-steps
'              that are used during the execution of a workspace.
'  Contact:    Reshma Tharamal (reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name when errors
' are raised by this class
Private Const mstrModuleName As String = "cSubStep"

Private mlngStepId As Long
Private mintRunning As Integer ' Number of running tasks
Private mintComplete As Integer ' Number of completed tasks
' The last iterator for this sub-step
Private mcLastIterator As cRunItDetails

Public Function NewIteration(cStepRec As cStep) As cIterator
  ' Calls a procedure to determine the next iterator value
  ' for the passed in step - returns the value to be used
  ' in the iteration.
  ' It updates the instance node with the new iteration
  ' for the step.

  Dim cItRec As cIterator

  On Error GoTo NewIterationErr

  ' Call a function that will populate an iterator record
  ' with the iterator values
  Set cItRec = NextIteration(cStepRec)

  ' Initialize the run node with the new iterator
```

```
    ' values
    If Not mcLastIterator Is Nothing Then
        If cItRec Is Nothing Then
            mcLastIterator.Value =
gstrEmptyString
        Else
            mcLastIterator.Value = cItRec.Value

            ' And if the iterator is a list of values,
then update
            ' the sequence number as well
            If mcLastIterator.IteratorType =
gintValue Then
                mcLastIterator.Sequence =
cItRec.SequenceNo
            End If
        End If
    End If

    Set NewIteration = cItRec
    Set cItRec = Nothing

    Exit Function

NewIterationErr:
    ' Log the error code raised by Visual
Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errIterateFailed, mstrModuleName, _
        LoadResString(errIterateFailed)

End Function
Public Function NextIteration(cStepRec As
cStep) As cIterator

    ' Retrieves the next iterator value for the
passed in step -
    ' returns an iterator record with the new
iterator values

    Dim cItRec As cIterator
    Dim vntIterators As Variant
    Dim lngValue As String

    On Error GoTo NextIterationErr

    vntIterators = cStepRec.Iterators

    If Not mcLastIterator Is Nothing Then
        ' The run node contains the iterator
details
        ' Get the next value for the iterator
        If mcLastIterator.IteratorType =
gintValue Then
            ' Find the next iterator that appears in
the list of
            ' iterator values
            Set cItRec =
NextInSequence(vntIterators,
mcLastIterator.Sequence)
        Else
            lngValue =
CLng(Trim$(mcLastIterator.Value))
            ' Determine whether the new iterator
value falls in the
            ' range between From and To
            If (mcLastIterator.RangeStep > 0
And _
                (mcLastIterator.RangeFrom <=
mcLastIterator.RangeTo) And _
                (mcLastIterator.RangeStep +
lngValue) <= mcLastIterator.RangeTo) Or _
                (mcLastIterator.RangeStep < 0
And _
                (mcLastIterator.RangeFrom >=
mcLastIterator.RangeTo) And _
                (mcLastIterator.RangeStep +
lngValue) >= mcLastIterator.RangeTo) Then
                Set cItRec = New cIterator
                cItRec.Value =
Trim$(CStr(mcLastIterator.RangeStep +
lngValue))
            Else
                Set cItRec = Nothing
            End If
        End If
    Else
        Set cItRec = Nothing
    End If

    Set NextIteration = cItRec
    Exit Function

NextIterationErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError + errIterateFailed,
mstrModuleName, _
        LoadResString(errIterateFailed)

End Function
Public Sub InitializeIt(cPendingStep As cStep,
_
        ColParameters As cArrParameters, _
        Optional vntIterators As Variant)

    ' Initializes the LastIteration structure with
the iterator details for the
    ' passed in step

    On Error GoTo InitializeItErr

    If IsMissing(vntIterators) Then
        vntIterators = cPendingStep.Iterators
    End If

    If IsArray(vntIterators) And Not
IsEmpty(vntIterators) Then
        mcLastIterator.IteratorName =
cPendingStep.IteratorName
        If
vntIterators(LBound(vntIterators)).IteratorTyp
e = _
            gintValue Then
            mcLastIterator.IteratorType =
gintValue
            ' Since the sequence numbers begin at 0
            mcLastIterator.Sequence =
gintMinIteratorSequence - 1
        Else
            mcLastIterator.IteratorType = gintFrom
            Call InitializeItRange(vntIterators,
cPendingStep.WorkspaceId, _
                ColParameters)
        End If
    Else
        Set mcLastIterator = Nothing
    End If

    Exit Sub

InitializeItErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError + errIterateFailed,
mstrModuleName, _
        LoadResString(errIterateFailed)

End Sub

Private Sub InitializeItRange(vntIterators As
Variant, ByVal lWorkspace As Long, _
        ColParameters As cArrParameters)

    ' Initializes the LastIteration structure for range
iterators from the
    ' passed in variant containing the iterator records

    Dim lngIndex As Long
    Dim cItRec As cIterator

    On Error GoTo InitializeItRangeErr

    If IsArray(vntIterators) And Not
IsEmpty(vntIterators) Then

        ' Check if the iterator range has been
completely initialized
        RangeComplete (vntIterators)

        ' Initialize the Run node with the values for the
From,
        ' To and Step boundaries
        For lngIndex = LBound(vntIterators) To
UBound(vntIterators)
            Set cItRec = vntIterators(lngIndex)
            Select Case cItRec.IteratorType
                Case gintFrom
                    mcLastIterator.RangeFrom =
SubstituteParameters(cItRec.Value, lWorkspace,
WspParameters:=ColParameters)
                Case gintTo
                    mcLastIterator.RangeTo =
SubstituteParameters(cItRec.Value, lWorkspace,
WspParameters:=ColParameters)
                Case gintStep
                    mcLastIterator.RangeStep =
SubstituteParameters(cItRec.Value, lWorkspace,
WspParameters:=ColParameters)
                Case Else
                    On Error GoTo 0
                    Err.Raise vbObjectError +
errTypeInvalid, mstrModuleName, _
                        LoadResString(errTypeInvalid)
            End Select
        Next lngIndex

        mcLastIterator.Value =
Trim$(CStr(mcLastIterator.RangeFrom -
mcLastIterator.RangeStep))
    End If

    Exit Sub

InitializeItRangeErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError + errIterateFailed,
mstrModuleName, _
        LoadResString(errIterateFailed)

End Sub
Private Function NextInSequence(vntIterators As
Variant, _
        lngOldSequence As Long) As cIterator

    Dim lngIndex As Long
    Dim cItRec As cIterator
```

```
    On Error GoTo NextInSequenceErr

    If IsArray(vntIterators) And Not
IsEmpty(vntIterators) Then
        For lngIndex = LBound(vntIterators)
To UBound(vntIterators)
            Set cItRec = vntIterators(lngIndex)
            If cItRec.IteratorType <> gintValue
Then
                On Error GoTo 0
                Err.Raise vbObjectError +
errTypeInvalid, mstrModuleName, _

LoadResString(errTypeInvalid)
            End If
            If cItRec.SequenceNo =
lngOldSequence + 1 Then
                Exit For
            End If

        Next lngIndex

        If cItRec.SequenceNo <>
lngOldSequence + 1 Then
            Set cItRec = Nothing
        End If
    Else
        Set cItRec = Nothing
    End If

    Set NextInSequence = cItRec

    Exit Function

NextInSequenceErr:
    ' Log the error code raised by Visual
Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errIterateFailed, mstrModuleName, _
        LoadResString(errIterateFailed)

End Function

Public Property Get LastIterator() As
cRunItDetails

    Set LastIterator = mcLastIterator

End Property
Public Property Set LastIterator(vdata As
cRunItDetails)

    Set mcLastIterator = vdata

End Property

Public Property Get TasksRunning() As
Integer

    TasksRunning = mintRunning

End Property

Public Property Let TasksRunning(ByVal
vdata As Integer)

    mintRunning = vdata

End Property

Public Property Get TasksComplete() As
Integer

    TasksComplete = mintComplete

End Property
Public Property Let TasksComplete(ByVal
vdata As Integer)

    mintComplete = vdata

End Property
Public Property Get StepId() As Long

    StepId = mlngStepId

End Property
Public Property Let StepId(ByVal vdata As
Long)

    mlngStepId = vdata

End Property
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cSubSteps"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:       cSubSteps.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    This module provides a type-
safe wrapper around cVector to
'             implement a collection of cSubStep
objects.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private mcSubSteps As cVector

Public Sub Add(ByVal objItem As cSubStep)

    mcSubSteps.Add objItem

End Sub


Public Sub Clear()

    mcSubSteps.Clear

End Sub


Public Function Count() As Long

    Count = mcSubSteps.Count

End Function


Public Function Delete(ByVal lngDelete As
Long) As cSubStep

    Set Delete = mcSubSteps.Delete(lngDelete)

End Function

Public Property Get Item(ByVal Position As Long)
As cSubStep
Attribute Item.VB_UserMemId = 0

    Set Item = mcSubSteps.Item(Position)

End Property

Private Sub Class_Initialize()

    Set mcSubSteps = New cVector

End Sub

Private Sub Class_Terminate()

    Set mcSubSteps = Nothing

End Sub


VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cTermProcess"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:       cTermProcess.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    This module raises an event if a
completed step exists.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private WithEvents moTimer As cTimerSM
Attribute moTimer.VB_VarHelpID = -1
Private bTermProcessExists As Boolean
Public Event TermProcessExists()

Public Sub ProcessTerminated()

    bTermProcessExists = True
    moTimer.Enabled = True

End Sub

Private Sub Class_Initialize()

    bTermProcessExists = False

    Set moTimer = New cTimerSM
    moTimer.Enabled = False

End Sub

Private Sub Class_Terminate()

    Set moTimer = Nothing

End Sub

Private Sub moTimer_Timer()

    On Error GoTo moTimer_TimerErr
```

```
    If bTermProcessExists Then
        RaiseEvent TermProcessExists
    End If

    moTimer.Enabled = False
    bTermProcessExists = False

    Exit Sub

moTimer_TimerErr:
    LogErrors Errors

End Sub

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cTermStep"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:       cTermStep.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    This module encapsulates
the properties of steps that
'             have completed execution such as
status and time of completion.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Public TimeComplete As Currency
Public Index As Long
Public InstanceId As Long
Public ExecutionStatus As InstanceStatus

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cTermSteps"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:       cTermSteps.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    This module provides a
type-safe wrapper around cVector to
'             implement a collection of
cTermStep objects. Raises an
'             event if a step that has completed
execution exists.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private mcTermSteps As cVector
Private WithEvents moTimer As cTimerSM
Attribute moTimer.VB_VarHelpID = -1
Public Event TermStepExists(cStepDetails
As cTermStep)

Public Sub Add(ByVal citem As cTermStep)

    Call mcTermSteps.Add(citem)
    moTimer.Enabled = True

End Sub

Public Sub Clear()

    mcTermSteps.Clear

End Sub

Public Function Delete()

    Call mcTermSteps.Delete(0)
    ' Disable the timer if there are no more
pending events
    If mcTermSteps.Count = 0 Then
moTimer.Enabled = False

End Function

Public Property Get Item(ByVal Position As
Long) As cTermStep

    Set Item = mcTermSteps(Position)

End Property

Public Function Count() As Long

    Count = mcTermSteps.Count

End Function

Private Sub Class_Initialize()

    Set mcTermSteps = New cVector

    Set moTimer = New cTimerSM
    moTimer.Enabled = False

End Sub

Private Sub Class_Terminate()

    Set mcTermSteps = Nothing
    Set moTimer = Nothing

End Sub

Private Sub moTimer_Timer()

    On Error GoTo moTimer_TimerErr

    If mcTermSteps.Count > 0 Then
        ' Since items are appended to the end of
the array
        RaiseEvent
TermStepExists(mcTermSteps(0))
    Else
        moTimer.Enabled = False
    End If
    Exit Sub

moTimer_TimerErr:
    LogErrors Errors

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cTimerSM"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:       cTimer.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    This module implements a timer.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'

Option Explicit

Public Event Timer()

Private Const mnDefaultInterval As Long = 1

Private mnTimerID As Long
Private mnInterval As Long
Private mfEnabled As Boolean

Public Property Get Interval() As Long
    Interval = mnInterval
End Property
Public Property Let Interval(Value As Long)
    If mnInterval <> Value Then
        mnInterval = Value
        If mfEnabled Then
            SetInterval mnInterval, mnTimerID
        End If
    End If
End Property

Public Property Get Enabled() As Boolean
    Enabled = mfEnabled
End Property
Public Property Let Enabled(Value As Boolean)
    If mfEnabled <> Value Then
        If Value Then
            mnTimerID = StartTimer(mnInterval)
            If mnTimerID <> 0 Then
                mfEnabled = True
                'Storing Me in the global would add a
reference to Me, which
                '  would prevent Me from being released,
which in turn would
                '  prevent my Class_Terminate code from
running. To prevent
                '  this, I store a "soft reference" - the
collection holds a
                '  pointer to me without incrementing my
reference count.
                gcTimerObjects.Add ObjPtr(Me),
Str$(mnTimerID)
            End If
        Else
            StopTimer mnTimerID
            mfEnabled = False
            gcTimerObjects.Remove Str$(mnTimerID)
        End If
    End If
End Property

Private Sub Class_Initialize()
    If gcTimerObjects Is Nothing Then Set
gcTimerObjects = New Collection
    mnInterval = mnDefaultInterval
End Sub

Private Sub Class_Terminate()
    Enabled = False
```

```
End Sub

Friend Sub Tick()
   RaiseEvent Timer
End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cVBErrorsSM"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
Attribute VB_Ext_KEY =
"SavedWithClassBuilder" ,"Yes"
Attribute VB_Ext_KEY = "Top_Level"
,"Yes"
'  FILE:       cVBErrors.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This module encapsulates
the handling of Visual Basic errors.
'              This module does not do any error
handling - any error handler
'              will erase the errors object!
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' The Execute class exposes a method,
WriteError through which we can write to
the
' error log that is currently being used by the
Execute object. Store a reference to
' Execute object locally.
Private mcExecObjRef As
EXECUTEDLLLib.Execute
Public Sub WriteError(ByVal ErrorCode As
errErrorConstants, _
       Optional ByVal ErrorSource As String
= gstrEmptyString, _
       Optional ByVal OptArgs As String =
gstrEmptyString)

   Dim sError As String

   sError = "StepMaster Error:" &
ErrorCode & vbCrLf &
LoadResString(ErrorCode) & vbCrLf

   If Not StringEmpty(ErrorSource) Then
      sError = sError & "(Source: " &
ErrorSource & ")" & vbCrLf
   End If
   sError = sError & OptArgs

   Call LogMessage(sError)

End Sub
Private Function InitErrorString() As String
   ' Initializes a string with all the properties
of the
   ' Err object

   Dim strError As String
   Dim errCode As Long

   If Err.Number = 0 Then
      InitErrorString = gstrEmptyString
   Else
      With Err
         If Err.Number > vbObjectError And
Err.Number < (vbObjectError + 65536) Then
            errCode = .Number - vbObjectError
         Else
            errCode = .Number
         End If
         strError = "Error #: " & errCode &
vbCrLf
         strError = strError & "Description: " &
.Description & vbCrLf
         strError = strError & "Source: " &
Err.Source & vbCrLf
      End With

      Debug.Print strError
      InitErrorString = strError
   End If

End Function
Public Sub LogVBErrors()

   Dim strErr As String

   strErr = InitErrorString

   On Error GoTo LogVBErrorsErr

   If Not StringEmpty(strErr) Then
      ' Write an error using the WriteError
method of the Execute object.
      If Not mcExecObjRef Is Nothing Then
         mcExecObjRef.WriteError strErr
      Else
         WriteMessage strErr
      End If
   End If

   Err.Clear

   Exit Sub

LogVBErrorsErr:
   Call LogErrors(Errors)
   ' Since write to the error file for the step has
failed, write to the project log
   Call WriteMessage(strErr)

End Sub
Public Sub DisplayErrors()

   Dim strErr As String

   strErr = InitErrorString

   If Not StringEmpty(strErr) Then
      ' Display the error message
      MsgBox strErr
   End If

   Err.Clear

End Sub
Public Sub LogMessage(strMsg As String)

   On Error GoTo LogMessageErr

   ' Write an error using the WriteError method
of the Execute object.
   If Not mcExecObjRef Is Nothing Then
      mcExecObjRef.WriteError strMsg
   Else
      WriteMessage strMsg
   End If

   Exit Sub

LogMessageErr:
   Call LogErrors(Errors)
   ' Since write to the error file for the step has
failed, write to the project log
   Call WriteMessage(strMsg)

End Sub
Public Property Set ErrorFile(vdata As
EXECUTEDLLLib.Execute)

   Set mcExecObjRef = vdata

End Property
Private Sub Class_Terminate()

   Set mcExecObjRef = Nothing

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cVector"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cVector.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This class implements an array of
objects.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name when
errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cVector."

' Array counter
Private mlngCount As Long
Private mcarrItems() As Object

Public Sub Add(ByVal objItem As Object)
   ' Adds the passed in Object variable to the array

   On Error GoTo AddErr

   ReDim Preserve mcarrItems(mlngCount)

   ' Set the newly added element in the array to the
   ' passed in variable
   Set mcarrItems(mlngCount) = objItem
   mlngCount = mlngCount + 1

   Exit Sub

AddErr:
   LogErrors Errors
   gstrSource = mstrModuleName & "Add"
   On Error GoTo 0
   Err.Raise vbObjectError + errLoadInArrayFailed,
_
         mstrSource, _
         LoadResString(errLoadInArrayFailed)
```

```
End Sub
Public Sub Clear()

   ' Clear the array
   ReDim mcarrItems(0)
   mlngCount = 0

End Sub

Public Function Delete(ByVal lngDelete As
Long) As Object

   Dim lngIndex As Long

   On Error GoTo DeleteErr

   If lngDelete < (mlngCount - 1) Then

      ' We want to maintain the order of all
items in the
      ' array - so move all remaining
elements in the array
      ' up by 1
      For lngIndex = lngDelete To
mlngCount - 2
         MoveDown lngIndex
      Next lngIndex

   End If

   ' Return the deleted node
   Set Delete = mcarrItems(mlngCount - 1)

   ' Delete the last Node from the array
   mlngCount = mlngCount - 1
   If mlngCount > 0 Then
      ReDim Preserve mcarrItems(0 To
mlngCount - 1)
   Else
      ReDim mcarrItems(0)
   End If

   Exit Function

DeleteErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"Delete"
   On Error GoTo 0
   Err.Raise vbObjectError +
errDeleteArrayElementFailed, _
         mstrSource, _

LoadResString(errDeleteArrayElementFaile
d)

End Function
Public Property Get Item(ByVal Position As
Long) As Object
Attribute Item.VB_UserMemId = 0

   ' Returns the element at the passed in
position in the array
   If Position >= 0 And Position <
mlngCount Then
      Set Item = mcarrItems(Position)
   Else
      On Error GoTo 0
      Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _

LoadResString(errItemDoesNotExist)
   End If
End Property
Public Property Set Item(ByVal Position As
Long, _
      ByVal Value As Object)

   ' Returns the element at the passed in
position in the array
   If Position >= 0 Then
      ' If the passed in position is outside the
array
      ' bounds, then resize the array
      If Position >= mlngCount Then
         ReDim Preserve mcarrItems(Position)
         mlngCount = Position + 1
      End If

      ' Set the newly added element in the array
to the
      ' passed in variable
      Set mcarrItems(Position) = Value
   Else
      On Error GoTo 0
      Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _
         LoadResString(errItemDoesNotExist)
   End If

End Property
Public Sub MoveUp(ByVal Position As Long)
   ' Moves the element at the passed in position
up by 1

   Dim cTemp As Object

   If Position > 0 And Position < mlngCount
Then
      Set cTemp = mcarrItems(Position)

      Set mcarrItems(Position) =
mcarrItems(Position - 1)
      Set mcarrItems(Position - 1) = cTemp
   End If

End Sub
Public Sub MoveDown(ByVal Position As
Long)
   ' Moves the element at the passed in position
down by 1

   Dim cTemp As Object

   If Position >= 0 And Position < mlngCount -
1 Then
      Set cTemp = mcarrItems(Position)

      Set mcarrItems(Position) =
mcarrItems(Position + 1)
      Set mcarrItems(Position + 1) = cTemp
   End If

End Sub

Public Function Count() As Long

   Count = mlngCount

End Function


Private Sub Class_Initialize()

   mlngCount = 0

End Sub

Private Sub Class_Terminate()

   Call Clear

End Sub

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cVectorLng"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cVectorLng.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This class implements an array of
longs.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name when
errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cVectorLng."

' Array counter
Private mlngCount As Long
Private mcarrItems() As Long

Public Sub Add(ByVal lngItem As Long)
   ' Adds the passed in long variable to the array

   On Error GoTo AddErr

   ReDim Preserve mcarrItems(mlngCount)

   ' Set the newly added element in the array to the
   ' passed in variable
   mcarrItems(mlngCount) = lngItem
   mlngCount = mlngCount + 1

   Exit Sub

AddErr:
   LogErrors Errors
   gstrSource = mstrModuleName & "Add"
   On Error GoTo 0
   Err.Raise vbObjectError + errLoadInArrayFailed,
_
         mstrSource, _
         LoadResString(errLoadInArrayFailed)

End Sub
Public Sub Clear()

   ' Clear the array
   ReDim mcarrItems(0)

End Sub

Public Sub Delete(Optional ByVal Position As
Long = -1, _
      Optional ByVal Item As Long = -1)
```

```
    ' The user can opt to delete either a
specific item in
    ' the list or the item at a specified position.
If no
    ' parameters are passed in, we delete the
element at
    ' position 0!

    Dim lngDelete As Long
    Dim lngIndex As Long

    On Error GoTo DeleteErr

    If Position = -1 Then
        ' Since we can never store an element at
position -1,
        ' we can be sure that the user is trying
to delete
        ' a given item
        lngDelete = Find(Item)
    Else
        lngDelete = Position
    End If

    If lngDelete < (mlngCount - 1) Then

        ' We want to maintain the order of all
items in the
        ' array - so move all remaining
elements in the array
        ' up by 1
        For lngIndex = lngDelete To
mlngCount - 2
            MoveDown lngIndex
        Next lngIndex

    End If

    ' Delete the last Node from the array
    mlngCount = mlngCount - 1
    If mlngCount > 0 Then
        ReDim Preserve mcarrItems(0 To
mlngCount - 1)
    Else
        ReDim mcarrItems(0)
    End If

    Exit Sub

DeleteErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"Delete"
    On Error GoTo 0
    Err.Raise vbObjectError +
errDeleteArrayElementFailed, _
            mstrSource, _

LoadResString(errDeleteArrayElementFaile
d)

End Sub
Public Function Find(ByVal Item As Long)
As Long

    ' Returns the position at which the passed
in value occurs
    ' in the array

    Dim lngIndex As Long

    On Error GoTo FindErr

    ' Find the element in the array to be
deleted
    For lngIndex = 0 To mlngCount - 1

        If mcarrItems(lngIndex) = Item Then
            Find = lngIndex
            Exit Function
        End If

    Next lngIndex

    Find = -1

    Exit Function

FindErr:
    LogErrors Errors
    mstrSource = mstrModuleName & "Find"
    On Error GoTo 0
    Err.Raise vbObjectError +
errItemNotFound, mstrSource, _
        LoadResString(errItemNotFound)

End Function
Public Property Get Item(ByVal Position As
Long) As Long
Attribute Item.VB_UserMemId = 0

    ' Returns the element at the passed in
position in the array
    If Position >= 0 And Position < mlngCount
Then
        Item = mcarrItems(Position)
    Else
        On Error GoTo 0
        Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _
            LoadResString(errItemDoesNotExist)
    End If

End Property
Public Property Let Item(ByVal Position As
Long, _
        ByVal Value As Long)

    ' Returns the element at the passed in
position in the array
    If Position >= 0 Then
        ' If the passed in position is outside the
array
        ' bounds, then resize the array
        If Position >= mlngCount Then
            ReDim Preserve mcarrItems(Position)
            mlngCount = Position + 1
        End If

        ' Set the newly added element in the array
to the
        ' passed in variable
        mcarrItems(Position) = Value
    Else
        On Error GoTo 0
        Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _
            LoadResString(errItemDoesNotExist)
    End If

End Property
Public Sub MoveUp(ByVal Position As Long)
    ' Moves the element at the passed in position
up by 1

    Dim lngTemp As Long

    If Position > 0 And Position < mlngCount
Then
        lngTemp = mcarrItems(Position)

        mcarrItems(Position) = mcarrItems(Position -
1)
        mcarrItems(Position - 1) = lngTemp
    End If

End Sub
Public Sub MoveDown(ByVal Position As Long)
    ' Moves the element at the passed in position
down by 1

    Dim lngTemp As Long

    If Position >= 0 And Position < mlngCount - 1
Then
        lngTemp = mcarrItems(Position)

        mcarrItems(Position) = mcarrItems(Position +
1)
        mcarrItems(Position + 1) = lngTemp
    End If

End Sub

Public Function Count() As Long

    Count = mlngCount

End Function


Private Sub Class_Initialize()

    mlngCount = 0

End Sub


Private Sub Class_Terminate()

    Call Clear

End Sub

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cVectorStr"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cVectorStr.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This class implements an array of
strings.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name when
errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cVectorStr."

' Array counter
Private mlngCount As Long
```

```
Private mcarrItems() As String

Public Sub Add(ByVal strItem As String)
   ' Adds the passed in string variable to the
array

   On Error GoTo AddErr

   ReDim Preserve mcarrItems(mlngCount)

   ' Set the newly added element in the array
to the
   ' passed in variable
   mcarrItems(mlngCount) = strItem
   mlngCount = mlngCount + 1

   Exit Sub

AddErr:
   Call LogErrors(Errors)
   gstrSource = mstrModuleName & "Add"
   On Error GoTo 0
   Err.Raise vbObjectError +
errLoadInArrayFailed, _
         mstrSource, _

LoadResString(errLoadInArrayFailed)

End Sub
Public Sub Clear()

   ' Clear the array
   ReDim mcarrItems(0)

End Sub

Public Sub Delete(Optional ByVal Position
As Long = -1, _
      Optional ByVal Item As String = -1)
   ' The user can opt to delete either a
specific item in
   ' the list or the item at a specified position.
If no
   ' parameters are passed in, we delete the
element at
   ' position 0!

   Dim lngDelete As Long
   Dim lngIndex As Long

   On Error GoTo DeleteErr
   mstrSource = mstrModuleName &
"Delete"

   If Position = -1 Then
      ' Since we can never store an element at
position -1,
      ' we can be sure that the user is trying
to delete
      ' a given item
      lngDelete = Find(Item)
   Else
      lngDelete = Position
   End If

   If lngDelete < (mlngCount - 1) Then

      ' We want to maintain the order of all
items in the
      ' array - so move all remaining
elements in the array
      ' up by 1
      For lngIndex = lngDelete To
mlngCount - 2
         MoveDown lngIndex
      Next lngIndex

   End If

   ' Delete the last Node from the array
   mlngCount = mlngCount - 1
   If mlngCount > 0 Then
      ReDim Preserve mcarrItems(0 To
mlngCount - 1)
   Else
      ReDim mcarrItems(0)
   End If

   Exit Sub

DeleteErr:
   Call LogErrors(Errors)
   mstrSource = mstrModuleName & "Delete"
   On Error GoTo 0
   Err.Raise vbObjectError +
errDeleteArrayElementFailed, _
         mstrSource, _

LoadResString(errDeleteArrayElementFailed)

End Sub
Public Function Find(ByVal Item As String)
As Long

   ' Returns the position at which the passed in
value occurs
   ' in the array

   Dim lngIndex As Long

   On Error GoTo FindErr
   mstrSource = mstrModuleName & "Find"

   ' Find the element in the array to be deleted
   For lngIndex = 0 To mlngCount - 1

      If mcarrItems(lngIndex) = Item Then
         Find = lngIndex
         Exit Function
      End If

   Next lngIndex

   Find = -1

   Exit Function

FindErr:
   Call LogErrors(Errors)
   mstrSource = mstrModuleName & "Find"
   On Error GoTo 0
   Err.Raise vbObjectError +
errItemNotFound, mstrSource, _
      LoadResString(errItemNotFound)

End Function
Public Property Get Item(ByVal Position As
Long) As String
Attribute Item.VB_UserMemId = 0

   ' Returns the element at the passed in
position in the array
   If Position >= 0 And Position < mlngCount
Then
      Item = mcarrItems(Position)
   Else
      On Error GoTo 0
      Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _
         LoadResString(errItemDoesNotExist)
   End If

End Property
Public Property Let Item(ByVal Position As Long,
_
      ByVal Value As String)

   ' Returns the element at the passed in position in
the array
   If Position >= 0 Then
      ' If the passed in position is outside the array
      ' bounds, then resize the array
      If Position >= mlngCount Then
         ReDim Preserve mcarrItems(Position)
         mlngCount = Position + 1
      End If

      ' Set the newly added element in the array to
the
      ' passed in variable
      mcarrItems(Position) = Value
   Else
      On Error GoTo 0
      Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _
         LoadResString(errItemDoesNotExist)
   End If

End Property
Public Sub MoveUp(ByVal Position As Long)
   ' Moves the element at the passed in position up
by 1

   Dim strTemp As String

   If Position > 0 And Position < mlngCount Then
      strTemp = mcarrItems(Position)

      mcarrItems(Position) = mcarrItems(Position -
1)
      mcarrItems(Position - 1) = strTemp
   End If

End Sub
Public Sub MoveDown(ByVal Position As Long)
   ' Moves the element at the passed in position
down by 1

   Dim strTemp As String

   If Position >= 0 And Position < mlngCount - 1
Then
      strTemp = mcarrItems(Position)

      mcarrItems(Position) = mcarrItems(Position +
1)
      mcarrItems(Position + 1) = strTemp
   End If

End Sub

Public Function Count() As Long

   Count = mlngCount

End Function


Private Sub Class_Initialize()

   mlngCount = 0

End Sub
Private Sub Class_Terminate()
```

```
    Call Clear

End Sub


VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cWorker"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cWorker.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Encapsulates the properties and methods of a worker step.
'              Implements the cStep class - carries out initializations
'              and validations that are specific to worker steps.
'  Contact:    Reshma Tharamal (reshmat@microsoft.com)
'
Option Explicit

Implements cStep

' Object variable to keep the step reference in
Private mcStep As cStep

' Used to indicate the source module name when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String = "cWorker."
Private Sub cStep_AddAllIterators()

    Call mcStep.AddAllIterators

End Sub

Private Property Let cStep_StartDir(ByVal RHS As String)

    mcStep.StartDir = RHS

End Property

Private Property Get cStep_StartDir() As String

    cStep_StartDir = mcStep.StartDir

End Property

Private Property Set cStep_NodeDB(RHS As DAO.Database)

    Set mcStep.NodeDB = RHS

End Property

Private Property Get cStep_NodeDB() As DAO.Database

    Set cStep_NodeDB = mcStep.NodeDB

End Property

Private Function cStep_IncVersionY() As String

    cStep_IncVersionY = mcStep.IncVersionY

End Function
Private Function cStep_IsNewVersion() As Boolean
    cStep_IsNewVersion = mcStep.IsNewVersion
End Function
Private Function cStep_OldVersionNo() As String
    cStep_OldVersionNo = mcStep.OldVersionNo
End Function

Private Function cStep_IncVersionX() As String

    cStep_IncVersionX = mcStep.IncVersionX

End Function
Private Sub cStep_UpdateIteratorVersion()

    Call mcStep.UpdateIteratorVersion

End Sub

Private Function cStep_IteratorCount() As Long

    cStep_IteratorCount = mcStep.IteratorCount

End Function

Private Sub cStep_UnloadIterators()

    Call mcStep.UnloadIterators

End Sub

Private Sub cStep_SaveIterators()

    Call mcStep.SaveIterators

End Sub
Private Property Get cStep_IteratorName() As String

    cStep_IteratorName = mcStep.IteratorName

End Property
Private Property Let cStep_IteratorName(ByVal RHS As String)

    mcStep.IteratorName = RHS

End Property

Private Sub cStep_LoadIterator(cItRecord As cIterator)

    Call mcStep.LoadIterator(cItRecord)

End Sub
Private Sub cStep_DeleteIterator(cItRecord As cIterator)

    Call mcStep.DeleteIterator(cItRecord)

End Sub
Private Sub cStep_InsertIterator(cItRecord As cIterator)

    Call mcStep.InsertIterator(cItRecord)

End Sub
Private Function cStep_Iterators() As Variant

    cStep_Iterators = mcStep.Iterators

End Function
Private Sub cStep_ModifyIterator(cItRecord As cIterator)

    Call mcStep.ModifyIterator(cItRecord)

End Sub
Private Sub cStep_RemoveIterator(cItRecord As cIterator)

    Call mcStep.RemoveIterator(cItRecord)

End Sub
Private Sub cStep_UpdateIterator(cItRecord As cIterator)

    Call mcStep.UpdateIterator(cItRecord)

End Sub
Private Sub cStep_AddIterator(cItRecord As cIterator)

    Call mcStep.AddIterator(cItRecord)

End Sub

Private Property Let cStep_Position(ByVal RHS As Long)

    mcStep.Position = RHS

End Property

Private Property Get cStep_Position() As Long

    cStep_Position = mcStep.Position

End Property

Private Function cStep_Clone(Optional cCloneStep As cStep) As cStep

    Dim cNewWorker As cWorker

    Set cNewWorker = New cWorker
    Set cStep_Clone = mcStep.Clone(cNewWorker)

End Function

Private Sub StepTextOrFileEntered()
    ' Checks if either the step text or the name of the file containing
    ' the text has been entered
    ' If both of them are null or both of them are not null,
    ' the worker step is invalid and an error is raised
    If StringEmpty(mcStep.StepText) And StringEmpty(mcStep.StepTextFile) Then
        ShowError errStepTextAndFileNull
        On Error GoTo 0
        Err.Raise vbObjectError + errStepTextAndFileNull, _
            mstrSource, LoadResString(errStepTextAndFileNull)
    End If
```

```
End Sub

Private Property Get cStep_IndOperation()
As Operation

   cStep_IndOperation =
mcStep.IndOperation

End Property

Private Property Let
cStep_IndOperation(ByVal RHS As
Operation)

   mcStep.IndOperation = RHS

End Property

Private Property Get cStep_NextStepId() As
Long

   cStep_NextStepId = mcStep.NextStepId

End Property

Private Property Let
cStep_OutputFile(ByVal RHS As String)

   mcStep.OutputFile = RHS

End Property

Private Property Get cStep_OutputFile() As
String

   cStep_OutputFile = mcStep.OutputFile

End Property

Private Property Let cStep_ErrorFile(ByVal
RHS As String)

   mcStep.ErrorFile = RHS

End Property

Private Property Get cStep_ErrorFile() As
String

   cStep_ErrorFile = mcStep.ErrorFile

End Property
'Private Property Let cStep_LogFile(ByVal
RHS As String)
'
'   mcStep.LogFile = RHS
'
'End Property
'
'Private Property Get cStep_LogFile() As
String
'
'   cStep_LogFile = mcStep.LogFile
'
'End Property

Private Property Let
cStep_ArchivedFlag(ByVal RHS As
Boolean)

   mcStep.ArchivedFlag = RHS

End Property

Private Property Get cStep_ArchivedFlag() As
Boolean

   cStep_ArchivedFlag = mcStep.ArchivedFlag

End Property

Private Sub Class_Initialize()

   ' Create the object
   Set mcStep = New cStep

   ' Initialize the object with valid values for a
Worker step
   ' The global flag should be the first field to
be initialized
   ' since subsequent validations might try to
check if the
   ' step being created is global
   mcStep.GlobalFlag = False
'   mcStep.GlobalRunMethod = gintNoOption
   mcStep.StepType = gintWorkerStep

End Sub
Private Sub Class_Terminate()

   ' Remove the step object
   Set mcStep = Nothing

End Sub
Private Sub cStep_Add()

   ' Call a private procedure to see if the step
text has been
   ' entered - since a worker step actually
executes a step, entry
   ' of the text is mandatory
   Call StepTextOrFileEntered

   ' Call the Add method of the step class to
carry out the insert
   mcStep.Add

End Sub

Private Property Get
cStep_ContinuationCriteria() As
ContinuationCriteria

   cStep_ContinuationCriteria =
mcStep.ContinuationCriteria

End Property

Private Property Let
cStep_ContinuationCriteria(ByVal RHS As
ContinuationCriteria)

   ' The Continuation criteria must be non-null
for all worker steps.
   ' Check if the Continuation Criteria is valid
   Select Case RHS
      Case gintOnFailureAbortSiblings,
gintOnFailureCompleteSiblings, _
            gintOnFailureSkipSiblings,
gintOnFailureAbort, _
            gintOnFailureContinue,
gintOnFailureAsk
         mcStep.ContinuationCriteria = RHS

      Case Else
         On Error GoTo 0
         Err.Raise vbObjectError +
errContCriteriaInvalid, _
            mstrModuleName,
LoadResString(errContCriteriaInvalid)
   End Select

End Property

Private Property Let
cStep_DegreeParallelism(ByVal RHS As String)

   mcStep.DegreeParallelism = RHS

End Property

Private Property Get cStep_DegreeParallelism() As
String

   cStep_DegreeParallelism =
mcStep.DegreeParallelism

End Property

Private Sub cStep_Delete()

   mcStep.Delete

End Sub

Private Property Get cStep_EnabledFlag() As
Boolean

   cStep_EnabledFlag = mcStep.EnabledFlag

End Property

Private Property Let cStep_EnabledFlag(ByVal
RHS As Boolean)

   mcStep.EnabledFlag = RHS

End Property

Private Property Let
cStep_ExecutionMechanism(ByVal RHS As
ExecutionMethod)

   On Error GoTo ExecutionMechanismErr
   mstrSource = mstrModuleName &
"cStep_ExecutionMechanism"

   Select Case RHS
      Case gintExecuteShell, gintExecuteODBC
         mcStep.ExecutionMechanism = RHS

      Case Else
         On Error GoTo 0
         Err.Raise vbObjectError +
errExecutionMechanismInvalid, _
            mstrSource,
LoadResString(errExecutionMechanismInvalid)
   End Select

   Exit Property

ExecutionMechanismErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"cStep_ExecutionMechanism"
   On Error GoTo 0
   Err.Raise vbObjectError +
errExecutionMechanismLetFailed, _
      mstrSource,
LoadResString(errExecutionMechanismLetFailed)

End Property
```

```
Private Property Get
cStep_ExecutionMechanism() As
ExecutionMethod

   cStep_ExecutionMechanism =
mcStep.ExecutionMechanism

End Property

Private Property Let
cStep_FailureDetails(ByVal RHS As String)

   mcStep.FailureDetails = RHS

End Property

Private Property Get cStep_FailureDetails()
As String

   cStep_FailureDetails =
mcStep.FailureDetails

End Property

Private Property Get cStep_GlobalFlag() As
Boolean

   cStep_GlobalFlag = mcStep.GlobalFlag

End Property

Private Property Let
cStep_GlobalFlag(ByVal RHS As Boolean)

   ' Set the global flag to false - this flag is
initialized when
   ' an instance of the class is created. Just
making sure that
   ' nobody changes the value inadvertently
   mcStep.GlobalFlag = False

End Property
Private Sub cStep_Modify()

   ' Call a private procedure to see if the step
text has been
   ' entered - since a worker step actually
executes a step, entry
   ' of the text is mandatory
   Call StepTextOrFileEntered

   ' Call the Modify method of the step class
to carry out the update
   mcStep.Modify

End Sub

Private Property Let
cStep_ParentStepId(ByVal RHS As Long)

   mcStep.ParentStepId = RHS

End Property

Private Property Get cStep_ParentStepId()
As Long

   cStep_ParentStepId =
mcStep.ParentStepId

End Property

Private Property Let
cStep_ParentVersionNo(ByVal RHS As
String)

   mcStep.ParentVersionNo = RHS

End Property

Private Property Get cStep_ParentVersionNo()
As String

   cStep_ParentVersionNo =
mcStep.ParentVersionNo

End Property

Private Property Let
cStep_SequenceNo(ByVal RHS As Integer)

   mcStep.SequenceNo = RHS

End Property

Private Property Get cStep_SequenceNo() As
Integer

   cStep_SequenceNo = mcStep.SequenceNo

End Property

Private Property Let cStep_StepId(ByVal RHS
As Long)

   mcStep.StepId = RHS

End Property

Private Property Get cStep_StepId() As Long

   cStep_StepId = mcStep.StepId

End Property


Private Property Let cStep_StepLabel(ByVal
RHS As String)

   mcStep.StepLabel = RHS

End Property

Private Property Get cStep_StepLabel() As
String

   cStep_StepLabel = mcStep.StepLabel

End Property


Private Property Let cStep_StepLevel(ByVal
RHS As Integer)

   mcStep.StepLevel = RHS

End Property

Private Property Get cStep_StepLevel() As
Integer

   cStep_StepLevel = mcStep.StepLevel

End Property

Private Property Let cStep_StepText(ByVal
RHS As String)

   mcStep.StepText = RHS

End Property

Private Property Get cStep_StepText() As String

   cStep_StepText = mcStep.StepText

End Property

Private Property Let cStep_StepTextFile(ByVal
RHS As String)

   mcStep.StepTextFile = RHS

End Property

Private Property Get cStep_StepTextFile() As
String

   cStep_StepTextFile = mcStep.StepTextFile

End Property

Private Property Let cStep_StepType(RHS As
gintStepType)

   mcStep.StepType = gintWorkerStep

End Property

Private Property Get cStep_StepType() As
gintStepType

   cStep_StepType = mcStep.StepType

End Property

Private Sub cStep_Validate()
   ' The validate routines for each of the steps will
   ' carry out the specific validations for the type
and
   ' call the generic validation routine

   On Error GoTo cStep_ValidateErr

   ' Validations specific to worker steps

   ' Check if the step text or a file name has been
   ' specified
   Call StepTextOrFileEntered

   mcStep.Validate

   Exit Sub

cStep_ValidateErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"cStep_Validate"
   On Error GoTo 0
   Err.Raise vbObjectError + errValidateFailed, _
         mstrSource, _
         LoadResString(errValidateFailed)
End Sub

Private Property Let cStep_VersionNo(ByVal RHS
As String)

   mcStep.VersionNo = RHS

End Property

Private Property Get cStep_VersionNo() As String

   cStep_VersionNo = mcStep.VersionNo
```

```
End Property

Private Property Let
cStep_WorkspaceId(ByVal RHS As Long)

   mcStep.WorkspaceId = RHS

End Property

Private Property Get cStep_WorkspaceId()
As Long

   cStep_WorkspaceId =
mcStep.WorkspaceId

End Property
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cWorkspace"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cWorkspace.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Encapsulates the properties
and methods of a workspace.
'              Contains functions to insert,
update and delete
'              att_workspaces records from the
database.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Local variable(s) to hold property value(s)
Private mlngWorkspaceId As Long
Private mstrWorkspaceName As String
Private mblnArchivedFlag As Boolean
Private mdbsStepMaster As Database

' Used to indicate the source module name
when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cWorkspace."

' The cSequence class is used to generate
unique workspace identifiers
Private mWorkspaceSeq As cSequence

' The StringSM class is used to carry out
string operations
Private mFieldValue As cStringSM

Public Function Clone() As cWorkspace

   ' Creates a copy of a given workspace

   Dim cCloneWsp As cWorkspace

   On Error GoTo CloneErr

   Set cCloneWsp = New cWorkspace

   ' Copy all the workspace properties to the
newly
   ' created workspace
   cCloneWsp.WorkspaceId =
mlngWorkspaceId
   cCloneWsp.WorkspaceName =
mstrWorkspaceName
   cCloneWsp.ArchivedFlag =
mblnArchivedFlag

   ' And set the return value to the newly
created workspace
   Set Clone = cCloneWsp

   Exit Function

CloneErr:
   LogErrors Errors
   mstrSource = mstrModuleName & "Clone"
   On Error GoTo 0
   Err.Raise vbObjectError + errCloneFailed, _
         mstrSource,
LoadResString(errCloneFailed)

End Function

Public Property Let ArchivedFlag(ByVal vdata
As Boolean)

   mblnArchivedFlag = vdata

End Property

Public Property Get ArchivedFlag() As
Boolean

   ArchivedFlag = mblnArchivedFlag

End Property

Public Property Set WorkDatabase(vdata As
Database)

   Set mdbsStepMaster = vdata

End Property

Private Sub WorkspaceNameDuplicate()
   ' Check if the workspace name already exists
in the workspace

   Dim rstWorkspace As Recordset
   Dim strSql As String
   Dim qy As DAO.QueryDef

   On Error GoTo
WorkspaceNameDuplicateErr
   mstrSource = mstrModuleName &
"WorkspaceNameDuplicate"

   ' Create a recordset to retrieve the count of
records
   ' having the same workspace name
   strSql = " Select count(*) as
workspace_count " & _
      " from att_workspaces " & _
      " where workspace_name = [w_name] "
& _
      " and workspace_id <> [w_id] "
   Set qy =
mdbsStepMaster.CreateQueryDef(gstrEmptySt
ring, strSql)

   ' Call a procedure to assign the parameter
values
   Call AssignParameters(qy)
   Set rstWorkspace =
qy.OpenRecordset(dbOpenForwardOnly)

'      mFieldValue.MakeStringFieldValid
(mstrWorkspaceName) & _
'       " and workspace_id <> " & _
'      Str(mlngWorkspaceId)
'
'   Set rstWorkspace =
mdbsStepMaster.OpenRecordset( _
'      strSQL, dbOpenForwardOnly)

   If rstWorkspace![workspace_count] > 0 Then
      rstWorkspace.Close
      qy.Close
      ShowError errDuplicateWorkspaceName
      On Error GoTo 0
      Err.Raise vbObjectError +
errDuplicateWorkspaceName, _
         mstrSource,
LoadResString(errDuplicateWorkspaceName)
   End If
   rstWorkspace.Close
   qy.Close

   Exit Sub

WorkspaceNameDuplicateErr:
   Call LogErrors(Errors)
   mstrSource = mstrModuleName &
"WorkspaceNameDuplicate"
   On Error GoTo 0
   Err.Raise vbObjectError +
errWorkspaceNameDuplicateFailed, _
      mstrSource,
LoadResString(errWorkspaceNameDuplicateFailed
)

End Sub
Public Property Let WorkspaceName(vdata As
String)

   On Error GoTo WorkspaceNameErr
   mstrSource = mstrModuleName &
"WorkspaceName"

   If vdata = gstrEmptyString Then

      On Error GoTo 0
      ' Propogate this error back to the caller
      Err.Raise vbObjectError +
errWorkspaceNameMandatory, _
         mstrSource,
LoadResString(errWorkspaceNameMandatory)
   Else
      mstrWorkspaceName = vdata
   End If
   Exit Property

WorkspaceNameErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"WorkspaceName"
   On Error GoTo 0
   Err.Raise vbObjectError +
errWorkspaceNameSetFailed, _
      mstrSource,
LoadResString(errWorkspaceNameSetFailed)

End Property

Public Property Let WorkspaceId(vdata As Long)

   On Error GoTo WorkspaceIdErr
```

```
    mstrSource = mstrModuleName &
"WorkspaceId"

    If (vdata > 0) Then
        mlngWorkspaceId = vdata
    Else
        ' Propogate this error back to the caller
        On Error GoTo 0
        Err.Raise vbObjectError +
errWorkspaceIdInvalid, _
            mstrSource,
LoadResString(errWorkspaceIdInvalid)
    End If

    Exit Property

WorkspaceIdErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"WorkspaceId"
    On Error GoTo 0
    Err.Raise vbObjectError +
errWorkspaceIdSetFailed, _
        mstrSource,
LoadResString(errWorkspaceIdSetFailed)

End Property

Public Sub AddWorkspace()

    Dim strInsert As String
    Dim qy As DAO.QueryDef

    On Error GoTo AddWorkspaceErr

    ' Retrieve the next identifier using the
sequence class
    Set mWorkspaceSeq = New cSequence
    Set mWorkspaceSeq.IdDatabase =
mdbsStepMaster
    mWorkspaceSeq.IdentifierColumn =
FLD_ID_WORKSPACE
    mlngWorkspaceId =
mWorkspaceSeq.Identifier
    Set mWorkspaceSeq = Nothing

    ' Call procedure to raise an error if the
Workspace name
    ' already exists in the db
    Call WorkspaceNameDuplicate

    ' A new record will have the
archived_flag turned off
    mblnArchivedFlag = False

    ' Create a temporary querydef object
    strInsert = "insert into att_workspaces " &
_
            "( workspace_id, workspace_name, "
& _
            " archived_flag ) " & _
            " values ( [w_id], [w_name],
[archived] ) "
    Set qy =
mdbsStepMaster.CreateQueryDef(gstrEmpt
yString, strInsert)

    ' Call a procedure to assign the parameter
values
    Call AssignParameters(qy)

    qy.Execute dbFailOnError
    qy.Close

'    strInsert = "insert into att_workspaces " & _
'            "( workspace_id, workspace_name, "
& _
'            " archived_flag ) " & _
'            " values ( " & _
'            Str(mlngWorkspaceId) & _
'            ", " &
mFieldValue.MakeStringFieldValid(mstrWork
spaceName) & _
'            ", " & Str(mblnArchivedFlag) & _
'            " ) "
'    mdbsStepMaster.Execute strInsert,
dbFailOnError
'
    Exit Sub

AddWorkspaceErr:

    Call LogErrors(Errors)
    mstrSource = mstrModuleName &
"AddWorkspace"
    On Error GoTo 0
    Err.Raise vbObjectError +
errWorkspaceInsertFailed, _
        mstrSource,
LoadResString(errWorkspaceInsertFailed)

End Sub
Private Sub AssignParameters(qyExec As
DAO.QueryDef)
    ' Assigns values to the parameters in the
querydef object
    ' The parameter names are cryptic to make
them different
    ' from the field names. When the parameter
names are
    ' the same as the field names, parameters in
the where
    ' clause do not get created.

    Dim prmParam As DAO.Parameter

    On Error GoTo AssignParametersErr
    mstrSource = mstrModuleName &
"AssignParameters"

    For Each prmParam In qyExec.Parameters
        Select Case prmParam.Name
            Case "[w_id]"
                prmParam.Value =
mlngWorkspaceId

            Case "[w_name]"
                prmParam.Value =
mstrWorkspaceName

            Case "[archived]"
                prmParam.Value =
mblnArchivedFlag

            Case Else
                ' Write the parameter name that is
faulty
                WriteError errInvalidParameter,
mstrSource, _
                    prmParam.Name
                On Error GoTo 0
                Err.Raise errInvalidParameter,
mstrSource, _

LoadResString(errInvalidParameter)
        End Select
    Next prmParam

    Exit Sub

AssignParametersErr:

    mstrSource = mstrModuleName &
"AssignParameters"
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errAssignParametersFailed, _
        mstrSource,
LoadResString(errAssignParametersFailed)

End Sub
Public Sub DeleteWorkspace()

    Dim strDelete As String
    Dim qy As DAO.QueryDef

    On Error GoTo DeleteWorkspaceErr

    strDelete = "delete from att_workspaces " & _
        " where workspace_id = [w_id]"
    Set qy =
mdbsStepMaster.CreateQueryDef(gstrEmptyString,
strDelete)

    ' Call a procedure to assign the parameter values
    Call AssignParameters(qy)

    qy.Execute dbFailOnError
    qy.Close

'    mdbsStepMaster.Execute strDelete,
dbFailOnError
'        " where workspace_id = " & _
'        Str(mlngWorkspaceId)

    Exit Sub

DeleteWorkspaceErr:
    Call LogErrors(Errors)
    mstrSource = mstrModuleName &
"DeleteWorkspace"
    On Error GoTo 0
    Err.Raise vbObjectError +
errWorkspaceDeleteFailed, _
        mstrSource,
LoadResString(errWorkspaceDeleteFailed)
End Sub

Public Sub ModifyWorkspace()

    Dim strUpdate As String
    Dim qy As DAO.QueryDef

    On Error GoTo ModifyWorkspaceErr

    ' Call procedure to raise an error if the Workspace
name
    ' already exists in the db
    Call WorkspaceNameDuplicate

    strUpdate = "update att_workspaces " & _
        " set workspace_name = [w_name] " & _
        ", archived_flag = [archived] " & _
        " where workspace_id = [w_id] "
    Set qy =
mdbsStepMaster.CreateQueryDef(gstrEmptyString,
strUpdate)

    ' Call a procedure to assign the parameter values
    Call AssignParameters(qy)

    qy.Execute dbFailOnError
    qy.Close
```

```
'    strUpdate = "update att_workspaces " &
_
'        " set workspace_name = " & _
'
mFieldValue.MakeStringFieldValid(mstrW
orkspaceName) & _
'        ", archived_flag = " & _
'        Str(mblnArchivedFlag) & _
'        " where workspace_id = " & _
'        Str(mlngWorkspaceId)
'
'    mdbsStepMaster.Execute strUpdate,
dbFailOnError
'
    Exit Sub

ModifyWorkspaceErr:

    Call LogErrors(Errors)
    mstrSource = mstrModuleName &
"ModifyWorkspace"
    On Error GoTo 0
    Err.Raise vbObjectError +
errWorkspaceUpdateFailed, _
        mstrSource,
LoadResString(errWorkspaceUpdateFailed)

End Sub
Public Property Get WorkspaceName() As
String

    WorkspaceName = mstrWorkspaceName

End Property

Public Property Get WorkspaceId() As Long

    WorkspaceId = mlngWorkspaceId

End Property

Private Sub Class_Initialize()

    ' Each function will append it's own name
to this
    ' variable
    mstrSource = "cWorkspace."

    Set mFieldValue = New cStringSM

End Sub

Private Sub Class_Terminate()

    Set mdbsStepMaster = Nothing
    Set mFieldValue = Nothing

End Sub
Attribute VB_Name = "DatabaseSM"
' FILE:       DatabaseSM.bas
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    Contains all the database
initialization/cleanup
'             procedures for the project. Also
contains upgrade
'             database upgrade functions.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
' This module is called DatabaseSM, since
Database is a standard
' Visual Basic object and we want to avoid any
confusion with it.

Option Explicit

Public wrkJet As Workspace
Public dbsAttTool As Database
Public gblnDbOpen As Boolean
Public gRunEngine As rdoEngine

' Used to indicate the source module name
when errors
' are raised by this module
Private Const mstrModuleName As String =
"DatabaseSM."
Public Const gsDefDBFileExt As String =
".stp"
Private Const msDefDBFile As String =
"\SMData" & gsDefDBFileExt

Private Const merrFileNotFound As Integer =
3024
Private Const merrDaoTableMissing As
Integer = 3078

Private Const
STEPMASTER_SETTINGS_VAL_NAME_D
BFILE As String = "WorkspaceFile"

Public Const DEF_NO_COUNT_DISPLAY
As Boolean = False
Public Const DEF_NO_EXECUTE
As Boolean = False
Public Const DEF_PARSE_QUERY_ONLY
As Boolean = False
Public Const
DEF_ANSI_QUOTED_IDENTIFIERS   As
Boolean = False
Public Const DEF_ANSI_NULLS          As
Boolean = True
Public Const DEF_SHOW_QUERY_PLAN
As Boolean = False
Public Const DEF_SHOW_STATS_TIME
As Boolean = False
Public Const DEF_SHOW_STATS_IO
As Boolean = False
Public Const
DEF_PARSE_ODBC_MSG_PREFIXES   As
Boolean = True
Public Const DEF_ROW_COUNT
As Long = 0
Public Const
DEF_TSQL_BATCH_SEPARATOR     As
String = "GO"
Public Const DEF_QUERY_TIME_OUT
As Long = 0
Public Const DEF_SERVER_LANGUAGE
As String = "(Default)"
Public Const
DEF_CHARACTER_TRANSLATION    As
Boolean = True
Public Const DEF_REGIONAL_SETTINGS
As Boolean = False

Public Const PARAM_DEFAULT_DIR
As String = "DEFAULT_DIR"
Public Const
PARAM_DEFAULT_DIR_DESC       As
String = "Default destination directory " & _
            "for all output and error files. If it is
blank, the StepMaster installation directory
will be used."
Public Const PARAM_RUN_ID            As
String = "RUN_ID"
Public Const PARAM_RUN_ID_DESC       As
String = "The run identifier for a run. " & _
            "Any modifications will be overwritten
before each run."

Public Const PARAM_OUTPUT_DIR        As
String = "OUTPUT_DIR"
Public Const PARAM_OUTPUT_DIR_DESC
As String = "The output directory for a run. " & _
            "Any modifications will be overwritten
before each run."

Public Const
CONNECTION_STRINGS_TO_NAME_SUFFIX
As String = "_NAME"

Private Const TBL_RUN_STEP_HDR As String =
"run_header"
Private Const TBL_RUN_STEP_DTLS As String =
"run_step_details"
Public Const TBL_CONNECTION_DTLS As
String = "connection_dtls"
Public Const TBL_CONNECTION_STRINGS As
String = "workspace_connections"
Public Const TBL_STEPS As String = "att_steps"

Public Const FLD_ID_CONN_NAME As String =
"connection_name_id"
Public Const FLD_ID_WORKSPACE As String =
"workspace_id"
Public Const FLD_ID_STEP As String = "step_id"
Public Const FLD_ID_PARAMETER As String =
"parameter_id"

Public Const
FLD_CONN_DTL_CONNECTION_NAME As
String = "connection_name"
Public Const
FLD_CONN_DTL_CONNECTION_STRING As
String = "connection_string_name"
Public Const
FLD_CONN_DTL_CONNECTION_TYPE As
String = "connection_type"

Public Const
FLD_CONN_STR_CONNECTION_NAME As
String = "connection_name"

Public Const FLD_STEPS_EXEC_MECHANISM
As String = "execution_mechanism"
Public Const FLD_STEPS_EXEC_DTL As String
= "start_directory"
Public Const FLD_STEPS_VERSION_NO As
String = "version_no"

Public Const DATA_TYPE_CURRENCY As
String = "CURRENCY"
Public Const DATA_TYPE_LONG As String =
"Long"
Public Const DATA_TYPE_INTEGER As String =
"INTEGER"
Public Const DATA_TYPE_TEXT255 As String =
"Text(255)"

Private Sub InsertBuiltInParameter(dbFile As
Database, sParamName As String, _
        sParamValue As String, sParamDesc As
String)

    Dim sBuf As String
    Dim cTempStr As New cStringSM
    Dim lId As Long
    Dim rTemp As DAO.Recordset
```

```
    Dim rParam As DAO.Recordset
    Dim cTempSeq As cSequence

    ' Create the passed in built-in parameter,
for each workspace in the db
    Set cTempSeq = New cSequence
    Set cTempSeq.IdDatabase = dbFile
    cTempSeq.IdentifierColumn =
FLD_ID_PARAMETER

    sBuf = "select * from att_workspaces "
    Set rTemp = dbFile.OpenRecordset(sBuf,
dbOpenSnapshot)
    If rTemp.RecordCount <> 0 Then
        rTemp.MoveFirst

        While Not rTemp.EOF
            sBuf = "select * from
workspace_parameters " & _
                   " where workspace_id = " &
Str(rTemp!workspace_id) & _
                   " and parameter_name = " &
cTempStr.MakeStringFieldValid(sParamNa
me)
            Set rParam =
dbFile.OpenRecordset(sBuf,
dbOpenSnapshot)
            If rParam.RecordCount <> 0 Then
                rParam.MoveFirst
                ' Since the parameter already
exists, change it to a built-in type
                sBuf = "update
workspace_parameters " & _
                       " set parameter_type = " &
CStr(gintParameterBuiltIn) & _
                       ", description = " &
cTempStr.MakeStringFieldValid(sParamDe
sc) & _
                       " where workspace_id = " &
Str(rTemp!workspace_id) & _
                       " and parameter_id = " &
Str(rParam!parameter_id)
            Else
                ' Else, insert a parameter record
                lId = cTempSeq.Identifier
                sBuf = "insert into
workspace_parameters " & _
                       "( workspace_id,
parameter_id, " & _
                       " parameter_name,
parameter_value, " & _
                       " description, parameter_type
) " & _
                       " values ( " & _
                       Str(rTemp!workspace_id) &
", " & Str(lId) & ", " & _

cTempStr.MakeStringFieldValid(sParamNa
me) & ", " & _

cTempStr.MakeStringFieldValid(sParamVal
ue) & ", " & _

cTempStr.MakeStringFieldValid(sParamDe
sc) & ", " & _
                       CStr(gintParameterBuiltIn) &
_
                       " ) "
            End If
            dbFile.Execute sBuf, dbFailOnError
            rParam.Close

            rTemp.MoveNext
        Wend
    End If
    rTemp.Close

End Sub
Public Sub InitRunEngine()

    Set gRunEngine = New rdoEngine
    gRunEngine.rdoDefaultCursorDriver =
rdUseServer

End Sub

Public Function DefaultDBFile() As String
    DefaultDBFile = GetSetting(App.Title,
"Settings",
STEPMASTER_SETTINGS_VAL_NAME_D
BFILE, App.Path & msDefDBFile)
End Function

Public Sub CloseDatabase()

    Dim dbsInstance As Database
    Dim recInstance As Recordset

    On Error GoTo CloseDatabaseErr

    ' Close all open recordsets and databases in
the workspace
    For Each dbsInstance In wrkJet.Databases

        For Each recInstance In
dbsAttTool.Recordsets
            recInstance.Close
        Next recInstance
        dbsInstance.Close

    Next dbsInstance

    Set dbsAttTool = Nothing

    gblnDbOpen = False
    wrkJet.Close

    Exit Sub

CloseDatabaseErr:

    Call LogErrors(Errors)
    Resume Next

End Sub

Private Function NoDbChanges(sVerTo As
String, sVerFrom As String) As Boolean

    If sVerTo = gsVersion242 And sVerFrom =
gsVersion241 Then
        NoDbChanges = True
    ElseIf sVerTo = gsVersion242 And
sVerFrom = gsVersion24 Then
        NoDbChanges = True
    ElseIf sVerTo = gsVersion253 And
sVerFrom = gsVersion251 Then
        NoDbChanges = True
    ElseIf sVerTo = gsVersion255 And
sVerFrom = gsVersion251 Then
        NoDbChanges = True
    Else
        NoDbChanges = False
    End If

End Function

Public Function SMOpenDatabase(Optional
strDbName As String = gstrEmptyString) As
Boolean
    Dim sVersion As String
    Dim bOpeningDb As Boolean ' This flag is used
to check if OpenDatabase failed

    On Error GoTo OpenDatabaseErr

    bOpeningDb = False
    SMOpenDatabase = False

    ' Create Microsoft Jet Workspace object.
    If Not gblnDbOpen Then
        Set wrkJet =
CreateWorkspace("att_tool_workspace_setup",
"admin", gstrEmptyString, dbUseJet)
    End If

    ' Prompt the user for the database file if it is not
passed in
    If StringEmpty(strDbName) Then
        strDbName = BrowseDBFile
        If StringEmpty(strDbName) Then
            Exit Function
        End If
    End If

    Do
        If gblnDbOpen Then
#If Not RUN_ONLY Then
            CloseOpenWorkspaces
#End If
            Set wrkJet =
CreateWorkspace("att_tool_workspace_setup",
"admin", gstrEmptyString, dbUseJet)
        End If

        ' Toggle the bOpeningDb flag around the
OpenDatabase method - the value
        ' of this flag will be checked by the error
handler to determine if it is
        ' the OpenDatabase that failed.
        BugMessage "DB File: " & strDbName

        bOpeningDb = True
        ' Open the database for exclusive use
        Set dbsAttTool =
wrkJet.OpenDatabase(strDbName, Options:=True)
        bOpeningDb = False

        If dbsAttTool Is Nothing Then
            ' If the file is not present in the directory,
display
            ' an error and ask the user to enter a new
path
            Call ShowError(errOpenDbFailed,
OptArgs:=strDbName)

            strDbName = BrowseDBFile
        Else
            sVersion = DBVersion(dbsAttTool)

            ' Make sure the application and db version
numbers match
            If sVersion = gsVersion Then
                Call InitializeData(strDbName)
                gblnDbOpen = True
                SMOpenDatabase = True
            Else
                If UpgradeDb(wrkJet, dbsAttTool,
gsVersion, sVersion) Then
                    Call InitializeData(strDbName)
                    gblnDbOpen = True
                    SMOpenDatabase = True
                Else
                    dbsAttTool.Close
                    Set dbsAttTool = Nothing
```

```
            ShowError
errVersionMismatch, _
                OptArgs:=" Please install
Version '" & gsVersion & "' of the
workspace definition file."
            strDbName = BrowseDBFile
          End If
        End If
      End If
   Loop While gblnDbOpen = False And
Not StringEmpty(strDbName)

   Exit Function

OpenDatabaseErr:
   Call DisplayErrors(Errors)

   ' If the OpenDatabase failed, continue
   If bOpeningDb Then
      Resume Next
   End If

   Call ShowError(errOpenDbFailed,
OptArgs:=strDbName)

End Function
Private Sub InitializeData(sDb As String)

   Set gcParameters = New cArrParameters
   Set gcParameters.ParamDatabase =
dbsAttTool

   Set gcSteps = New cArrSteps
   Set gcSteps.StepDB = dbsAttTool

   Set gcConstraints = New cArrConstraints
   Set gcConstraints.ConstraintDB =
dbsAttTool

   Set gcConnections = New cConnections
   Set gcConnections.ConnDb = dbsAttTool

   Set gcConnDtls = New cConnDtls
   Set gcConnDtls.ConnDb = dbsAttTool

   ' Disable the error handler since this is not
a critical step
   On Error GoTo 0
   SaveSetting App.Title, "Settings",
STEPMASTER_SETTINGS_VAL_NAME
_DBFILE, sDb
End Sub
Private Sub
UpdateContinuationCriteria(dbFile As
DAO.Database)

   Dim qyTemp As DAO.QueryDef
   Dim sBuf As String

   On Error GoTo
UpdateContinuationCriteriaErr

   sBuf = "Since this version of the
executable incorporates failure processing, "
& _
         "the upgrade will update the On
Failure field for each of the steps " & _
         "to 'Continue' to be compatible with
the existing behaviour. " & _
         "Proceed?"
   If Not Confirm(Buttons:=vbYesNo,
strMessage:=sBuf, strTitle:="Upgrade
database") Then
      Exit Sub
   End If

   ' Create a recordset object to retrieve all
steps for
   ' the given workspace
   sBuf = " update att_steps a " & _
      " set continuation_criteria = " &
CStr(gintOnFailureContinue) & _
      " where archived_flag = [archived] "

   ' Find the highest X-component of the
version number
   sBuf = sBuf & " AND cint( mid(
version_no, 1, instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) - 1 ) ) = " &
_
      " ( select max( cint( mid( version_no, 1,
instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) - 1 ) ) ) " & _
      " from att_steps AS d " & _
      " WHERE a.step_id = d.step_id ) "

   ' Find the highest Y-component of the
version number for the highest X-component
   sBuf = sBuf & " AND cint( mid(
version_no, instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) + 1 ) ) = " &
_
      " ( select max( cint( mid( version_no,
instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) + 1 ) ) ) " &
_
      " from att_steps AS b " & _
      " Where a.step_id = b.step_id " & _
      " AND cint( mid( version_no, 1, instr(
version_no, " & gstrDQ & gstrVerSeparator &
gstrDQ & " ) - 1 ) ) = " & _
      " ( select max( cint( mid( version_no, 1,
instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) - 1 ) ) ) " & _
      " from att_steps AS c " & _
      " WHERE a.step_id = c.step_id ) ) "

   ' Create a temporary Querydef object
   Set qyTemp =
dbFile.CreateQueryDef(gstrEmptyString,
sBuf)
   qyTemp.Parameters("archived").Value =
False

   qyTemp.Execute dbFailOnError
   qyTemp.Close

   Exit Sub

UpdateContinuationCriteriaErr:
   Call LogErrors(Errors)
   Err.Raise vbObjectError +
errModifyStepFailed, mstrModuleName, _
         LoadResString(errModifyStepFailed)

End Sub

Private Sub UpdateDbDtls(dbFile As
Database, sNewVersion As String)

   Dim sSql As String
   Dim cTemp As New cStringSM

   On Error GoTo UpdateDbDtlsErr

   sSql = "update db_details " & _
         " set db_version = " &
cTemp.MakeStringFieldValid(sNewVersion)
   dbFile.Execute sSql, dbFailOnError

   Exit Sub

UpdateDbDtlsErr:
   Call LogErrors(Errors)
   Err.Raise vbObjectError + errUpgradeFailed,
mstrModuleName, _
         LoadResString(errUpgradeFailed)

End Sub

Private Sub Upgrade10to21(UpgradeWsp As
DAO.Workspace, dbFile As Database, sVersion As
String)

   Dim sSql As String

   On Error GoTo Upgrade10to21Err

   Call UpdateDbDtls(dbFile, sVersion)

   Call UpdateContinuationCriteria(dbFile)

   Exit Sub

Upgrade10to21Err:
   UpgradeWsp.Rollback
   Call LogErrors(Errors)
   Err.Raise vbObjectError + errUpgradeFailed,
mstrModuleName, _
         LoadResString(errUpgradeFailed)

End Sub
Private Sub Upgrade21to23(UpgradeWsp As
DAO.Workspace, dbFile As Database, sVersion As
String)

   Dim sBuf As String
   Dim cTempStr As New cStringSM

   On Error GoTo Upgrade21to23Err

   ' Add a parameter type field and a description
field to the parameter table
   sBuf = "alter table workspace_parameters " & _
         " add column description TEXT(255) "
   dbFile.Execute sBuf, dbFailOnError

   sBuf = "alter table workspace_parameters " & _
         " add column parameter_type INTEGER "
   dbFile.Execute sBuf, dbFailOnError

   ' Initialize the parameter type on all parameters to
indicate generic parameters
   sBuf = "update workspace_parameters " & _
         " set parameter_type = " &
CStr(gintParameterGeneric)
   dbFile.Execute sBuf, dbFailOnError

   sBuf = "Release 2.3 onwards, connection string
parameters will be " & _
         "displayed in a separate node. After this
upgrade, all connection " & _
         "string parameters will appear under the
Globals/Connection Strings " & _
         "node in the workspace. "
   Call MsgBox(sBuf, vbOKOnly +
vbApplicationModal, "Upgrade database")

   ' Update the parameter type on all parameters that
look like db connection strings
   sBuf = "update workspace_parameters " & _
         " set parameter_type = " &
CStr(gintParameterConnect) & _
```

```
        " where UCase(parameter_value)
like '*DRIVER*' " & _
        " or UCase(parameter_value) like
'*DSN*'"
   dbFile.Execute sBuf, dbFailOnError

   ' Add an elapsed time field to the
run_step_details table - this field is
   ' needed to store the elapsed time in
milliseconds.
   sBuf = "alter table run_step_details " & _
        " add column elapsed_time LONG "
   dbFile.Execute sBuf, dbFailOnError

   ' The failure_details field has some data
for the case when an ODBC failure
   ' threshold was specified. Since that's no
longer relevant, update the failure_details
   ' field for records with failure_criteria =
gintFailureODBC to empty.
   ' failure_criteria = gintFailureODBC = 1
   sBuf = "update att_steps " & _
        " set failure_details = " &
cTempStr.MakeStringFieldValid(gstrEmpty
String) & _
        " where failure_criteria = '1'"
   dbFile.Execute sBuf, dbFailOnError

   Call UpdateDbDtls(dbFile, sVersion)

   UpgradeWsp.CommitTrans

   On Error GoTo DropColumnErr

   UpgradeWsp.BeginTrans

   ' This ddl cannot be in the same
transaction as the failure_details update
   ' But we can do this in a separate
transaction since we do not expect this
   ' statement to fail - AND, it doesn't matter
if this transaction fails
   ' Drop the failure_criteria column from
the att_steps table
   sBuf = "alter table att_steps " & _
        " drop column failure_criteria "
   dbFile.Execute sBuf, dbFailOnError

   Exit Sub

DropColumnErr:
   Call LogErrors(Errors)
   ShowError errDeleteColumnFailed
   Exit Sub

Upgrade21to23Err:
   UpgradeWsp.Rollback
   Call LogErrors(Errors)
   Err.Raise vbObjectError +
errUpgradeFailed, mstrModuleName, _
        LoadResString(errUpgradeFailed)

End Sub
Private Sub Upgrade23to24(UpgradeWsp
As DAO.Workspace, dbFile As Database,
sVersion As String)

   Dim sBuf As String
   Dim lId As Long
   Dim rTemp As DAO.Recordset
   Dim cTempStr As New cStringSM

   On Error GoTo Upgrade23to24Err

   ' Add a new table for connection properties
   sBuf = CreateConnectionsTableScript()
   ' TODO: Not sure of column sizes for row
count, tsql_batch_separator and
server_language
   dbFile.Execute sBuf, dbFailOnError

   ' Move all connection parameters from the
parameter table to the connections tables
   ' Insert default values for the newly added
connection properties
   sBuf = "select * from workspace_parameters
" & _
        "where parameter_type = " &
CStr(gintParameterConnect)
   Set rTemp = dbFile.OpenRecordset(sBuf,
dbOpenSnapshot)
   lId = 1
   If rTemp.RecordCount <> 0 Then
      rTemp.MoveFirst

      While Not rTemp.EOF
         sBuf = "insert into
workspace_connections " & _
         "( workspace_id, connection_id, " & _
         "connection_name, connection_value,
" & _
         "description, no_count_display, " & _
         "no_execute, parse_query_only, " & _
         "ANSI_quoted_identifiers,
ANSI_nulls, " & _
         "show_query_plan, show_stats_time, "
& _
         "show_stats_io,
parse_odbc_msg_prefixes, " & _
         "row_count, tsql_batch_separator, " &
_
         "query_time_out, server_language, " &
_
         "character_translation,
regional_settings ) " & _
         " values ( " & _
         Str(rTemp!workspace_id) & ", " &
Str(lId) & ", " & _
         cTempStr.MakeStringFieldValid("" &
rTemp!parameter_name) & ", " & _
         cTempStr.MakeStringFieldValid("" &
rTemp!parameter_value) & ", " & _
         cTempStr.MakeStringFieldValid("" &
rTemp!Description) & ", " & _
         Str(DEF_NO_COUNT_DISPLAY) &
", " & _
         Str(DEF_NO_EXECUTE) & ", " &
Str(DEF_PARSE_QUERY_ONLY) & ", " & _

Str(DEF_ANSI_QUOTED_IDENTIFIERS) &
", " & Str(DEF_ANSI_NULLS) & ", " & _
         Str(DEF_SHOW_QUERY_PLAN) &
", " & Str(DEF_SHOW_STATS_TIME) & ", "
& _
         Str(DEF_SHOW_STATS_IO) & ", " &
Str(DEF_PARSE_ODBC_MSG_PREFIXES)
& ", " & _
         Str(DEF_ROW_COUNT) & ", " &
cTempStr.MakeStringFieldValid(DEF_TSQL_
BATCH_SEPARATOR) & ", " & _
         Str(DEF_QUERY_TIME_OUT) & ", "
&
cTempStr.MakeStringFieldValid(DEF_SERV
ER_LANGUAGE) & ", " & _

Str(DEF_CHARACTER_TRANSLATION) &
", " & Str(DEF_REGIONAL_SETTINGS) & _
         " ) "
         dbFile.Execute sBuf, dbFailOnError
         lId = lId + 1
         rTemp.MoveNext
      Wend
   End If
   rTemp.Close

   ' Add an identifier column for the connection_id
field
   sBuf = "alter table att_identifiers " & _
        " add column connection_id long "
   dbFile.Execute sBuf, dbFailOnError

   ' Initialize the value of the connection identifier,
initialized above
   sBuf = "update att_identifiers " & _
        " set connection_id = " & Str(lId)
   dbFile.Execute sBuf, dbFailOnError

   ' Delete all connection strings from the parameter
table
   sBuf = "delete from workspace_parameters " & _
         "where parameter_type = " &
CStr(gintParameterConnect)
   dbFile.Execute sBuf, dbFailOnError

   ' Create the built-in parameter, default directory,
for each workspace in the db
   Call InsertBuiltInParameter(dbFile,
PARAM_DEFAULT_DIR, gstrEmptyString,
PARAM_DEFAULT_DIR_DESC)

   Call UpdateDbDtls(dbFile, sVersion)

   Exit Sub

Upgrade23to24Err:
   UpgradeWsp.Rollback
   Call LogErrors(Errors)
   Err.Raise vbObjectError + errUpgradeFailed,
mstrModuleName, _
        LoadResString(errUpgradeFailed)

End Sub
Private Sub Upgrade243to25(UpgradeWsp As
DAO.Workspace, dbFile As Database, sVersion As
String)

   Dim sBuf As String
   Dim qy As DAO.QueryDef
   Dim rTemp As DAO.Recordset
   Dim lId As Long
   Dim cTempStr As New cStringSM

   On Error GoTo Upgrade243to25Err

   sBuf = "Release " & gsVersion25 & " onwards,
new 'Connections' must be created for all " & _
        "connection strings. " & vbCrLf & vbCrLf
& _
        "Connections will appear under the
Globals/Connections " & _
        "node in the workspace. " & vbCrLf & _
        "A list of all 'Connections' (instead of
'Connection Strings') " & _
        "in the workspace will be displayed in the
'Connections' field for " & _
        "ODBC steps on the Step definition screen.
" & vbCrLf & vbCrLf & _
        "Each Connection can be marked as static or
dynamic. " & vbCrLf & _
        "Dynamic connections will be created when
a step starts execution and " & _
        "closed once the step completes. " & vbCrLf
& _
```

```
        "Static connections will be kept open
till the run completes." & vbCrLf & vbCrLf
& _
        "Currently dynamic 'Connections'
have been created for all existing
'Connection Strings' " & _
        "with the suffix " &
CONNECTION_STRINGS_TO_NAME_S
UFFIX
   Call MsgBox(sBuf, vbOKOnly +
vbApplicationModal, "Upgrade database")

   ' Add a new table for the connection name
entity
   ' This table has been added in order to
satisfy the TPC-H requirement that
   ' all the queries in a stream need to be
executed on a single connection.
   sBuf =
CreateConnectionDtlsTableScript()
   dbFile.Execute sBuf, dbFailOnError

   ' Add an identifier column for the
connection_name_id field
   sBuf = "alter table att_identifiers " & _
        " add column " &
FLD_ID_CONN_NAME & " long "
   dbFile.Execute sBuf, dbFailOnError

   Call UpdateDbDtls(dbFile, sVersion)

   ' insert connection_dtl records for each of
the connection strings
   sBuf = "select * from " &
TBL_CONNECTION_STRINGS
   Set rTemp = dbFile.OpenRecordset(sBuf,
dbOpenSnapshot)

   sBuf = "insert into " &
TBL_CONNECTION_DTLS & _
        "( " & FLD_ID_WORKSPACE & _
        ", " & FLD_ID_CONN_NAME & _
        ", " &
FLD_CONN_DTL_CONNECTION_NAM
E & _
        ", " &
FLD_CONN_DTL_CONNECTION_STRI
NG & _
        ", " &
FLD_CONN_DTL_CONNECTION_TYPE
& " ) " & _
        " values ( [w_id], [c_id], [c_name],
[c_str], [c_type] ) "
   Set qy = dbFile.CreateQueryDef("", sBuf)

   lId = glMinId
   If rTemp.RecordCount <> 0 Then
      rTemp.MoveFirst

      While Not rTemp.EOF
         qy.Parameters("w_id").Value =
rTemp.Fields(FLD_ID_WORKSPACE)
         qy.Parameters("c_id").Value = lId
         qy.Parameters("c_name").Value =
rTemp.Fields(FLD_CONN_STR_CONNEC
TION_NAME) &
CONNECTION_STRINGS_TO_NAME_S
UFFIX
         qy.Parameters("c_str").Value =
rTemp.Fields(FLD_CONN_STR_CONNEC
TION_NAME)
         qy.Parameters("c_type").Value =
ConnTypeDynamic

         qy.Execute dbFailOnError
         lId = lId + 1
         rTemp.MoveNext
      Wend
   End If
   qy.Close
   rTemp.Close

   ' Initialize the value of the
connection_name_id
   sBuf = "update att_identifiers " & _
        " set " & FLD_ID_CONN_NAME & "
= " & Str(lId)
   dbFile.Execute sBuf, dbFailOnError

   ' Update the start_directory field in att_steps
to point to the newly
   ' created connections
   Call ReadStepsInWorkspace(rTemp, qy,
glInvalidId, dbLoad:=dbFile, _
        bSelectArchivedRecords:=False)

   sBuf = "update " & TBL_STEPS & _
      " set " & FLD_STEPS_EXEC_DTL & " =
[c_name] " & _
      " where " & FLD_ID_STEP & " = [s_id] "
& _
      " and " & FLD_STEPS_VERSION_NO
& " = [ver_no] "
   Set qy = dbFile.CreateQueryDef("", sBuf)

   If rTemp.RecordCount <> 0 Then
      rTemp.MoveFirst

      While Not rTemp.EOF
         If
rTemp.Fields(FLD_STEPS_EXEC_MECHAN
ISM).Value = gintExecuteODBC Then
            If Not (StringEmpty("" &
rTemp.Fields(FLD_STEPS_EXEC_DTL)))
Then
               sBuf =
rTemp.Fields(FLD_STEPS_EXEC_DTL)
               ' Strip the enclosing "%"
characters
               sBuf = Mid(sBuf, 2, Len(sBuf) -
2) &
CONNECTION_STRINGS_TO_NAME_SUF
FIX

               qy.Parameters("c_name").Value =
sBuf
               qy.Parameters("s_id").Value =
rTemp.Fields(FLD_ID_STEP)
               qy.Parameters("ver_no").Value =
rTemp.Fields(FLD_STEPS_VERSION_NO)

               qy.Execute dbFailOnError
            End If
         End If
         rTemp.MoveNext
      Wend
   End If

   qy.Close
   rTemp.Close

   Exit Sub

Upgrade243to25Err:
   UpgradeWsp.Rollback
   Call LogErrors(Errors)
   Err.Raise vbObjectError +
errUpgradeFailed, mstrModuleName, _
        LoadResString(errUpgradeFailed)
End Sub
Private Sub Upgrade25to251(UpgradeWsp As
DAO.Workspace, dbFile As Database, sVersion As
String)

   On Error GoTo Upgrade25to251Err

   ' Create the built-in parameters, run_id and
output_dir, for each workspace in the db
   Call InsertBuiltInParameter(dbFile,
PARAM_RUN_ID, gstrEmptyString,
PARAM_RUN_ID_DESC)
   Call InsertBuiltInParameter(dbFile,
PARAM_OUTPUT_DIR, gstrEmptyString,
PARAM_OUTPUT_DIR_DESC)

   Call UpdateDbDtls(dbFile, sVersion)

   Exit Sub

Upgrade25to251Err:
   UpgradeWsp.Rollback
   Call LogErrors(Errors)
   Err.Raise vbObjectError + errUpgradeFailed,
mstrModuleName, _
        LoadResString(errUpgradeFailed)

End Sub

Private Sub Upgrade242to243(UpgradeWsp As
DAO.Workspace, dbFile As Database, sVersion As
String)

   Dim sBuf As String
   Dim cTempStr As New cStringSM
   Dim iResponse As Integer

   On Error GoTo DeleteHistoryErr

   Call DeleteRunHistory(dbFile)

   On Error GoTo Upgrade242to243Err

   UpgradeWsp.CommitTrans

   UpgradeWsp.BeginTrans

   ' Add a parameter type field and a description
field to the parameter table
   sBuf = "alter table run_step_details " & _
        " add column parent_instance_id LONG "

   dbFile.Execute sBuf, dbFailOnError

   sBuf = "alter table run_step_details " & _
        " add column iterator_value TEXT(255) "

   dbFile.Execute sBuf, dbFailOnError

   Call AlterFieldType(dbFile,
TBL_RUN_STEP_DTLS, "start_time",
DATA_TYPE_CURRENCY)
   Call AlterFieldType(dbFile,
TBL_RUN_STEP_DTLS, "end_time",
DATA_TYPE_CURRENCY)
   Call AlterFieldType(dbFile,
TBL_RUN_STEP_HDR, "start_time",
DATA_TYPE_CURRENCY)
   Call AlterFieldType(dbFile,
TBL_RUN_STEP_HDR, "end_time",
DATA_TYPE_CURRENCY)

   Call UpdateDbDtls(dbFile, sVersion)
```

```
    Exit Sub

DeleteHistoryErr:
    ' This is not a critical error - continue with
upgrade
    Call LogErrors(Errors)
    Resume Next

Upgrade242to243Err:
    UpgradeWsp.Rollback
    Call LogErrors(Errors)
    Err.Raise vbObjectError +
errUpgradeFailed, mstrModuleName, _
            LoadResString(errUpgradeFailed)

End Sub
'**********************************
*******************************
' The AlterFieldType Sub procedure requires
three string
' parameters. The first string specifies the
name of the table
' containing the field to be changed. The
second string specifies
' the name of the field to be changed. The
third string specifies
' the new data type for the field.
'**********************************
*******************************

Private Sub AlterFieldType(dbFile As
Database, TblName As String, FieldName
As String, _
                NewDataType As String)
    Dim qdf As DAO.QueryDef
    Dim sSql As String

    ' Add a temporary field to the table.
    sSql = "ALTER TABLE [" & TblName &
_
            "] ADD COLUMN AlterTempField
" & NewDataType
    Set qdf = dbFile.CreateQueryDef("",
sSql)
    qdf.Execute

    ' Copy the data from old field into the new
field.
    qdf.SQL = "UPDATE DISTINCTROW
[" & TblName & "] SET AlterTempField =
[" & FieldName & "]"
    qdf.Execute

    ' Delete the old field.
    qdf.SQL = "ALTER TABLE [" &
TblName & "] DROP COLUMN [" &
FieldName & "]"
    qdf.Execute

    ' Rename the temporary field to the old
field's name.
    dbFile.TableDefs("[" & TblName &
"]").Fields("AlterTempField").Name =
FieldName
    dbFile.TableDefs.Refresh

    ' Clean up.
End Sub
Private Sub Upgrade01to21(UpgradeWsp
As DAO.Workspace, dbFile As
DAO.Database, sVersion As String)
    Dim sSql As String

    On Error GoTo Upgrade01to21Err

    sSql = "Create table db_details (" & _
            "db_version             Text(50) " & _
    ");"

    dbFile.Execute sSql, dbFailOnError

    sSql = "insert into db_details " & _
            "( db_version ) values ( '" & sVersion
& "' ) "

    dbFile.Execute sSql, dbFailOnError

    Call UpdateContinuationCriteria(dbFile)

    Exit Sub

Upgrade01to21Err:
    Call LogErrors(Errors)
    UpgradeWsp.Rollback
    Err.Raise vbObjectError +
errUpgradeFailed, mstrModuleName, _
            LoadResString(errUpgradeFailed)

End Sub
Private Function UpgradeDb(UpgradeWsp As
DAO.Workspace, dbFile As Database, _
        sVerTo As String, sVerFrom As String)
As Boolean

    Dim sMsg As String

    On Error GoTo UpgradeDbErr

    UpgradeDb = False
    If Not ValidUpgrade(sVerTo, sVerFrom)
Then Exit Function

    If NoDbChanges(sVerTo, sVerFrom) Then
        UpgradeDb = True
        Exit Function
    End If

    sMsg = "The database needs to be upgraded
from Version " & sVerFrom & _
            " to Version " & sVerTo & "." &
vbCrLf & _
            "Proceed?"
    If Not Confirm(Buttons:=vbYesNo,
strMessage:=sMsg, strTitle:="Upgrade
database") Then
        Exit Function
    End If

    UpgradeWsp.BeginTrans

    Select Case sVerFrom
        Case gsVersion25
            Call Upgrade25to251(UpgradeWsp,
dbFile, gsVersion251)

        Case gsVersion243
            Call Upgrade243to25(UpgradeWsp,
dbFile, gsVersion25)
            Call Upgrade25to251(UpgradeWsp,
dbFile, gsVersion251)

        Case gsVersion24, gsVersion241,
gsVersion242
            sMsg = "After this upgrade, the run
history for previous runs will no longer be
available. " & _
                    "Continue?"
            If Not Confirm(Buttons:=vbYesNo,
strMessage:=sMsg, strTitle:="Upgrade
database") Then
                UpgradeWsp.CommitTrans
                Exit Function
            End If
            Call Upgrade242to243(UpgradeWsp,
dbFile, gsVersion243)
            Call Upgrade243to25(UpgradeWsp,
dbFile, gsVersion25)
            Call Upgrade25to251(UpgradeWsp,
dbFile, gsVersion251)

        Case gsVersion23
            Call Upgrade23to24(UpgradeWsp, dbFile,
gsVersion24)
            Call Upgrade242to243(UpgradeWsp,
dbFile, gsVersion242)
            Call Upgrade243to25(UpgradeWsp, dbFile,
gsVersion25)
            Call Upgrade25to251(UpgradeWsp, dbFile,
gsVersion251)

        Case gsVersion21
            Call Upgrade21to23(UpgradeWsp, dbFile,
gsVersion23)
            Call Upgrade23to24(UpgradeWsp, dbFile,
gsVersion24)
            Call Upgrade242to243(UpgradeWsp,
dbFile, gsVersion242)
            Call Upgrade243to25(UpgradeWsp, dbFile,
gsVersion25)
            Call Upgrade25to251(UpgradeWsp, dbFile,
gsVersion251)

        Case gsVersion10
            Call Upgrade10to21(UpgradeWsp, dbFile,
gsVersion21)
            Call Upgrade21to23(UpgradeWsp, dbFile,
gsVersion23)
            Call Upgrade23to24(UpgradeWsp, dbFile,
gsVersion24)
            Call Upgrade242to243(UpgradeWsp,
dbFile, gsVersion242)
            Call Upgrade243to25(UpgradeWsp, dbFile,
gsVersion25)
            Call Upgrade25to251(UpgradeWsp, dbFile,
gsVersion251)

        Case gsVersion01
            Call Upgrade01to21(UpgradeWsp, dbFile,
gsVersion21)
            Call Upgrade21to23(UpgradeWsp, dbFile,
gsVersion23)
            Call Upgrade23to24(UpgradeWsp, dbFile,
gsVersion24)
            Call Upgrade242to243(UpgradeWsp,
dbFile, gsVersion242)
            Call Upgrade243to25(UpgradeWsp, dbFile,
gsVersion25)
            Call Upgrade25to251(UpgradeWsp, dbFile,
gsVersion251)

    End Select

    UpgradeWsp.CommitTrans

    UpgradeDb = True
    Exit Function

UpgradeDbErr:
    Call LogErrors(Errors)
    ShowError errUpgradeFailed

End Function
Private Function DBVersion(TestDb As Database)
As String
    ' Retrieves the database version
```

```
    Dim rVersion As Recordset

    On Error GoTo DBVersionErr

    Set rVersion =
TestDb.OpenRecordset("Select db_version
from db_details ", _
          dbOpenForwardOnly)

    BugAssert rVersion.RecordCount <> 0
    DBVersion = rVersion!db_version

    rVersion.Close
    Exit Function

DBVersionErr:
    If Err.Number = merrDaoTableMissing
Then
        DBVersion = gsVersion01
    Else
        LogErrors Errors
        Err.Raise vbObjectError +
errUpgradeFailed, mstrModuleName, _
              LoadResString(errUpgradeFailed)
    End If

End Function

Private Function ValidUpgrade(sVerTo As
String, sVerFrom As String) As Boolean

    If sVerTo = gsVersion And sVerFrom =
gsVersion251 Then
        ValidUpgrade = True
    ElseIf sVerTo = gsVersion And
sVerFrom = gsVersion25 Then
        ValidUpgrade = True
    ElseIf sVerTo = gsVersion And
sVerFrom = gsVersion243 Then
        ValidUpgrade = True
    ElseIf sVerTo = gsVersion And
sVerFrom = gsVersion242 Then
        ValidUpgrade = True
    ElseIf sVerTo = gsVersion And
sVerFrom = gsVersion241 Then
        ValidUpgrade = True
    ElseIf sVerTo = gsVersion And
sVerFrom = gsVersion24 Then
        ValidUpgrade = True
    ElseIf sVerTo = gsVersion And
sVerFrom = gsVersion23 Then
        ValidUpgrade = True
    ElseIf sVerTo = gsVersion And
sVerFrom = gsVersion21 Then
        ValidUpgrade = True
    ElseIf sVerTo = gsVersion And
sVerFrom = gsVersion10 Then
        ValidUpgrade = True
    ElseIf sVerTo = gsVersion And
sVerFrom = gsVersion01 Then
        ValidUpgrade = True
    Else
        ValidUpgrade = False
    End If

End Function

Attribute VB_Name = "DebugSM"
'  FILE:       DebugSM.bas
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Contains all the functions that
carry out error/debug
'              processing for the project.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
' Most of the functions in this module that
manipulate the
' error object do not have an On Error GoTo
statement - this
' is because it will clear the passed in error
object - let
' the calling functions handle the errors raised
by this
' module, if any
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this module
Private Const mstrModuleName As String =
"DebugSM."

Private mcLogFile As cFileSM
Private mcErrorFile As cFileSM

Private Const
FORMAT_MESSAGE_FROM_SYSTEM =
&H1000
Private Const
FORMAT_MESSAGE_IGNORE_INSERTS =
&H200
Private Const pNull = 0

Declare Function FormatMessage Lib
"kernel32" Alias "FormatMessageA" (ByVal
dwFlags As Long, lpSource As Any, ByVal
dwMessageId As Long, ByVal dwLanguageId
As Long, ByVal lpbuffer As String, ByVal
nSize As Long, Arguments As Long) As Long
Public Function Confirm(Optional
lngMessageCode As conConfirmMsgCodes, _
        Optional lngTitleCode As
conConfirmMsgTitleCodes, _
        Optional TitleParameter As String, _
        Optional ByVal Buttons As Integer = -1, _
        Optional strMessage As String =
gstrEmptyString, _
        Optional strTitle As String =
gstrEmptyString) _
        As Boolean
    ' Displays a confirmation message
corresponding to the
    ' passed in message code. Returns True if the
user says
    ' Ok and False otherwise

    Dim intResponse As Integer
    Dim intButtonStyle As Integer

    On Error GoTo ConfirmErr

    Confirm = False

    ' If the buttons style hasn't been specified, set
the
    ' default style to display OK and Cancel
buttons
    If Buttons = -1 Then
        intButtonStyle = vbOKCancel
    Else
        intButtonStyle = Buttons
    End If

    ' Find the message string for the passed in code
    If StringEmpty(strMessage) Then
        strMessage =
Trim$(LoadResString(lngMessageCode))
    End If

    If StringEmpty(strTitle) Then
        strTitle =
Trim$(LoadResString(lngTitleCode))
    End If

    If Not StringEmpty(TitleParameter) Then
        strTitle = strTitle & Chr$(vbKeySpace) & _
              gstrSQ & TitleParameter & gstrSQ
    End If

    ' Display the confirmation message with the
Cancel button
    ' set to the default - assume that we are
confirming
    ' potentially dangerous operations!
    intResponse = MsgBox(strMessage, _
          intButtonStyle + vbQuestion +
vbApplicationModal, _
          strTitle)

    ' Translate the user response into a True/False
return code
    If intButtonStyle = vbOKCancel Then
        If intResponse = vbOK Then
            Confirm = True
        Else
            Confirm = False
        End If
    Else
        If intResponse = vbYes Then
            Confirm = True
        Else
            Confirm = False
        End If
    End If

    Exit Function

ConfirmErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    gstrSource = mstrModuleName & "Confirm"
    Err.Raise vbObjectError + errConfirmFailed, _
          gstrSource, _
          LoadResString(errConfirmFailed)

End Function
Public Sub LogSystemError()
    Dim eErrCode As Long

    eErrCode = GetLastError()
    If eErrCode <> 0 Then
        WriteToFile "System Error: " & eErrCode &
vbCrLf & ApiError(eErrCode), _
              blnError:=True
    End If

End Sub
Public Function ApiError(ByVal e As Long) As
String

    Dim s As String
    Dim c As Long

    s = String(256, 0)
    c =
FormatMessage(FORMAT_MESSAGE_FROM_S
YSTEM Or _
```

```
FORMAT_MESSAGE_IGNORE_INSERTS, _
        pNull, e, 0&, s, Len(s), ByVal pNull)
   If c Then ApiError = e & ": " & Left$(s, c)

End Function

' Output flags determine output destination of BugAsserts and messages
#Const afLogfile = 1
#Const afMsgBox = 2
#Const afDebugWin = 4
#Const afAppLog = 8

' Display appropriate error message, and then stop
' program.  These errors should NOT be possible in
' shipping product.
Sub BugAssert(ByVal fExpression As Boolean, _
          Optional sExpression As String)
#If afDebug Then
   If fExpression Then Exit Sub
   BugMessage "BugAssert failed: " & sExpression
   Stop
#End If
End Sub

Sub BugMessage(sMsg As String)

#If afDebug And afLogfile Then
   ' Since we are writing log messages, the error flag is turned off
   Call WriteToFile(sMsg, False)
#End If
#If afDebug And afMsgBox Then
   MsgBox sMsg
#End If
#If afDebug And afDebugWin Then
   Debug.Print sMsg
#End If
#If afDebug And afAppLog Then
    App.LogEvent sMsg
#End If

End Sub
Public Function ProjectLogFile() As String

   ProjectLogFile = mcLogFile.FileName

End Function
Public Function ProjectErrorFile() As String

   ProjectErrorFile = mcErrorFile.FileName

End Function

Private Sub WriteToFile(sMsg As String, Optional ByVal blnError As Boolean)

   ' Calls procedures to write the passed in message to the log -
   ' The blnError flag is used to indicate that the message
   ' should be logged to the error file - by default the log
   ' file is used

   Dim mcFileObj As cFileSM
   Dim strFileName As String
   Dim strFileHdr As String

   On Error GoTo WriteToFileErr

   If blnError Then
      If mcErrorFile Is Nothing Then
         Set mcErrorFile = New cFileSM
      End If
      Set mcFileObj = mcErrorFile
   Else
      If mcLogFile Is Nothing Then
         Set mcLogFile = New cFileSM
      End If
      Set mcFileObj = mcLogFile
   End If

   If StringEmpty(mcFileObj.FileName) Then
      If blnError Then
         strFileName = gstrProjectPath & "\" & App.EXEName & ".ERR"
         strFileHdr = "Stepmaster Errors"
      Else
         strFileName = gstrProjectPath & "\" & App.EXEName & ".DBG"
         strFileHdr = "Stepmaster Log"
      End If

      mcFileObj.FileName = strFileName
      mcFileObj.WriteLine strFileHdr
      mcFileObj.WriteLine "Log start time : " & Now
   End If

   mcFileObj.WriteLine sMsg

   Exit Sub

WriteToFileErr:
   ' Display the error code raised by Visual Basic
   Call DisplayErrors(Errors)
   ' An error message would've been displayed by the called
   ' procedures

End Sub
Public Sub WriteMessage(sMsg As String)

   Call WriteToFile(sMsg, True)

End Sub

Sub BugTerm()
#If afDebug And afLogfile Then
   ' Close log file
   mcLogFile.CloseFile
#End If
End Sub

Public Sub ShowError(ByVal ErrorCode As errErrorConstants, _
      Optional ByVal ErrorSource As String = gstrEmptyString, _
      Optional ByVal OptArgs As String = gstrEmptyString, _
      Optional ByVal DoWriteError As Boolean = True)

   If DoWriteError Then
      ' Call a procedure to write the error to a log file
      Call WriteError(ErrorCode, ErrorSource, OptArgs)
   End If

   ' Re-initialize the values of the Error object before
   ' displaying the error to the user
   Call InitErrObject(ErrorCode, ErrorSource, OptArgs)

   Call DisplayErrors(Errors)

   Err.Clear

End Sub
Public Sub WriteError(ByVal ErrorCode As errErrorConstants, _
      Optional ByVal ErrorSource As String = gstrEmptyString, _
      Optional ByVal OptArgs As String = gstrEmptyString)

   ' Initialize the values of the Error object before
   ' calling the log function
   Call InitErrObject(ErrorCode, ErrorSource, OptArgs)

   Call LogErrors(Errors)

   Err.Clear

End Sub
Private Sub InitErrObject(ByVal ErrorCode As errErrorConstants, _
      Optional ByVal ErrorSource As String = gstrEmptyString, _
      Optional ByVal OptArgs As String = gstrEmptyString)

   Dim lngError As Long

   lngError = IIf(ErrorCode > vbObjectError And ErrorCode < vbObjectError + 65535, _
         ErrorCode - vbObjectError, ErrorCode)
   Err.Number = lngError + vbObjectError
   Err.Description = LoadResString(lngError) & OptArgs
   Err.Source = App.EXEName & ErrorSource

End Sub
Public Sub ShowMessage(ByVal MessageCode As errErrorConstants, _
      Optional ByVal OptArgs As String)

   Dim strMessage As String

   On Error GoTo ShowMessageErr

   strMessage = LoadResString(MessageCode) & OptArgs

   ' Write the error to a log file
   BugMessage strMessage

   MsgBox strMessage, vbOKOnly

   Exit Sub

ShowMessageErr:
   ' Log the error and exit
   Call DisplayErrors(Errors)

End Sub
Public Sub ShowMessageStr(sMessage As String)

   ' Write the error to a log file
   BugMessage sMessage

   MsgBox sMessage, vbOKOnly
```

```
End Sub

Public Sub DisplayErrors(myErrCollection
As Errors)
   Dim strError As String
   Dim errLoop As Error
   Dim errCode As Long

   ' Enumerate Errors collection and display
properties of
   ' each Error object.
   If Err.Number <> 0 Then
      If Err.Number > vbObjectError And
Err.Number < (vbObjectError + 65536)
Then
         errCode = Err.Number -
vbObjectError
      Else
         errCode = Err.Number
      End If
      strError = "Error # " & Str(errCode) &
" was generated by " _
         & Err.Source & Chr(13) &
Err.Description
      MsgBox strError, , "Error",
Err.HelpFile, Err.HelpContext
   Else
      For Each errLoop In myErrCollection
         With errLoop
            If Err.Number > vbObjectError
And Err.Number < (vbObjectError + 65536)
Then
               errCode = .Number -
vbObjectError
            Else
               errCode = .Number
            End If
            strError = "Error #" & errCode &
vbCrLf
            strError = strError & "    " &
.Description & vbCrLf
            strError = strError & _
               "    (Source: " & .Source & ")"
& vbCrLf
'            strError = strError & _
'               "Press F1 to see topic " &
.HelpContext & vbCrLf
'            strError = strError & _
'               "    in the file " & .HelpFile &
"."
         End With

         MsgBox strError
      Next
   End If

End Sub
Public Sub LogErrors(myErrCollection As
Errors)
   Dim cColErrors As cVectorStr
   Dim strError As String
   Dim errLoop As Error
   Dim errCode As Long
   Dim lngIndex As Long

   Set cColErrors = New cVectorStr

   ' Enumerate Errors collection and display
properties of
   ' each Error object.
   If Err.Number <> 0 Then
      If Err.Number > vbObjectError And
Err.Number < (vbObjectError + 65536)
Then
         errCode = Err.Number - vbObjectError
      Else
         errCode = Err.Number
      End If
      strError = "Error # " & Str(errCode) &
" was generated by " _
         & Err.Source & vbCrLf &
Err.Description

      cColErrors.Add strError
   End If

   ' Log all database errors, if any
   For Each errLoop In myErrCollection
      With errLoop
         If Err.Number > vbObjectError And
Err.Number < (vbObjectError + 65536) Then
            errCode = .Number - vbObjectError
         Else
            errCode = .Number
         End If
         strError = "Error #" & errCode &
vbCrLf
         strError = strError & "    " &
.Description & vbCrLf
         strError = strError & _
            "    (Source: " & .Source & ")" &
vbCrLf
      End With

      cColErrors.Add strError
   Next

   ' We can have a error handler now that we
have stored all
   ' errors away safely! - having an error
handler before
   ' enumerating all the errors would have
cleared the error
   ' collection
   On Error GoTo LogErrorsErr
   gstrSource = mstrModuleName &
"LogErrors"

   For lngIndex = 0 To cColErrors.Count - 1
      strError = cColErrors(lngIndex)
      Debug.Print strError
      Call WriteToFile(strError, True)
   Next lngIndex

   Set cColErrors = Nothing

   Exit Sub

LogErrorsErr:
   ' Display the error code raised by Visual
Basic
   DisplayErrors Errors
   On Error GoTo 0
   ShowError errUnableToWriteError,
DoWriteError:=False

End Sub
Attribute VB_Name = "FileCommon"
'  FILE:       FileCommon.bas
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This module contains common
functionality to display
'              the File Open dialog.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name when
errors
' are raised by this module
Private Const mstrModuleName As String =
"FileCommon."

Private Enum EOpenFile
   OFN_OVERWRITEPROMPT = &H2
   OFN_HIDEREADONLY = &H4
   OFN_FILEMUSTEXIST = &H1000
   OFN_EXPLORER = &H80000
End Enum

' The locations for the different output files are
presented to
' the user in a list box. These constants are used
while loading the
' data and while reading the data from the list box.
' These constants also represent the different file
types that are
' displayed to the user in File Open dialogs
Public Enum gFileTypes
   gintOutputFile = 0
'   gintLogFile = 1
   gintErrorFile
   gintStepTextFile
   gintOutputCompareFile
   gintDBFile
   gintDBFileNew
   gintImportFile
   gintExportFile
End Enum

Public Const gsSqlFileSuffix = ".sql"
Public Const gsCmdFileSuffix = ".cmd"

Public Const gsOutputFileSuffix = ".out"
Public Const gstrLogFileSuffix = ".log"
Public Const gsErrorFileSuffix = ".err"
Public Function BrowseDBFile() As String
   ' Prompts the user for a database file with the
workspace information
   ' Call CallFileDialog to display the open file
dialog
   BrowseDBFile = CallFileDialog(gintDBFile)

End Function
Public Function CallFileDialog(intFileType As
Integer, _
      Optional ByVal strDefaultFile As String =
gstrEmptyString) As String
   ' This function initializes the values of the filter
property,
   ' the dialog title and flags for the File Open dialog
depending
   ' on the FileType passed in
   ' It then calls ShowFileOpenDialog to set these
properties and
   ' display the File Open dialog to the user

   ' All the properties used by the File Open dialog
are defined
   ' as constants in this function and passed to
ShowFileOpenDialog
   ' as parameters. So if any of the dialog properties
need to be
   ' modified, these constants are what need to be
changed
   Const s_DLG_TITLE_OPEN = "Open"
   Const s_DLG_TITLE_NEW = "New"
   Const s_DLG_TITLE_IMPORT = "Import
From"
```

```
    Const s_DLG_TITLE_EXPORT =
"Export To"

    Const mlng_FILE_STEP_TEXT_FLAGS
= OFN_EXPLORER Or
OFN_FILEMUSTEXIST Or
OFN_HIDEREADONLY
    Const
mlng_FILE_OUTPUT_COMPARE_FLAG
S = mlng_FILE_STEP_TEXT_FLAGS
    Const mlng_FILE_DB_FLAGS =
mlng_FILE_STEP_TEXT_FLAGS
    Const mlng_FILE_OUTPUT_FLAGS =
OFN_EXPLORER Or
OFN_HIDEREADONLY Or
OFN_OVERWRITEPROMPT
    Const mlng_FILE_LOG_FLAGS =
mlng_FILE_OUTPUT_FLAGS
    Const mlng_FILE_ERROR_FLAGS =
mlng_FILE_OUTPUT_FLAGS
    Const mlng_FILE_DB_NEW_FLAGS =
mlng_FILE_OUTPUT_FLAGS

    Const mstr_FILE_ALL_FILTER = "|All
Files (*.*)|*.*"
    Const mstr_FILE_STEP_TEXT_FILTER
= "Query Files (*" & gsSqlFileSuffix & _
          ")|*" & gsSqlFileSuffix &
"|Command Script Files (*" &
gsCmdFileSuffix & _
          ")|*" & gsCmdFileSuffix
    Const
mstr_FILE_OUTPUT_COMPARE_FILTE
R = "Text Files (*.txt)|*.txt"
    Const mstr_FILE_OUTPUT_FILTER =
"Output Files (*.out)|*.out"
    Const mstr_FILE_LOG_FILTER = "Log
Files (*.log)|*.log"
    Const mstr_FILE_ERROR_FILTER =
"Error Files (*.err)|*.err"
    Const mstr_FILE_DB_FILTER =
"Stepmaster Workspace Files (*" &
gsDefDBFileExt & ")|*" & gsDefDBFileExt

    Dim strFileName As String

    On Error GoTo CallFileDialogErr

    Select Case intFileType
        Case gintStepTextFile
            strFileName =
ShowFileOpenDialog( _

mstr_FILE_STEP_TEXT_FILTER &
mstr_FILE_ALL_FILTER, _
              s_DLG_TITLE_OPEN, _

mlng_FILE_STEP_TEXT_FLAGS, _
              strDefaultFile)

        Case gintOutputCompareFile
            strFileName =
ShowFileOpenDialog( _

mstr_FILE_OUTPUT_COMPARE_FILTE
R & mstr_FILE_ALL_FILTER, _
              s_DLG_TITLE_OPEN, _

mlng_FILE_OUTPUT_COMPARE_FLAG
S, _
              strDefaultFile)

        Case gintOutputFile
            strFileName =
ShowFileOpenDialog( _
              mstr_FILE_OUTPUT_FILTER &
mstr_FILE_ALL_FILTER, _
              s_DLG_TITLE_OPEN, _
              mlng_FILE_OUTPUT_FLAGS, _
              strDefaultFile)

'       Case gintLogFile
'           strFileName = ShowFileOpenDialog( _
'               mstr_FILE_LOG_FILTER &
mstr_FILE_ALL_FILTER, _
'               s_DLG_TITLE_OPEN, _
'               mlng_FILE_LOG_FLAGS, _
'               strDefaultFile)
'
        Case gintErrorFile
            strFileName = ShowFileOpenDialog( _
                mstr_FILE_ERROR_FILTER &
mstr_FILE_ALL_FILTER, _
                s_DLG_TITLE_OPEN, _
                mlng_FILE_ERROR_FLAGS, _
                strDefaultFile)

        Case gintDBFile
            strFileName = ShowFileOpenDialog( _
                mstr_FILE_DB_FILTER &
mstr_FILE_ALL_FILTER, _
                s_DLG_TITLE_OPEN, _
                mlng_FILE_DB_FLAGS, _
                strDefaultFile)

        Case gintDBFileNew
            strFileName = ShowFileOpenDialog( _
                mstr_FILE_DB_FILTER &
mstr_FILE_ALL_FILTER, _
                s_DLG_TITLE_NEW, _
                mlng_FILE_DB_NEW_FLAGS, _
                strDefaultFile)

        Case gintImportFile
            strFileName = ShowFileOpenDialog( _
                mstr_FILE_DB_FILTER &
mstr_FILE_ALL_FILTER, _
                s_DLG_TITLE_IMPORT, _
                mlng_FILE_DB_FLAGS, _
                strDefaultFile)

        Case gintExportFile
            strFileName = ShowFileOpenDialog( _
                mstr_FILE_DB_FILTER &
mstr_FILE_ALL_FILTER, _
                s_DLG_TITLE_EXPORT, _
                mlng_FILE_DB_FLAGS, _
                strDefaultFile)

        Case Else
            BugAssert True, "Incorrect file type
passed in."
            ' Default processing will be for the
output file
            strFileName = ShowFileOpenDialog( _
                mstr_FILE_OUTPUT_FILTER &
mstr_FILE_ALL_FILTER, _
                s_DLG_TITLE_OPEN, _
                mlng_FILE_OUTPUT_FLAGS, _
                strDefaultFile)

    End Select
    CallFileDialog = strFileName

    Exit Function

CallFileDialogErr:
    CallFileDialog = gstrEmptyString
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    gstrSource = mstrModuleName &
"CallFileDialog"
    Call ShowError(errBrowseFailed)

End Function

VERSION 5.00
Begin VB.Form frmSplash
  BorderStyle    =  3  'Fixed Dialog
  ClientHeight   =  4710
  ClientLeft     =  45
  ClientTop      =  45
  ClientWidth    =  7455
  ControlBox     =  0  'False
  Icon           =  "frmSplash.frx":0000
  LinkTopic      =  "Form1"
  LockControls   =  -1  'True
  MaxButton      =  0  'False
  MinButton      =  0  'False
  ScaleHeight    =  4710
  ScaleWidth     =  7455
  ShowInTaskbar  =  0  'False
  StartUpPosition =  2  'CenterScreen
  Visible        =  0  'False
  Begin VB.Frame fraMainFrame
    Height         =  4590
    Left           =  45
    TabIndex       =  0
    Top            =  -15
    Width          =  7380
    Begin VB.PictureBox picLogo
      Height         =  2385
      Left           =  510
      Picture        =  "frmSplash.frx":0442
      ScaleHeight    =  2325
      ScaleWidth     =  1755
      TabIndex       =  1
      Top            =  855
      Width          =  1815
    End
    Begin VB.Label lblReserved
      AutoSize       =  -1  'True
      Caption        =  "All Rights Reserved."
      Height         =  195
      Left           =  5520
      TabIndex       =  8
      Top            =  4080
      Width          =  1440
    End
    Begin VB.Label lblCopyright
      AutoSize       =  -1  'True
      Caption        =  "Copyright © 1998"
      BeginProperty Font
        Name           =  "Arial"
        Size           =  8.25
        Charset        =  0
        Weight         =  400
        Underline      =  0  'False
        Italic         =  0  'False
        Strikethrough  =  0  'False
      EndProperty
      Height         =  210
      Left           =  5550
      TabIndex       =  7
      Tag            =  "Copyright"
      Top            =  3850
      Width          =  1380
      WordWrap       =  -1  'True
    End
    Begin VB.Label lblCompany
      AutoSize       =  -1  'True
      Caption        =  "Microsoft Corporation"
      BeginProperty Font
        Name           =  "Arial"
        Size           =  8.25
```

```
      Charset        =  0
      Weight         =  400
      Underline      =  0  'False
      Italic         =  0  'False
      Strikethrough  =  0  'False
    EndProperty
    Height         =  210
    Left           =  5460
    TabIndex       =  6
    Tag            =  "Company"
    Top            =  3640
    Width          =  1560
  End
  Begin VB.Label lblRestrictions
    AutoSize       =  -1  'True
    Caption        =  "See License
Agreement for Restrictions"
    Height         =  195
    Left           =  460
    TabIndex       =  5
    Top            =  4080
    Width          =  2790
  End
  Begin VB.Label lblProductName
    AutoSize       =  -1  'True
    Caption        =  "StepMaster"
    BeginProperty Font
      Name           =  "Arial"
      Size           =  32.25
      Charset        =  0
      Weight         =  700
      Underline      =  0  'False
      Italic         =  0  'False
      Strikethrough  =  0  'False
    EndProperty
    Height         =  765
    Left           =  2670
    TabIndex       =  4
    Tag            =  "Product"
    Top            =  1200
    Width          =  3495
  End
  Begin VB.Label lblVersion
    Alignment      =  1  'Right Justify
    AutoSize       =  -1  'True
    Caption        =  "Version 2.4"
    BeginProperty Font
      Name           =  "Arial"
      Size           =  12
      Charset        =  0
      Weight         =  700
      Underline      =  0  'False
      Italic         =  0  'False
      Strikethrough  =  0  'False
    EndProperty
    Height         =  285
    Left           =  4800
    TabIndex       =  3
    Tag            =  "Version"
    Top            =  2040
    Width          =  1275
  End
  Begin VB.Label lblWarning
    AutoSize       =  -1  'True
    Caption        =  "Do Not Redistribute"
    BeginProperty Font
      Name           =  "Arial"
      Size           =  8.25
      Charset        =  0
      Weight         =  400
      Underline      =  0  'False
      Italic         =  0  'False
      Strikethrough  =  0  'False
    EndProperty
    Height         =  210
    Left           =  480
    TabIndex       =  2
    Tag            =  "Warning"
    Top            =  3850
    Width          =  1380
  End
End
Attribute VB_Name = "frmSplash"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
' FILE:      frmSplash.frm
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:   Splash screen for StepMaster
' Contact:   Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit


Private Sub Form_Load()
'   lblVersion.Caption = "Version " &
App.Major & "." & App.Minor & "." &
App.Revision
    lblProductName.Caption = App.Title
    lblVersion.Caption = GetVersionString

End Sub



VERSION 5.00
Begin VB.Form frmWorkspaceOpen
  BorderStyle    =  3  'Fixed Dialog
  Caption        =  "Open Workspace"
  ClientHeight   =  2550
  ClientLeft     =  45
  ClientTop      =  330
  ClientWidth    =  4695
  LinkTopic      =  "Form1"
  LockControls   =  -1  'True
  MaxButton      =  0  'False
  MinButton      =  0  'False
  ScaleHeight    =  2550
  ScaleWidth     =  4695
  ShowInTaskbar  =  0  'False
  StartUpPosition =  1  'CenterOwner
  Begin VB.CommandButton cmdOK
    Caption        =  "OK"
    Default        =  -1  'True
    Height         =  375
    Left           =  2160
    TabIndex       =  2
    Top            =  2040
    Width          =  1095
  End
  Begin VB.CommandButton cmdCancel
    Cancel         =  -1  'True
    Caption        =  "Cancel"
    Height         =  375
    Left           =  3360
    TabIndex       =  3
    Top            =  2040
    Width          =  1095
  End
  Begin VB.ListBox lstWorkspaces
    Height         =  1425
    ItemData       =
"frmWorkspaceOpen.frx":0000
    Left           =  240
    List           =  "frmWorkspaceOpen.frx":0002
    MultiSelect    =  2  'Extended
    TabIndex       =  1
    Top            =  480
    Width          =  4215
  End
  Begin VB.Label lblWorkspaces
    AutoSize       =  -1  'True
    Caption        =  "Workspace"
    Height         =  195
    Left           =  240
    TabIndex       =  0
    Top            =  120
    Width          =  825
  End
End
Attribute VB_Name = "frmWorkspaceOpen"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
' FILE:      frmWorkspaceOpen.frm
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:   Used to display a list of all
workspaces in a
'            workspace definition file for Open, Import,
Export
'            and Run (in SMRunOnly) workspace
' Contact:   Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit
#If RUN_ONLY Then
  Private WithEvents cRunOnlyInst As cRunOnly
Attribute cRunOnlyInst.VB_VarHelpID = -1

Private Sub cRunOnlyInst_Done()
  ShowFree
End Sub

Private Sub Run()
  Dim iIndex As Integer

  Set cRunOnlyInst = New cRunOnly

  For iIndex = 0 To Me.lstWorkspaces.ListCount -
1
    If Me.lstWorkspaces.Selected(iIndex) Then
      ShowBusy
      cRunOnlyInst.WorkspaceId =
Me.lstWorkspaces.ItemData(Me.lstWorkspaces.List
Index)
      cRunOnlyInst.WspName =
Me.lstWorkspaces.List(Me.lstWorkspaces.ListInde
x)
      cRunOnlyInst.RunWsp
    End If
  Next iIndex

End Sub

#End If

Private Sub cmdCancel_Click()

  Unload Me

End Sub

Private Sub cmdOK_Click()
```

```
#If RUN_ONLY Then
   Call Run
#Else
   Call WorkspaceOpenOk
#End If

End Sub


Private Sub lstWorkspaces_DblClick()

   ' A double click on the workspaces list
box is considered
   ' equivalent to selecting an item in the list
and then selecting
   ' the OK command
   Call cmdOK_Click

End Sub

Attribute VB_Name = "IteratorCommon"
' FILE:      IteratorCommon.bas
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:   Contains functionality
common across StepMaster and
'            SMRunOnly, pertaining to iterators
'            Specifically, functions to read
iterators records
'            in the workspace, load them in an
array and so on.
' Contact:   Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this module
Private Const mstrModuleName As String =
"IteratorCommon."

Public Const gintMinIteratorSequence As
Integer = 0

Public Sub RangeComplete(vntIterators As
Variant)
   ' This is a debug procedure
   ' Checks if the from, to and step values
are present in
   ' the array

   Dim bReset As Byte
   Dim bShift As Byte
   Dim lngIndex As Long

   ' Set the three lowest order bits to 1
   bReset = 7

   BugAssert IsArray(vntIterators) And Not
IsEmpty(vntIterators), _
         "Iterators not specified!"

   For lngIndex = LBound(vntIterators) To _
         UBound(vntIterators)
      bShift = 1
      bShift = bShift * (2 ^
(vntIterators(lngIndex).IteratorType - 1))

      bReset = bReset Xor bShift
   Next lngIndex

   ' Assert that all the elements are present
   BugAssert bReset = 0, "Range not
completely specified!"

End Sub
Public Sub LoadIteratorsForWsp(cStepsCol As
cArrSteps, _
      ByVal lngWorkspaceId As Long,
rstStepsInWsp As Recordset)
   ' Initializes the step records in with all the
iterator
   ' values for each step

   Dim recIterators As Recordset

   On Error GoTo LoadIteratorsForWspErr

#If QUERY_ALL Then
   Dim dtStart As Date

   dtStart = Now
   Set recIterators =
ReadWspIterators(lngWorkspaceId)

   Call LoadIteratorsArray(cStepsCol,
recIterators)

   recIterators.Close

   BugMessage "QueryAll Read + load took: "
& CStr(DateDiff("s", dtStart, Now))

#Else
   Dim dtStart As Date
   Dim qyIt As DAO.QueryDef
   Dim sSql As String

   dtStart = Now
   If rstStepsInWsp.RecordCount = 0 Then
      Exit Sub
   End If

   ' This method has the advantage that if the
steps are queried right, everything else follows
   sSql = "Select step_id, version_no, type,
iterator_value, " & _
      " sequence_no " & _
      " from iterator_values " & _
      " where step_id = [s_id] " & _
      " and version_no = [ver_no] "

   ' Order the iterators by sequence within a
step
   sSql = sSql & " order by sequence_no "

   Set qyIt =
dbsAttTool.CreateQueryDef(gstrEmptyString,
sSql)
   rstStepsInWsp.MoveFirst

   While Not rstStepsInWsp.EOF

      qyIt.Parameters("s_id").Value =
rstStepsInWsp!step_id
      qyIt.Parameters("ver_no").Value =
rstStepsInWsp!version_no

      Set recIterators =
qyIt.OpenRecordset(dbOpenSnapshot)

      Call LoadIteratorsArray(cStepsCol,
recIterators)
      recIterators.Close

      rstStepsInWsp.MoveNext
   Wend

   qyIt.Close

   BugMessage "Query step at a time Read + load
took: " & CStr(DateDiff("s", dtStart, Now))

#End If

   Exit Sub

LoadIteratorsForWspErr:
   LogErrors Errors
   gstrSource = mstrModuleName &
"LoadIteratorsForWsp"
   On Error GoTo 0
   Err.Raise vbObjectError +
errLoadRsInArrayFailed, _
         gstrSource, _
         LoadResString(errLoadRsInArrayFailed)

End Sub
Private Function ReadWspIterators(ByVal
lngWorkspaceId As Long) As Recordset

   ' This function will return a recordset that is
populated
   ' with the iterators for all the steps in a given
workspace

   Dim recIterators As Recordset
   Dim qyIt As DAO.QueryDef
   Dim strSql As String

   On Error GoTo ReadWspIteratorsErr
   gstrSource = mstrModuleName &
"ReadWspIterators"

   strSql = "Select i.step_id, i.version_no, " & _
      " i.type, i.iterator_value, " & _
      " i.sequence_no " & _
      " from iterator_values i, att_steps a " & _
      " where i.step_id = a.step_id " & _
      " and i.version_no = a.version_no " & _
      " and a.workspace_id = [w_id] " & _
      " and a.archived_flag = [archived] "

   ' Find the highest X-component of the version
number
   strSql = strSql & " AND cint( mid( a.version_no,
1, instr( a.version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) - 1 ) ) = " & _
      " ( select max( cint( mid( version_no, 1, instr(
version_no, " & gstrDQ & gstrVerSeparator &
gstrDQ & " ) - 1 ) ) ) " & _
      " from att_steps AS d " & _
      " WHERE a.step_id = d.step_id ) "

   ' Find the highest Y-component of the version
number for the highest X-component
   strSql = strSql & " AND cint( mid( a.version_no,
instr( a.version_no, " & gstrDQ & gstrVerSeparator
& gstrDQ & " ) + 1 ) ) = " & _
      " ( select max( cint( mid( version_no, instr(
version_no, " & gstrDQ & gstrVerSeparator &
gstrDQ & " ) + 1 ) ) ) " & _
      " from att_steps AS b " & _
      " Where a.step_id = b.step_id " & _
      " AND cint( mid( version_no, 1, instr(
version_no, " & gstrDQ & gstrVerSeparator &
gstrDQ & " ) - 1 ) ) = " & _
      " ( select max( cint( mid( version_no, 1, instr(
version_no, " & gstrDQ & gstrVerSeparator &
gstrDQ & " ) - 1 ) ) ) " & _
```

```
      " from att_steps AS c " & _
      " WHERE a.step_id = c.step_id ) ) "


   ' Order the iterators by sequence within a
step
   strSql = strSql & " order by i.step_id,
i.sequence_no "

   Set qyIt =
dbsAttTool.CreateQueryDef(gstrEmptyStrin
g, strSql)
   qyIt.Parameters("w_id").Value =
lngWorkspaceId
   qyIt.Parameters("archived").Value =
False

   Set recIterators =
qyIt.OpenRecordset(dbOpenSnapshot)

   qyIt.Close
   Set ReadWspIterators = recIterators

   Exit Function

ReadWspIteratorsErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errReadDataFailed, _
         gstrSource,
LoadResString(errReadDataFailed)

End Function
Private Sub LoadIteratorsArray(cStepsCol
As cArrSteps, _
      recIterators As Recordset)
   ' Initializes the step records with the
iterators for
   ' the step

   Dim cNewIt As cIterator
   Dim cStepRec As cStep
   Dim lngStepId As Long

   On Error GoTo LoadIteratorsArrayErr
   gstrSource = mstrModuleName &
"LoadIteratorsArray"

   If recIterators.RecordCount = 0 Then
      Exit Sub
   End If

   recIterators.MoveFirst
   While Not recIterators.EOF
      Set cNewIt = New cIterator

      lngStepId =
CLng(ErrorOnNullField(recIterators,
"step_id"))
      If Not cStepRec Is Nothing Then
         If cStepRec.StepId <> lngStepId
Then
            Set cStepRec =
cStepsCol.QueryStep(lngStepId)
         End If
      Else
         Set cStepRec =
cStepsCol.QueryStep(lngStepId)
      End If

      ' Initialize iterator values
      cNewIt.IteratorType =
CInt(ErrorOnNullField(recIterators, "type"))
      cNewIt.Value =
CStr(ErrorOnNullField(recIterators,
"iterator_value"))
      cNewIt.SequenceNo =
CInt(ErrorOnNullField(recIterators,
"sequence_no"))

      ' Add this record to the array of iterators
      cStepRec.LoadIterator cNewIt

      Set cNewIt = Nothing
      recIterators.MoveNext
   Wend

   Exit Sub

LoadIteratorsArrayErr:
   LogErrors Errors
   gstrSource = mstrModuleName &
"LoadIteratorsArray"
   On Error GoTo 0
   Err.Raise vbObjectError +
errLoadRsInArrayFailed, _
         gstrSource, _

LoadResString(errLoadRsInArrayFailed)

End Sub


Attribute VB_Name = "MsgConfirm"
' FILE:      MsgConfirm.bas
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:    Contains constants for
confirmation messages that
'            will be displayed by StepMaster
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' A public enum containing the codes for all the
confirmation
' messages that will be used by the project -
each of the codes
' has the prefix, con
Public Enum conConfirmMsgCodes
   conWspDelete = 2000
   conSave
   conStopRun
   conSaveConnect
   conSaveDB
End Enum

' A public enum containing the titles for all the
confirmation
' messages that will be used by the project -
each of the codes
' has the prefix, cont - most confirmation
message codes will
' have a corresponding title code in here
Public Enum conConfirmMsgTitleCodes
   contWspDelete = 3000
   contSave
   contStopRun
   contSaveConnect
   contSaveDB
End Enum

Attribute VB_Name = "OpenFiles"
' FILE:      OpenFiles.bas
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:    This module holds a list of all files
that have been
'            opened by the project. This module is
needed since there
'            is no way to share static data between
different instances
'            of a class.
'            Many procedure in this module do not do
any error handling -
'            this is 'coz it is also used by procedures
that log error
'            messages and any error handler will erase
the collection
'            of errors!

' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit


' Used to indicate the source module name when
errors
' are raised by this class
Private Const mstrModuleName As String =
".OpenFiles."

Private mOpenFiles As cNodeCollections

Private Const mstrTempDir As String = "\Temp\"

' The maximum number of temporary files that we
can create in a
' session
Private Const mlngMaxFileIndex As Long =
999999
Private Const mstrFileIndexFormat As String =
"000000"
Private Const mstrTempFilePrefix As String =
"SM"
Private Const mstrTempFileSuffix As String =
".cmd"

Private Const merrFileNotFound As Long = 76
Private Function GetFileHandle(strFileName) As
cFileInfo

   Dim lngIndex As Long
   Dim blnFileOpen As Boolean

   If Not mOpenFiles Is Nothing Then

      blnFileOpen = False
      For lngIndex = 0 To mOpenFiles.Count - 1
         If mOpenFiles(lngIndex).FileName =
strFileName Then
            blnFileOpen = True
            Exit For
         End If
      Next lngIndex

      If blnFileOpen Then
         Set GetFileHandle = mOpenFiles(lngIndex)
      Else
         Set GetFileHandle = Nothing
      End If
   Else
      Set GetFileHandle = Nothing
```

```
    End If

End Function

Private Function GetTempFileDir() As
String

    Dim strTempFileDir As String

    On Error GoTo GetTempFileDirErr

    strTempFileDir = gstrProjectPath &
mstrTempDir

    If StringEmpty(Dir$(strTempFileDir,
vbDirectory)) Then
        MkDir strTempFileDir
    End If

    GetTempFileDir = strTempFileDir

    Exit Function

GetTempFileDirErr:
    ' Log the error code raised by Visual
Basic
    Call LogErrors(Errors)
    gstrSource = mstrModuleName &
"GetTempFileDir"
    On Error GoTo 0
    Err.Raise vbObjectError +
errProgramError, gstrSource, _
          LoadResString(errProgramError)

End Function
Public Function
MakePathValid(strFileName As String) As
String
    ' Checks if the passed in file path is valid

    Dim strFileDir As String
    Dim strTempDir As String
    Dim strTempFile As String
    Dim intPos As Integer
    Dim intStart As Integer

    On Error GoTo MakePathValidErr
    gstrSource = mstrModuleName &
"MakePathValid"

    strTempFile = strFileName
    intPos = InstrR(strFileName,
gstrFileSeparator)

    If intPos > 0 Then
        strFileDir = Left$(strTempFile, intPos -
1)
        If StringEmpty(Dir$(strFileDir,
vbDirectory)) Then
            ' Loop through the entire path
starting at the root
            ' since Mkdir can create only one
level of sub-directory
            ' at a time
            intStart = InStr(strFileDir,
gstrFileSeparator)

            Do While strTempDir <> strFileDir

                If intStart > 0 Then
                    strTempDir = Left$(strFileDir,
intStart - 1)
                Else
                    strTempDir = strFileDir
                End If

                If StringEmpty(Dir$(strTempDir,
vbDirectory)) Then
                    ' If the specified directory doesn't
exist, try to
                    ' create it.
                    MkDir strTempDir
                Else
                    ' The directory exists - go to it's
sub-directory
                End If
                intStart = InStr(intStart + 1,
strFileDir, gstrFileSeparator)
            Loop

            ' Sanity check
            If StringEmpty(Dir$(strFileDir,
vbDirectory)) Then
                ' We were unable to create the file
directory
                ShowError errCreateDirectoryFailed,
gstrSource, _
                    strFileDir, DoWriteError:=False
                MakePathValid = gstrEmptyString
            Else
                MakePathValid = strTempFile
            End If
        Else
            ' The specified directory exists - we
should be able
            ' to create the output file in it
            MakePathValid = strTempFile
        End If
    Else
        ' The user has only specified a filename -
VB will try
        ' to create it in the current directory
        MakePathValid = strTempFile
    End If

    Exit Function

MakePathValidErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    gstrSource = mstrModuleName &
"MakePathValid"
    ' Log the filename for debug
    Call WriteError(errInvalidFile, gstrSource,
strTempFile)
    On Error GoTo 0
    Err.Raise vbObjectError + errProgramError,
gstrSource, _
          LoadResString(errProgramError)

End Function
Public Function OpenFileSM(strFileName As
String) As Integer
    Dim intHFile As Integer
    Dim NewFileInfo As cFileInfo

    On Error GoTo OpenFileSMErr
    gstrSource = mstrModuleName &
"OpenFileSM"

    If StringEmpty(strFileName) Then
        On Error GoTo 0
        Err.Raise vbObjectError + errInvalidFile,
gstrSource, _
            LoadResString(errInvalidFile)
    End If

    If mOpenFiles Is Nothing Then
        Set mOpenFiles = New cNodeCollections
    End If

    Set NewFileInfo = GetFileHandle(strFileName)

    If NewFileInfo Is Nothing Then
        ' The file has not been opened yet

        ' If the filename has not been initialized, do not
        ' attempt to open it
        strFileName = MakePathValid(strFileName)

        If strFileName <> gstrEmptyString Then
            intHFile = FreeFile
            Open strFileName For Output Shared As
intHFile

            Set NewFileInfo = New cFileInfo
            NewFileInfo.FileHandle = intHFile
            NewFileInfo.FileName = strFileName
            mOpenFiles.Load NewFileInfo
        Else
            ' Either the directory was invalid or s'thing
failed
            ' Display the error to the user instead of
trying
            ' to log to the file
            ShowError errInvalidFile, gstrSource,
strFileName, _
                DoWriteError:=False
            intHFile = 0
        End If
    Else
        intHFile = NewFileInfo.FileHandle
    End If

    OpenFileSM = intHFile

    Exit Function

OpenFileSMErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    ' The Open command failed for some reason -
write an error
    ' and let the calling function handle the error
    ShowError errInvalidFile, gstrSource,
strFileName, _
          DoWriteError:=False
    OpenFileSM = 0

End Function
Public Function CreateTempFile() As String

    Dim strTempFileDir As String
    Dim strTempFileName As String

    Static lngLastFileIndex As Long

    On Error GoTo CreateTempFileErr

    strTempFileDir = GetTempFileDir()

    Do
        If lngLastFileIndex = mlngMaxFileIndex Then
            On Error GoTo 0
            Err.Raise vbObjectError +
errMaxTempFiles, gstrSource, _
                LoadResString(errMaxTempFiles)
        End If

        lngLastFileIndex = lngLastFileIndex + 1
        strTempFileName = mstrTempFilePrefix & _
            Format$(lngLastFileIndex,
mstrFileIndexFormat) & _
            mstrTempFileSuffix
```

```
    If Not
StringEmpty(Dir$(strTempFileDir &
strTempFileName)) Then
        ' Remove any files left over from a
previous run,
        ' if they still exist
        Kill strTempFileDir &
strTempFileName
    End If

  ' Looping in case the file delete doesn't go
through for
  ' some reason
  Loop While Not
StringEmpty(Dir$(strTempFileDir &
strTempFileName))

  CreateTempFile =
GetShortName(strTempFileDir)
  CreateTempFile = CreateTempFile &
strTempFileName

  Exit Function

CreateTempFileErr:
  ' Log the error code raised by Visual
Basic
  Call LogErrors(Errors)
  gstrSource = gstrSource &
"CreateTempFile"
  On Error GoTo 0
  Err.Raise vbObjectError +
errProgramError, gstrSource, _
      LoadResString(errProgramError)

End Function
Public Sub CloseFileSM(strFileName As
String)
  Dim FileToClose As cFileInfo

  If Not mOpenFiles Is Nothing Then

    ' Get the handle to the open file, if it
exists
    Set FileToClose =
GetFileHandle(strFileName)

    If Not FileToClose Is Nothing Then
      Close FileToClose.FileHandle

      ' Remove the file info from the
collection of open files
      mOpenFiles.Unload
FileToClose.Position
    End If
  End If

End Sub
Public Sub CloseOpenFiles()
  Dim lIndex As Long

  If Not mOpenFiles Is Nothing Then
    For lIndex = mOpenFiles.Count - 1 To
0
      CloseFileSM
(mOpenFiles(lIndex).FileName)
    Next lIndex
  End If

End Sub

Attribute VB_Name = "ParameterCommon"
'  FILE:      ParameterCommon.bas
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
'  PURPOSE:   Contains functionality common
across StepMaster and
'             SMRunOnly, pertaining to parameters
'             Specifically, functions to load
parameter records
'             in an array.
'  Contact:   Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this module
Private Const mstrModuleName As String =
"ParameterCommon."

Public Sub
LoadRecordsetInParameterArray(rstWorkSpac
eParameters As Recordset, _
  cParamCol As cArrParameters)

  Dim cNewParameter As cParameter

  On Error GoTo
LoadRecordsetInParameterArrayErr

  If rstWorkSpaceParameters.RecordCount =
0 Then
    Exit Sub
  End If

  rstWorkSpaceParameters.MoveFirst
  While Not rstWorkSpaceParameters.EOF

    Set cNewParameter = New cParameter

    ' Initialize parameter values
    cNewParameter.ParameterId =
rstWorkSpaceParameters.Fields(0)

    ' Call a procedure to raise an error if
mandatory fields are
    ' null.
    cNewParameter.ParameterName = CStr( _

ErrorOnNullField(rstWorkSpaceParameters,
"parameter_name"))
    cNewParameter.ParameterValue =
CheckForNullField( _
        rstWorkSpaceParameters,
"parameter_value")
    cNewParameter.WorkspaceId = CStr( _

ErrorOnNullField(rstWorkSpaceParameters,
FLD_ID_WORKSPACE))
    cNewParameter.ParameterType = CStr( _

ErrorOnNullField(rstWorkSpaceParameters,
"parameter_type"))
    cNewParameter.Description =
CheckForNullField( _
        rstWorkSpaceParameters,
"description")

    cParamCol.Load cNewParameter

    Set cNewParameter = Nothing
    rstWorkSpaceParameters.MoveNext
  Wend

  Exit Sub

LoadRecordsetInParameterArrayErr:
  LogErrors Errors
  gstrSource = mstrModuleName &
"LoadRecordsetInParameterArray"
  On Error GoTo 0
  Err.Raise vbObjectError +
errLoadRsInArrayFailed, gstrSource, _
      LoadResString(errLoadRsInArrayFailed)
End Sub
Attribute VB_Name = "Public"
'  FILE:      Public.bas
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
'  PURPOSE:   This module contains all the public
constants for this project
'  Contact:   Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Public Const gsVersion01 As String = "0.1"
Public Const gsVersion10 As String = "1.0"
Public Const gsVersion21 As String = "2.1"
Public Const gsVersion23 As String = "2.3"
Public Const gsVersion24 As String = "2.4"
Public Const gsVersion241 As String = "2.4.1"
Public Const gsVersion242 As String = "2.4.2"
Public Const gsVersion243 As String = "2.4.3"
Public Const gsVersion25 As String = "2.5"
Public Const gsVersion251 As String = "2.5.1"
Public Const gsVersion253 As String = "2.5.3"
Public Const gsVersion254 As String = "2.5.4"
Public Const gsVersion255 As String = "2.5.5"
Public Const gsVersion As String = gsVersion255

' The same form is used for the creation of new
nodes and
' updates to existing nodes (where each node can be
a parameter,
' global step, etc.) A tag is set on each flag is used to
indicate
' whether it is being called in the insert or update
mode. The
' constants for these modes are defined below
Public Const gstrInsertMode = "Insert"
Public Const gstrUpdateMode = "Update"
Public Const gstrPropertiesMode = "View"

Public Const gstrEmptyString = ""
Public Const gstrSQ = "'"
Public Const gstrDQ = """"
Public Const gstrVerSeparator = "."
Public Const gstrBlank = " "

' Constants used to indicate type of node being
processed
' The constants for the different objects correspond
to the
' indexes in the menu control arrays (for both the
main and popup
' menus) that are used to create new objects. That
way we can
' use the index passed in by the click event to
determine the
' type of node being processed
Public Const gintWorkspace = 1

' Decided to leave it here after some debate over
whether it
' actually belongs in the cStep class definition
Public Enum gintStepType
```

```
    gintGlobalStep = 3
    gintManagerStep
    gintWorkerStep
End Enum

Public Const gintRunManager = 6
Public Const gintRunWorker = 7

Public Enum gintParameterNodeType
    gintParameter = 8
    gintNodeParamConnection
    gintNodeParamExtension
    gintNodeParamBuiltIn
End Enum

' Leave some constants free for newer types
of parameters (?)
Public Const gintConnectionDtl = 15

Public Enum gintLabelNodeType
    gintGlobalsLabel = 21
    gintParameterLabel
    gintParamConnectionLabel
    gintParamExtensionLabel
    gintParamBuiltInLabel
    gintConnDtlLabel
    gintGlobalStepLabel
    gintStepLabel
End Enum

Public Enum ConnectionType
    ConnTypeStatic = 1
    ConnTypeDynamic
End Enum

Public Const giDefaultConnType As Integer
= ConnTypeStatic

' The constants defined below are used to
identify the different
' tabs. If any more step properties and
thereby tabs are added
' to the tabbed dialog on the Step Properties
form, they should
' be defined here and accessed in the code
only using these
' pre-defined constants
' Note: These constants will mainly be used
by the functions that
' initialize, customize and display the Step
Properties form
Public Const gintDefinition = 0
Public Const gintExecution = 1
Public Const gintMgrDefinition = 2
Public Const gintPreExecutionSteps = 3
Public Const gintPostExecutionSteps = 4
Public Const gintFileLocations = 5

' These constants correspond to the index
values in the imagelist
' associated with the tree view control. The
imagelist contains
' the icons that will be displayed for each
node.
Public Enum TreeImages
    gintImageWorkspaceClosed = 1
    gintImageWorkspaceOpen
    gintImageLabelClosed
    gintImageLabelOpen
    gintImageManagerClosedDis
    gintImageManagerClosedEn
    gintImageManagerOpenDis
    gintImageManagerOpenEn
    gintImageWorkerDis
    gintImageWorkerEn
    gintImageGlobalClosed
    gintImageGlobalOpen
    gintImageParameter
    gintImageRun
    gintImagePending
    gintImageStop
    gintImageDisabled
    gintImageAborted
    gintImageFailed
End Enum

' Public variable used to indicate the name of
the function
' that raises an error
Public gstrSource As String

' Public instances of the different collections
Public gcParameters As cArrParameters
Public gcSteps As cArrSteps
Public gcConstraints As cArrConstraints
Public gcConnections As cConnections
Public gcConnDtls As cConnDtls

' Public constants for the index values of the
different toolbar
' options. Will be used while dynamically
enabling/disabling
' these options.
Public Const tbNew = 1
Public Const tbOpen = 2
Public Const tbSave = 3

Public Const tbCut = 5
Public Const tbCopy = 6
Public Const tbPaste = 7
Public Const tbDelete = 8

Public Const tbProperties = 10
Public Const tbRun = 11
Public Const tbStop = 12

' The initial version #
Public Const gstrMinVersion As String = "0.0"
Public Const gstrGlobalParallelism As String =
"0"
Public Const gintMinParallelism As Integer =
1
Public Const gintMaxParallelism As Integer =
100

' Constant for the minimum identifier, used for
all identifier, viz.
' step, workspace, etc.
Public Const glMinId As Long = 1
Public Const glInvalidId As Long = -1

' A parameter that has a special meaning to
Stepmaster
' The system time will be substituted wherever
it occurs
' (typically as a part of the error, log ... file
names
Public Const gstrTimeStamp As String =
"TIMESTAMP"
Public Const gstrEnvVarSeparator = "%"
Public Const gstrFileSeparator = "\"
Public Const gstrUnderscore = "_"

' Constants used by date and time formatting
functions
Public Const gsTimeSeparator = ":"
Public Const gsDateSeparator = "-"
Public Const gsMsSeparator = "."
Public Const gsDtFormat = "00"
Public Const gsYearFormat = "0000"
Public Const gsTmFormat = "00"
Public Const gsMSecondFormat = "000"

' Default nothing value for a date variable
Public Const gdtmEmpty As Currency = 0

Public Const FMT_WSP_LOG_FILE As String =
"yyyymmdd-hhnnss"

Public gsContCriteria() As String
' Note: Update the initialization of
gsExecutionStatus in Initialize() if the
' InstanceStatus values are modified - also the
boundary checks
Public gsExecutionStatus() As String

Public Const gsConnTypeStatic As String =
"Static"
Public Const gsConnTypeDynamic As String =
"Dynamic"

#If RUN_ONLY Then
Public Const gsCaptionRunWsp As String = "Run
Workspace"
#End If

' Valid operations on a cNode object
Public Enum Operation
    QueryOp = 1
    InsertOp = 2
    UpdateOp = 3
    DeleteOp = 4
End Enum

Attribute VB_Name = "RunCommon"
'  FILE:      RunCommon.bas
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
'  PURPOSE:    Contains common functions that are
used during the execution
'             of a workspace.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name when
errors
' are raised by this class
Private Const mstrModuleName As String =
".RunCommon."


Public Function GetInstanceItValue(cInstanceRec
As cInstance) As String

    ' Returns the iterator value for the instance, if an
    ' iterator has been defined for it
    Dim cStepIt As cRunColIt
    Dim cRunIterator As cRunItNode

    On Error GoTo GetInstanceItValueErr

    ' Since we create a dummy instance for Disabled
and Pending steps,
    ' doesn't make sense to look at their iterators
    If cInstanceRec.Status <> gintDisabled And
cInstanceRec.Status <> gintPending Then
        Set cStepIt = cInstanceRec.Iterators
```

```
      If Not
StringEmpty(cInstanceRec.Step.IteratorNam
e) Then
         If cStepIt.Count > 0 Then
            Set cRunIterator = cStepIt(0)
            BugAssert
cRunIterator.IteratorName =
cInstanceRec.Step.IteratorName, _
                  "The first iterator in the
collection is the " & _
                  "one that has been defined for
the step."
            If cRunIterator.IteratorName =
cInstanceRec.Step.IteratorName Then
               GetInstanceItValue =
cRunIterator.Value
            Else
               GetInstanceItValue =
gstrEmptyString
            End If
         Else
            GetInstanceItValue =
gstrEmptyString
         End If
      Else
         GetInstanceItValue =
gstrEmptyString
      End If
   Else
      GetInstanceItValue = gstrEmptyString
   End If

   Exit Function

GetInstanceItValueErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   gstrSource = mstrModuleName &
"GetInstanceItValue"
   Err.Raise vbObjectError +
errProgramError, gstrSource, _
         LoadResString(errProgramError)

End Function


Attribute VB_Name = "RunInstHelper"
'  FILE:      RunInstHelper.bas
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
'  PURPOSE:    This module contains helper
procedures that are called by
'             cRunInst.cls
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this class
Private Const mstrModuleName As String =
"RunInstHelper."

' Should be equal to the number of steps
defined in cRunInst.cls
Public Const glngNumConcurrentProcesses
As Long = 99
Public Const gintBitsPerByte = 8

Public Function AnyStepRunning(cFreeSteps
As cVectorLng, arrFree() As Byte) As Boolean

   Dim lngIndex As Long
   Dim intPosInByte As Integer
   Dim lngTemp As Long

   ' Check if there are any running instances to
wait for
   If cFreeSteps.Count <>
glngNumConcurrentProcesses Then

      ' For every free step, reset the
corresponding element
      ' in the byte array to 0
      For lngIndex = 0 To cFreeSteps.Count - 1

         lngTemp = cFreeSteps(lngIndex) \
gintBitsPerByte
         intPosInByte = cFreeSteps(lngIndex)
Mod gintBitsPerByte

         arrFree(lngTemp) = arrFree(lngTemp)
Xor 2 ^ intPosInByte
      Next lngIndex

      AnyStepRunning = False

      ' Check if we have a non-zero bit in the
byte array
      For lngIndex = LBound(arrFree) To
UBound(arrFree) Step 1
         If arrFree(lngIndex) <> 0 Then
            ' We are waiting for a step to
complete
            AnyStepRunning = True
            Exit For
         End If
      Next lngIndex

   Else
      AnyStepRunning = False
   End If

End Function


Public Function
OrderConstraints(vntTempCons() As Variant,
_
      intConsType As ConstraintType) As
Variant
   ' Returns a variant containing all the
constraint records in the order
   ' in which they should be executed

   Dim vntTemp As Variant
   Dim lngOuter As Long
   Dim lngInner As Long
   Dim cTempConstraint As cConstraint
   Dim cConstraints() As cConstraint
   Dim lngConsCount As Long
   Dim lngLbound As Long
   Dim lngUbound As Long
   Dim lngStep As Long

   On Error GoTo OrderConstraintsErr

   If intConsType = gintPreStep Then
      ' Since we are travelling up and we need
to execute the constraints
      ' for the top-level steps first, reverse the
order that they
      ' have been stored in the array
      lngLbound = UBound(vntTempCons)
      lngUbound = LBound(vntTempCons)
      lngStep = -1
   Else
      lngLbound = LBound(vntTempCons)
      lngUbound = UBound(vntTempCons)
      lngStep = 1
   End If

   lngConsCount = 0

   For lngOuter = lngLbound To lngUbound Step
lngStep
      vntTemp = vntTempCons(lngOuter)

      If Not IsEmpty(vntTemp) Then
         ' Each of the elements is an array
         For lngInner = LBound(vntTemp) To
UBound(vntTemp) Step 1
            If Not IsEmpty(vntTemp(lngInner)) Then
               Set cTempConstraint =
vntTemp(lngInner)

               If Not cTempConstraint Is Nothing
Then
                  ReDim Preserve
cConstraints(lngConsCount)
                  Set cConstraints(lngConsCount) =
cTempConstraint
                  lngConsCount = lngConsCount + 1
               End If
            End If
         Next lngInner
      End If
   Next lngOuter

   ' Set the return value of the function to the array
of
   ' constraints that has been built above
   If lngConsCount = 0 Then
      OrderConstraints = Empty
   Else
      OrderConstraints = cConstraints()
   End If

   Exit Function

OrderConstraintsErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errExecInstanceFailed, _
         mstrModuleName,
LoadResString(errExecInstanceFailed)

End Function
Attribute VB_Name = "ShellSM"
'  FILE:      ShellSM.bas
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
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'
'
'  PURPOSE:    This module contains a function
that creates a process and
'             waits for it to complete.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Public Function SyncShell(CommandLine As
String, Optional Timeout As Long, _
   Optional WaitForInputIdle As Boolean) As
Boolean
```

```
   Dim proc As
PROCESS_INFORMATION
   Dim Start As STARTUPINFO
   Dim ret As Long
   Dim nMilliseconds As Long

   BugMessage "Executing: " &
CommandLine
   If Timeout > 0 Then
      nMilliseconds = Timeout
   Else
      nMilliseconds = INFINITE
   End If

   'Initialize the STARTUPINFO structure:
   Start.cb = Len(Start)
   Start.dwFlags =
STARTF_USESHOWWINDOW
   Start.wShowWindow =
SW_SHOWMINNOACTIVE

   'Start the shelled application:
   CreateProcessA 0&, CommandLine, 0&,
0&, 1&, _
      NORMAL_PRIORITY_CLASS, 0&,
0&, Start, proc

   If WaitForInputIdle Then
      'Wait for the shelled application to
finish setting up its UI:
      ret = InputIdle(proc.hProcess,
nMilliseconds)
   Else
      'Wait for the shelled application to
terminate:
      ret =
WaitForSingleObject(proc.hProcess,
nMilliseconds)
   End If

   CloseHandle proc.hProcess

   'Return True if the application finished.
Otherwise it timed out or erred.
   SyncShell = (ret = WAIT_OBJECT_0)
End Function

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cArrConstraints"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cArrConstraints.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
'  PURPOSE:    Implements an array of
cConstraint objects.
'             Type-safe wrapper around
cNodeCollections.
'             Also contains additional functions
that determine all the
'             constraints for a step, all
constraints in a workspace,
'             validation functions, etc.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private mcarrConstraints As cNodeCollections

' Used to indicate the source module name
when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cArrConstraints."
Public Sub SaveWspConstraints(ByVal
lngWorkspace As Long)
   ' Calls a procedure to commit all changes to
the constraints
   ' in the passed in workspace.

   Call mcarrConstraints.Save(lngWorkspace)

End Sub
Public Property Set ConstraintDB(vdata As
Database)

   Set mcarrConstraints.NodeDB = vdata

End Property
Public Property Get ConstraintDB() As
Database

   Set ConstraintDB =
mcarrConstraints.NodeDB

End Property

Public Sub Modify(cConsToUpdate As
cConstraint)

   ' Modify the constraint record
   Call
mcarrConstraints.Modify(cConsToUpdate)

End Sub
Public Sub
CreateNewConstraintVersion(ByVal lngStepId
As Long, _
      ByVal strNewVersion As String, _
      ByVal strOldVersion As String, _
      ByVal intStepType As Integer)

   ' Does all the processing needed to create
new versions of
   ' all the constraints for a given step
   ' It inserts new constraint records in the
database with
   ' the new version numbers on them
   ' It also updates the version number on all
constraints
   ' for the step in the array to the new version
passed in
   ' Since it handles both global and
manager/worker steps,
   ' it checks for the step_id or global_step_id
fields,
   ' depending on the type of step

   Dim lngIndex As Long
   Dim cUpdateConstraint As cConstraint

   On Error GoTo
CreateNewConstraintVersionErr
   mstrSource = mstrModuleName &
"CreateNewConstraintVersion"

   ' Update the version/global version on
Constraint with the
   ' passed in step/global step id
   For lngIndex = 0 To mcarrConstraints.Count - 1
      Set cUpdateConstraint =
mcarrConstraints(lngIndex)
      If intStepType = gintGlobalStep Then
         If cUpdateConstraint.GlobalStepId =
lngStepId And _
            cUpdateConstraint.IndOperation <>
DeleteOp Then
            cUpdateConstraint.GlobalVersionNo =
strNewVersion

            ' Set the operation to indicate an insert
            cUpdateConstraint.IndOperation =
InsertOp
         End If
      Else
         If cUpdateConstraint.StepId = lngStepId
And _
            cUpdateConstraint.IndOperation <>
DeleteOp Then
            cUpdateConstraint.VersionNo =
strNewVersion

            ' Set the operation to indicate an insert
            cUpdateConstraint.IndOperation =
InsertOp
         End If
      End If
   Next lngIndex

   Exit Sub

CreateNewConstraintVersionErr:
   LogErrors Errors
   gstrSource = mstrModuleName &
"CreateNewConstraintVersion"
   On Error GoTo 0
   Err.Raise vbObjectError +
errCreateNewConstraintVersionFailed, _
         mstrSource, _

LoadResString(errCreateNewConstraintVersionFail
ed)

End Sub
Private Sub Class_Initialize()

   Set mcarrConstraints = New cNodeCollections
   BugMessage "cArrConstraints: Initialize event -
setting Constraint count to 0"

End Sub

Private Sub Class_Terminate()

   Set mcarrConstraints = Nothing
   BugMessage "cArrConstraints: Terminate event
triggered"

End Sub

Public Sub Add(ByVal cConstraintToAdd As
cConstraint)

   Set cConstraintToAdd.NodeDB =
mcarrConstraints.NodeDB

   ' Retrieve a unique constraint identifier
   cConstraintToAdd.ConstraintId =
cConstraintToAdd.NextIdentifier

   ' Call a procedure to load the constraint record in
the array
   Call mcarrConstraints.Add(cConstraintToAdd)
```

```
End Sub
Public Sub Delete(ByVal cOldConstraint As
cConstraint)

   Dim lngDeleteElement As Long
   Dim cConsToDelete As cConstraint

   lngDeleteElement =
QueryConstraintIndex(cOldConstraint.Const
raintId)
   Set cConsToDelete =
mcarrConstraints(lngDeleteElement)

   Call
mcarrConstraints.Delete(cConsToDelete.Pos
ition)

   Set cConsToDelete = Nothing

End Sub
Private Function
QueryConstraintIndex(lngConstraintId As
Long) _
      As Long

   Dim lngIndex As Integer

   ' Find the element in the array to be
deleted
   For lngIndex = 0 To
mcarrConstraints.Count - 1

      ' Note: The constraint id is not a
primary key field in
      ' the database - there can be multiple
records with the
      ' same constraint_id but for different
versions of a step
      ' However, since we'll always load the
constraint information
      ' for the latest version of a step, we'll
have just one
      ' constraint record with a given
constraint_id
      If
mcarrConstraints(lngIndex).ConstraintId =
lngConstraintId Then
         QueryConstraintIndex = lngIndex
         Exit Function
      End If

   Next lngIndex

   ' Raise error that Constraint has not been
found
   ShowError errConstraintNotFound
   On Error GoTo 0
   Err.Raise vbObjectError +
errConstraintNotFound, mstrSource, _
      LoadResString(errConstraintNotFound)

End Function

Public Function QueryConstraint(ByVal
lngConstraintId As Long) _
   As cConstraint

   ' Returns a cConstraint object with the
property values
   ' corresponding to the Constraint
Identifier, lngConstraintId

   Dim lngQueryElement As Long
   lngQueryElement =
QueryConstraintIndex(lngConstraintId)

   ' Set the return value to the queried
Constraint
   Set QueryConstraint =
mcarrConstraints(lngQueryElement)

End Function

Public Sub LoadConstraints(ByVal
lngWorkspaceId As Long, rstStepsInWsp As
Recordset)

   ' Loads the constraints array with all the
constraints
   ' for the workspace
   Dim recConstraints As Recordset
   Dim qyCons As DAO.QueryDef
   Dim strSql As String
   Dim dtStart As Date

   On Error GoTo LoadConstraintsErr
   mstrSource = mstrModuleName &
"LoadConstraints"

   If rstStepsInWsp.RecordCount = 0 Then
      Exit Sub
   End If

   ' First check if the database object has been
set
   If mcarrConstraints.NodeDB Is Nothing
Then
      On Error GoTo 0
      Err.Raise vbObjectError +
errSetDBBeforeLoad, _
            mstrSource, _

LoadResString(errSetDBBeforeLoad)
   End If

   dtStart = Now

   ' Select based on the global step id since
there might
   ' be constraints for a global step that run are
executed
   ' for the workspace
   ' This method has the advantage that if the
steps are queried right, everything else follows
   strSql = "Select a.constraint_id, a.step_id,
a.version_no, " & _
      " a.constraint_type, a.global_step_id,
a.global_version_no, " & _
      " a.sequence_no, b.workspace_id " & _
      " from step_constraints a, att_steps b " &
_
      " where a.global_step_id = b.step_id " &
_
      " and a.global_version_no = b.version_no
" & _
      " and a.global_step_id = [g_s_id] " & _
      " and a.global_version_no = [g_ver_no] "
& _
      " and b.archived_flag = [archived] "

   ' Find the highest X-component of the
version number
   strSql = strSql & " AND ( a.step_id = 0 or (
cint( mid( a.version_no, 1, instr( a.version_no,
" & gstrDQ & gstrVerSeparator & gstrDQ & "
) - 1 ) ) = " & _
      " ( select max( cint( mid( version_no, 1, instr(
version_no, " & gstrDQ & gstrVerSeparator &
gstrDQ & " ) - 1 ) ) ) " & _
      " from att_steps AS d " & _
      " WHERE a.step_id = d.step_id " & _
      " and d.archived_flag = [archived] ) "

   ' Find the highest Y-component of the version
number for the highest X-component
   strSql = strSql & " AND cint( mid( a.version_no,
instr( a.version_no, " & gstrDQ & gstrVerSeparator
& gstrDQ & " ) + 1 ) ) = " & _
      " ( select max( cint( mid( version_no, instr(
version_no, " & gstrDQ & gstrVerSeparator &
gstrDQ & " ) + 1 ) ) ) " & _
      " from att_steps AS y " & _
      " Where a.step_id = y.step_id " & _
      " AND cint( mid( version_no, 1, instr(
version_no, " & gstrDQ & gstrVerSeparator &
gstrDQ & " ) - 1 ) ) = " & _
      " ( select max( cint( mid( version_no, 1, instr(
version_no, " & gstrDQ & gstrVerSeparator &
gstrDQ & " ) - 1 ) ) ) " & _
      " from att_steps AS c " & _
      " WHERE y.step_id = c.step_id " & _
      " and c.archived_flag = [archived] ) ) ) ) "

   ' Order the constraints by sequence within a given
step
   strSql = strSql & " order by a.sequence_no "

   Set qyCons =
mcarrConstraints.NodeDB.CreateQueryDef(gstrEm
ptyString, strSql)
   qyCons.Parameters("archived").Value = False

   rstStepsInWsp.MoveFirst

   While Not rstStepsInWsp.EOF

      If Not (rstStepsInWsp!global_flag) Then
         qyCons.Close
         BugMessage "Query constraints Read +
load took: " & CStr(DateDiff("s", dtStart, Now))
         Exit Sub
      End If

      qyCons.Parameters("g_s_id").Value =
rstStepsInWsp!step_id
      qyCons.Parameters("g_ver_no").Value =
rstStepsInWsp!version_no

      Set recConstraints =
qyCons.OpenRecordset(dbOpenSnapshot)

      Call
LoadRecordsetInConstraintArray(recConstraints)
      recConstraints.Close

      rstStepsInWsp.MoveNext
   Wend

   qyCons.Close
   BugMessage "Query constraints Read + load
took: " & CStr(DateDiff("s", dtStart, Now))

   Exit Sub

LoadConstraintsErr:
   LogErrors Errors
   gstrSource = mstrModuleName &
"LoadConstraints"
   On Error GoTo 0
   Err.Raise vbObjectError + errLoadDataFailed, _
         mstrSource, _
```

```
        LoadResString(errLoadDataFailed)

End Sub
Public Sub UnloadStepConstraints(ByVal
lngStepId As Long)

   ' Unloads all the constraints for the
workspace from
   ' the constraints array

   Dim lngIndex As Long

   ' Find all constraints in the array with a
matching step id
   ' It is important to step in reverse order
through the array,
   ' since we delete constraint records!
   For lngIndex = mcarrConstraints.Count -
1 To 0 Step -1
      If
mcarrConstraints(lngIndex).GlobalStepId =
lngStepId Then

         ' Unload the constraint from the
array
         Call
mcarrConstraints.Unload(lngIndex)

      End If
   Next lngIndex

End Sub
Public Sub
UnloadConstraint(cOldConstraint As
cConstraint)
   ' Unloads the constraint from the
constraints array

   Dim lngDeleteElement As Long

   lngDeleteElement =
QueryConstraintIndex(cOldConstraint.Const
raintId)

   Call
mcarrConstraints.Unload(lngDeleteElement)

End Sub
Private Sub
LoadRecordsetInConstraintArray(ByVal
recConstraints As Recordset)
   ' Loads all the constraint records in the
passed in
   ' recordset into the array

   Dim cNewConstraint As cConstraint

   On Error GoTo
LoadRecordsetInConsArrayErr
   mstrSource = mstrModuleName &
"LoadRecordsetInConstraintArray"

   If recConstraints.RecordCount = 0 Then
      Exit Sub
   End If

   recConstraints.MoveFirst
   While Not recConstraints.EOF
      Set cNewConstraint = New cConstraint

      ' Initialize Constraint values
      cNewConstraint.ConstraintId =
CLng(ErrorOnNullField(recConstraints,
"Constraint_id"))
      cNewConstraint.StepId =
CLng(ErrorOnNullField(recConstraints,
"step_id"))
      cNewConstraint.VersionNo =
CStr(ErrorOnNullField(recConstraints,
"version_no"))

      cNewConstraint.GlobalStepId =
CLng(ErrorOnNullField(recConstraints,
"global_step_id"))
      cNewConstraint.GlobalVersionNo =
CStr(ErrorOnNullField(recConstraints,
"global_version_no"))
      cNewConstraint.SequenceNo =
CInt(ErrorOnNullField(recConstraints,
"sequence_no"))

      cNewConstraint.WorkspaceId =
CLng(ErrorOnNullField(recConstraints,
FLD_ID_WORKSPACE))
      cNewConstraint.ConstraintType =
CInt(ErrorOnNullField(recConstraints,
"constraint_type"))

      ' Add this record to the array of
Constraints
      mcarrConstraints.Load cNewConstraint

      Set cNewConstraint = Nothing
      recConstraints.MoveNext
   Wend

   Exit Sub

LoadRecordsetInConsArrayErr:
   LogErrors Errors
   gstrSource = mstrModuleName &
"LoadRecordsetInConstraintArray"
   On Error GoTo 0
   Err.Raise vbObjectError +
errLoadRsInArrayFailed, _
         mstrSource, _

LoadResString(errLoadRsInArrayFailed)

End Sub

Public Function ConstraintsForStep( _
      ByVal lngStepId As Long, _
      ByVal strVersionNo As String, _
      Optional ByVal intConstraintType As
ConstraintType = 0, _
      Optional ByVal blnSort As Boolean =
True, _
      Optional ByVal blnGlobal As Boolean =
False, _
      Optional ByVal
blnGlobalConstraintsOnly As Boolean = False)
_
      As Variant

   ' Returns a variant containing an array of
cConstraint objects,
   ' containing all the constraints that have been
defined for the
   ' given step. If the Global flag is set to true,
the
   ' search will be made for all the constraints
that have
   ' a matching global_step_id

   Dim lngIndex As Long
   Dim cStepConstraint() As cConstraint
   Dim lngConstraintCount As Long
   Dim cTempConstraint As cConstraint

   On Error GoTo ConstraintsForStepErr
   mstrSource = mstrModuleName &
"ConstraintsForStep"

   lngConstraintCount = 0

   ' Find each element in the constraints array
   For lngIndex = 0 To mcarrConstraints.Count - 1
      ' If a constraint type has been specified then
check
      ' if the constraint type for the record matches
the
      ' passed in type
      Set cTempConstraint =
mcarrConstraints(lngIndex)
      If Not blnGlobal Then
         If cTempConstraint.StepId = lngStepId And
_
               cTempConstraint.VersionNo =
strVersionNo And _
               cTempConstraint.IndOperation <>
DeleteOp And _
               (intConstraintType = 0 Or _
               cTempConstraint.ConstraintType =
intConstraintType) Then
            ' We have a matching constraint for the
given step
            AddArrayElement cStepConstraint, _
                  cTempConstraint,
lngConstraintCount
         End If
      Else
         If cTempConstraint.GlobalStepId =
lngStepId And _
               cTempConstraint.GlobalVersionNo =
strVersionNo And _
               cTempConstraint.IndOperation <>
DeleteOp Then
            If blnGlobalConstraintsOnly = False Or _
                  (blnGlobalConstraintsOnly And _
                  cTempConstraint.StepId = 0 And _
                  cTempConstraint.VersionNo =
gstrMinVersion) Then

               ' We have a matching constraint for the
global step
               AddArrayElement cStepConstraint, _
                     cTempConstraint,
lngConstraintCount
            End If
         End If
      End If

   Next lngIndex

   ' Set the return value of the function to the array
of
   ' constraints that has been built above
   If lngConstraintCount = 0 Then
      ConstraintsForStep = Empty
   Else
      ConstraintsForStep = cStepConstraint()
   End If

   ' Sort the constraints
   If blnSort Then
      Call QuickSort(ConstraintsForStep)
   End If

   Exit Function

ConstraintsForStepErr:
   LogErrors Errors
   On Error GoTo 0
```

```
    Err.Raise vbObjectError +
errConstraintsForStepFailed, _
        mstrSource, _

LoadResString(errConstraintsForStepFailed)

End Function
Private Sub AddArrayElement(ByRef
arrNodes() As cConstraint, _
    ByVal objToAdd As cConstraint, _
    ByRef lngCount As Long)
  ' Adds the passed in object to the array

  ' Increase the array dimension and add the
object to it
  ReDim Preserve arrNodes(lngCount)
  Set arrNodes(lngCount) = objToAdd
  lngCount = lngCount + 1

End Sub

Public Function ConstraintsForWsp( _
    ByVal lngWorkspaceId As Long, _
    Optional ByVal intConstraintType As
Integer = 0, _
    Optional ByVal blnSort As Boolean =
True, _
    Optional ByVal
blnGlobalConstraintsOnly As Boolean =
False) _
    As Variant

  ' Returns a variant containing an array of
cConstraint objects,
  ' containing all the constraints that have
been defined for the
  ' given workspace.

  Dim lngIndex As Long
  Dim cWspConstraint() As cConstraint
  Dim lngConstraintCount As Long
  Dim cTempConstraint As cConstraint

  On Error GoTo ConstraintsForWspErr
  mstrSource = mstrModuleName &
"ConstraintsForWsp"

  lngConstraintCount = 0

  ' Find each element in the constraints
array
  For lngIndex = 0 To
mcarrConstraints.Count - 1
    ' If a constraint type has been specified
then check
    ' if the constraint type for the record
matches the
    ' passed in type
    Set cTempConstraint =
mcarrConstraints(lngIndex)
    If cTempConstraint.WorkspaceId =
lngWorkspaceId And _
        cTempConstraint.IndOperation <>
DeleteOp And _
        (intConstraintType = 0 Or _
        cTempConstraint.ConstraintType
= intConstraintType) Then

      If blnGlobalConstraintsOnly = False
Or _
          (blnGlobalConstraintsOnly And
_
          cTempConstraint.StepId = 0
And _
          cTempConstraint.VersionNo =
gstrMinVersion) Then

        ' We have a matching constraint for
the workspace
        AddArrayElement cWspConstraint,
_
          cTempConstraint,
lngConstraintCount
      End If
    End If
  Next lngIndex

  ' Set the return value of the function to the
array of
  ' constraints that has been built above
  If lngConstraintCount = 0 Then
    ConstraintsForWsp = Empty
  Else
    ConstraintsForWsp = cWspConstraint()
  End If

  ' Sort the constraints
  If blnSort Then
    Call QuickSort(ConstraintsForWsp)
  End If

  Exit Function

ConstraintsForWspErr:
  LogErrors Errors
  On Error GoTo 0
  Err.Raise vbObjectError +
errConstraintsForWspFailed, _
      mstrSource, _

LoadResString(errConstraintsForWspFailed)

End Function
Public Function PreConstraintsForStep( _
    ByVal lngStepId As Long, _
    ByVal strVersionNo As String, _
    Optional ByVal blnSort As Boolean) As
Variant

  ' Returns a variant containing an array of
cConstraint objects,
  ' containing all the pre-execution constraints
that have
  ' been defined for the given step_id and
version

  ' Call a function that will return a variant
containing
  ' all the constraints of the passed in type
  PreConstraintsForStep =
ConstraintsForStep(lngStepId, _
      strVersionNo, gintPreStep, blnSort)

End Function
Public Function PostConstraintsForStep( _
    ByVal lngStepId As Long, _
    ByVal strVersionNo As String, _
    Optional ByVal blnSort As Boolean) As
Variant

  ' Returns a variant containing an array of
cConstraint objects,
  ' containing all the Post-execution
constraints that have
  ' been defined for the given step_id and
version

  ' Call a function that will return a variant
containing
  ' all the constraints of the passed in type
  PostConstraintsForStep =
ConstraintsForStep(lngStepId, _
      strVersionNo, gintPostStep, blnSort)

End Function
Public Function PostConstraintsForWsp( _
    ByVal lngWorkspaceId As Long, _
    Optional ByVal blnSort As Boolean) As
Variant

  ' Returns a variant containing an array of
cConstraint objects,
  ' containing all the Post-execution globals that
have
  ' been defined for the workspace

  ' Call a function that will return a variant
containing
  ' all the constraints of the passed in type
  PostConstraintsForWsp =
ConstraintsForWsp(lngWorkspaceId, _
      gintPostStep, blnSort, True)

End Function
Public Function PreConstraintsForWsp( _
    ByVal lngWorkspaceId As Long, _
    Optional ByVal blnSort As Boolean) As
Variant

  ' Returns a variant containing an array of
cConstraint objects,
  ' containing all the Pre-execution globals that
have
  ' been defined for the workspace

  ' Call a function that will return a variant
containing
  ' all the constraints of the passed in type
  PreConstraintsForWsp =
ConstraintsForWsp(lngWorkspaceId, _
      gintPreStep, blnSort, True)

End Function
Public Property Get ConstraintCount() As Long

  ConstraintCount = mcarrConstraints.Count

End Property

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cArrParameters"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:      cArrParameters.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
'  PURPOSE:   Implements an array of cParameter
objects.
'             Type-safe wrapper around
cNodeCollections.
'             Also contains additional functions to
determine parameter
'             values, validation functions, etc.
'  Contact:   Reshma Tharamal
(reshmat@microsoft.com)
'
```

```
Option Explicit

Private mcarrParameters As
cNodeCollections

' Used to indicate the source module name
when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cArrParameters."

Public Sub InitBuiltInsForRun(lWspId As
Long, lRunId As Long)

   Dim cParamRec As cParameter

   ' Initialize the values of the run_id and
output_dir built-in parameters and save them
   ' to the database
   Set cParamRec =
GetParameterValue(lWspId,
PARAM_RUN_ID)
   cParamRec.ParameterValue =
CStr(lRunId)
   Call Modify(cParamRec)

   Set cParamRec =
GetParameterValue(lWspId,
PARAM_OUTPUT_DIR)
   cParamRec.ParameterValue =
GetDefaultDir(lWspId, Me)
   cParamRec.ParameterValue =
cParamRec.ParameterValue &
gstrFileSeparator & CStr(lRunId)
   Call Modify(cParamRec)

   Call SaveParametersInWsp(lWspId)

End Sub


Public Property Set ParamDatabase(vdata
As Database)

   Set mcarrParameters.NodeDB = vdata

End Property
Public Sub Modify(cModifiedParam As
cParameter)

   ' First check if the parameter record is
valid
   Call
CheckDupParamName(cModifiedParam)

   Call
mcarrParameters.Modify(cModifiedParam)

End Sub
Public Sub Load(ByRef cParamToAdd As
cParameter)

   Call
mcarrParameters.Load(cParamToAdd)

End Sub
Public Sub Add(ByRef cParamToAdd As
cParameter)

   Set cParamToAdd.NodeDB =
mcarrParameters.NodeDB

   ' First check if the parameter record is
valid
   Call Validate(cParamToAdd)

   ' Retrieve a unique parameter identifier
   cParamToAdd.ParameterId =
cParamToAdd.NextIdentifier

   Call mcarrParameters.Add(cParamToAdd)

End Sub

Public Sub Unload(lngParamToDelete As
Long)

   Dim lngDeleteElement As Long

   lngDeleteElement =
QueryIndex(lngParamToDelete)

   Call
mcarrParameters.Unload(lngDeleteElement)

End Sub

Public Sub SaveParametersInWsp(ByVal
lngWorkspace As Long)
   ' Calls a procedure to commit all changes to
the parameters
   ' for the passed in workspace.

   ' Call a procedure to save all parameter
records for the
   ' workspace
   Call mcarrParameters.Save(lngWorkspace)

End Sub
Public Function GetParameterValue(ByVal
lngWorkspace As Long, _
      ByVal strParamName As String) As
cParameter
   ' Returns the value for the passed in
workspace parameter

   Dim cParamRec As cParameter
   Dim lngIndex As Long

   On Error GoTo GetParameterValueErr

   ' Find all parameters in the array with a
matching workspace id
   For lngIndex = 0 To mcarrParameters.Count
- 1
      Set cParamRec =
mcarrParameters(lngIndex)
      If cParamRec.WorkspaceId =
lngWorkspace And _
            cParamRec.ParameterName =
strParamName Then

         Set GetParameterValue = cParamRec
         Exit For
      End If
   Next lngIndex

   If lngIndex > mcarrParameters.Count - 1
Then
      ' The parameter has not been defined for
the workspace
      ' Raise an error
      On Error GoTo 0
      Err.Raise vbObjectError +
errParamNameInvalid, _
            mstrModuleName &
"GetParameterValue", _

LoadResString(errParamNameInvalid)
   End If

   Exit Function

GetParameterValueErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   gstrSource = mstrModuleName &
"GetParameterValue"
   On Error GoTo 0
   Err.Raise vbObjectError +
errGetParamValueFailed, _
         gstrSource, _
         LoadResString(errGetParamValueFailed)

End Function
Public Sub Delete(lngParamToDelete As Long)
   ' Delete the passed in parameter

   Dim lngDeleteElement As Long

   lngDeleteElement =
QueryIndex(lngParamToDelete)
   Call mcarrParameters.Delete(lngDeleteElement)

End Sub
Private Function QueryIndex(lngParameterId As
Long) As Long

   Dim lngIndex As Long

   ' Find the matching parameter record in the array
   For lngIndex = 0 To mcarrParameters.Count - 1
      If mcarrParameters(lngIndex).ParameterId =
lngParameterId And _
            mcarrParameters(lngIndex).IndOperation
<> DeleteOp Then
         QueryIndex = lngIndex
         Exit Function
      End If
   Next lngIndex

   ' Raise error that parameter has not been found
   On Error GoTo 0
   Err.Raise vbObjectError + errParamNotFound,
"cArrParameters.QueryIndex", _
      LoadResString(errParamNotFound)

End Function

Public Function QueryParameter(lngParameterId
As Long) _
      As cParameter

   Dim lngQueryElement As Long

   lngQueryElement = QueryIndex(lngParameterId)

   ' Return the queried parameter object
   Set QueryParameter =
mcarrParameters(lngQueryElement)

End Function
Public Property Get ParameterCount() As Long

   ParameterCount = mcarrParameters.Count

End Property
Public Property Get Item(lngIndex As Long) As
cParameter
Attribute Item.VB_UserMemId = 0

   Set Item = mcarrParameters(lngIndex)

End Property
```

```
Public Sub Validate(ByVal
cParamToValidate As cParameter)
   ' This procedure is necessary since the
class cannot validate
   ' all the parameter properties on it's own.
This is 'coz we
   ' might have created new parameters in
the workspace, but not
   ' saved them to the database yet - hence
the duplicate check
   ' has to be repeated in the array

   Dim lngIndex As Long
   Dim cTempParam As cParameter

   On Error GoTo ValidateErr

   ' Check if the parameter name already
exists in the workspace
   For lngIndex = 0 To
mcarrParameters.Count - 1
      Set cTempParam =
mcarrParameters(lngIndex)
      If cTempParam.WorkspaceId =
cParamToValidate.WorkspaceId And _
            cTempParam.ParameterName =
cParamToValidate.ParameterName And _
            cTempParam.IndOperation <>
DeleteOp Then
         On Error GoTo 0
         Err.Raise vbObjectError +
errDuplicateParameterName, _
            mstrSource,
LoadResString(errDuplicateParameterName
)
      End If
   Next lngIndex

   Exit Sub

ValidateErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"Validate"
   On Error GoTo 0
   Err.Raise vbObjectError +
errValidateFailed, _
      mstrSource,
LoadResString(errValidateFailed)

End Sub
Public Sub CheckDupParamName(ByVal
cParamToValidate As cParameter)

   Dim lngIndex As Long
   Dim cTempParam As cParameter

   ' Check if the parameter name already
exists in the workspace
   For lngIndex = 0 To
mcarrParameters.Count - 1
      Set cTempParam =
mcarrParameters(lngIndex)
      If cTempParam.WorkspaceId =
cParamToValidate.WorkspaceId And _
            cTempParam.ParameterName =
cParamToValidate.ParameterName And _
            cTempParam.ParameterId <>
cParamToValidate.ParameterId And _
            cTempParam.IndOperation <>
DeleteOp Then
         ShowError
errDuplicateParameterName
         On Error GoTo 0
         Err.Raise vbObjectError +
errDuplicateParameterName, _
            mstrSource,
LoadResString(errDuplicateParameterName)
      End If
   Next lngIndex

End Sub

Private Sub Class_Initialize()

   'bugmessage "cArrParameters: Initialize
event - setting parameter count to 0"
   Set mcarrParameters = New
cNodeCollections

End Sub


Private Sub Class_Terminate()

   Set mcarrParameters = Nothing

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cArrSteps"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:      cArrSteps.cls
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:    Implements an array of cStep
objects.
'            Type-safe wrapper around
cNodeCollections.
'            Also contains additional functions to
update parent version
'            on substeps, validation functions, etc.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private mcarrSteps As cNodeCollections

' Used to indicate the source module name
when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cArrSteps."

Public Sub Unload(lngStepToDelete As Long)

   Dim lngDeleteElement As Long
   Dim cUnloadStep As cStep

   lngDeleteElement =
QueryStepIndex(lngStepToDelete)
   Set cUnloadStep =
QueryStep(lngStepToDelete)

   ' First unload all iterators for the step
   Call cUnloadStep.UnloadIterators

   ' Unload the step from the collection
   Call mcarrSteps.Unload(lngDeleteElement)

End Sub
Public Sub Modify(cModifiedStep As cStep)

   Dim iAppend As Integer
   Dim sLabel As String

   On Error GoTo ModifyErr

   iAppend = 0
   sLabel = cModifiedStep.StepLabel

   Validate cModifiedStep

   Call mcarrSteps.Modify(cModifiedStep)

   Exit Sub

ModifyErr:
   ' If the error raised by the add function is due to a
duplication
   ' of the step label, then try to generate a unique
label
   If Err.Number - vbObjectError =
errStepLabelUnique Then
      iAppend = iAppend + 1
      cModifiedStep.StepLabel = sLabel &
CStr(iAppend)
      ' Try to insert the step record again
      Resume
   End If

   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError + errModifyStepFailed,
_
         gstrSource, _
         LoadResString(errModifyStepFailed)

End Sub
Public Sub UpdateParentVersion(ByVal lngStepId
As Long, _
      ByVal strNewVersion As String, _
      ByVal strOldVersion As String, _
      ByVal intStepType As Integer)

   ' Does all the processing needed to update the
parent version
   ' number on all the sub-steps for a given step
   ' It updates the parent version no in the database
for all
   ' sub-steps of the passed in step id
   ' It also updates the parent version number on all
sub-steps
   ' in the array to the new version passed in

   Dim lngIndex As Long
   Dim cUpdateStep As cStep

   On Error GoTo UpdateParentVersionErr

   If intStepType <> gintManagerStep Then
      ' Only a manager can have sub-steps - if the
passed
      ' in step is not a manager, exit
      Exit Sub
   End If

   ' For all steps in the array
   For lngIndex = 0 To mcarrSteps.Count - 1

      Set cUpdateStep = mcarrSteps(lngIndex)
```

```
      ' If the current step is a sub-step of the
passed in step
      If cUpdateStep.ParentStepId =
lngStepId And _
            cUpdateStep.ParentVersionNo =
strOldVersion And _
            Not cUpdateStep.ArchivedFlag
Then

         ' Update the parent version number
for the sub-step
         ' in the array
         cUpdateStep.ParentVersionNo =
strNewVersion

         ' Update the parent version number
for the sub-step
         ' in the array
         Call Modify(cUpdateStep)

      End If
   Next lngIndex

   Exit Sub

UpdateParentVersionErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"UpdateParentVersion"
   On Error GoTo 0
   Err.Raise vbObjectError +
errUpdateParentVersionFailed, _
         mstrSource, _

LoadResString(errUpdateParentVersionFail
ed)

End Sub
Private Sub Validate(cCheckStep As cStep)

   ' Step validations that depend on other
steps in the collection

   Dim lngIndex As Long

   ' Ensure that the step label is unique in the
workspace
   For lngIndex = 0 To mcarrSteps.Count - 1

      ' If the current step is a sub-step of the
passed in step
      If mcarrSteps(lngIndex).WorkspaceId
= cCheckStep.WorkspaceId And _
            mcarrSteps(lngIndex).StepLabel =
cCheckStep.StepLabel And _
            mcarrSteps(lngIndex).StepId <>
cCheckStep.StepId And _

mcarrSteps(lngIndex).IndOperation <>
DeleteOp Then
         On Error GoTo 0
         Err.Raise vbObjectError +
errStepLabelUnique, _
               mstrModuleName &
"Validate", _

LoadResString(errStepLabelUnique)
      End If
   Next lngIndex

End Sub

Public Sub ValidateStep(cCheckStep As
cStep)

   On Error GoTo ValidateStepErr

   'Public wrapper for Validate function (2
many Validates)
   Call Validate(cCheckStep)

   Exit Sub

ValidateStepErr:
   ShowError errStepLabelUnique
   On Error GoTo 0
   Err.Raise vbObjectError +
errValidateFailed, _
         gstrSource, _
         LoadResString(errValidateFailed)
End Sub

Private Sub Class_Initialize()

   BugMessage "cArrSteps: Initialize event -
setting step count to 0"
   Set mcarrSteps = New cNodeCollections

End Sub

Private Sub Class_Terminate()

   BugMessage "cArrSteps: Terminate event
triggered"
   Set mcarrSteps = Nothing

End Sub

Public Sub Add(ByVal cStepToAdd As cStep)

   Dim iAppend As Integer
   Dim sLabel As String

   On Error GoTo AddErr

   iAppend = 0
   sLabel = cStepToAdd.StepLabel

   Set cStepToAdd.NodeDB =
mcarrSteps.NodeDB

   ' Retrieve a unique step identifier
   cStepToAdd.StepId =
cStepToAdd.NextStepId

   Validate cStepToAdd

   ' Call a procedure to add the step record
   Call mcarrSteps.Add(cStepToAdd)

   ' Call a procedure to add all iterators for the
step
   cStepToAdd.AddAllIterators

   Exit Sub

AddErr:
   ' If the error raised by the add function is due
to a duplication
   ' of the step label, then try to generate a
unique label
   If Err.Number - vbObjectError =
errStepLabelUnique Then
      iAppend = iAppend + 1
      cStepToAdd.StepLabel = sLabel &
CStr(iAppend)
      ' Try to insert the step record again
      Resume
   End If
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError + errInsertStepFailed, _
         gstrSource, _
         LoadResString(errInsertStepFailed)

End Sub
Public Sub Load(cStepToLoad As cStep)

   Call mcarrSteps.Load(cStepToLoad)

End Sub
Public Sub SaveStepsInWsp(ByVal lngWorkspace
As Long)
   ' Calls a procedure to commit all changes to the
steps
   ' in the passed in workspace.

   Dim lngIndex As Integer

   ' Find all steps in the array with a matching
workspace id
   ' It is important to step in reverse order through
the array,
   ' since we delete step records sometimes!
   For lngIndex = mcarrSteps.Count - 1 To 0 Step -
1
      If mcarrSteps(lngIndex).WorkspaceId =
lngWorkspace Then

         ' Call a procedure to commit all changes to
the
         ' Step record, if any
         Call CommitStep(mcarrSteps(lngIndex),
lngIndex)

      End If
   Next lngIndex

End Sub
Private Sub CommitStep(ByVal cCommitStep As
cStep, _
      ByVal intIndex As Integer)
   ' This procedure checks if any changes have been
made to the
   ' passed in Step. If so, it calls the step methods to
commit
   ' the changes.

   ' First commit all changes to the iterator records
for
   ' the step
   cCommitStep.SaveIterators

   Call mcarrSteps.Commit(cCommitStep, intIndex)

End Sub
Public Sub Delete(lngStepToDelete As Long)

   Dim lngDeleteElement As Long

   lngDeleteElement =
QueryStepIndex(lngStepToDelete)
   Call mcarrSteps.Delete(lngDeleteElement)

End Sub
Public Function QueryStepIndex(lngStepId As
Long) As Long

   Dim lngIndex As Long

   ' Find the element in the array that corresponds to
the
```

```
    ' passed in step id - note that while there
will be multiple
    ' versions of a step in the database, only
one version will
    ' be currently loaded in the array -
meaning that the stepid
    ' is enough to uniquely identify a step
    For lngIndex = 0 To mcarrSteps.Count - 1
        If mcarrSteps(lngIndex).StepId =
lngStepId Then
            QueryStepIndex = lngIndex
            Exit Function
        End If
    Next lngIndex

    ' Raise error that step has not been found
    On Error GoTo 0
    Err.Raise vbObjectError +
errStepNotFound, mstrSource, _
        LoadResString(errStepNotFound)

End Function

Public Function QueryStep(ByVal lngStepId
As Long) As cStep

    ' Populates the passed in cStep object with
the property
    ' values corresponding to the Step
Identifier, lngStepId

    Dim lngQueryElement As Integer

    lngQueryElement =
QueryStepIndex(lngStepId)

    ' Initialize the passed in step object to the
queried step
    Set QueryStep =
mcarrSteps(lngQueryElement)

End Function
Public Property Get Item(ByVal Position As
Long) As cStep
Attribute Item.VB_UserMemId = 0

    ' Returns the element at the passed in
position in the array
    If Position >= 0 And Position <
mcarrSteps.Count Then
        Set Item = mcarrSteps(Position)
    Else
        On Error GoTo 0
        Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _

LoadResString(errItemDoesNotExist)
    End If

End Property
Public Property Set Item(ByVal Position As
Long, _
        ByVal cStepRec As cStep)

    ' Returns the element at the passed in
position in the array
    If Position >= 0 And Position <
mcarrSteps.Count Then
        Set mcarrSteps(Position) = cStepRec
    Else
        On Error GoTo 0
        Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _

LoadResString(errItemDoesNotExist)
    End If

End Property
Public Property Set StepDB(vdata As
Database)

    Set mcarrSteps.NodeDB = vdata

End Property
Public Function SubSteps(ByVal lngStepId As
Long, _
        ByVal strVersionNo As String) As
Variant

    ' Returns a variant containing an array of all
the substeps
    ' for the passed in step

    Dim intIndex As Integer
    Dim cSubSteps() As cStep
    Dim lngStepCount As Long
    Dim cQueryStep As cStep

    On Error GoTo SubStepsErr

    lngStepCount = 0

    Set cQueryStep = QueryStep(lngStepId)

    ' Only a manager can have sub-steps
    If cQueryStep.StepType = gintManagerStep
Then

        ' For each element in the Steps array
        For intIndex = 0 To mcarrSteps.Count - 1
            ' Check if the parent step id and parent
version number
            ' match the passed in step
            If mcarrSteps(intIndex).ParentStepId =
lngStepId And _

mcarrSteps(intIndex).ParentVersionNo =
strVersionNo And _

mcarrSteps(intIndex).IndOperation <>
DeleteOp Then

                ' Increase the array dimension and
add the step
                ' to it
                ReDim Preserve
cSubSteps(lngStepCount)
                Set cSubSteps(lngStepCount) =
mcarrSteps(intIndex)
                lngStepCount = lngStepCount + 1

            End If
        Next intIndex

    End If

    ' Set the return value of the function to the
array of
    ' Steps that has been built above
    If lngStepCount = 0 Then
        SubSteps = Empty
    Else
        SubSteps = cSubSteps()
    End If

    Exit Function

SubStepsErr:
    LogErrors Errors
    mstrSource = mstrModuleName & "SubSteps"
    On Error GoTo 0
    Err.Raise vbObjectError + errSubStepsFailed, _
            mstrSource, _
            LoadResString(errSubStepsFailed)

End Function

Public Property Get StepCount() As Integer

    StepCount = mcarrSteps.Count

End Property

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cAsyncShell"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'--------------------------------------------------------------------
----------------
' Copyright © 1997 Microsoft Corporation. All
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'
' You have a royalty-free right to use, modify,
reproduce and distribute the
' Sample Application Files (and/or any modified
version) in any way you find
' useful, provided that you agree that Microsoft has
no warranty, obligations or
' liability for any Sample Application Files.
'--------------------------------------------------------------------
----------------

Option Explicit

' Used to indicate the source module name when
errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cAsyncShell."

Public Event Terminated()

Private WithEvents moTimer As cTimerSM
Attribute moTimer.VB_VarHelpID = -1
Private proc As PROCESS_INFORMATION
Private mfShelling As Boolean


'--------------------------------------------------------------------
----------------
'Initialization and cleanup:

Private Sub Class_Initialize()
    Set moTimer = New cTimerSM
End Sub

Private Sub Class_Terminate()
    If mfShelling Then CloseHandle proc.hProcess
End Sub

'--------------------------------------------------------------------
----------------
'Shelling:

Public Sub Shell(CommandLine As String,
Optional PollingInterval As Long = 1000)
    Dim Start As STARTUPINFO
```

```
   If mfShelling Then
      On Error GoTo 0
      Err.Raise vbObjectError +
errInstanceInUse, _
            mstrSource, _
            LoadResString(errInstanceInUse)
   End If
   mfShelling = True

   ' Initialize the STARTUPINFO structure:
   Start.cb = Len(Start)
   Start.dwFlags =
STARTF_USESHOWWINDOW
   Start.wShowWindow =
SW_SHOWMINNOACTIVE

   ' Start the shelled application:
   CreateProcessA 0&, CommandLine, 0&,
0&, 1&, _
      NORMAL_PRIORITY_CLASS, 0&,
0&, Start, proc

   With moTimer
      If PollingInterval > 0 Then
         .Interval = PollingInterval
      Else
         .Interval = 1000
      End If
      .Enabled = True
   End With
End Sub
'-----------------------------------------------------
-------------------------
'Aborting:
Public Sub Abort()
   Dim nCode As Long
'   Dim X As Integer
'   Dim ReturnVal As Integer

   On Error GoTo AbortErr

   If Not mfShelling Then
      Call WriteError(errProgramError,
mstrSource)
   Else
'      If IsWindow(proc.hProcess) = False
Then Exit Sub
'
'      If (GetWindowLong(proc.hProcess,
GWL_STYLE) And WS_DISABLED)
Then Exit Sub
'
'      If IsWindow(proc.hProcess) Then
'         If Not
(GetWindowLong(proc.hProcess,
GWL_STYLE) And WS_DISABLED)
Then
'            X = PostMessage(proc.hProcess,
WM_CANCELMODE, 0, 0&)
'            X = PostMessage(proc.hProcess,
WM_CLOSE, 0, 0&)
'         End If
'      End If

      If TerminateProcess(proc.hProcess,
0&) = 0 Then
         Debug.Print "Unable to terminate
process: " & proc.hProcess
         Call
WriteError(errTerminateProcessFailed,
mstrSource, _
               ApiError(GetLastError()))
      Else
         ' Should always come here!
         GetExitCodeProcess proc.hProcess,
nCode
         If nCode = STILL_ACTIVE Then
            ' Write an error and close the handles
to the
            ' process anyway
            Call
WriteError(errTerminateProcessFailed,
mstrSource)
         End If
      End If

      ' Close all open handles to the shelled
process, even
      ' if any of the above calls error out
      CloseHandle proc.hProcess
      moTimer.Enabled = False
      mfShelling = False
      RaiseEvent Terminated

   End If

   Exit Sub

AbortErr:
   Call LogErrors(Errors)
   mstrSource = mstrModuleName & "Abort"
   On Error GoTo 0
   Err.Raise vbObjectError + errProgramError,
_
      mstrSource, _
      LoadResString(errProgramError)

End Sub
Private Sub moTimer_Timer()
   Dim nCode As Long

   GetExitCodeProcess proc.hProcess, nCode
   If nCode <> STILL_ACTIVE Then
      CloseHandle proc.hProcess
      moTimer.Enabled = False
      mfShelling = False
      RaiseEvent Terminated
   End If
End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cConnDtl"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:       cConnDtl.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    Encapsulates the properties
and methods of a connection.
'             Contains functions to insert, update
and delete
'             connection_dtls records from the
database.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit
Option Base 0

' Local variable(s) to hold property value(s)
Public WorkspaceId As Long
Public ConnNameId As Long
Public ConnName As String
Public ConnectionString As String
Public ConnType As ConnectionType
Public Position As Long
Public NodeDB As Database

Private mintOperation As Operation

' Used to indicate the source module name when
errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cConnDtl."

' The cSequence class is used to generate unique
Connection identifiers
Private mConnectionSeq As cSequence

' The StringSM class is used to carry out string
operations
Private mFieldValue As cStringSM

Private Sub AssignParameters(qyExec As
DAO.QueryDef)
   ' Assigns values to the parameters in the querydef
object
   ' The parameter names are cryptic to differentiate
them from the field names.
   ' When the parameter names are the same as the
field names, parameters in the where
   ' clause do not get created.

   Dim prmParam As DAO.Parameter

   On Error GoTo AssignParametersErr

   For Each prmParam In qyExec.Parameters
      Select Case prmParam.Name
         Case "[w_id]"
            prmParam.Value = WorkspaceId

         Case "[c_id]"
            prmParam.Value = ConnNameId

         Case "[c_name]"
            prmParam.Value = ConnName

         Case "[c_str]"
            prmParam.Value = ConnectionString

         Case "[c_type]"
            prmParam.Value = ConnType

         Case Else
            ' Write the parameter name that is faulty
            WriteError errInvalidParameter,
mstrSource, prmParam.Name
            On Error GoTo 0
            Err.Raise errInvalidParameter,
mstrModuleName & "AssignParameters", _
               LoadResString(errInvalidParameter)
      End Select
   Next prmParam

   Exit Sub

AssignParametersErr:

   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errAssignParametersFailed, _
      mstrModuleName & "AssignParameters",
LoadResString(errAssignParametersFailed)
```

```
End Sub

Public Function Clone() As cConnDtl

   ' Creates a copy of a given Connection

   Dim cCloneConn As cConnDtl

   On Error GoTo CloneErr

   Set cCloneConn = New cConnDtl

   ' Copy all the Connection properties to the
newly created Connection
   cCloneConn.WorkspaceId = WorkspaceId
   cCloneConn.ConnNameId =
ConnNameId
   cCloneConn.ConnName = ConnName
   cCloneConn.ConnectionString =
ConnectionString
   cCloneConn.ConnType = ConnType
   cCloneConn.IndOperation =
mintOperation
   cCloneConn.Position = Position

   ' And set the return value to the newly
created Connection
   Set Clone = cCloneConn
   Set cCloneConn = Nothing

   Exit Function

CloneErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"Clone"
   On Error GoTo 0
   Err.Raise vbObjectError +
errCloneFailed, mstrSource,
LoadResString(errCloneFailed)

End Function
Private Sub CheckDupConnectionName()
   ' Check if the Connection name already
exists in the workspace

   Dim rstConnection As Recordset
   Dim strSql As String
   Dim qy As DAO.QueryDef

   On Error GoTo
CheckDupConnectionNameErr
   mstrSource = mstrModuleName &
"CheckDupConnectionName"

   ' Create a recordset object to retrieve the
count of all Connections
   ' for the workspace with the same name
   strSql = "Select count(*) as
Connection_count " & _
      " from " &
TBL_CONNECTION_DTLS & _
      " where " & FLD_ID_WORKSPACE
& " = [w_id]" & _
      " and " &
FLD_CONN_DTL_CONNECTION_NAM
E & " = [c_name]" & _
      " and " & FLD_ID_CONN_NAME & "
<> [c_id]"

   Set qy =
dbsAttTool.CreateQueryDef(gstrEmptyStrin
g, strSql)
   Call AssignParameters(qy)

   Set rstConnection =
qy.OpenRecordset(dbOpenForwardOnly)

   If rstConnection![Connection_count] > 0
Then
      rstConnection.Close
      qy.Close
      ShowError errDupConnDtlName
      On Error GoTo 0
      Err.Raise vbObjectError +
errDupConnDtlName, _
         mstrSource,
LoadResString(errDupConnDtlName)
   End If

   rstConnection.Close
   qy.Close

   Exit Sub

CheckDupConnectionNameErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"CheckDupConnectionName"
   On Error GoTo 0
   Err.Raise vbObjectError + errProgramError,
_
      mstrSource,
LoadResString(errProgramError)

End Sub
Public Property Let IndOperation(ByVal vdata
As Operation)

   ' The valid operations are define in the
cOperations
   ' class. Check if the operation is valid
   Select Case vdata
      Case QueryOp, InsertOp, UpdateOp,
DeleteOp
         mintOperation = vdata

      Case Else
         BugAssert True
   End Select

End Property
Public Sub Validate()
   ' Each distinct object will have a Validate
method which
   ' will check if the class properties are valid.
This method
   ' will be used to check interdependant
properties that
   ' cannot be validated by the let procedures.
   ' It should be called by the add and modify
methods of the class

   If ConnName = gstrEmptyString Then

      ShowError
errConnectionNameMandatory
      On Error GoTo 0
      ' Propogate this error back to the caller
      Err.Raise vbObjectError +
errConnectionNameMandatory, _
         mstrSource,
LoadResString(errConnectionNameMandatory
)
   End If

   ' Raise an error if the Connection name
already exists in the workspace
   Call CheckDupConnectionName

End Sub
Public Sub Add()

   Dim strInsert As String
   Dim qy As DAO.QueryDef

   On Error GoTo AddErr

   ' Validate the record before trying to insert the
record
   Call Validate

   ' Create a temporary querydef object
   strInsert = "insert into " &
TBL_CONNECTION_DTLS & _
         "( " & FLD_ID_WORKSPACE & _
         ", " & FLD_ID_CONN_NAME & _
         ", " &
FLD_CONN_DTL_CONNECTION_NAME & _
         ", " &
FLD_CONN_DTL_CONNECTION_STRING & _
         ", " &
FLD_CONN_DTL_CONNECTION_TYPE & " ) "
& _
         " values ( [w_id], [c_id], " & _
         " [c_name], [c_str], [c_type] ) "

   Set qy =
dbsAttTool.CreateQueryDef(gstrEmptyString,
strInsert)

   ' Call a procedure to assign the Connection values
   Call AssignParameters(qy)

   qy.Execute dbFailOnError
   qy.Close

   Exit Sub

AddErr:

   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError + errInsertFailed, _
      mstrModuleName & "Add",
LoadResString(errInsertFailed)

End Sub
Public Sub Delete()

   Dim strDelete As String
   Dim qy As DAO.QueryDef

   On Error GoTo DeleteErr

   strDelete = "delete from " &
TBL_CONNECTION_DTLS & _
         " where " & FLD_ID_CONN_NAME & " =
[c_id]"
   Set qy =
dbsAttTool.CreateQueryDef(gstrEmptyString,
strDelete)

   Call AssignParameters(qy)
   qy.Execute dbFailOnError

   qy.Close

   Exit Sub

DeleteErr:
   LogErrors Errors
   On Error GoTo 0
   Err.Raise vbObjectError + errDeleteFailed, _
```

```
        mstrModuleName & "Delete",
LoadResString(errDeleteFailed)

End Sub

Public Sub Modify()

   Dim strUpdate As String
   Dim qy As QueryDef

   On Error GoTo ModifyErr

   ' Validate the updated values before trying
to modify the db
   Call Validate

   ' Create a temporary querydef object with
the modify string
   strUpdate = "update " &
TBL_CONNECTION_DTLS & _
          " set " & FLD_ID_WORKSPACE &
" = [w_id], " & _

FLD_CONN_DTL_CONNECTION_NAM
E & " = [c_name], " & _

FLD_CONN_DTL_CONNECTION_STRI
NG & " = [c_str], " & _

FLD_CONN_DTL_CONNECTION_TYPE
& " = [c_type] " & _
          " where " &
FLD_ID_CONN_NAME & " = [c_id]"
   Set qy =
dbsAttTool.CreateQueryDef(gstrEmptyStrin
g, strUpdate)

   ' Call a procedure to assign the
Connection values to the
   ' querydef object
   Call AssignParameters(qy)
   qy.Execute dbFailOnError

   qy.Close

   Exit Sub

ModifyErr:

   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errModifyFailed, _
      mstrModuleName & "Modify",
LoadResString(errModifyFailed)

End Sub
Public Property Get NextIdentifier() As
Long

   Dim lngNextId As Long

   On Error GoTo NextIdentifierErr

   ' Retrieve the next identifier using the
sequence class
   Set mConnectionSeq = New cSequence
   Set mConnectionSeq.IdDatabase =
dbsAttTool
   mConnectionSeq.IdentifierColumn =
FLD_ID_CONN_NAME
   lngNextId = mConnectionSeq.Identifier
   Set mConnectionSeq = Nothing

   NextIdentifier = lngNextId

   Exit Property

NextIdentifierErr:
   LogErrors Errors
   On Error GoTo 0
   Err.Raise vbObjectError + errIdGetFailed, _
      mstrModuleName & "NextIdentifier",
LoadResString(errIdGetFailed)

End Property
Public Property Get IndOperation() As
Operation

   IndOperation = mintOperation

End Property

Private Sub Class_Initialize()

   Set mFieldValue = New cStringSM

   ' Initialize the operation indicator variable to
Query
   ' It will be modified later by the collection
class when
   ' inserts, updates or deletes are performed
   mintOperation = QueryOp

   ConnType = giDefaultConnType

End Sub

Private Sub Class_Terminate()

   Set mFieldValue = Nothing

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cConnDtls"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:      cConnDtls.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
'  PURPOSE:    Implements an array of
cConnDtl objects.
'             Type-safe wrapper around
cNodeCollections.
'             Also contains additional functions to
determine the connection
'             string value, validation functions, etc.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private mcarrConnDtls As cNodeCollections

' Used to indicate the source module name
when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cConnDtls."

Public Property Set ConnDb(vdata As
Database)

   Set mcarrConnDtls.NodeDB = vdata

End Property
Public Sub Modify(cModifiedConn As cConnDtl)

   ' First check if the parameter record is valid
   Call CheckDupConnName(cModifiedConn)

   Call mcarrConnDtls.Modify(cModifiedConn)

End Sub
Public Sub Load(ByRef cConnToAdd As
cConnDtl)

   Call mcarrConnDtls.Load(cConnToAdd)

End Sub
Public Sub Add(ByRef cConnToAdd As cConnDtl)

   ' First check if the record is valid
   Call Validate(cConnToAdd)

   ' Retrieve a unique identifier
   cConnToAdd.ConnNameId =
cConnToAdd.NextIdentifier

   Call mcarrConnDtls.Add(cConnToAdd)

End Sub

Public Sub Unload(lConnNameId As Long)

   Dim lngDeleteElement As Long

   lngDeleteElement = QueryIndex(lConnNameId)

   Call mcarrConnDtls.Unload(lngDeleteElement)

End Sub

Public Sub SaveConnDtlsInWsp(ByVal
lngWorkspace As Long)
   ' Call a procedure to save all connection details
records for the workspace
   Call mcarrConnDtls.Save(lngWorkspace)

End Sub
Public Function GetConnectionDtl(ByVal
lngWorkspace As Long, _
      ByVal strConnectionName As String) As
cConnDtl
   ' Returns the connection dtl for the passed in
connection name

   Dim lngIndex As Long

   ' Find all parameters in the array with a matching
workspace id
   For lngIndex = 0 To mcarrConnDtls.Count - 1
      If mcarrConnDtls(lngIndex).WorkspaceId =
lngWorkspace And _
            mcarrConnDtls(lngIndex).ConnName =
strConnectionName Then

         Set GetConnectionDtl =
mcarrConnDtls(lngIndex)
         Exit For
      End If
   Next lngIndex

   If lngIndex > mcarrConnDtls.Count - 1 Then
      ' The parameter has not been defined for the
workspace
      ' Raise an error
```

```
      On Error GoTo 0
      Err.Raise vbObjectError +
errConnNameInvalid, mstrModuleName &
"GetConnection", _

LoadResString(errConnNameInvalid)
   End If

End Function
Public Sub Delete(lConnNameId As Long)
   ' Delete the passed in parameter

   Dim lngDeleteElement As Long

   lngDeleteElement =
QueryIndex(lConnNameId)
   Call
mcarrConnDtls.Delete(lngDeleteElement)

End Sub
Private Function QueryIndex(lConnNameId
As Long) As Long

   Dim lngIndex As Long

   ' Find the matching parameter record in
the array
   For lngIndex = 0 To
mcarrConnDtls.Count - 1
      If
mcarrConnDtls(lngIndex).ConnNameId =
lConnNameId And _

mcarrConnDtls(lngIndex).IndOperation <>
DeleteOp Then
         QueryIndex = lngIndex
         Exit Function
      End If
   Next lngIndex

   ' Raise error that parameter has not been
found
   On Error GoTo 0
   Err.Raise vbObjectError +
errQueryIndexFailed,
"cArrParameters.QueryIndex", _
      LoadResString(errQueryIndexFailed)

End Function

Public Function
QueryConnDtl(lConnNameId As Long) As
cConnDtl

   Dim lngQueryElement As Long

   lngQueryElement =
QueryIndex(lConnNameId)

   ' Return the queried connection object
   Set QueryConnDtl =
mcarrConnDtls(lngQueryElement)

End Function
Public Property Get Count() As Long

   Count = mcarrConnDtls.Count

End Property
Public Property Get Item(lngIndex As Long)
As cConnDtl
Attribute Item.VB_UserMemId = 0

   Set Item = mcarrConnDtls(lngIndex)

End Property

Private Sub Validate(ByVal cConnToValidate
As cConnDtl)
   ' This procedure is necessary since the class
cannot validate
   ' all the connection_dtl properties on it's
own. This is 'coz we
   ' might have created new connections in the
workspace, but not
   ' saved them to the database yet - hence the
duplicate check
   ' has to be repeated in the array

   Dim lngIndex As Long
   Dim cTempParam As cConnDtl

   ' Check if the parameter name already exists
in the workspace
   For lngIndex = 0 To mcarrConnDtls.Count -
1
      Set cTempParam =
mcarrConnDtls(lngIndex)
      If cTempParam.WorkspaceId =
cConnToValidate.WorkspaceId And _
            cTempParam.ConnName =
cConnToValidate.ConnName And _
            cTempParam.IndOperation <>
DeleteOp Then
         On Error GoTo 0
         Err.Raise vbObjectError +
errDupConnDtlName, _
            mstrSource,
LoadResString(errDupConnDtlName)
      End If
   Next lngIndex

End Sub
Private Sub CheckDupConnName(ByVal
cConnToValidate As cConnDtl)

   Dim lngIndex As Long
   Dim cTempParam As cConnDtl

   ' Check if the parameter name already exists
in the workspace
   For lngIndex = 0 To mcarrConnDtls.Count -
1
      Set cTempParam =
mcarrConnDtls(lngIndex)
      If cTempParam.WorkspaceId =
cConnToValidate.WorkspaceId And _
            cTempParam.ConnName =
cConnToValidate.ConnName And _
            cTempParam.ConnNameId <>
cConnToValidate.ConnNameId And _
            cTempParam.IndOperation <>
DeleteOp Then
         ShowError errDupConnDtlName
         On Error GoTo 0
         Err.Raise vbObjectError +
errDupConnDtlName, _
            mstrSource,
LoadResString(errDupConnDtlName)
      End If
   Next lngIndex

End Sub

Private Sub Class_Initialize()

   Set mcarrConnDtls = New cNodeCollections

End Sub

Private Sub Class_Terminate()

   Set mcarrConnDtls = Nothing

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cConnection"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cConnection.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Encapsulates the properties and
methods of a connection string.
'              Contains functions to insert, update and
delete
'              workspace_connections records from the
database.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit
Option Base 0

' Local variable(s) to hold property value(s)
Public WorkspaceId As Long
Public ConnectionId As Long
Public ConnectionValue As String
Public Description As String
Public NodeDB As Database
Public Position As Long
Public NoCountDisplay As Boolean
Public NoExecute As Boolean
Public ParseQueryOnly As Boolean
Public QuotedIdentifiers As Boolean
Public AnsiNulls As Boolean
Public ShowQueryPlan As Boolean
Public ShowStatsTime As Boolean
Public ShowStatsIO As Boolean
Public ParseOdbcMsg As Boolean
Public RowCount As Long
Public TsqlBatchSeparator As String
Public QueryTimeOut As Long
Public ServerLanguage As String
Public CharacterTranslation As Boolean
Public RegionalSettings As Boolean

Private mstrConnectionName As String
Private mintOperation As Operation

' Used to indicate the source module name when
errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cConnection."

' The cSequence class is used to generate unique
Connection identifiers
Private mConnectionSeq As cSequence

' The StringSM class is used to carry out string
operations
Private mFieldValue As cStringSM

Private Sub AssignParameters(qyExec As
DAO.QueryDef)
```

```
    ' Assigns values to the parameters in the
querydef object
    ' The parameter names are cryptic to
differentiate them from the field names.
    ' When the parameter names are the same
as the field names, parameters in the where
    ' clause do not get created.

    Dim prmParam As DAO.Parameter

    On Error GoTo AssignParametersErr

    For Each prmParam In
qyExec.Parameters
        Select Case prmParam.Name
            Case "[w_id]"
                prmParam.Value = WorkspaceId

            Case "[c_id]"
                prmParam.Value = ConnectionId

            Case "[c_name]"
                prmParam.Value =
mstrConnectionName

            Case "[c_value]"
                prmParam.Value =
ConnectionValue

            Case "[desc]"
                prmParam.Value = Description

            Case "[no_count]"
                prmParam.Value =
NoCountDisplay

            Case "[no_exec]"
                prmParam.Value = NoExecute

            Case "[parse_only]"
                prmParam.Value =
ParseQueryOnly

            Case "[quoted_id]"
                prmParam.Value =
QuotedIdentifiers

            Case "[a_nulls]"
                prmParam.Value = AnsiNulls

            Case "[show_qp]"
                prmParam.Value =
ShowQueryPlan

            Case "[stats_tm]"
                prmParam.Value =
ShowStatsTime

            Case "[stats_io]"
                prmParam.Value = ShowStatsIO

            Case "[parse_odbc]"
                prmParam.Value = ParseOdbcMsg

            Case "[row_cnt]"
                prmParam.Value = RowCount

            Case "[batch_sep]"
                prmParam.Value =
TsqlBatchSeparator

            Case "[qry_tmout]"
                prmParam.Value = QueryTimeOut

            Case "[lang]"
                prmParam.Value = ServerLanguage

            Case "[char_trans]"
                prmParam.Value =
CharacterTranslation

            Case "[reg_settings]"
                prmParam.Value = RegionalSettings

            Case Else
                ' Write the parameter name that is
faulty
                WriteError errInvalidParameter,
mstrSource, prmParam.Name
                On Error GoTo 0
                Err.Raise errInvalidParameter,
mstrModuleName & "AssignParameters", _

LoadResString(errInvalidParameter)
        End Select
    Next prmParam

    Exit Sub

AssignParametersErr:

    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errAssignParametersFailed, _
        mstrModuleName & "AssignParameters",
LoadResString(errAssignParametersFailed)

End Sub

Public Function Clone() As cConnection

    ' Creates a copy of a given Connection

    Dim cCloneConn As cConnection

    On Error GoTo CloneErr

    Set cCloneConn = New cConnection

    ' Copy all the Connection properties to the
newly
    ' created Connection
    Set cCloneConn.NodeDB = NodeDB
    cCloneConn.WorkspaceId = WorkspaceId
    cCloneConn.ConnectionId = ConnectionId
    cCloneConn.ConnectionName =
mstrConnectionName
    cCloneConn.ConnectionValue =
ConnectionValue
    cCloneConn.Description = Description
    cCloneConn.IndOperation = mintOperation
    cCloneConn.Position = Position
    cCloneConn.NoCountDisplay =
NoCountDisplay
    cCloneConn.NoExecute = NoExecute
    cCloneConn.ParseQueryOnly =
ParseQueryOnly
    cCloneConn.QuotedIdentifiers =
QuotedIdentifiers
    cCloneConn.AnsiNulls = AnsiNulls
    cCloneConn.ShowQueryPlan =
ShowQueryPlan
    cCloneConn.ShowStatsTime =
ShowStatsTime
    cCloneConn.ShowStatsIO = ShowStatsIO
    cCloneConn.ParseOdbcMsg =
ParseOdbcMsg
    cCloneConn.RowCount = RowCount
    cCloneConn.TsqlBatchSeparator =
TsqlBatchSeparator
    cCloneConn.QueryTimeOut = QueryTimeOut
    cCloneConn.ServerLanguage = ServerLanguage
    cCloneConn.CharacterTranslation =
CharacterTranslation
    cCloneConn.RegionalSettings = RegionalSettings

    ' And set the return value to the newly created
Connection
    Set Clone = cCloneConn
    Set cCloneConn = Nothing

    Exit Function

CloneErr:
    LogErrors Errors
    mstrSource = mstrModuleName & "Clone"
    On Error GoTo 0
    Err.Raise vbObjectError + errCloneFailed,
mstrSource, LoadResString(errCloneFailed)

End Function
Private Sub CheckDupConnectionName()
    ' Check if the Connection name already exists in
the workspace

    Dim rstConnection As Recordset
    Dim strSql As String
    Dim qy As DAO.QueryDef

    On Error GoTo CheckDupConnectionNameErr
    mstrSource = mstrModuleName &
"CheckDupConnectionName"

    ' Create a recordset object to retrieve the count of
all Connections
    ' for the workspace with the same name
    strSql = "Select count(*) as Connection_count "
& _
        " from workspace_connections " & _
        " where workspace_id = [w_id]" & _
        " and connection_name = [c_name]" & _
        " and connection_id <> [c_id]"

    Set qy =
NodeDB.CreateQueryDef(gstrEmptyString, strSql)
    Call AssignParameters(qy)

    Set rstConnection =
qy.OpenRecordset(dbOpenForwardOnly)

    If rstConnection![Connection_count] > 0 Then
        rstConnection.Close
        qy.Close
        ShowError errDuplicateConnectionName
        On Error GoTo 0
        Err.Raise vbObjectError +
errDuplicateConnectionName, _
            mstrSource,
LoadResString(errDuplicateConnectionName)
    End If

    rstConnection.Close
    qy.Close

    Exit Sub

CheckDupConnectionNameErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"CheckDupConnectionName"
    On Error GoTo 0
    Err.Raise vbObjectError + errProgramError, _
        mstrSource, LoadResString(errProgramError)
```

```
End Sub
Private Sub CheckDB()
   ' Check if the database object has been
initialized

   If NodeDB Is Nothing Then
      On Error GoTo 0
      Err.Raise vbObjectError +
errInvalidDB, _
         mstrModuleName & "CheckDB",
LoadResString(errInvalidDB)
   End If

End Sub
Public Property Let ConnectionName(vdata
As String)

   If vdata = gstrEmptyString Then

      ShowError
errConnectionNameMandatory
      On Error GoTo 0
      ' Propogate this error back to the caller
      Err.Raise vbObjectError +
errConnectionNameMandatory, _
         mstrSource,
LoadResString(errConnectionNameMandato
ry)
   Else
      mstrConnectionName = vdata
   End If

End Property

Public Property Let IndOperation(ByVal
vdata As Operation)

   ' The valid operations are define in the
cOperations
   ' class. Check if the operation is valid
   Select Case vdata
      Case QueryOp, InsertOp, UpdateOp,
DeleteOp
         mintOperation = vdata

      Case Else
         BugAssert True
   End Select

End Property
Public Sub Validate()
   ' Each distinct object will have a Validate
method which
   ' will check if the class properties are
valid. This method
   ' will be used to check interdependant
properties that
   ' cannot be validated by the let
procedures.
   ' It should be called by the add and
modify methods of the class

   ' Check if the db object is valid
   Call CheckDB

   ' Raise an error if the Connection name
already exists in the workspace
   Call CheckDupConnectionName

End Sub
Public Sub Add()

   Dim strInsert As String
   Dim qy As DAO.QueryDef

   On Error GoTo AddErr

   ' Validate the record before trying to insert
the record
   Call Validate

   ' Create a temporary querydef object
   strInsert = "insert into
workspace_connections " & _
         "( workspace_id, connection_id, " & _
         "connection_name, connection_value,
" & _
         "description, no_count_display, " & _
         "no_execute, parse_query_only, " & _
         "ANSI_quoted_identifiers,
ANSI_nulls, " & _
         "show_query_plan, show_stats_time, "
& _
         "show_stats_io,
parse_odbc_msg_prefixes, " & _
         "row_count, tsql_batch_separator, " &
_
         "query_time_out, server_language, " &
_
         "character_translation,
regional_settings ) " & _
         " values ( [w_id], [c_id], [c_name],
[c_value], " & _
         " [desc], [no_count], [no_exec],
[parse_only], " & _
         " [quoted_id], [a_nulls], [show_qp],
[stats_tm], " & _
         " [stats_io], [parse_odbc], [row_cnt],
[batch_sep], " & _
         " [qry_tmout], [lang], [char_trans],
[reg_settings] ) "

   Set qy =
NodeDB.CreateQueryDef(gstrEmptyString,
strInsert)

   ' Call a procedure to assign the Connection
values
   Call AssignParameters(qy)

   qy.Execute dbFailOnError
   qy.Close

   Exit Sub

AddErr:

   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError + errInsertFailed, _
      mstrModuleName & "Add",
LoadResString(errInsertFailed)

End Sub
Public Sub Delete()

   Dim strDelete As String
   Dim qy As DAO.QueryDef

   On Error GoTo DeleteErr

   ' Check if the db object is valid
   Call CheckDB

   strDelete = "delete from
workspace_connections " & _
         " where connection_id = [c_id]"

   Set qy =
NodeDB.CreateQueryDef(gstrEmptyString,
strDelete)

   Call AssignParameters(qy)
   qy.Execute dbFailOnError

   qy.Close

   Exit Sub

DeleteErr:
   LogErrors Errors
   On Error GoTo 0
   Err.Raise vbObjectError + errDeleteFailed, _
         mstrModuleName & "Delete",
LoadResString(errDeleteFailed)

End Sub

Public Sub Modify()

   Dim strUpdate As String
   Dim qy As QueryDef

   On Error GoTo ModifyErr

   ' Validate the updated values before trying to
modify the db
   Call Validate

   ' Create a temporary querydef object with the
modify string
   strUpdate = "update workspace_connections " &
_
         " set workspace_id = [w_id], " & _
         "connection_name = [c_name], " & _
         "connection_value = [c_value], " & _
         "description = [desc], " & _
         "no_count_display = [no_count], " & _
         "no_execute = [no_exec], " & _
         "parse_query_only = [parse_only], " & _
         "ANSI_quoted_identifiers = [quoted_id], "
& _
         "ANSI_nulls = [a_nulls], " & _
         "show_query_plan = [show_qp], " & _
         "show_stats_time = [stats_tm], " & _
         "show_stats_io = [stats_io], " & _
         "parse_odbc_msg_prefixes = [parse_odbc],
" & _
         "row_count = [row_cnt], " & _
         "tsql_batch_separator = [batch_sep], " & _
         "query_time_out = [qry_tmout], " & _
         "server_language = [lang], " & _
         "character_translation = [char_trans], " & _
         "regional_settings = [reg_settings] " & _
         " where connection_id = [c_id]"
   Set qy =
NodeDB.CreateQueryDef(gstrEmptyString,
strUpdate)

   ' Call a procedure to assign the Connection values
to the
   ' querydef object
   Call AssignParameters(qy)
   qy.Execute dbFailOnError

   qy.Close

   Exit Sub

ModifyErr:

   Call LogErrors(Errors)
   On Error GoTo 0
```

```
    Err.Raise vbObjectError +
errModifyFailed, _
        mstrModuleName & "Modify",
LoadResString(errModifyFailed)

End Sub
Public Property Get ConnectionName() As
String

    ConnectionName = mstrConnectionName

End Property

Public Property Get NextIdentifier() As
Long

    Dim lngNextId As Long

    On Error GoTo NextIdentifierErr

    ' First check if the database object is valid
    Call CheckDB

    ' Retrieve the next identifier using the
sequence class
    Set mConnectionSeq = New cSequence
    Set mConnectionSeq.IdDatabase =
NodeDB
    mConnectionSeq.IdentifierColumn =
"connection_id"
    lngNextId = mConnectionSeq.Identifier
    Set mConnectionSeq = Nothing

    NextIdentifier = lngNextId
    Exit Property

NextIdentifierErr:
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError + errIdGetFailed,
_
        mstrModuleName & "NextIdentifier",
LoadResString(errIdGetFailed)

End Property
Public Property Get IndOperation() As
Operation

    IndOperation = mintOperation

End Property

Private Sub Class_Initialize()

    Set mFieldValue = New cStringSM

    ' Initialize the operation indicator variable
to Query
    ' It will be modified later by the collection
class when
    ' inserts, updates or deletes are performed
    mintOperation = QueryOp

    ' Initialize connection properties to their
default values
    NoCountDisplay =
DEF_NO_COUNT_DISPLAY
    NoExecute = DEF_NO_EXECUTE
    ParseQueryOnly =
DEF_PARSE_QUERY_ONLY
    QuotedIdentifiers =
DEF_ANSI_QUOTED_IDENTIFIERS
     AnsiNulls = DEF_ANSI_NULLS
    ShowQueryPlan =
DEF_SHOW_QUERY_PLAN
    ShowStatsTime =
DEF_SHOW_STATS_TIME
    ShowStatsIO = DEF_SHOW_STATS_IO
    ParseOdbcMsg =
DEF_PARSE_ODBC_MSG_PREFIXES
    RowCount = DEF_ROW_COUNT
    TsqlBatchSeparator =
DEF_TSQL_BATCH_SEPARATOR
    QueryTimeOut =
DEF_QUERY_TIME_OUT
    ServerLanguage =
DEF_SERVER_LANGUAGE
    CharacterTranslation =
DEF_CHARACTER_TRANSLATION
    RegionalSettings =
DEF_REGIONAL_SETTINGS

End Sub

Private Sub Class_Terminate()

    Set NodeDB = Nothing
    Set mFieldValue = Nothing

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cConnections"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:      cConnections.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
'  PURPOSE:    Implements an array of
cConnection objects.
'             Type-safe wrapper around
cNodeCollections.
'             Also contains validation functions,
etc.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private mcarrConnections As
cNodeCollections

' Used to indicate the source module name
when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cConnections."

Public Property Set ConnDb(vdata As
Database)

    Set mcarrConnections.NodeDB = vdata

End Property
Public Sub Modify(cModifiedConn As
cConnection)

    ' First check if the parameter record is valid
    Call CheckDupConnName(cModifiedConn)

    Call
mcarrConnections.Modify(cModifiedConn)

End Sub
Public Sub Load(ByRef cConnToAdd As
cConnection)

    Call mcarrConnections.Load(cConnToAdd)

End Sub
Public Sub Add(ByRef cConnToAdd As
cConnection)

    Set cConnToAdd.NodeDB =
mcarrConnections.NodeDB

    ' First check if the record is valid
    Call Validate(cConnToAdd)

    ' Retrieve a unique identifier
    cConnToAdd.ConnectionId =
cConnToAdd.NextIdentifier

    Call mcarrConnections.Add(cConnToAdd)

End Sub

Public Sub Unload(lngConnId As Long)

    Dim lngDeleteElement As Long

    lngDeleteElement = QueryIndex(lngConnId)

    Call
mcarrConnections.Unload(lngDeleteElement)

End Sub

Public Sub SaveConnectionsInWsp(ByVal
lngWorkspace As Long)
    ' Call a procedure to save all connection records
for the workspace
    Call mcarrConnections.Save(lngWorkspace)

End Sub
Public Function GetConnection(ByVal
lngWorkspace As Long, _
        ByVal strConnectionName As String) As
cConnection
    ' Returns the connection string for the passed in
connection name

    Dim lngIndex As Long

    ' Find all parameters in the array with a matching
workspace id
    For lngIndex = 0 To mcarrConnections.Count - 1
        If mcarrConnections(lngIndex).WorkspaceId =
lngWorkspace And _

mcarrConnections(lngIndex).ConnectionName =
strConnectionName Then

            Set GetConnection =
mcarrConnections(lngIndex)
            Exit For
        End If
    Next lngIndex

    If lngIndex > mcarrConnections.Count - 1 Then
        ' The parameter has not been defined for the
workspace
        ' Raise an error
        On Error GoTo 0
        Err.Raise vbObjectError +
errConnNameInvalid, mstrModuleName &
"GetConnection", _
```

```
LoadResString(errConnNameInvalid)
   End If

End Function
Public Sub Delete(lngConnId As Long)
   ' Delete the passed in parameter

   Dim lngDeleteElement As Long

   lngDeleteElement =
QueryIndex(lngConnId)
   Call
mcarrConnections.Delete(lngDeleteElement
)

End Sub
Private Function QueryIndex(lngConnId As
Long) As Long

   Dim lngIndex As Long

   ' Find the matching parameter record in
the array
   For lngIndex = 0 To
mcarrConnections.Count - 1
      If
mcarrConnections(lngIndex).ConnectionId
= lngConnId And _

mcarrConnections(lngIndex).IndOperation
<> DeleteOp Then
         QueryIndex = lngIndex
         Exit Function
      End If
   Next lngIndex

   ' Raise error that parameter has not been
found
   On Error GoTo 0
   Err.Raise vbObjectError +
errQueryIndexFailed,
"cArrParameters.QueryIndex", _
      LoadResString(errQueryIndexFailed)

End Function

Public Function
QueryConnection(lngConnId As Long) As
cConnection

   Dim lngQueryElement As Long

   lngQueryElement =
QueryIndex(lngConnId)

   ' Return the queried connection object
   Set QueryConnection =
mcarrConnections(lngQueryElement)

End Function
Public Property Get Count() As Long

   Count = mcarrConnections.Count

End Property
Public Property Get Item(lngIndex As Long)
As cConnection
Attribute Item.VB_UserMemId = 0

   Set Item = mcarrConnections(lngIndex)

End Property

Public Sub Validate(ByVal cConnToValidate
As cConnection)
   ' This procedure is necessary since the class
cannot validate
   ' all the parameter properties on it's own.
This is 'coz we
   ' might have created new parameters in the
workspace, but not
   ' saved them to the database yet - hence the
duplicate check
   ' has to be repeated in the array

   Dim lngIndex As Long
   Dim cTempParam As cConnection

   ' Check if the parameter name already exists
in the workspace
   For lngIndex = 0 To
mcarrConnections.Count - 1
      Set cTempParam =
mcarrConnections(lngIndex)
      If cTempParam.WorkspaceId =
cConnToValidate.WorkspaceId And _
         cTempParam.ConnectionName =
cConnToValidate.ConnectionName And _
         cTempParam.IndOperation <>
DeleteOp Then
         On Error GoTo 0
         Err.Raise vbObjectError +
errDuplicateConnectionName, _
         mstrSource,
LoadResString(errDuplicateConnectionName)
      End If
   Next lngIndex

End Sub
Public Sub CheckDupConnName(ByVal
cConnToValidate As cConnection)

   Dim lngIndex As Long
   Dim cTempParam As cConnection

   ' Check if the parameter name already exists
in the workspace
   For lngIndex = 0 To
mcarrConnections.Count - 1
      Set cTempParam =
mcarrConnections(lngIndex)
      If cTempParam.WorkspaceId =
cConnToValidate.WorkspaceId And _
         cTempParam.ConnectionName =
cConnToValidate.ConnectionName And _
         cTempParam.ConnectionId <>
cConnToValidate.ConnectionId And _
         cTempParam.IndOperation <>
DeleteOp Then
         ShowError
errDuplicateConnectionName
         On Error GoTo 0
         Err.Raise vbObjectError +
errDuplicateConnectionName, _
         mstrSource,
LoadResString(errDuplicateConnectionName)
      End If
   Next lngIndex

End Sub

Private Sub Class_Initialize()

   Set mcarrConnections = New
cNodeCollections

End Sub

Private Sub Class_Terminate()

   Set mcarrConnections = Nothing

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cConstraint"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cConstraint.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Encapsulates the properties and
methods of a constraint.
'              Contains functions to insert, update and
delete
'              step_constraints records from the
database.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Module level variables to store the property values
Private mlngConstraintId As Long
Private mlngStepId As Long
Private mstrVersionNo As String
Private mintConstraintType As Integer
Private mlngGlobalStepId As Long
Private mstrGlobalVersionNo As String
Private mintSequenceNo As Integer
Private mdbsConstraintDB As Database
Private mlngWorkspaceId As Integer
Private mintOperation As Operation
Private mlngPosition As Long

' The cSequence class is used to generate unique
step identifiers
Private mConstraintSeq As cSequence

Private Const mstrModuleName As String =
".cConstraint."
Private mstrSource As String

Public Enum ConstraintType
   gintPreStep = 1
   gintPostStep = 2
End Enum

Private Const mstrSQ As String = """
Public Property Get WorkspaceId() As Long
   WorkspaceId = mlngWorkspaceId
End Property
Public Property Let WorkspaceId(ByVal vdata As
Long)
   mlngWorkspaceId = vdata
End Property

Public Property Get IndOperation() As Operation

   IndOperation = mintOperation

End Property
Public Property Let IndOperation(ByVal vdata As
Operation)

   On Error GoTo IndOperationErr
```

```
    mstrSource = mstrModuleName &
"IndOperation"

    ' The valid operations are define in the
cOperations
    ' class. Check if the operation is valid
    Select Case vdata
        Case QueryOp, InsertOp, UpdateOp,
DeleteOp
            mintOperation = vdata

        Case Else
            On Error GoTo 0
            Err.Raise vbObjectError +
errInvalidOperation, _
                mstrSource,
LoadResString(errInvalidOperation)
    End Select

    Exit Property

IndOperationErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"IndOperation"
    On Error GoTo 0
    Err.Raise vbObjectError +
errLetOperationFailed, _
        mstrSource,
LoadResString(errLetOperationFailed)

End Property

Public Function Clone() As cConstraint

    ' Creates a copy of a given constraint

    Dim cConsClone As cConstraint

    On Error GoTo CloneErr
    mstrSource = mstrModuleName &
"Clone"

    Set cConsClone = New cConstraint

    ' Copy all the workspace properties to the
newly
    ' created workspace
    cConsClone.ConstraintId =
mlngConstraintId
    cConsClone.StepId = mlngStepId
    cConsClone.VersionNo = mstrVersionNo
    cConsClone.ConstraintType =
mintConstraintType
    cConsClone.GlobalStepId =
mlngGlobalStepId
    cConsClone.GlobalVersionNo =
mstrGlobalVersionNo
    cConsClone.SequenceNo =
mintSequenceNo
    cConsClone.WorkspaceId =
mlngWorkspaceId
    cConsClone.IndOperation =
mintOperation

    ' And set the return value to the newly
created constraint
    Set Clone = cConsClone

    Exit Function

CloneErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"Clone"
    On Error GoTo 0
    Err.Raise vbObjectError + errCloneFailed, _
        mstrSource,
LoadResString(errCloneFailed)

End Function

Public Property Get SequenceNo() As Integer

    SequenceNo = mintSequenceNo

End Property

Public Property Let SequenceNo(ByVal vdata
As Integer)
    mintSequenceNo = vdata
End Property

Public Sub Add()
    ' Inserts a new step constraint into the
database

    Dim strInsert As String
    Dim qy As DAO.QueryDef

    On Error GoTo AddErr

    ' First check if the database object is valid
    Call CheckDB

    ' Any record validations
    Call Validate

    ' Create a temporary querydef object
    strInsert = "insert into step_constraints " & _
            "( constraint_id, step_id, version_no, "
& _
            " constraint_type, global_step_id,
global_version_no, sequence_no ) " & _
            " values ( [cons_id], [s_id], [ver_no], "
& _
            " [cons_type], [g_step_id], [g_ver_no],
" & _
            " [seq_no] )"
    Set qy =
mdbsConstraintDB.CreateQueryDef(gstrEmpt
yString, strInsert)

    ' Call a procedure to execute the Querydef
object
    Call AssignParameters(qy)

    qy.Execute dbFailOnError
    qy.Close

'    strInsert = "insert into step_constraints " &
_
'        "( constraint_id, step_id, version_no, " &
_
'        " constraint_type, global_step_id,
global_version_no, sequence_no ) " & _
'        " values ( " & _
'        Str(mlngConstraintId) & ", " &
Str(mlngStepId) & ", " & _
'        mstrSQ & mstrVersionNo & mstrSQ & ",
" & Str(mintConstraintType) & ", " & _
'        Str(mlngGlobalStepId) & ", " & mstrSQ
& mstrGlobalVersionNo & mstrSQ & ", " & _
'        Str(mintSequenceNo) & " ) "
'
'    BugMessage strInsert
'    mdbsConstraintDB.Execute strInsert,
dbFailOnError
    Exit Sub

AddErr:
    LogErrors Errors
    mstrSource = mstrModuleName & "Add"
    On Error GoTo 0
    Err.Raise vbObjectError +
errAddConstraintFailed, _
        mstrSource, _
        LoadResString(errAddConstraintFailed)
End Sub
Private Sub AssignParameters(qyExec As
DAO.QueryDef)
    ' Assigns values to the parameters in the querydef
object
    ' The parameter names are cryptic to make them
different
    ' from the field names. When the parameter
names are
    ' the same as the field names, parameters in the
where
    ' clause do not get created.

    Dim prmParam As DAO.Parameter

    On Error GoTo AssignParametersErr
    mstrSource = mstrModuleName &
"AssignParameters"

    For Each prmParam In qyExec.Parameters
        Select Case prmParam.Name
            Case "[cons_id]"
                prmParam.Value = mlngConstraintId

            Case "[s_id]"
                prmParam.Value = mlngStepId

            Case "[ver_no]"
                prmParam.Value = mstrVersionNo

            Case "[cons_type]"
                prmParam.Value = mintConstraintType

            Case "[g_step_id]"
                prmParam.Value = mlngGlobalStepId

            Case "[g_ver_no]"
                prmParam.Value = mstrGlobalVersionNo

            Case "[seq_no]"
                prmParam.Value = mintSequenceNo

            Case Else
                ' Write the parameter name that is faulty
                WriteError errInvalidParameter,
mstrSource, _
                    prmParam.Name
                On Error GoTo 0
                Err.Raise errInvalidParameter,
mstrSource, _
                    LoadResString(errInvalidParameter)
        End Select
    Next prmParam

    Exit Sub

AssignParametersErr:

    mstrSource = mstrModuleName &
"AssignParameters"
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errAssignParametersFailed, _
        mstrSource,
LoadResString(errAssignParametersFailed)
```

```
End Sub
Public Property Get NextIdentifier() As
Long

   Dim lngNextId As Long

   On Error GoTo NextIdentifierErr

   ' First check if the database object is valid
   Call CheckDB

   ' Retrieve the next constraint identifier
using the
   ' sequence class
   Set mConstraintSeq = New cSequence
   Set mConstraintSeq.IdDatabase =
mdbsConstraintDB
   mConstraintSeq.IdentifierColumn =
"constraint_id"
   lngNextId = mConstraintSeq.Identifier
   Set mConstraintSeq = Nothing

   NextIdentifier = lngNextId
   Exit Property

NextIdentifierErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"NextIdentifier"
   On Error GoTo 0
   Err.Raise vbObjectError +
errStepIdGetFailed, _
      mstrSource,
LoadResString(errStepIdGetFailed)

End Property

Private Sub CheckDB()
   ' Check if the database object has been
initialized

   If mdbsConstraintDB Is Nothing Then
      ShowError errInvalidDB
      On Error GoTo 0
      Err.Raise vbObjectError +
errInvalidDB, _
         mstrModuleName,
LoadResString(errInvalidDB)
   End If

End Sub

Public Sub Delete()
   ' Deletes the step constraint record from
the database

   Dim strDelete As String
   Dim qy As DAO.QueryDef

   On Error GoTo DeleteErr
   mstrSource = mstrModuleName &
"Delete"

   ' There can be multiple constraints for a
step,
   ' meaning that there can be multiple
constraint records
   ' with the same constraint_id. Only a
combination
   ' of the step_id, version and constraint_id
will be
   ' unique
   strDelete = "delete from step_constraints
" & _
         " where constraint_id = [cons_id]" & _
         " and step_id = [s_id] " & _
         " and version_no = [ver_no] "
   Set qy =
mdbsConstraintDB.CreateQueryDef(gstrEmpt
yString, strDelete)

   Call AssignParameters(qy)
   qy.Execute dbFailOnError

   qy.Close

'   strDelete = "Delete from step_constraints "
& _
'         " where constraint_id = " &
Str(mlngConstraintId) & _
'         " and step_id = " & Str(mlngStepId) &
_
'         " and version_no = " & mstrSQ &
mstrVersionNo & mstrSQ
'
'   'BugMessage strDelete
'   mdbsConstraintDB.Execute strDelete,
dbFailOnError

   Exit Sub

DeleteErr:
   LogErrors Errors
   mstrSource = mstrModuleName & "Delete"
   On Error GoTo 0
   Err.Raise vbObjectError +
errDeleteConstraintFailed, _
         mstrSource, _

LoadResString(errDeleteConstraintFailed)
End Sub
Public Sub Modify()
   ' Updates the sequence no of the step
constraint record
   ' in the database

   Dim strUpdate As String
   Dim qy As QueryDef

   On Error GoTo Modify

   ' First check if the database object is valid
   Call CheckDB

   ' Any record validations
   Call Validate

   ' There can be multiple constraints for a step,
   ' meaning that there can be multiple
constraint records
   ' with the same constraint_id. Only a
combination
   ' of the step_id, version and constraint_id
will be
   ' unique
   ' Create a temporary querydef object with
the modify string
   strUpdate = "Update step_constraints " & _
         " set sequence_no = [seq_no] " & _
         " where constraint_id = [cons_id] " & _
         " and step_id = [s_id] " & _
         " and version_no = [ver_no] "
   Set qy =
mdbsConstraintDB.CreateQueryDef(gstrEmpt
yString, strUpdate)

   ' Call a procedure to assign the parameter
values to the
   ' querydef object
   Call AssignParameters(qy)
   qy.Execute dbFailOnError

   qy.Close

'   strUpdate = "Update step_constraints " & _
'         " set sequence_no = " &
Str(mintSequenceNo) & _
'         " where constraint_id = " &
Str(mlngConstraintId) & _
'         " and step_id = " & Str(mlngStepId) & _
'         " and version_no = " & mstrSQ &
mstrVersionNo & mstrSQ
'
'   'BugMessage strUpdate
'   mdbsConstraintDB.Execute strUpdate,
dbFailOnError
   Exit Sub

Modify:
   LogErrors Errors
   mstrSource = mstrModuleName & "Modify"
   On Error GoTo 0
   Err.Raise vbObjectError +
errUpdateConstraintFailed, _
         mstrSource, _
         LoadResString(errUpdateConstraintFailed)
End Sub
Public Property Get Position() As Long

   Position = mlngPosition

End Property
Public Property Let Position(ByVal RHS As Long)

   mlngPosition = RHS

End Property

Public Sub Validate()
   ' Each distinct object will have a Validate method
which
   ' will check if the class properties are valid. This
method
   ' will be used to check interdependant properties
that
   ' cannot be validated by the let procedures.
   ' It should be called by the add and modify
methods of the class

   ' No validations are necessary for the constraint
object

End Sub

Public Property Set NodeDB(vdata As Database)

   Set mdbsConstraintDB = vdata

End Property

Public Property Get NodeDB() As Database

   Set NodeDB = mdbsConstraintDB

End Property

Public Property Get GlobalVersionNo() As String

   GlobalVersionNo = mstrGlobalVersionNo

End Property

Public Property Let GlobalVersionNo(ByVal vdata
As String)
```

```
    mstrGlobalVersionNo = vdata

End Property

Public Property Get GlobalStepId() As Long

    GlobalStepId = mlngGlobalStepId

End Property

Public Property Get ConstraintId() As Long

    ConstraintId = mlngConstraintId

End Property

Public Property Get VersionNo() As String

    VersionNo = mstrVersionNo

End Property

Public Property Get StepId() As Long

    StepId = mlngStepId

End Property

Public Property Let VersionNo(ByVal vdata
As String)

    mstrVersionNo = vdata

End Property

Public Property Let StepId(ByVal vdata As
Long)

    mlngStepId = vdata

End Property

Public Property Let ConstraintId(ByVal
vdata As Long)
    On Error GoTo ConstraintIdErr
    mstrSource = mstrModuleName &
"ConstraintId"

    If (vdata > 0) Then
        mlngConstraintId = vdata
    Else
        ' Propogate this error back to the caller
        On Error GoTo 0
        Err.Raise vbObjectError +
errConstraintIdInvalid, _
            mstrSource,
LoadResString(errConstraintIdInvalid)
    End If

    Exit Property

ConstraintIdErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"ConstraintId"
    On Error GoTo 0
    Err.Raise vbObjectError +
errConstraintIdSetFailed, _
        mstrSource,
LoadResString(errConstraintIdSetFailed)

End Property

Public Property Let GlobalStepId(ByVal vdata
As Long)

    On Error GoTo GlobalStepIdErr
    mstrSource = mstrModuleName &
"GlobalStepId"

    If (vdata > 0) Then
        mlngGlobalStepId = vdata
    Else
        ' Propogate this error back to the caller
        On Error GoTo 0
        Err.Raise vbObjectError +
errGlobalStepIdInvalid, _
            mstrSource,
LoadResString(errGlobalStepIdInvalid)
    End If

    Exit Property

GlobalStepIdErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"GlobalStepId"
    On Error GoTo 0
    Err.Raise vbObjectError +
errGlobalStepIdSetFailed, _
        mstrSource,
LoadResString(errGlobalStepIdSetFailed)

End Property

Public Property Let ConstraintType(ByVal
vdata As ConstraintType)

    On Error GoTo ConstraintTypeErr

    ' A global step can be either a pre- or a post-
execution step.
    ' These constants have been defined in the
enumeration,
    ' ConstraintType, which is exposed
    Select Case vdata
        Case gintPreStep, gintPostStep
            mintConstraintType = vdata

        Case Else
            On Error GoTo 0
            Err.Raise vbObjectError +
errConstraintTypeInvalid, _
                mstrSource,
LoadResString(errConstraintTypeInvalid)
    End Select

    Exit Property

ConstraintTypeErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"ConstraintType"
    On Error GoTo 0
    Err.Raise vbObjectError +
errConstraintTypeLetFailed, _
        mstrSource,
LoadResString(errConstraintTypeLetFailed)

End Property

Public Property Get ConstraintType() As
ConstraintType

    ConstraintType = mintConstraintType

End Property

Private Sub Class_Initialize()

    ' Initialize the operation indicator variable to
Query
    ' It will be modified later by the collection class
when
    ' inserts, updates or deletes are performed
    mintOperation = QueryOp

End Sub


VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cFailedStep"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:        cFailedStep.cls
'               Microsoft TPC-H Kit Ver. 1.00
'               Copyright Microsoft, 1999
'               All Rights Reserved
'
'
'  PURPOSE:     Properties of a step execution
failure.
'  Contact:     Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Public InstanceId As Long
Public StepId As Long
Public ParentStepId As Long
Public ContCriteria As ContinuationCriteria
Public EndTime As Currency
Public AskResponse As Long
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cFailedSteps"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:        cFailedSteps.cls
'               Microsoft TPC-H Kit Ver. 1.00
'               Copyright Microsoft, 1999
'               All Rights Reserved
'
'
'  PURPOSE:     This module encapsulates a
collection of failed steps. It
'               also determines whether sub-steps of a
passed in step need
'               to be skipped due to a failure.
'  Contact:     Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private mcFailedSteps As cVector
Public Function ExecuteSubStep(lParentStepId As
Long) As Boolean
    ' Returns False if there is any condition that
prevents sub-steps of the passed
    ' in instance from being executed
    Dim lIndex As Long

    ExecuteSubStep = True
```

```
    For lIndex = 0 To Count() - 1
        If mcFailedSteps(lIndex).ContCriteria
= gintOnFailureCompleteSiblings And _
                lParentStepId <>
mcFailedSteps(lIndex).ParentStepId Then
            ExecuteSubStep = False
            Exit For
        End If

        If mcFailedSteps(lIndex).ContCriteria
= gintOnFailureAbortSiblings And _
                lParentStepId =
mcFailedSteps(lIndex).ParentStepId Then
            ExecuteSubStep = False
            Exit For
        End If

        If mcFailedSteps(lIndex).ContCriteria
= gintOnFailureSkipSiblings And _
                lParentStepId =
mcFailedSteps(lIndex).ParentStepId Then
            ExecuteSubStep = False
            Exit For
        End If

        If mcFailedSteps(lIndex).ContCriteria
= gintOnFailureAbort Then
            ExecuteSubStep = False
            Exit For
        End If

    Next lIndex

End Function
Public Sub Add(ByVal objItem As
cFailedStep)

    mcFailedSteps.Add objItem

End Sub
Public Function Delete(ByVal lPosition As
Long) As cFailedStep

    Set Delete =
mcFailedSteps.Delete(lPosition)

End Function

Public Sub Clear()

    mcFailedSteps.Clear

End Sub
Public Function Count() As Long

    Count = mcFailedSteps.Count

End Function
Public Property Get Item(ByVal Position As
Long) As cFailedStep
Attribute Item.VB_UserMemId = 0

    Set Item = mcFailedSteps.Item(Position)

End Property

Public Function StepFailed(lStepId As
Long) As Boolean

    ' Returns True if a failure record already
exists for the passed in step
    Dim lIndex As Long

    StepFailed = False

    For lIndex = 0 To Count() - 1
        If mcFailedSteps(lIndex).StepId = lStepId
Then
            StepFailed = True
            Exit For
        End If
    Next lIndex

End Function

Private Sub Class_Initialize()

    Set mcFailedSteps = New cVector

End Sub

Private Sub Class_Terminate()

    Set mcFailedSteps = Nothing

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cFileInfo"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:        cFileInfo.cls
'               Microsoft TPC-H Kit Ver. 1.00
'               Copyright Microsoft, 1999
'               All Rights Reserved
'
'
'  PURPOSE:     File Properties viz. name,
handle, etc.
'  Contact:     Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private mstrFileName As String
Private mintFileHandle As Integer
Private mdbsNodeDb As Database ' Since it is
used to form a cNodeCollection
Private mlngPosition As Long ' Since it is used
to form a cNodeCollection
Public Property Get FileName() As String

    FileName = mstrFileName

End Property
Public Property Let FileName(ByVal vdata As
String)

    mstrFileName = vdata

End Property
Public Property Let FileHandle(ByVal vdata
As Integer)

    mintFileHandle = vdata

End Property
Public Property Set NodeDB(vdata As
Database)

    Set mdbsNodeDb = vdata

End Property

Public Property Get NodeDB() As Database

    Set NodeDB = mdbsNodeDb

End Property
Public Property Get Position() As Long

    Position = mlngPosition

End Property
Public Property Let Position(ByVal vdata As Long)

    mlngPosition = vdata

End Property

Public Property Get FileHandle() As Integer

    FileHandle = mintFileHandle

End Property

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cFileSM"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
Attribute VB_Ext_KEY =
"SavedWithClassBuilder" ,"Yes"
Attribute VB_Ext_KEY = "Top_Level" ,"Yes"
'  FILE:        cFileSM.cls
'               Microsoft TPC-H Kit Ver. 1.00
'               Copyright Microsoft, 1999
'               All Rights Reserved
'
'
'  PURPOSE:     Encapsulates functions to open a
file and write to it.
'  Contact:     Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name when
errors
' are raised by this class
Private Const mstrModuleName As String =
"cFileSM."
Private mstrSource As String

Private mstrFileName As String
Private mintHFile As Integer
Private mstrFileHeader As String
Private mstrProjectName As String

Public Sub CloseFile()

    ' Close the file
    If mintHFile > 0 Then
        Call CloseFileSM(mstrFileName)
        mintHFile = 0
    End If

End Sub

Public Property Let ProjectName(ByVal vdata As
String)
    ' An optional field - will be appended to the file
    ' header string if specified

    Const strProjectHdr As String = "Project Name:"

    mstrProjectName = vdata
```

```
    mstrFileHeader = mstrFileHeader & _
        Space$(1) & strProjectHdr &
Space$(1) & _
        gstrSQ & vdata & gstrSQ

End Property
Public Property Get ProjectName() As
String

    ProjectName = mstrProjectName

End Property
Public Property Get FileName() As String

    FileName = mstrFileName

End Property
Public Property Let FileName(ByVal vdata
As String)

    mstrFileName = vdata

End Property
Public Sub WriteLine(strMsg As String)

    ' Writes the passed in string to the file
    Call WriteToFile(strMsg, False)

End Sub

Public Sub WriteField(strMsg As String)

    ' Writes the passed in string to the file
    Call WriteToFile(strMsg, True)

End Sub

Private Sub WriteToFile(strMsg As String, _
        blnContinue As Boolean)
    ' Writes the passed in string to the file -
the
    ' Continue flag indicates whether the next
line will
    ' be continued on the same line or printed
on a new one

    On Error GoTo WriteToFileErr

    ' Open the file if it hasn't been already
    If mintHFile = 0 Then

        ' If the filename has not been
initialized, do not
        ' attempt to open it
        If mstrFileName <> gstrEmptyString
Then

            mintHFile =
OpenFileSM(mstrFileName)

            If mintHFile = 0 Then
                ' The Open File command failed
for some reason
                ' No point in trying to write the
file header
            Else
                ' Print a file header, if a header
string has been
                ' initialized
                If mstrFileHeader <>
gstrEmptyString Then
                    Print #mintHFile,
                    Print #mintHFile,
mstrFileHeader
                    Print #mintHFile,
                End If
            End If
        End If
    End If

    If mintHFile <> 0 Then
        If strMsg = gstrEmptyString Then
            Print #mintHFile,
        Else
            If blnContinue Then
                ' Write the message to the file -
continue
                ' all subsequent characters on the
same line
                Print #mintHFile, strMsg;
            Else
                ' Write the message to the file
                Print #mintHFile, strMsg
            End If
        End If
    Else
        ' Display the string to the user instead of
        ' trying to write it to the file
        ' This could be the project error log that
we were
        ' trying to open! Play it safe and display
errors - do
        ' not try to log them.
        MsgBox strMsg, vbOKOnly
    End If

    Exit Sub

WriteToFileErr:
    ' Log the error code raised by Visual Basic
    Call DisplayErrors(Errors)

    ' Display the string to the user instead of
    ' trying to write it to the file
    MsgBox strMsg, vbOKOnly

End Sub
Public Property Let FileHeader(ByVal vdata
As String)

    mstrFileHeader = vdata

End Property
Public Property Get FileHeader() As String

    FileHeader = mstrFileHeader

End Property

Private Sub Class_Terminate()

    ' Close the file opened by this instance
    Call CloseFile

End Sub


VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cGlobalStep"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cGlobalStep.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Encapsulates the properties and
methods of a global step.
'              Implements the cStep class - carries out
initializations
'              and validations that are specific to global
steps.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Implements cStep

' Object variable to keep the reference in
Private mcStep As cStep

' Used to indicate the source module name when
errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cGlobalStep."

Private Sub cStep_AddAllIterators()

    Call mcStep.AddAllIterators

End Sub

Private Sub cStep_AddIterator(cItRecord As
cIterator)

    Call mcStep.AddIterator(cItRecord)

End Sub

Private Property Let cStep_ArchivedFlag(ByVal
RHS As Boolean)

    mcStep.ArchivedFlag = RHS

End Property

Private Property Get cStep_ArchivedFlag() As
Boolean

    cStep_ArchivedFlag = mcStep.ArchivedFlag

End Property

Private Sub Class_Initialize()

    ' Create the object
    Set mcStep = New cStep

    ' Initialize the object with valid values for a
global step
    ' The global flag should be the first field to be
initialized
    ' since subsequent validations might try to check
if the
    ' step being created is global
    mcStep.GlobalFlag = True
    mcStep.StepType = gintGlobalStep

    ' A global step cannot have any sub-steps
associated with it
    ' Hence, it will always be at Step Level 0
    mcStep.ParentStepId = 0
    mcStep.ParentVersionNo = gstrMinVersion
    mcStep.StepLevel = 0
```

```
    ' The enabled flag must be False for all
global steps
    ' Global steps can be of two types
    ' a. Those that are run globally within a
workspace either
    '    before every step, after every step or
during the entire
    '    run, depending on the global run
method
    ' b. Those that are not run globally, but
qualify to be either
    '    pre or post-execution steps for other
steps in the workspace.
    '    Whether or not such a step will be
executed depends on
    '    whether the step for which it is defined
as a pre/post
    '    step will be executed
    mcStep.EnabledFlag = False

    mcStep.ContinuationCriteria =
gintNoOption
    mcStep.DegreeParallelism =
gstrGlobalParallelism

End Sub
Private Sub Class_Terminate()

    ' Remove the step object
    Set mcStep = Nothing

End Sub

Private Sub cStep_Add()

    ' Call a private procedure to see if the step
text has been
    ' entered - since a global step actually
executes a step, entry
    ' of the text is mandatory
    Call StepTextOrFileEntered

    ' Call the Add method of the step class to
carry out the insert
    mcStep.Add

End Sub

Private Function cStep_Clone(Optional
cCloneStep As cStep) As cStep

    Dim cNewGlobal As cGlobalStep

    Set cNewGlobal = New cGlobalStep
    Set cStep_Clone =
mcStep.Clone(cNewGlobal)

End Function


Private Property Get
cStep_ContinuationCriteria() As
ContinuationCriteria

    cStep_ContinuationCriteria =
mcStep.ContinuationCriteria

End Property

Private Property Let
cStep_ContinuationCriteria(ByVal RHS As
ContinuationCriteria)

    ' The continuation criteria field will
always be empty for a
    ' global step
    mcStep.ContinuationCriteria = 0

End Property

Private Property Let
cStep_DegreeParallelism(ByVal RHS As
String)

    ' Will always be zero for a global step
    mcStep.DegreeParallelism =
gstrGlobalParallelism

End Property

Private Property Get
cStep_DegreeParallelism() As String

    cStep_DegreeParallelism =
mcStep.DegreeParallelism

End Property

Private Sub cStep_DeleteIterator(cItRecord As
cIterator)

    Call mcStep.DeleteIterator(cItRecord)

End Sub

Private Sub cStep_Delete()

    mcStep.Delete

End Sub

Private Property Get cStep_EnabledFlag() As
Boolean

    cStep_EnabledFlag = mcStep.EnabledFlag

End Property

Private Property Let
cStep_EnabledFlag(ByVal RHS As Boolean)

    ' The enabled flag must be False for all
global steps
    ' Global steps can be of two types
    ' a. Those that are run globally within a
workspace either
    '    before every step, after every step or
during the entire
    '    run, depending on the global run method
    ' b. Those that are not run globally, but
qualify to be either
    '    pre or post-execution steps for other steps
in the workspace.
    '    Whether or not such a step will be
executed depends on
    '    whether the step for which it is defined as
a pre/post
    '    step will be executed
    mcStep.EnabledFlag = False

End Property

Private Property Let cStep_ErrorFile(ByVal
RHS As String)

    mcStep.ErrorFile = RHS

End Property

Private Property Get cStep_ErrorFile() As String

    cStep_ErrorFile = mcStep.ErrorFile

End Property

Private Property Let
cStep_ExecutionMechanism(ByVal RHS As
ExecutionMethod)

    ' Whether or not the Execution Mechanism is
valid will be
    ' checked by the Step class
    mcStep.ExecutionMechanism = RHS

End Property

Private Property Get cStep_ExecutionMechanism()
As ExecutionMethod

    cStep_ExecutionMechanism =
mcStep.ExecutionMechanism

End Property

Private Property Let cStep_FailureDetails(ByVal
RHS As String)

    ' Whether or not the Failure Details are valid for
the
    ' selected failure criteria will be checked by the
Step class
    mcStep.FailureDetails = RHS

End Property

Private Property Get cStep_FailureDetails() As
String

    cStep_FailureDetails = mcStep.FailureDetails

End Property

Private Property Get cStep_GlobalFlag() As
Boolean

    cStep_GlobalFlag = mcStep.GlobalFlag

End Property

Private Property Let cStep_GlobalFlag(ByVal RHS
As Boolean)

    ' Set the global flag to true
    mcStep.GlobalFlag = True

End Property

Private Function cStep_IncVersionX() As String

    cStep_IncVersionX = mcStep.IncVersionX

End Function

Private Function cStep_IncVersionY() As String

    cStep_IncVersionY = mcStep.IncVersionY

End Function


'Private Property Let
cStep_GlobalRunMethod(ByVal RHS As Integer)
'
```

```
'    ' Whether or not the Global Run Method is valid for the step
'    ' will be checked by the Step class
'    mcStep.GlobalRunMethod = RHS
'
'End Property
'
'Private Property Get cStep_GlobalRunMethod() As Integer
'
'    cStep_GlobalRunMethod = mcStep.GlobalRunMethod
'
'End Property
'
Private Property Get cStep_IndOperation() As Operation

    cStep_IndOperation = mcStep.IndOperation

End Property

Private Property Let cStep_IndOperation(ByVal RHS As Operation)

    mcStep.IndOperation = RHS

End Property

Private Sub cStep_InsertIterator(cItRecord As cIterator)

    Call mcStep.InsertIterator(cItRecord)

End Sub

Private Function cStep_IsNewVersion() As Boolean
    cStep_IsNewVersion = mcStep.IsNewVersion
End Function

Private Function cStep_IteratorCount() As Long

    cStep_IteratorCount = mcStep.IteratorCount

End Function

Private Property Let cStep_IteratorName(ByVal RHS As String)

    mcStep.IteratorName = RHS

End Property

Private Property Get cStep_IteratorName() As String

    cStep_IteratorName = mcStep.IteratorName

End Property

Private Function cStep_Iterators() As Variant

    cStep_Iterators = mcStep.Iterators

End Function

Private Sub cStep_LoadIterator(cItRecord As cIterator)

    Call mcStep.LoadIterator(cItRecord)

End Sub

'Private Property Let cStep_LogFile(ByVal RHS As String)
'
'    mcStep.LogFile = RHS
'
'End Property
'
'Private Property Get cStep_LogFile() As String
'
'    cStep_LogFile = mcStep.LogFile
'
'End Property

Private Sub cStep_ModifyIterator(cItRecord As cIterator)

    Call mcStep.ModifyIterator(cItRecord)

End Sub

Private Sub cStep_Modify()

    ' Call a private procedure to see if the step text has been
    ' entered - since a global step actually executes a step,
    ' entry of the text is mandatory
    Call StepTextOrFileEntered

    ' Call the Modify method of the step class to carry out the update
    mcStep.Modify

End Sub

Private Property Get cStep_NextStepId() As Long

    cStep_NextStepId = mcStep.NextStepId

End Property

Private Property Set cStep_NodeDB(RHS As DAO.Database)

    Set mcStep.NodeDB = RHS

End Property

Private Property Get cStep_NodeDB() As DAO.Database

    Set cStep_NodeDB = mcStep.NodeDB

End Property

Private Function cStep_OldVersionNo() As String
    cStep_OldVersionNo = mcStep.OldVersionNo
End Function

Private Property Let cStep_OutputFile(ByVal RHS As String)

    mcStep.OutputFile = RHS

End Property

Private Property Get cStep_OutputFile() As String

    cStep_OutputFile = mcStep.OutputFile

End Property

Private Property Let cStep_ParentStepId(ByVal RHS As Long)

    ' A global step cannot have any sub-steps associated with it
    ' Hence, the parent step id and parent version number will be zero
    mcStep.ParentStepId = 0

End Property

Private Property Get cStep_ParentStepId() As Long

    cStep_ParentStepId = mcStep.ParentStepId

End Property

Private Property Let cStep_ParentVersionNo(ByVal RHS As String)

    ' A global step cannot have any sub-steps associated with it
    ' Hence, the parent step id and parent version number will be zero
    mcStep.ParentVersionNo = gstrMinVersion

End Property

Private Property Get cStep_ParentVersionNo() As String

    cStep_ParentVersionNo = mcStep.ParentVersionNo

End Property

Private Property Let cStep_Position(ByVal RHS As Long)

    mcStep.Position = RHS

End Property

Private Property Get cStep_Position() As Long

    cStep_Position = mcStep.Position

End Property

Private Sub cStep_RemoveIterator(cItRecord As cIterator)

    Call mcStep.RemoveIterator(cItRecord)

End Sub

Private Sub cStep_SaveIterators()

    Call mcStep.SaveIterators

End Sub

Private Property Let cStep_SequenceNo(ByVal RHS As Integer)

    mcStep.SequenceNo = RHS
```

```
End Property

Private Property Get cStep_SequenceNo()
As Integer

   cStep_SequenceNo =
mcStep.SequenceNo

End Property

Private Property Let cStep_StepId(ByVal
RHS As Long)

   mcStep.StepId = RHS

End Property
Private Property Get cStep_StepId() As
Long

   cStep_StepId = mcStep.StepId

End Property


Private Property Let
cStep_StepLabel(ByVal RHS As String)

   mcStep.StepLabel = RHS

End Property

Private Property Get cStep_StepLabel() As
String

   cStep_StepLabel = mcStep.StepLabel

End Property

Private Property Let cStep_StartDir(ByVal
RHS As String)

   mcStep.StartDir = RHS

End Property

Private Property Get cStep_StartDir() As
String

   cStep_StartDir = mcStep.StartDir

End Property

Private Property Let
cStep_StepLevel(ByVal RHS As Integer)

   ' A global step cannot have any sub-steps
associated with it
   ' Hence, it will always be at step level 0
   mcStep.StepLevel = 0

End Property

Private Property Get cStep_StepLevel() As
Integer

   cStep_StepLevel = mcStep.StepLevel

End Property

Private Property Let cStep_StepText(ByVal
RHS As String)

   mcStep.StepText = RHS

End Property


Private Property Get cStep_StepText() As
String

   cStep_StepText = mcStep.StepText

End Property

Private Property Let
cStep_StepTextFile(ByVal RHS As String)

   mcStep.StepTextFile = RHS

End Property

Private Property Get cStep_StepTextFile() As
String

   cStep_StepTextFile = mcStep.StepTextFile

End Property

Private Property Let cStep_StepType(RHS As
gintStepType)

   mcStep.StepType = gintGlobalStep

End Property

Private Property Get cStep_StepType() As
gintStepType

   cStep_StepType = mcStep.StepType

End Property

Private Sub cStep_UnloadIterators()

   Call mcStep.UnloadIterators

End Sub

Private Sub cStep_UpdateIterator(cItRecord
As cIterator)

   Call mcStep.UpdateIterator(cItRecord)

End Sub

Private Sub cStep_UpdateIteratorVersion()

   Call mcStep.UpdateIteratorVersion

End Sub

Private Sub cStep_Validate()
   ' The validate routines for each of the steps
will
   ' carry out the specific validations for the
type and
   ' call the generic validation routine

   On Error GoTo cStep_ValidateErr
   mstrSource = mstrModuleName &
"cStep_Validate"

   ' Validations specific to global steps

   ' Check if the step text or a file name has
been
   ' specified
   Call StepTextOrFileEntered

   ' The step level must be zero for all globals
   If mcStep.StepLevel <> 0 Then
      ShowError errStepLevelZeroForGlobal
      On Error GoTo 0
      Err.Raise vbObjectError + errValidateFailed, _
            gstrSource, _
            LoadResString(errValidateFailed)
   End If

   If mcStep.EnabledFlag Then
      ShowError errEnabledFlagFalseForGlobal
      On Error GoTo 0
      Err.Raise vbObjectError + errValidateFailed, _
            gstrSource, _
            LoadResString(errValidateFailed)
   End If

   If mcStep.DegreeParallelism > 0 Then
      ShowError errDegParallelismNullForGlobal
      On Error GoTo 0
      Err.Raise vbObjectError + errValidateFailed, _
            gstrSource, _
            LoadResString(errValidateFailed)
   End If

   If mcStep.ContinuationCriteria > 0 Then
      ShowError errContCriteriaNullForGlobal
      On Error GoTo 0
      Err.Raise vbObjectError + errValidateFailed, _
            gstrSource, _
            LoadResString(errValidateFailed)
   End If

   mcStep.Validate

   Exit Sub

cStep_ValidateErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"cStep_Validate"
   On Error GoTo 0
   Err.Raise vbObjectError + errValidateFailed, _
         mstrSource, _
         LoadResString(errValidateFailed)
End Sub
Private Sub StepTextOrFileEntered()
   ' Checks if either the step text or the name of the
file containing
   ' the text has been entered
   ' If both of them are null or both of them are not
null,
   ' the global step is invalid and an error is raised

   If StringEmpty(mcStep.StepText) And
StringEmpty(mcStep.StepTextFile) Then
      ShowError errStepTextAndFileNull
      On Error GoTo 0
      Err.Raise vbObjectError +
errStepTextAndFileNull, _
         mstrSource,
LoadResString(errStepTextAndFileNull)
   ElseIf Not StringEmpty(mcStep.StepText) And
Not StringEmpty(mcStep.StepTextFile) Then
      ShowError errStepTextOrFile
      On Error GoTo 0
      Err.Raise vbObjectError + errStepTextOrFile,
_
         mstrSource,
LoadResString(errStepTextOrFile)
   End If

End Sub

Private Property Let cStep_VersionNo(ByVal RHS
As String)
```

```
    mcStep.VersionNo = RHS

End Property

Private Property Get cStep_VersionNo() As
String

    cStep_VersionNo = mcStep.VersionNo

End Property

Private Property Let
cStep_WorkspaceId(ByVal RHS As Long)

    mcStep.WorkspaceId = RHS

End Property

Private Property Get cStep_WorkspaceId()
As Long

    cStep_WorkspaceId =
mcStep.WorkspaceId

End Property
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cInstance"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cInstance.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Encapsulates the properties
and methods of an instance.
'              An instance is created when a step
is executed for a
'              particular iterator value (if
applicable) at 'run' time.
'              Contains functions to determine if
an instance is running,
'              complete, and so on.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this class
Private Const mstrModuleName As String =
"cInstance."
Private mstrSource As String

Private mcStep As cStep
Public Key As String ' Node key for the step
being executed
Public InstanceId As Long
Public ParentInstanceId As Long ' The
parent instance
Private mblnNoMoreToStart As Boolean
Private mblnComplete As Boolean
Public StartTime As Currency
Public EndTime As Currency
Public ElapsedTime As Currency
Private mintStatus As InstanceStatus
Public DegreeParallelism As Integer
Private mcIterators As cRunColIt

' A collection of all the sub-steps for this step
Private mcSubSteps As cSubSteps
Public Sub UpdateStartTime(lStepId As Long,
Optional ByVal StartTm As Currency =
gdtmEmpty, _
    Optional ByVal EndTm As Currency =
gdtmEmpty, _
    Optional ByVal Elapsed As Currency = 0)
  ' We do not maintain start and end
timestamps for the constraint
  ' of a step. Hence we check if the process
that just started/
  ' terminated is the worker step that is being
executed. If so,
  ' we update the start/end time and status on
the instance record.

  BugAssert (StartTm <> gdtmEmpty) Or
(EndTm <> gdtmEmpty), "Mandatory
parameter missing."

  ' Make sure that we are executing the actual
step and not
  ' a pre or post-execution constraint
  If mcStep.StepId = lStepId Then
    If StartTm <> 0 Then
      StartTime = StartTm
      mintStatus = gintRunning
    Else
      EndTime = EndTm
      ElapsedTime = Elapsed
      mintStatus = gintComplete
    End If
  End If

End Sub
Public Function
ValidForIteration(cParentInstance As
cInstance, _
    ByVal intConsType As ConstraintType)
As Boolean
  ' Returns true if the instance passed in is the
first or
  ' last iteration for the step, depending on the
constraint type

  Dim cSubStepRec As cSubStep
  Dim vntIterators As Variant

  On Error GoTo ValidForIterationErr

  If cParentInstance Is Nothing Then
    ' This will only be true for the dummy
instance, which
    ' cannot have any iterators defined for it
    ValidForIteration = True
    Exit Function
  End If

  vntIterators = mcStep.Iterators

  If Not StringEmpty(mcStep.IteratorName)
And Not IsEmpty(vntIterators) Then

    Set cSubStepRec =
cParentInstance.QuerySubStep(mcStep.StepId)

    If intConsType = gintPreStep Then
      ' Pre-execution constraints will only be
executed
      ' before the first iteration
      If
cSubStepRec.LastIterator.IteratorType =
gintValue Then
        ValidForIteration =
(cSubStepRec.LastIterator.Sequence = _
            gintMinIteratorSequence)
      Else
        ValidForIteration =
(cSubStepRec.LastIterator.Value = _

cSubStepRec.LastIterator.RangeFrom)
      End If
    Else
      ' Post-execution constraints will only be
executed
      ' after the last iteration - check if there are
any
      ' pending iterations
      ValidForIteration =
cSubStepRec.NextIteration(mcStep) Is Nothing
    End If
  Else
    ValidForIteration = True
  End If

  Exit Function

ValidForIterationErr:
  ' Log the error code raised by Visual Basic
  Call LogErrors(Errors)
  On Error GoTo 0
  mstrSource = mstrModuleName &
"ValidForIteration"
  Err.Raise vbObjectError +
errExecInstanceFailed, _
      mstrSource,
LoadResString(errExecInstanceFailed)

End Function

Public Sub CreateSubStep(cSubStepDtls As cStep,
RunParams As cArrParameters)

  Dim cNewSubStep As cSubStep

  On Error GoTo CreateSubStepErr

  Set cNewSubStep = New cSubStep

  cNewSubStep.StepId = cSubStepDtls.StepId
  cNewSubStep.TasksComplete = 0
  cNewSubStep.TasksRunning = 0

  ' Initialize the iterator for the instance
  Set cNewSubStep.LastIterator = New
cRunItDetails
  Call cNewSubStep.InitializeIt(cSubStepDtls,
RunParams)

  ' Add add the substep to the collection
  mcSubSteps.Add cNewSubStep

  Set cNewSubStep = Nothing

  Exit Sub

CreateSubStepErr:
  ' Log the error code raised by Visual Basic
  Call LogErrors(Errors)
  On Error GoTo 0
  mstrSource = mstrModuleName &
"CreateSubStep"
  Err.Raise vbObjectError + errProgramError,
mstrSource, _
    LoadResString(errProgramError)

End Sub
```

```
Public Function QuerySubStep(ByVal
SubStepId As Long) As cSubStep
   ' Retrieves the sub-step record for the
passed in sub-step id

   Dim lngIndex As Long

   On Error GoTo QuerySubStepErr

   ' Find the sub-step node with the matching
step id
   For lngIndex = 0 To mcSubSteps.Count -
1
      If mcSubSteps(lngIndex).StepId =
SubStepId Then
         Set QuerySubStep =
mcSubSteps(lngIndex)
         Exit For
      End If
   Next lngIndex

   Exit Function

QuerySubStepErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   mstrSource = mstrModuleName &
"QuerySubStep"
   Err.Raise vbObjectError +
errNavInstancesFailed, _
         mstrSource,
LoadResString(errNavInstancesFailed)

End Function
Public Property Let AllStarted(ByVal vdata
As Boolean)

   'bugmessage "Set All Started to " & vData
& " for : " & _
      mstrKey

   mblnNoMoreToStart = vdata

End Property
Public Property Get AllStarted() As Boolean

   AllStarted = mblnNoMoreToStart

End Property
Public Property Let AllComplete(ByVal
vdata As Boolean)

   'bugmessage "Set All Complete to " &
vData & " for : " & _
      mstrKey

   mblnComplete = vdata

End Property

Public Property Get AllComplete() As
Boolean

   AllComplete = mblnComplete

End Property

Public Sub ChildExecuted(mlngStepId As
Long)
   ' This procedure is called when a sub-step
executes.

   Dim lngIndex As Long

   On Error GoTo ChildExecutedErr

   BugAssert mcStep.StepType =
gintManagerStep

   For lngIndex = 0 To mcSubSteps.Count - 1
      If mcSubSteps(lngIndex).StepId =
mlngStepId Then
         mcSubSteps(lngIndex).TasksRunning =
_

mcSubSteps(lngIndex).TasksRunning + 1
'         BugMessage "Tasks Running for Step
Id : " & _
'
CStr(mcSubSteps(lngIndex).StepId) & _
'                " Instance Id: " & InstanceId & _
'                " = " &
mcSubSteps(lngIndex).TasksRunning
         Exit For
      End If
   Next lngIndex

   If lngIndex > mcSubSteps.Count - 1 Then
      ' The child step wasn't found - raise an
error
      On Error GoTo 0
      Err.Raise vbObjectError +
errInvalidChild, mstrModuleName, _
            LoadResString(errInvalidChild)
   End If

   Exit Sub

ChildExecutedErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errInstanceOpFailed, mstrModuleName &
"ChildExecuted", _
         LoadResString(errInstanceOpFailed)

End Sub
Public Sub ChildTerminated(mlngStepId As
Long)
   ' This procedure is called when any sub-step
process
   ' terminates. Note: The TasksComplete field
will be
   ' updated only when all the instances for a
sub-step
   ' complete execution.
   Dim lngIndex As Long

   On Error GoTo ChildTerminatedErr

   BugAssert mcStep.StepType =
gintManagerStep

   For lngIndex = 0 To mcSubSteps.Count - 1

      If mcSubSteps(lngIndex).StepId =
mlngStepId Then
         mcSubSteps(lngIndex).TasksRunning =
_

mcSubSteps(lngIndex).TasksRunning - 1
'         BugMessage "Tasks Running for Step
Id : " & _
'
CStr(mcSubSteps(lngIndex).StepId) & _
'                " Instance Id: " & InstanceId & _
'                " = " &
mcSubSteps(lngIndex).TasksRunning

         BugAssert
mcSubSteps(lngIndex).TasksRunning >= 0, _
            "Tasks running for " &
CStr(mlngStepId) & _
            " Instance Id " & InstanceId & " is less
than 0."
         Exit For
      End If
   Next lngIndex

   If lngIndex > mcSubSteps.Count - 1 Then
      ' The child step wasn't found - raise an error
      On Error GoTo 0
      Err.Raise errInvalidChild, mstrModuleName &
"ChildTerminated", _
            LoadResString(errInvalidChild)
   End If

   Exit Sub

ChildTerminatedErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   mstrSource = mstrModuleName &
"ChildTerminated"
   Err.Raise vbObjectError + errInstanceOpFailed,
mstrSource, _
         LoadResString(errInstanceOpFailed)

End Sub
Public Sub ChildCompleted(mlngStepId As Long)
   ' This procedure is called when any a sub-step
completes
   ' execution. Note: The TasksComplete field will
be
   ' incremented.
   Dim lngIndex As Long

   On Error GoTo ChildCompletedErr

   BugAssert mcStep.StepType = gintManagerStep

   For lngIndex = 0 To mcSubSteps.Count - 1
      BugAssert
mcSubSteps(lngIndex).TasksComplete >= 0, _
            "Tasks complete for " &
CStr(mcSubSteps(lngIndex).StepId) & _
            " Instance Id " & InstanceId & " is less
than 0."

      If mcSubSteps(lngIndex).StepId = mlngStepId
Then
         mcSubSteps(lngIndex).TasksComplete = _
               mcSubSteps(lngIndex).TasksComplete
+ 1
'         BugMessage "Tasks Complete for Step Id :
" & _
'                CStr(mcSubSteps(lngIndex).StepId) &
_
'                " Instance Id: " & InstanceId & _
'                " = " &
mcSubSteps(lngIndex).TasksComplete
         Exit For
      End If
   Next lngIndex

   If lngIndex > mcSubSteps.Count - 1 Then
      ' The child step wasn't found - raise an error
      On Error GoTo 0
      Err.Raise errInvalidChild, mstrModuleName, _
            LoadResString(errInvalidChild)
```

```
    End If

    Exit Sub

ChildCompletedErr:
    ' Log the error code raised by Visual
Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errInstanceOpFailed, mstrModuleName &
"ChildCompleted", _
          LoadResString(errInstanceOpFailed)

End Sub
Public Sub ChildDeleted(mlngStepId As
Long)
    ' This procedure is called when a sub-step
needs to be re-executed
    ' Note: The TasksComplete field is
decremented. We needn't worry about
    ' the TasksRunning field since no steps
are currently running.
    Dim lngIndex As Long

    On Error GoTo ChildDeletedErr

    BugAssert mcStep.StepType =
gintManagerStep

    For lngIndex = 0 To mcSubSteps.Count -
1

        If mcSubSteps(lngIndex).StepId =
mlngStepId Then

mcSubSteps(lngIndex).TasksRunning = _

mcSubSteps(lngIndex).TasksRunning - 1

            BugAssert
mcSubSteps(lngIndex).TasksRunning >= 0,
_
                "Tasks running for " &
CStr(mcSubSteps(lngIndex).StepId) & _
                " Instance Id " & InstanceId & "
is less than 0."
            Exit For
        End If
    Next lngIndex

    If lngIndex > mcSubSteps.Count - 1 Then
        ' The child step wasn't found - raise an
error
        On Error GoTo 0
        Err.Raise errInvalidChild,
mstrModuleName, _
            LoadResString(errInvalidChild)
    End If

    Exit Sub

ChildDeletedErr:
    ' Log the error code raised by Visual
Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errInstanceOpFailed, mstrModuleName &
"ChildDeleted", _
          LoadResString(errInstanceOpFailed)

End Sub
Private Sub RaiseErrForWorker()

    If mcStep.StepType <> gintManagerStep
Then
        On Error GoTo 0
        mstrSource = mstrModuleName &
"RaiseErrForWorker"
        Err.Raise vbObjectError +
errInvalidForWorker, _
            mstrSource, _
            LoadResString(errInvalidForWorker)
    End If

End Sub

Public Property Get Step() As cStep

    Set Step = mcStep

End Property
Public Property Get Iterators() As cRunColIt

    Set Iterators = mcIterators

End Property
Public Property Get SubSteps() As cSubSteps

    Call RaiseErrForWorker

    Set SubSteps = mcSubSteps

End Property
Public Property Set Step(cRunStep As cStep)

    Set mcStep = cRunStep

End Property

Public Property Set Iterators(cIts As
cRunColIt)

    Set mcIterators = cIts

End Property
Public Property Get IsPending() As Boolean
    ' Returns true if the step has any substeps
that need
    ' execution
    Dim lngIndex As Long
    Dim lngRunning As Long

    Call RaiseErrForWorker

    If Not mblnComplete And Not
mblnNoMoreToStart Then
        ' Get a count of all the substeps that are
already being
        ' executed
        lngRunning = 0
        For lngIndex = 0 To mcSubSteps.Count -
1
            lngRunning = lngRunning +
mcSubSteps(lngIndex).TasksRunning
        Next lngIndex

        IsPending = (lngRunning <
DegreeParallelism)
    Else
        ' This should be sufficient to prove that
there r no
        ' more sub-steps to be executed.
        ' mblnComplete: Handles the case where
all steps have
        ' been executed
        ' mblnNoMoreToStart: Handles the case
where the step
        ' has a degree of parallelism greater than the
total
        ' number of sub-steps available to execute
        IsPending = False
    End If

End Property
Public Property Get IsRunning() As Boolean
    ' Returns true if the any one of the substeps is still
    ' executing
    Dim lngIndex As Long

    Call RaiseErrForWorker

    IsRunning = False

    ' If a substep has no currently executing tasks and
    ' the tasks completed is greater than zero, then we
can
    ' assume that it has completed execution
(otherwise we
    ' would've run a new task the moment one
completed!)
    For lngIndex = 0 To mcSubSteps.Count - 1
        If mcSubSteps(lngIndex).TasksRunning > 0
Then
            IsRunning = True
            Exit For
        End If
    Next lngIndex

End Property
Public Property Get TotalRunning() As Long
    ' Returns the total number of substeps that are
executing
    Dim lngTotalProcesses As Long
    Dim lngIndex As Long

    Call RaiseErrForWorker

    lngTotalProcesses = 0
    For lngIndex = 0 To mcSubSteps.Count - 1
        BugAssert
mcSubSteps(lngIndex).TasksRunning >= 0, _
            "Tasks running for " &
CStr(mcSubSteps(lngIndex).StepId) & _
            " is less than 0."
        lngTotalProcesses = lngTotalProcesses +
mcSubSteps(lngIndex).TasksRunning
    Next lngIndex

    TotalRunning = lngTotalProcesses
End Property
Public Property Get RunningForStep(lngSubStepId
As Long) As Long
    ' Returns the total number of instances of the
substep
    ' that are executing
    Dim lngIndex As Long

    Call RaiseErrForWorker

    For lngIndex = 0 To mcSubSteps.Count - 1
        BugAssert
mcSubSteps(lngIndex).TasksRunning >= 0, _
            "Tasks running for " &
CStr(mcSubSteps(lngIndex).StepId) & _
            " is less than 0."

        If mcSubSteps(lngIndex).StepId =
lngSubStepId Then
            RunningForStep =
mcSubSteps(lngIndex).TasksRunning
            Exit For
        End If
```

```
    Next lngIndex

    If lngIndex > mcSubSteps.Count - 1 Then
        ' The child step wasn't found - raise an
error
        On Error GoTo 0
        Err.Raise errInvalidChild, mstrSource,
_
            LoadResString(errInvalidChild)
    End If

End Property

Public Property Let Status(ByVal vdata As
InstanceStatus)

    mintStatus = vdata

End Property

Public Property Get Status() As
InstanceStatus

    Status = mintStatus

End Property
Private Sub Class_Initialize()

    Set mcSubSteps = New cSubSteps

    mblnNoMoreToStart = False
    mblnComplete = False
    StartTime = gdtmEmpty
    EndTime = gdtmEmpty

End Sub

Private Sub Class_Terminate()

    mcSubSteps.Clear
    Set mcSubSteps = Nothing

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cInstances"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cInstances.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Implements a collection of
cInstance objects.
'              Type-safe wrapper around cVector.
'              Also contains additional functions
to query an instance, etc.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this class
Private Const mstrModuleName As String =
"cInstance."
Private mstrSource As String

Private mcInstances As cVector

Public Function QueryInstance(ByVal
InstanceId As Long) As cInstance
    ' Retrieves the record for the passed in
instance from
    ' the collection

    Dim lngIndex As Long

    On Error GoTo QueryInstanceErr

    ' Check for valid values of the instance id
    If InstanceId > 0 Then
        ' Find the run node with the matching step
id
        For lngIndex = 0 To Count() - 1
            If mcInstances(lngIndex).InstanceId =
InstanceId Then
                Set QueryInstance =
mcInstances(lngIndex)
                Exit For
            End If
        Next lngIndex

        If lngIndex > mcInstances.Count - 1 Then
            On Error GoTo 0
            Err.Raise vbObjectError +
errQueryFailed, mstrSource, _
                LoadResString(errQueryFailed)
        End If
    Else
        On Error GoTo 0
        Err.Raise vbObjectError +
errQueryFailed, mstrSource, _
            LoadResString(errQueryFailed)
    End If

    Exit Function

QueryInstanceErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    mstrSource = mstrModuleName &
"QueryInstance"
    Err.Raise vbObjectError + errQueryFailed, _
        mstrSource,
LoadResString(errQueryFailed)

End Function

Public Function QueryPendingInstance(ByVal
ParentInstanceId As Long, _
        ByVal lngSubStepId As Long) As
cInstance
    ' Retrieves a pending instance for the passed
in substep
    ' and the given parent instance id.

    Dim lngIndex As Long

    On Error GoTo QueryPendingInstanceErr

    ' Find the run node with the matching step id
    For lngIndex = 0 To Count() - 1
        If mcInstances(lngIndex).ParentInstanceId
= ParentInstanceId And _
            mcInstances(lngIndex).Step.StepId =
lngSubStepId Then
            ' Put in a separate if condition since the
IsPending
            ' property is valid only for manager
steps. If the
            ' calling procedure does not pass a manager
step
            ' identifier, the procedure will error out.
            If mcInstances(lngIndex).IsPending Then
                Set QueryPendingInstance =
mcInstances(lngIndex)
                Exit For
            End If
        End If
    Next lngIndex

    Exit Function

QueryPendingInstanceErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    mstrSource = mstrModuleName &
"QueryPendingInstance"
    Err.Raise vbObjectError + errQueryFailed, _
        mstrSource, LoadResString(errQueryFailed)

End Function
Public Function InstanceAborted(cSubStepRec As
cSubStep) As Boolean

    Dim lIndex As Long

    InstanceAborted = False

    For lIndex = 0 To Count() - 1
        If mcInstances(lIndex).Step.StepId =
cSubStepRec.StepId And _
            mcInstances(lIndex).Status = gintAborted
Then
            InstanceAborted = True
            Exit For
        End If
    Next lIndex

End Function
Public Function
CompletedInstanceExists(lParentInstance As Long,
_
        cSubStepDtls As cStep) As Boolean
    ' Checks if there is a completed instance of the
passed in step

    Dim lngIndex As Long

    CompletedInstanceExists = False

    If cSubStepDtls.StepType = gintManagerStep
Then
        ' Find the run node with the matching step id
        For lngIndex = 0 To Count() - 1
            If mcInstances(lngIndex).ParentInstanceId =
lParentInstance And _
                mcInstances(lngIndex).Step.StepId =
cSubStepDtls.StepId Then
                ' Put in a separate if condition since the
IsPending
                ' property is valid only for manager steps.
                BugAssert (Not
mcInstances(lngIndex).IsPending), "Pending
instance exists!"

                CompletedInstanceExists = True
                Exit Function
            End If
        Next lngIndex
    End If

End Function
Public Sub Add(ByVal objItem As cInstance)
```

```
    mcInstances.Add objItem

End Sub


Public Sub Clear()

    mcInstances.Clear

End Sub


Public Function Count() As Long

    Count = mcInstances.Count

End Function


Public Function Delete(ByVal lngDelete As
Long) As cInstance

    Set Delete =
mcInstances.Delete(lngDelete)

End Function


Public Property Set Item(Optional ByVal
Position As Long, _
        RHS As cInstance)

    If Position = -1 Then
        Position = 0
    End If
    Set mcInstances(Position) = RHS

End Property

Public Property Get Item(Optional ByVal
Position As Long = -1) _
        As cInstance
Attribute Item.VB_UserMemId = 0

    If Position = -1 Then
        Position = 0
    End If
    Set Item = mcInstances.Item(Position)

End Property

Private Sub Class_Initialize()

    Set mcInstances = New cVector

End Sub


Private Sub Class_Terminate()

    Set mcInstances = Nothing

End Sub


VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cIterator"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:       cIterator.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    Encapsulates the properties
and methods of an iterator.
'             Contains functions to insert, update
and delete
'             iterator_values records from the
database.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Implements cNode

' Module level variables to store the property
values
Private mintType As Integer
Private mintSequenceNo As Integer
Private mstrValue As String
Private mdbsIteratorDB As Database
Private mintOperation As Integer
Private mlngPosition As Long

Private Const mstrModuleName As String =
"cIterator."
Private mstrSource As String

Public Enum ValueType
    gintFrom = 1
    gintTo
    gintStep
    gintValue
End Enum
Public Property Get Value() As String

    Value = mstrValue

End Property
Public Property Let Value(ByVal vdata As
String)

    mstrValue = vdata

End Property

Public Property Get IndOperation() As
Operation

    IndOperation = mintOperation

End Property
Public Property Let IndOperation(ByVal vdata
As Operation)

    On Error GoTo IndOperationErr
    mstrSource = mstrModuleName &
"IndOperation"

    ' The valid operations are define in the
cOperations
    ' class. Check if the operation is valid
    Select Case vdata
        Case QueryOp, InsertOp, UpdateOp,
DeleteOp
            mintOperation = vdata

        Case Else
            On Error GoTo 0
            Err.Raise vbObjectError +
errInvalidOperation, _
                mstrSource,
LoadResString(errInvalidOperation)
    End Select

    Exit Property

IndOperationErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"IndOperation"
    On Error GoTo 0
    Err.Raise vbObjectError +
errLetOperationFailed, _
        mstrSource,
LoadResString(errLetOperationFailed)

End Property

Public Function Clone() As cIterator

    ' Creates a copy of a given Iterator

    Dim cItClone As cIterator

    On Error GoTo CloneErr

    Set cItClone = New cIterator

    ' Copy all the iterator properties to the newly
    ' created object
    cItClone.IteratorType = mintType
    cItClone.SequenceNo = mintSequenceNo
    cItClone.IndOperation = mintOperation
    cItClone.Value = mstrValue

    ' And set the return value to the newly created
Iterator
    Set Clone = cItClone

    Exit Function

CloneErr:
    LogErrors Errors
    mstrSource = mstrModuleName & "Clone"
    On Error GoTo 0
    Err.Raise vbObjectError + errCloneFailed, _
          mstrSource, LoadResString(errCloneFailed)

End Function
Public Property Get SequenceNo() As Integer

    SequenceNo = mintSequenceNo

End Property

Public Property Let SequenceNo(ByVal vdata As
Integer)
    mintSequenceNo = vdata
End Property

Public Sub Add(ByVal lngStepId As Long, _
        strVersion As String)
    ' Inserts a new iterator values record into the
database

    Dim strInsert As String
    Dim qy As DAO.QueryDef

    On Error GoTo AddIteratorErr

    ' First check if the database object is valid
    Call CheckDB

    ' Create a temporary querydef object
    strInsert = "insert into iterator_values " & _
```

```
        "( step_id, version_no, type, " & _
        " iterator_value, sequence_no ) " & _
        " values ( [st_id], [ver_no], [it_typ],
" & _
        " [it_val], [seq_no] )"
   Set qy =
mdbsIteratorDB.CreateQueryDef(gstrEmpty
String, strInsert)

   ' Call a procedure to execute the Querydef
object
   Call AssignParameters(qy, lngStepId,
strVersion)

   qy.Execute dbFailOnError
   qy.Close

   Exit Sub

AddIteratorErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"AddIterator"
   On Error GoTo 0
   Err.Raise vbObjectError +
errInsertIteratorFailed, _
        mstrSource, _

LoadResString(errInsertIteratorFailed)
End Sub

Private Sub AssignParameters(qyExec As
DAO.QueryDef, _
      ByVal lngStepId As Long, _
      strVersion As String)
   ' Assigns values to the parameters in the
querydef object
   ' The parameter names are cryptic to make
them different
   ' from the field names. When the
parameter names are
   ' the same as the field names, parameters
in the where
   ' clause do not get created.

   Dim prmParam As DAO.Parameter

   On Error GoTo AssignParametersErr
   mstrSource = mstrModuleName &
"AssignParameters"

   For Each prmParam In
qyExec.Parameters
      Select Case prmParam.Name
         Case "[st_id]"
            prmParam.Value = lngStepId

         Case "[ver_no]"
            prmParam.Value = strVersion

         Case "[it_typ]"
            prmParam.Value = mintType

         Case "[it_val]"
            prmParam.Value = mstrValue

         Case "[seq_no]"
            prmParam.Value =
mintSequenceNo

         Case Else
            ' Write the parameter name that is
faulty
            WriteError errInvalidParameter,
mstrSource, _
                  prmParam.Name
            On Error GoTo 0
            Err.Raise errInvalidParameter,
mstrSource, _

LoadResString(errInvalidParameter)
      End Select
   Next prmParam

   Exit Sub

AssignParametersErr:

   mstrSource = mstrModuleName &
"AssignParameters"
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errAssignParametersFailed, _
      mstrSource,
LoadResString(errAssignParametersFailed)

End Sub
Private Sub CheckDB()
   ' Check if the database object has been
initialized

   If mdbsIteratorDB Is Nothing Then
      ShowError errInvalidDB
      On Error GoTo 0
      Err.Raise vbObjectError + errInvalidDB,
_
         mstrModuleName,
LoadResString(errInvalidDB)
   End If

End Sub

Public Sub Delete(ByVal lngStepId As Long, _
      strVersion As String)
   ' Deletes the step iterator record from the
database

   Dim strDelete As String
   Dim qy As DAO.QueryDef

   On Error GoTo DeleteIteratorErr
   mstrSource = mstrModuleName &
"DeleteIterator"

   ' There can be multiple iterators for a step.
   ' However the values that an iterator for a
step can
   ' assume will be unique, meaning that a
combination of
   ' the iterator_id and value will be unique.
   strDelete = "delete from iterator_values " &
_
         " where step_id = [st_id]" & _
         " and version_no = [ver_no]" & _
         " and iterator_value = [it_val] "
   Set qy =
mdbsIteratorDB.CreateQueryDef(gstrEmptyStr
ing, strDelete)

   Call AssignParameters(qy, lngStepId,
strVersion)
   qy.Execute dbFailOnError

   qy.Close

   Exit Sub

DeleteIteratorErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"DeleteIterator"
   On Error GoTo 0
   Err.Raise vbObjectError +
errDeleteIteratorFailed, _
         mstrSource, _
         LoadResString(errDeleteIteratorFailed)
End Sub
Public Sub Update(ByVal lngStepId As Long,
strVersion As String)
   ' Updates the sequence no of the step iterator
record
   ' in the database

   Dim strUpdate As String
   Dim qy As QueryDef

   On Error GoTo UpdateErr

   ' First check if the database object is valid
   Call CheckDB

   If mintType = gintValue Then
      ' If the iterator is of type value, only the
sequence of the values can get updated
      strUpdate = "Update iterator_values " & _
            " set sequence_no = [seq_no] " & _
            " where step_id = [st_id]" & _
            " and version_no = [ver_no]" & _
            " and iterator_value = [it_val] "
   Else
      ' If the iterator is of type range, only the values
can get updated
      strUpdate = "Update iterator_values " & _
            " set iterator_value = [it_val] " & _
            " where step_id = [st_id]" & _
            " and version_no = [ver_no]" & _
            " and type = [it_typ] "
   End If

   Set qy =
mdbsIteratorDB.CreateQueryDef(gstrEmptyString,
strUpdate)

   ' Call a procedure to assign the parameter values
to the
   ' querydef object
   Call AssignParameters(qy, lngStepId, strVersion)
   qy.Execute dbFailOnError

   qy.Close

   Exit Sub

UpdateErr:
   LogErrors Errors
   mstrSource = mstrModuleName & "Update"
   On Error GoTo 0
   Err.Raise vbObjectError +
errUpdateConstraintFailed, _
         mstrSource, _
         LoadResString(errUpdateConstraintFailed)

End Sub
Public Property Set NodeDB(vdata As Database)

   Set mdbsIteratorDB = vdata

End Property

Public Property Get NodeDB() As Database

   Set NodeDB = mdbsIteratorDB

End Property
```

```
Public Property Get Position() As Long

   Position = mlngPosition

End Property
Public Property Let Position(ByVal vdata
As Long)

   mlngPosition = vdata

End Property

Public Property Let IteratorType(ByVal
vdata As ValueType)

   On Error GoTo TypeErr
   mstrSource = mstrModuleName &
"Type"

   ' These constants have been defined in the
enumeration,
   ' Type, which is exposed
   Select Case vdata
      Case gintFrom, gintTo, gintStep,
gintValue
         mintType = vdata

      Case Else
         On Error GoTo 0
         Err.Raise vbObjectError +
errTypeInvalid, _
            mstrSource,
LoadResString(errTypeInvalid)
   End Select

   Exit Property

TypeErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"Type"
   On Error GoTo 0
   Err.Raise vbObjectError +
errTypeInvalid, _
      mstrSource,
LoadResString(errTypeInvalid)

End Property

Public Property Get IteratorType() As
ValueType

   IteratorType = mintType

End Property
Public Sub Validate()

   ' No validations necessary for the iterator
class

End Sub

Private Sub Class_Initialize()

   ' Initialize the operation indicator variable
to Query
   ' It will be modified later by the collection
class when
   ' inserts, updates or deletes are performed
   mintOperation = QueryOp

End Sub

Private Property Let
cNode_IndOperation(ByVal vdata As
Operation)

   On Error GoTo IndOperationErr
   mstrSource = mstrModuleName &
"IndOperation"

   ' The valid operations are define in the
cOperations
   ' class. Check if the operation is valid
   Select Case vdata
      Case QueryOp, InsertOp, UpdateOp,
DeleteOp
         mintOperation = vdata

      Case Else
         On Error GoTo 0
         Err.Raise vbObjectError +
errInvalidOperation, _
            mstrSource,
LoadResString(errInvalidOperation)
   End Select

   Exit Property

IndOperationErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"IndOperation"
   On Error GoTo 0
   Err.Raise vbObjectError +
errLetOperationFailed, _
      mstrSource,
LoadResString(errLetOperationFailed)

End Property

Private Property Get cNode_IndOperation() As
Operation

   IndOperation = mintOperation

End Property

Private Property Set cNode_NodeDB(RHS As
DAO.Database)

   Set mdbsIteratorDB = RHS

End Property

Private Property Get cNode_NodeDB() As
DAO.Database

   Set cNode_NodeDB = mdbsIteratorDB

End Property


Private Property Let cNode_Position(ByVal
vdata As Long)

   mlngPosition = vdata

End Property


Private Property Get cNode_Position() As
Long

   cNode_Position = mlngPosition

End Property


Private Sub cNode_Validate()

   ' No validations necessary for the iterator class

End Sub


Private Property Let cNode_Value(ByVal vdata As
String)

   mstrValue = vdata

End Property

Private Property Get cNode_Value() As String

   Value = mstrValue

End Property
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cManager"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cManager.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Encapsulates the properties and
methods of a manager step.
'              Implements the cStep class - carries out
initializations
'              and validations that are specific to
manager steps.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Implements cStep

' Object variable to keep the step reference in
Private mcStep As cStep

' Used to indicate the source module name when
errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cManager."
Private Sub cStep_AddAllIterators()

   Call mcStep.AddAllIterators

End Sub

Private Property Let cStep_StartDir(ByVal RHS As
String)

   mcStep.StartDir = RHS

End Property

Private Property Get cStep_StartDir() As String

   cStep_StartDir = mcStep.StartDir

End Property
```

```
Private Sub cStep_Delete()

   Call mcStep.Delete

End Sub

Private Property Set cStep_NodeDB(RHS
As DAO.Database)

   Set mcStep.NodeDB = RHS

End Property

Private Function cStep_IncVersionY() As
String

   cStep_IncVersionY =
mcStep.IncVersionY

End Function
Private Function cStep_IsNewVersion() As
Boolean
   cStep_IsNewVersion =
mcStep.IsNewVersion
End Function
Private Function cStep_OldVersionNo() As
String
   cStep_OldVersionNo =
mcStep.OldVersionNo
End Function

Private Function cStep_IncVersionX() As
String

   cStep_IncVersionX =
mcStep.IncVersionX

End Function
Private Sub cStep_UpdateIteratorVersion()

   Call mcStep.UpdateIteratorVersion

End Sub

Private Function cStep_IteratorCount() As
Long

   cStep_IteratorCount =
mcStep.IteratorCount

End Function

Private Sub cStep_UnloadIterators()

   Call mcStep.UnloadIterators

End Sub

Private Sub cStep_DeleteIterator(cItRecord
As cIterator)

   Call mcStep.DeleteIterator(cItRecord)

End Sub
Private Property Get cStep_IteratorName()
As String

   cStep_IteratorName =
mcStep.IteratorName

End Property
Private Property Let
cStep_IteratorName(ByVal RHS As String)

   mcStep.IteratorName = RHS

End Property

Private Sub cStep_SaveIterators()

   Call mcStep.SaveIterators

End Sub
Private Sub cStep_LoadIterator(cItRecord As
cIterator)

   Call mcStep.LoadIterator(cItRecord)

End Sub

Private Property Let cStep_Position(ByVal
RHS As Long)

   mcStep.Position = RHS

End Property
Private Sub cStep_InsertIterator(cItRecord As
cIterator)

   Call mcStep.InsertIterator(cItRecord)

End Sub
Private Function cStep_Iterators() As Variant

   cStep_Iterators = mcStep.Iterators

End Function
Private Sub cStep_ModifyIterator(cItRecord
As cIterator)

   Call mcStep.ModifyIterator(cItRecord)

End Sub
Private Sub cStep_RemoveIterator(cItRecord
As cIterator)

   Call mcStep.RemoveIterator(cItRecord)

End Sub
Private Sub cStep_UpdateIterator(cItRecord
As cIterator)

   Call mcStep.UpdateIterator(cItRecord)

End Sub
Private Sub cStep_AddIterator(cItRecord As
cIterator)

   Call mcStep.AddIterator(cItRecord)

End Sub

Private Property Get cStep_Position() As Long

   cStep_Position = mcStep.Position

End Property

Private Function cStep_Clone(Optional
cCloneStep As cStep) As cStep

   Dim cNewManager As cManager

   Set cNewManager = New cManager
   Set cStep_Clone =
mcStep.Clone(cNewManager)

End Function

Private Property Get cStep_IndOperation() As
Operation

   cStep_IndOperation = mcStep.IndOperation

End Property

Private Property Let cStep_IndOperation(ByVal
RHS As Operation)

   mcStep.IndOperation = RHS

End Property

Private Property Get cStep_NextStepId() As Long

   cStep_NextStepId = mcStep.NextStepId

End Property

Private Property Let cStep_OutputFile(ByVal RHS
As String)

   mcStep.OutputFile = RHS

End Property

Private Property Get cStep_OutputFile() As String

   cStep_OutputFile = mcStep.OutputFile

End Property

Private Property Let cStep_ErrorFile(ByVal RHS
As String)

   mcStep.ErrorFile = RHS

End Property

Private Property Get cStep_ErrorFile() As String

   cStep_ErrorFile = mcStep.ErrorFile

End Property
'Private Property Let cStep_LogFile(ByVal RHS As
String)
'
'   mcStep.LogFile = RHS
'
'End Property
'
'Private Property Get cStep_LogFile() As String
'
'   cStep_LogFile = mcStep.LogFile
'
'End Property

Private Property Let cStep_ArchivedFlag(ByVal
RHS As Boolean)

   mcStep.ArchivedFlag = RHS

End Property

Private Property Get cStep_ArchivedFlag() As
Boolean

   cStep_ArchivedFlag = mcStep.ArchivedFlag

End Property

Private Property Get cStep_NodeDB() As
DAO.Database
```

```
    Set cStep_NodeDB = mcStep.NodeDB

End Property

Private Sub Class_Initialize()

    ' Create the object
    Set mcStep = New cStep

    ' Initialize the object with valid values for
a manager step
    ' The global flag should be the first field
to be initialized
    ' since subsequent validations might try to
check if the
    ' step being created is global
    mcStep.GlobalFlag = False
'    mcStep.GlobalRunMethod =
gintNoOption
    mcStep.StepType = gintManagerStep

    ' Since the manager step does not take any
action, the step
    ' text and file name will always be empty
    mcStep.StepText = gstrEmptyString
    mcStep.StepTextFile = gstrEmptyString

    ' Since the manager step does not take any
action, execution
    ' properties for the step will be empty
    mcStep.ExecutionMechanism =
gintNoOption
    mcStep.FailureDetails = gstrEmptyString
    mcStep.ContinuationCriteria =
gintNoOption

End Sub
Private Sub Class_Terminate()

    ' Remove the step object
    Set mcStep = Nothing

End Sub
Private Sub cStep_Add()

    ' Call the Add method of the step class to
carry out the insert
    mcStep.Add

End Sub
Private Property Get
cStep_ContinuationCriteria() As
ContinuationCriteria

    cStep_ContinuationCriteria =
mcStep.ContinuationCriteria

End Property

Private Property Let
cStep_ContinuationCriteria(ByVal RHS As
ContinuationCriteria)

    ' Since a manager step cannot take any
action, the continuation
    ' criteria property does not apply to it
    mcStep.ContinuationCriteria =
gintNoOption

End Property

Private Property Let
cStep_DegreeParallelism(ByVal RHS As
String)

    mcStep.DegreeParallelism = RHS

End Property

Private Property Get
cStep_DegreeParallelism() As String

    cStep_DegreeParallelism =
mcStep.DegreeParallelism

End Property

Private Sub cStep_DeleteStep()

    On Error GoTo cStep_DeleteStepErr
    mstrSource = mstrModuleName &
"cStep_DeleteStep"

    mcStep.Delete
    Exit Sub

cStep_DeleteStepErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"cStep_DeleteStep"
    On Error GoTo 0
    Err.Raise vbObjectError +
errDeleteStepFailed, _
            mstrSource, _
            LoadResString(errDeleteStepFailed)

End Sub

Private Property Get cStep_EnabledFlag() As
Boolean

    cStep_EnabledFlag = mcStep.EnabledFlag

End Property

Private Property Let
cStep_EnabledFlag(ByVal RHS As Boolean)

    mcStep.EnabledFlag = RHS

End Property

Private Property Let
cStep_ExecutionMechanism(ByVal RHS As
ExecutionMethod)

    ' Since a manager step cannot take any
action, the Execution
    ' Mechanism property does not apply to it
    mcStep.ExecutionMechanism =
gintNoOption

End Property

Private Property Get
cStep_ExecutionMechanism() As
ExecutionMethod

    cStep_ExecutionMechanism =
mcStep.ExecutionMechanism

End Property

Private Property Let
cStep_FailureDetails(ByVal RHS As String)

    ' Since a manager step cannot take any
action, the Failure
    ' Details property does not apply to it
    mcStep.FailureDetails = gstrEmptyString

End Property

Private Property Get cStep_FailureDetails() As
String

    cStep_FailureDetails = mcStep.FailureDetails

End Property

Private Property Get cStep_GlobalFlag() As
Boolean

    cStep_GlobalFlag = mcStep.GlobalFlag

End Property

Private Property Let cStep_GlobalFlag(ByVal RHS
As Boolean)

    ' Set the global flag to false - this flag is
initialized when
    ' an instance of the class is created. Just making
sure that
    ' nobody changes the value inadvertently
    mcStep.GlobalFlag = False

End Property
Private Sub cStep_Modify()

    ' Call the Modify method of the step class to
carry out the update
    mcStep.Modify

End Sub

Private Property Let cStep_ParentStepId(ByVal
RHS As Long)

    mcStep.ParentStepId = RHS

End Property

Private Property Get cStep_ParentStepId() As Long

    cStep_ParentStepId = mcStep.ParentStepId

End Property

Private Property Let cStep_ParentVersionNo(ByVal
RHS As String)

    mcStep.ParentVersionNo = RHS

End Property

Private Property Get cStep_ParentVersionNo() As
String

    cStep_ParentVersionNo =
mcStep.ParentVersionNo

End Property

Private Property Let cStep_SequenceNo(ByVal
RHS As Integer)

    mcStep.SequenceNo = RHS

End Property

Private Property Get cStep_SequenceNo() As
Integer

    cStep_SequenceNo = mcStep.SequenceNo
```

```
End Property

Private Property Let cStep_StepId(ByVal
RHS As Long)

   mcStep.StepId = RHS

End Property

Private Property Get cStep_StepId() As
Long

   cStep_StepId = mcStep.StepId

End Property


Private Property Let
cStep_StepLabel(ByVal RHS As String)

   mcStep.StepLabel = RHS

End Property

Private Property Get cStep_StepLabel() As
String

   cStep_StepLabel = mcStep.StepLabel

End Property


Private Property Let
cStep_StepLevel(ByVal RHS As Integer)

   mcStep.StepLevel = RHS

End Property

Private Property Get cStep_StepLevel() As
Integer

   cStep_StepLevel = mcStep.StepLevel

End Property

Private Property Let cStep_StepText(ByVal
RHS As String)

   ' Since the manager step does not take any
action, the step
   ' text and file name will always be empty
   mcStep.StepText = gstrEmptyString

End Property

Private Property Get cStep_StepText() As
String

   cStep_StepText = mcStep.StepText

End Property

Private Property Let
cStep_StepTextFile(ByVal RHS As String)

   ' Since the manager step does not take any
action, the step
   ' text and file name will always be empty
   mcStep.StepTextFile = gstrEmptyString

End Property

Private Property Get cStep_StepTextFile() As
String

   cStep_StepTextFile = mcStep.StepTextFile

End Property

Private Property Let cStep_StepType(RHS As
gintStepType)

   mcStep.StepType = gintManagerStep

End Property

Private Property Get cStep_StepType() As
gintStepType

   cStep_StepType = mcStep.StepType

End Property

Private Sub cStep_Validate()
   ' The validate routines for each of the steps
will
   ' carry out the specific validations for the
type and
   ' call the generic validation routine

   On Error GoTo cStep_ValidateErr
   mstrSource = mstrModuleName &
"cStep_Validate"

   ' Validations specific to manager steps

   ' Check if the step text or a file name has
been
   ' specified
   If Not StringEmpty(mcStep.StepText) Or
Not StringEmpty(mcStep.StepTextFile) Then
      ShowError
errTextAndFileNullForManager
      On Error GoTo 0
      Err.Raise vbObjectError +
errValidateFailed, _
            gstrSource, _
            LoadResString(errValidateFailed)
   End If

   If mcStep.ExecutionMechanism <>
gintNoOption Then
      ShowError
errExecutionMechanismInvalid
      On Error GoTo 0
      Err.Raise vbObjectError +
errValidateFailed, _
            gstrSource, _
            LoadResString(errValidateFailed)
   End If

   If mcStep.FailureDetails <>
gstrEmptyString Then
      ShowError errFailureDetailsNullForMgr
      On Error GoTo 0
      Err.Raise vbObjectError +
errValidateFailed, _
            gstrSource, _
            LoadResString(errValidateFailed)
   End If

   If mcStep.ContinuationCriteria <>
gintNoOption Then
      ShowError errContCriteriaInvalid
      On Error GoTo 0
      Err.Raise vbObjectError +
errValidateFailed, _
            gstrSource, _
            LoadResString(errValidateFailed)
   End If

   mcStep.Validate

   Exit Sub

cStep_ValidateErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"cStep_Validate"
   On Error GoTo 0
   Err.Raise vbObjectError + errValidateFailed, _
         mstrSource, _
         LoadResString(errValidateFailed)
End Sub

Private Property Let cStep_VersionNo(ByVal RHS
As String)

   mcStep.VersionNo = RHS

End Property

Private Property Get cStep_VersionNo() As String

   cStep_VersionNo = mcStep.VersionNo

End Property

Private Property Let cStep_WorkspaceId(ByVal
RHS As Long)

   mcStep.WorkspaceId = RHS

End Property

Private Property Get cStep_WorkspaceId() As Long

   cStep_WorkspaceId = mcStep.WorkspaceId

End Property
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cNode"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cNode.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Defines the properties that an
object has to implement.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Public Property Get IndOperation() As Operation
End Property
Public Property Let IndOperation(ByVal vdata As
Operation)
End Property
Public Sub Validate()
End Sub
Public Property Get Value() As String
End Property
Public Property Let Value(ByVal vdata As String)
```

```
End Property

Public Property Get NodeDB() As Database
End Property
Public Property Set NodeDB(vdata As
Database)
End Property

Public Property Get Position() As Long
End Property
Public Property Let Position(ByVal vdata
As Long)
End Property

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cNodeCollections"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cNodeCollections.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Implements an array of
objects.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Node counter
Private mlngNodeCount As Long
Private mdbsNodeDb As Database
Private mcarrNodes() As Object

' Used to indicate the source module name
when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cNodeCollections."

Public Property Set Item(ByVal Position As
Long, _
      ByVal objNode As Object)

    ' Returns the element at the passed in
position in the array
    If Position >= 0 And Position <
mlngNodeCount Then
       Set mcarrNodes(Position) = objNode
    Else
       On Error GoTo 0
       Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _

LoadResString(errItemDoesNotExist)
    End If

End Property
Public Property Get Item(ByVal Position As
Long) As Object
Attribute Item.VB_UserMemId = 0

    ' Returns the element at the passed in
position in the array
    If Position >= 0 And Position <
mlngNodeCount Then
       Set Item = mcarrNodes(Position)
    Else
       On Error GoTo 0
       Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _
          LoadResString(errItemDoesNotExist)
    End If

End Property

Public Sub Commit(ByVal cSaveObj As
Object, _
       ByVal lngIndex As Long)
    ' This procedure checks if any changes have
been made to the
    ' passed in object. If so, it calls the
corresponding method
    ' to commit the changes.

    On Error GoTo CommitErr
    mstrSource = mstrModuleName &
"Commit"

    Select Case cSaveObj.IndOperation
       Case QueryOp
          ' No changes were made to the queried
parameter.
          ' Do nothing

       Case InsertOp
          cSaveObj.Add
          cSaveObj.IndOperation = QueryOp

       Case UpdateOp
          cSaveObj.Modify
          cSaveObj.IndOperation = QueryOp

       Case DeleteOp
          cSaveObj.Delete
          ' Now we can remove the record from
the array
          Call Unload(lngIndex)

    End Select

    Exit Sub

CommitErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"Commit"
    On Error GoTo 0
    Err.Raise vbObjectError + errCommitFailed,
_
          mstrSource, _
          LoadResString(errCommitFailed)

End Sub
Public Sub Save(ByVal lngWorkspace As
Long)
    ' Calls a procedure to commit all changes for
the passed
    ' in workspace.

    Dim lngIndex As Long

    On Error GoTo SaveErr

    ' Find all parameters in the array with a
matching workspace id
    ' It is important to step backwards through
the array, since
    ' we delete parameter records as we go
along!
    For lngIndex = mlngNodeCount - 1 To 0
Step -1
       If mcarrNodes(lngIndex).WorkspaceId =
lngWorkspace Then

          ' Call a procedure to commit all changes to
the
          ' parameter record, if any
          Call Commit(mcarrNodes(lngIndex),
lngIndex)

       End If
    Next lngIndex

    Exit Sub

SaveErr:
    LogErrors Errors
    mstrSource = mstrModuleName & "Save"
    On Error GoTo 0
    Err.Raise vbObjectError + errSaveFailed, _
          mstrSource, _
          LoadResString(errSaveFailed)

End Sub
Public Property Get Count() As Long

    Count = mlngNodeCount

End Property

Public Property Get NodeDB() As Database

    Set NodeDB = mdbsNodeDb

End Property
Public Property Set NodeDB(vdata As Database)

    Set mdbsNodeDb = vdata

End Property

Public Sub Load(cNodeToLoad As Object)
    ' Adds the passed in object to the array

    On Error GoTo LoadErr

    ' If this procedure is called by the add to array
procedure,
    ' the database object has already been initialized
    If cNodeToLoad.NodeDB Is Nothing Then

       ' All the Nodes will be initialized with the
database
       ' objects before being added to the array
       Set cNodeToLoad.NodeDB = mdbsNodeDb

    End If

    ReDim Preserve mcarrNodes(mlngNodeCount)

    ' Set the newly added element in the array to the
passed in Node
    cNodeToLoad.Position = mlngNodeCount
    Set mcarrNodes(mlngNodeCount) =
cNodeToLoad

    mlngNodeCount = mlngNodeCount + 1

    Exit Sub

LoadErr:
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError + errLoadFailed,
mstrModuleName & "Load", _
          LoadResString(errLoadFailed)
```

```
End Sub
Public Sub Unload(lngDeletePosition As
Long)
   ' Unloads the passed in object from the
array

   On Error GoTo UnloadErr

   If lngDeletePosition < (mlngNodeCount -
1) Then

      ' Set the Node at the position being
deleted to
      ' the last Node in the Node array
      Set mcarrNodes(lngDeletePosition) =
mcarrNodes(mlngNodeCount - 1)

mcarrNodes(lngDeletePosition).Position =
lngDeletePosition
   End If

   ' Delete the last Node from the array
   mlngNodeCount = mlngNodeCount - 1
   If mlngNodeCount > 0 Then
      ReDim Preserve mcarrNodes(0 To
mlngNodeCount - 1)
   Else
      ReDim mcarrNodes(0)
   End If

   Exit Sub

UnloadErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"Unload"
   On Error GoTo 0
   Err.Raise vbObjectError +
errUnloadFailed, _
         mstrSource, _
         LoadResString(errUnloadFailed)

End Sub
Public Sub Delete(lngDeletePosition As
Long)
   ' Deletes the object at the specified
position in the
   ' array

   Dim cDeleteObj As Object

   On Error GoTo DeleteErr
   mstrSource = mstrModuleName &
"Delete"

   Set cDeleteObj =
mcarrNodes(lngDeletePosition)

   If cDeleteObj.IndOperation = InsertOp
Then
      ' If we are deleting a record that has just
been inserted,
      ' blow it away
      Call Unload(lngDeletePosition)
   Else
      ' Set the operation for the deleted object
to indicate a
      ' delete - we actually delete the element
only at the time
      ' of a save operation
      cDeleteObj.IndOperation = DeleteOp
   End If

   Exit Sub

DeleteErr:
   LogErrors Errors
   mstrSource = mstrModuleName & "Delete"
   On Error GoTo 0
   Err.Raise vbObjectError + errDeleteFailed, _
         mstrSource, _
         LoadResString(errDeleteFailed)

End Sub
Public Sub Modify(cModifiedNode As Object)
   ' Sets the object at the passed in position to
the
   ' modified object passed in

   On Error GoTo ModifyErr

   ' First check if the record is valid - all objects
that
   ' use this collection class must have a
Validate routine
   cModifiedNode.Validate

   ' If we are updating a record that hasn't yet
been inserted,
   ' do not change the operation indicator - or
we try to update
   ' a non-existant record
   If cModifiedNode.IndOperation <> InsertOp
Then
      ' Set the operations to indicate an update
      cModifiedNode.IndOperation =
UpdateOp
   End If

   ' Modify the object at the queried position -
the Position
   ' will be maintained by this class
   Set mcarrNodes(cModifiedNode.Position) =
cModifiedNode

   Exit Sub

ModifyErr:
   LogErrors Errors
   mstrSource = mstrModuleName & "Modify"
   On Error GoTo 0
   Err.Raise vbObjectError + errModifyFailed,
_
         mstrSource, _
         LoadResString(errModifyFailed)

End Sub
Public Sub Add(cNodeToAdd As Object)

   On Error GoTo AddErr

   Set cNodeToAdd.NodeDB = mdbsNodeDb

   ' First check if the record is valid
   cNodeToAdd.Validate

   ' Set the operation to indicate an insert
   cNodeToAdd.IndOperation = InsertOp

   ' Call a procedure to load the record in the
array
   Call Load(cNodeToAdd)

   Exit Sub

AddErr:
   LogErrors Errors
   mstrSource = mstrModuleName & "Add"
   On Error GoTo 0
   Err.Raise vbObjectError + errAddFailed, _
         mstrSource, _
         LoadResString(errAddFailed)

End Sub

Private Sub Class_Terminate()

   ReDim mcarrNodes(0)
   mlngNodeCount = 0

End Sub


Attribute VB_Name = "Common"
'  FILE:      Common.bas
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
'  PURPOSE:   Module containing common
functionality throughout
'             StepMaster
'  Contact:   Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private Const mstrModuleName As String =
"Common."

' Used to separate the variable data from the
constant error
' message being raised when a context-sensitive
error is displayed
Private Const mintDelimiter As String = " : "
Private Const mstrFormatString = "mmddyy"

' Identifiers for the different labels that need to be
loaded
' into the tree view for each workspace
Public Const mstrWorkspacePrefix = "W"
Public Const mstrParameterPrefix = "P"
Public Const mstrParamConnectionPrefix = "C"
Public Const mstrConnectionDtlPrefix = "N"
Public Const mstrParamExtensionPrefix = "E"
Public Const mstrParamBuiltInPrefix = "B"
Public Const gstrGlobalStepPrefix = "G"
Public Const gstrManagerStepPrefix = "M"
Public Const gstrWorkerStepPrefix = "S"
Public Const gstrDummyPrefix = "D"
Public Const mstrLabelPrefix = "L"
Public Const mstrInstancePrefix = "I"
Public Function LabelStep(lngWorkspaceIdentifier
As Long) As String
   ' Returns the step label for the workspace
identifier passed in
   ' Basically this is a wrapper around the
MakeKeyValid function

   LabelStep = MakeKeyValid(gintStepLabel,
gintStepLabel, lngWorkspaceIdentifier)

End Function


Public Function JulianDateToString(dt64Bit As
Currency) As String

   Dim lYear As Long
   Dim lMonth As Long
   Dim lDay As Long
   Dim lHour As Long
   Dim lMin As Long
```

```
    Dim lSec As Long
    Dim lMs As Long

    Call JulianToTime(dt64Bit, lYear,
lMonth, lDay, lHour, lMin, lSec, lMs)
    JulianDateToString = Format$(lYear,
gsYearFormat) & gsDateSeparator & _
            Format$(lMonth, gsDtFormat) &
gsDateSeparator & _
            Format$(lDay, gsDtFormat) &
gstrBlank & _
            Format$(lHour, gsTmFormat) &
gsTimeSeparator & _
            Format$(lMin, gsTmFormat) &
gsTimeSeparator & _
            Format$(lSec, gsTmFormat) &
gsMsSeparator & _
            Format$(lMs, gsMSecondFormat)

End Function
Public Sub DeleteFile(strFile As String,
Optional ByVal bCheckIfEmpty As Boolean
= False)

    ' Ensure that there is only a single file of
the name before delete, since
    ' Kill supports wildcards and can
potentially delete a number of files
    Dim strTemp As String

    If CheckFileExists(strFile) Then
        If bCheckIfEmpty Then
            If FileLen(strFile) = 0 Then
                Kill strFile
            End If
        Else
            Kill strFile
        End If
    End If

End Sub
Public Function CheckFileExists(strFile As
String) As Boolean

    ' Returns true if the passed in file exists
    ' Raises an error if multiple files are found
(filename contains a wildcard)
    CheckFileExists = False

    If Not StringEmpty(Dir(strFile)) Then
        If Not StringEmpty(Dir()) Then
            On Error GoTo 0
            Err.Raise vbObjectError +
errDeleteSingleFile, _
                mstrModuleName & "DeleteFile",
LoadResString(errDeleteSingleFile)
        End If

        CheckFileExists = True
    End If

End Function

Public Function GetVersionString() As
String
GetVersionString = "Version " & gsVersion
End Function

Function IsLabel(strKey As String) As
Boolean

    ' The tree view control on frmMain can
contain two types of
    ' nodes -
    ' 1. Nodes that contain data for the
workspace - this could
    ' be data for the different types of steps or
parameters
    ' 2. Nodes that display static data - these kind
of nodes
    ' are referred to as label nodes e.g. "Global
Steps" is a
    ' label node
    ' This function returns True if the passed in
key corresponds
    ' to a label node

    IsLabel = InStr(strKey, mstrLabelPrefix) > 0

End Function

Function MakeKeyValid(lngIdentifier As
Long, _
    intTypeOfNode As Integer, _
    Optional ByVal WorkspaceId As Long = 0,
_
    Optional ByVal InstanceId As Long = 0) As
String

    ' We use a numbering scheme while loading
the tree view with
    ' all node data, since it needs a unique key
and we want to
    ' use the key to identify the data it contains.
    ' Moreover, add a character to the beginning
of the identifier
    ' so that the tree view control accepts it as a
valid string,
    ' viz. "456" doesn't work, so change it to
"W456"
    ' The general scheme is to concatenate a
Label with the Identifier
    ' e.g A Global Step Node will have the
Label, G and the Step Id
    ' concatenated to form the unique key
    ' The list of all such node types is given
below
    ' 1. "W" + Workspace_Id for Workspace
nodes
    ' 2. "P" + Parameter_Id for Parameter nodes
    ' 3. "M" + Step_Id for Manager Step nodes
    ' 4. "S" + Step_Id for Worker Step nodes
    ' 5. "G" + Step_Id for Global Step nodes
    ' 6. Instance_id + "I" + Step_Id for Instance
nodes
    ' 7. Workspace_id + "L" + the label
identifier = node type for all Label nodes
    ' Since the manager, worker and global steps
are stored in the
    ' same table and the step identifiers will
always be unique, we
    ' can use the same character as the prefix, but
this is a
    ' convenient way to know the type of step
being processed.
    ' The workspace id is appended to the label
identifier to make
    ' it unique, since multiple workspaces may
be open during a session
    ' Strip the prefix characters off while saving
the Ids to the db

    Dim strPrefixChar As String

    On Error GoTo MakeKeyValidErr
    gstrSource = mstrModuleName &
"MakeKeyValid"

    Select Case intTypeOfNode
        Case gintWorkspace
            strPrefixChar = mstrWorkspacePrefix
        Case gintGlobalStep
            strPrefixChar = gstrGlobalStepPrefix
        Case gintManagerStep
            strPrefixChar = gstrManagerStepPrefix
        Case gintWorkerStep
            strPrefixChar = gstrWorkerStepPrefix
        Case gintRunManager, gintRunWorker
            If InstanceId = 0 Then
                On Error GoTo 0
                Err.Raise vbObjectError +
errMandatoryParameterMissing, _
                    gstrSource, _

LoadResString(errMandatoryParameterMissing)
            End If
            ' Concatenate the instance identifier and the
step
            ' identifier to form a unique key
            strPrefixChar = Trim$(Str$(InstanceId)) &
mstrInstancePrefix
        Case gintParameter
            strPrefixChar = mstrParameterPrefix
        Case gintNodeParamConnection
            strPrefixChar = mstrParamConnectionPrefix
        Case gintConnectionDtl
            strPrefixChar = mstrConnectionDtlPrefix
        Case gintNodeParamExtension
            strPrefixChar = mstrParamExtensionPrefix
        Case gintNodeParamBuiltIn
            strPrefixChar = mstrParamBuiltInPrefix
        Case gintGlobalsLabel, gintParameterLabel,
gintParamConnectionLabel, _
                gintConnDtlLabel, _
                gintParamExtensionLabel,
gintParamBuiltInLabel, gintGlobalStepLabel, _
                gintStepLabel
            If WorkspaceId = 0 Then
                ' The Workspace Id has to be specified for
a label node
                ' Otherwise it will not be possible to
generate unique label
                ' identifiers if multiple workspaces are
open
                On Error GoTo 0
                Err.Raise vbObjectError +
errWorkspaceIdMandatory, _
                    gstrSource, _

LoadResString(errWorkspaceIdMandatory)
            End If
            ' For all labels, the workspace identifier and
the
            ' label prefix are concatenated to form the
key
            strPrefixChar = Trim$(Str$(WorkspaceId))
& mstrLabelPrefix
        Case Else
            On Error GoTo 0
            Err.Raise vbObjectError +
errInvalidNodeType, _
                gstrSource, _
                LoadResString(errInvalidNodeType)
    End Select

    MakeKeyValid = strPrefixChar &
Trim$(Str$(lngIdentifier))

    Exit Function

MakeKeyValidErr:
    Call LogErrors(Errors)
    On Error GoTo 0
```

```
    Err.Raise vbObjectError +
errMakeKeyValidFailed, _
            gstrSource, _

LoadResString(errMakeKeyValidFailed)

End Function

Function MakeIdentifierValid(strKey As
String) As Long

    ' Returns the Identifier corresponding to
the passed in key
    ' (Reverse of what was done in
MakeKeyValid)

    On Error GoTo MakeIdentifierValidErr

    If IsLabel(strKey) Then
        ' If the key corresponds to a label node,
the identifier
        ' appears to the right of the label prefix
        MakeIdentifierValid = Val(Mid(strKey,
InStr(strKey, mstrLabelPrefix) + 1))
    ElseIf InStr(strKey, mstrInstancePrefix) =
0 Then
        ' For all other nodes, stripping the first
character off
        ' returns a valid Id
        MakeIdentifierValid = Val(Mid(strKey,
2))
    Else
        ' Instance node - strip of all characters
till the
        ' instance prefix
        MakeIdentifierValid = Val(Mid(strKey,
InStr(strKey, mstrInstancePrefix) + 1))
    End If

    Exit Function

MakeIdentifierValidErr:
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errMakeIdentifierValidFailed, _
            mstrModuleName &
"MakeIdentifierValid", _

LoadResString(errMakeIdentifierValidFaile
d)

End Function
Public Function IsInstanceNode(strNodeKey
As String) As Boolean

    ' Returns true if the passed in node key
corresponds to a step instance
    IsInstanceNode = InStr(strNodeKey,
mstrInstancePrefix) > 0

End Function
Public Function IsBuiltInLabel(strNodeKey
As String) As Boolean

    ' Returns true if the passed in node key
corresponds to a step instance
    IsBuiltInLabel = (IsLabel(strNodeKey)
And _
        (MakeIdentifierValid(strNodeKey) =
gintParamBuiltInLabel))

End Function

Public Sub ShowBusy()
    ' Modifies the mousepointer to indicate that
the
    ' application is busy

    On Error Resume Next

    Screen.MousePointer = vbHourglass

End Sub
Public Sub ShowFree()
    ' Modifies the mousepointer to indicate that
the
    ' application has finished processing and is
ready
    ' to accept user input

    On Error Resume Next

    Screen.MousePointer = vbDefault

End Sub

Public Function InstrR(strMain As String, _
        strSearch As String) As Integer
    ' Finds the last occurrence of the passed in
string

    Dim intPos As Integer
    Dim intPrev As Integer

    On Error GoTo InstrRErr

    intPrev = intPos
    intPos = InStr(1, strMain, strSearch)

    Do While intPos > 0
        intPrev = intPos
        intPos = InStr(intPos + 1, strMain,
strSearch)
    Loop
    InstrR = intPrev

    Exit Function

InstrRErr:
    Call LogErrors(Errors)
    gstrSource = mstrModuleName & "InstrR"
    On Error GoTo 0
    Err.Raise vbObjectError + errInstrRFailed, _
        gstrSource, _
        LoadResString(errInstrRFailed)

End Function

Public Function GetDefaultDir(lWspId As
Long, WspParameters As cArrParameters) As
String

    Dim sDir As String
    sDir = SubstituteParameters( _
            gstrEnvVarSeparator &
PARAM_DEFAULT_DIR &
gstrEnvVarSeparator, _
            lWspId,
WspParameters:=WspParameters)
    MakePathValid (sDir & gstrFileSeparator &
"a.txt")
    GetDefaultDir = GetShortName(sDir)
    If StringEmpty(GetDefaultDir) Then
        GetDefaultDir = App.Path
    End If

End Function

Public Sub AddArrayElement(ByRef arrNodes() As
Object, _
        ByVal objToAdd As Object, _
        ByRef lngCount As Long)
    ' Adds the passed in object to the array

    On Error GoTo AddArrayElementErr

    ' Increase the array dimension and add the object
to it
    ReDim Preserve arrNodes(lngCount)
    Set arrNodes(lngCount) = objToAdd
    lngCount = lngCount + 1

    Exit Sub

AddArrayElementErr:
    LogErrors Errors
    gstrSource = mstrModuleName &
"AddArrayElement"
    On Error GoTo 0
    Err.Raise vbObjectError +
errAddArrayElementFailed, _
            gstrSource, _
            LoadResString(errAddArrayElementFailed)

End Sub


Public Function CheckForNullField(rstRecords As
Recordset, strFieldName As String) As String

    ' Returns an empty string if a given field is null
    On Error GoTo CheckForNullFieldErr

    If IsNull(rstRecords.Fields(strFieldName)) Then
        CheckForNullField = gstrEmptyString
    Else
        CheckForNullField =
rstRecords.Fields(strFieldName)
    End If
    Exit Function

CheckForNullFieldErr:
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errCheckForNullFieldFailed, _
            mstrModuleName & "CheckForNullField",
_

LoadResString(errCheckForNullFieldFailed)

End Function

Public Function ErrorOnNullField(rstRecords As
Recordset, strFieldName As String) As Variant

    ' If a given field is null, raises an error
    ' Else, returns the field value in a variant
    ' The calling function must convert the return
value to the
    ' appropriate type
    On Error GoTo ErrorOnNullFieldErr
    gstrSource = mstrModuleName &
"ErrorOnNullField"

    If IsNull(rstRecords.Fields(strFieldName)) Then
        On Error GoTo 0
        Err.Raise vbObjectError +
errMandatoryFieldNull, _
            gstrSource, _
            strFieldName & mintDelimiter &
LoadResString(errMandatoryFieldNull)
    Else
```

```
      ErrorOnNullField =
rstRecords.Fields(strFieldName)
   End If
   Exit Function

ErrorOnNullFieldErr:
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errUnableToCheckNull, _
      gstrSource, _
      strFieldName & mintDelimiter &
LoadResString(errUnableToCheckNull)

End Function
Public Function
StringEmpty(strCheckString As String) As
Boolean

   StringEmpty = (strCheckString =
gstrEmptyString)

End Function
Public Function
GetIteratorValue(cStepIterators As
cRunColIt, _
      ByVal strItName As String)

   Dim lngIndex As Long
   Dim strValue As String

   On Error GoTo GetIteratorValueErr
   gstrSource = mstrModuleName &
"GetIteratorValue"

   ' Find the iterator in the Iterators
collection
   For lngIndex = 0 To cStepIterators.Count
- 1
      If
cStepIterators(lngIndex).IteratorName =
strItName Then
         strValue =
cStepIterators(lngIndex).Value
         Exit For
      End If
   Next lngIndex

   If lngIndex > cStepIterators.Count - 1
Then
      ' The iterator has not been defined for
the branch
      ' Raise an error
      On Error GoTo 0
      Err.Raise vbObjectError +
errParamNameInvalid, _
            gstrSource, _

LoadResString(errParamNameInvalid)
   End If

   GetIteratorValue = strValue
   Exit Function

GetIteratorValueErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   gstrSource = mstrModuleName &
"GetIteratorValue"
   On Error GoTo 0
   Err.Raise vbObjectError +
errGetParamValueFailed, _
         gstrSource, _
LoadResString(errGetParamValueFailed)

End Function
Public Function SubstituteParameters(ByVal
strComString As String, _
      ByVal lngWorkspaceId As Long, _
      Optional StepIterators As cRunColIt =
Nothing, _
      Optional WspParameters As
cArrParameters = Nothing) As String
   ' This function substitutes all parameter
names and
   ' environment variables in the passed in
string with
   ' their values. It also substitutes the value for
the
   ' iterators, if any.
   ' Since the syntax is to enclose parameter
names and
   ' environment variables in "%", we check if
a given
   ' variable is a parameter - if so, we substitute
the
   ' parameter value - else we try to get the
value from
   ' the environment

   Dim intPos As Integer
   Dim intEndPos As Integer
   Dim strEnvVariable As String
   Dim strValue As String
   Dim strCommand As String
   Dim cTempStr As cStringSM

   ' Initialize the return value of the function to
the
   ' passed in command
   strCommand = strComString

   If WspParameters Is Nothing Then Set
WspParameters = gcParameters

   Set cTempStr = New cStringSM

   intPos = InStr(strCommand,
gstrEnvVarSeparator)
   Do While intPos <> 0
      If Mid(strCommand, intPos + 1, 1) =
gstrEnvVarSeparator Then
         ' Wildcard character - to be substituted
by a single % - later!
         intPos = intPos + 2
         If intPos > Len(strCommand) Then
Exit Do
      Else
         ' Extract the environment variable from
the passed
         ' in string
         intEndPos = InStr(intPos + 1,
strCommand, gstrEnvVarSeparator)

         If intEndPos > 0 Then
            strEnvVariable = Mid(strCommand,
intPos + 1, intEndPos - intPos - 1)
         Else
            On Error GoTo 0
            Err.Raise vbObjectError +
errParamSeparatorMissing, _
                  gstrSource, _

LoadResString(errParamSeparatorMissing)
         End If
         strValue = gstrEmptyString
         ' Get the value of the variable and call a
function
         ' to replace the variable with it's value
         strValue = GetValue(strEnvVariable,
lngWorkspaceId, StepIterators, WspParameters)
         ' The function raises an error if the variable
is
         ' not found
         strCommand =
cTempStr.ReplaceSubString(strCommand, _
               gstrEnvVarSeparator & strEnvVariable
& gstrEnvVarSeparator, _
               strValue)
      End If

      intPos = InStr(intPos, strCommand,
gstrEnvVarSeparator)
   Loop

   strCommand =
cTempStr.ReplaceSubString(strCommand, _
         gstrEnvVarSeparator &
gstrEnvVarSeparator, gstrEnvVarSeparator)

   Set cTempStr = Nothing
   SubstituteParameters = strCommand

End Function
Private Function GetValue(ByVal strParameter As
String, _
      ByVal lngWorkspaceId As Long, _
      cStepIterators As cRunColIt, _
      WspParameters As cArrParameters) As String
   ' This function returns the value for the passed in
   ' parameter - it may be a workspace parameter, an
   ' environment variable or an iterator

   Dim intPos As Integer
   Dim intEndPos As Integer
   Dim strVariable As String
   Dim strValue As String
   Dim cParamRec As cParameter

   On Error GoTo GetValueErr

   ' Initialize the return value of the function to the
   ' empty
   strValue = gstrEmptyString

   intPos = InStr(strParameter,
gstrEnvVarSeparator)
   If intPos > 0 Then
      ' Extract the variable from the passed in string
      intEndPos = InStr(intPos + 1, strParameter,
gstrEnvVarSeparator)
      If intEndPos = 0 Then
         intEndPos = Len(strParameter)
      End If

      strVariable = Mid(strParameter, intPos + 1,
intEndPos - intPos - 1)
   Else
      ' The separator charactor has not been passed
in -
      ' try to find the value of the passed in
parameter
      strVariable = strParameter
   End If

   If Not StringEmpty(strVariable) Then
      ' Check if this is the timestamp parameter first
      If strVariable = gstrTimeStamp Then
         strValue = Format$(Now, mstrFormatString,
_
```

```
            vbUseSystemDayOfWeek,
vbUseSystem)
      Else
         ' Try to find a parameter for the
workspace with
         ' the same name
         Set cParamRec =
WspParameters.GetParameterValue(lngWor
kspaceId, _
               strVariable)
         If cParamRec Is Nothing Then
            If Not cStepIterators Is Nothing
Then
               ' If the string is not a parameter,
then check
               ' if it is an iterator
               strValue =
GetIteratorValue(cStepIterators, strVariable)
            End If

            If StringEmpty(strValue) Then
               ' Neither - Check if it is an
environment variable
               strValue =
Environ$(strVariable)
               If StringEmpty(strValue) Then
                  On Error GoTo 0
                  WriteError
errSubValuesFailed, _
                        OptArgs:="Invalid
parameter: " & gstrSQ & strVariable &
gstrSQ
                  Err.Raise vbObjectError +
errSubValuesFailed, _
                        mstrModuleName &
"GetValue", _

LoadResString(errSubValuesFailed) &
"Invalid parameter: " & gstrSQ &
strVariable & gstrSQ
               End If
            End If
         Else
            strValue =
cParamRec.ParameterValue
         End If
      End If
   End If

   GetValue = strValue

   Exit Function

GetValueErr:
   If Err.Number = vbObjectError +
errParamNameInvalid Then
      ' If the parameter has not been defined
for the
      ' workspace then check if it is an
environment
      ' variable
      Resume Next
   End If

   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   gstrSource = mstrModuleName &
"GetValue"
   WriteError errSubValuesFailed,
gstrSource, "Parameter: " & gstrSQ &
strVariable & gstrSQ
   On Error GoTo 0
   Err.Raise vbObjectError +
errSubValuesFailed, _
         gstrSource, _
         LoadResString(errSubValuesFailed) &
"Parameter: " & gstrSQ & strVariable &
gstrSQ

End Function
Public Function SQLFixup(strField As String)
As String
   ' Returns a string that can be executed by
SQL Server

   Dim cMyStr As New cStringSM
   Dim strTemp As String

   On Error GoTo SQLFixupErr

   strTemp = strField
   SQLFixup = strTemp

   ' Single-quotes have to be replaced by two
single-quotes,
   ' since a single-quote is the identifier
delimiter
   ' character - call a procedure to do the
replace
'    SQLFixup =
cMyStr.ReplaceSubString(strTemp, gstrDQ,
"\" & gstrDQ)

   ' Replace pipe characters with the
corresponding chr function
   ' SQLFixup =
cMyStr.ReplaceSubString(strTemp, gstrDQ,
gstrDQ & gstrDQ)

   Exit Function

SQLFixupErr:
   gstrSource = mstrModuleName &
"SQLFixup"
   LogErrors Errors
   On Error GoTo 0
   Err.Raise vbObjectError +
errMakeFieldValidFailed, _
         gstrSource,
LoadResString(errMakeFieldValidFailed)

End Function
Public Function TranslateStepLabel(sLabel As
String) As String
   ' Translates the passed in step label to a valid
file name
   ' All characters in the label that are invalid
for filenames (viz. \ / : * ? " < > |)
   ' and spaces are substituted with underscores
- also ensure that the resulting filename
   ' is not greater than 255 characters
   Dim cTempStr As New cStringSM
   TranslateStepLabel =
cTempStr.ReplaceSubString(sLabel,
gstrFileSeparator, "_")
   TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepLab
el, "/", gstrUnderscore)
   TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepLab
el, ":", gstrUnderscore)
   TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepLab
el, "*", gstrUnderscore)
   TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepLab
el, "?", gstrUnderscore)
   TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepLabel,
gstrDQ, gstrUnderscore)
   TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepLabel,
"<", gstrUnderscore)
   TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepLabel,
">", gstrUnderscore)
   TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepLabel,
"|", gstrUnderscore)
   TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepLabel,
gstrBlank, gstrUnderscore)

   ' Commas are substituted with underscores since
the command shell uses a comma to
   ' delimit commands
   TranslateStepLabel =
cTempStr.ReplaceSubString(TranslateStepLabel,
",", gstrUnderscore)

   If Len(TranslateStepLabel) > MAX_PATH Then
      TranslateStepLabel = Mid(TranslateStepLabel,
1, MAX_PATH)
   End If

End Function

Public Function TypeOfObject(ByVal objNode As
Object) As Integer
   ' Determines the type of object that is passed in

   On Error GoTo TypeOfObjectErr
   gstrSource = mstrModuleName &
"TypeOfObject"

   Select Case TypeName(objNode)
      Case "cWorkspace"
         TypeOfObject = gintWorkspace

      Case "cParameter"
         TypeOfObject = gintParameter

      Case "cConnection"
         TypeOfObject = gintParameterConnect

      Case "cConnDtl"
         TypeOfObject = gintConnectionDtl

      Case "cGlobalStep"
         TypeOfObject = gintGlobalStep

      Case "cManager"
         TypeOfObject = gintManagerStep

      Case "cWorker"
         TypeOfObject = gintWorkerStep

      Case "cStep"
         ' If a step record is passed in, call a function
         ' to determine the type of step
         TypeOfObject =
TypeOfStep(StepClass:=objNode)

      Case Else
         WriteError errTypeOfObjectFailed,
gstrSource, _
               TypeName(objNode)
         On Error GoTo 0
         Err.Raise vbObjectError +
errTypeOfObjectFailed, _
               gstrSource, _
```

```
LoadResString(errTypeOfObjectFailed)
   End Select

   Exit Function

TypeOfObjectErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errTypeOfObjectFailed, _
         gstrSource, _

LoadResString(errTypeOfObjectFailed)

End Function
Attribute VB_Name = "ConnDtlCommon"
' FILE:      ConnDtlCommon.bas
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:   Contains functionality
common across StepMaster and
'            SMRunOnly, pertaining to
connections
'            Specifically, functions to load
connections in an array
'            and so on.
' Contact:   Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this module
Private Const mstrModuleName As String =
"ConnDtlCommon."

Public Sub
LoadRSInConnDtlArray(rstConns As
Recordset, cConns As cConnDtls)

   Dim cNewConnDtl As cConnDtl

   On Error GoTo
LoadRSInConnDtlArrayErr

   If rstConns.RecordCount = 0 Then
      Exit Sub
   End If

   rstConns.MoveFirst
   While Not rstConns.EOF

      Set cNewConnDtl = New cConnDtl

      ' Initialize ConnDtl values
      ' Call a procedure to raise an error if
mandatory fields are null.
      cNewConnDtl.ConnNameId =
ErrorOnNullField(rstConns,
FLD_ID_CONN_NAME)
      cNewConnDtl.WorkspaceId =
ErrorOnNullField(rstConns,
FLD_ID_WORKSPACE)
      cNewConnDtl.ConnName =
CStr(ErrorOnNullField(rstConns,
FLD_CONN_DTL_CONNECTION_NAM
E))
      cNewConnDtl.ConnectionString =
CheckForNullField(rstConns,
FLD_CONN_DTL_CONNECTION_STRING
)
      cNewConnDtl.ConnType =
CheckForNullField(rstConns,
FLD_CONN_DTL_CONNECTION_TYPE)

      cConns.Load cNewConnDtl

      Set cNewConnDtl = Nothing
      rstConns.MoveNext
   Wend

   Exit Sub

LoadRSInConnDtlArrayErr:
   LogErrors Errors
   gstrSource = mstrModuleName &
"LoadRSInConnDtlArray"
   On Error GoTo 0
   Err.Raise vbObjectError +
errLoadRsInArrayFailed, gstrSource, _

LoadResString(errLoadRsInArrayFailed)
End Sub
Attribute VB_Name = "ConnectionCommon"
' FILE:      ConnnectionCommon.bas
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:   Contains functionality common
across StepMaster and
'            SMRunOnly, pertaining to connection
strings
'            Specifically, functions to load
connections strings
'            in an array and so on.
' Contact:   Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this module
Private Const mstrModuleName As String =
"ConnectionCommon."

Public Sub
LoadRecordsetInConnectionArray(rstConns
As Recordset, cConns As cConnections)

   Dim cNewConnection As cConnection

   On Error GoTo
LoadRecordsetInConnectionArrayErr

   If rstConns.RecordCount = 0 Then
      Exit Sub
   End If

   rstConns.MoveFirst
   While Not rstConns.EOF

      Set cNewConnection = New cConnection

      ' Initialize Connection values
      ' Call a procedure to raise an error if
mandatory fields are null.
      cNewConnection.ConnectionId =
ErrorOnNullField(rstConns, "connection_id")
      cNewConnection.WorkspaceId =
CStr(ErrorOnNullField(rstConns,
FLD_ID_WORKSPACE))
      cNewConnection.ConnectionName =
CStr(ErrorOnNullField(rstConns,
"connection_name"))
      cNewConnection.ConnectionValue =
CheckForNullField(rstConns, "connection_value")
      cNewConnection.Description =
CheckForNullField(rstConns, "description")

      cNewConnection.NoCountDisplay =
CheckForNullField(rstConns, "no_count_display")
      cNewConnection.NoExecute =
CheckForNullField(rstConns, "no_execute")
      cNewConnection.ParseQueryOnly =
CheckForNullField(rstConns, "parse_query_only")
      cNewConnection.QuotedIdentifiers =
CheckForNullField(rstConns,
"ANSI_quoted_identifiers")
      cNewConnection.AnsiNulls =
CheckForNullField(rstConns, "ANSI_nulls")
      cNewConnection.ShowQueryPlan =
CheckForNullField(rstConns, "show_query_plan")
      cNewConnection.ShowStatsTime =
CheckForNullField(rstConns, "show_stats_time")
      cNewConnection.ShowStatsIO =
CheckForNullField(rstConns, "show_stats_io")
      cNewConnection.ParseOdbcMsg =
CheckForNullField(rstConns,
"parse_odbc_msg_prefixes")
      cNewConnection.RowCount =
CheckForNullField(rstConns, "row_count")
      cNewConnection.TsqlBatchSeparator =
CheckForNullField(rstConns,
"tsql_batch_separator")
      cNewConnection.QueryTimeOut =
CheckForNullField(rstConns, "query_time_out")
      cNewConnection.ServerLanguage =
CheckForNullField(rstConns, "server_language")
      cNewConnection.CharacterTranslation =
CheckForNullField(rstConns,
"character_translation")
      cNewConnection.RegionalSettings =
CheckForNullField(rstConns, "regional_settings")

      cConns.Load cNewConnection

      Set cNewConnection = Nothing
      rstConns.MoveNext
   Wend

   Exit Sub

LoadRecordsetInConnectionArrayErr:
   LogErrors Errors
   gstrSource = mstrModuleName &
"LoadRecordsetInConnectionArray"
   On Error GoTo 0
   Err.Raise vbObjectError +
errLoadRsInArrayFailed, gstrSource, _
         LoadResString(errLoadRsInArrayFailed)
End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cParameter"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:      cParameter.cls
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
```

```
'               All Rights Reserved
'
'
' PURPOSE:     Encapsulates the properties
and methods of a parameter.
'               Contains functions to insert,
update and delete
'               workspace_parameters records
from the database.
' Contact:     Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit
Option Base 0

' Local variable(s) to hold property value(s)
Private mlngWorkspaceId As Long
Private mlngParameterId As Long
Private mstrParameterName As String
Private mstrParameterValue As String
Private mstrDescription As String
Private mintParameterType As Integer
Private mdbsStepMaster As Database
Private mintOperation As Operation
Private mlngPosition As Long

' Used to indicate the source module name
when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cParameter."

' The cSequence class is used to generate
unique parameter identifiers
Private mParameterSeq As cSequence

' The StringSM class is used to carry out
string operations
Private mFieldValue As cStringSM

' Parameter types
Public Enum ParameterType
   gintParameterGeneric = 0
   gintParameterConnect
   gintParameterApplication
   gintParameterBuiltIn
End Enum


Private Sub AssignParameters(qyExec As
DAO.QueryDef)
   ' Assigns values to the parameters in the
querydef object
   ' The parameter names are cryptic to make
them different
   ' from the field names. When the
parameter names are
   ' the same as the field names, parameters
in the where
   ' clause do not get created.

   Dim prmParam As DAO.Parameter

   On Error GoTo AssignParametersErr

   For Each prmParam In
qyExec.Parameters
      Select Case prmParam.Name
         Case "[w_id]"
            prmParam.Value =
mlngWorkspaceId

         Case "[p_id]"
            prmParam.Value = mlngParameterId

         Case "[p_name]"
            prmParam.Value =
mstrParameterName

         Case "[p_value]"
            prmParam.Value =
mstrParameterValue

         Case "[desc]"
            prmParam.Value = mstrDescription

         Case "[p_type]"
            prmParam.Value =
mintParameterType

         Case Else
            ' Write the parameter name that is
faulty
            WriteError errInvalidParameter,
mstrSource, _
                  prmParam.Name
            On Error GoTo 0
            Err.Raise errInvalidParameter,
mstrModuleName & "AssignParameters", _

LoadResString(errInvalidParameter)
      End Select
   Next prmParam

'   qyExec.Parameters("w_id").Value =
mlngWorkspaceId
'   qyExec.Parameters("p_id").Value =
mlngParameterId
'   qyExec.Parameters("p_name").Value =
mstrParameterName
'   qyExec.Parameters("p_value").Value =
mstrParameterValue
'


   Exit Sub

AssignParametersErr:

   mstrSource = mstrModuleName &
"AssignParameters"
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errAssignParametersFailed, _
      mstrSource,
LoadResString(errAssignParametersFailed)

End Sub

Public Property Let Position(ByVal RHS As
Long)

   mlngPosition = RHS

End Property

Public Property Get Position() As Long

   Position = mlngPosition

End Property

Public Function Clone() As cParameter

   ' Creates a copy of a given parameter

   Dim cCloneParam As cParameter

   On Error GoTo CloneErr
   mstrSource = mstrModuleName & "Clone"

   Set cCloneParam = New cParameter

   ' Copy all the parameter properties to the newly
   ' created parameter
   Set cCloneParam.NodeDB = mdbsStepMaster
   cCloneParam.WorkspaceId = mlngWorkspaceId
   cCloneParam.ParameterId = mlngParameterId
   cCloneParam.ParameterName =
mstrParameterName
   cCloneParam.ParameterValue =
mstrParameterValue
   cCloneParam.Description = mstrDescription
   cCloneParam.ParameterType =
mintParameterType
   cCloneParam.IndOperation = mintOperation
   cCloneParam.Position = mlngPosition

   ' And set the return value to the newly created
parameter
   Set Clone = cCloneParam
   Set cCloneParam = Nothing

   Exit Function

CloneErr:
   LogErrors Errors
   mstrSource = mstrModuleName & "Clone"
   On Error GoTo 0
   Err.Raise vbObjectError + errCloneFailed, _
         mstrSource, LoadResString(errCloneFailed)

End Function
Public Property Set NodeDB(vdata As Database)

   Set mdbsStepMaster = vdata

End Property
Public Property Get NodeDB() As Database

   Set NodeDB = mdbsStepMaster

End Property

Private Sub CheckDupParameterName()
   ' Check if the parameter name already exists in
the workspace

   Dim rstParameter As Recordset
   Dim strSql As String
   Dim qy As DAO.QueryDef

   On Error GoTo CheckDupParameterNameErr
   mstrSource = mstrModuleName &
"CheckDupParameterName"

   ' Create a recordset object to retrieve the count of
all parameters
   ' for the workspace with the same name
   strSql = "Select count(*) as parameter_count " &
_
      " from workspace_parameters " & _
      " where workspace_id = [w_id]" & _
      " and parameter_name = [p_name]" & _
      " and parameter_id <> [p_id]"

   Set qy =
mdbsStepMaster.CreateQueryDef(gstrEmptyString,
strSql)
   Call AssignParameters(qy)

   Set rstParameter =
qy.OpenRecordset(dbOpenForwardOnly)
```

```
   If rstParameter![parameter_count] > 0
Then
      rstParameter.Close
      qy.Close
      ShowError
errDuplicateParameterName
      On Error GoTo 0
      Err.Raise vbObjectError +
errDuplicateParameterName, _
         mstrSource,
LoadResString(errDuplicateParameterName
)
   End If

   rstParameter.Close
   qy.Close

   Exit Sub

CheckDupParameterNameErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"CheckDupParameterName"
   On Error GoTo 0
   Err.Raise vbObjectError +
errCheckDupParameterNameFailed, _
      mstrSource,
LoadResString(errCheckDupParameterNam
eFailed)

End Sub
Private Sub CheckDB()
   ' Check if the database object has been
initialized

   If mdbsStepMaster Is Nothing Then
      On Error GoTo 0
      Err.Raise vbObjectError +
errInvalidDB, _
         mstrModuleName & "CheckDB",
LoadResString(errInvalidDB)
   End If

End Sub
Public Property Let ParameterValue(vdata
As String)

   mstrParameterValue = vdata

End Property
Public Property Let Description(vdata As
String)

   mstrDescription = vdata

End Property
Public Property Let ParameterType(vdata
As ParameterType)

   mintParameterType = vdata

End Property

Public Property Let ParameterName(vdata
As String)

   If vdata = gstrEmptyString Then

      ShowError
errParameterNameMandatory
      On Error GoTo 0
      ' Propogate this error back to the caller
      Err.Raise vbObjectError +
errParameterNameMandatory, _
         mstrSource,
LoadResString(errParameterNameMandatory)
   Else
      mstrParameterName = vdata
   End If

End Property

Public Property Let ParameterId(vdata As
Long)
   mlngParameterId = vdata
End Property

Public Property Let IndOperation(ByVal vdata
As Operation)

   ' The valid operations are define in the
cOperations
   ' class. Check if the operation is valid
   Select Case vdata
      Case QueryOp, InsertOp, UpdateOp,
DeleteOp
         mintOperation = vdata

      Case Else
         On Error GoTo 0
         Err.Raise vbObjectError +
errInvalidOperation, _
            mstrSource,
LoadResString(errInvalidOperation)
   End Select

End Property
Public Sub Validate()
   ' Each distinct object will have a Validate
method which
   ' will check if the class properties are valid.
This method
   ' will be used to check interdependant
properties that
   ' cannot be validated by the let procedures.
   ' It should be called by the add and modify
methods of the class

   On Error GoTo ValidateErr

   ' Check if the db object is valid
   Call CheckDB

   ' Call procedure to raise an error if the
parameter name
   ' already exists in the workspace -
   ' if there are duplicates, we don't know what
value for the
   ' parameter to use at runtime
   Call CheckDupParameterName

   Exit Sub

ValidateErr:

   mstrSource = mstrModuleName &
"Validate"
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errValidateFailed, _
      mstrSource,
LoadResString(errValidateFailed)

End Sub
Public Property Let WorkspaceId(vdata As
Long)

   mlngWorkspaceId = vdata

End Property

Public Sub Add()

   Dim strInsert As String
   Dim qy As DAO.QueryDef

   On Error GoTo AddErr

   ' Validate the record before trying to insert the
record
   Call Validate

   ' Create a temporary querydef object
   strInsert = "insert into workspace_parameters " &
_
         "( workspace_id, parameter_id, " & _
         " parameter_name, parameter_value, " & _
         " description, parameter_type ) " & _
         " values ( [w_id], [p_id], [p_name],
[p_value], [desc], [p_type] ) "
   Set qy =
mdbsStepMaster.CreateQueryDef(gstrEmptyString,
strInsert)

   ' Call a procedure to assign the parameter values
   Call AssignParameters(qy)

   qy.Execute dbFailOnError
   qy.Close

'   strInsert = "insert into workspace_parameters "
& _
'         "( workspace_id, parameter_id, " & _
'         " parameter_name, parameter_value ) " & _
'         " values ( " & _
'         Str(mlngWorkspaceId) & ", " &
Str(mlngParameterId) & _
'         ", " &
mFieldValue.MakeStringFieldValid(mstrParameter
Name) & _
'         ", " &
mFieldValue.MakeStringFieldValid(mstrParameter
Value) & " ) "
'   mdbsStepMaster.Execute strInsert,
dbFailOnError + dbSQLPassThrough

   Exit Sub

AddErr:

   mstrSource = mstrModuleName & "Add"
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errParameterInsertFailed, _
      mstrSource,
LoadResString(errParameterInsertFailed)

End Sub
Public Sub Delete()

   Dim strDelete As String
   Dim qy As DAO.QueryDef

   On Error GoTo DeleteErr

   ' Check if the db object is valid
   Call CheckDB

   strDelete = "delete from workspace_parameters "
& _
         " where parameter_id = [p_id]"
```

```
    Set qy =
mdbsStepMaster.CreateQueryDef(gstrEmpt
yString, strDelete)

    Call AssignParameters(qy)
    qy.Execute dbFailOnError

    qy.Close

    Exit Sub

DeleteErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"Delete"
    On Error GoTo 0
    Err.Raise vbObjectError +
errDeleteParameterFailed, _
          mstrSource, _

LoadResString(errDeleteParameterFailed)

End Sub

Public Sub Modify()

    Dim strUpdate As String
    Dim qy As QueryDef

    On Error GoTo ModifyErr

    ' Validate the updated values before trying
to modify the db
    Call Validate

    ' Create a temporary querydef object with
the modify string
    strUpdate = "update
workspace_parameters " & _
          " set workspace_id = [w_id], " & _
          "parameter_name = [p_name], " & _
          "parameter_value = [p_value], " & _
          "description = [desc], " & _
          "parameter_type = [p_type] " & _
          " where parameter_id = [p_id]"
    Set qy =
mdbsStepMaster.CreateQueryDef(gstrEmpt
yString, strUpdate)

    ' Call a procedure to assign the parameter
values to the
    ' querydef object
    Call AssignParameters(qy)
    qy.Execute dbFailOnError

    qy.Close

'    mdbsStepMaster.Execute strUpdate,
dbFailOnError
'
    Exit Sub

ModifyErr:

    mstrSource = mstrModuleName &
"Modify"
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errParameterUpdateFailed, _
       mstrSource,
LoadResString(errParameterUpdateFailed)

End Sub
Public Property Get ParameterName() As
String

    ParameterName = mstrParameterName

End Property

Public Property Get ParameterId() As Long

    ParameterId = mlngParameterId

End Property
Public Property Get NextIdentifier() As Long

    Dim lngNextId As Long

    On Error GoTo NextIdentifierErr

    ' First check if the database object is valid
    Call CheckDB

    ' Retrieve the next identifier using the
sequence class
    Set mParameterSeq = New cSequence
    Set mParameterSeq.IdDatabase =
mdbsStepMaster
    mParameterSeq.IdentifierColumn =
FLD_ID_PARAMETER
    lngNextId = mParameterSeq.Identifier
    Set mParameterSeq = Nothing

    NextIdentifier = lngNextId
    Exit Property

NextIdentifierErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"NextIdentifier"
    On Error GoTo 0
    Err.Raise vbObjectError + errIdGetFailed, _
       mstrSource,
LoadResString(errIdGetFailed)

End Property
Public Property Get IndOperation() As
Operation

    IndOperation = mintOperation

End Property

Public Property Get WorkspaceId() As Long

    WorkspaceId = mlngWorkspaceId

End Property

Public Property Get ParameterValue() As
String

    ParameterValue = mstrParameterValue

End Property
Public Property Get Description() As String

    Description = mstrDescription

End Property
Public Property Get ParameterType() As
ParameterType

    ParameterType = mintParameterType

End Property


Private Sub Class_Initialize()

    Set mFieldValue = New cStringSM

    ' Initialize the operation indicator variable to
Query
    ' It will be modified later by the collection class
when
    ' inserts, updates or deletes are performed
    mintOperation = QueryOp

End Sub

Private Sub Class_Terminate()

    Set mdbsStepMaster = Nothing
    Set mFieldValue = Nothing

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cRunColIt"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cRunColIt.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This module implements a stack of
Iterator nodes.
'              Ensures that only cRunItNode objects are
stored in the stack.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name when
errors
' are raised by this class
Private Const mstrModuleName As String =
"cRunColIt."
Private mstrSource As String

Private mcIterators As cStack
Public Sub Clear()

    mcIterators.Clear

End Sub

Private Sub Class_Initialize()

    Set mcIterators = New cStack

End Sub

Private Sub Class_Terminate()

    Set mcIterators = Nothing

End Sub


Public Function Value(strItName As String) As
String

    Dim lngIndex As Long
```

```
   For lngIndex = 0 To mcIterators.Count - 1
      If mcIterators(lngIndex).IteratorName
= strItName Then
         Value = mcIterators(lngIndex).Value
         Exit For
      End If
   Next lngIndex

End Function

Public Property Get Item(ByVal Position As
Long) As cRunItNode
Attribute Item.VB_UserMemId = 0

   Set Item = mcIterators(Position)

End Property


Public Function Count() As Long

   Count = mcIterators.Count

End Function

Public Function Pop() As cRunItNode

   Set Pop = mcIterators.Pop

End Function

Public Sub Push(objToPush As
cRunItNode)

   Call mcIterators.Push(objToPush)

End Sub


VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
  Persistable = 0  'NotPersistable
  DataBindingBehavior = 0  'vbNone
  DataSourceBehavior  = 0  'vbNone
  MTSTransactionMode  = 0
'NotAnMTSObject
END
Attribute VB_Name = "cRunInst"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cRunColIt.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This module controls the
run processing. It runs a branch
'              at a time and raises events when
each step completes execution.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this class
Private Const mstrModuleName As String =
"cRunInst."
Private mstrSource As String

' Local variable(s) to hold property value(s)
Private mstrRootKey As String
Public WspId As Long
Private mcParameters As cArrParameters
Private mcRunSteps As cArrSteps
Private mcRunConstraints As cArrConstraints
Public RunConnections As cConnections
Public RunConnDtls As cConnDtls
Private mcvntWspPreCons As Variant
Private mcvntWspPostCons As Variant
Private mcNavSteps As cStepTree

Private mcInstances As cInstances
Private mcFreeSteps As cVectorLng
Private mcFailures As cFailedSteps
Private mblnAsk As Boolean   ' Set to True
when the a step with continuation criteria=Ask
fails
Private mblnAbort As Boolean ' Set to True
when the run is aborted
Private msAbortDtls As String
Private mbarrFree() As Byte
Private WithEvents mcTermSteps As
cTermSteps
Attribute mcTermSteps.VB_VarHelpID = -1
Public RunId As Long
Public CreateInputFiles As Boolean
Private Enum WspLogEvents
   mintRunStart
   mintRunComplete
   mintStepStart
   mintStepComplete
End Enum

Private mcWspLog As cFileSM
Private mstrCurBranchRoot As String
Private mcDummyRootInstance As cInstance
' Key for the dummy root instance - Should be
a key that is invalid for an actual step record
Private Const mstrDummyRootKey As String
= "D"
' Public events to notify the calling function of
the
' start and end time for each step
Public Event RunStart(dtmStartTime As
Currency, strWspLog As String)
Public Event RunComplete(dtmEndTime As
Currency)
Public Event StepStart(cStepRecord As cStep,
dtmStartTime As Currency, _
      lngInstanceId As Long, lParentInstanceId
As Long, sPath As String, _
      sIts As String, sItValue As String)
Public Event StepComplete(cStepRecord As
cStep, dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)
Public Event ProcessStart(cStepRecord As
cStep, strCommand As String, _
      dtmStartTime As Currency, lngInstanceId
As Long, lParentInstanceId As Long, _
      sItValue As String)
Public Event ProcessComplete(cStepRecord
As cStep, dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)
' The class that will execute each step - we trap
the events
' that are raised by it when a step
starts/completes
' execution
Private WithEvents cExecStep1 As cRunStep
Attribute cExecStep1.VB_VarHelpID = -1
Private WithEvents cExecStep2 As cRunStep
Attribute cExecStep2.VB_VarHelpID = -1
Private WithEvents cExecStep3 As cRunStep
Attribute cExecStep3.VB_VarHelpID = -1
Private WithEvents cExecStep4 As cRunStep
Attribute cExecStep4.VB_VarHelpID = -1
Private WithEvents cExecStep5 As cRunStep
Attribute cExecStep5.VB_VarHelpID = -1
Private WithEvents cExecStep6 As cRunStep
Attribute cExecStep6.VB_VarHelpID = -1
Private WithEvents cExecStep7 As cRunStep
Attribute cExecStep7.VB_VarHelpID = -1
Private WithEvents cExecStep8 As cRunStep
Attribute cExecStep8.VB_VarHelpID = -1
Private WithEvents cExecStep9 As cRunStep
Attribute cExecStep9.VB_VarHelpID = -1

Private WithEvents cExecStep10 As cRunStep
Attribute cExecStep10.VB_VarHelpID = -1
Private WithEvents cExecStep11 As cRunStep
Attribute cExecStep11.VB_VarHelpID = -1
Private WithEvents cExecStep12 As cRunStep
Attribute cExecStep12.VB_VarHelpID = -1
Private WithEvents cExecStep13 As cRunStep
Attribute cExecStep13.VB_VarHelpID = -1
Private WithEvents cExecStep14 As cRunStep
Attribute cExecStep14.VB_VarHelpID = -1
Private WithEvents cExecStep15 As cRunStep
Attribute cExecStep15.VB_VarHelpID = -1
Private WithEvents cExecStep16 As cRunStep
Attribute cExecStep16.VB_VarHelpID = -1
Private WithEvents cExecStep17 As cRunStep
Attribute cExecStep17.VB_VarHelpID = -1
Private WithEvents cExecStep18 As cRunStep
Attribute cExecStep18.VB_VarHelpID = -1
Private WithEvents cExecStep19 As cRunStep
Attribute cExecStep19.VB_VarHelpID = -1

Private WithEvents cExecStep20 As cRunStep
Attribute cExecStep20.VB_VarHelpID = -1
Private WithEvents cExecStep21 As cRunStep
Attribute cExecStep21.VB_VarHelpID = -1
Private WithEvents cExecStep22 As cRunStep
Attribute cExecStep22.VB_VarHelpID = -1
Private WithEvents cExecStep23 As cRunStep
Attribute cExecStep23.VB_VarHelpID = -1
Private WithEvents cExecStep24 As cRunStep
Attribute cExecStep24.VB_VarHelpID = -1
Private WithEvents cExecStep25 As cRunStep
Attribute cExecStep25.VB_VarHelpID = -1
Private WithEvents cExecStep26 As cRunStep
Attribute cExecStep26.VB_VarHelpID = -1
Private WithEvents cExecStep27 As cRunStep
Attribute cExecStep27.VB_VarHelpID = -1
Private WithEvents cExecStep28 As cRunStep
Attribute cExecStep28.VB_VarHelpID = -1
Private WithEvents cExecStep29 As cRunStep
Attribute cExecStep29.VB_VarHelpID = -1

Private WithEvents cExecStep30 As cRunStep
Attribute cExecStep30.VB_VarHelpID = -1
Private WithEvents cExecStep31 As cRunStep
Attribute cExecStep31.VB_VarHelpID = -1
Private WithEvents cExecStep32 As cRunStep
Attribute cExecStep32.VB_VarHelpID = -1
Private WithEvents cExecStep33 As cRunStep
Attribute cExecStep33.VB_VarHelpID = -1
Private WithEvents cExecStep34 As cRunStep
Attribute cExecStep34.VB_VarHelpID = -1
Private WithEvents cExecStep35 As cRunStep
Attribute cExecStep35.VB_VarHelpID = -1
Private WithEvents cExecStep36 As cRunStep
Attribute cExecStep36.VB_VarHelpID = -1
Private WithEvents cExecStep37 As cRunStep
Attribute cExecStep37.VB_VarHelpID = -1
Private WithEvents cExecStep38 As cRunStep
Attribute cExecStep38.VB_VarHelpID = -1
Private WithEvents cExecStep39 As cRunStep
```

```
Attribute cExecStep39.VB_VarHelpID = -1

Private WithEvents cExecStep40 As
cRunStep
Attribute cExecStep40.VB_VarHelpID = -1
Private WithEvents cExecStep41 As
cRunStep
Attribute cExecStep41.VB_VarHelpID = -1
Private WithEvents cExecStep42 As
cRunStep
Attribute cExecStep42.VB_VarHelpID = -1
Private WithEvents cExecStep43 As
cRunStep
Attribute cExecStep43.VB_VarHelpID = -1
Private WithEvents cExecStep44 As
cRunStep
Attribute cExecStep44.VB_VarHelpID = -1
Private WithEvents cExecStep45 As
cRunStep
Attribute cExecStep45.VB_VarHelpID = -1
Private WithEvents cExecStep46 As
cRunStep
Attribute cExecStep46.VB_VarHelpID = -1
Private WithEvents cExecStep47 As
cRunStep
Attribute cExecStep47.VB_VarHelpID = -1
Private WithEvents cExecStep48 As
cRunStep
Attribute cExecStep48.VB_VarHelpID = -1
Private WithEvents cExecStep49 As
cRunStep
Attribute cExecStep49.VB_VarHelpID = -1

Private WithEvents cExecStep50 As
cRunStep
Attribute cExecStep50.VB_VarHelpID = -1
Private WithEvents cExecStep51 As
cRunStep
Attribute cExecStep51.VB_VarHelpID = -1
Private WithEvents cExecStep52 As
cRunStep
Attribute cExecStep52.VB_VarHelpID = -1
Private WithEvents cExecStep53 As
cRunStep
Attribute cExecStep53.VB_VarHelpID = -1
Private WithEvents cExecStep54 As
cRunStep
Attribute cExecStep54.VB_VarHelpID = -1
Private WithEvents cExecStep55 As
cRunStep
Attribute cExecStep55.VB_VarHelpID = -1
Private WithEvents cExecStep56 As
cRunStep
Attribute cExecStep56.VB_VarHelpID = -1
Private WithEvents cExecStep57 As
cRunStep
Attribute cExecStep57.VB_VarHelpID = -1
Private WithEvents cExecStep58 As
cRunStep
Attribute cExecStep58.VB_VarHelpID = -1
Private WithEvents cExecStep59 As
cRunStep
Attribute cExecStep59.VB_VarHelpID = -1

Private WithEvents cExecStep60 As
cRunStep
Attribute cExecStep60.VB_VarHelpID = -1
Private WithEvents cExecStep61 As
cRunStep
Attribute cExecStep61.VB_VarHelpID = -1
Private WithEvents cExecStep62 As
cRunStep
Attribute cExecStep62.VB_VarHelpID = -1
Private WithEvents cExecStep63 As
cRunStep
Attribute cExecStep63.VB_VarHelpID = -1
Private WithEvents cExecStep64 As cRunStep
Attribute cExecStep64.VB_VarHelpID = -1
Private WithEvents cExecStep65 As cRunStep
Attribute cExecStep65.VB_VarHelpID = -1
Private WithEvents cExecStep66 As cRunStep
Attribute cExecStep66.VB_VarHelpID = -1
Private WithEvents cExecStep67 As cRunStep
Attribute cExecStep67.VB_VarHelpID = -1
Private WithEvents cExecStep68 As cRunStep
Attribute cExecStep68.VB_VarHelpID = -1
Private WithEvents cExecStep69 As cRunStep
Attribute cExecStep69.VB_VarHelpID = -1

Private WithEvents cExecStep70 As cRunStep
Attribute cExecStep70.VB_VarHelpID = -1
Private WithEvents cExecStep71 As cRunStep
Attribute cExecStep71.VB_VarHelpID = -1
Private WithEvents cExecStep72 As cRunStep
Attribute cExecStep72.VB_VarHelpID = -1
Private WithEvents cExecStep73 As cRunStep
Attribute cExecStep73.VB_VarHelpID = -1
Private WithEvents cExecStep74 As cRunStep
Attribute cExecStep74.VB_VarHelpID = -1
Private WithEvents cExecStep75 As cRunStep
Attribute cExecStep75.VB_VarHelpID = -1
Private WithEvents cExecStep76 As cRunStep
Attribute cExecStep76.VB_VarHelpID = -1
Private WithEvents cExecStep77 As cRunStep
Attribute cExecStep77.VB_VarHelpID = -1
Private WithEvents cExecStep78 As cRunStep
Attribute cExecStep78.VB_VarHelpID = -1
Private WithEvents cExecStep79 As cRunStep
Attribute cExecStep79.VB_VarHelpID = -1

Private WithEvents cExecStep80 As cRunStep
Attribute cExecStep80.VB_VarHelpID = -1
Private WithEvents cExecStep81 As cRunStep
Attribute cExecStep81.VB_VarHelpID = -1
Private WithEvents cExecStep82 As cRunStep
Attribute cExecStep82.VB_VarHelpID = -1
Private WithEvents cExecStep83 As cRunStep
Attribute cExecStep83.VB_VarHelpID = -1
Private WithEvents cExecStep84 As cRunStep
Attribute cExecStep84.VB_VarHelpID = -1
Private WithEvents cExecStep85 As cRunStep
Attribute cExecStep85.VB_VarHelpID = -1
Private WithEvents cExecStep86 As cRunStep
Attribute cExecStep86.VB_VarHelpID = -1
Private WithEvents cExecStep87 As cRunStep
Attribute cExecStep87.VB_VarHelpID = -1
Private WithEvents cExecStep88 As cRunStep
Attribute cExecStep88.VB_VarHelpID = -1
Private WithEvents cExecStep89 As cRunStep
Attribute cExecStep89.VB_VarHelpID = -1

Private WithEvents cExecStep90 As cRunStep
Attribute cExecStep90.VB_VarHelpID = -1
Private WithEvents cExecStep91 As cRunStep
Attribute cExecStep91.VB_VarHelpID = -1
Private WithEvents cExecStep92 As cRunStep
Attribute cExecStep92.VB_VarHelpID = -1
Private WithEvents cExecStep93 As cRunStep
Attribute cExecStep93.VB_VarHelpID = -1
Private WithEvents cExecStep94 As cRunStep
Attribute cExecStep94.VB_VarHelpID = -1
Private WithEvents cExecStep95 As cRunStep
Attribute cExecStep95.VB_VarHelpID = -1
Private WithEvents cExecStep96 As cRunStep
Attribute cExecStep96.VB_VarHelpID = -1
Private WithEvents cExecStep97 As cRunStep
Attribute cExecStep97.VB_VarHelpID = -1
Private WithEvents cExecStep98 As cRunStep
Attribute cExecStep98.VB_VarHelpID = -1
Private WithEvents cExecStep99 As cRunStep
Attribute cExecStep99.VB_VarHelpID = -1

Private Const msIt As String = " Iterator: "
Private Const msItValue As String = " Value: "
Public Sub Abort()

    On Error GoTo AbortErr

    ' Make sure that we don't execute any more steps
    Call StopRun

    If cExecStep1 Is Nothing And cExecStep2 Is
Nothing And cExecStep3 Is Nothing And
cExecStep4 Is Nothing And cExecStep5 Is Nothing
And cExecStep6 Is Nothing And cExecStep7 Is
Nothing And cExecStep8 Is Nothing And
cExecStep9 Is Nothing And _
        cExecStep10 Is Nothing And cExecStep11 Is
Nothing And cExecStep12 Is Nothing And
cExecStep13 Is Nothing And cExecStep14 Is
Nothing And cExecStep15 Is Nothing And
cExecStep16 Is Nothing And cExecStep17 Is
Nothing And cExecStep18 Is Nothing And
cExecStep19 Is Nothing And _
        cExecStep20 Is Nothing And cExecStep21 Is
Nothing And cExecStep22 Is Nothing And
cExecStep23 Is Nothing And cExecStep24 Is
Nothing And cExecStep25 Is Nothing And
cExecStep26 Is Nothing And cExecStep27 Is
Nothing And cExecStep28 Is Nothing And
cExecStep29 Is Nothing And _
        cExecStep30 Is Nothing And cExecStep31 Is
Nothing And cExecStep32 Is Nothing And
cExecStep33 Is Nothing And cExecStep34 Is
Nothing And cExecStep35 Is Nothing And
cExecStep36 Is Nothing And cExecStep37 Is
Nothing And cExecStep38 Is Nothing And
cExecStep39 Is Nothing And _
        cExecStep40 Is Nothing And cExecStep41 Is
Nothing And cExecStep42 Is Nothing And
cExecStep43 Is Nothing And cExecStep44 Is
Nothing And cExecStep45 Is Nothing And
cExecStep46 Is Nothing And cExecStep47 Is
Nothing And cExecStep48 Is Nothing And
cExecStep49 Is Nothing And _
        cExecStep50 Is Nothing And cExecStep51 Is
Nothing And cExecStep52 Is Nothing And
cExecStep53 Is Nothing And cExecStep54 Is
Nothing And cExecStep55 Is Nothing And
cExecStep56 Is Nothing And cExecStep57 Is
Nothing And cExecStep58 Is Nothing And
cExecStep59 Is Nothing And _
        cExecStep60 Is Nothing And cExecStep61 Is
Nothing And cExecStep62 Is Nothing And
cExecStep63 Is Nothing And cExecStep64 Is
Nothing And cExecStep65 Is Nothing And
cExecStep66 Is Nothing And cExecStep67 Is
Nothing And cExecStep68 Is Nothing And
cExecStep69 Is Nothing And _
        cExecStep70 Is Nothing And cExecStep71 Is
Nothing And cExecStep72 Is Nothing And
cExecStep73 Is Nothing And cExecStep74 Is
Nothing And cExecStep75 Is Nothing And
cExecStep76 Is Nothing And cExecStep77 Is
Nothing And cExecStep78 Is Nothing And
cExecStep79 Is Nothing And _
        cExecStep80 Is Nothing And cExecStep81 Is
Nothing And cExecStep82 Is Nothing And
cExecStep83 Is Nothing And cExecStep84 Is
Nothing And cExecStep85 Is Nothing And
cExecStep86 Is Nothing And cExecStep87 Is
Nothing And cExecStep88 Is Nothing And
cExecStep89 Is Nothing And _
        cExecStep90 Is Nothing And cExecStep91 Is
Nothing And cExecStep92 Is Nothing And
```

```
cExecStep93 Is Nothing And cExecStep94
Is Nothing And cExecStep95 Is Nothing
And cExecStep96 Is Nothing And
cExecStep97 Is Nothing And cExecStep98
Is Nothing And cExecStep99 Is Nothing
Then
      ' Then...
      WriteToWspLog (mintRunComplete)
      RaiseEvent
RunComplete(Determine64BitTime())
   Else
      ' Abort each of the steps that is
currently executing.
      If Not cExecStep1 Is Nothing Then
         cExecStep1.Abort
      End If
      If Not cExecStep2 Is Nothing Then
         cExecStep2.Abort
      End If
      If Not cExecStep3 Is Nothing Then
         cExecStep3.Abort
      End If
      If Not cExecStep4 Is Nothing Then
         cExecStep4.Abort
      End If
      If Not cExecStep5 Is Nothing Then
         cExecStep5.Abort
      End If
      If Not cExecStep6 Is Nothing Then
         cExecStep6.Abort
      End If
      If Not cExecStep7 Is Nothing Then
         cExecStep7.Abort
      End If
      If Not cExecStep8 Is Nothing Then
         cExecStep8.Abort
      End If
      If Not cExecStep9 Is Nothing Then
         cExecStep9.Abort
      End If
      If Not cExecStep10 Is Nothing Then
         cExecStep10.Abort
      End If
      If Not cExecStep11 Is Nothing Then
         cExecStep11.Abort
      End If
      If Not cExecStep12 Is Nothing Then
         cExecStep12.Abort
      End If
      If Not cExecStep13 Is Nothing Then
         cExecStep13.Abort
      End If

      If Not cExecStep14 Is Nothing Then
         cExecStep14.Abort
      End If

      If Not cExecStep15 Is Nothing Then
         cExecStep15.Abort
      End If

      If Not cExecStep16 Is Nothing Then
         cExecStep16.Abort
      End If

      If Not cExecStep17 Is Nothing Then
         cExecStep17.Abort
      End If

      If Not cExecStep18 Is Nothing Then
         cExecStep18.Abort
      End If

      If Not cExecStep19 Is Nothing Then
         cExecStep19.Abort
      End If

      If Not cExecStep20 Is Nothing Then
         cExecStep20.Abort
      End If

      If Not cExecStep21 Is Nothing Then
         cExecStep21.Abort
      End If

      If Not cExecStep22 Is Nothing Then
         cExecStep22.Abort
      End If

      If Not cExecStep23 Is Nothing Then
         cExecStep23.Abort
      End If

      If Not cExecStep24 Is Nothing Then
         cExecStep24.Abort
      End If

      If Not cExecStep25 Is Nothing Then
         cExecStep25.Abort
      End If

      If Not cExecStep26 Is Nothing Then
         cExecStep26.Abort
      End If

      If Not cExecStep27 Is Nothing Then
         cExecStep27.Abort
      End If

      If Not cExecStep28 Is Nothing Then
         cExecStep28.Abort
      End If

      If Not cExecStep29 Is Nothing Then
         cExecStep29.Abort
      End If

      ' ============== 30 - 39
==============
      If Not cExecStep30 Is Nothing Then
         cExecStep30.Abort
      End If

      If Not cExecStep31 Is Nothing Then
         cExecStep31.Abort
      End If

      If Not cExecStep32 Is Nothing Then
         cExecStep32.Abort
      End If

      If Not cExecStep33 Is Nothing Then
         cExecStep33.Abort
      End If

      If Not cExecStep34 Is Nothing Then
         cExecStep34.Abort
      End If

      If Not cExecStep35 Is Nothing Then
         cExecStep35.Abort
      End If

      If Not cExecStep36 Is Nothing Then
         cExecStep36.Abort
      End If

      If Not cExecStep37 Is Nothing Then
         cExecStep37.Abort
      End If

      If Not cExecStep38 Is Nothing Then
         cExecStep38.Abort
      End If

      If Not cExecStep39 Is Nothing Then
         cExecStep39.Abort
      End If

      ' ============== 40 - 49
==============
      If Not cExecStep40 Is Nothing Then
         cExecStep40.Abort
      End If

      If Not cExecStep41 Is Nothing Then
         cExecStep41.Abort
      End If

      If Not cExecStep42 Is Nothing Then
         cExecStep42.Abort
      End If

      If Not cExecStep43 Is Nothing Then
         cExecStep43.Abort
      End If

      If Not cExecStep44 Is Nothing Then
         cExecStep44.Abort
      End If

      If Not cExecStep45 Is Nothing Then
         cExecStep45.Abort
      End If

      If Not cExecStep46 Is Nothing Then
         cExecStep46.Abort
      End If

      If Not cExecStep47 Is Nothing Then
         cExecStep47.Abort
      End If

      If Not cExecStep48 Is Nothing Then
         cExecStep48.Abort
      End If

      If Not cExecStep49 Is Nothing Then
         cExecStep49.Abort
      End If

      ' ============== 50 - 59
==============
      If Not cExecStep50 Is Nothing Then
         cExecStep50.Abort
      End If

      If Not cExecStep51 Is Nothing Then
         cExecStep51.Abort
      End If

      If Not cExecStep52 Is Nothing Then
         cExecStep52.Abort
      End If

      If Not cExecStep53 Is Nothing Then
         cExecStep53.Abort
      End If

      If Not cExecStep54 Is Nothing Then
         cExecStep54.Abort
      End If

      If Not cExecStep55 Is Nothing Then
         cExecStep55.Abort
```

```
    End If

    If Not cExecStep56 Is Nothing Then
      cExecStep56.Abort
    End If

    If Not cExecStep57 Is Nothing Then
      cExecStep57.Abort
    End If

    If Not cExecStep58 Is Nothing Then
      cExecStep58.Abort
    End If

    If Not cExecStep59 Is Nothing Then
      cExecStep59.Abort
    End If

    ' ============== 60 - 69
==============
    If Not cExecStep60 Is Nothing Then
      cExecStep60.Abort
    End If

    If Not cExecStep61 Is Nothing Then
      cExecStep61.Abort
    End If

    If Not cExecStep62 Is Nothing Then
      cExecStep62.Abort
    End If

    If Not cExecStep63 Is Nothing Then
      cExecStep63.Abort
    End If

    If Not cExecStep64 Is Nothing Then
      cExecStep64.Abort
    End If

    If Not cExecStep65 Is Nothing Then
      cExecStep65.Abort
    End If

    If Not cExecStep66 Is Nothing Then
      cExecStep66.Abort
    End If

    If Not cExecStep67 Is Nothing Then
      cExecStep67.Abort
    End If

    If Not cExecStep68 Is Nothing Then
      cExecStep68.Abort
    End If

    If Not cExecStep69 Is Nothing Then
      cExecStep69.Abort
    End If

    ' ============== 70 - 79
==============
    If Not cExecStep70 Is Nothing Then
      cExecStep70.Abort
    End If

    If Not cExecStep71 Is Nothing Then
      cExecStep71.Abort
    End If

    If Not cExecStep72 Is Nothing Then
      cExecStep72.Abort
    End If

    If Not cExecStep73 Is Nothing Then
      cExecStep73.Abort
    End If

    If Not cExecStep74 Is Nothing Then
      cExecStep74.Abort
    End If

    If Not cExecStep75 Is Nothing Then
      cExecStep75.Abort
    End If

    If Not cExecStep76 Is Nothing Then
      cExecStep76.Abort
    End If

    If Not cExecStep77 Is Nothing Then
      cExecStep77.Abort
    End If

    If Not cExecStep78 Is Nothing Then
      cExecStep78.Abort
    End If

    If Not cExecStep79 Is Nothing Then
      cExecStep79.Abort
    End If

    ' ============== 80 - 89
==============
    If Not cExecStep80 Is Nothing Then
      cExecStep80.Abort
    End If

    If Not cExecStep81 Is Nothing Then
      cExecStep81.Abort
    End If

    If Not cExecStep82 Is Nothing Then
      cExecStep82.Abort
    End If

    If Not cExecStep83 Is Nothing Then
      cExecStep83.Abort
    End If

    If Not cExecStep84 Is Nothing Then
      cExecStep84.Abort
    End If

    If Not cExecStep85 Is Nothing Then
      cExecStep85.Abort
    End If

    If Not cExecStep86 Is Nothing Then
      cExecStep86.Abort
    End If

    If Not cExecStep87 Is Nothing Then
      cExecStep87.Abort
    End If

    If Not cExecStep88 Is Nothing Then
      cExecStep88.Abort
    End If

    If Not cExecStep89 Is Nothing Then
      cExecStep89.Abort
    End If

    ' ============== 90 - 99
==============
    If Not cExecStep90 Is Nothing Then
      cExecStep90.Abort
    End If

    If Not cExecStep91 Is Nothing Then
      cExecStep91.Abort
    End If

    If Not cExecStep92 Is Nothing Then
      cExecStep92.Abort
    End If

    If Not cExecStep93 Is Nothing Then
      cExecStep93.Abort
    End If

    If Not cExecStep94 Is Nothing Then
      cExecStep94.Abort
    End If

    If Not cExecStep95 Is Nothing Then
      cExecStep95.Abort
    End If

    If Not cExecStep96 Is Nothing Then
      cExecStep96.Abort
    End If

    If Not cExecStep97 Is Nothing Then
      cExecStep97.Abort
    End If

    If Not cExecStep98 Is Nothing Then
      cExecStep98.Abort
    End If

    If Not cExecStep99 Is Nothing Then
      cExecStep99.Abort
    End If

  End If

  Exit Sub

AbortErr:
  Call LogErrors(Errors)
  On Error GoTo 0
  ShowError errAbortFailed
  ' Try to abort the remaining steps, if any
  Resume Next

End Sub
Public Sub AbortSiblings(cTermInstance As
cInstance)

  On Error GoTo AbortSiblingsErr

  ' Abort each of the steps that is currently
executing.
  If Not cExecStep1 Is Nothing Then
    If cExecStep1.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
      cExecStep1.Abort
    End If
  End If

  If Not cExecStep2 Is Nothing Then
    If cExecStep2.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
      cExecStep2.Abort
    End If
  End If

  If Not cExecStep3 Is Nothing Then
    If cExecStep3.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
      cExecStep3.Abort
    End If
  End If
```

```
    If Not cExecStep4 Is Nothing Then
        If
cExecStep4.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep4.Abort
        End If
    End If

    If Not cExecStep5 Is Nothing Then
        If
cExecStep5.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep5.Abort
        End If
    End If

    If Not cExecStep6 Is Nothing Then
        If
cExecStep6.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep6.Abort
        End If
    End If

    If Not cExecStep7 Is Nothing Then
        If
cExecStep7.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep7.Abort
        End If
    End If

    If Not cExecStep8 Is Nothing Then
        If
cExecStep8.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep8.Abort
        End If
    End If

    If Not cExecStep9 Is Nothing Then
        If
cExecStep9.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep9.Abort
        End If
    End If

    If Not cExecStep10 Is Nothing Then
        If
cExecStep10.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep10.Abort
        End If
    End If

    If Not cExecStep11 Is Nothing Then
        If
cExecStep11.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep11.Abort
        End If
    End If

    If Not cExecStep12 Is Nothing Then
        If
cExecStep12.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep12.Abort
        End If
    End If

    If Not cExecStep13 Is Nothing Then
        If cExecStep13.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep13.Abort
        End If
    End If

    If Not cExecStep14 Is Nothing Then
        If cExecStep14.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep14.Abort
        End If
    End If

    If Not cExecStep15 Is Nothing Then
        If cExecStep15.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep15.Abort
        End If
    End If

    If Not cExecStep16 Is Nothing Then
        If cExecStep16.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep16.Abort
        End If
    End If

    If Not cExecStep17 Is Nothing Then
        If cExecStep17.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep17.Abort
        End If
    End If

    If Not cExecStep18 Is Nothing Then
        If cExecStep18.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep18.Abort
        End If
    End If

    If Not cExecStep19 Is Nothing Then
        If cExecStep19.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep19.Abort
        End If
    End If

    If Not cExecStep20 Is Nothing Then
        If cExecStep20.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep20.Abort
        End If
    End If

    If Not cExecStep21 Is Nothing Then
        If cExecStep21.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep21.Abort
        End If
    End If

    If Not cExecStep22 Is Nothing Then
        If cExecStep22.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep22.Abort
        End If
    End If

    If Not cExecStep23 Is Nothing Then
        If cExecStep23.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
            cExecStep23.Abort
        End If
    End If

    If Not cExecStep24 Is Nothing Then
        If cExecStep24.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep24.Abort
        End If
    End If

    If Not cExecStep25 Is Nothing Then
        If cExecStep25.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep25.Abort
        End If
    End If

    If Not cExecStep26 Is Nothing Then
        If cExecStep26.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep26.Abort
        End If
    End If

    If Not cExecStep27 Is Nothing Then
        If cExecStep27.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep27.Abort
        End If
    End If

    If Not cExecStep28 Is Nothing Then
        If cExecStep28.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep28.Abort
        End If
    End If

    If Not cExecStep29 Is Nothing Then
        If cExecStep29.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep29.Abort
        End If
    End If

    ' ============ 30 =================
    If Not cExecStep30 Is Nothing Then
        If cExecStep30.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep30.Abort
        End If
    End If

    If Not cExecStep31 Is Nothing Then
        If cExecStep31.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep31.Abort
        End If
    End If

    If Not cExecStep32 Is Nothing Then
        If cExecStep32.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep32.Abort
        End If
    End If

    If Not cExecStep33 Is Nothing Then
        If cExecStep33.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep33.Abort
        End If
    End If

    If Not cExecStep34 Is Nothing Then
        If cExecStep34.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
```

```
        cExecStep34.Abort
      End If
    End If

    If Not cExecStep35 Is Nothing Then
      If
cExecStep35.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep35.Abort
      End If
    End If

    If Not cExecStep36 Is Nothing Then
      If
cExecStep36.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep36.Abort
      End If
    End If

    If Not cExecStep37 Is Nothing Then
      If
cExecStep37.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep37.Abort
      End If
    End If

    If Not cExecStep38 Is Nothing Then
      If
cExecStep38.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep38.Abort
      End If
    End If

    If Not cExecStep39 Is Nothing Then
      If
cExecStep39.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep39.Abort
      End If
    End If

    ' ============ 40
==================
    If Not cExecStep40 Is Nothing Then
      If
cExecStep40.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep40.Abort
      End If
    End If

    If Not cExecStep41 Is Nothing Then
      If
cExecStep41.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep41.Abort
      End If
    End If

    If Not cExecStep42 Is Nothing Then
      If
cExecStep42.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep42.Abort
      End If
    End If

    If Not cExecStep43 Is Nothing Then
      If
cExecStep43.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep43.Abort
      End If
    End If

    If Not cExecStep44 Is Nothing Then
      If cExecStep44.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
        cExecStep44.Abort
      End If
    End If

    If Not cExecStep45 Is Nothing Then
      If cExecStep45.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
        cExecStep45.Abort
      End If
    End If

    If Not cExecStep46 Is Nothing Then
      If cExecStep46.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
        cExecStep46.Abort
      End If
    End If

    If Not cExecStep47 Is Nothing Then
      If cExecStep47.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
        cExecStep47.Abort
      End If
    End If

    If Not cExecStep48 Is Nothing Then
      If cExecStep48.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
        cExecStep48.Abort
      End If
    End If

    If Not cExecStep49 Is Nothing Then
      If cExecStep49.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
        cExecStep49.Abort
      End If
    End If

    ' ============ 50
==================
    If Not cExecStep50 Is Nothing Then
      If cExecStep50.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
        cExecStep50.Abort
      End If
    End If

    If Not cExecStep51 Is Nothing Then
      If cExecStep51.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
        cExecStep51.Abort
      End If
    End If

    If Not cExecStep52 Is Nothing Then
      If cExecStep52.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
        cExecStep52.Abort
      End If
    End If

    If Not cExecStep53 Is Nothing Then
      If cExecStep53.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
        cExecStep53.Abort
      End If
    End If

    If Not cExecStep54 Is Nothing Then
      If cExecStep54.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep54.Abort
      End If
    End If

    If Not cExecStep55 Is Nothing Then
      If cExecStep55.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep55.Abort
      End If
    End If

    If Not cExecStep56 Is Nothing Then
      If cExecStep56.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep56.Abort
      End If
    End If

    If Not cExecStep57 Is Nothing Then
      If cExecStep57.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep57.Abort
      End If
    End If

    If Not cExecStep58 Is Nothing Then
      If cExecStep58.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep58.Abort
      End If
    End If

    If Not cExecStep59 Is Nothing Then
      If cExecStep59.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep59.Abort
      End If
    End If

    ' ============ 60 ==================
    If Not cExecStep60 Is Nothing Then
      If cExecStep60.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep60.Abort
      End If
    End If

    If Not cExecStep61 Is Nothing Then
      If cExecStep61.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep61.Abort
      End If
    End If

    If Not cExecStep62 Is Nothing Then
      If cExecStep62.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep62.Abort
      End If
    End If

    If Not cExecStep63 Is Nothing Then
      If cExecStep63.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep63.Abort
      End If
    End If

    If Not cExecStep64 Is Nothing Then
      If cExecStep64.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
        cExecStep64.Abort
```

```
      End If
   End If

   If Not cExecStep65 Is Nothing Then
      If
cExecStep65.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep65.Abort
      End If
   End If

   If Not cExecStep66 Is Nothing Then
      If
cExecStep66.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep66.Abort
      End If
   End If

   If Not cExecStep67 Is Nothing Then
      If
cExecStep67.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep67.Abort
      End If
   End If

   If Not cExecStep68 Is Nothing Then
      If
cExecStep68.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep68.Abort
      End If
   End If

   If Not cExecStep69 Is Nothing Then
      If
cExecStep69.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep69.Abort
      End If
   End If

   ' ============ 70
=================
   If Not cExecStep70 Is Nothing Then
      If
cExecStep70.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep70.Abort
      End If
   End If

   If Not cExecStep71 Is Nothing Then
      If
cExecStep71.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep71.Abort
      End If
   End If

   If Not cExecStep72 Is Nothing Then
      If
cExecStep72.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep72.Abort
      End If
   End If

   If Not cExecStep73 Is Nothing Then
      If
cExecStep73.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep73.Abort
      End If
   End If

   If Not cExecStep74 Is Nothing Then
      If cExecStep74.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep74.Abort
      End If
   End If

   If Not cExecStep75 Is Nothing Then
      If cExecStep75.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep75.Abort
      End If
   End If

   If Not cExecStep76 Is Nothing Then
      If cExecStep76.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep76.Abort
      End If
   End If

   If Not cExecStep77 Is Nothing Then
      If cExecStep77.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep77.Abort
      End If
   End If

   If Not cExecStep78 Is Nothing Then
      If cExecStep78.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep78.Abort
      End If
   End If

   If Not cExecStep79 Is Nothing Then
      If cExecStep79.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep79.Abort
      End If
   End If

   ' ============ 80
=================
   If Not cExecStep80 Is Nothing Then
      If cExecStep80.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep80.Abort
      End If
   End If

   If Not cExecStep81 Is Nothing Then
      If cExecStep81.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep81.Abort
      End If
   End If

   If Not cExecStep82 Is Nothing Then
      If cExecStep82.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep82.Abort
      End If
   End If

   If Not cExecStep83 Is Nothing Then
      If cExecStep83.ExecuteStep.ParentStepId
= cTermInstance.Step.ParentStepId Then
         cExecStep83.Abort
      End If
   End If

   If Not cExecStep84 Is Nothing Then
      If cExecStep84.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep84.Abort
      End If
   End If

   If Not cExecStep85 Is Nothing Then
      If cExecStep85.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep85.Abort
      End If
   End If

   If Not cExecStep86 Is Nothing Then
      If cExecStep86.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep86.Abort
      End If
   End If

   If Not cExecStep87 Is Nothing Then
      If cExecStep87.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep87.Abort
      End If
   End If

   If Not cExecStep88 Is Nothing Then
      If cExecStep88.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep88.Abort
      End If
   End If

   If Not cExecStep89 Is Nothing Then
      If cExecStep89.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep89.Abort
      End If
   End If

   ' ============ 90 =================
   If Not cExecStep90 Is Nothing Then
      If cExecStep90.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep90.Abort
      End If
   End If

   If Not cExecStep91 Is Nothing Then
      If cExecStep91.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep91.Abort
      End If
   End If

   If Not cExecStep92 Is Nothing Then
      If cExecStep92.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep92.Abort
      End If
   End If

   If Not cExecStep93 Is Nothing Then
      If cExecStep93.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep93.Abort
      End If
   End If

   If Not cExecStep94 Is Nothing Then
      If cExecStep94.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
         cExecStep94.Abort
      End If
```

```
    End If

    If Not cExecStep95 Is Nothing Then
        If
cExecStep95.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep95.Abort
        End If
    End If

    If Not cExecStep96 Is Nothing Then
        If
cExecStep96.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep96.Abort
        End If
    End If

    If Not cExecStep97 Is Nothing Then
        If
cExecStep97.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep97.Abort
        End If
    End If

    If Not cExecStep98 Is Nothing Then
        If
cExecStep98.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep98.Abort
        End If
    End If

    If Not cExecStep99 Is Nothing Then
        If
cExecStep99.ExecuteStep.ParentStepId =
cTermInstance.Step.ParentStepId Then
            cExecStep99.Abort
        End If
    End If

    Exit Sub

AbortSiblingsErr:
    Call LogErrors(Errors)
    On Error GoTo 0
    ShowError errAbortFailed
    ' Try to abort the remaining steps, if any
    Resume Next

End Sub
Private Sub ExecutionFailed(cTermStep As
cRunStep)
    ' Called when execution of a step fails for
any reason - ensure that execution
    ' continues

    On Error GoTo ExecutionFailedErr

    Call AddFreeProcess(cTermStep.Index)

    Call RunBranch(mstrCurBranchRoot)

    Exit Sub

ExecutionFailedErr:
    ' Log the error code raised by Visual
Basic - do not raise an error here!
    Call LogErrors(Errors)

End Sub
Private Sub FreeExecStep(lngIndex As
Long)
    ' Frees an instance of a cExecuteSM object
depending on the index
    On Error GoTo FreeExecStepErr

    Select Case lngIndex + 1
        Case 1
            Set cExecStep1 = Nothing
        Case 2
            Set cExecStep2 = Nothing
        Case 3
            Set cExecStep3 = Nothing
        Case 4
            Set cExecStep4 = Nothing
        Case 5
            Set cExecStep5 = Nothing
        Case 6
            Set cExecStep6 = Nothing
        Case 7
            Set cExecStep7 = Nothing
        Case 8
            Set cExecStep8 = Nothing
        Case 9
            Set cExecStep9 = Nothing
        Case 10
            Set cExecStep10 = Nothing
        Case 11
            Set cExecStep11 = Nothing
        Case 12
            Set cExecStep12 = Nothing
        Case 13
            Set cExecStep13 = Nothing
        Case 14
            Set cExecStep14 = Nothing
        Case 15
            Set cExecStep15 = Nothing
        Case 16
            Set cExecStep16 = Nothing
        Case 17
            Set cExecStep17 = Nothing
        Case 18
            Set cExecStep18 = Nothing
        Case 19
            Set cExecStep19 = Nothing
        Case 20
            Set cExecStep20 = Nothing
        Case 21
            Set cExecStep21 = Nothing
        Case 22
            Set cExecStep22 = Nothing
        Case 23
            Set cExecStep23 = Nothing
        Case 24
            Set cExecStep24 = Nothing
        Case 25
            Set cExecStep25 = Nothing
        Case 26
            Set cExecStep26 = Nothing
        Case 27
            Set cExecStep27 = Nothing
        Case 28
            Set cExecStep28 = Nothing
        Case 29
            Set cExecStep29 = Nothing
        Case 30
            Set cExecStep30 = Nothing
        Case 31
            Set cExecStep31 = Nothing
        Case 32
            Set cExecStep32 = Nothing
        Case 33
            Set cExecStep33 = Nothing
        Case 34
            Set cExecStep34 = Nothing
        Case 35
            Set cExecStep35 = Nothing
        Case 36
            Set cExecStep36 = Nothing
        Case 37
            Set cExecStep37 = Nothing
        Case 38
            Set cExecStep38 = Nothing
        Case 39
            Set cExecStep39 = Nothing
        Case 40
            Set cExecStep40 = Nothing
        Case 41
            Set cExecStep41 = Nothing
        Case 42
            Set cExecStep42 = Nothing
        Case 43
            Set cExecStep43 = Nothing
        Case 44
            Set cExecStep44 = Nothing
        Case 45
            Set cExecStep45 = Nothing
        Case 46
            Set cExecStep46 = Nothing
        Case 47
            Set cExecStep47 = Nothing
        Case 48
            Set cExecStep48 = Nothing
        Case 49
            Set cExecStep49 = Nothing
        Case 50
            Set cExecStep50 = Nothing
        Case 51
            Set cExecStep51 = Nothing
        Case 52
            Set cExecStep52 = Nothing
        Case 53
            Set cExecStep53 = Nothing
        Case 54
            Set cExecStep54 = Nothing
        Case 55
            Set cExecStep55 = Nothing
        Case 56
            Set cExecStep56 = Nothing
        Case 57
            Set cExecStep57 = Nothing
        Case 58
            Set cExecStep58 = Nothing
        Case 59
            Set cExecStep59 = Nothing
        Case 60
            Set cExecStep60 = Nothing
        Case 61
            Set cExecStep61 = Nothing
        Case 62
            Set cExecStep62 = Nothing
        Case 63
            Set cExecStep63 = Nothing
        Case 64
            Set cExecStep64 = Nothing
        Case 65
            Set cExecStep65 = Nothing
        Case 66
            Set cExecStep66 = Nothing
        Case 67
            Set cExecStep67 = Nothing
        Case 68
            Set cExecStep68 = Nothing
        Case 69
            Set cExecStep69 = Nothing
        Case 70
            Set cExecStep70 = Nothing
        Case 71
            Set cExecStep71 = Nothing
        Case 72
            Set cExecStep72 = Nothing
        Case 73
```

```
        Set cExecStep73 = Nothing
    Case 74
        Set cExecStep74 = Nothing
    Case 75
        Set cExecStep75 = Nothing
    Case 76
        Set cExecStep76 = Nothing
    Case 77
        Set cExecStep77 = Nothing
    Case 78
        Set cExecStep78 = Nothing
    Case 79
        Set cExecStep79 = Nothing
    Case 80
        Set cExecStep80 = Nothing
    Case 81
        Set cExecStep81 = Nothing
    Case 82
        Set cExecStep82 = Nothing
    Case 83
        Set cExecStep83 = Nothing
    Case 84
        Set cExecStep84 = Nothing
    Case 85
        Set cExecStep85 = Nothing
    Case 86
        Set cExecStep86 = Nothing
    Case 87
        Set cExecStep87 = Nothing
    Case 88
        Set cExecStep88 = Nothing
    Case 89
        Set cExecStep89 = Nothing
    Case 90
        Set cExecStep90 = Nothing
    Case 91
        Set cExecStep91 = Nothing
    Case 92
        Set cExecStep92 = Nothing
    Case 93
        Set cExecStep93 = Nothing
    Case 94
        Set cExecStep94 = Nothing
    Case 95
        Set cExecStep95 = Nothing
    Case 96
        Set cExecStep96 = Nothing
    Case 97
        Set cExecStep97 = Nothing
    Case 98
        Set cExecStep98 = Nothing
    Case 99
        Set cExecStep99 = Nothing
    Case Else
        BugAssert False, "FreeExecStep:
Invalid index value!"
  End Select

  Exit Sub

FreeExecStepErr:
  ' Log the error code raised by Visual
Basic
  Call LogErrors(Errors)

End Sub
Private Sub ProcessAskFailures()
  ' This procedure is called when a step
with a continuation criteria = Ask has failed.
  ' Wait for all running processes to
complete before displaying an
Abort/Retry/Fail
  ' message to the user. We process every
Ask step that has failed and use a simple
  ' algorithm to determine what to do next.
  ' 1. An abort response to any failure results
in an immediate abort of the run
  ' 2. A continue means the run continues - this
failure is popped off the failure list.
  ' 3. A retry means that the execution details
for the instance are cleared and the
  '    step is re-executed.
  Dim lIndex As Long
  Dim cStepRec As cStep
  Dim cNextInst As cInstance
  Dim cFailureRec As cFailedStep

  On Error GoTo ProcessAskFailuresErr

  ' Display a popup message for all steps that
have failed with a continuation
  ' criteria of Ask
  For lIndex = mcFailures.Count - 1 To 0 Step
-1

    Set cFailureRec = mcFailures(lIndex)

    If cFailureRec.ContCriteria =
gintOnFailureAsk Then
      Set cStepRec =
mcRunSteps.QueryStep(cFailureRec.StepId)
      ' Ask the user whether to
abort/retry/continue
      #If RUN_ONLY Then
        cFailureRec.AskResponse =
ShowMessageBox(0, _
          "Step '" &
GetStepNodeText(cStepRec) & "' failed. " & _
          "Select Abort to abort run and
Ignore to continue. " & _
          "Select Retry to re-execute the
failed step.", _
          "Step Failure", _
          MB_ABORTRETRYIGNORE
+ MB_APPLMODAL +
MB_ICONEXCLAMATION)
      #Else
        cFailureRec.AskResponse =
ShowMessageBox(frmRunning.hWnd, _
          "Step '" &
GetStepNodeText(cStepRec) & "' failed. " & _
          "Select Abort to abort run and
Ignore to continue. " & _
          "Select Retry to re-execute the
failed step.", _
          "Step Failure", _
          MB_ABORTRETRYIGNORE
+ MB_APPLMODAL +
MB_ICONEXCLAMATION)
      #End If

      ' Process an abort response immediately
      If cFailureRec.AskResponse =
IDABORT Then
        mblnAbort = True
        Set cNextInst =
mcInstances.QueryInstance(cFailureRec.Instan
ceId)
        Call RunPendingSiblings(cNextInst,
cFailureRec.EndTime)
        Exit For
      End If
    End If

  Next lIndex

  ' Process all failed steps for which we have
Ignore and Retry responses.
  If Not mblnAbort Then
    ' Navigate in reverse order since we'll be
deleting items from the collection
    For lIndex = mcFailures.Count - 1 To 0 Step -1
      If mcFailures(lIndex).ContCriteria =
gintOnFailureAsk Then
        mblnAsk = False
        Set cFailureRec =
mcFailures.Delete(lIndex)

        Select Case cFailureRec.AskResponse
          Case IDABORT
            BugAssert True

          Case IDRETRY
            ' Delete all instances for the failed
step and re-try
            ' Returns a parent instance reference
            Set cNextInst =
ProcessRetryStep(cFailureRec)
            Call
RunPendingStepInBranch(mstrCurBranchRoot,
cNextInst)

          Case IDIGNORE
            Set cNextInst =
mcInstances.QueryInstance(cFailureRec.InstanceId)
            Call RunPendingSiblings(cNextInst,
cFailureRec.EndTime)

        End Select
      End If
    Next lIndex
  End If

  Exit Sub

ProcessAskFailuresErr:
  ' Log the error code raised by Visual Basic
  Call LogErrors(Errors)
  Err.Raise vbObjectError +
errExecuteBranchFailed, mstrModuleName, _
    LoadResString(errExecuteBranchFailed)

End Sub
Private Function ProcessRetryStep(cFailureRec As
cFailedStep) As cInstance
  ' This procedure is called when a step with a
continuation criteria = Ask has failed
  ' and the user wants to re-execute the step.
  ' We delete all existing instances for the step and
reset the iterator, if
  ' any on the parent instance - this way we ensure
that the step will be executed
  ' in the next pass.
  Dim lIndex As Long
  Dim cParentInstance As cInstance
  Dim cSubStepRec As cSubStep
  Dim cStepRec As cStep

  On Error GoTo ProcessRetryStepErr

  ' Navigate in reverse order since we'll be deleting
items from the collection
  For lIndex = mcInstances.Count - 1 To 0 Step -1

    If mcInstances(lIndex).Step.StepId =
cFailureRec.StepId Then
      Set cParentInstance =
mcInstances.QueryInstance(mcInstances(lIndex).Pa
rentInstanceId)
      Set cSubStepRec =
cParentInstance.QuerySubStep(cFailureRec.StepId)
      Set cStepRec =
mcRunSteps.QueryStep(cFailureRec.StepId)
```

```
        ' Decrement the child count on the
parent instance and reset the
        ' step iterators on the sub-step record,
if any -
        ' all the iterations of the step will be
re-executed.
        cParentInstance.ChildDeleted
cFailureRec.StepId
        cParentInstance.AllComplete = False
        cParentInstance.AllStarted = False

        cSubStepRec.InitializeIt cStepRec,
mcParameters

        ' Now delete the current instance
        Set ProcessRetryStep =
mcInstances.Delete(lIndex)
      End If
   Next lIndex

   Exit Function

ProcessRetryStepErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   Err.Raise vbObjectError +
errExecuteBranchFailed, mstrModuleName,
_
LoadResString(errExecuteBranchFailed)

End Function


Private Sub RunNextStep(ByVal
dtmCompleteTime As Currency, ByVal
lngIndex As Long, _
      ByVal InstanceId As Long, ByVal
ExecutionStatus As InstanceStatus)
   ' Checks if there are any steps remaining
to be
   ' executed in the current branch. If so, it
executes
   ' the step.
   Dim cTermInstance As cInstance
   Dim cFailure As cFailedStep

   On Error GoTo RunNextStepErr

   BugMessage "RunNextStep: cExecStep"
& CStr(lngIndex + 1) & " has completed."

   Call mcTermSteps.Delete
   Call FreeExecStep(lngIndex)

   ' Call a procedure to add the freed up
object to the list
   Call AddFreeProcess(lngIndex)

   Set cTermInstance =
mcInstances.QueryInstance(InstanceId)
   cTermInstance.Status = ExecutionStatus

   If ExecutionStatus = gintFailed Then
      If
cTermInstance.Step.ContinuationCriteria =
gintOnFailureAbortSiblings Then
         Call AbortSiblings(cTermInstance)
      End If

      If Not
mcFailures.StepFailed(cTermInstance.Step.
StepId) Then
         Set cFailure = New cFailedStep
         cFailure.InstanceId =
cTermInstance.InstanceId
         cFailure.StepId =
cTermInstance.Step.StepId
         cFailure.ParentStepId =
cTermInstance.Step.ParentStepId
         cFailure.ContCriteria =
cTermInstance.Step.ContinuationCriteria
         cFailure.EndTime = dtmCompleteTime
         mcFailures.Add cFailure
         Set cFailure = Nothing
      End If
   End If

   If ExecutionStatus = gintFailed And
cTermInstance.Step.ContinuationCriteria =
gintOnFailureAbort Then
      If StringEmpty(msAbortDtls) Then
         ' Initialize the abort message
         msAbortDtls = "Step '" &
GetStepNodeText(cTermInstance.Step) & "'
failed. " & _
               "Aborting execution. Please check
the error file for details."
      End If
      Call Abort
   ElseIf ExecutionStatus = gintFailed And
cTermInstance.Step.ContinuationCriteria =
gintOnFailureAsk Then
      mblnAsk = True

      ' If the step failed due to a Cancel
operation (Abort), abort the run
      If mblnAbort Then
         Call
RunPendingSiblings(cTermInstance,
dtmCompleteTime)
      End If
   Else
      Call RunPendingSiblings(cTermInstance,
dtmCompleteTime)
   End If

   If mblnAbort Then
      If Not AnyStepRunning(mcFreeSteps,
mbarrFree) And Not
StringEmpty(msAbortDtls) Then
         ' Display an error only if the abort is
due to a failure
         ' We had to abort since a step failed -
since no other steps are currently
         ' running, we can display a message to
the user saying that we had to abort
         #If RUN_ONLY Then
            Call ShowMessageBox(0,
msAbortDtls, "Run Aborted", _
                  MB_APPLMODAL + MB_OK
+ MB_ICONEXCLAMATION)
         #Else
            Call
ShowMessageBox(frmRunning.hWnd,
msAbortDtls, "Run Aborted", _
                  MB_APPLMODAL + MB_OK
+ MB_ICONEXCLAMATION)
         #End If
'          MsgBox msAbortDtls, vbOKOnly,
"Run Aborted"
      End If
   ElseIf mblnAsk Then
      If Not AnyStepRunning(mcFreeSteps,
mbarrFree) Then
         ' Ask the user whether to
abort/retry/ignore failed steps
         Call ProcessAskFailures
      End If
   End If

   Exit Sub

RunNextStepErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   WriteError errExecuteBranchFailed, mstrSource
   Call ResetForm(lngIndex)

End Sub
Public Sub StopRun()

   ' Setting the Abort flag to True will ensure that
we
   ' don't execute any more steps
   mblnAbort = True

End Sub

Private Sub CreateDummyInstance(strRootKey As
String)

   Dim cNewInstance As cInstance
   Dim cSubStepDtls  As cStep
   Dim lngSubStepId As Long

   On Error GoTo CreateDummyInstanceErr

   ' Create a new instance of the step
   ' initialize substeps for the step
   Set cNewInstance = New cInstance

   ' There can be multiple iterations of the top level
nodes
   ' running at the same time, but only one branch at
any
   ' time - so enforce a degree of parallelism of 1 on
this
   ' node!
   Set cNewInstance.Step = New cStep
   cNewInstance.DegreeParallelism = 1
   cNewInstance.Key = mstrDummyRootKey

   cNewInstance.InstanceId = NewInstanceId
   cNewInstance.ParentInstanceId = 0

   lngSubStepId =
MakeIdentifierValid(strRootKey)

   Set cSubStepDtls =
mcRunSteps.QueryStep(lngSubStepId)
   If cSubStepDtls.EnabledFlag Then
      ' Create a child node for the step corresponding
to
      ' the root node of the branch being currently
executed,
      ' only if it has been enabled
      Call
cNewInstance.CreateSubStep(cSubStepDtls,
mcParameters)
   End If

   mcInstances.Add cNewInstance
   Set cNewInstance.Iterators =
DetermineIterators(cNewInstance)

   ' Set a reference to the newly created dummy
instance
   Set mcDummyRootInstance = cNewInstance

   Set cNewInstance = Nothing

   Exit Sub
```

```
CreateDummyInstanceErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   mstrSource = mstrModuleName &
"CreateDummyInstance"
   Err.Raise vbObjectError +
errCreateInstanceFailed, _
         mstrSource,
LoadResString(errCreateInstanceFailed)

End Sub
Private Function CreateInstance(cExecStep
As cStep, _
      cParentInstance As cInstance) As
cInstance
   ' Creates a new instance of the passed in
step. Returns
   ' a reference to the newly created instance
object.

   Dim cNewInstance As cInstance
   Dim nodChild As cStep
   Dim lngSubStepId As Long

   On Error GoTo CreateInstanceErr

   ' Create a new instance of the step
   ' initialize substeps for the step
   Set cNewInstance = New cInstance
   Set cNewInstance.Step = cExecStep
   cNewInstance.Key =
MakeKeyValid(cExecStep.StepId,
cExecStep.StepType)
   cNewInstance.ParentInstanceId =
cParentInstance.InstanceId
   cNewInstance.InstanceId =
NewInstanceId
   ' Validate the degree of parallelism field
before assigning it to the instance -
   ' (the parameter value might have been set
to an invalid value at runtime)
   Call
ValidateParallelism(cExecStep.DegreeParall
elism, _
         cExecStep.WorkspaceId,
ParamsInWsp:=mcParameters)
   cNewInstance.DegreeParallelism =
SubstituteParameters(cExecStep.DegreePara
llelism, _
         cExecStep.WorkspaceId,
WspParameters:=mcParameters)

   If
mcNavSteps.HasChild(StepKey:=cNewInsta
nce.Key) Then
      Set nodChild =
mcNavSteps.ChildStep(StepKey:=cNewInst
ance.Key)
      Do
         If nodChild.EnabledFlag Then
            ' Create nodes for all it's substeps
only
            ' if the substeps have been enabled
            Call
cNewInstance.CreateSubStep(nodChild,
mcParameters)
         End If

         Set nodChild =
mcNavSteps.NextStep(StepId:=nodChild.St
epId)
      Loop While (Not nodChild Is Nothing)
   End If

   mcInstances.Add cNewInstance
   Set cNewInstance.Iterators =
DetermineIterators(cNewInstance)

   ' Increment the number of executing steps on
the parent
   cParentInstance.ChildExecuted
(cExecStep.StepId)

   Set CreateInstance = cNewInstance

   Exit Function

CreateInstanceErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   mstrSource = mstrModuleName &
"CreateInstance"
   Err.Raise vbObjectError +
errCreateInstanceFailed, _
         mstrSource,
LoadResString(errCreateInstanceFailed)

End Function
Private Function
DetermineIterators(cInstanceRec As cInstance)
As cRunColIt
   ' Returns a collection of all the iterator
values for this
   ' instance - since an iterator that is defined at
a
   ' particular level can be used in all it's
substeps, we
   ' need to navigate the step tree all the way to
the root

   Dim cRunIts As cRunColIt
   Dim cRunIt As cRunItNode
   Dim cStepIt As cIterator
   Dim cParentInst As cInstance
   Dim cSubStepRec As cSubStep
   Dim cSubStepDtls As cStep
   Dim lngSubStepId As Long
   Dim lngIndex As Long

   On Error GoTo DetermineIteratorsErr

   Set cRunIts = New cRunColIt

   If cInstanceRec.ParentInstanceId > 0 Then
      ' The last iterator for an instance of a step
is stored
      ' on it's parent! So navigate up before
beginning the
      ' search for iterator values.
      Set cParentInst =
mcInstances.QueryInstance(cInstanceRec.Pare
ntInstanceId)

      ' Get the sub-step record for the current
step
      ' on it's parent's instance!
      lngSubStepId = cInstanceRec.Step.StepId
      Set cSubStepRec =
cParentInst.QuerySubStep(lngSubStepId)
      Set cSubStepDtls =
mcRunSteps.QueryStep(lngSubStepId)

      ' And determine the next iteration value
for the
      ' substep in this instance
      Set cStepIt =
cSubStepRec.NewIteration(cSubStepDtls)
      If Not cStepIt Is Nothing Then
         ' Add the iterator details to the collection
since
         ' an iterator has been defined for the step
         Set cRunIt = New cRunItNode
         cRunIt.IteratorName =
cSubStepDtls.IteratorName
         cRunIt.Value =
SubstituteParameters(cStepIt.Value,
cSubStepDtls.WorkspaceId,
WspParameters:=mcParameters)
         cRunIt.StepId = cSubStepRec.StepId
         cRunIts.Push cRunIt
      End If

      ' Since the parent instance has all the iterators
upto
      ' that level, read them and push them on to the
stack for
      ' this instance
      For lngIndex = 0 To
cParentInst.Iterators.Count - 1
         Set cRunIt = cParentInst.Iterators(lngIndex)
         cRunIts.Push cRunIt
      Next lngIndex
   End If

   Set DetermineIterators = cRunIts

   Exit Function

DetermineIteratorsErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   mstrSource = mstrModuleName &
"DetermineIterators"
   Err.Raise vbObjectError +
errExecInstanceFailed, _
         mstrSource,
LoadResString(errExecInstanceFailed)

End Function
Private Function
DetermineConstraints(cInstanceRec As cInstance, _
      intConsType As ConstraintType) As Variant
   ' Returns a collection of all the constraints for this
   ' instance of the passed in type - all the
constraints defined
   ' for the manager are executed first, followed by
those defined
   ' for the step. If a step has an iterator defined for
it, each
   ' constraint is executed only once.

   Dim cParentInst As cInstance
   Dim cTempInst As cInstance
   Dim vntConstraints As Variant
   Dim vntTempCons As Variant
   Dim cColConstraints() As Variant
   Dim lngConsCount As Long

   On Error GoTo DetermineConstraintsErr

   Set cTempInst = cInstanceRec
   lngConsCount = 0

   ' Go all the way to the root
   Do
      If cTempInst.ParentInstanceId > 0 Then
         Set cParentInst =
mcInstances.QueryInstance(cTempInst.ParentInstan
ceId)
      Else
```

```
        Set cParentInst = Nothing
      End If

      ' Check if the step has an iterator
defined for it
      If
cTempInst.ValidForIteration(cParentInst,
intConsType) Then
         vntTempCons =
mcRunConstraints.ConstraintsForStep( _
            cTempInst.Step.StepId,
cTempInst.Step.VersionNo, _
            intConsType, blnSort:=True, _
            blnGlobal:=False,
blnGlobalConstraintsOnly:=False)

         If Not IsEmpty(vntTempCons) Then
            ReDim Preserve
cColConstraints(lngConsCount)
            cColConstraints(lngConsCount) =
vntTempCons
            lngConsCount = lngConsCount +
1
         End If
      End If

      Set cTempInst = cParentInst

   Loop While Not cTempInst Is Nothing

   If lngConsCount > 0 Then
      vntTempCons =
OrderConstraints(cColConstraints,
intConsType)
   End If

   DetermineConstraints = vntTempCons

   Exit Function

DetermineConstraintsErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   mstrSource = mstrModuleName &
"DetermineConstraints"
   Err.Raise vbObjectError +
errExecInstanceFailed, _
         mstrSource,
LoadResString(errExecInstanceFailed)

End Function
Private Function
GetInstanceToExecute(cParentNode As
cInstance, _
      cSubStepRec As cSubStep, _
      cSubStepDtls As cStep) As cInstance

   Dim cSubStepInst As cInstance

   On Error GoTo GetInstanceToExecuteErr

   BugAssert Not (cParentNode Is Nothing
Or _
         cSubStepRec Is Nothing Or _
         cSubStepDtls Is Nothing), _
         "GetInstanceToExecute: Input
invalid"

   ' Check if it has iterators
   If cSubStepDtls.IteratorCount = 0 Then
      ' Check if the step has been executed
      If cSubStepRec.TasksRunning = 0 And
cSubStepRec.TasksComplete = 0 And _
            Not
mcInstances.CompletedInstanceExists(cParent
Node.InstanceId, cSubStepDtls) Then
         ' The sub-step hasn't been executed yet.
         ' Create an instance for it and exit
         Set cSubStepInst =
CreateInstance(cSubStepDtls, cParentNode)
      Else
         Set cSubStepInst = Nothing
      End If
   Else
      ' Check if there are pending iterations for
the sub-step
      If Not
cSubStepRec.NextIteration(cSubStepDtls) Is
Nothing Then
         ' Pending iterations exist - create an
instance for the sub-step and exit
         Set cSubStepInst =
CreateInstance(cSubStepDtls, cParentNode)
      Else
         ' No more iterations - continue with the
next substep
         Set cSubStepInst = Nothing
      End If
   End If

   Set GetInstanceToExecute = cSubStepInst
   Exit Function

GetInstanceToExecuteErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   mstrSource = mstrModuleName &
"GetInstanceToExecute"
   Err.Raise vbObjectError +
errNavInstancesFailed, _
         mstrSource,
LoadResString(errNavInstancesFailed)

End Function

Public Function InstancesForStep(lngStepId
As Long, ByRef StepStatus As InstanceStatus)
As cInstances
   ' Returns an array of all the instances for a
step
   Dim lngIndex As Long
   Dim cTempInst As cInstance
   Dim cStepInstances As cInstances
   Dim cStepRec As cStep

   On Error GoTo InstancesForStepErr

   Set cStepInstances = New cInstances

   For lngIndex = 0 To mcInstances.Count - 1
      Set cTempInst = mcInstances(lngIndex)

      If cTempInst.Step.StepId = lngStepId
Then
         cStepInstances.Add cTempInst
      End If
   Next lngIndex

   If cStepInstances.Count = 0 Then
      Set cStepRec =
mcRunSteps.QueryStep(lngStepId)
      If Not
mcFailures.ExecuteSubStep(cStepRec.ParentSt
epId) Then
         StepStatus = gintAborted
      End If
      Set cStepRec = Nothing
   End If

   ' Set the return value of the function to the array
of
   ' constraints that has been built above
   Set InstancesForStep = cStepInstances

   Set cStepInstances = Nothing
   Exit Function

InstancesForStepErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   mstrSource = mstrModuleName &
"InstancesForStep"
   Err.Raise vbObjectError +
errNavInstancesFailed, mstrSource, _
         LoadResString(errNavInstancesFailed)

End Function
Private Sub
RemoveFreeProcess(lngRunningProcess As Long)
   ' Removes the passed in element from the
collection of
   ' free objects

   ' Confirm that the last element in the array is the
one
   ' we need to delete
   If mcFreeSteps(mcFreeSteps.Count - 1) =
lngRunningProcess Then
      mcFreeSteps.Delete
Position:=mcFreeSteps.Count - 1
   Else
      ' Ask the class to find the element and delete it
      mcFreeSteps.Delete Item:=lngRunningProcess
   End If

End Sub
Private Sub AddFreeProcess(lngTerminatedProcess
As Long)
   ' Adds the passed in element to the collection of
   ' free objects

   mcFreeSteps.Add lngTerminatedProcess

End Sub

Private Sub ResetForm(Optional ByVal lngIndex
As Long)

   Dim lngTemp As Long

   On Error GoTo ResetFormErr

   ' Check if there are any running instances to wait
for
   If mcFreeSteps.Count <>
glngNumConcurrentProcesses Then

      For lngTemp = 0 To mcFreeSteps.Count - 1
         If mcFreeSteps(lngTemp) = lngIndex Then
            Exit For
         End If
      Next lngTemp

      If lngTemp <= mcFreeSteps.Count - 1 Then
         ' This process that just completed did not
exist in the list of
         ' free processes
         Call AddFreeProcess(lngIndex)
      End If
```

```
      If Not AnyStepRunning(mcFreeSteps,
mbarrFree) Then
         WriteToWspLog
(mintRunComplete)
         ' All steps are complete
         RaiseEvent
RunComplete(Determine64BitTime())
      End If
   Else
      WriteToWspLog (mintRunComplete)
      RaiseEvent
RunComplete(Determine64BitTime())
   End If

   Exit Sub

ResetFormErr:

End Sub
Private Function NewInstanceId() As Long
   ' Will return new instance id's - uses a
static counter
   ' that it increments each time
   Static lngInstance As Long

   lngInstance = lngInstance + 1
   NewInstanceId = lngInstance

End Function

Private Function
RunPendingStepInBranch(strCurBranchRoo
t As String, _
      Optional cExecInstance As cInstance =
Nothing) As cInstance
   ' Runs a worker step in the branch being
executed, if
   ' there are any pending execution
   ' This function is also called when a step
has just completed
   ' execution - in which case the terminated
instance is
   ' passed in as the optional parameter.
When that happens,
   ' we first try to execute the siblings of the
terminated
   ' step if any are pending execution.
   ' If the terminated instance has not been
passed in, we
   ' start with the dummy root instance and
navigate down,
   ' trying to find a pending worker step.

   Dim cExecSubStep As cStep
   Dim cParentInstance As cInstance
   Dim cNextInst As cInstance

   On Error GoTo
RunPendingStepInBranchErr

   If Not cExecInstance Is Nothing Then
      ' Called when an instance has
terminated
      ' When a worker step terminates, then
we need to
      ' decremement the number of running
steps on it's
      ' manager
      Set cParentInstance = _

mcInstances.QueryInstance(cExecInstance.P
arentInstanceId)

   Else
      If StringEmpty(strCurBranchRoot) Or
mcDummyRootInstance Is Nothing Then
         ' Run complete - event raised by Run
method
         Set RunPendingStepInBranch =
Nothing
         Exit Function
      End If

      ' If there are no pending steps on the root
instance,
      ' then there are no steps within the branch
that need
      ' to be executed
      If mcDummyRootInstance.AllComplete
Or mcDummyRootInstance.AllStarted Then
         Set RunPendingStepInBranch =
Nothing
         Exit Function
      End If

      Set cParentInstance =
mcDummyRootInstance
   End If

   Do
      Set cNextInst =
GetSubStepToExecute(cParentInstance)
      If cNextInst Is Nothing Then
         ' There are no steps within the branch
that can
         ' be executed - If we are at the dummy
instance,
         ' this branch has completed executing
         If cParentInstance.Key =
mstrDummyRootKey Then
            Set cNextInst = Nothing
            Exit Do
         Else
            ' Go to the parent instance and try to
find
            ' some other sibling is pending
execution
            Set cNextInst =
mcInstances.QueryInstance(cParentInstance.Pa
rentInstanceId)

            If cParentInstance.SubSteps.Count =
0 Then
               cNextInst.ChildTerminated
cParentInstance.Step.StepId
            End If
         End If
      End If

      BugAssert Not cNextInst Is Nothing
      Set cParentInstance = cNextInst

   Loop While cNextInst.Step.StepType <>
gintWorkerStep

   If Not cNextInst Is Nothing Then
      Call ExecuteStep(cNextInst)
   End If

   Set RunPendingStepInBranch = cNextInst

   Exit Function

RunPendingStepInBranchErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errNavInstancesFailed, _
         mstrModuleName &
"RunPendingStepInBranch",
LoadResString(errNavInstancesFailed)

End Function
Private Function
RunPendingSibling(cTermInstance As cInstance, _
      dtmCompleteTime As Currency) As cInstance
   ' This process is called when a step terminates.
Tries to
   ' run a sibling of the terminated step, if one is
pending
   ' execution.

   Dim cParentInstance As cInstance
   Dim cNextInst As cInstance

   On Error GoTo RunPendingSiblingErr

   If StringEmpty(mstrCurBranchRoot) Or
mcDummyRootInstance Is Nothing Then
      ' Run complete - event raised by Run method
      Set RunPendingSibling = Nothing
      Exit Function
   End If

   BugAssert cTermInstance.ParentInstanceId > 0,
"Orphaned instance in array!"

   ' When a worker step terminates, then we need to
   ' decremement the number of running steps on it's
   ' manager
   Set cParentInstance =
mcInstances.QueryInstance(cTermInstance.ParentIn
stanceId)

   ' Decrement the number of running processes on
the
   ' parent by 1
   Call
cParentInstance.ChildTerminated(cTermInstance.St
ep.StepId)

   ' The first step that terminates has to be a worker
   ' If it is complete, update the completed steps on
the
   ' parent by 1.
   Call
cParentInstance.ChildCompleted(cTermInstance.St
ep.StepId)
   cParentInstance.AllStarted = False

   Do
      Set cNextInst =
GetSubStepToExecute(cParentInstance,
dtmCompleteTime)
      If cNextInst Is Nothing Then
         If cParentInstance.Key =
mstrDummyRootKey Then
            Set cNextInst = Nothing
            Exit Do
         Else
            ' Go to the parent instance and try to find
            ' some other sibling is pending execution
            Set cNextInst =
mcInstances.QueryInstance(cParentInstance.ParentI
nstanceId)
            If cParentInstance.IsRunning Then
               cNextInst.AllStarted = True
            Else
               ' No more sub-steps to execute
               Call
cNextInst.ChildCompleted(cParentInstance.Step.Ste
pId)
```

```
            Call
cNextInst.ChildTerminated(cParentInstance.
Step.StepId)
              cNextInst.AllStarted = False
            End If
          End If
        End If

        BugAssert Not cNextInst Is Nothing
        Set cParentInstance = cNextInst

    Loop While cNextInst.Step.StepType <>
gintWorkerStep

    If Not cNextInst Is Nothing Then
      Call ExecuteStep(cNextInst)
    End If

    Set RunPendingSibling = cNextInst

    Exit Function

RunPendingSiblingErr:
    ' Log the error code raised by Visual
Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    mstrSource = mstrModuleName &
"RunPendingSibling"
    Err.Raise vbObjectError +
errNavInstancesFailed, mstrSource, _
        LoadResString(errNavInstancesFailed)

End Function
Private Sub
RunPendingSiblings(cTermInstance As
cInstance, _
        dtmCompleteTime As Currency)
    ' This process is called when a step
terminates. Tries to
    ' run siblings of the terminated step, if
they are pending
    ' execution.

    Dim cExecInst As cInstance

    On Error GoTo RunPendingSiblingsErr
    BugMessage "In RunPendingSiblings"

    ' Call a procedure to run the sibling of the
terminated
    ' step, if any. This procedure will also
update the
    ' number of complete/running tasks on the
manager steps.
    Set cExecInst =
RunPendingSibling(cTermInstance,
dtmCompleteTime)

    If Not cExecInst Is Nothing Then
      Do
        ' Execute any other pending steps in
the branch.
        ' The step that has just terminated
might be
        ' the last one that was executing in a
sub-branch.
        ' That would mean that we can
execute another
        ' sub-branch that might involve more
than 1 step.
        ' Pass the just executed step as a
parameter.
        Set cExecInst =
RunPendingStepInBranch(mstrCurBranchRoot
, cExecInst)
      Loop While Not cExecInst Is Nothing
    Else
      If Not mcDummyRootInstance.IsRunning
Then
        ' All steps have been executed in the
branch - run
        ' a new branch
        Call RunNewBranch
      Else
        ' There are no more steps to execute in
the current
        ' branch but we have running processes.
      End If
    End If

    Exit Sub

RunPendingSiblingsErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    mstrSource = mstrModuleName &
"RunPendingSiblings"
    Err.Raise vbObjectError +
errNavInstancesFailed, _
        mstrSource,
LoadResString(errNavInstancesFailed)

End Sub

Private Sub
NoSubStepsToExecute(cMgrInstance As
cInstance, Optional dtmCompleteTime As
Currency = gdtmEmpty)
    ' Called when we cannot find any more
substeps to run for
    ' manager step - set the allcomplete or
allstarted
    ' properties to true

    If cMgrInstance.IsRunning() Then
      cMgrInstance.AllStarted = True
    Else
      cMgrInstance.AllComplete = True
      If dtmCompleteTime <> gdtmEmpty
Then
        ' Update the end time on the manager
step
        Call
TimeCompleteUpdateForStep(cMgrInstance,
dtmCompleteTime)
      End If
    End If

End Sub

Private Function
GetSubStepToExecute(cParentNode As
cInstance, _
      Optional dtmCompleteTime As Currency
= 0) As cInstance
    ' Returns the child of the passed in node that
is to be
    ' executed next. Checks if we are in the
middle of an instance
    ' being executed in which case it returns the
pending
    ' instance. Creates a new instance if there are
pending
    ' instances for a sub-step.

    Dim lngIndex As Long
    Dim cSubStepRec As cSubStep
    Dim cSubStepDtls As cStep
    Dim cSubStepInst As cInstance

    On Error GoTo GetSubStepToExecuteErr

    ' There are a number of cases that need to be
accounted
    ' for here.
    ' 1. While traversing through all enabled nodes
for the
    ' first time - instance records may not exist for the
    ' substeps.
    ' 2. Instance records exist, and there are processes
    ' that need to be executed for a sub-step
    ' 3. There are no more processes that need to be
currently
    ' executed (till a process completes)
    ' 4. There are no more processes that need to be
executed
    ' (All substeps have completed execution)

    ' This is the only point where we check the Abort
flag -
    ' since this is the heart of the navigation routine
that
    ' selects processes to execute. Also, when a step
terminates
    ' selection of the next process goes through here.
    If mblnAbort Then
      Set GetSubStepToExecute = Nothing
      cParentNode.Status = gintAborted
      Exit Function
    End If

    If mblnAsk Then
      Set GetSubStepToExecute = Nothing
      Exit Function
    End If

    If Not
mcFailures.ExecuteSubStep(cParentNode.Step.Step
Id) Then
      Set GetSubStepToExecute = Nothing
      cParentNode.Status = gintAborted
      Exit Function
    End If

    ' First check if there are pending steps for the
parent!
    If cParentNode.IsPending Then
      ' Loop through all the sub-steps for the parent
node
      For lngIndex = 0 To
cParentNode.SubSteps.Count - 1
        Set cSubStepRec =
cParentNode.SubSteps(lngIndex)
        Set cSubStepDtls =
mcRunSteps.QueryStep(cSubStepRec.StepId)
        If Not
mcInstances.InstanceAborted(cSubStepRec) Then
          ' Check if the sub-step is a worker
          If cSubStepDtls.StepType =
gintWorkerStep Then
            ' Find/create an instance to execute
            Set cSubStepInst =
GetInstanceToExecute( _
                cParentNode, cSubStepRec,
cSubStepDtls)
            If Not cSubStepInst Is Nothing Then
              Exit For
            Else
              ' Continue w/ the next sub-step
            End If
          Else
```

```
            ' The sub-step is a manager step
            ' Check if there are any pending instances for
            ' the manager
            Set cSubStepInst = mcInstances.QueryPendingInstance( _
                  cParentNode.InstanceId, cSubStepRec.StepId)
            If cSubStepInst Is Nothing Then
               ' Find/create an instance to execute
               Set cSubStepInst = GetInstanceToExecute( _
                     cParentNode, cSubStepRec, cSubStepDtls)
               If Not cSubStepInst Is Nothing Then
                  Exit For
               Else
                  ' Continue w/ the next sub-step
               End If
            Else
               ' We have found a pending instance for the
               ' sub-step (manager) - exit the loop
               Exit For
            End If
         End If
      End If
   Next lngIndex

   If lngIndex > cParentNode.SubSteps.Count - 1 Or cParentNode.SubSteps.Count = 0 Then
      ' If we could not find any sub-steps to execute,
      ' mark the parent node as complete/all started
      Call NoSubStepsToExecute(cParentNode, dtmCompleteTime)
      Set cSubStepInst = Nothing
   End If
End If

Set GetSubStepToExecute = cSubStepInst
Exit Function

GetSubStepToExecuteErr:
' Log the error code raised by Visual Basic
Call LogErrors(Errors)
On Error GoTo 0
mstrSource = mstrModuleName & "GetSubStepToExecute"
Err.Raise vbObjectError + errNavInstancesFailed, mstrSource, _
   LoadResString(errNavInstancesFailed)

End Function

Private Sub TimeCompleteUpdateForStep(cMgrInstance As cInstance, ByVal EndTime As Currency)

' Called when there are no more sub-steps to execute for
' the manager step. It updates the end time and status on
' the manager.
Dim lElapsed As Long
On Error GoTo TimeCompleteUpdateForStepErr

If cMgrInstance.Key <> mstrDummyRootKey Then
   cMgrInstance.EndTime = EndTime
   cMgrInstance.Status = gintComplete
   lElapsed = (EndTime - cMgrInstance.StartTime) * 10000
   cMgrInstance.ElapsedTime = lElapsed
   RaiseEvent StepComplete(cMgrInstance.Step, EndTime, cMgrInstance.InstanceId, lElapsed)
End If

Exit Sub

TimeCompleteUpdateForStepErr:
' Log the error code raised by Visual Basic
Call LogErrors(Errors)
WriteError errUpdateDisplayFailed, mstrModuleName & "TimeCompleteUpdateForStep"

End Sub

Private Function GetFreeObject() As Long

' Check the array of free objects and retrieve the first one
If mcFreeSteps.Count > 0 Then
   GetFreeObject = mcFreeSteps(mcFreeSteps.Count - 1)
Else
   mstrSource = mstrModuleName & "GetFreeObject"
   ShowError errMaxProcessesExceeded
   On Error GoTo 0
   Err.Raise vbObjectError + errMaxProcessesExceeded, _
         mstrSource, _

LoadResString(errMaxProcessesExceeded)
End If

End Function
Private Function StepTerminated(cCompleteStep As cStep, ByVal dtmCompleteTime As Currency, _
   ByVal lngIndex As Long, ByVal InstanceId As Long, ByVal ExecutionStatus As InstanceStatus) As cStep
' This procedure is called whenever a step terminates.
Dim cTermRec As cTermStep
Dim cInstRec As cInstance
Dim cStartInst As cInstance
Dim lElapsed As Long
Dim sLogLabel As String
Dim LogLabels As New cVectorStr
Dim iItIndex As Long

On Error GoTo StepTerminatedErr

Set cInstRec = mcInstances.QueryInstance(InstanceId)
If dtmCompleteTime <> 0 And cInstRec.StartTime <> 0 Then
   ' Convert to milliseconds since that is the default precision
   lElapsed = (dtmCompleteTime - cInstRec.StartTime) * 10000
Else
   lElapsed = 0
End If

Set cStartInst = cInstRec
iItIndex = 0
Do While cInstRec.Key <> mstrDummyRootKey
   sLogLabel = gstrSQ & cInstRec.Step.StepLabel & gstrSQ

   If iItIndex < cInstRec.Iterators.Count Then
      If cStartInst.Iterators(iItIndex).StepId = cInstRec.Step.StepId Then
         sLogLabel = sLogLabel & msIt & gstrSQ & cStartInst.Iterators(iItIndex).IteratorName & gstrSQ & _
               msItValue & gstrSQ & cStartInst.Iterators(iItIndex).Value & gstrSQ
         iItIndex = iItIndex + 1
      End If
   End If

   If cInstRec.Key = cStartInst.Key Then
      ' Append the execution status
      sLogLabel = sLogLabel & " Status: " & gstrSQ & gsExecutionStatus(ExecutionStatus) & gstrSQ
      If ExecutionStatus = gintFailed Then
         ' Append the continuation criteria for the step since it failed
         sLogLabel = sLogLabel & " Continuation Criteria: " & gstrSQ & gsContCriteria(cInstRec.Step.ContinuationCriteria) & gstrSQ
      End If
   End If
   LogLabels.Add sLogLabel

   Set cInstRec = mcInstances.QueryInstance(cInstRec.ParentInstanceId)
Loop

Call WriteToWspLog(mintStepComplete, LogLabels, dtmCompleteTime)
Set LogLabels = Nothing

' Adds the terminated step details to a queue.
Set cTermRec = New cTermStep
cTermRec.ExecutionStatus = ExecutionStatus
cTermRec.Index = lngIndex
cTermRec.InstanceId = InstanceId
cTermRec.TimeComplete = dtmCompleteTime
Call mcTermSteps.Add(cTermRec)
Set cTermRec = Nothing

RaiseEvent StepComplete(cCompleteStep, dtmCompleteTime, InstanceId, lElapsed)

Exit Function

StepTerminatedErr:
' Log the error code raised by Visual Basic
Call LogErrors(Errors)
WriteError errExecuteBranchFailed, mstrSource
Call ResetForm(lngIndex)

End Function
Public Property Let RootKey(ByVal vdata As String)

mstrRootKey = vdata

End Property

Public Property Get RootKey() As String
RootKey = mstrRootKey
End Property
```

```
Private Function InitExecStep() As cRunStep
   ' Since arrays of objects cannot be declared as WithEvents,
   ' we use a limited number of objects and set a maximum
   ' on the number of steps that can run in parallel
   ' This is a wrapper that will create an instance of
   ' a cExecuteSM object depending on the index
   Dim lngIndex As Long

   On Error GoTo InitExecStepErr

   lngIndex = GetFreeObject

   Select Case lngIndex + 1
      Case 1
         Set cExecStep1 = New cRunStep
         Set InitExecStep = cExecStep1
      Case 2
         Set cExecStep2 = New cRunStep
         Set InitExecStep = cExecStep2
      Case 3
         Set cExecStep3 = New cRunStep
         Set InitExecStep = cExecStep3
      Case 4
         Set cExecStep4 = New cRunStep
         Set InitExecStep = cExecStep4
      Case 5
         Set cExecStep5 = New cRunStep
         Set InitExecStep = cExecStep5
      Case 6
         Set cExecStep6 = New cRunStep
         Set InitExecStep = cExecStep6
      Case 7
         Set cExecStep7 = New cRunStep
         Set InitExecStep = cExecStep7
      Case 8
         Set cExecStep8 = New cRunStep
         Set InitExecStep = cExecStep8
      Case 9
         Set cExecStep9 = New cRunStep
         Set InitExecStep = cExecStep9
      Case 10
         Set cExecStep10 = New cRunStep
         Set InitExecStep = cExecStep10
      Case 11
         Set cExecStep11 = New cRunStep
         Set InitExecStep = cExecStep11
      Case 12
         Set cExecStep12 = New cRunStep
         Set InitExecStep = cExecStep12
      Case 13
         Set cExecStep13 = New cRunStep
         Set InitExecStep = cExecStep13
      Case 14
         Set cExecStep14 = New cRunStep
         Set InitExecStep = cExecStep14
      Case 15
         Set cExecStep15 = New cRunStep
         Set InitExecStep = cExecStep15
      Case 16
         Set cExecStep16 = New cRunStep
         Set InitExecStep = cExecStep16
      Case 17
         Set cExecStep17 = New cRunStep
         Set InitExecStep = cExecStep17
      Case 18
         Set cExecStep18 = New cRunStep
         Set InitExecStep = cExecStep18
      Case 19
         Set cExecStep19 = New cRunStep
         Set InitExecStep = cExecStep19
      Case 20
         Set cExecStep20 = New cRunStep
         Set InitExecStep = cExecStep20
      Case 21
         Set cExecStep21 = New cRunStep
         Set InitExecStep = cExecStep21
      Case 22
         Set cExecStep22 = New cRunStep
         Set InitExecStep = cExecStep22
      Case 23
         Set cExecStep23 = New cRunStep
         Set InitExecStep = cExecStep23
      Case 24
         Set cExecStep24 = New cRunStep
         Set InitExecStep = cExecStep24
      Case 25
         Set cExecStep25 = New cRunStep
         Set InitExecStep = cExecStep25
      Case 26
         Set cExecStep26 = New cRunStep
         Set InitExecStep = cExecStep26
      Case 27
         Set cExecStep27 = New cRunStep
         Set InitExecStep = cExecStep27
      Case 28
         Set cExecStep28 = New cRunStep
         Set InitExecStep = cExecStep28
      Case 29
         Set cExecStep29 = New cRunStep
         Set InitExecStep = cExecStep29
      Case 30
         Set cExecStep30 = New cRunStep
         Set InitExecStep = cExecStep30
      Case 31
         Set cExecStep31 = New cRunStep
         Set InitExecStep = cExecStep31
      Case 32
         Set cExecStep32 = New cRunStep
         Set InitExecStep = cExecStep32
      Case 33
         Set cExecStep33 = New cRunStep
         Set InitExecStep = cExecStep33
      Case 34
         Set cExecStep34 = New cRunStep
         Set InitExecStep = cExecStep34
      Case 35
         Set cExecStep35 = New cRunStep
         Set InitExecStep = cExecStep35
      Case 36
         Set cExecStep36 = New cRunStep
         Set InitExecStep = cExecStep36
      Case 37
         Set cExecStep37 = New cRunStep
         Set InitExecStep = cExecStep37
      Case 38
         Set cExecStep38 = New cRunStep
         Set InitExecStep = cExecStep38
      Case 39
         Set cExecStep39 = New cRunStep
         Set InitExecStep = cExecStep39
      Case 40
         Set cExecStep40 = New cRunStep
         Set InitExecStep = cExecStep40
      Case 41
         Set cExecStep41 = New cRunStep
         Set InitExecStep = cExecStep41
      Case 42
         Set cExecStep42 = New cRunStep
         Set InitExecStep = cExecStep42
      Case 43
         Set cExecStep43 = New cRunStep
         Set InitExecStep = cExecStep43
      Case 44
         Set cExecStep44 = New cRunStep
         Set InitExecStep = cExecStep44
      Case 45
         Set cExecStep45 = New cRunStep
         Set InitExecStep = cExecStep45
      Case 46
         Set cExecStep46 = New cRunStep
         Set InitExecStep = cExecStep46
      Case 47
         Set cExecStep47 = New cRunStep
         Set InitExecStep = cExecStep47
      Case 48
         Set cExecStep48 = New cRunStep
         Set InitExecStep = cExecStep48
      Case 49
         Set cExecStep49 = New cRunStep
         Set InitExecStep = cExecStep49
      Case 50
         Set cExecStep50 = New cRunStep
         Set InitExecStep = cExecStep50
      Case 51
         Set cExecStep51 = New cRunStep
         Set InitExecStep = cExecStep51
      Case 52
         Set cExecStep52 = New cRunStep
         Set InitExecStep = cExecStep52
      Case 53
         Set cExecStep53 = New cRunStep
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      Case 54
         Set cExecStep54 = New cRunStep
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      Case 55
         Set cExecStep55 = New cRunStep
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      Case 56
         Set cExecStep56 = New cRunStep
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      Case 57
         Set cExecStep57 = New cRunStep
         Set InitExecStep = cExecStep57
      Case 58
         Set cExecStep58 = New cRunStep
         Set InitExecStep = cExecStep58
      Case 59
         Set cExecStep59 = New cRunStep
         Set InitExecStep = cExecStep59
      Case 60
         Set cExecStep60 = New cRunStep
         Set InitExecStep = cExecStep60
      Case 61
         Set cExecStep61 = New cRunStep
         Set InitExecStep = cExecStep61
      Case 62
         Set cExecStep62 = New cRunStep
         Set InitExecStep = cExecStep62
      Case 63
         Set cExecStep63 = New cRunStep
         Set InitExecStep = cExecStep63
      Case 64
         Set cExecStep64 = New cRunStep
         Set InitExecStep = cExecStep64
      Case 65
         Set cExecStep65 = New cRunStep
         Set InitExecStep = cExecStep65
      Case 66
         Set cExecStep66 = New cRunStep
         Set InitExecStep = cExecStep66
      Case 67
         Set cExecStep67 = New cRunStep
         Set InitExecStep = cExecStep67
      Case 68
         Set cExecStep68 = New cRunStep
         Set InitExecStep = cExecStep68
      Case 69
```

```
      Set cExecStep69 = New cRunStep
      Set InitExecStep = cExecStep69
   Case 70
      Set cExecStep70 = New cRunStep
      Set InitExecStep = cExecStep70
   Case 71
      Set cExecStep71 = New cRunStep
      Set InitExecStep = cExecStep71
   Case 72
      Set cExecStep72 = New cRunStep
      Set InitExecStep = cExecStep72
   Case 73
      Set cExecStep73 = New cRunStep
      Set InitExecStep = cExecStep73
   Case 74
      Set cExecStep74 = New cRunStep
      Set InitExecStep = cExecStep74
   Case 75
      Set cExecStep75 = New cRunStep
      Set InitExecStep = cExecStep75
   Case 76
      Set cExecStep76 = New cRunStep
      Set InitExecStep = cExecStep76
   Case 77
      Set cExecStep77 = New cRunStep
      Set InitExecStep = cExecStep77
   Case 78
      Set cExecStep78 = New cRunStep
      Set InitExecStep = cExecStep78
   Case 79
      Set cExecStep79 = New cRunStep
      Set InitExecStep = cExecStep79
   Case 80
      Set cExecStep80 = New cRunStep
      Set InitExecStep = cExecStep80
   Case 81
      Set cExecStep81 = New cRunStep
      Set InitExecStep = cExecStep81
   Case 82
      Set cExecStep82 = New cRunStep
      Set InitExecStep = cExecStep82
   Case 83
      Set cExecStep83 = New cRunStep
      Set InitExecStep = cExecStep83
   Case 84
      Set cExecStep84 = New cRunStep
      Set InitExecStep = cExecStep84
   Case 85
      Set cExecStep85 = New cRunStep
      Set InitExecStep = cExecStep85
   Case 86
      Set cExecStep86 = New cRunStep
      Set InitExecStep = cExecStep86
   Case 87
      Set cExecStep87 = New cRunStep
      Set InitExecStep = cExecStep87
   Case 88
      Set cExecStep88 = New cRunStep
      Set InitExecStep = cExecStep88
   Case 89
      Set cExecStep89 = New cRunStep
      Set InitExecStep = cExecStep89
   Case 90
      Set cExecStep90 = New cRunStep
      Set InitExecStep = cExecStep90
   Case 91
      Set cExecStep91 = New cRunStep
      Set InitExecStep = cExecStep91
   Case 92
      Set cExecStep92 = New cRunStep
      Set InitExecStep = cExecStep92
   Case 93
      Set cExecStep93 = New cRunStep
      Set InitExecStep = cExecStep93
   Case 94
      Set cExecStep94 = New cRunStep
      Set InitExecStep = cExecStep94
   Case 95
      Set cExecStep95 = New cRunStep
      Set InitExecStep = cExecStep95
   Case 96
      Set cExecStep96 = New cRunStep
      Set InitExecStep = cExecStep96
   Case 97
      Set cExecStep97 = New cRunStep
      Set InitExecStep = cExecStep97
   Case 98
      Set cExecStep98 = New cRunStep
      Set InitExecStep = cExecStep98
   Case 99
      Set cExecStep99 = New cRunStep
      Set InitExecStep = cExecStep99
   Case Else
      Set InitExecStep = Nothing
  End Select

  BugMessage "Sending cExecStep" &
(lngIndex + 1) & "!"

  If Not InitExecStep Is Nothing Then
    InitExecStep.Index = lngIndex

    ' Remove this element from the collection
of free objects
    Call RemoveFreeProcess(lngIndex)
  End If

  Exit Function

InitExecStepErr:
  ' Log the error code raised by Visual Basic
  Call LogErrors(Errors)
  Set InitExecStep = Nothing

End Function
Public Sub Run()
  ' Calls procedures to build a list of all the
steps that
  ' need to be executed and to execute them
  ' Determines whether the run has
started/terminated and
  ' raises the Run Start and Complete events.
  Dim cTempStep As cStep

  On Error GoTo RunErr

  If StringEmpty(mstrRootKey) Then
    Call ShowError(errExecuteBranchFailed)
    On Error GoTo 0
    Err.Raise vbObjectError +
errExecuteBranchFailed, mstrModuleName &
"Run", _

LoadResString(errExecuteBranchFailed)
  Else
    ' Execute the first branch
    WriteToWspLog (mintRunStart)
    RaiseEvent
RunStart(Determine64BitTime(),
mcWspLog.FileName)

    If
mcNavSteps.HasChild(StepKey:=mstrRootKe
y) Then
      Set cTempStep =
mcNavSteps.ChildStep(StepKey:=mstrRootKe
y)
      mstrCurBranchRoot =
MakeKeyValid(cTempStep.StepId,
cTempStep.StepType)
      Call
CreateDummyInstance(mstrCurBranchRoot)

      ' Run all pending steps in the branch
      If Not RunBranch(mstrCurBranchRoot)
Then
        ' Execute a new branch if there aren't any
        ' steps to run
        Call RunNewBranch
      End If
    Else
      WriteToWspLog (mintRunComplete)
      ' No children to execute - the run is complete
      RaiseEvent
RunComplete(Determine64BitTime())
    End If
  End If

  Exit Sub

RunErr:
  ' Log the error code raised by Visual Basic
  Call LogErrors(Errors)
  Call ShowError(errExecuteBranchFailed,
OptArgs:=mstrCurBranchRoot)
  Call ResetForm

End Sub
Private Sub RunNewBranch()
  ' We will build a tree of all instances that occur
and
  ' the count of the sub-steps that are running will
be
  ' stored at each node in the tree (maintained
internally
  ' as an array). Since there can be multiple
iterations
  ' of the top level nodes running at the same time,
we
  ' create a dummy node at the root that keeps a
record of
  ' the instances of the top level node.

  ' Determines whether the run has
started/terminated and
  ' raises the Run Start and Complete events.
  Dim cNextStep As cStep
  Dim bRunComplete As Boolean

  On Error GoTo RunNewBranchErr

  bRunComplete = False

  Do
    If StringEmpty(mstrCurBranchRoot) Then
      Exit Do
'     On Error GoTo 0
'     Err.Raise vbObjectError +
errExecuteBranchFailed, mstrSource, _
'       LoadResString(errExecuteBranchFailed)
    Else
      Set cNextStep =
mcNavSteps.NextStep(StepKey:=mstrCurBranchRo
ot)
      If cNextStep Is Nothing Then
        mstrCurBranchRoot = gstrEmptyString
        bRunComplete = True
        Exit Do
      Else
        ' Starting execution of a new branch -
initialize the
        ' module-level variable
```

```
            mstrCurBranchRoot =
MakeKeyValid(cNextStep.StepId,
cNextStep.StepType)
            Call
CreateDummyInstance(mstrCurBranchRoot)
        End If
      End If
      Debug.Print "Running new branch: " &
mstrCurBranchRoot

   ' Loop until we find a branch that has
steps to execute
   Loop While Not
RunBranch(mstrCurBranchRoot)

   If bRunComplete Then
      WriteToWspLog (mintRunComplete)
      ' Run is complete
      RaiseEvent
RunComplete(Determine64BitTime())
   End If

   Exit Sub

RunNewBranchErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   Call ShowError(errExecuteBranchFailed,
OptArgs:=mstrCurBranchRoot)
   On Error GoTo 0
   mstrSource = mstrModuleName &
"RunNewBranch"
   Err.Raise vbObjectError +
errExecuteBranchFailed, mstrSource, _

LoadResString(errExecuteBranchFailed)

End Sub
Private Function RunBranch(strRootNode
As String) As Boolean
   ' This procedure is called to run all the
necessary steps
   ' in a branch. It can also be called when a
step terminates,
   ' in which case the terminated step is
passed in as the
   ' optional parameter. When a step
terminates, we need to
   ' either wait for some other steps to
terminate before
   ' we execute more steps or run as many
steps as necessary
   ' Returns True if there are steps currently
executing
   ' in the branch, else returns False
   Dim cRunning As cInstance

   On Error GoTo RunBranchErr

   If Not StringEmpty(strRootNode) Then
      ' Call a procedure to execute all the
enabled steps
      ' in the branch - will return the step
node that is
      ' being executed - nothing means 'No
more steps to
      ' execute in the branch'.
      Do
         Set cRunning =
RunPendingStepInBranch(strRootNode,
cRunning)

      Loop While Not cRunning Is Nothing
      RunBranch =
mcDummyRootInstance.IsRunning
   End If

   Exit Function

RunBranchErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   mstrSource = mstrModuleName &
"RunBranch"
   Err.Raise vbObjectError +
errExecuteBranchFailed, _
         mstrSource,
LoadResString(errExecuteBranchFailed)

End Function
Private Sub
TimeUpdateForProcess(StepRecord As cStep,
_
      ByVal InstanceId As Long, _
      Optional ByVal StartTime As Currency =
0, _
      Optional ByVal EndTime As Currency =
0, _
      Optional ByVal ElapsedTime As Long =
0, _
      Optional Command As String)
   ' We do not maintain start and end
timestamps for the constraint
   ' of a step. Hence we check if the process
that just started/
   ' terminated is the worker step that is being
executed. If so,
   ' we update the start/end time and status on
the instance record.

   Dim cInstanceRec As cInstance
   Dim sItVal As String

   On Error GoTo TimeUpdateForProcessErr

   Set cInstanceRec =
mcInstances.QueryInstance(InstanceId)

   If StartTime = 0 Then
      RaiseEvent ProcessComplete(StepRecord,
EndTime, InstanceId, ElapsedTime)
   Else
      sItVal =
GetInstanceItValue(cInstanceRec)
      RaiseEvent ProcessStart(StepRecord,
Command, StartTime, InstanceId, _
            cInstanceRec.ParentInstanceId,
sItVal)
   End If

   Call
cInstanceRec.UpdateStartTime(StepRecord.Ste
pId, StartTime, EndTime, ElapsedTime)

   Exit Sub

TimeUpdateForProcessErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   WriteError errUpdateDisplayFailed,
mstrModuleName & "TimeUpdateForProcess"

End Sub
Private Sub
TimeStartUpdateForStep(StepRecord As
cStep, _
      ByVal InstanceId As Long, _
      ByVal StartTime As Currency)

   ' Called when a step starts execution. Checks if
this is the
   ' first enabled child of the manager step. If so,
updates
   ' the start time and status on the manager.
   ' Also raises the Step Start event for the
completed step.

   Dim cStartInst As cInstance
   Dim cInstanceRec As cInstance
   Dim LogLabels As New cVectorStr
   Dim iItIndex As Long
   Dim sLogLabel As String
   Dim sPath As String
   Dim sIt As String
   Dim sItVal As String

   On Error GoTo TimeStartUpdateForStepErr

   Set cStartInst =
mcInstances.QueryInstance(InstanceId)

   ' Determine the step path and iterator values for
the step and raise a step start event
   Set cInstanceRec = cStartInst
   Do While cInstanceRec.Key <>
mstrDummyRootKey
      If Not StringEmpty(sPath) Then
         sPath = sPath & gstrFileSeparator
      End If
      sPath = sPath & gstrSQ &
cInstanceRec.Step.StepLabel & gstrSQ
      Set cInstanceRec =
mcInstances.QueryInstance(cInstanceRec.ParentIns
tanceId)
   Loop

   For iItIndex = cStartInst.Iterators.Count - 1 To 0
Step -1
      If Not StringEmpty(sIt) Then
         sIt = sIt & gstrFileSeparator
      End If
      sIt = sIt & gstrSQ &
cStartInst.Iterators(iItIndex).Value & gstrSQ
   Next iItIndex

   sItVal = GetInstanceItValue(cStartInst)
   RaiseEvent StepStart(StepRecord, StartTime,
InstanceId, cStartInst.ParentInstanceId, _
         sPath, sIt, sItVal)

   iItIndex = 0
   Set cInstanceRec = cStartInst
   ' Raise a StepStart event for the manager step, if
this is it's first sub-step being executed
   Do While cInstanceRec.Key <>
mstrDummyRootKey

      sLogLabel = gstrSQ &
cInstanceRec.Step.StepLabel & gstrSQ
      If iItIndex < cStartInst.Iterators.Count Then
         If cStartInst.Iterators(iItIndex).StepId =
cInstanceRec.Step.StepId Then
            sLogLabel = sLogLabel & msIt & gstrSQ
& cStartInst.Iterators(iItIndex).IteratorName &
gstrSQ & _
                  msItValue & gstrSQ &
cStartInst.Iterators(iItIndex).Value & gstrSQ
            iItIndex = iItIndex + 1
         End If
      End If
      LogLabels.Add sLogLabel
```

```
      If cInstanceRec.Key <> cStartInst.Key
And cInstanceRec.StartTime = 0 Then
         cInstanceRec.StartTime = StartTime
         cInstanceRec.Status = gintRunning
         sItVal =
GetInstanceItValue(cInstanceRec)
         ' The step path and iterator values are
not needed for manager steps, since
         ' they are primarily used by the run
status form
         RaiseEvent
StepStart(cInstanceRec.Step, StartTime,
cInstanceRec.InstanceId, _
               cInstanceRec.ParentInstanceId,
gstrEmptyString, gstrEmptyString, _
               sItVal)
      End If

      Set cInstanceRec =
mcInstances.QueryInstance(cInstanceRec.Pa
rentInstanceId)
   Loop

   Call WriteToWspLog(mintStepStart,
LogLabels, StartTime)
   Set LogLabels = Nothing

   Exit Sub

TimeStartUpdateForStepErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   WriteError errUpdateDisplayFailed,
mstrModuleName &
"TimeStartUpdateForStep"

End Sub
Private Sub WriteToWspLog(iLogEvent As
WspLogEvents, Optional StepDtls As
cVectorStr, _
      Optional dtStamp As Currency =
gdtmEmpty)

   ' Writes to the workspace log that is
generated for the run. The last three
   ' parameters are valid only for Step Start
and Step Complete events.
   Static bError As Boolean
   Dim sLabel As String
   Dim lIndex As Long
   Dim bHdr As Boolean
   Dim cTempConn As cConnection

   On Error GoTo WriteToWspLogErr

   Select Case iLogEvent
      Case mintRunStart
         Set mcWspLog = New cFileSM
         mcWspLog.FileName =
GetDefaultDir(WspId, mcParameters) &
gstrFileSeparator & _
               Trim(Str(RunId)) &
gstrFileSeparator & "SMLog-" &
Format(Now, FMT_WSP_LOG_FILE) &
gstrLogFileSuffix
         mcWspLog.WriteLine
(JulianDateToString(Determine64BitTime()
) & " Start Run: " & vbTab & gstrSQ &
GetWorkspaceDetails(WorkspaceId:=WspId
)) & gstrSQ

         ' Write all current parameter values
to the log
         bHdr = False
         For lIndex = 0 To
mcParameters.ParameterCount - 1
            If
mcParameters(lIndex).ParameterType <>
gintParameterApplication Then
               If Not bHdr Then
                  mcWspLog.WriteField
JulianDateToString(Determine64BitTime()) &
" Parameters: "
                  bHdr = True
               Else
                  mcWspLog.WriteField vbTab
& vbTab & vbTab
               End If
               mcWspLog.WriteLine vbTab &
gstrSQ &
mcParameters(lIndex).ParameterName &
gstrSQ & vbTab & vbTab & gstrSQ &
mcParameters(lIndex).ParameterValue &
gstrSQ
            End If
         Next lIndex

         ' Write all connection properties to the
log
         For lIndex = 0 To
RunConnections.Count - 1
            Set cTempConn =
RunConnections(lIndex)
            If lIndex = 0 Then
               mcWspLog.WriteField
JulianDateToString(Determine64BitTime()) &
" Connections: "
            Else
               mcWspLog.WriteField vbTab &
vbTab & vbTab
            End If
            mcWspLog.WriteLine vbTab &
gstrSQ & cTempConn.ConnectionName &
gstrSQ & _
                  vbTab & vbTab & gstrSQ &
cTempConn.ConnectionValue & gstrSQ & _
                  vbTab & "No Count: " &
gstrSQ & cTempConn.NoCountDisplay &
gstrSQ & gstrBlank & _
                  "No Execute: " & gstrSQ &
cTempConn.NoExecute & gstrSQ & gstrBlank
& _
                  "Parse Query Only: " & gstrSQ
& cTempConn.ParseQueryOnly & gstrSQ &
gstrBlank & _
                  "Quoted Identifiers: " & gstrSQ
& cTempConn.QuotedIdentifiers & gstrSQ &
gstrBlank & _
                  "ANSI Nulls: " & gstrSQ &
cTempConn.AnsiNulls & gstrSQ & gstrBlank
& _
                  "Show Query Plan: " & gstrSQ
& cTempConn.ShowQueryPlan & gstrSQ &
gstrBlank & _
                  "Show Stats Time: " & gstrSQ
& cTempConn.ShowStatsTime & gstrSQ &
gstrBlank & _
                  "Show Stats IO: " & gstrSQ &
cTempConn.ShowStatsIO & gstrSQ &
gstrBlank & _
                  "Row Count" & gstrSQ &
cTempConn.RowCount & gstrSQ & gstrBlank
& _
                  "Query Timeout" & gstrSQ &
cTempConn.QueryTimeOut & gstrSQ
         Next lIndex

      Case mintRunComplete
         BugAssert Not mcWspLog Is Nothing
         mcWspLog.WriteLine
(JulianDateToString(Determine64BitTime()) &
" Comp. Run: " & vbTab & gstrSQ &
GetWorkspaceDetails(WorkspaceId:=WspId)) &
gstrSQ
         Set mcWspLog = Nothing

      Case mintStepStart
         For lIndex = StepDtls.Count - 1 To 0 Step -1
            sLabel = StepDtls(lIndex)
            If lIndex = StepDtls.Count - 1 Then
               mcWspLog.WriteLine
JulianDateToString(dtStamp) & " Start Step: " &
vbTab & sLabel
            Else
               mcWspLog.WriteLine vbTab & vbTab
& vbTab & vbTab & sLabel
            End If
         Next lIndex

      Case mintStepComplete
         For lIndex = StepDtls.Count - 1 To 0 Step -1
            sLabel = StepDtls(lIndex)
            If lIndex = StepDtls.Count - 1 Then
               mcWspLog.WriteLine
JulianDateToString(dtStamp) & " Comp. Step: " &
vbTab & sLabel
            Else
               mcWspLog.WriteLine vbTab & vbTab
& vbTab & vbTab & sLabel
            End If
         Next lIndex

   End Select

   Exit Sub

WriteToWspLogErr:
   If Not bError Then
      bError = True
   End If

End Sub
'Private Sub WriteToWspLog(iLogEvent As
WspLogEvents, Optional StepDtls As cVectorStr, _
'      Optional dtStamp As Date = gdtmEmpty)
'
'   This function uses the LogWriter dll - memory
corruption problems since the vb exe
'   and the vc Execute Dll both use the same dll to
write.
'   ' Writes to the workspace log that is generated
for the run. The last three
'   ' parameters are valid only for StepStart and
StepComplete events.
'   Static bError As Boolean
'   Static sFile As String
'   Dim sLabel As String
'   Dim lIndex As Long
'   Dim bHdr As Boolean
'
'   On Error GoTo WriteToWspLogErr
'
'   Select Case iLogEvent
'      Case mintRunStart
'         Set mcWspLog = New
LOGWRITERLib.SMLog
'         sFile = App.Path & "\" & "SMLog-" &
Format(Now, FMT_WSP_LOG_FILE) &
gstrLogFileSuffix
'         mcWspLog.FileName = sFile
'         mcWspLog.Init
'         mcWspLog.WriteLine (Format(Now,
FMT_WSP_LOG_DATE) & " Start Run: " &
vbTab & gstrSQ &
```

```
GetWorkspaceDetails(WorkspaceId:=WspId
)) & gstrSQ
'
'           ' Write all current parameter values
to the log
'           bHdr = False
'           For lIndex = 0 To
mcParameters.ParameterCount - 1
'               If
mcParameters(lIndex).ParameterType <>
gintParameterApplication Then
'                   If Not bHdr Then
'                       'mcWspLog.WriteLine
Format(Now, FMT_WSP_LOG_DATE) &
" Parameters: " & vbTab & gstrSQ &
mcParameters(lIndex).ParameterName &
gstrSQ & vbTab & vbTab & gstrSQ &
mcParameters(lIndex).ParameterValue &
gstrSQ
'                       bHdr = True
'                   Else
'                       'mcWspLog.WriteLine
vbTab & vbTab & vbTab & vbTab &
gstrSQ &
mcParameters(lIndex).ParameterName &
gstrSQ & vbTab & vbTab & gstrSQ &
mcParameters(lIndex).ParameterValue &
gstrSQ
'                   End If
'               End If
'           Next lIndex
'
'       Case mintRunComplete
'           BugAssert Not mcWspLog Is
Nothing
'           mcWspLog.WriteLine
(Format(Now, FMT_WSP_LOG_DATE) &
" Comp. Run: " & vbTab & gstrSQ &
GetWorkspaceDetails(WorkspaceId:=WspId
)) & gstrSQ
'           Set mcWspLog = Nothing
'
'       Case mintStepStart
'           For lIndex = StepDtls.Count - 1 To
0 Step -1
'               sLabel = StepDtls(lIndex)
'               If lIndex = StepDtls.Count - 1
Then
'                   mcWspLog.WriteLine
Format(dtStamp, FMT_WSP_LOG_DATE)
& " Start Step: " & vbTab & sLabel
'               Else
'                   mcWspLog.WriteLine vbTab
& vbTab & vbTab & vbTab & sLabel
'               End If
'           Next lIndex
'
'       Case mintStepComplete
'           For lIndex = StepDtls.Count - 1 To
0 Step -1
'               sLabel = StepDtls(lIndex)
'               If lIndex = StepDtls.Count - 1
Then
'                   mcWspLog.WriteLine
Format(dtStamp, FMT_WSP_LOG_DATE)
& " Comp. Step: " & vbTab & sLabel
'               Else
'                   mcWspLog.WriteLine vbTab
& vbTab & vbTab & vbTab & sLabel
'               End If
'           Next lIndex
'
'   End Select
'
'   Exit Sub
'
'WriteToWspLogErr:
'   If Not bError Then
'       bError = True
'   End If
'
'End Sub
'
Public Property Get WspPreExecution() As
Variant
   WspPreExecution = mcvntWspPreCons
End Property
Public Property Let WspPreExecution(ByVal
vdata As Variant)
   mcvntWspPreCons = vdata
End Property

Public Property Get WspPostExecution() As
Variant
   WspPostExecution = mcvntWspPostCons
End Property
Public Property Let WspPostExecution(ByVal
vdata As Variant)
   mcvntWspPostCons = vdata
End Property

Private Sub ExecuteStep(cCurStep As
cInstance)
   ' Initializes a cRunStep object with all the
properties
   ' corresponding to the step to be executed
and calls it's
   ' execute method to execute the step

   Dim cExecStep As cRunStep

   On Error GoTo ExecuteStepErr
   mstrSource = mstrModuleName &
"ExecuteStep"

   ' Confirm that the step is a worker
   If cCurStep.Step.StepType <>
gintWorkerStep Then
      On Error GoTo 0
      Err.Raise vbObjectError +
errExecInstanceFailed, mstrSource, _

LoadResString(errExecInstanceFailed)
   End If

   Set cExecStep = InitExecStep()
   ' Exceeded the number of processes that we
can run simultaneously
   If cExecStep Is Nothing Then
      ' Raise an error
      On Error GoTo 0
      Err.Raise vbObjectError +
errProgramError, mstrSource, _
         LoadResString(errProgramError)
   End If
   ' Initialize the instance id - not needed for
step execution
   ' but necessary to identify later which
instance completed
   cExecStep.InstanceId = cCurStep.InstanceId

   Set cExecStep.ExecuteStep = cCurStep.Step
   Set cExecStep.Iterators = cCurStep.Iterators
   Set cExecStep.Globals = mcRunSteps
   Set cExecStep.WspParameters =
mcParameters
   Set cExecStep.WspConnections =
RunConnections
   Set cExecStep.WspConnDtls =
RunConnDtls

   ' Initialize all the pre and post-execution
constraints that
   ' have been defined globally for the workspace
   cExecStep.WspPreCons = mcvntWspPreCons
   cExecStep.WspPostCons = mcvntWspPostCons

   ' Initialize all the pre and post-execution
constraints for
   ' the step being executed
   cExecStep.PreCons =
DetermineConstraints(cCurStep, gintPreStep)
   cExecStep.PostCons =
DetermineConstraints(cCurStep, gintPostStep)

   cExecStep.RunId = RunId
   cExecStep.CreateInputFiles = CreateInputFiles

   ' Call the execute method to execute the step
   cExecStep.Execute

   Set cExecStep = Nothing

   Exit Sub

ExecuteStepErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   Call ExecutionFailed(cExecStep)

End Sub

Public Property Set Steps(cRunSteps As cArrSteps)

   Set mcRunSteps = cRunSteps
   Set mcNavSteps.StepRecords = cRunSteps

End Property
Public Property Set Parameters(cParameters As
cArrParameters)
   ' A reference to the parameter array - we use it to
   ' substitute parameter values in the step text

   Set mcParameters = cParameters

End Property
Public Property Get Steps() As cArrSteps

   Set Steps = mcRunSteps

End Property
Public Property Get Constraints() As
cArrConstraints

   Set Constraints = mcRunConstraints

End Property
Public Property Set Constraints(vdata As
cArrConstraints)

   Set mcRunConstraints = vdata

End Property


Private Sub
cExecStep1_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)
```

```
End Sub


Private Sub
cExecStep1_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep1_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep1.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep1_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep9_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep9_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep9_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep9.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep9_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep10_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep10_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep10_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep10.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep10_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep11_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep11_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep11_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep11.Index, InstanceId, Status)

End Sub

Private Sub cExecStep11_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub
Private Sub
cExecStep12_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep12_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep12_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep12.Index, InstanceId, Status)

End Sub
```

```
Private Sub
cExecStep12_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub
Private Sub
cExecStep13_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep13_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep13_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep13.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep13_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub
Private Sub
cExecStep14_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep14_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep14_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep14.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep14_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub
Private Sub
cExecStep15_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep15_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep15_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep15.Index, InstanceId,
Status)

End Sub

Private Sub cExecStep15_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub
Private Sub
cExecStep16_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep16_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep16_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep16.Index, InstanceId, Status)

End Sub

Private Sub cExecStep16_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub
Private Sub
cExecStep17_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep17_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)
```

```
End Sub


Private Sub
cExecStep17_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep17.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep17_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep18_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep18_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep18_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep18.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep18_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep19_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub


Private Sub
cExecStep19_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep19_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep19.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep19_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep20_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep20_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep20_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep20.Index, InstanceId, Status)

End Sub

Private Sub cExecStep20_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep21_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep21_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep21_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep21.Index, InstanceId, Status)

End Sub

Private Sub cExecStep21_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep22_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)
```

```
    Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep22_ProcessStart(cStepRecord As
cStep, _
        strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

    Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep22_StepComplete(cStepRecord
As cStep, _
        dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep22.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep22_StepStart(cStepRecord As
cStep, _
        dtmStartTime As Currency, InstanceId
As Long)

    Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep23_ProcessComplete(cStepRecor
d As cStep, _
        dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

    Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep23_ProcessStart(cStepRecord As
cStep, _
        strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

    Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep23_StepComplete(cStepRecord
As cStep, _
        dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep23.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep23_StepStart(cStepRecord As cStep,
_
        dtmStartTime As Currency, InstanceId As
Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep24_ProcessComplete(cStepRecord
As cStep, _
        dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep24_ProcessStart(cStepRecord As
cStep, _
        strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep24_StepComplete(cStepRecord As
cStep, _
        dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep24.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep24_StepStart(cStepRecord As cStep,
_
        dtmStartTime As Currency, InstanceId As
Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep25_ProcessComplete(cStepRecord
As cStep, _
        dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep25_ProcessStart(cStepRecord As cStep, _
        strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep25_StepComplete(cStepRecord As cStep,
_
        dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep25.Index, InstanceId, Status)

End Sub

Private Sub cExecStep25_StepStart(cStepRecord
As cStep, _
        dtmStartTime As Currency, InstanceId As
Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep26_ProcessComplete(cStepRecord As
cStep, _
        dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep26_ProcessStart(cStepRecord As cStep, _
        strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep26_StepComplete(cStepRecord As cStep,
_
        dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep26.Index, InstanceId, Status)

End Sub

Private Sub cExecStep26_StepStart(cStepRecord
As cStep, _
        dtmStartTime As Currency, InstanceId As
Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)
```

```
End Sub

Private Sub
cExecStep27_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep27_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep27_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep27.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep27_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep28_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep28_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep28_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep28.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep28_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep29_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep29_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep29_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep29.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep29_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep30_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep30_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep30_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep30.Index, InstanceId, Status)

End Sub

Private Sub cExecStep30_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep31_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep31_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep31_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep31.Index, InstanceId, Status)
```

```
End Sub

Private Sub
cExecStep31_StepStart(cStepRecord As
cStep, _
    dtmStartTime As Currency, InstanceId
As Long)

  Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep32_ProcessComplete(cStepRecor
d As cStep, _
    dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

  Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep32_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

  Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep32_StepComplete(cStepRecord
As cStep, _
    dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep32.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep32_StepStart(cStepRecord As
cStep, _
    dtmStartTime As Currency, InstanceId
As Long)

  Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep33_ProcessComplete(cStepRecor
d As cStep, _
    dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

  Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep33_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep33_StepComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep33.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep33_StepStart(cStepRecord As cStep,
_
    dtmStartTime As Currency, InstanceId As
Long)

  Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep34_ProcessComplete(cStepRecord
As cStep, _
    dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep34_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep34_StepComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep34.Index, InstanceId,
Status)

End Sub

Private Sub cExecStep34_StepStart(cStepRecord
As cStep, _
    dtmStartTime As Currency, InstanceId As
Long)

  Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep35_ProcessComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep35_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep35_StepComplete(cStepRecord As cStep,
_
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep35.Index, InstanceId, Status)

End Sub

Private Sub cExecStep35_StepStart(cStepRecord
As cStep, _
    dtmStartTime As Currency, InstanceId As
Long)

  Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep36_ProcessComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep36_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)
```

```
End Sub

Private Sub
cExecStep36_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep36.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep36_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep37_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep37_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep37_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep37.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep37_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep38_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep38_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep38_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep38.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep38_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep39_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep39_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep39_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep39.Index, InstanceId, Status)

End Sub

Private Sub cExecStep39_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep40_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep40_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep40_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep40.Index, InstanceId, Status)

End Sub

Private Sub cExecStep40_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep41_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub
```

```
Private Sub
cExecStep41_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep41_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep41.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep41_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep42_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep42_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep42_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep42.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep42_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep43_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep43_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep43_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep43.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep43_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep44_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep44_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep44_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep44.Index, InstanceId, Status)

End Sub

Private Sub cExecStep44_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep45_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep45_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep45_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep45.Index, InstanceId, Status)

End Sub

Private Sub cExecStep45_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep46_ProcessComplete(cStepRecord As
cStep, _
```

```
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep46_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep46_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep46.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep46_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep47_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep47_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep47_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep47.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep47_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep48_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep48_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep48_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep48.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep48_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep49_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep49_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep49_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep49.Index, InstanceId, Status)

End Sub

Private Sub cExecStep49_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep50_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep50_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep50_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep50.Index, InstanceId, Status)

End Sub

Private Sub cExecStep50_StepStart(cStepRecord
As cStep, _
```

```
    dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep51_ProcessComplete(cStepRecor
d As cStep, _
    dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep51_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep51_StepComplete(cStepRecord
As cStep, _
    dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep51.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep51_StepStart(cStepRecord As
cStep, _
    dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep52_ProcessComplete(cStepRecor
d As cStep, _
    dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep52_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep52_StepComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep52.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep52_StepStart(cStepRecord As cStep,
_
    dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep53_ProcessComplete(cStepRecord
As cStep, _
    dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep53_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep53_StepComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep53.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep53_StepStart(cStepRecord As cStep,
_
    dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep54_ProcessComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep54_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep54_StepComplete(cStepRecord As cStep,
_
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep54.Index, InstanceId, Status)

End Sub

Private Sub cExecStep54_StepStart(cStepRecord
As cStep, _
    dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep55_ProcessComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep55_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep55_StepComplete(cStepRecord As cStep,
_
```

```
    dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep55.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep55_StepStart(cStepRecord As
cStep, _
    dtmStartTime As Currency, InstanceId
As Long)

  Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep56_ProcessComplete(cStepRecor
d As cStep, _
    dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

  Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep56_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

  Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep56_StepComplete(cStepRecord
As cStep, _
    dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep56.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep56_StepStart(cStepRecord As
cStep, _
    dtmStartTime As Currency, InstanceId
As Long)

  Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep57_ProcessComplete(cStepRecor
d As cStep, _
    dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep57_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep57_StepComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep57.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep57_StepStart(cStepRecord As cStep,
_
    dtmStartTime As Currency, InstanceId As
Long)

  Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep58_ProcessComplete(cStepRecord
As cStep, _
    dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep58_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep58_StepComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep58.Index, InstanceId, Status)

End Sub

Private Sub cExecStep58_StepStart(cStepRecord
As cStep, _
    dtmStartTime As Currency, InstanceId As
Long)

  Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep59_ProcessComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep59_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep59_StepComplete(cStepRecord As cStep,
_
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep59.Index, InstanceId, Status)

End Sub

Private Sub cExecStep59_StepStart(cStepRecord
As cStep, _
    dtmStartTime As Currency, InstanceId As
Long)

  Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep60_ProcessComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep60_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)
```

```
    Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep60_StepComplete(cStepRecord
As cStep, _
        dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep60.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep60_StepStart(cStepRecord As
cStep, _
        dtmStartTime As Currency, InstanceId
As Long)

    Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep61_ProcessComplete(cStepRecor
d As cStep, _
        dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

    Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep61_ProcessStart(cStepRecord As
cStep, _
        strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

    Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep61_StepComplete(cStepRecord
As cStep, _
        dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep61.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep61_StepStart(cStepRecord As
cStep, _
        dtmStartTime As Currency, InstanceId
As Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep62_ProcessComplete(cStepRecord
As cStep, _
        dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep62_ProcessStart(cStepRecord As
cStep, _
        strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep62_StepComplete(cStepRecord As
cStep, _
        dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep62.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep62_StepStart(cStepRecord As cStep,
_
        dtmStartTime As Currency, InstanceId As
Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep63_ProcessComplete(cStepRecord
As cStep, _
        dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep63_ProcessStart(cStepRecord As
cStep, _
        strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep63_StepComplete(cStepRecord As cStep,
_
        dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep63.Index, InstanceId, Status)

End Sub

Private Sub cExecStep63_StepStart(cStepRecord
As cStep, _
        dtmStartTime As Currency, InstanceId As
Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep64_ProcessComplete(cStepRecord As
cStep, _
        dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep64_ProcessStart(cStepRecord As cStep, _
        strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep64_StepComplete(cStepRecord As cStep,
_
        dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

    Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep64.Index, InstanceId, Status)

End Sub

Private Sub cExecStep64_StepStart(cStepRecord
As cStep, _
        dtmStartTime As Currency, InstanceId As
Long)

    Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep65_ProcessComplete(cStepRecord As
cStep, _
        dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)
```

```
   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep65_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep65_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep65.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep65_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep66_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep66_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep66_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep66.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep66_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep67_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep67_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep67_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep67.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep67_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep68_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep68_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep68_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep68.Index, InstanceId, Status)

End Sub

Private Sub cExecStep68_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep69_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep69_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep69_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep69.Index, InstanceId, Status)

End Sub

Private Sub cExecStep69_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)
```

```
End Sub

Private Sub
cExecStep70_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep70_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep70_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep70.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep70_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep71_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep71_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep71_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep71.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep71_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep72_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep72_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep72_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep72.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep72_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep73_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep73_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep73_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep73.Index, InstanceId, Status)

End Sub

Private Sub cExecStep73_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep74_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep74_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep74_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep74.Index, InstanceId, Status)
```

```
End Sub

Private Sub
cExecStep74_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep75_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep75_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep75_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep75.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep75_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep76_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep76_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep76_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep76.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep76_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep77_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep77_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep77_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep77.Index, InstanceId,
Status)

End Sub

Private Sub cExecStep77_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep78_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep78_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep78_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep78.Index, InstanceId, Status)

End Sub

Private Sub cExecStep78_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep79_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep79_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)
```

```
End Sub

Private Sub
cExecStep79_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep79.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep79_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep80_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep80_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep80_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep80.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep80_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep81_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep81_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep81_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep81.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep81_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep82_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep82_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep82_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep82.Index, InstanceId, Status)

End Sub

Private Sub cExecStep82_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep83_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep83_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep83_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep83.Index, InstanceId, Status)

End Sub

Private Sub cExecStep83_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep84_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub
```

```
Private Sub
cExecStep84_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep84_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep84.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep84_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep85_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep85_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep85_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep85.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep85_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep86_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep86_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep86_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep86.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep86_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep87_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep87_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep87_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep87.Index, InstanceId, Status)

End Sub

Private Sub cExecStep87_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep88_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep88_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep88_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep88.Index, InstanceId, Status)

End Sub

Private Sub cExecStep88_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep89_ProcessComplete(cStepRecord As
cStep, _
```

```
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep89_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep89_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep89.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep89_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep90_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep90_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep90_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep90.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep90_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep91_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep91_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep91_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep91.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep91_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep92_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep92_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep92_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep92.Index, InstanceId, Status)

End Sub

Private Sub cExecStep92_StepStart(cStepRecord
As cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep93_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep93_ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep93_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep93.Index, InstanceId, Status)

End Sub

Private Sub cExecStep93_StepStart(cStepRecord
As cStep, _
```

```
    dtmStartTime As Currency, InstanceId
As Long)

  Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep94_ProcessComplete(cStepRecor
d As cStep, _
    dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

  Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep94_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

  Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep94_StepComplete(cStepRecord
As cStep, _
    dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep94.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep94_StepStart(cStepRecord As
cStep, _
    dtmStartTime As Currency, InstanceId
As Long)

  Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep95_ProcessComplete(cStepRecor
d As cStep, _
    dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

  Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep95_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep95_StepComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep95.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep95_StepStart(cStepRecord As cStep,
_
    dtmStartTime As Currency, InstanceId As
Long)

  Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep96_ProcessComplete(cStepRecord
As cStep, _
    dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep96_ProcessStart(cStepRecord As
cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep96_StepComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep96.Index, InstanceId,
Status)

End Sub

Private Sub
cExecStep96_StepStart(cStepRecord As cStep,
_
    dtmStartTime As Currency, InstanceId As
Long)

  Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep97_ProcessComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep97_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep97_StepComplete(cStepRecord As cStep,
_
    dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

  Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep97.Index, InstanceId, Status)

End Sub

Private Sub cExecStep97_StepStart(cStepRecord
As cStep, _
    dtmStartTime As Currency, InstanceId As
Long)

  Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep98_ProcessComplete(cStepRecord As
cStep, _
    dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep98_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

  Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep98_StepComplete(cStepRecord As cStep,
_
```

```
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep98.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep98_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep99_ProcessComplete(cStepRecor
d As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep99_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep99_StepComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep99.Index,
InstanceId, Status)

End Sub

Private Sub
cExecStep99_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep2_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep2_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep2_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep2.Index, _
         InstanceId, Status)

End Sub

Private Sub
cExecStep2_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub


Private Sub
cExecStep3_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep3_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub


Private Sub
cExecStep3_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep3.Index, _
         InstanceId, Status)

End Sub

Private Sub cExecStep3_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub


Private Sub
cExecStep4_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub cExecStep4_ProcessStart(cStepRecord
As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep4_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep4.Index, _
         InstanceId, Status)

End Sub


Private Sub cExecStep4_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep5_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)
```

```
End Sub

Private Sub
cExecStep5_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep5_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep5.Index, _
         InstanceId, Status)

End Sub

Private Sub
cExecStep5_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId
As Long)

   Call
TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep6_ProcessComplete(cStepRecord
As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep6_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long)

   Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep6_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep6.Index, _
         InstanceId, Status)

End Sub

Private Sub
cExecStep6_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep7_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep7_ProcessStart(cStepRecord As
cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep7_StepComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord,
dtmEndTime, cExecStep7.Index, _
         InstanceId, Status)

End Sub

Private Sub
cExecStep7_StepStart(cStepRecord As cStep,
_
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub
cExecStep8_ProcessComplete(cStepRecord As
cStep, _
      dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub cExecStep8_ProcessStart(cStepRecord
As cStep, _
      strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long)

   Call TimeUpdateForProcess(cStepRecord,
lngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep8_StepComplete(cStepRecord As cStep,
_
      dtmEndTime As Currency, InstanceId As
Long, Status As InstanceStatus)

   Call StepTerminated(cStepRecord, dtmEndTime,
cExecStep8.Index, _
         InstanceId, Status)

End Sub

Private Sub cExecStep8_StepStart(cStepRecord As
cStep, _
      dtmStartTime As Currency, InstanceId As
Long)

   Call TimeStartUpdateForStep(cStepRecord,
InstanceId, dtmStartTime)

End Sub

Private Sub Class_Initialize()

   Dim lngCount As Long
   Dim lngTemp As Long

   On Error GoTo InitializeErr

   Set mcFreeSteps = New cVectorLng
   ' Initialize the array of free objects with all
elements
   ' for now
   For lngCount = 0 To
glngNumConcurrentProcesses - 1 Step 1
      mcFreeSteps.Add lngCount
   Next lngCount

   ' Initialize a byte array with the number of free
processes. It will
   ' be used later to determine if any step is running
   ' Each element in the array can represent 8 steps,
1 for each bit
   ReDim mbarrFree(glngNumConcurrentProcesses
\ gintBitsPerByte)

   ' Initialize each element in the byte array w/ all
1's
   ' (upto glngNumConcurrentProcesses)
   For lngCount = LBound(mbarrFree) To
UBound(mbarrFree) Step 1
      lngTemp = IIf( _
            glngNumConcurrentProcesses -
(gintBitsPerByte * lngCount) > gintBitsPerByte, _
            gintBitsPerByte, _
            glngNumConcurrentProcesses -
(gintBitsPerByte * lngCount))

      mbarrFree(lngCount) = (2 ^ lngTemp) - 1
   Next lngCount

   Set mcInstances = New cInstances
   Set mcFailures = New cFailedSteps
   Set mcNavSteps = New cStepTree
```

```
    Set mcTermSteps = New cTermSteps

    ' Initialize the Abort flag to False
    mblnAbort = False
    mblnAsk = False

    Exit Sub

InitializeErr:
    ' Log the error code raised by Visual
Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errInitializeFailed, mstrModuleName &
"Initialize", _
           LoadResString(errInitializeFailed)

End Sub
Private Sub Class_Terminate()

    On Error GoTo Class_TerminateErr

    mcFreeSteps.Clear
    Set mcFreeSteps = Nothing
    ReDim mbarrFree(0)

    mcInstances.Clear
    Set mcInstances = Nothing

    Set mcFailures = Nothing
    Set mcNavSteps = Nothing
    Set mcTermSteps = Nothing

    Exit Sub

Class_TerminateErr:
    Call LogErrors(Errors)

End Sub

Private Sub
mcTermSteps_TermStepExists(cStepDetails
As cTermStep)

    Call
RunNextStep(cStepDetails.TimeComplete,
cStepDetails.Index, _
           cStepDetails.InstanceId,
cStepDetails.ExecutionStatus)

End Sub

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cRunItDetails"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cRunItDetails.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This module encapsulates
the properties of iterator values
'              that are used by the step being
executed at runtime.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'


Option Explicit

' Used to indicate the source module name
when errors
' are raised by this class
Private Const mstrModuleName As String =
"cRunItDetails."
Private mstrSource As String

Private mstrIteratorName As String
Private mintType As ValueType
Private mlngSequence As Long
Private mlngFrom As Long
Private mlngTo As Long
Private mlngStep As Long
Private mstrValue As String

Public Property Get RangeTo() As Long

    RangeTo = mlngTo

End Property
Public Property Let RangeTo(ByVal vdata As
Long)

    mlngTo = vdata

End Property

Public Property Get RangeFrom() As Long

    RangeFrom = mlngFrom

End Property
Public Property Get Sequence() As Long

    Sequence = mlngSequence

End Property

Public Property Get RangeStep() As Long

    RangeStep = mlngStep

End Property
Public Property Let RangeStep(vdata As Long)

    mlngStep = vdata

End Property

Public Property Let RangeFrom(ByVal vdata
As Long)

    mlngFrom = vdata

End Property
Public Property Let Sequence(ByVal vdata As
Long)

    mlngSequence = vdata

End Property

Public Property Get IteratorType() As
ValueType

    IteratorType = mintType

End Property
Public Property Let IteratorType(ByVal vdata
As ValueType)

    On Error GoTo TypeErr
    mstrSource = mstrModuleName & "Type"

    ' These constants have been defined in the
enumeration,
    ' Type, which is exposed
    Select Case vdata
        Case gintFrom, gintTo, gintStep, gintValue
            mintType = vdata

        Case Else
            On Error GoTo 0
            Err.Raise vbObjectError + errTypeInvalid, _
                mstrSource,
LoadResString(errTypeInvalid)
    End Select

    Exit Property

TypeErr:
    LogErrors Errors
    mstrSource = mstrModuleName & "Type"
    On Error GoTo 0
    Err.Raise vbObjectError + errTypeInvalid, _
        mstrSource, LoadResString(errTypeInvalid)

End Property
Private Sub IsList()

    If mintType <> gintValue Then
        On Error GoTo 0
        Err.Raise vbObjectError + errInvalidProperty,
mstrSource, _
            LoadResString(errInvalidProperty)
    End If

End Sub
Private Sub IsRange()

    If mintType = gintValue Then
        On Error GoTo 0
        Err.Raise vbObjectError + errInvalidProperty,
mstrSource, _
            LoadResString(errInvalidProperty)
    End If

End Sub

Public Property Get Value() As String

    Value = mstrValue

End Property
Public Property Let Value(vdata As String)

    mstrValue = vdata

End Property


Public Property Get IteratorName() As String

    IteratorName = mstrIteratorName

End Property
Public Property Let IteratorName(ByVal vdata As
String)

    mstrIteratorName = vdata

End Property

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
```

```
Attribute VB_Name = "cRunItNode"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' An iterator class containing the properties that are used
' by the stpe being executed.
' These iterators might actually come from steps that are at
' a higher level than the step actually being executed (viz.
' direct ascendants of the step at any level).

Option Explicit

Public IteratorName As String
Public Value As String
Public StepId As Long

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cRunOnly"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
Option Explicit

Public Event Done()
Private WithEvents mcRunWsp As cRunWorkspace
Attribute mcRunWsp.VB_VarHelpID = -1

Public WspName As String
Public WorkspaceId As Long
Public WspLog As String

Public Sub RunWsp()

   On Error GoTo RunWspErr

   Set mcRunWsp = New cRunWorkspace
   Set mcRunWsp.LoadDb = dbsAttTool
   mcRunWsp.WorkspaceId = WorkspaceId
   mcRunWsp.CreateInputFiles = True
   mcRunWsp.RunWorkspace

   Exit Sub

RunWspErr:
   ' Log the VB error code
   LogErrors Errors

End Sub

Private Sub mcRunWsp_RunComplete(dtmEndTime As Currency)

   MsgBox "Completed executing workspace: " & gstrSQ & WspName & gstrSQ & " at " & _
          JulianDateToString(dtmEndTime) & "." & vbCrLf & vbCrLf & _
          "The log file for the run is: " & gstrSQ & WspLog & gstrSQ & "."
   RaiseEvent Done

End Sub

Private Sub mcRunWsp_RunStart(dtmStartTime As Currency, strWspLog As String, lRunId As Long)
   WspLog = strWspLog
End Sub


VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cRunStep"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cRunStep.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This class executes the step that is assigned to the
'              ExecuteStep property. It executes the pre-execution constraints
'              in sequence and then the step itself. At the end it executes
'              the post-execution constraints. Since these steps should always
'              be executed in sequence, each step is only fired on the
'              completion of the previous step.
'  Contact:    Reshma Tharamal (reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name when errors
' are raised by this class
Private Const mstrModuleName As String = "cRunStep."
Private mstrSource As String

' Local variable(s) to hold property value(s)
Private mcStep As cStep
Private mcGlobals As cArrSteps
Private mcvntWspPreCons As Variant
Private mcvntWspPostCons As Variant
Private mcvntPreCons As Variant
Private mcvntPostCons As Variant
Private mcIterators As cRunColIt
Private mlngInstanceId As Long ' Identifier for the current instance
Private mlngIndex As Long ' Index value for the current instance
Private mstrCommand As String ' The command string
Private msRunStepDtl As String ' Step text/file name that will go into the run_step_details table
Private mblnAbort As Boolean   ' Set to True when the user aborts the run
Private msOutputFile As String
Private msErrorFile As String
Private miStatus As InstanceStatus
Private mcVBErr As cVBErrorsSM
Public WspParameters As cArrParameters
Public WspConnections As cConnections
Public WspConnDtls As cConnDtls

Private WithEvents mcTermProcess As cTermProcess
Attribute mcTermProcess.VB_VarHelpID = -1
Public RunId As Long
Public CreateInputFiles As Boolean
Private msOutputDir As String

' Object that will execute the step
Private WithEvents mcExecObj As EXECUTEDLLLib.Execute
Attribute mcExecObj.VB_VarHelpID = -1

' Holds the step that is currently being executed (constraint or
' worker step)
Private mcExecStep As cStep

Private Const msCompareExe As String = "\diff.exe"

Private Enum NextNodeType
   mintWspPreConstraint = 1
   mintPreConstraint
   mintStep
   mintWspPostConstraint
   mintPostConstraint
End Enum

' Public events to notify the calling function of the
' start and end time for each step
Public Event StepStart(cStepRecord As cStep, _
      dtmStartTime As Currency, InstanceId As Long)
Public Event StepComplete(cStepRecord As cStep, _
      dtmEndTime As Currency, InstanceId As Long, Status As InstanceStatus)
Public Event ProcessStart(cStepRecord As cStep, _
      strCommand As String, dtmStartTime As Currency, _
      InstanceId As Long)
Public Event ProcessComplete(cStepRecord As cStep, _
      dtmStartTime As Currency, InstanceId As Long, lElapsed As Long)

Private Function AppendDiffErrors(sDiffFile As String)
   ' The file containing the errors generated by the diff utility is passed in
   ' These errors are appended to the error file for the step

   Dim sTemp As String
   Dim InputFile As Integer

   If Not StringEmpty(sDiffFile) Then

      InputFile = FreeFile
      Open sDiffFile For Input Access Read As InputFile

      Do While Not EOF(InputFile)        ' Loop until end of file.
         Line Input #InputFile, sTemp    ' Read line into variable.
         mcVBErr.LogMessage sTemp
      Loop

      Close InputFile
   End If

End Function

Private Sub CreateStepTextFile()
   ' Creates a file containing the step text being executed
   On Error GoTo CreateStepTextFileErr
```

```
    Dim sInputFile As String

    If mcExecStep.ExecutionMechanism =
gintExecuteShell Then
        sInputFile =
GetOutputFile(gsCmdFileSuffix)
    Else
        sInputFile =
GetOutputFile(gsSqlFileSuffix)
    End If

    ' Generate a file containing the step text
being executed
    If Not
StringEmpty(mcExecStep.StepTextFile) Or
mcExecStep.ExecutionMechanism =
gintExecuteShell Then
        FileCopy mstrCommand, sInputFile
    Else
        Call
WriteCommandToFile(mstrCommand,
sInputFile)
    End If

    Exit Sub

CreateStepTextFileErr:

    mcVBErr.LogVBErrors

End Sub
Private Function GetOutputFile(strFileExt
As String) As String
    ' This function generates the output file
name for the step currently being executed
    ' The value of the built-in parameter
'DefaultDir' is appended with the run
identifier
    ' for the file location
    ' The step label is used for the file name
and a combination of all iterator values
    ' for the step is used to make the output
files unique for each instance
    Dim sFile As String
    Dim sIt As String
    Dim lIt As Long

    On Error GoTo GetOutputFileErr

    sFile =
SubstituteParametersIfPossible(mcExecStep
.StepLabel)

    sFile = TranslateStepLabel(sFile)

    If mcExecStep Is mcStep Then
        ' Use iterators that have been defined
for the worker or any of it's managers
        ' to make the error/log file unique for
this instance
        For lIt = mcIterators.Count - 1 To 0
Step -1
            sIt = sIt & gsExtSeparator &
mcIterators(lIt).Value
        Next lIt
    End If
    sIt = sIt & strFileExt

    ' Ensure that the length of the complete
path does not exceed 255 characters
    If Len(msOutputDir) + Len(sFile) +
Len(sIt) > MAX_PATH Then
        sFile = Mid(sFile, 1, MAX_PATH -
Len(sIt) - Len(msOutputDir))
    End If
    GetOutputFile = msOutputDir & sFile & sIt
    Exit Function

GetOutputFileErr:

    ' Does not make sense to log error to the
error file yet. Write to the project
    ' log and return the step label as default
    GetOutputFile = mcExecStep.StepLabel &
gsExtSeparator & strFileExt

End Function


Private Sub HandleExecutionError()

    On Error GoTo HandleExecutionError

    ' Log the error code raised by Visual Basic
    miStatus = gintFailed
    mcVBErr.LogVBErrors
    Call
mcVBErr.WriteError(errExecuteStepFailed, _
            OptArgs:="Continuation criteria for the
step is: " &
gsContCriteria(mcStep.ContinuationCriteria))

HandleExecutionError:

    ' Logging failed - return

End Sub

Public Property Get Index() As Long

    Index = mlngIndex

End Property
Public Property Let Index(ByVal vdata As
Long)

    mlngIndex = vdata

End Property
Private Function InitializeExecStatus() As
InstanceStatus
    Dim sCompareFile As String

    On Error GoTo InitializeExecStatusErr

    InitializeExecStatus =
mcExecObj.StepStatus

    If InitializeExecStatus = gintComplete Then
        If Not
StringEmpty(mcExecStep.FailureDetails) Then
            ' Compare output to determine whether
the step failed
            sCompareFile =
GetShortName(SubstituteParameters( _
                    mcExecStep.FailureDetails,
mcExecStep.WorkspaceId, mcIterators, _
                    WspParameters))
            InitializeExecStatus =
IIf(CompareOutput(sCompareFile,
msOutputFile), gintComplete, gintFailed)
        End If
    End If

    Exit Function

InitializeExecStatusErr:
    mcVBErr.LogVBErrors
'   Call LogErrors(Errors)
    InitializeExecStatus = mcExecObj.StepStatus

End Function
Private Function CompareOutput(sCompareFile As
String, sOutputFile As String) As Boolean

    Dim sCmpOutput As String
    Dim sDiffOutput As String

    On Error GoTo CompareOutputErr

    ' Create temporary files to store the file compare
output and
    ' the errors generated by the compare function
    sCmpOutput = CreateTempFile()
    sDiffOutput = CreateTempFile()

    ' Run the compare utility and redirect it's output
and errors
    SyncShell ("cmd /c " & _
            GetShortName(App.Path &
msCompareExe) & gstrBlank & _
            sCompareFile & gstrBlank & sOutputFile &
_
            " > " & sCmpOutput & " 2> " &
sDiffOutput)

    If FileLen(sDiffOutput) > 0 Then
        ' The compare generated errors - append error
msgs to the error file
        Call AppendDiffErrors(sDiffOutput)
        CompareOutput = False
    Else
        CompareOutput = (FileLen(sCmpOutput) = 0)
    End If

    If Not CompareOutput Then
        mcVBErr.WriteError errDiffFailed
    End If

    ' Delete the temporary files used to store the
output of the compare and
    ' the errors generated by the compare
    Kill sDiffOutput
    Kill sCmpOutput

    Exit Function

CompareOutputErr:
    mcVBErr.LogVBErrors
    CompareOutput = False

End Function
Public Property Get InstanceId() As Long

    InstanceId = mlngInstanceId

End Property
Public Property Let InstanceId(ByVal vdata As
Long)

    mlngInstanceId = vdata

End Property

Private Function ExecuteConstraint(vntConstraints
As Variant, _
        ByRef intLoopIndex As Integer) As Boolean

    ' Returns True if there is a constraint in the
passed in
    ' array that remains to be executed

    If IsArray(vntConstraints) And Not
IsEmpty(vntConstraints) Then
```

```
      ExecuteConstraint =
(LBound(vntConstraints) <= intLoopIndex)
And (intLoopIndex <=
UBound(vntConstraints))
   Else
      ExecuteConstraint = False
   End If

End Function
Private Function NextStep() As cStep

   ' Determines which is the next step to be
executed - it could
   ' be either a pre-execution step, the
worker step itself
   ' or a post-execution step

   Dim cConsRec As cConstraint
   Dim cNextStepRec As cStep
   Dim vntStepConstraints As Variant

   ' Static variable to remember exactly
where we are in the
   ' processing
   Static intIndex As Integer
   Static intNextStepType As
NextNodeType

   On Error GoTo NextStepErr

   If mblnAbort = True Then
      ' The user has aborted the run - do not
run any more
      ' processes for the step
      Set NextStep = Nothing
      Exit Function
   End If

   If intNextStepType = 0 Then
      ' First time through this function - set
the Index and
      ' node type to initial values
      intNextStepType =
mintWspPreConstraint
      intIndex = 0
      RaiseEvent StepStart(mcStep,
Determine64BitTime(), mlngInstanceId)
   End If

   Do
      Select Case intNextStepType
         Case mintWspPreConstraint
            vntStepConstraints =
mcvntWspPreCons

         Case mintPreConstraint
            vntStepConstraints =
mcvntPreCons

         Case mintStep
            ' CONS:
            If mcStep.StepType =
gintWorkerStep Then
               Set cNextStepRec = mcStep
            End If

         Case mintWspPostConstraint
            vntStepConstraints =
mcvntWspPostCons

         Case mintPostConstraint
            vntStepConstraints =
mcvntPostCons

      End Select

      If intNextStepType <> mintStep Then
         ' Check if there is a constraint to be
executed
         If
ExecuteConstraint(vntStepConstraints,
intIndex) Then
            ' Get the corresponding step record to
be executed
            ' Query the global step record for the
current
            ' constraint
            Set cConsRec =
vntStepConstraints(intIndex)

            Set cNextStepRec =
mcGlobals.QueryStep(cConsRec.GlobalStepId
)
            intIndex = intIndex + 1
         Else
            If intNextStepType =
mintPostConstraint Then
               ' No more stuff to be executed for
the step
               ' Raise a Done event
               Set cNextStepRec = Nothing

               ' Set the next step type to an
invalid value
               intNextStepType = -1
            Else
               Call NextType(intNextStepType,
intIndex)
            End If
         End If
      Else
         ' Increment the step type so we look at
the post-
         ' execution steps the next time through
         Call NextType(intNextStepType,
intIndex)
      End If

   Loop Until (Not cNextStepRec Is Nothing)
Or _
         intNextStepType = -1

   Set NextStep = cNextStepRec

   Exit Function

NextStepErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   mstrSource = mstrModuleName &
"NextStep"
   Err.Raise vbObjectError +
errNextStepFailed, mstrSource, _
      LoadResString(errNextStepFailed)

End Function
Public Sub Execute()
   ' This procedure is the method that executes
the step that
   ' is assigned to the ExecuteStep property. It
call a procedure
   ' to determine the next step to be executed.
   ' Then it initializes all the properties of the
cExecuteSM object
   ' and calls it's run method to execute it.
   Dim cConn As cConnection
   Dim cRunConnDtl As cConnDtl

   On Error GoTo ExecuteErr

   ' If this procedure is called after a step has
completed,
   ' we would have to check if we created any
temporary files
   ' while executing that step
   If Not mcExecStep Is Nothing Then
      If Not StringEmpty(mcExecStep.StepTextFile)
Or mcExecStep.ExecutionMechanism =
gintExecuteShell Then
         ' Remove the temporary file that we created
while
         ' running this command
         Kill mstrCommand
      End If

      Call StepCompleted

      ' The VB errors class stores a reference to the
Execute class since it uses
      ' a method of the class to write errors to the
error log. Hence,
      ' release all references to the Execute object
before destroying it.
      Set mcVBErr.ErrorFile = Nothing
      Set mcExecObj = Nothing

      ' Delete empty output and error files (generated
by shell commands)
      ' (Can be done only after cleaning up
cExecObj)
      Call DeleteEmptyOutputFiles
   Else
      ' First time through - initialize the location of
output files
      msOutputDir =
GetDefaultDir(mcStep.WorkspaceId,
WspParameters)
      msOutputDir = msOutputDir &
gstrFileSeparator & Trim(Str(RunId)) &
gstrFileSeparator
      ' Dummy file since the function expects a file
name
      MakePathValid (msOutputDir & "a.txt")
   End If

   ' Call a procedure to determine the next step to be
executed
   ' - could be a constraint or the step itself
   ' Initialize a module-level variable to the step
being
   ' executed
   Set mcExecStep = NextStep
   If mcExecStep Is Nothing Then
      RaiseEvent StepComplete(mcStep,
Determine64BitTime(), mlngInstanceId, miStatus)
      ' No more stuff to execute
      Exit Sub
   End If

   Dim sStartDir As String

   Set mcExecObj = New
EXECUTEDLLLib.Execute

   ' The VB errors class uses the WriteError method
of the Execute class to write
   ' all VB errors to the error file for the step (this
prevents a clash when the
   ' VB errors and Execution errors have to be
written to the same log). Hence, store
   ' a reference to the Execute object in mcVBErr
   msErrorFile = GetOutputFile(gsErrorFileSuffix)
   mcExecObj.ErrorFile = msErrorFile
```

```
   Call DeleteFile(msErrorFile,
bCheckIfEmpty:=False)
   Set mcVBErr.ErrorFile = mcExecObj

   If mcExecStep.ExecutionMechanism =
gintExecuteShell Then
      sStartDir =
Trim$(GetShortName(SubstituteParameters(
_
                  mcExecStep.StartDir,
mcExecStep.WorkspaceId, mcIterators,
WspParameters:=WspParameters)))
      ' Dummy connection object
      Set cConn = New cConnection
      Set cRunConnDtl = New cConnDtl
   Else
      ' Find the connection string value and
substitute parameter values in it
      Set cRunConnDtl =
WspConnDtls.GetConnectionDtl(mcExecSt
ep.WorkspaceId, mcExecStep.StartDir)
      Set cConn =
WspConnections.GetConnection(mcExecSte
p.WorkspaceId,
cRunConnDtl.ConnectionString)
      sStartDir =
Trim$(SubstituteParameters(cConn.Connect
ionValue, _
            mcExecStep.WorkspaceId,
mcIterators,
WspParameters:=WspParameters))
   End If

   msOutputFile =
GetOutputFile(gsOutputFileSuffix)
   Call DeleteFile(msOutputFile,
bCheckIfEmpty:=False)
   mcExecObj.OutputFile = msOutputFile
'   mcExecObj.LogFile =
GetShortName(SubstituteParameters( _
'          mcExecStep.LogFile,
mcExecStep.WorkspaceId, mcIterators,
WspParameters:=WspParameters))
   If mcExecStep.ExecutionMechanism =
gintExecuteODBC And _
         cRunConnDtl.ConnType =
ConnTypeDynamic Then
      Call
mcExecObj.DoExecute(BuildCommandStri
ng(), sStartDir,
mcExecStep.ExecutionMechanism, _
            cConn.NoCountDisplay,
cConn.NoExecute, cConn.ParseQueryOnly,
cConn.QuotedIdentifiers, _
            cConn.AnsiNulls,
cConn.ShowQueryPlan,
cConn.ShowStatsTime,
cConn.ShowStatsIO, _
            cConn.RowCount,
cConn.QueryTimeOut, gstrEmptyString)
   Else
      Call
mcExecObj.DoExecute(BuildCommandStri
ng(), sStartDir,
mcExecStep.ExecutionMechanism, _
            cConn.NoCountDisplay,
cConn.NoExecute, cConn.ParseQueryOnly,
cConn.QuotedIdentifiers, _
            cConn.AnsiNulls,
cConn.ShowQueryPlan,
cConn.ShowStatsTime,
cConn.ShowStatsIO, _
            cConn.RowCount,
cConn.QueryTimeOut,
mcExecStep.StartDir)
   End If

   Exit Sub

ExecuteErr:
   Call HandleExecutionError

   ' We can assume that if we are in this
function, a StepStart event has been triggered
already.
   RaiseEvent StepComplete(mcStep,
Determine64BitTime(), mlngInstanceId,
miStatus)

End Sub
Private Function BuildCommandString() As
String
   ' Process text to be executed - either from the
text
   ' field or read it from a file.
   ' This function will always return the
command text for ODBC commands
   ' and a file name for Shell commands
   Dim sFile As String
   Dim sCommand As String
   Dim sTemp As String

   On Error GoTo BuildCommandStringErr

   If Not
StringEmpty(mcExecStep.StepTextFile) Then
      ' Substitute parameter values and
environment variables
      ' in the filename
      msRunStepDtl =
SubstituteParameters(mcExecStep.StepTextFil
e, _
            mcExecStep.WorkspaceId,
mcIterators, WspParameters:=WspParameters)

      sFile = GetShortName(msRunStepDtl)

      mstrCommand =
SubstituteParametersInText(sFile,
mcExecStep.WorkspaceId)

      If mcExecStep.ExecutionMechanism =
gintExecuteODBC Then
         ' Read the contents of the file and pass
it to ODBC
         BuildCommandString =
ReadCommandFromFile(mstrCommand)
      Else
         BuildCommandString = mstrCommand
      End If
   Else
      ' Substitute parameter values and
environment variables
      ' in the step text
      msRunStepDtl =
SubstituteParameters(mcExecStep.StepText, _
            mcExecStep.WorkspaceId,
mcIterators, WspParameters:=WspParameters)
      mstrCommand = msRunStepDtl

      If mcExecStep.ExecutionMechanism =
gintExecuteShell Then
         ' Write the command to a temp file
(enables us to execute multiple
         ' commands via the command
interpreter)
         mstrCommand =
WriteCommandToFile(msRunStepDtl)
         BuildCommandString = mstrCommand
      Else
         BuildCommandString =
SQLFixup(msRunStepDtl)
      End If
   End If

   If CreateInputFiles Then
      Call CreateStepTextFile
   End If

   Exit Function

BuildCommandStringErr:
   ' Log the error code raised by the Execute
procedure
'   Call LogErrors(Errors)
   mcVBErr.LogVBErrors

   On Error GoTo 0
   mstrSource = mstrModuleName & "Execute"
   Err.Raise vbObjectError + errExecuteStepFailed,
mstrSource, _
      LoadResString(errExecuteStepFailed) &
mstrCommand

End Function
Public Sub Abort()

   On Error GoTo AbortErr

   ' Setting the Abort flag to True will ensure that
we
   ' don't execute any more processes for this step
   mblnAbort = True

   If Not mcExecObj Is Nothing Then
      mcExecObj.Abort
   Else
      ' We are not in the middle of execution yet
   End If

   Exit Sub

AbortErr:
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError + errProgramError, _
      mstrModuleName & "Abort", _
      LoadResString(errProgramError)

End Sub
Private Sub NextType(ByRef StepType As
NextNodeType, _
      ByRef Position As Integer)

   StepType = StepType + 1
   Position = 0

End Sub
Private Sub StepCompleted()

   On Error GoTo StepCompletedErr

   If Not mcExecStep Is Nothing Then
      If mcExecStep Is mcStep Then
         miStatus = InitializeExecStatus
         If miStatus = gintFailed Then
            ' Create input files if the step failed
execution and one hasn't been created already
            If Not CreateInputFiles Then
CreateStepTextFile
            Call
mcVBErr.WriteError(errExecuteStepFailed, _
                  OptArgs:="Continuation criteria for
the step is: " &
gsContCriteria(mcStep.ContinuationCriteria))
```

```
        End If
      End If
   End If

   Exit Sub

StepCompletedErr:
   ' Log the error code raised by Visual
Basic
   miStatus = gintFailed
   mcVBErr.LogVBErrors
   Call
mcVBErr.WriteError(errExecuteStepFailed,
_
         OptArgs:="Continuation criteria for
the step is: " &
gsContCriteria(mcStep.ContinuationCriteria
))

End Sub
Private Sub DeleteEmptyOutputFiles()

   On Error GoTo
DeleteEmptyOutputFilesErr

   ' Delete empty output and error files
   If Not mcExecStep Is Nothing Then
      Call DeleteFile(msErrorFile,
bCheckIfEmpty:=True)
      Call DeleteFile(msOutputFile,
bCheckIfEmpty:=True)
   End If

   Exit Sub

DeleteEmptyOutputFilesErr:
   ' Not a critical error - continue

End Sub
Private Function
ReadCommandFromFile(strFileName As
String) As String

   ' Returns the contents of the passed in file

   Dim sCommand As String
   Dim sTemp As String
   Dim InputFile As Integer

   On Error GoTo
ReadCommandFromFileErr

   If Not StringEmpty(strFileName) Then

      InputFile = FreeFile
      Open strFileName For Input Access
Read As InputFile

      Line Input #InputFile, sCommand '
Read line into variable.

      Do While Not EOF(InputFile) ' Loop
until end of file.
         Line Input #InputFile, sTemp ' Read
line into variable.
         sCommand = sCommand & vbCrLf
& sTemp
      Loop

      Close InputFile
   End If

   ReadCommandFromFile = sCommand

   Exit Function

ReadCommandFromFileErr:

   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   mstrSource = mstrModuleName &
"ReadCommandFromFile"
   On Error GoTo 0
   Err.Raise vbObjectError +
errSubValuesFailed, _
         gstrSource, _
         LoadResString(errSubValuesFailed)

End Function
Private Function
SubstituteParametersIfPossible(strLabel As
String)

   On Error GoTo
SubstituteParametersIfPossibleErr

   SubstituteParametersIfPossible =
SubstituteParameters(strLabel, _
         mcExecStep.WorkspaceId, mcIterators,
WspParameters:=WspParameters)
   Exit Function

SubstituteParametersIfPossibleErr:
   SubstituteParametersIfPossible = strLabel

End Function
Private Function
SubstituteParametersInText(strFileName As
String, _
      lngWorkspace As Long) As String

   ' Reads each line in the passed in file,
substitutes parameter
   ' values in the line and writes out the
modified line to a
   ' temporary file that we create. The
temporary file will be
   ' removed once the step completes
execution.
   ' Returns the name of the newly created
temporary file.

   Dim strTempFile As String
   Dim strTemp As String
   Dim strOutput As String
   Dim InputFile As Integer
   Dim OutputFile As Integer

   On Error GoTo
SubstituteParametersInTextErr

   strTempFile = CreateTempFile()

   If Not StringEmpty(strFileName) Then

      InputFile = FreeFile
      Open strFileName For Input Access Read
As InputFile

      OutputFile = FreeFile
      Open strTempFile For Output Access
Write As OutputFile

      Do While Not EOF(InputFile) ' Loop until
end of file.
         Line Input #InputFile, strTemp ' Read
line into variable.
         strOutput =
SubstituteParameters(strTemp, lngWorkspace,
mcIterators, WspParameters:=WspParameters)

         If mcExecStep.ExecutionMechanism =
gintExecuteODBC Then strOutput =
SQLFixup(strOutput)

         Print #OutputFile, strOutput
         BugMessage strOutput
      Loop

   End If

   Close InputFile
   Close OutputFile

   SubstituteParametersInText = strTempFile

   Exit Function

SubstituteParametersInTextErr:

   ' Log the error code raised by Visual Basic
'   Call LogErrors(Errors)
   mcVBErr.LogVBErrors
   mstrSource = mstrModuleName &
"SubstituteParametersInText"
   On Error GoTo 0
   Err.Raise vbObjectError + errSubValuesFailed, _
         gstrSource, _
         LoadResString(errSubValuesFailed)

End Function

Private Function WriteCommandToFile(sCommand
As String, Optional sFile As String =
gstrEmptyString) As String

   ' Writes the command text to a temporary file
   ' Returns the name of the temporary file

   Dim OutputFile As Integer

   On Error GoTo WriteCommandToFileErr

   If StringEmpty(sFile) Then
      sFile = CreateTempFile()
   End If

   OutputFile = FreeFile
   Open sFile For Output Access Write As
OutputFile

   Print #OutputFile, sCommand

   Close OutputFile

   WriteCommandToFile = sFile

   Exit Function

WriteCommandToFileErr:

   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   mstrSource = mstrModuleName &
"WriteCommandToFile"
   On Error GoTo 0
   Err.Raise vbObjectError + errSubValuesFailed, _
         gstrSource, _
         LoadResString(errSubValuesFailed)

End Function


Public Property Get WspPreCons() As Variant
   WspPreCons = mcvntWspPreCons
```

```
End Property
Public Property Let WspPreCons(ByVal
vdata As Variant)
   mcvntWspPreCons = vdata
End Property

Public Property Get WspPostCons() As
Variant
   WspPostCons = mcvntWspPostCons
End Property
Public Property Let WspPostCons(ByVal
vdata As Variant)
   mcvntWspPostCons = vdata
End Property

Public Property Get PreCons() As Variant
   PreCons = mcvntPreCons
End Property
Public Property Let PreCons(ByVal vdata
As Variant)
   mcvntPreCons = vdata
End Property

Public Property Get PostCons() As Variant
   PostCons = mcvntPostCons
End Property
Public Property Let PostCons(ByVal vdata
As Variant)
   mcvntPostCons = vdata
End Property

Public Property Set Globals(cRunSteps As
cArrSteps)

   Set mcGlobals = cRunSteps

End Property
Public Property Set ExecuteStep(cRunStep
As cStep)

   Set mcStep = cRunStep

End Property
Public Property Get Globals() As cArrSteps

   Set Globals = mcGlobals

End Property
Public Property Get ExecuteStep() As cStep

   Set ExecuteStep = mcStep

End Property
Public Property Set Iterators(vdata As
cRunColIt)

   Set mcIterators = vdata

End Property
Private Sub Class_Initialize()

   ' Initialize the Abort flag to False
   mblnAbort = False
   Set mcVBErr = New cVBErrorsSM
   Set mcTermProcess = New cTermProcess

End Sub

Private Sub Class_Terminate()

   On Error GoTo Class_TerminateErr

   Set mcExecObj = Nothing
   Set mcVBErr = Nothing
   Set mcTermProcess = Nothing

   Exit Sub

Class_TerminateErr:
   Call LogErrors(Errors)

End Sub

Private Sub mcExecObj_Start(ByVal
StartTime As Currency)
   ' Raise an event indicating that the step has
begun execution
   RaiseEvent ProcessStart(mcExecStep,
msRunStepDtl, StartTime, mlngInstanceId)
End Sub

Private Sub mcExecObj_Complete(ByVal
EndTime As Currency, ByVal Elapsed As
Long)

   On Error GoTo mcExecObj_CompleteErr

   Debug.Print Elapsed
   RaiseEvent ProcessComplete(mcExecStep,
EndTime, mlngInstanceId, Elapsed)
   mcTermProcess.ProcessTerminated

   Exit Sub

mcExecObj_CompleteErr:
   Call LogErrors(Errors)

End Sub

Private Sub
mcTermProcess_TermProcessExists()

   On Error GoTo TermProcessExistsErr

   ' Call a procedure to execute the next step, if
any
   Call Execute

   Exit Sub

TermProcessExistsErr:
   ' Log the error code raised by the Execute
procedure
   Call LogErrors(Errors)

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cRunWorkspace"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cRunWorkspace.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This class loads all the
information necessary to
'              execute a workspace and calls
cRunInst to execute the workspace.
'              It also propagates Step start and
complete and
'              Run start and complete events.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name when
errors
' are raised by this module
Private Const mstrModuleName As String =
"cRunWorkspace."
Private mstrSource As String

Private mcRunSteps As cArrSteps
Private mcRunParams As cArrParameters
Private mcRunConstraints As cArrConstraints
Private mcRunConnections As cConnections
Private mcRunConnDtls As cConnDtls
Private mcvntWspPreCons As Variant
Private mcvntWspPostCons As Variant
Private mdbsLoadDb As Database
Private mlngRunId As Long
Private mlngWorkspaceId As Long
Private mField As cStringSM
Public CreateInputFiles As Boolean

Private WithEvents mcRun As cRunInst
Attribute mcRun.VB_VarHelpID = -1

Public Event RunStart(dtmStartTime As Currency,
strWspLog As String, lRunId As Long)
Public Event RunComplete(dtmEndTime As
Currency)
Public Event StepStart(cStepRecord As cStep,
dtmStartTime As Currency, lngInstanceId As Long,
_
      sPath As String, sIts As String)
Public Event StepComplete(cStepRecord As cStep,
dtmEndTime As Currency, lngInstanceId As Long)
Public Event ProcessStart(cStepRecord As cStep,
strCommand As String, _
      dtmStartTime As Currency, lngInstanceId As
Long)
Public Event ProcessComplete(cStepRecord As
cStep, dtmEndTime As Currency, lngInstanceId As
Long)
Public Function InstancesForStep(lngStepId As
Long, iStatus As InstanceStatus) As cInstances
   ' Returns an array of all the instances for a step

   If mcRun Is Nothing Then
      Set InstancesForStep = Nothing
   Else
      Set InstancesForStep =
mcRun.InstancesForStep(lngStepId, iStatus)
   End If

End Function
Private Sub InsertRunDetail(cStepRecord As cStep,
_
      strCommand As String, dtmStartTime As
Currency, _
      lngInstanceId As Long, lParentInstanceId As
Long, sItValue As String)
   ' Inserts a new run detail record into the database

   Dim strInsert As String
   Dim qy As QueryDef

   On Error GoTo InsertRunDetailErr
   mstrSource = mstrModuleName &
"InsertRunDetail"

   strInsert = "insert into run_step_details " & _
         "( run_id, step_id, version_no, instance_id,
parent_instance_id, " & _
         " command, start_time, iterator_value ) " &
_
```

```
        " values ( "

#If USE_JET Then

   strInsert = strInsert & " [r_id], [s_id],
[ver_no], [i_id], [p_i_id], " & _
        " [com], [s_date], [it_val] )"

   Set qy = mdbsLoadDb.CreateQueryDef( _
        gstrEmptyString, strInsert)

   ' Call a procedure to assign the Querydef
parameters
   Call AssignParameters(qy,
StartTime:=dtmStartTime, _
        StepId:=cStepRecord.StepId, _
        Version:=cStepRecord.VersionNo, _
        InstanceId:=lngInstanceId, _
        Command:=strCommand)

   qy.Execute dbFailOnError
   qy.Close

#Else

   strInsert = strInsert & Str(mlngRunId) _
      & ", " & Str(cStepRecord.StepId) _
      & ", " &
mField.MakeStringFieldValid(cStepRecord.
VersionNo) _
      & ", " & Str(lngInstanceId) _
      & ", " & Str(lParentInstanceId) _
      & ", " &
mField.MakeStringFieldValid(strCommand)
_
      & ", " & Str(dtmStartTime) _
      & ", " &
mField.MakeStringFieldValid(sItValue)

   strInsert = strInsert & " ) "

   mdbsLoadDb.Execute strInsert,
dbFailOnError

#End If

   Exit Sub

InsertRunDetailErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"InsertRunDetail"
   On Error GoTo 0
   Err.Raise vbObjectError +
errUpdateRunDataFailed, _
        mstrSource, _

LoadResString(errUpdateRunDataFailed)

End Sub
Private Sub UpdateRunDetail(cStepRecord
As cStep, _
      dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)
   ' Updates the run detail record in the
database

   Dim strUpdate As String
   Dim qy As QueryDef

   On Error GoTo UpdateRunDetailErr

   strUpdate = "update run_step_details " &
_
        " set end_time = [e_date], elapsed_time
= [elapsed] " & _
        " where run_id = [r_id] " & _
        " and step_id = [s_id] " & _
        " and version_no = [ver_no] " & _
        " and instance_id = [i_id] "

   Set qy = mdbsLoadDb.CreateQueryDef( _
        gstrEmptyString, strUpdate)

   ' Call a procedure to assign the Querydef
parameters
   Call AssignParameters(qy,
EndTime:=dtmEndTime, _
        StepId:=cStepRecord.StepId, _
        Version:=cStepRecord.VersionNo, _
        InstanceId:=lngInstanceId,
Elapsed:=lElapsed)

   qy.Execute dbFailOnError
   qy.Close

   Exit Sub

UpdateRunDetailErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"UpdateRunDetail"
   On Error GoTo 0
   Err.Raise vbObjectError +
errUpdateRunDataFailed, _
        mstrSource, _

LoadResString(errUpdateRunDataFailed)

End Sub
Private Function
InsertRunHeader(dtmStartTime As Currency)
As Long
   ' Inserts a new run header record into the
database
   ' and returns the id for the run

   Dim strInsert As String
   Dim qy As QueryDef

   On Error GoTo InsertRunHeaderErr

   strInsert = "insert into run_header " & _
      "( run_id, workspace_id, start_time ) " &
_
      " values ( " & _
      " [r_id], [w_id], [s_date] )"

   Set qy = mdbsLoadDb.CreateQueryDef( _
        gstrEmptyString, strInsert)

   ' Call a procedure to execute the Querydef
object
   Call AssignParameters(qy,
StartTime:=dtmStartTime)

   qy.Execute dbFailOnError
   qy.Close

   InsertRunHeader = mlngRunId
   Exit Function

InsertRunHeaderErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"InsertRunHeader"
   On Error GoTo 0
   Err.Raise vbObjectError +
errUpdateRunDataFailed, _
        mstrSource, _
        LoadResString(errUpdateRunDataFailed)

End Function
Private Sub InsertRunParameters(dtmStartTime As
Currency)
   ' Inserts a new run header record into the database
   ' and returns the id for the run

   Dim strInsert As String
   Dim qy As QueryDef
   Dim cParamRec As cParameter
   Dim lngIndex As Long

   On Error GoTo InsertRunParametersErr

   strInsert = "insert into run_parameters " & _
      "( run_id, parameter_name, parameter_value )
" & _
      " values ( " & _
      " [r_id], [p_name], [p_value] )"

   Set qy = mdbsLoadDb.CreateQueryDef( _
        gstrEmptyString, strInsert)
   qy.Parameters("r_id").Value = mlngRunId

   For lngIndex = 0 To
mcRunParams.ParameterCount - 1
      Set cParamRec = mcRunParams(lngIndex)

      qy.Parameters("p_name").Value =
cParamRec.ParameterName
      qy.Parameters("p_value").Value =
cParamRec.ParameterValue
      qy.Execute dbFailOnError

   Next lngIndex

   qy.Close

   Exit Sub

InsertRunParametersErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"InsertRunParameters"
   On Error GoTo 0
   Err.Raise vbObjectError +
errUpdateRunDataFailed, _
        mstrSource, _
        LoadResString(errUpdateRunDataFailed)

End Sub
Private Sub AssignParameters(qyExec As
DAO.QueryDef, _
      Optional StartTime As Currency = 0, _
      Optional EndTime As Currency = 0, _
      Optional StepId As Long = 0, _
      Optional Version As String = gstrEmptyString,
_
      Optional InstanceId As Long = 0, _
      Optional ParentInstanceId As Long = 0, _
      Optional Command As String =
gstrEmptyString, _
      Optional Elapsed As Long = 0, _
      Optional ItValue As String = gstrEmptyString)
   ' Assigns values to the parameters in the querydef
object

   Dim prmParam As DAO.Parameter

   On Error GoTo AssignParametersErr
   mstrSource = mstrModuleName &
"AssignParameters"
```

```
    For Each prmParam In
qyExec.Parameters
        Select Case prmParam.Name
            Case "[w_id]"
                prmParam.Value =
mlngWorkspaceId

            Case "[r_id]"
                prmParam.Value = mlngRunId

            Case "[s_id]"
                BugAssert StepId <> 0
                prmParam.Value = StepId

            Case "[ver_no]"
                BugAssert Not
StringEmpty(Version)
                prmParam.Value = Version

            Case "[i_id]"
                BugAssert InstanceId <> 0
                prmParam.Value = InstanceId

            Case "[p_i_id]"
                prmParam.Value =
ParentInstanceId

            Case "[com]"
                BugAssert Not
StringEmpty(Command)
                prmParam.Value = Command

            Case "[s_date]"
                BugAssert StartTime <> 0
                prmParam.Value = StartTime

            Case "[e_date]"
                BugAssert EndTime <> 0
                prmParam.Value = EndTime

            Case "[elapsed]"
                prmParam.Value = Elapsed

            Case "[it_val]"
                prmParam.Value = ItValue

            Case Else
                ' Write the parameter name that is
faulty
                WriteError errInvalidParameter,
mstrSource, _
                    prmParam.Name
                On Error GoTo 0
                Err.Raise errInvalidParameter,
mstrSource, _

LoadResString(errInvalidParameter)
        End Select
    Next prmParam

    Exit Sub

AssignParametersErr:

    mstrSource = mstrModuleName &
"AssignParameters"
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errAssignParametersFailed, _
        mstrSource,
LoadResString(errAssignParametersFailed)

End Sub
Private Sub RunStartProcessing(dtmStartTime
As Currency)

    On Error GoTo RunStartProcessingErr

    ' Insert the run header into the database
    Call InsertRunHeader(dtmStartTime)

    ' Insert the run parameters into the database
    Call InsertRunParameters(dtmStartTime)

    Exit Sub

RunStartProcessingErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    mstrSource = mstrModuleName &
"RunStartProcessing"
    ShowError errUpdateRunDataFailed
    WriteError errUpdateRunDataFailed,
mstrSource

End Sub
Private Sub
ProcessStartProcessing(cStepRecord As cStep,
_
        strCommand As String, dtmStartTime As
Currency, lngInstanceId As Long, _
        lParentInstanceId As Long, sItValue As
String)

    On Error GoTo ProcessStartProcessingErr

    ' Insert the run detail into the database
    Call InsertRunDetail(cStepRecord,
strCommand, dtmStartTime, lngInstanceId, _
            lParentInstanceId, sItValue)

    Exit Sub

ProcessStartProcessingErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    mstrSource = mstrModuleName &
"ProcessStartProcessing"
    ShowError errUpdateRunDataFailed
    WriteError errUpdateRunDataFailed,
mstrSource

End Sub
Private Sub StepStartProcessing(cStepRecord
As cStep, dtmStartTime As Currency, _
        lngInstanceId As Long, lParentInstanceId
As Long, sItValue As String)

    On Error GoTo StepStartProcessingErr

    ' Since ProcessStart events won't be
triggered for manager steps
    If cStepRecord.StepType = gintManagerStep
Then
        ' Insert the run detail into the database
        Call InsertRunDetail(cStepRecord,
cStepRecord.StepLabel, _
                dtmStartTime, lngInstanceId,
lParentInstanceId, sItValue)
    End If

    Exit Sub

StepStartProcessingErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    mstrSource = mstrModuleName &
"StepStartProcessing"
    ShowError errUpdateRunDataFailed

End Sub
Private Sub
ProcessCompleteProcessing(cStepRecord As cStep,
_
        dtmStartTime As Currency, lngInstanceId As
Long, lElapsed As Long)

    On Error GoTo ProcessCompleteProcessingErr

    ' Insert the run detail into the database
    Call UpdateRunDetail(cStepRecord,
dtmStartTime, lngInstanceId, lElapsed)

    Exit Sub

ProcessCompleteProcessingErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    mstrSource = mstrModuleName &
"ProcessCompleteProcessing"
    ShowError errUpdateRunDataFailed

End Sub
Private Sub StepCompleteProcessing(cStepRecord
As cStep, _
        dtmEndTime As Currency, lngInstanceId As
Long, lElapsed As Long)

    On Error GoTo StepCompleteProcessingErr

    ' Since ProcessComplete events won't be
triggered for manager steps
    If cStepRecord.StepType = gintManagerStep
Then
        ' Update the run detail in the database
        Call UpdateRunDetail(cStepRecord,
dtmEndTime, lngInstanceId, lElapsed)
    End If

    Exit Sub

StepCompleteProcessingErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    ShowError errUpdateRunDataFailed

End Sub
Private Sub RunCompleteProcessing(dtmEndTime
As Currency)

    On Error GoTo RunCompleteProcessingErr

    ' Update the header record with the end time for
the run
    Call UpdateRunHeader(dtmEndTime)

    Exit Sub

RunCompleteProcessingErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    ShowError errUpdateRunDataFailed

End Sub

Private Sub UpdateRunHeader(ByVal dtmEndTime
As Currency)
    ' Updates the run header record with the end date

    Dim strUpdate As String
    Dim qy As QueryDef

    On Error GoTo UpdateRunHeaderErr
```

```
    strUpdate = "update run_header " & _
            " set end_time = [e_date] " & _
            " where run_id = [r_id] "

    Set qy = mdbsLoadDb.CreateQueryDef( _
            gstrEmptyString, strUpdate)

    ' Call a procedure to execute the Querydef
object
    Call AssignParameters(qy,
EndTime:=dtmEndTime)

    qy.Execute dbFailOnError
    qy.Close

    Exit Sub

UpdateRunHeaderErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"UpdateRunHeader"
    On Error GoTo 0
    Err.Raise vbObjectError +
errUpdateRunDataFailed, _
            mstrSource, _

LoadResString(errUpdateRunDataFailed)

End Sub

Public Property Let WorkspaceId(ByVal
vdata As Long)
    mlngWorkspaceId = vdata
End Property
Public Property Get WorkspaceId() As Long
    WorkspaceId = mlngWorkspaceId
End Property
Public Sub RunWorkspace()

    Dim cRunSeq As cSequence

    On Error GoTo RunWorkspaceErr

    ' Call a procedure to load the module-
level structures
    ' with all the step and parameter data for
the run
    If LoadRunData = False Then
        ' Error handled by the function already
        Exit Sub
    End If

    ' Retrieve the next run identifier using the
sequence class
    Set cRunSeq = New cSequence
    Set cRunSeq.IdDatabase = dbsAttTool
    cRunSeq.IdentifierColumn = "run_id"
    mlngRunId = cRunSeq.Identifier
    Set cRunSeq = Nothing

    Call
mcRunParams.InitBuiltInsForRun(mlngWor
kspaceId, mlngRunId)

    Set mcRun.Constraints =
mcRunConstraints
    mcRun.WspPreExecution =
mcvntWspPreCons
    mcRun.WspPostExecution =
mcvntWspPostCons

    Set mcRun.Steps = mcRunSteps
    Set mcRun.Parameters = mcRunParams
    Set mcRun.RunConnections =
mcRunConnections
    Set mcRun.RunConnDtls = mcRunConnDtls

    mcRun.WspId = mlngWorkspaceId
    mcRun.RootKey =
LabelStep(mlngWorkspaceId)
    mcRun.RunId = mlngRunId
    mcRun.CreateInputFiles = CreateInputFiles

    mcRun.Run

    Exit Sub

RunWorkspaceErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)

End Sub
Public Property Get LoadDb() As Database

    Set LoadDb = mdbsLoadDb

End Property
Public Property Set LoadDb(vdata As
Database)

    Set mdbsLoadDb = vdata

End Property
Private Function LoadRunData() As Boolean

    ' Loads the step, parameter and constraint
arrays
    ' with all the data for the workspace. Returns
False
    ' if a failure occurs

    Dim strWorkspaceName As String
    Dim recWspSteps As Recordset
    Dim qySteps As DAO.QueryDef
    Dim recWspParams As Recordset
    Dim qyParams As DAO.QueryDef
    Dim recWspConns As Recordset
    Dim qyConns As DAO.QueryDef
    Dim recWspConnDtls As Recordset
    Dim qyConnDtls As DAO.QueryDef

    On Error GoTo LoadRunDataErr

    Set mcRunSteps.StepDB = mdbsLoadDb
    Set mcRunParams.ParamDatabase =
mdbsLoadDb
    Set mcRunConstraints.ConstraintDB =
mdbsLoadDb
    Set mcRunConnections.ConnDb =
mdbsLoadDb
    Set mcRunConnDtls.ConnDb =
mdbsLoadDb

    ' Read all the step and parameter data for the
workspace
    Call
ReadWorkspaceData(mlngWorkspaceId,
mcRunSteps, _
            mcRunParams, mcRunConstraints,
mcRunConnections, mcRunConnDtls, _
            recWspSteps, qySteps, recWspParams,
qyParams, recWspConns, qyConns, _
            recWspConnDtls, qyConnDtls)

    ' Load all the pre- and post-execution
constraints that
    ' have been defined for the workspace
    mcvntWspPreCons =
mcRunConstraints.ConstraintsForWsp( _
        mlngWorkspaceId, _
        gintPreStep, _
        blnSort:=True, _
        blnGlobalConstraintsOnly:=True)
    mcvntWspPostCons =
mcRunConstraints.ConstraintsForWsp( _
        mlngWorkspaceId, _
        gintPostStep, _
        blnSort:=True, _
        blnGlobalConstraintsOnly:=True)

    On Error Resume Next
    recWspSteps.Close
    qySteps.Close
    recWspParams.Close
    qyParams.Close
    recWspConns.Close
    qyConns.Close

    LoadRunData = True

    Exit Function

LoadRunDataErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    ShowError errLoadRunDataFailed
    LoadRunData = False

End Function
Public Sub StopRun()

    On Error GoTo StopRunErr

    If mcRun Is Nothing Then
        ' We haven't been the run yet, so do nothing
    Else
        mcRun.StopRun
    End If

    Exit Sub

StopRunErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    ' Errors would have been displayed by the called
process

End Sub
Public Sub AbortRun()

    On Error GoTo AbortRunErr

    If mcRun Is Nothing Then
        ' We haven't been the run yet, so do nothing
    Else
        mcRun.Abort
    End If

    Exit Sub

AbortRunErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    ' Errors would have been displayed by the called
process

End Sub

Private Sub Class_Initialize()

    ' Create instances of the step, parameter and
constraint arrays
```

```
    Set mcRunSteps = New cArrSteps
    Set mcRunParams = New cArrParameters
    Set mcRunConstraints = New
cArrConstraints
    Set mcRunConnections = New
cConnections
    Set mcRunConnDtls = New cConnDtls
    Set mcRun = New cRunInst
    Set mField = New cStringSM

End Sub
Private Sub Class_Terminate()

    On Error GoTo UnLoadRunDataErr

    ' Clears the step, parameter and constraint
arrays
    Set mcRunSteps = Nothing
    Set mcRunParams = Nothing
    Set mcRunConstraints = Nothing
    Set mcRunConnections = Nothing
    Set mcRunConnDtls = Nothing

    Set mcRun = Nothing
    Set mdbsLoadDb = Nothing
    Set mField = Nothing

    Exit Sub

UnLoadRunDataErr:
    ' Log the error code raised by Visual
Basic
    Call LogErrors(Errors)
    ' Not a critical error - continue
    Resume Next

End Sub

Private Sub
mcRun_ProcessComplete(cStepRecord As
cStep, _
        dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

    RaiseEvent
ProcessComplete(cStepRecord,
dtmEndTime, lngInstanceId)
    Call
ProcessCompleteProcessing(cStepRecord,
dtmEndTime, lngInstanceId, lElapsed)

End Sub

Private Sub
mcRun_ProcessStart(cStepRecord As cStep,
_
        strCommand As String, dtmStartTime
As Currency, lngInstanceId As Long, _
        lParentInstanceId As Long, sItValue As
String)

    RaiseEvent ProcessStart(cStepRecord,
strCommand, dtmStartTime, lngInstanceId)
    Call ProcessStartProcessing(cStepRecord,
strCommand, dtmStartTime, lngInstanceId,
_
          lParentInstanceId, sItValue)

End Sub

Private Sub
mcRun_RunComplete(dtmEndTime As
Currency)

    Debug.Print "Run ended at: " &
CStr(dtmEndTime)
    Call RunCompleteProcessing(dtmEndTime)

    RaiseEvent RunComplete(dtmEndTime)

End Sub
Private Sub mcRun_RunStart(dtmStartTime
As Currency, strWspLog As String)

    RaiseEvent RunStart(dtmStartTime,
strWspLog, mlngRunId)
    Debug.Print "Run started at: " &
CStr(dtmStartTime)

    Call RunStartProcessing(dtmStartTime)

End Sub
Private Sub
mcRun_StepComplete(cStepRecord As cStep,
_
        dtmEndTime As Currency, lngInstanceId
As Long, lElapsed As Long)

    RaiseEvent StepComplete(cStepRecord,
dtmEndTime, lngInstanceId)
'    BugMessage "Step: " &
cStepRecord.StepLabel & " has completed!"

    Call StepCompleteProcessing(cStepRecord,
dtmEndTime, lngInstanceId, lElapsed)

End Sub
Private Sub mcRun_StepStart(cStepRecord As
cStep, dtmStartTime As Currency, _
        lngInstanceId As Long, lParentInstanceId
As Long, sPath As String, sIts As String,
sItValue As String)

    RaiseEvent StepStart(cStepRecord,
dtmStartTime, lngInstanceId, sPath, sIts)
    'bugmessage "Step: " &
cStepRecord.StepLabel & " has started."

    Call StepStartProcessing(cStepRecord,
dtmStartTime, lngInstanceId,
lParentInstanceId, sItValue)

End Sub

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cSequence"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:       cSequence.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    This class uses the
att_identifiers table to generate unique
'             identifiers.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private mlngIdentifier As Long
Private mstrIdentifierColumn As String
Private mrecIdentifiers As Recordset
Private mdbsDatabase As Database

Private Const mstrEmptyString = ""

' Used to indicate the source module name when
errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cSequence."

Private Sub CreateIdRecord()
    ' Creates a record with all identifiers having an
initial value of 1

    Dim sSql As String
    Dim pId As DAO.Parameter
    Dim qyId As DAO.QueryDef

    sSql = "insert into att_identifiers (" & _
           " workspace_id, parameter_id, step_id, " &
_
           " constraint_id, run_id, connection_id " & _
           ", " & FLD_ID_CONN_NAME & _
           " ) values ( " & _
           "[w_id], [p_id], [s_id], [c_id], [r_id],
[conn_id], [conn_dtl_id] )"
    Set qyId =
mdbsDatabase.CreateQueryDef(gstrEmptyString,
sSql)
    For Each pId In qyId.Parameters
       pId.Value = glMinId
    Next pId
    qyId.Execute dbFailOnError
    qyId.Close

End Sub
Private Sub CreateIdRecordset()

    Dim strSql As String

    ' Initialize the recordset with all identifiers
    strSql = "select * from att_identifiers"
    Set mrecIdentifiers =
mdbsDatabase.OpenRecordset(strSql,
dbOpenForwardOnly)

    If mrecIdentifiers.RecordCount = 0 Then
       CreateIdRecord
       Set mrecIdentifiers =
mdbsDatabase.OpenRecordset(strSql,
dbOpenForwardOnly)
    End If

    BugAssert mrecIdentifiers.RecordCount <> 0

End Sub

Public Property Set IdDatabase(vdata As Database)

    Set mdbsDatabase = vdata

End Property

Public Property Let IdentifierColumn(vdata As
String)

    Dim intIndex As Integer

    On Error GoTo IdentifierColumnErr

    ' Initialize the return value to an empty string
    mstrIdentifierColumn = mstrEmptyString
    Call CreateIdRecordset
```

```
   For intIndex = 0 To
mrecIdentifiers.Fields.Count - 1

      If
LCase(Trim(mrecIdentifiers.Fields(intIndex
).Name)) = _
            LCase(Trim(vdata)) Then

         ' Valid column name
         mstrIdentifierColumn = vdata
         Exit Property
      End If

   Next intIndex

   BugAssert True, "Invalid column name!"

   Exit Property

IdentifierColumnErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"IdentifierColumn"
   On Error GoTo 0
   Err.Raise vbObjectError +
errIdentifierColumnFailed, _
         mstrSource, _

LoadResString(errIdentifierColumnFailed)

End Property
Public Property Get Identifier() As Long
   Dim strSql As String

   On Error GoTo GetIdentifierErr

   BugAssert mstrIdentifierColumn <>
mstrEmptyString

   ' Increment the identifier column by 1
   strSql = "update att_identifiers " & _
      " set " & mstrIdentifierColumn & _
      " = " & mstrIdentifierColumn & " + 1"
   mdbsDatabase.Execute strSql,
dbFailOnError

   ' Refresh the recordset with identifier
values
   Call CreateIdRecordset

   mlngIdentifier =
mrecIdentifiers.Fields(mstrIdentifierColumn
).Value

   Identifier = mlngIdentifier

   Exit Property

GetIdentifierErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"Identifier"
   On Error GoTo 0
   Err.Raise vbObjectError +
errGetIdentifierFailed, _
         mstrSource, _

LoadResString(errGetIdentifierFailed)

End Property
Private Sub Class_Terminate()

   mrecIdentifiers.Close

End Sub

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cStack"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cStack.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This class implements a stack
of objects.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this class
Private Const mstrModuleName As String =
"cStack."
Private mstrSource As String

Private mcVector As cVector
Private mlngCount As Long
Public Property Get Item(ByVal Position As
Long) As Object
Attribute Item.VB_UserMemId = 0

   Set Item = mcVector(Position)

End Property

Public Sub Push(objToPush As Object)

   mcVector.Add objToPush

End Sub
Public Sub Clear()

   mcVector.Clear

End Sub

Public Function Pop() As Object

   If mcVector.Count > 0 Then
      Set Pop =
mcVector.Delete(mcVector.Count - 1)
   Else
      Set Pop = Nothing
   End If

End Function
Public Function Count() As Long

   Count = mcVector.Count

End Function


Private Sub Class_Initialize()

   Set mcVector = New cVector

End Sub

Private Sub Class_Terminate()

   Set mcVector = Nothing

End Sub


VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cStep"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
Attribute VB_Ext_KEY =
"SavedWithClassBuilder" ,"Yes"
Attribute VB_Ext_KEY = "Top_Level" ,"Yes"
'  FILE:       cStep.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Encapsulates the properties and
methods of a step.
'              Contains functions to insert, update and
delete
'              att_steps records from the database.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Local variable(s) to hold property value(s)
Private mlngStepId As Long
Private mstrVersionNo As String
Private mstrStepLabel As String
Private mstrStepTextFile As String
Private mstrStepText As String
Private mstrStartDir As String
Private mlngWorkspaceId As Integer
Private mlngParentStepId As Integer
Private mstrParentVersionNo As String
Private mintSequenceNo As Integer
Private mintStepLevel As Integer
Private mblnEnabledFlag As Boolean
Private mstrDegreeParallelism As String
Private mintExecutionMechanism As Integer
Private mstrFailureDetails As String
Private mintContinuationCriteria As Integer
Private mblnGlobalFlag As Boolean
Private mblnArchivedFlag As Boolean
Private mstrOutputFile As String
'Private mstrLogFile As String
Private mstrErrorFile As String
Private mdbsDatabase As Database
Private mintStepType As Integer
Private mintOperation As Operation
Private mlngPosition As Long
Private mstrIteratorName As String
Private mcIterators As cNodeCollections
Private mbIsNewVersion As Boolean
Private msOldVersion As String

' The following constants are used throughout the
project to
' indicate the different options selected by the user
' The options are presented to the user as control
arrays of
' option buttons. These constants have to be in sync
with the
' indexes of the option buttons.
```

```
' All the control arrays have an lbound of 1. The value 0 is
' used to indicate that the property being represented by the
' control array is not valid for the step
' Public enums are used since we cannot expose public constants
' in class modules. gintNoOption is applicable to all enums,
' but declared in the Execution method enum, since we cannot
' declare it more than once.

' Is here as a comment
' Has been defined in public.bas with the other object types
'Public Enum gintStepType
'    gintGlobalStep = 3
'    gintManagerStep
'    gintWorkerStep
'End Enum

' Execution Method options
Public Enum ExecutionMethod
    gintNoOption = 0
    gintExecuteODBC
    gintExecuteShell
End Enum

' Failure criteria options
Public Enum FailureCriteria
    gintFailureODBC = 1
    gintFailureTextCompare
End Enum

' Continuation criteria options
' Note: Update the initialization of gsContCriteria in Initialize() if the
' continuation criteria are modified
Public Enum ContinuationCriteria
    gintOnFailureAbort = 1
    gintOnFailureContinue
    gintOnFailureCompleteSiblings
    gintOnFailureAbortSiblings
    gintOnFailureSkipSiblings
    gintOnFailureAsk
End Enum

' The initial version #
Private Const mstrMinVersion As String = "0.0"

' End of constants for option button control arrays
' Used to indicate the source module name when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String = "cStep."

' The cSequence class is used to generate unique step identifiers
Private mStepSeq As cSequence

' The StringSM class is used to carry out string operations
Private mFieldValue As cStringSM
Private Sub NewVersion()

mbIsNewVersion = True
msOldVersion = mstrVersionNo

End Sub
Public Function IsNewVersion() As Boolean
    IsNewVersion = mbIsNewVersion
End Function

Public Function OldVersionNo() As String
    OldVersionNo = msOldVersion
End Function

Public Sub SaveIterators()
    ' This procedure checks if any changes have been made
    ' to the iterators for the step. If so, it calls the
    ' methods of the iterator class to commit the changes
    Dim cItRec As cIterator
    Dim lngIndex As Long

    On Error GoTo SaveIteratorsErr

    For lngIndex = 0 To mcIterators.Count - 1
        Set cItRec = mcIterators(lngIndex)

        Select Case cItRec.IndOperation
            Case QueryOp
                ' No changes were made to the queried Step.
                ' Do nothing

            Case InsertOp
                cItRec.Add mlngStepId, mstrVersionNo
                cItRec.IndOperation = QueryOp

            Case UpdateOp
                cItRec.Update mlngStepId, mstrVersionNo
                cItRec.IndOperation = QueryOp

            Case DeleteOp
                cItRec.Delete mlngStepId, mstrVersionNo
                ' Remove the record from the collection
                mcIterators.Delete lngIndex

        End Select
    Next lngIndex

    Exit Sub

SaveIteratorsErr:
    LogErrors Errors
    mstrSource = mstrModuleName & "SaveIterators"
    On Error GoTo 0
    Err.Raise vbObjectError + errSaveFailed, _
          mstrSource, _
          LoadResString(errSaveFailed)

End Sub
Public Property Get IndOperation() As Operation

    IndOperation = mintOperation

End Property
Public Property Let IndOperation(ByVal vdata As Operation)

    BugAssert vdata = QueryOp Or vdata = InsertOp Or vdata = UpdateOp Or vdata = DeleteOp, "Invalid operation"
    mintOperation = vdata

End Property
Public Function Iterators() As Variant
    ' Returns a variant containing all the iterators that
    ' have been defined for the step

    Dim cStepIterators() As cIterator
    Dim cTempIt As cIterator
    Dim lngIndex As Long
    Dim lngItCount As Long

    On Error GoTo IteratorsErr

    lngItCount = 0
    For lngIndex = 0 To mcIterators.Count - 1
        ' Increase the array dimension and add the constraint
        ' to it
        Set cTempIt = mcIterators(lngIndex)

        If cTempIt.IndOperation <> DeleteOp Then
            ReDim Preserve cStepIterators(lngItCount)
            Set cStepIterators(lngItCount) = cTempIt
            lngItCount = lngItCount + 1
        End If

    Next lngIndex

    If lngItCount = 0 Then
        Iterators = Empty
    Else
        Iterators = cStepIterators()
    End If

    Call QuickSort(Iterators)

    Exit Function

IteratorsErr:
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError + errIteratorsFailed, _
          mstrModuleName & "Iterators", _
          LoadResString(errIteratorsFailed)

End Function
Public Function IteratorCount() As Long
    ' Returns a count of all the iterators for the step

    Dim lngItCount As Long
    Dim lngIndex As Long
    Dim cTempIt As cIterator

    On Error GoTo IteratorsErr

    lngItCount = 0
    For lngIndex = 0 To mcIterators.Count - 1

        If mcIterators(lngIndex).IndOperation <> DeleteOp Then
            lngItCount = lngItCount + 1
        End If

    Next lngIndex

    IteratorCount = lngItCount

    Exit Function

IteratorsErr:
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError + errIteratorsFailed, _
          mstrSource, _
          LoadResString(errIteratorsFailed)

End Function
```

```
Public Sub Validate()
   ' Each distinct object will have a Validate
method which
   ' will check if the class properties are
valid. This method
   ' will be used to check interdependant
properties that
   ' cannot be validated by the let
procedures.
   ' It should be called by the add and
modify methods of the class

   ' Check if the step label has been specified
   If StringEmpty(mstrStepLabel) Then
      ShowError errStepLabelMandatory
      On Error GoTo 0
      Err.Raise vbObjectError +
errValidateFailed, _
            "Validate",
LoadResString(errValidateFailed)
   End If

   If Not IsStringEmpty(mstrStepText) And
Not IsStringEmpty(mstrStepTextFile) Then
      ShowError errStepTextOrFile
      On Error GoTo 0
      Err.Raise vbObjectError +
errStepTextOrFile, _
         "Validate",
LoadResString(errStepTextOrFile)
   End If

End Sub

Public Function IncVersionY() As String
   ' The version number for a step is stored
in the x.y
   ' format where x is the parent component
and y is the
   ' child component of the step. This
function will increment
   ' the y component of the step by 1

   On Error GoTo IncVersionYErr

   ' Store the old version number for the step
   Call NewVersion

   mstrVersionNo =
Trim$(Str$(GetX(mstrVersionNo))) &
gstrVerSeparator & _
         Trim$(Str(GetY(mstrVersionNo) +
1))
   IncVersionY = mstrVersionNo

   Exit Function

IncVersionYErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   gstrSource = mstrModuleName &
"IncVersionY"
   On Error GoTo 0
   Err.Raise vbObjectError +
errIncVersionYFailed, _
         gstrSource, _

LoadResString(errIncVersionYFailed)

End Function
Public Function IncVersionX() As String
   ' The version number for a step is stored
in the x.y
   ' format where x is the parent component and
y is the
   ' child component of the step. This function
will increment
   ' the y component of the step by 1 and reset
the x component
   ' to 0

   On Error GoTo IncVersionXErr

   ' Store the old version number for the step
   Call NewVersion

   mstrVersionNo =
Trim$(Str$(GetX(mstrVersionNo) + 1)) &
gstrVerSeparator & "0"
   IncVersionX = mstrVersionNo

   Exit Function

IncVersionXErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   gstrSource = mstrModuleName &
"IncVersionX"
   On Error GoTo 0
   Err.Raise vbObjectError +
errIncVersionXFailed, _
         gstrSource, _
         LoadResString(errIncVersionXFailed)

End Function


Private Function GetY(strVersion As String)
As Long
   ' The version number for a step is stored in
the x.y
   ' format where x is the parent component and
y is the
   ' child component of the step. Given an
argument of type
   ' x.y, it returns y

   ' Truncate the fractional part to get the parent
component
   ' of the version number (x.y)
   GetY = Val(Mid(strVersion,
InStr(strVersion, gstrVerSeparator) + 1))

End Function
Private Function GetX(strVersion As String)
As Long
   ' The version number for a step is stored in
the x.y
   ' format where x is the parent component and
y is the
   ' child component of the step. Given an
argument of type
   ' x.y, it returns x

   ' Truncate the fractional part to get the parent
component
   ' of the version number (x.y)
   GetX = Val(Left(strVersion,
InStr(strVersion, gstrVerSeparator) - 1))

End Function

Public Function Clone(Optional cCloneStep As
cStep) As cStep

   ' Creates a copy of a given step

   Dim lngIndex As Long
   Dim cItRec As cIterator
   Dim cItClone As cIterator

   On Error GoTo CloneErr

   If cCloneStep Is Nothing Then
      Set cCloneStep = New cStep
   End If

   ' Copy all the step properties to the newly created
step
   ' Initialize the global flag first since subsequent
   ' validations might depend on it
   cCloneStep.GlobalFlag = mblnGlobalFlag
'   cCloneStep.GlobalRunMethod =
mintGlobalRunMethod

   cCloneStep.StepType = mintStepType
   cCloneStep.StepId = mlngStepId
   cCloneStep.VersionNo = mstrVersionNo
   cCloneStep.StepLabel = mstrStepLabel
   cCloneStep.StepTextFile = mstrStepTextFile
   cCloneStep.StepText = mstrStepText
   cCloneStep.StartDir = mstrStartDir
   cCloneStep.WorkspaceId = mlngWorkspaceId
   cCloneStep.ParentStepId = mlngParentStepId
   cCloneStep.ParentVersionNo =
mstrParentVersionNo
   cCloneStep.StepLevel = mintStepLevel
   cCloneStep.SequenceNo = mintSequenceNo
   cCloneStep.EnabledFlag = mblnEnabledFlag
   cCloneStep.DegreeParallelism =
mstrDegreeParallelism
   cCloneStep.ExecutionMechanism =
mintExecutionMechanism
   cCloneStep.FailureDetails = mstrFailureDetails
   cCloneStep.ContinuationCriteria =
mintContinuationCriteria
   cCloneStep.ArchivedFlag = mblnArchivedFlag
   cCloneStep.OutputFile = mstrOutputFile
'   cCloneStep.LogFile = mstrLogFile
   cCloneStep.ErrorFile = mstrErrorFile
   cCloneStep.IteratorName = mstrIteratorName

   cCloneStep.IndOperation = mintOperation
   cCloneStep.Position = mlngPosition

   Set cCloneStep.NodeDB = mdbsDatabase

   ' Clone all the iterators for the step
   For lngIndex = 0 To mcIterators.Count - 1
      Set cItRec = mcIterators(lngIndex)
      Set cItClone = cItRec.Clone
      cCloneStep.LoadIterator cItClone
   Next lngIndex

   ' And set the return value to the newly created
step
   Set Clone = cCloneStep

   Exit Function

CloneErr:
   LogErrors Errors
   mstrSource = mstrModuleName & "Clone"
   On Error GoTo 0
   Err.Raise vbObjectError + errCloneFailed, _
         mstrSource, LoadResString(errCloneFailed)

End Function
'End Sub
'
Public Property Let OutputFile(ByVal vdata As
String)
```

```
    mstrOutputFile = vdata

End Property

Public Property Get OutputFile() As String

    OutputFile = mstrOutputFile

End Property

'Public Property Let LogFile(ByVal vdata
As String)
'
'    mstrLogFile = vdata
'
'End Property
'
'Public Property Get LogFile() As String
'
'    LogFile = mstrLogFile
'
'End Property

Public Property Let ErrorFile(ByVal vdata
As String)

    mstrErrorFile = vdata

End Property
Public Property Let IteratorName(ByVal
vdata As String)

    mstrIteratorName = vdata

End Property

Public Property Get ErrorFile() As String

    ErrorFile = mstrErrorFile

End Property
Public Property Get IteratorName() As
String

    IteratorName = mstrIteratorName

End Property

Public Property Set NodeDB(vdata As
Database)

    Set mdbsDatabase = vdata
    Set mcIterators.NodeDB = vdata

End Property
Public Property Get NodeDB() As Database

    Set NodeDB = mdbsDatabase

End Property

Private Function IsStringEmpty(strToCheck
As String) As Boolean

    IsStringEmpty = (strToCheck =
gstrEmptyString)

End Function

Public Property Let EnabledFlag(ByVal
vdata As Boolean)

    ' The enabled flag must be False for all
global steps.
    ' This check must be made by the global step
class. Only
    ' generic step validations will be carried out
by this
    ' class
    mblnEnabledFlag = vdata

End Property

Public Property Let GlobalFlag(ByVal vdata
As Boolean)

    mblnGlobalFlag = vdata

End Property
Public Property Get EnabledFlag() As Boolean

    EnabledFlag = mblnEnabledFlag

End Property

Public Property Let ArchivedFlag(ByVal vdata
As Boolean)

    mblnArchivedFlag = vdata

End Property

Public Property Get ArchivedFlag() As
Boolean

    ArchivedFlag = mblnArchivedFlag

End Property

Public Property Get GlobalFlag() As Boolean

    GlobalFlag = mblnGlobalFlag

End Property

Public Sub Add()
    ' Inserts a step record into the database - it
initializes
    ' the necessary properties for the step and
calls InsertStepRec
    ' to do the database work

    On Error GoTo AddErr

    ' A new record would have the deleted_flag
turned off!
    mblnArchivedFlag = False

    Call InsertStepRec

    ' If a new version of a step has been created,
reset the old version info, since
    ' it's already been saved to the db
    If IsNewVersion() Then
        mbIsNewVersion = False
        msOldVersion = gstrEmptyString
    End If

    Exit Sub

AddErr:
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError +
errAddStepFailed, _
            mstrModuleName & "Add",
LoadResString(errAddStepFailed)
End Sub
Private Sub InsertStepRec()
    ' Inserts a step record into the database
    ' It first generates the insert statement using the
different
    ' step properties and then executes it

    Dim strInsert As String
    Dim qy As DAO.QueryDef

    On Error GoTo InsertStepRecErr

    ' First check if the database object is valid
    Call CheckDB

    ' Check if the step record is valid
    Call Validate

    If IsNewVersion() Then
        Call UpdOldVersionsArchFlg
    End If

    ' Create a temporary querydef object
    strInsert = "insert into att_steps " & _
        "( workspace_id, step_id, version_no, " & _
        " step_label, step_file_name, step_text,
start_directory, " & _
        " parent_step_id, parent_version_no,
sequence_no, " & _
        " enabled_flag, step_level, " & _
        " degree_parallelism, execution_mechanism, "
& _
        " failure_details, " & _
        " continuation_criteria, global_flag, " & _
        " archived_flag, " & _
        " output_file_name, error_file_name, " & _
        " iterator_name ) values ( "

    ' log_file_name,

#If USE_JET Then

    strInsert = strInsert & " [w_id], [s_id], [ver_no], "
& _
        " [s_label], [s_file_name], [s_text],
[s_start_dir], " & _
        " [p_step_id], [p_version_no], [seq_no], " & _
        " [enabled], [s_level], [deg_parallelism], " & _
        " [exec_mechanism], [fail_dtls], " & _
        " [cont_criteria], [global], [archived], " & _
        " [output_file], [error_file], " & _
        " [it_name] ) "

    ' [log_file],

    Set qy =
mdbsDatabase.CreateQueryDef(gstrEmptyString,
strInsert)

    ' Call a procedure to execute the Querydef object
    Call AssignParameters(qy)

    qy.Execute dbFailOnError
    qy.Close
#Else

        strInsert = strInsert & Str(mlngWorkspaceId)
& ", " & Str(mlngStepId) & _
        ", " &
mFieldValue.MakeStringFieldValid(mstrVersionNo
)

    ' For fields that may be null, call a function to
determine
    ' the string to be appended to the insert statement
    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrStepLabel)
```

```
    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrSte
pTextFile)
    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrSte
pText)
    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrSta
rtDir)

    strInsert = strInsert & ", " &
Str(mlngParentStepId) & _
        ", " &
mFieldValue.MakeStringFieldValid(mstrPar
entVersionNo) & _
        ", " & Str(mintSequenceNo) & _
        ", " & Str(mblnEnabledFlag) & ", " &
Str(mintStepLevel)

    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrDe
greeParallelism)
    strInsert = strInsert & ", " &
Str(mintExecutionMechanism)

    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrFai
lureDetails) & _
        ", " & Str(mintContinuationCriteria) &
_
        ", " & Str(mblnGlobalFlag) & _
        ", " & Str(mblnArchivedFlag)

    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrOu
tputFile)
'    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrLo
gFile)
    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrErr
orFile)
    strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrIter
atorName)

    strInsert = strInsert & " ) "

    BugMessage strInsert
    mdbsDatabase.Execute strInsert,
dbFailOnError

#End If

    Exit Sub

InsertStepRecErr:
    mstrSource = mstrModuleName &
"InsertStepRec"
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError +
errInsertStepFailed, _
          mstrSource,
LoadResString(errInsertStepFailed)
End Sub
Private Sub UpdOldVersionsArchFlg()
    ' Updates the archived flag on all old
version for the step to True

    Dim sUpdate As String
    Dim qy As DAO.QueryDef

    On Error GoTo
UpdOldVersionsArchFlgErr

    mstrSource = mstrModuleName &
"UpdOldVersionsArchFlg"

#If USE_JET Then

    sUpdate = "update att_steps " & _
        " set archived_flag = True "

    ' Append the Where clause
    sUpdate = sUpdate & " where step_id =
[s_id] " & _
        " and version_no <> [ver_no]"

    Set qy =
mdbsDatabase.CreateQueryDef(gstrEmptyStri
ng, sUpdate)

    ' Call a procedure to execute the Querydef
object
    Call AssignParameters(qy)
    qy.Execute dbFailOnError

    If qy.RecordsAffected = 0 Then
        On Error GoTo 0
        Err.Raise vbObjectError +
errModifyStepFailed, _
              mstrSource,
LoadResString(errModifyStepFailed)
    End If

    qy.Close

#Else

    sUpdate = "update att_steps " & _
        " set archived_flag = True "

    sUpdate = sUpdate & " where step_id = " &
Str(mlngStepId) & _
        " and version_no <> " &
mFieldValue.MakeStringFieldValid(mstrVersi
onNo)

    BugMessage sUpdate
    mdbsDatabase.Execute sUpdate,
dbFailOnError
#End If

    Exit Sub

UpdOldVersionsArchFlgErr:
    mstrSource = mstrModuleName &
"UpdOldVersionsArchFlg"
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError +
errModifyStepFailed, _
          mstrSource,
LoadResString(errModifyStepFailed)
End Sub
Public Sub InsertIterator(cItRecord As
cIterator)
    ' Inserts the iterator record into the database

    Call cItRecord.Add(mlngStepId,
mstrVersionNo)

End Sub
Public Sub UpdateIterator(cItRecord As
cIterator)
    ' Updates the iterator record in the database

    Call cItRecord.Update(mlngStepId,
mstrVersionNo)

End Sub
Public Sub UpdateIteratorVersion()
    ' Updates the iterator record in the database

    Dim lngIndex As Long
    Dim cTempIt As cIterator

    On Error GoTo UpdateIteratorVersionErr

    For lngIndex = 0 To mcIterators.Count - 1
        ' Increase the array dimension and add the
constraint
        ' to it
        Set cTempIt = mcIterators(lngIndex)

        If cTempIt.IndOperation <> DeleteOp Then
            ' Set the operation to indicate an insert
            cTempIt.IndOperation = InsertOp
        End If

    Next lngIndex

    Exit Sub

UpdateIteratorVersionErr:
    mstrSource = mstrModuleName &
"UpdateIteratorVersion"
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError + errUpdateFailed, _
          mstrSource,
LoadResString(errUpdateFailed)

End Sub
Public Sub AddIterator(cItRecord As cIterator)
    ' Adds the iterator record to the collection of
iterators
    ' for the step

    Call mcIterators.Add(cItRecord)

End Sub
Public Sub AddAllIterators()
    ' Sets the indicator variable for all iterators to
insert

    Dim lngIndex As Long

    For lngIndex = 0 To mcIterators.Count - 1
        mcIterators(lngIndex).Validate
        mcIterators(lngIndex).IndOperation = InsertOp
    Next lngIndex

End Sub

Public Sub LoadIterator(cItRecord As cIterator)
    ' Adds the iterator record to the collection of
iterators
    ' for the step

    Call mcIterators.Load(cItRecord)

End Sub
Public Sub UnloadIterators()
    ' Unloads all iterator records for the step

    Dim lngIndex As Long

    For lngIndex = mcIterators.Count - 1 To 0 Step -
1
        ' Calls the collection method to unload the
node
        ' from the array
        mcIterators.Unload lngIndex
    Next lngIndex
```

```
End Sub
Public Sub ModifyIterator(cItRecord As
cIterator)
   ' Modifies the iterator record in the
collection

   Call mcIterators.Modify(cItRecord)

End Sub
Public Sub DeleteIterator(cItRecord As
cIterator)
   ' Deletes the iterator record from the
database

   Call cItRecord.Delete(mlngStepId,
mstrVersionNo)

End Sub
Public Sub RemoveIterator(cItRecord As
cIterator)
   ' Marks the iterator record in the
collection to
   ' indicate a delete

   Call
mcIterators.Delete(cItRecord.Position)

End Sub


Private Sub AssignParameters(qyExec As
DAO.QueryDef)
   ' Assigns values to the parameters in the
querydef object
   ' The parameter names are cryptic to make
them different
   ' from the actual field names. When the
parameter names
   ' are the same as the field names,
parameters in the
   ' where clause do not get created.

   Dim prmParam As DAO.Parameter

   On Error GoTo AssignParametersErr
   mstrSource = mstrModuleName &
"AssignParameters"

   For Each prmParam In
qyExec.Parameters
      Select Case prmParam.Name
         Case "[w_id]"
            prmParam.Value =
mlngWorkspaceId
         Case "[s_id]"
            prmParam.Value = mlngStepId
         Case "[ver_no]"
            prmParam.Value =
mstrVersionNo
         Case "[s_label]"
            prmParam.Value = mstrStepLabel
         Case "[s_file_name]"
            prmParam.Value =
mstrStepTextFile
         Case "[s_text]"
            prmParam.Value = mstrStepText
         Case "[s_start_dir]"
            prmParam.Value = mstrStartDir
         Case "[p_step_id]"
            prmParam.Value =
mlngParentStepId
         Case "[p_version_no]"
            prmParam.Value =
mstrParentVersionNo
         Case "[seq_no]"
            prmParam.Value = mintSequenceNo
         Case "[enabled]"
            prmParam.Value = mblnEnabledFlag
         Case "[s_level]"
            prmParam.Value = mintStepLevel
         Case "[deg_parallelism]"
            prmParam.Value =
mstrDegreeParallelism
         Case "[exec_mechanism]"
            prmParam.Value =
mintExecutionMechanism
         Case "[fail_dtls]"
            prmParam.Value =
mstrFailureDetails
         Case "[cont_criteria]"
            prmParam.Value =
mintContinuationCriteria
         Case "[global]"
            prmParam.Value = mblnGlobalFlag
         Case "[archived]"
            prmParam.Value =
mblnArchivedFlag
         Case "[output_file]"
            prmParam.Value = mstrOutputFile
'         Case "[log_file]"
'            prmParam.Value = mstrLogFile
         Case "[error_file]"
            prmParam.Value = mstrErrorFile
         Case "[it_name]"
            prmParam.Value = mstrIteratorName
         Case Else
            ' Write the parameter name that is
faulty
            WriteError errInvalidParameter,
mstrSource, _
                  prmParam.Name
            On Error GoTo 0
            Err.Raise errInvalidParameter,
mstrSource, _

LoadResString(errInvalidParameter)
      End Select
   Next prmParam

   If qyExec.Parameters("s_id") = 0 Or
StringEmpty(qyExec.Parameters("ver_no"))
Then
      WriteError errInvalidParameter,
mstrSource
      On Error GoTo 0
      Err.Raise errInvalidParameter,
mstrSource,
LoadResString(errInvalidParameter)
   End If

   Exit Sub

AssignParametersErr:

   mstrSource = mstrModuleName &
"AssignParameters"
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errAssignParametersFailed, _
      mstrSource,
LoadResString(errAssignParametersFailed)

End Sub

Public Sub Modify()

   Dim strUpdate As String
   Dim qy As QueryDef

   On Error GoTo ModifyErr
   mstrSource = mstrModuleName & "Modify"

   ' Check if the database object is valid
   Call CheckDB

   ' Check if the step record is valid
   Call Validate

   ' The step_id and version_no will never be
updated -
   ' whenever a step is modified a copy of the old
step will
   ' be created with an incremented version_no

#If USE_JET Then

   strUpdate = "update att_steps " & _
      " set step_label = [s_label] " & _
      " , step_file_name = [s_file_name] " & _
      " , step_text = [s_text] " & _
      " , start_directory = [s_start_dir] " & _
      " , workspace_id = [w_id] " & _
      " , parent_step_id = [p_step_id] " & _
      " , parent_version_no = [p_version_no] " & _
      " , sequence_no = [seq_no] " & _
      " , step_level = [s_level] " & _
      " , enabled_flag = [enabled] " & _
      " , degree_parallelism = [deg_parallelism] " &
_
      " , execution_mechanism = [exec_mechanism]
" & _
      " , failure_details = [fail_dtls] " & _
      " , continuation_criteria = [cont_criteria] " & _
      " , global_flag = [global] " & _
      " , archived_flag = [archived] " & _
      " , output_file_name = [output_file] " & _
      " , error_file_name = [error_file] " & _
      " , iterator_name = [it_name] "

      ' " , log_file_name = [log_file] " & _

   ' Append the Where clause
   strUpdate = strUpdate & " where step_id = [s_id]
" & _
      " and version_no = [ver_no]"

   Set qy =
mdbsDatabase.CreateQueryDef(gstrEmptyString,
strUpdate)

   ' Call a procedure to execute the Querydef object
   Call AssignParameters(qy)
   qy.Execute dbFailOnError

   If qy.RecordsAffected = 0 Then
      On Error GoTo 0
      Err.Raise vbObjectError +
errModifyStepFailed, _
            mstrSource,
LoadResString(errModifyStepFailed)
   End If

   qy.Close

#Else

   strUpdate = "update att_steps " & _
      " set step_label = "

   ' For fields that may be null, call a function to
determine
   ' the string to be appended to the update statement
```

```
    strUpdate = strUpdate &
mFieldValue.MakeStringFieldValid(mstrSte
pLabel)

    strUpdate = strUpdate & " ,
step_file_name = " &
mFieldValue.MakeStringFieldValid(mstrSte
pTextFile)
    strUpdate = strUpdate & " , step_text = "
&
mFieldValue.MakeStringFieldValid(mstrSte
pText)
    strUpdate = strUpdate & " ,
start_directory = " &
mFieldValue.MakeStringFieldValid(mstrSta
rtDir)

    strUpdate = strUpdate & " , workspace_id
= " & Str(mlngWorkspaceId) & _
        " , parent_step_id = " &
Str(mlngParentStepId) & _
        " , parent_version_no = " &
mFieldValue.MakeStringFieldValid(mstrPar
entVersionNo) & _
        " , sequence_no = " &
Str(mintSequenceNo) & _
        " , step_level = " & Str(mintStepLevel)
& _
        " , enabled_flag = " &
Str(mblnEnabledFlag) & _
        " , degree_parallelism = " &
mFieldValue.MakeStringFieldValid(mstrDe
greeParallelism) & _
        " , execution_mechanism = " &
Str(mintExecutionMechanism) & _
        " , failure_details = " &
mFieldValue.MakeStringFieldValid(mstrFai
lureDetails) & _
        " , continuation_criteria = " &
Str(mintContinuationCriteria) & _
        " , global_flag = " &
Str(mblnGlobalFlag) & _
        " , archived_flag = " &
Str(mblnArchivedFlag) & _
        " , output_file_name = " &
mFieldValue.MakeStringFieldValid(mstrOu
tputFile) & _
        " , error_file_name = " &
mFieldValue.MakeStringFieldValid(mstrErr
orFile) & _
        " , iterator_name = " &
mFieldValue.MakeStringFieldValid(mstrIter
atorName)

'       " , log_file_name = " &
mFieldValue.MakeStringFieldValid(mstrLo
gFile) & _

    strUpdate = strUpdate & " where step_id
= " & Str(mlngStepId) & _
        " and version_no = " &
mFieldValue.MakeStringFieldValid(mstrVe
rsionNo)

    BugMessage strUpdate
    mdbsDatabase.Execute strUpdate,
dbFailOnError
#End If

    Exit Sub

ModifyErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"Modify"
    On Error GoTo 0
    Err.Raise vbObjectError +
errModifyStepFailed, _
            mstrSource,
LoadResString(errModifyStepFailed)
End Sub
Private Sub CheckDB()
    ' Check if the database object has been
initialized

    If mdbsDatabase Is Nothing Then
        ShowError errInvalidDB
        On Error GoTo 0
        Err.Raise vbObjectError + errInvalidDB,
_
            mstrModuleName,
LoadResString(errInvalidDB)
    End If

End Sub

Public Sub Delete()

    Dim strDelete As String
    Dim qy As DAO.QueryDef

    On Error GoTo DeleteErr

    Call CheckDB

    strDelete = "delete from att_steps " & _
            " where step_id = [s_id] " & _
            " and version_no = [ver_no] "
'    mdbsDatabase.Execute strDelete,
dbFailOnError
    Set qy =
mdbsDatabase.CreateQueryDef(gstrEmptyStri
ng, strDelete)

    Call AssignParameters(qy)
    qy.Execute dbFailOnError

    qy.Close

    Exit Sub

DeleteErr:
    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError +
errDeleteStepFailed, _
            mstrModuleName & "Delete",
LoadResString(errDeleteStepFailed)
End Sub
Public Property Get DegreeParallelism() As
String

    DegreeParallelism = mstrDegreeParallelism

End Property
Public Property Get Position() As Long

    Position = mlngPosition

End Property

Public Property Let DegreeParallelism(ByVal
vdata As String)

    ' The degree of parallelism must be zero for
all global steps
    ' This check must be made by the global step
class. Only
    ' generic step validations will be carried out
by this
    ' class
    mstrDegreeParallelism = vdata

End Property

Public Property Let ExecutionMechanism(ByVal
vdata As ExecutionMethod)

    BugAssert vdata = gintExecuteODBC Or vdata =
gintExecuteShell Or vdata = gintNoOption, _
            "Execution mechanism invalid"
    mintExecutionMechanism = vdata

End Property

Public Property Let FailureDetails(ByVal vdata As
String)

    mstrFailureDetails = vdata

End Property
Public Property Let SequenceNo(ByVal vdata As
Integer)
    mintSequenceNo = vdata
End Property

Public Property Let Position(ByVal vdata As Long)
    mlngPosition = vdata
End Property

Public Property Let ParentStepId(ByVal vdata As
Long)
    mlngParentStepId = vdata
End Property

Public Property Get SequenceNo() As Integer

    SequenceNo = mintSequenceNo

End Property

Public Property Get StepLevel() As Integer
    StepLevel = mintStepLevel
End Property

Public Property Get ParentVersionNo() As String
    ParentVersionNo = mstrParentVersionNo
End Property

Public Property Let ParentVersionNo(ByVal vdata
As String)
    mstrParentVersionNo = vdata
End Property

Public Property Get ParentStepId() As Long
    ParentStepId = mlngParentStepId
End Property

Public Property Let WorkspaceId(ByVal vdata As
Long)
    mlngWorkspaceId = vdata
End Property

Public Property Let VersionNo(ByVal vdata As
String)
    ' The version number of a step is stored in the x.y
format where
    ' x represents a change to the step as a result of
modifications
    ' to any of the step properties
    ' y represents a change to the step as a result of
modifications
    ' to the sub-steps associated with it. Hence the y-
component
```

```
    ' of the version will be incremented when
a sub-step is added,
    ' modified or deleted
    ' x will be referred to throughout this code
as the parent
    ' component of the version and y will be
referred to as the
    ' child component of the version
    ' The version information for a step is
maintained by the
    ' calling function

    mstrVersionNo = vdata

End Property

Public Property Get StepType() As
gintStepType

    On Error GoTo StepTypeErr

    If mintStepType = 0 Then
        ' The step type variable has not been
initialized -
        If mblnGlobalFlag Then
            mintStepType = gintGlobalStep
        ElseIf IsStringEmpty(mstrStepText)
And _
                IsStringEmpty(mstrStepTextFile)
Then
            mintStepType = gintManagerStep
        Else
            mintStepType = gintWorkerStep
        End If
    End If

    StepType = mintStepType

    Exit Property

StepTypeErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"StepType"
    On Error GoTo 0
    Err.Raise vbObjectError +
errGetStepTypeFailed, _
            mstrSource, _

LoadResString(errGetStepTypeFailed)

End Property

Public Property Let StepType(vdata As
gintStepType)

    On Error GoTo StepTypeErr

    Select Case vdata
        Case gintGlobalStep, gintManagerStep,
gintWorkerStep
            mintStepType = vdata

        Case Else
            On Error GoTo 0
            Err.Raise vbObjectError +
errStepTypeInvalid, _
                    mstrModuleName &
"StepType",
LoadResString(errStepTypeInvalid)
    End Select
    Exit Property

StepTypeErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"StepType"
    On Error GoTo 0
    Err.Raise vbObjectError +
errLetStepTypeFailed, _
            mstrSource, _
            LoadResString(errLetStepTypeFailed)

End Property

Public Property Get WorkspaceId() As Long
    WorkspaceId = mlngWorkspaceId
End Property

Public Property Get ContinuationCriteria() As
ContinuationCriteria

    ContinuationCriteria =
mintContinuationCriteria

End Property

Public Property Let
ContinuationCriteria(ByVal vdata As
ContinuationCriteria)

    ' The Continuation criteria must be null for
all global steps
    ' and non-null for all manager and worker
steps
    ' These checks will have to be made by the
corresponding
    ' classes - only generic step validations will
be made
    ' by this class
    BugAssert vdata =
gintOnFailureAbortSiblings Or vdata =
gintOnFailureCompleteSiblings _
                Or vdata =
gintOnFailureSkipSiblings Or vdata =
gintOnFailureAbort _
                Or vdata = gintOnFailureContinue
Or vdata = gintOnFailureAsk _
                Or vdata = gintNoOption, _
                "Invalid continuation criteria"
    mintContinuationCriteria = vdata

End Property
Public Property Get ExecutionMechanism() As
ExecutionMethod

    ExecutionMechanism =
mintExecutionMechanism

End Property


Public Property Get FailureDetails() As String

    FailureDetails = mstrFailureDetails

End Property

Public Property Let StepText(ByVal vdata As
String)
    ' Has to be null for manager steps
    ' The check will have to be made by the user
interface or
    ' by the manager step class
    mstrStepText = vdata
End Property
Public Property Let StepLevel(ByVal vdata As
Integer)
    ' The step level must be zero for all global steps
    ' This check must be made in the global step class
    mintStepLevel = vdata

End Property
Public Property Get StepText() As String
    StepText = mstrStepText
End Property

Public Property Let StepTextFile(ByVal vdata As
String)
    ' Has to be null for manager steps
    ' The check will have to be made by the user
interface and
    ' by the manager step class
    mstrStepTextFile = vdata
End Property

Public Property Get StepTextFile() As String
    StepTextFile = mstrStepTextFile
End Property

Public Property Let StepLabel(ByVal vdata As
String)
    ' Cannot be null for manager steps
    ' But this check cannot be made here since we do
not know
    ' at this point if the step being created is a
manager
    ' or a worker step
    ' The check will have to be made by the user
interface and
    ' by the manager step class
    mstrStepLabel = vdata
End Property

Public Property Get StepLabel() As String
    StepLabel = mstrStepLabel
End Property

Public Property Let StartDir(ByVal vdata As
String)
    mstrStartDir = vdata
End Property

Public Property Get StartDir() As String
    StartDir = mstrStartDir
End Property

Public Property Get VersionNo() As String
    ' The version number of a step is stored in the x.y
format where
    ' x represents a change to the step as a result of
modifications
    ' to any of the step properties
    ' y represents a change to the step as a result of
modifications
    ' to the sub-steps associated with it. Hence the y-
component
    ' of the version will be incremented when a sub-
step is added,
    ' modified or deleted
    ' x will be referred to throughout this code as the
parent
    ' component of the version and y will be referred
to as the
    ' child component of the version
    ' The version information for a step is maintained
by the
    ' calling function

    VersionNo = mstrVersionNo

End Property
```

```
Public Property Get StepId() As Long

   StepId = mlngStepId

End Property
Public Property Get NextStepId() As Long

   Dim lngNextId As Long

   On Error GoTo NextStepIdErr

   ' First check if the database object is valid
   Call CheckDB

   ' Retrieve the next identifier using the
sequence class
   Set mStepSeq = New cSequence
   Set mStepSeq.IdDatabase =
mdbsDatabase
   mStepSeq.IdentifierColumn = "step_id"
   lngNextId = mStepSeq.Identifier
   Set mStepSeq = Nothing

   NextStepId = lngNextId
   Exit Property

NextStepIdErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"NextStepId"
   On Error GoTo 0
   Err.Raise vbObjectError +
errStepIdGetFailed, _
      mstrSource,
LoadResString(errStepIdGetFailed)

End Property
Public Property Let StepId(ByVal vdata As
Long)

   mlngStepId = vdata

End Property

Private Sub Class_Initialize()

   ' Initialize the operation indicator variable
to Query
   ' It will be modified later by the collection
class when
   ' inserts, updates or deletes are performed
   mintOperation = QueryOp
   mbIsNewVersion = False
   msOldVersion = gstrEmptyString

   Set mFieldValue = New cStringSM
   Set mcIterators = New cNodeCollections

End Sub

Private Sub Class_Terminate()

   Set mFieldValue = Nothing
   Set mcIterators = Nothing

End Sub


VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cStepTree"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:       cStepTree.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    Implements step navigation
functions such as determining
'             the child of a step and so on.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this class
Private Const mstrModuleName As String =
"cStepTree."
Private mstrSource As String

Public StepRecords As cArrSteps
Public Property Get HasChild(Optional ByVal
StepKey As String, _
      Optional ByVal StepId As Long = 0) As
Boolean

   Dim lTemp As Long

   HasChild = False
   StepId = GetStepId(StepKey, StepId)

   For lTemp = 0 To StepRecords.StepCount -
1
      If StepRecords(lTemp).StepType <>
gintGlobalStep And
StepRecords(lTemp).ParentStepId = StepId
Then
         HasChild = True
         Exit For
      End If
   Next lTemp

End Property
Public Property Get ChildStep(Optional ByVal
StepKey As String, _
      Optional ByVal StepId As Long = 0) As
cStep

   Dim lTemp As Long

   Set ChildStep = Nothing
   StepId = GetStepId(StepKey, StepId)

   For lTemp = 0 To StepRecords.StepCount -
1
      If StepRecords(lTemp).StepType <>
gintGlobalStep And
StepRecords(lTemp).ParentStepId = StepId
And _
            StepRecords(lTemp).SequenceNo =
gintMinSequenceNo Then
         Set ChildStep = StepRecords(lTemp)
         Exit For
      End If
   Next lTemp

End Property
Public Property Get NextStep(Optional ByVal
StepKey As String, _
      Optional ByVal StepId As Long = 0) As
cStep

   Dim lTemp As Long
   Dim cChildStep As cStep

   Set NextStep = Nothing
   StepId = GetStepId(StepKey, StepId)
   Set cChildStep = StepRecords.QueryStep(StepId)

   For lTemp = 0 To StepRecords.StepCount - 1
      If StepRecords(lTemp).StepType <>
gintGlobalStep And _
         StepRecords(lTemp).ParentStepId =
cChildStep.ParentStepId And _
         StepRecords(lTemp).SequenceNo =
cChildStep.SequenceNo + 1 Then
         Set NextStep = StepRecords(lTemp)
         Exit For
      End If
   Next lTemp

End Property
Private Function GetStepId(Optional ByVal
StepKey As String, _
      Optional ByVal StepId As Long = 0) As Long
   If StepId = 0 Then
      If StringEmpty(StepKey) Then
         Err.Raise vbObjectError +
errMandatoryParameterMissing, _
            mstrModuleName & "GetStepId",
LoadResString(errMandatoryParameterMissing)
      Else
         GetStepId = IIf(IsLabel(StepKey), 0,
MakeIdentifierValid(StepKey))
      End If
   Else
      GetStepId = StepId
   End If
End Function
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cStringSM"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:       cStringSM.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    This module contains common
procedures that can be used
'             to manipulate strings
'             It is called StringSM, since String is a
Visual Basic keyword
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name when
errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cStringSM."

Private mstrText As String

Private Const mstrNullValue = "null"
Private Const mstrSQ = """
Private Const mstrEnvVarSeparator = "%"
Public Function InsertEnvVariables( _
```

```
      Optional ByVal strComString As
String) As String
   ' This function replaces all environment
variables in
   ' the passed in string with their values -
they are
   ' enclosed by "%"

   Dim intPos As Integer
   Dim intEndPos As Integer
   Dim strEnvVariable As String
   Dim strValue As String
   Dim strCommand As String

   On Error GoTo InsertEnvVariablesErr
   mstrSource = mstrModuleName &
"InsertEnvVariables"

   ' Initialize the return value of the function
to the
   ' passed in command
   If IsStringEmpty(strComString) Then
      strCommand = mstrText
   Else
      strCommand = strComString
   End If

   intPos = InStr(strCommand,
mstrEnvVarSeparator)
   Do While intPos <> 0
      ' Extract the environment variable from
the passed
      ' in string
      intEndPos = InStr(intPos + 1,
strCommand, mstrEnvVarSeparator)
      strEnvVariable = Mid(strCommand,
intPos + 1, intEndPos - intPos - 1)

      ' Get the value of the variable and call a
function
      ' to replace the variable with it's value
      strValue = Environ$(strEnvVariable)
      strCommand =
ReplaceSubString(strCommand, _
            mstrEnvVarSeparator &
strEnvVariable & mstrEnvVarSeparator, _
            strValue)

      intPos = InStr(strCommand,
mstrEnvVarSeparator)
   Loop

   InsertEnvVariables = strCommand
   Exit Function

InsertEnvVariablesErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   ' Return an empty string
   InsertEnvVariables = gstrEmptyString

End Function
Public Function MakeStringFieldValid( _
      Optional strField As String =
gstrEmptyString) As String
   ' Returns a string that can be appended to
any insert
   ' or modify (sql) statement
   ' If an argument is not passed to this
function, the
   ' default text property is used

   Dim strTemp As String
   On Error GoTo MakeStringFieldValidErr

   If IsStringEmpty(strField) Then
      strTemp = mstrText
   Else
      strTemp = strField
   End If

   ' It checks whether the text is empty
   ' If so, it returns the string, "null"
   If IsStringEmpty(strTemp) Then
      MakeStringFieldValid = mstrNullValue
   Else
      ' Single-quotes have to be replaced by two
single-quotes,
      ' since a single-quote is the identifier
delimiter
      ' character - call a procedure to do the
replace
      strTemp = ReplaceSubString(strTemp,
mstrSQ, mstrSQ & mstrSQ)

      ' Replace pipe characters with the
corresponding chr function
      strTemp = ReplaceSubString(strTemp, "|",
'" & Chr(124) & "')

      ' Enclose the string in single quotes
      MakeStringFieldValid = mstrSQ &
strTemp & mstrSQ

   End If

   Exit Function

MakeStringFieldValidErr:
   mstrSource = mstrModuleName &
"MakeStringFieldValid"
   LogErrors Errors
   On Error GoTo 0
   Err.Raise vbObjectError +
errMakeFieldValidFailed, _
         mstrSource,
LoadResString(errMakeFieldValidFailed)

End Function
Public Function MakeDateFieldValid( _
      Optional dtmField As Date = gdtmEmpty)
As String
   ' Returns a string that can be appended to
any insert
   ' or modify (sql) statement

   ' Enclose the date in single quotes
   MakeDateFieldValid = mstrSQ & dtmField
& mstrSQ

End Function

Private Function IsStringEmpty(strToCheck
As String) As Boolean

   If strToCheck = gstrEmptyString Then
      IsStringEmpty = True
   Else
      IsStringEmpty = False
   End If

End Function
Public Function ReplaceSubString(ByVal
MainString As String, _
      ByVal ReplaceString As String, _
      ByVal ReplaceWith As String) As String
   ' Replaces all occurrences of ReplaceString in
MainString with ReplaceWith

   Dim intPos As Integer
   Dim strTemp As String

   On Error GoTo ReplaceSubStringErr

   strTemp = MainString

   intPos = InStr(strTemp, ReplaceString)
   Do While intPos <> 0
      strTemp = Left(strTemp, intPos - 1) &
ReplaceWith & _
            Mid(strTemp, intPos +
Len(ReplaceString))
      intPos = InStr(intPos + Len(ReplaceString) +
1, strTemp, ReplaceString)
   Loop
   ReplaceSubString = strTemp

   Exit Function

ReplaceSubStringErr:
   Call LogErrors(Errors)
   mstrSource = mstrModuleName &
"ReplaceSubString"
   On Error GoTo 0
   Err.Raise vbObjectError + errParseStringFailed,
_
      mstrSource, _
      LoadResString(errParseStringFailed)

End Function

Public Property Get Text() As String
Attribute Text.VB_UserMemId = 0
   Text = mstrText
End Property

Public Property Let Text(ByVal vdata As String)
   mstrText = vdata
End Property

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cSubStep"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cSubStep.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This module encapsulates the
properties of sub-steps
'              that are used during the execution of a
workspace.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name when
errors
' are raised by this class
Private Const mstrModuleName As String =
"cSubStep"

Private mlngStepId As Long
```

```
Private mintRunning As Integer ' Number of
running tasks
Private mintComplete As Integer ' Number
of completed tasks
' The last iterator for this sub-step
Private mcLastIterator As cRunItDetails

Public Function NewIteration(cStepRec As
cStep) As cIterator
   ' Calls a procedure to determine the next
iterator value
   ' for the passed in step - returns the value
to be used
   ' in the iteration.
   ' It updates the instance node with the new
iteration
   ' for the step.

   Dim cItRec As cIterator

   On Error GoTo NewIterationErr

   ' Call a function that will populate an
iterator record
   ' with the iterator values
   Set cItRec = NextIteration(cStepRec)

   ' Initialize the run node with the new
iterator
   ' values
   If Not mcLastIterator Is Nothing Then
      If cItRec Is Nothing Then
         mcLastIterator.Value =
gstrEmptyString
      Else
         mcLastIterator.Value = cItRec.Value

         ' And if the iterator is a list of values,
then update
         ' the sequence number as well
         If mcLastIterator.IteratorType =
gintValue Then
            mcLastIterator.Sequence =
cItRec.SequenceNo
         End If
      End If
   End If

   Set NewIteration = cItRec
   Set cItRec = Nothing

   Exit Function

NewIterationErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errIterateFailed, mstrModuleName, _
      LoadResString(errIterateFailed)

End Function
Public Function NextIteration(cStepRec As
cStep) As cIterator

   ' Retrieves the next iterator value for the
passed in step -
   ' returns an iterator record with the new
iterator values

   Dim cItRec As cIterator
   Dim vntIterators As Variant
   Dim lngValue As String

   On Error GoTo NextIterationErr

   vntIterators = cStepRec.Iterators

   If Not mcLastIterator Is Nothing Then
      ' The run node contains the iterator details
      ' Get the next value for the iterator
      If mcLastIterator.IteratorType = gintValue
Then
         ' Find the next iterator that appears in
the list of
         ' iterator values
         Set cItRec =
NextInSequence(vntIterators,
mcLastIterator.Sequence)
      Else
         lngValue =
CLng(Trim$(mcLastIterator.Value))
         ' Determine whether the new iterator
value falls in the
         ' range between From and To
         If (mcLastIterator.RangeStep > 0 And _
               (mcLastIterator.RangeFrom <=
mcLastIterator.RangeTo) And _
               (mcLastIterator.RangeStep +
lngValue) <= mcLastIterator.RangeTo) Or _
               (mcLastIterator.RangeStep < 0
And _
               (mcLastIterator.RangeFrom >=
mcLastIterator.RangeTo) And _
               (mcLastIterator.RangeStep +
lngValue) >= mcLastIterator.RangeTo) Then
            Set cItRec = New cIterator
            cItRec.Value =
Trim$(CStr(mcLastIterator.RangeStep +
lngValue))
         Else
            Set cItRec = Nothing
         End If
      End If
   Else
      Set cItRec = Nothing
   End If

   Set NextIteration = cItRec
   Exit Function

NextIterationErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError + errIterateFailed,
mstrModuleName, _
      LoadResString(errIterateFailed)

End Function
Public Sub InitializeIt(cPendingStep As cStep,
_
      ColParameters As cArrParameters, _
      Optional vntIterators As Variant)

   ' Initializes the LastIteration structure with
the iterator details for the
   ' passed in step

   On Error GoTo InitializeItErr

   If IsMissing(vntIterators) Then
      vntIterators = cPendingStep.Iterators
   End If

   If IsArray(vntIterators) And Not
IsEmpty(vntIterators) Then
      mcLastIterator.IteratorName =
cPendingStep.IteratorName
      If
vntIterators(LBound(vntIterators)).IteratorType = _
            gintValue Then
         mcLastIterator.IteratorType = gintValue
         ' Since the sequence numbers begin at 0
         mcLastIterator.Sequence =
gintMinIteratorSequence - 1
      Else
         mcLastIterator.IteratorType = gintFrom
         Call InitializeItRange(vntIterators,
cPendingStep.WorkspaceId, _
               ColParameters)
      End If
   Else
      Set mcLastIterator = Nothing
   End If

   Exit Sub

InitializeItErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError + errIterateFailed,
mstrModuleName, _
      LoadResString(errIterateFailed)

End Sub

Private Sub InitializeItRange(vntIterators As
Variant, ByVal lWorkspace As Long, _
      ColParameters As cArrParameters)

   ' Initializes the LastIteration structure for range
iterators from the
   ' passed in variant containing the iterator records

   Dim lngIndex As Long
   Dim cItRec As cIterator

   On Error GoTo InitializeItRangeErr

   If IsArray(vntIterators) And Not
IsEmpty(vntIterators) Then

      ' Check if the iterator range has been
completely initialized
      RangeComplete (vntIterators)

      ' Initialize the Run node with the values for the
From,
      ' To and Step boundaries
      For lngIndex = LBound(vntIterators) To
UBound(vntIterators)
         Set cItRec = vntIterators(lngIndex)
         Select Case cItRec.IteratorType
            Case gintFrom
               mcLastIterator.RangeFrom =
SubstituteParameters(cItRec.Value, lWorkspace,
WspParameters:=ColParameters)
            Case gintTo
               mcLastIterator.RangeTo =
SubstituteParameters(cItRec.Value, lWorkspace,
WspParameters:=ColParameters)
            Case gintStep
               mcLastIterator.RangeStep =
SubstituteParameters(cItRec.Value, lWorkspace,
WspParameters:=ColParameters)
            Case Else
               On Error GoTo 0
               Err.Raise vbObjectError +
errTypeInvalid, mstrModuleName, _
                     LoadResString(errTypeInvalid)
         End Select
      Next lngIndex
```

```
      mcLastIterator.Value =
Trim$(CStr(mcLastIterator.RangeFrom -
mcLastIterator.RangeStep))
   End If

   Exit Sub

InitializeItRangeErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errIterateFailed, mstrModuleName, _
      LoadResString(errIterateFailed)

End Sub
Private Function
NextInSequence(vntIterators As Variant, _
      lngOldSequence As Long) As cIterator

   Dim lngIndex As Long
   Dim cItRec As cIterator

   On Error GoTo NextInSequenceErr

   If IsArray(vntIterators) And Not
IsEmpty(vntIterators) Then
      For lngIndex = LBound(vntIterators)
To UBound(vntIterators)
         Set cItRec = vntIterators(lngIndex)
         If cItRec.IteratorType <> gintValue
Then
            On Error GoTo 0
            Err.Raise vbObjectError +
errTypeInvalid, mstrModuleName, _

LoadResString(errTypeInvalid)
         End If
         If cItRec.SequenceNo =
lngOldSequence + 1 Then
            Exit For
         End If

      Next lngIndex

      If cItRec.SequenceNo <>
lngOldSequence + 1 Then
         Set cItRec = Nothing
      End If
   Else
      Set cItRec = Nothing
   End If

   Set NextInSequence = cItRec

   Exit Function

NextInSequenceErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errIterateFailed, mstrModuleName, _
      LoadResString(errIterateFailed)

End Function

Public Property Get LastIterator() As
cRunItDetails

   Set LastIterator = mcLastIterator

End Property
Public Property Set LastIterator(vdata As
cRunItDetails)

   Set mcLastIterator = vdata

End Property

Public Property Get TasksRunning() As
Integer

   TasksRunning = mintRunning

End Property

Public Property Let TasksRunning(ByVal
vdata As Integer)

   mintRunning = vdata

End Property

Public Property Get TasksComplete() As
Integer

   TasksComplete = mintComplete

End Property
Public Property Let TasksComplete(ByVal
vdata As Integer)

   mintComplete = vdata

End Property
Public Property Get StepId() As Long

   StepId = mlngStepId

End Property
Public Property Let StepId(ByVal vdata As
Long)

   mlngStepId = vdata

End Property
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cSubSteps"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cSubSteps.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This module provides a type-
safe wrapper around cVector to
'              implement a collection of cSubStep
objects.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private mcSubSteps As cVector

Public Sub Add(ByVal objItem As cSubStep)

   mcSubSteps.Add objItem

End Sub


Public Sub Clear()

   mcSubSteps.Clear

End Sub


Public Function Count() As Long

   Count = mcSubSteps.Count

End Function


Public Function Delete(ByVal lngDelete As Long)
As cSubStep

   Set Delete = mcSubSteps.Delete(lngDelete)

End Function


Public Property Get Item(ByVal Position As Long)
As cSubStep
Attribute Item.VB_UserMemId = 0

   Set Item = mcSubSteps.Item(Position)

End Property

Private Sub Class_Initialize()

   Set mcSubSteps = New cVector

End Sub

Private Sub Class_Terminate()

   Set mcSubSteps = Nothing

End Sub


VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cTermProcess"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cTermProcess.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This module raises an event if a
completed step exists.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private WithEvents moTimer As cTimerSM
Attribute moTimer.VB_VarHelpID = -1
Private bTermProcessExists As Boolean
Public Event TermProcessExists()

Public Sub ProcessTerminated()
```

```
    bTermProcessExists = True
    moTimer.Enabled = True

End Sub

Private Sub Class_Initialize()

    bTermProcessExists = False

    Set moTimer = New cTimerSM
    moTimer.Enabled = False

End Sub

Private Sub Class_Terminate()

    Set moTimer = Nothing

End Sub

Private Sub moTimer_Timer()

    On Error GoTo moTimer_TimerErr

    If bTermProcessExists Then
        RaiseEvent TermProcessExists
    End If

    moTimer.Enabled = False
    bTermProcessExists = False

    Exit Sub

moTimer_TimerErr:
    LogErrors Errors

End Sub

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cTermStep"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:       cTermStep.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    This module encapsulates
the properties of steps that
'             have completed execution such as
status and time of completion.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Public TimeComplete As Currency
Public Index As Long
Public InstanceId As Long
Public ExecutionStatus As InstanceStatus

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cTermSteps"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:       cTermSteps.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    This module provides a type-
safe wrapper around cVector to
'             implement a collection of cTermStep
objects. Raises an
'             event if a step that has completed
execution exists.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Private mcTermSteps As cVector
Private WithEvents moTimer As cTimerSM
Attribute moTimer.VB_VarHelpID = -1
Public Event TermStepExists(cStepDetails As
cTermStep)

Public Sub Add(ByVal citem As cTermStep)

    Call mcTermSteps.Add(citem)
    moTimer.Enabled = True

End Sub

Public Sub Clear()

    mcTermSteps.Clear

End Sub

Public Function Delete()

    Call mcTermSteps.Delete(0)
    ' Disable the timer if there are no more
pending events
    If mcTermSteps.Count = 0 Then
moTimer.Enabled = False

End Function

Public Property Get Item(ByVal Position As
Long) As cTermStep

    Set Item = mcTermSteps(Position)

End Property

Public Function Count() As Long

    Count = mcTermSteps.Count

End Function

Private Sub Class_Initialize()

    Set mcTermSteps = New cVector

    Set moTimer = New cTimerSM
    moTimer.Enabled = False

End Sub

Private Sub Class_Terminate()

    Set mcTermSteps = Nothing
    Set moTimer = Nothing

End Sub

Private Sub moTimer_Timer()

    On Error GoTo moTimer_TimerErr

    If mcTermSteps.Count > 0 Then
        ' Since items are appended to the end of the
array
        RaiseEvent TermStepExists(mcTermSteps(0))
    Else
        moTimer.Enabled = False
    End If
    Exit Sub

moTimer_TimerErr:
    LogErrors Errors

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cTimerSM"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:       cTimer.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    This module implements a timer.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'

Option Explicit

Public Event Timer()

Private Const mnDefaultInterval As Long = 1

Private mnTimerID As Long
Private mnInterval As Long
Private mfEnabled As Boolean

Public Property Get Interval() As Long
    Interval = mnInterval
End Property
Public Property Let Interval(Value As Long)
    If mnInterval <> Value Then
        mnInterval = Value
        If mfEnabled Then
            SetInterval mnInterval, mnTimerID
        End If
    End If
End Property

Public Property Get Enabled() As Boolean
    Enabled = mfEnabled
End Property
Public Property Let Enabled(Value As Boolean)
    If mfEnabled <> Value Then
        If Value Then
            mnTimerID = StartTimer(mnInterval)
            If mnTimerID <> 0 Then
                mfEnabled = True
                'Storing Me in the global would add a
reference to Me, which
                ' would prevent Me from being released,
which in turn would
                ' prevent my Class_Terminate code from
running. To prevent
```

```
            '  this, I store a "soft reference" -
the collection holds a
            '  pointer to me without
incrementing my reference count.
            gcTimerObjects.Add ObjPtr(Me),
Str$(mnTimerID)
         End If
      Else
         StopTimer mnTimerID
         mfEnabled = False
         gcTimerObjects.Remove
Str$(mnTimerID)
      End If
   End If
End Property

Private Sub Class_Initialize()
   If gcTimerObjects Is Nothing Then Set
gcTimerObjects = New Collection
   mnInterval = mnDefaultInterval
End Sub

Private Sub Class_Terminate()
   Enabled = False
End Sub

Friend Sub Tick()
   RaiseEvent Timer
End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cVBErrorsSM"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
Attribute VB_Ext_KEY =
"SavedWithClassBuilder" ,"Yes"
Attribute VB_Ext_KEY = "Top_Level"
,"Yes"
'  FILE:       cVBErrors.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This module encapsulates
the handling of Visual Basic errors.
'              This module does not do any error
handling - any error handler
'              will erase the errors object!
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' The Execute class exposes a method,
WriteError through which we can write to
the
' error log that is currently being used by the
Execute object. Store a reference to
' Execute object locally.
Private mcExecObjRef As
EXECUTEDLLLib.Execute
Public Sub WriteError(ByVal ErrorCode As
errErrorConstants, _
      Optional ByVal ErrorSource As String
= gstrEmptyString, _
      Optional ByVal OptArgs As String =
gstrEmptyString)

   Dim sError As String
   sError = "StepMaster Error:" & ErrorCode
& vbCrLf & LoadResString(ErrorCode) &
vbCrLf

   If Not StringEmpty(ErrorSource) Then
      sError = sError & "(Source: " &
ErrorSource & ")" & vbCrLf
   End If
   sError = sError & OptArgs

   Call LogMessage(sError)

End Sub
Private Function InitErrorString() As String
   ' Initializes a string with all the properties of
the
   ' Err object

   Dim strError As String
   Dim errCode As Long

   If Err.Number = 0 Then
      InitErrorString = gstrEmptyString
   Else
   With Err
      If Err.Number > vbObjectError And
Err.Number < (vbObjectError + 65536) Then
         errCode = .Number - vbObjectError
      Else
         errCode = .Number
      End If
      strError = "Error #: " & errCode &
vbCrLf
      strError = strError & "Description: " &
.Description & vbCrLf
      strError = strError & "Source: " &
Err.Source & vbCrLf
   End With

   Debug.Print strError
   InitErrorString = strError
   End If

End Function
Public Sub LogVBErrors()

   Dim strErr As String

   strErr = InitErrorString

   On Error GoTo LogVBErrorsErr

   If Not StringEmpty(strErr) Then
      ' Write an error using the WriteError
method of the Execute object.
      If Not mcExecObjRef Is Nothing Then
         mcExecObjRef.WriteError strErr
      Else
         WriteMessage strErr
      End If
   End If

   Err.Clear

   Exit Sub

LogVBErrorsErr:
   Call LogErrors(Errors)
   ' Since write to the error file for the step has
failed, write to the project log
   Call WriteMessage(strErr)

End Sub
Public Sub DisplayErrors()

   Dim strErr As String

   strErr = InitErrorString

   If Not StringEmpty(strErr) Then
      ' Display the error message
      MsgBox strErr
   End If

   Err.Clear

End Sub
Public Sub LogMessage(strMsg As String)

   On Error GoTo LogMessageErr

   ' Write an error using the WriteError method of
the Execute object.
   If Not mcExecObjRef Is Nothing Then
      mcExecObjRef.WriteError strMsg
   Else
      WriteMessage strMsg
   End If

   Exit Sub

LogMessageErr:
   Call LogErrors(Errors)
   ' Since write to the error file for the step has
failed, write to the project log
   Call WriteMessage(strMsg)

End Sub
Public Property Set ErrorFile(vdata As
EXECUTEDLLLib.Execute)

   Set mcExecObjRef = vdata

End Property
Private Sub Class_Terminate()

   Set mcExecObjRef = Nothing

End Sub
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cVector"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cVector.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This class implements an array of
objects.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name when
errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cVector."

' Array counter
Private mlngCount As Long
```

```
Private mcarrItems() As Object

Public Sub Add(ByVal objItem As Object)
   ' Adds the passed in Object variable to the
array

   On Error GoTo AddErr

   ReDim Preserve mcarrItems(mlngCount)

   ' Set the newly added element in the array
to the
   ' passed in variable
   Set mcarrItems(mlngCount) = objItem
   mlngCount = mlngCount + 1

   Exit Sub

AddErr:
   LogErrors Errors
   gstrSource = mstrModuleName & "Add"
   On Error GoTo 0
   Err.Raise vbObjectError +
errLoadInArrayFailed, _
         mstrSource, _

LoadResString(errLoadInArrayFailed)

End Sub
Public Sub Clear()

   ' Clear the array
   ReDim mcarrItems(0)
   mlngCount = 0

End Sub

Public Function Delete(ByVal lngDelete As
Long) As Object

   Dim lngIndex As Long

   On Error GoTo DeleteErr

   If lngDelete < (mlngCount - 1) Then

      ' We want to maintain the order of all
items in the
      ' array - so move all remaining
elements in the array
      ' up by 1
      For lngIndex = lngDelete To
mlngCount - 2
         MoveDown lngIndex
      Next lngIndex

   End If

   ' Return the deleted node
   Set Delete = mcarrItems(mlngCount - 1)

   ' Delete the last Node from the array
   mlngCount = mlngCount - 1
   If mlngCount > 0 Then
      ReDim Preserve mcarrItems(0 To
mlngCount - 1)
   Else
      ReDim mcarrItems(0)
   End If

   Exit Function

DeleteErr:
   LogErrors Errors
   mstrSource = mstrModuleName & "Delete"
   On Error GoTo 0
   Err.Raise vbObjectError +
errDeleteArrayElementFailed, _
         mstrSource, _

LoadResString(errDeleteArrayElementFailed)

End Function
Public Property Get Item(ByVal Position As
Long) As Object
Attribute Item.VB_UserMemId = 0

   ' Returns the element at the passed in
position in the array
   If Position >= 0 And Position < mlngCount
Then
      Set Item = mcarrItems(Position)
   Else
      On Error GoTo 0
      Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _
         LoadResString(errItemDoesNotExist)
   End If

End Property
Public Property Set Item(ByVal Position As
Long, _
      ByVal Value As Object)

   ' Returns the element at the passed in
position in the array
   If Position >= 0 Then
      ' If the passed in position is outside the
array
      ' bounds, then resize the array
      If Position >= mlngCount Then
         ReDim Preserve mcarrItems(Position)
         mlngCount = Position + 1
      End If

      ' Set the newly added element in the array
to the
      ' passed in variable
      Set mcarrItems(Position) = Value
   Else
      On Error GoTo 0
      Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _
         LoadResString(errItemDoesNotExist)
   End If

End Property
Public Sub MoveUp(ByVal Position As Long)
   ' Moves the element at the passed in position
up by 1

   Dim cTemp As Object

   If Position > 0 And Position < mlngCount
Then
      Set cTemp = mcarrItems(Position)

      Set mcarrItems(Position) =
mcarrItems(Position - 1)
      Set mcarrItems(Position - 1) = cTemp
   End If

End Sub
Public Sub MoveDown(ByVal Position As
Long)
   ' Moves the element at the passed in position
down by 1

   Dim cTemp As Object

   If Position >= 0 And Position < mlngCount - 1
Then
      Set cTemp = mcarrItems(Position)

      Set mcarrItems(Position) =
mcarrItems(Position + 1)
      Set mcarrItems(Position + 1) = cTemp
   End If

End Sub

Public Function Count() As Long

   Count = mlngCount

End Function


Private Sub Class_Initialize()

   mlngCount = 0

End Sub


Private Sub Class_Terminate()

   Call Clear

End Sub

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cVectorLng"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cVectorLng.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This class implements an array of
longs.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name when
errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cVectorLng."

' Array counter
Private mlngCount As Long
Private mcarrItems() As Long

Public Sub Add(ByVal lngItem As Long)
   ' Adds the passed in long variable to the array

   On Error GoTo AddErr

   ReDim Preserve mcarrItems(mlngCount)

   ' Set the newly added element in the array to the
   ' passed in variable
   mcarrItems(mlngCount) = lngItem
```

```
    mlngCount = mlngCount + 1

    Exit Sub

AddErr:
    LogErrors Errors
    gstrSource = mstrModuleName & "Add"
    On Error GoTo 0
    Err.Raise vbObjectError +
errLoadInArrayFailed, _
            mstrSource, _

LoadResString(errLoadInArrayFailed)

End Sub
Public Sub Clear()

    ' Clear the array
    ReDim mcarrItems(0)

End Sub

Public Sub Delete(Optional ByVal Position
As Long = -1, _
        Optional ByVal Item As Long = -1)
    ' The user can opt to delete either a
specific item in
    ' the list or the item at a specified position.
If no
    ' parameters are passed in, we delete the
element at
    ' position 0!

    Dim lngDelete As Long
    Dim lngIndex As Long

    On Error GoTo DeleteErr

    If Position = -1 Then
        ' Since we can never store an element at
position -1,
        ' we can be sure that the user is trying
to delete
        ' a given item
        lngDelete = Find(Item)
    Else
        lngDelete = Position
    End If

    If lngDelete < (mlngCount - 1) Then

        ' We want to maintain the order of all
items in the
        ' array - so move all remaining
elements in the array
        ' up by 1
        For lngIndex = lngDelete To
mlngCount - 2
            MoveDown lngIndex
        Next lngIndex

    End If

    ' Delete the last Node from the array
    mlngCount = mlngCount - 1
    If mlngCount > 0 Then
        ReDim Preserve mcarrItems(0 To
mlngCount - 1)
    Else
        ReDim mcarrItems(0)
    End If

    Exit Sub

DeleteErr:
    LogErrors Errors
    mstrSource = mstrModuleName & "Delete"
    On Error GoTo 0
    Err.Raise vbObjectError +
errDeleteArrayElementFailed, _
            mstrSource, _

LoadResString(errDeleteArrayElementFailed)

End Sub
Public Function Find(ByVal Item As Long) As
Long

    ' Returns the position at which the passed in
value occurs
    ' in the array

    Dim lngIndex As Long

    On Error GoTo FindErr

    ' Find the element in the array to be deleted
    For lngIndex = 0 To mlngCount - 1

        If mcarrItems(lngIndex) = Item Then
            Find = lngIndex
            Exit Function
        End If

    Next lngIndex

    Find = -1

    Exit Function

FindErr:
    LogErrors Errors
    mstrSource = mstrModuleName & "Find"
    On Error GoTo 0
    Err.Raise vbObjectError +
errItemNotFound, mstrSource, _
        LoadResString(errItemNotFound)

End Function
Public Property Get Item(ByVal Position As
Long) As Long
Attribute Item.VB_UserMemId = 0

    ' Returns the element at the passed in
position in the array
    If Position >= 0 And Position < mlngCount
Then
        Item = mcarrItems(Position)
    Else
        On Error GoTo 0
        Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _
            LoadResString(errItemDoesNotExist)
    End If

End Property
Public Property Let Item(ByVal Position As
Long, _
        ByVal Value As Long)

    ' Returns the element at the passed in
position in the array
    If Position >= 0 Then
        ' If the passed in position is outside the
array
        ' bounds, then resize the array
        If Position >= mlngCount Then
            ReDim Preserve mcarrItems(Position)
            mlngCount = Position + 1
        End If

        ' Set the newly added element in the array to
the
        ' passed in variable
        mcarrItems(Position) = Value
    Else
        On Error GoTo 0
        Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _
            LoadResString(errItemDoesNotExist)
    End If

End Property
Public Sub MoveUp(ByVal Position As Long)
    ' Moves the element at the passed in position up
by 1

    Dim lngTemp As Long

    If Position > 0 And Position < mlngCount Then
        lngTemp = mcarrItems(Position)

        mcarrItems(Position) = mcarrItems(Position -
1)
        mcarrItems(Position - 1) = lngTemp
    End If

End Sub
Public Sub MoveDown(ByVal Position As Long)
    ' Moves the element at the passed in position
down by 1

    Dim lngTemp As Long

    If Position >= 0 And Position < mlngCount - 1
Then
        lngTemp = mcarrItems(Position)

        mcarrItems(Position) = mcarrItems(Position +
1)
        mcarrItems(Position + 1) = lngTemp
    End If

End Sub

Public Function Count() As Long

    Count = mlngCount

End Function


Private Sub Class_Initialize()

    mlngCount = 0

End Sub


Private Sub Class_Terminate()

    Call Clear

End Sub

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cVectorStr"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cVectorStr.cls
```

```
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:    This class implements an
array of strings.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cVectorStr."

' Array counter
Private mlngCount As Long
Private mcarrItems() As String

Public Sub Add(ByVal strItem As String)
   ' Adds the passed in string variable to the
array

   On Error GoTo AddErr

   ReDim Preserve mcarrItems(mlngCount)

   ' Set the newly added element in the array
to the
   ' passed in variable
   mcarrItems(mlngCount) = strItem
   mlngCount = mlngCount + 1

   Exit Sub

AddErr:
   Call LogErrors(Errors)
   gstrSource = mstrModuleName & "Add"
   On Error GoTo 0
   Err.Raise vbObjectError +
errLoadInArrayFailed, _
         mstrSource, _

LoadResString(errLoadInArrayFailed)

End Sub
Public Sub Clear()

   ' Clear the array
   ReDim mcarrItems(0)

End Sub

Public Sub Delete(Optional ByVal Position
As Long = -1, _
      Optional ByVal Item As String = -1)
   ' The user can opt to delete either a
specific item in
   ' the list or the item at a specified position.
If no
   ' parameters are passed in, we delete the
element at
   ' position 0!

   Dim lngDelete As Long
   Dim lngIndex As Long

   On Error GoTo DeleteErr
   mstrSource = mstrModuleName &
"Delete"

   If Position = -1 Then
      ' Since we can never store an element at
position -1,
      ' we can be sure that the user is trying to
delete
      ' a given item
      lngDelete = Find(Item)
   Else
      lngDelete = Position
   End If

   If lngDelete < (mlngCount - 1) Then

      ' We want to maintain the order of all
items in the
      ' array - so move all remaining elements in
the array
      ' up by 1
      For lngIndex = lngDelete To mlngCount -
2
         MoveDown lngIndex
      Next lngIndex

   End If

   ' Delete the last Node from the array
   mlngCount = mlngCount - 1
   If mlngCount > 0 Then
      ReDim Preserve mcarrItems(0 To
mlngCount - 1)
   Else
      ReDim mcarrItems(0)
   End If

   Exit Sub

DeleteErr:
   Call LogErrors(Errors)
   mstrSource = mstrModuleName & "Delete"
   On Error GoTo 0
   Err.Raise vbObjectError +
errDeleteArrayElementFailed, _
         mstrSource, _

LoadResString(errDeleteArrayElementFailed)

End Sub
Public Function Find(ByVal Item As String)
As Long

   ' Returns the position at which the passed in
value occurs
   ' in the array

   Dim lngIndex As Long

   On Error GoTo FindErr
   mstrSource = mstrModuleName & "Find"

   ' Find the element in the array to be deleted
   For lngIndex = 0 To mlngCount - 1

      If mcarrItems(lngIndex) = Item Then
         Find = lngIndex
         Exit Function
      End If

   Next lngIndex

   Find = -1

   Exit Function

FindErr:
   Call LogErrors(Errors)
   mstrSource = mstrModuleName & "Find"
   On Error GoTo 0
   Err.Raise vbObjectError + errItemNotFound,
mstrSource, _
      LoadResString(errItemNotFound)

End Function
Public Property Get Item(ByVal Position As Long)
As String
Attribute Item.VB_UserMemId = 0

   ' Returns the element at the passed in position in
the array
   If Position >= 0 And Position < mlngCount Then
      Item = mcarrItems(Position)
   Else
      On Error GoTo 0
      Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _
         LoadResString(errItemDoesNotExist)
   End If

End Property
Public Property Let Item(ByVal Position As Long,
_
      ByVal Value As String)

   ' Returns the element at the passed in position in
the array
   If Position >= 0 Then
      ' If the passed in position is outside the array
      ' bounds, then resize the array
      If Position >= mlngCount Then
         ReDim Preserve mcarrItems(Position)
         mlngCount = Position + 1
      End If

      ' Set the newly added element in the array to
the
      ' passed in variable
      mcarrItems(Position) = Value
   Else
      On Error GoTo 0
      Err.Raise vbObjectError +
errItemDoesNotExist, mstrSource, _
         LoadResString(errItemDoesNotExist)
   End If

End Property
Public Sub MoveUp(ByVal Position As Long)
   ' Moves the element at the passed in position up
by 1

   Dim strTemp As String

   If Position > 0 And Position < mlngCount Then
      strTemp = mcarrItems(Position)

      mcarrItems(Position) = mcarrItems(Position -
1)
      mcarrItems(Position - 1) = strTemp
   End If

End Sub
Public Sub MoveDown(ByVal Position As Long)
   ' Moves the element at the passed in position
down by 1

   Dim strTemp As String

   If Position >= 0 And Position < mlngCount - 1
Then
      strTemp = mcarrItems(Position)
```

```
      mcarrItems(Position) =
mcarrItems(Position + 1)
      mcarrItems(Position + 1) = strTemp
   End If

End Sub

Public Function Count() As Long

   Count = mlngCount

End Function


Private Sub Class_Initialize()

   mlngCount = 0

End Sub
Private Sub Class_Terminate()

   Call Clear

End Sub


VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cWorker"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:       cWorker.cls
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    Encapsulates the properties
and methods of a worker step.
'             Implements the cStep class -
carries out initializations
'             and validations that are specific to
worker steps.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Implements cStep

' Object variable to keep the step reference
in
Private mcStep As cStep

' Used to indicate the source module name
when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cWorker."
Private Sub cStep_AddAllIterators()

   Call mcStep.AddAllIterators

End Sub

Private Property Let cStep_StartDir(ByVal
RHS As String)

   mcStep.StartDir = RHS

End Property

Private Property Get cStep_StartDir() As
String

   cStep_StartDir = mcStep.StartDir

End Property

Private Property Set cStep_NodeDB(RHS As
DAO.Database)

   Set mcStep.NodeDB = RHS

End Property

Private Property Get cStep_NodeDB() As
DAO.Database

   Set cStep_NodeDB = mcStep.NodeDB

End Property

Private Function cStep_IncVersionY() As
String

   cStep_IncVersionY = mcStep.IncVersionY

End Function
Private Function cStep_IsNewVersion() As
Boolean
   cStep_IsNewVersion =
mcStep.IsNewVersion
End Function
Private Function cStep_OldVersionNo() As
String
   cStep_OldVersionNo =
mcStep.OldVersionNo
End Function

Private Function cStep_IncVersionX() As
String

   cStep_IncVersionX = mcStep.IncVersionX

End Function
Private Sub cStep_UpdateIteratorVersion()

   Call mcStep.UpdateIteratorVersion

End Sub

Private Function cStep_IteratorCount() As
Long

   cStep_IteratorCount = mcStep.IteratorCount

End Function

Private Sub cStep_UnloadIterators()

   Call mcStep.UnloadIterators

End Sub

Private Sub cStep_SaveIterators()

   Call mcStep.SaveIterators

End Sub
Private Property Get cStep_IteratorName() As
String

   cStep_IteratorName = mcStep.IteratorName

End Property
Private Property Let cStep_IteratorName(ByVal
RHS As String)

   mcStep.IteratorName = RHS

End Property

Private Sub cStep_LoadIterator(cItRecord As
cIterator)

   Call mcStep.LoadIterator(cItRecord)

End Sub
Private Sub cStep_DeleteIterator(cItRecord As
cIterator)

   Call mcStep.DeleteIterator(cItRecord)

End Sub

Private Sub cStep_InsertIterator(cItRecord As
cIterator)

   Call mcStep.InsertIterator(cItRecord)

End Sub
Private Function cStep_Iterators() As Variant

   cStep_Iterators = mcStep.Iterators

End Function
Private Sub cStep_ModifyIterator(cItRecord As
cIterator)

   Call mcStep.ModifyIterator(cItRecord)

End Sub
Private Sub cStep_RemoveIterator(cItRecord As
cIterator)

   Call mcStep.RemoveIterator(cItRecord)

End Sub
Private Sub cStep_UpdateIterator(cItRecord As
cIterator)

   Call mcStep.UpdateIterator(cItRecord)

End Sub
Private Sub cStep_AddIterator(cItRecord As
cIterator)

   Call mcStep.AddIterator(cItRecord)

End Sub

Private Property Let cStep_Position(ByVal RHS As
Long)

   mcStep.Position = RHS

End Property

Private Property Get cStep_Position() As Long

   cStep_Position = mcStep.Position

End Property

Private Function cStep_Clone(Optional cCloneStep
As cStep) As cStep

   Dim cNewWorker As cWorker
```

```
    Set cNewWorker = New cWorker
    Set cStep_Clone =
mcStep.Clone(cNewWorker)

End Function

Private Sub StepTextOrFileEntered()
    ' Checks if either the step text or the name
of the file containing
    ' the text has been entered
    ' If both of them are null or both of them
are not null,
    ' the worker step is invalid and an error is
raised
    If StringEmpty(mcStep.StepText) And
StringEmpty(mcStep.StepTextFile) Then
        ShowError errStepTextAndFileNull
        On Error GoTo 0
        Err.Raise vbObjectError +
errStepTextAndFileNull, _
            mstrSource,
LoadResString(errStepTextAndFileNull)
    End If

End Sub

Private Property Get cStep_IndOperation()
As Operation

    cStep_IndOperation =
mcStep.IndOperation

End Property

Private Property Let
cStep_IndOperation(ByVal RHS As
Operation)

    mcStep.IndOperation = RHS

End Property

Private Property Get cStep_NextStepId() As
Long

    cStep_NextStepId = mcStep.NextStepId

End Property

Private Property Let
cStep_OutputFile(ByVal RHS As String)

    mcStep.OutputFile = RHS

End Property

Private Property Get cStep_OutputFile() As
String

    cStep_OutputFile = mcStep.OutputFile

End Property

Private Property Let cStep_ErrorFile(ByVal
RHS As String)

    mcStep.ErrorFile = RHS

End Property

Private Property Get cStep_ErrorFile() As
String

    cStep_ErrorFile = mcStep.ErrorFile

End Property
'Private Property Let cStep_LogFile(ByVal
RHS As String)
'
'    mcStep.LogFile = RHS
'
'End Property
'
'Private Property Get cStep_LogFile() As
String
'
'    cStep_LogFile = mcStep.LogFile
'
'End Property

Private Property Let
cStep_ArchivedFlag(ByVal RHS As Boolean)

    mcStep.ArchivedFlag = RHS

End Property

Private Property Get cStep_ArchivedFlag() As
Boolean

    cStep_ArchivedFlag = mcStep.ArchivedFlag

End Property

Private Sub Class_Initialize()

    ' Create the object
    Set mcStep = New cStep

    ' Initialize the object with valid values for a
Worker step
    ' The global flag should be the first field to
be initialized
    ' since subsequent validations might try to
check if the
    ' step being created is global
    mcStep.GlobalFlag = False
'    mcStep.GlobalRunMethod = gintNoOption
    mcStep.StepType = gintWorkerStep

End Sub
Private Sub Class_Terminate()

    ' Remove the step object
    Set mcStep = Nothing

End Sub
Private Sub cStep_Add()

    ' Call a private procedure to see if the step
text has been
    ' entered - since a worker step actually
executes a step, entry
    ' of the text is mandatory
    Call StepTextOrFileEntered

    ' Call the Add method of the step class to
carry out the insert
    mcStep.Add

End Sub

Private Property Get
cStep_ContinuationCriteria() As
ContinuationCriteria

    cStep_ContinuationCriteria =
mcStep.ContinuationCriteria

End Property

Private Property Let
cStep_ContinuationCriteria(ByVal RHS As
ContinuationCriteria)

    ' The Continuation criteria must be non-null for
all worker steps.
    ' Check if the Continuation Criteria is valid
    Select Case RHS
        Case gintOnFailureAbortSiblings,
gintOnFailureCompleteSiblings, _
            gintOnFailureSkipSiblings,
gintOnFailureAbort, _
            gintOnFailureContinue,
gintOnFailureAsk
            mcStep.ContinuationCriteria = RHS

        Case Else
            On Error GoTo 0
            Err.Raise vbObjectError +
errContCriteriaInvalid, _
                mstrModuleName,
LoadResString(errContCriteriaInvalid)
    End Select

End Property

Private Property Let
cStep_DegreeParallelism(ByVal RHS As String)

    mcStep.DegreeParallelism = RHS

End Property

Private Property Get cStep_DegreeParallelism() As
String

    cStep_DegreeParallelism =
mcStep.DegreeParallelism

End Property

Private Sub cStep_Delete()

    mcStep.Delete

End Sub

Private Property Get cStep_EnabledFlag() As
Boolean

    cStep_EnabledFlag = mcStep.EnabledFlag

End Property

Private Property Let cStep_EnabledFlag(ByVal
RHS As Boolean)

    mcStep.EnabledFlag = RHS

End Property

Private Property Let
cStep_ExecutionMechanism(ByVal RHS As
ExecutionMethod)

    On Error GoTo ExecutionMechanismErr
    mstrSource = mstrModuleName &
"cStep_ExecutionMechanism"

    Select Case RHS
        Case gintExecuteShell, gintExecuteODBC
            mcStep.ExecutionMechanism = RHS

        Case Else
```

```
        On Error GoTo 0
        Err.Raise vbObjectError +
errExecutionMechanismInvalid, _
                mstrSource,
LoadResString(errExecutionMechanismInva
lid)
    End Select

    Exit Property

ExecutionMechanismErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"cStep_ExecutionMechanism"
    On Error GoTo 0
    Err.Raise vbObjectError +
errExecutionMechanismLetFailed, _
        mstrSource,
LoadResString(errExecutionMechanismLet
Failed)

End Property

Private Property Get
cStep_ExecutionMechanism() As
ExecutionMethod

    cStep_ExecutionMechanism =
mcStep.ExecutionMechanism

End Property

Private Property Let
cStep_FailureDetails(ByVal RHS As String)

    mcStep.FailureDetails = RHS

End Property

Private Property Get cStep_FailureDetails()
As String

    cStep_FailureDetails =
mcStep.FailureDetails

End Property

Private Property Get cStep_GlobalFlag() As
Boolean

    cStep_GlobalFlag = mcStep.GlobalFlag

End Property

Private Property Let
cStep_GlobalFlag(ByVal RHS As Boolean)

    ' Set the global flag to false - this flag is
initialized when
    ' an instance of the class is created. Just
making sure that
    ' nobody changes the value inadvertently
    mcStep.GlobalFlag = False

End Property
Private Sub cStep_Modify()

    ' Call a private procedure to see if the step
text has been
    ' entered - since a worker step actually
executes a step, entry
    ' of the text is mandatory
    Call StepTextOrFileEntered
    ' Call the Modify method of the step class to
carry out the update
    mcStep.Modify

End Sub

Private Property Let
cStep_ParentStepId(ByVal RHS As Long)

    mcStep.ParentStepId = RHS

End Property

Private Property Get cStep_ParentStepId() As
Long

    cStep_ParentStepId = mcStep.ParentStepId

End Property

Private Property Let
cStep_ParentVersionNo(ByVal RHS As
String)

    mcStep.ParentVersionNo = RHS

End Property

Private Property Get cStep_ParentVersionNo()
As String

    cStep_ParentVersionNo =
mcStep.ParentVersionNo

End Property

Private Property Let
cStep_SequenceNo(ByVal RHS As Integer)

    mcStep.SequenceNo = RHS

End Property

Private Property Get cStep_SequenceNo() As
Integer

    cStep_SequenceNo = mcStep.SequenceNo

End Property

Private Property Let cStep_StepId(ByVal RHS
As Long)

    mcStep.StepId = RHS

End Property

Private Property Get cStep_StepId() As Long

    cStep_StepId = mcStep.StepId

End Property


Private Property Let cStep_StepLabel(ByVal
RHS As String)

    mcStep.StepLabel = RHS

End Property

Private Property Get cStep_StepLabel() As
String

    cStep_StepLabel = mcStep.StepLabel

End Property


Private Property Let cStep_StepLevel(ByVal RHS
As Integer)

    mcStep.StepLevel = RHS

End Property

Private Property Get cStep_StepLevel() As Integer

    cStep_StepLevel = mcStep.StepLevel

End Property

Private Property Let cStep_StepText(ByVal RHS
As String)

    mcStep.StepText = RHS

End Property

Private Property Get cStep_StepText() As String

    cStep_StepText = mcStep.StepText

End Property

Private Property Let cStep_StepTextFile(ByVal
RHS As String)

    mcStep.StepTextFile = RHS

End Property

Private Property Get cStep_StepTextFile() As
String

    cStep_StepTextFile = mcStep.StepTextFile

End Property

Private Property Let cStep_StepType(RHS As
gintStepType)

    mcStep.StepType = gintWorkerStep

End Property

Private Property Get cStep_StepType() As
gintStepType

    cStep_StepType = mcStep.StepType

End Property

Private Sub cStep_Validate()
    ' The validate routines for each of the steps will
    ' carry out the specific validations for the type
and
    ' call the generic validation routine

    On Error GoTo cStep_ValidateErr

    ' Validations specific to worker steps

    ' Check if the step text or a file name has been
    ' specified
    Call StepTextOrFileEntered

    mcStep.Validate

    Exit Sub
```

```
cStep_ValidateErr:
   LogErrors Errors
   mstrSource = mstrModuleName &
"cStep_Validate"
   On Error GoTo 0
   Err.Raise vbObjectError +
errValidateFailed, _
         mstrSource, _
         LoadResString(errValidateFailed)
End Sub

Private Property Let
cStep_VersionNo(ByVal RHS As String)

   mcStep.VersionNo = RHS

End Property

Private Property Get cStep_VersionNo() As
String

   cStep_VersionNo = mcStep.VersionNo

End Property

Private Property Let
cStep_WorkspaceId(ByVal RHS As Long)

   mcStep.WorkspaceId = RHS

End Property

Private Property Get cStep_WorkspaceId()
As Long

   cStep_WorkspaceId =
mcStep.WorkspaceId

End Property
VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cWorkspace"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
'  FILE:       cWorkspace.cls
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Encapsulates the properties
and methods of a workspace.
'              Contains functions to insert,
update and delete
'              att_workspaces records from the
database.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Local variable(s) to hold property value(s)
Private mlngWorkspaceId As Long
Private mstrWorkspaceName As String
Private mblnArchivedFlag As Boolean
Private mdbsStepMaster As Database

' Used to indicate the source module name
when errors
' are raised by this class
Private mstrSource As String
Private Const mstrModuleName As String =
"cWorkspace."

' The cSequence class is used to generate
unique workspace identifiers
Private mWorkspaceSeq As cSequence

' The StringSM class is used to carry out string
operations
Private mFieldValue As cStringSM

Public Function Clone() As cWorkspace

   ' Creates a copy of a given workspace

   Dim cCloneWsp As cWorkspace

   On Error GoTo CloneErr

   Set cCloneWsp = New cWorkspace

   ' Copy all the workspace properties to the
newly
   ' created workspace
   cCloneWsp.WorkspaceId =
mlngWorkspaceId
   cCloneWsp.WorkspaceName =
mstrWorkspaceName
   cCloneWsp.ArchivedFlag =
mblnArchivedFlag

   ' And set the return value to the newly
created workspace
   Set Clone = cCloneWsp

   Exit Function

CloneErr:
   LogErrors Errors
   mstrSource = mstrModuleName & "Clone"
   On Error GoTo 0
   Err.Raise vbObjectError + errCloneFailed, _
         mstrSource,
LoadResString(errCloneFailed)

End Function

Public Property Let ArchivedFlag(ByVal vdata
As Boolean)

   mblnArchivedFlag = vdata

End Property

Public Property Get ArchivedFlag() As
Boolean

   ArchivedFlag = mblnArchivedFlag

End Property

Public Property Set WorkDatabase(vdata As
Database)

   Set mdbsStepMaster = vdata

End Property

Private Sub WorkspaceNameDuplicate()
   ' Check if the workspace name already exists
in the workspace

   Dim rstWorkspace As Recordset
   Dim strSql As String
   Dim qy As DAO.QueryDef

   On Error GoTo WorkspaceNameDuplicateErr
   mstrSource = mstrModuleName &
"WorkspaceNameDuplicate"

   ' Create a recordset to retrieve the count of
records
   ' having the same workspace name
   strSql = " Select count(*) as workspace_count "
& _
      " from att_workspaces " & _
      " where workspace_name = [w_name] " & _
      " and workspace_id <> [w_id] "
   Set qy =
mdbsStepMaster.CreateQueryDef(gstrEmptyString,
strSql)

   ' Call a procedure to assign the parameter values
   Call AssignParameters(qy)

   Set rstWorkspace =
qy.OpenRecordset(dbOpenForwardOnly)

'      mFieldValue.MakeStringFieldValid
(mstrWorkspaceName) & _
'       " and workspace_id <> " & _
'      Str(mlngWorkspaceId)
'
'   Set rstWorkspace =
mdbsStepMaster.OpenRecordset( _
'      strSQL, dbOpenForwardOnly)

   If rstWorkspace![workspace_count] > 0 Then
      rstWorkspace.Close
      qy.Close
      ShowError errDuplicateWorkspaceName
      On Error GoTo 0
      Err.Raise vbObjectError +
errDuplicateWorkspaceName, _
         mstrSource,
LoadResString(errDuplicateWorkspaceName)
   End If
   rstWorkspace.Close
   qy.Close

   Exit Sub

WorkspaceNameDuplicateErr:
   Call LogErrors(Errors)
   mstrSource = mstrModuleName &
"WorkspaceNameDuplicate"
   On Error GoTo 0
   Err.Raise vbObjectError +
errWorkspaceNameDuplicateFailed, _
      mstrSource,
LoadResString(errWorkspaceNameDuplicateFailed
)

End Sub
Public Property Let WorkspaceName(vdata As
String)

   On Error GoTo WorkspaceNameErr
   mstrSource = mstrModuleName &
"WorkspaceName"

   If vdata = gstrEmptyString Then

      On Error GoTo 0
      ' Propogate this error back to the caller
      Err.Raise vbObjectError +
errWorkspaceNameMandatory, _
         mstrSource,
LoadResString(errWorkspaceNameMandatory)
```

```
    Else
        mstrWorkspaceName = vdata
    End If
    Exit Property

WorkspaceNameErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"WorkspaceName"
    On Error GoTo 0
    Err.Raise vbObjectError +
errWorkspaceNameSetFailed, _
        mstrSource,
LoadResString(errWorkspaceNameSetFaile
d)

End Property

Public Property Let WorkspaceId(vdata As
Long)

    On Error GoTo WorkspaceIdErr
    mstrSource = mstrModuleName &
"WorkspaceId"

    If (vdata > 0) Then
        mlngWorkspaceId = vdata
    Else
        ' Propogate this error back to the caller
        On Error GoTo 0
        Err.Raise vbObjectError +
errWorkspaceIdInvalid, _
            mstrSource,
LoadResString(errWorkspaceIdInvalid)
    End If

    Exit Property

WorkspaceIdErr:
    LogErrors Errors
    mstrSource = mstrModuleName &
"WorkspaceId"
    On Error GoTo 0
    Err.Raise vbObjectError +
errWorkspaceIdSetFailed, _
        mstrSource,
LoadResString(errWorkspaceIdSetFailed)

End Property

Public Sub AddWorkspace()

    Dim strInsert As String
    Dim qy As DAO.QueryDef

    On Error GoTo AddWorkspaceErr

    ' Retrieve the next identifier using the
sequence class
    Set mWorkspaceSeq = New cSequence
    Set mWorkspaceSeq.IdDatabase =
mdbsStepMaster
    mWorkspaceSeq.IdentifierColumn =
FLD_ID_WORKSPACE
    mlngWorkspaceId =
mWorkspaceSeq.Identifier
    Set mWorkspaceSeq = Nothing

    ' Call procedure to raise an error if the
Workspace name
    ' already exists in the db
    Call WorkspaceNameDuplicate

    ' A new record will have the
archived_flag turned off
    mblnArchivedFlag = False

    ' Create a temporary querydef object
    strInsert = "insert into att_workspaces " & _
            "(  workspace_id, workspace_name, " &
_
            " archived_flag ) " & _
            " values ( [w_id], [w_name], [archived]
) "
    Set qy =
mdbsStepMaster.CreateQueryDef(gstrEmptySt
ring, strInsert)

    ' Call a procedure to assign the parameter
values
    Call AssignParameters(qy)

    qy.Execute dbFailOnError
    qy.Close

'    strInsert = "insert into att_workspaces " & _
'            "(  workspace_id, workspace_name, "
& _
'            " archived_flag ) " & _
'            " values ( " & _
'            Str(mlngWorkspaceId) & _
'            ", " &
mFieldValue.MakeStringFieldValid(mstrWork
spaceName) & _
'            ", " & Str(mblnArchivedFlag) & _
'            " ) "
'    mdbsStepMaster.Execute strInsert,
dbFailOnError
'
    Exit Sub

AddWorkspaceErr:

    Call LogErrors(Errors)
    mstrSource = mstrModuleName &
"AddWorkspace"
    On Error GoTo 0
    Err.Raise vbObjectError +
errWorkspaceInsertFailed, _
        mstrSource,
LoadResString(errWorkspaceInsertFailed)

End Sub
Private Sub AssignParameters(qyExec As
DAO.QueryDef)
    ' Assigns values to the parameters in the
querydef object
    ' The parameter names are cryptic to make
them different
    ' from the field names. When the parameter
names are
    ' the same as the field names, parameters in
the where
    ' clause do not get created.

    Dim prmParam As DAO.Parameter

    On Error GoTo AssignParametersErr
    mstrSource = mstrModuleName &
"AssignParameters"

    For Each prmParam In qyExec.Parameters
        Select Case prmParam.Name
            Case "[w_id]"
                prmParam.Value =
mlngWorkspaceId

            Case "[w_name]"
                prmParam.Value =
mstrWorkspaceName

            Case "[archived]"
                prmParam.Value = mblnArchivedFlag

            Case Else
                ' Write the parameter name that is faulty
                WriteError errInvalidParameter,
mstrSource, _
                    prmParam.Name
                On Error GoTo 0
                Err.Raise errInvalidParameter,
mstrSource, _
                    LoadResString(errInvalidParameter)
        End Select
    Next prmParam

    Exit Sub

AssignParametersErr:

    mstrSource = mstrModuleName &
"AssignParameters"
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errAssignParametersFailed, _
        mstrSource,
LoadResString(errAssignParametersFailed)

End Sub
Public Sub DeleteWorkspace()

    Dim strDelete As String
    Dim qy As DAO.QueryDef

    On Error GoTo DeleteWorkspaceErr

    strDelete = "delete from att_workspaces " & _
        " where workspace_id = [w_id]"
    Set qy =
mdbsStepMaster.CreateQueryDef(gstrEmptyString,
strDelete)

    ' Call a procedure to assign the parameter values
    Call AssignParameters(qy)

    qy.Execute dbFailOnError
    qy.Close

'    mdbsStepMaster.Execute strDelete,
dbFailOnError
'        " where workspace_id = " & _
'        Str(mlngWorkspaceId)

    Exit Sub

DeleteWorkspaceErr:
    Call LogErrors(Errors)
    mstrSource = mstrModuleName &
"DeleteWorkspace"
    On Error GoTo 0
    Err.Raise vbObjectError +
errWorkspaceDeleteFailed, _
        mstrSource,
LoadResString(errWorkspaceDeleteFailed)
End Sub

Public Sub ModifyWorkspace()

    Dim strUpdate As String
    Dim qy As DAO.QueryDef

    On Error GoTo ModifyWorkspaceErr
```

```
   ' Call procedure to raise an error if the
Workspace name
   ' already exists in the db
   Call WorkspaceNameDuplicate

   strUpdate = "update att_workspaces " & _
      " set workspace_name = [w_name] " &
_
      ", archived_flag = [archived] " & _
      " where workspace_id = [w_id] "
   Set qy =
mdbsStepMaster.CreateQueryDef(gstrEmpt
yString, strUpdate)

   ' Call a procedure to assign the parameter
values
   Call AssignParameters(qy)

   qy.Execute dbFailOnError
   qy.Close

'    strUpdate = "update att_workspaces " &
_
'       " set workspace_name = " & _
'
mFieldValue.MakeStringFieldValid(mstrW
orkspaceName) & _
'       ", archived_flag = " & _
'       Str(mblnArchivedFlag) & _
'       " where workspace_id = " & _
'       Str(mlngWorkspaceId)
'
'    mdbsStepMaster.Execute strUpdate,
dbFailOnError
'
   Exit Sub

ModifyWorkspaceErr:

   Call LogErrors(Errors)
   mstrSource = mstrModuleName &
"ModifyWorkspace"
   On Error GoTo 0
   Err.Raise vbObjectError +
errWorkspaceUpdateFailed, _
      mstrSource,
LoadResString(errWorkspaceUpdateFailed)

End Sub
Public Property Get WorkspaceName() As
String

   WorkspaceName = mstrWorkspaceName

End Property

Public Property Get WorkspaceId() As Long

   WorkspaceId = mlngWorkspaceId

End Property

Private Sub Class_Initialize()

   ' Each function will append it's own name
to this
   ' variable
   mstrSource = "cWorkspace."

   Set mFieldValue = New cStringSM

End Sub

Private Sub Class_Terminate()

   Set mdbsStepMaster = Nothing
   Set mFieldValue = Nothing

End Sub
Attribute VB_Name = "DatabaseSM"
' FILE:      DatabaseSM.bas
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:    Contains all the database
initialization/cleanup
'            procedures for the project. Also
contains upgrade
'            database upgrade functions.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
' This module is called DatabaseSM, since
Database is a standard
' Visual Basic object and we want to avoid any
confusion with it.

Option Explicit

Public wrkJet As Workspace
Public dbsAttTool As Database
Public gblnDbOpen As Boolean
Public gRunEngine As rdoEngine

' Used to indicate the source module name
when errors
' are raised by this module
Private Const mstrModuleName As String =
"DatabaseSM."
Public Const gsDefDBFileExt As String =
".stp"
Private Const msDefDBFile As String =
"\SMData" & gsDefDBFileExt

Private Const merrFileNotFound As Integer =
3024
Private Const merrDaoTableMissing As
Integer = 3078

Private Const
STEPMASTER_SETTINGS_VAL_NAME_D
BFILE As String = "WorkspaceFile"

Public Const DEF_NO_COUNT_DISPLAY
As Boolean = False
Public Const DEF_NO_EXECUTE
As Boolean = False
Public Const DEF_PARSE_QUERY_ONLY
As Boolean = False
Public Const
DEF_ANSI_QUOTED_IDENTIFIERS   As
Boolean = False
Public Const DEF_ANSI_NULLS          As
Boolean = True
Public Const DEF_SHOW_QUERY_PLAN
As Boolean = False
Public Const DEF_SHOW_STATS_TIME
As Boolean = False
Public Const DEF_SHOW_STATS_IO
As Boolean = False
Public Const
DEF_PARSE_ODBC_MSG_PREFIXES   As
Boolean = True
Public Const DEF_ROW_COUNT
As Long = 0
Public Const
DEF_TSQL_BATCH_SEPARATOR      As
String = "GO"
Public Const DEF_QUERY_TIME_OUT          As
Long = 0
Public Const DEF_SERVER_LANGUAGE
As String = "(Default)"
Public Const
DEF_CHARACTER_TRANSLATION     As
Boolean = True
Public Const DEF_REGIONAL_SETTINGS
As Boolean = False

Public Const PARAM_DEFAULT_DIR           As
String = "DEFAULT_DIR"
Public Const PARAM_DEFAULT_DIR_DESC
As String = "Default destination directory " & _
         "for all output and error files. If it is
blank, the StepMaster installation directory will be
used."

Public Const PARAM_RUN_ID                As
String = "RUN_ID"
Public Const PARAM_RUN_ID_DESC           As
String = "The run identifier for a run. " & _
         "Any modifications will be overwritten
before each run."

Public Const PARAM_OUTPUT_DIR            As
String = "OUTPUT_DIR"
Public Const PARAM_OUTPUT_DIR_DESC
As String = "The output directory for a run. " & _
         "Any modifications will be overwritten
before each run."

Public Const
CONNECTION_STRINGS_TO_NAME_SUFFIX
As String = "_NAME"

Private Const TBL_RUN_STEP_HDR As String =
"run_header"
Private Const TBL_RUN_STEP_DTLS As String =
"run_step_details"
Public Const TBL_CONNECTION_DTLS As
String = "connection_dtls"
Public Const TBL_CONNECTION_STRINGS As
String = "workspace_connections"
Public Const TBL_STEPS As String = "att_steps"

Public Const FLD_ID_CONN_NAME As String =
"connection_name_id"
Public Const FLD_ID_WORKSPACE As String =
"workspace_id"
Public Const FLD_ID_STEP As String = "step_id"
Public Const FLD_ID_PARAMETER As String =
"parameter_id"

Public Const
FLD_CONN_DTL_CONNECTION_NAME As
String = "connection_name"
Public Const
FLD_CONN_DTL_CONNECTION_STRING As
String = "connection_string_name"
Public Const
FLD_CONN_DTL_CONNECTION_TYPE As
String = "connection_type"

Public Const
FLD_CONN_STR_CONNECTION_NAME As
String = "connection_name"

Public Const FLD_STEPS_EXEC_MECHANISM
As String = "execution_mechanism"
Public Const FLD_STEPS_EXEC_DTL As String
= "start_directory"
Public Const FLD_STEPS_VERSION_NO As
String = "version_no"
```

```
Public Const DATA_TYPE_CURRENCY As String = "CURRENCY"
Public Const DATA_TYPE_LONG As String = "Long"
Public Const DATA_TYPE_INTEGER As String = "INTEGER"
Public Const DATA_TYPE_TEXT255 As String = "Text(255)"

Private Sub InsertBuiltInParameter(dbFile As Database, sParamName As String, _
      sParamValue As String, sParamDesc As String)

   Dim sBuf As String
   Dim cTempStr As New cStringSM
   Dim lId As Long
   Dim rTemp As DAO.Recordset
   Dim rParam As DAO.Recordset
   Dim cTempSeq As cSequence

   ' Create the passed in built-in parameter, for each workspace in the db
   Set cTempSeq = New cSequence
   Set cTempSeq.IdDatabase = dbFile
   cTempSeq.IdentifierColumn = FLD_ID_PARAMETER

   sBuf = "select * from att_workspaces "
   Set rTemp = dbFile.OpenRecordset(sBuf, dbOpenSnapshot)
   If rTemp.RecordCount <> 0 Then
      rTemp.MoveFirst

      While Not rTemp.EOF
         sBuf = "select * from workspace_parameters " & _
                " where workspace_id = " & Str(rTemp!workspace_id) & _
                " and parameter_name = " & cTempStr.MakeStringFieldValid(sParamName)
         Set rParam = dbFile.OpenRecordset(sBuf, dbOpenSnapshot)
         If rParam.RecordCount <> 0 Then
            rParam.MoveFirst
            ' Since the parameter already exists, change it to a built-in type
            sBuf = "update workspace_parameters " & _
                   " set parameter_type = " & CStr(gintParameterBuiltIn) & _
                   ", description = " & cTempStr.MakeStringFieldValid(sParamDesc) & _
                   " where workspace_id = " & Str(rTemp!workspace_id) & _
                   " and parameter_id = " & Str(rParam!parameter_id)
         Else
            ' Else, insert a parameter record
            lId = cTempSeq.Identifier
            sBuf = "insert into workspace_parameters " & _
                   "( workspace_id, parameter_id, " & _
                   " parameter_name, parameter_value, " & _
                   " description, parameter_type ) " & _
                   " values ( " & _
                   Str(rTemp!workspace_id) & ", " & Str(lId) & ", " & _
                   cTempStr.MakeStringFieldValid(sParamName) & ", " & _
                   cTempStr.MakeStringFieldValid(sParamValue) & ", " & _
                   cTempStr.MakeStringFieldValid(sParamDesc) & ", " & _
                   CStr(gintParameterBuiltIn) & _
                   " ) "
         End If
         dbFile.Execute sBuf, dbFailOnError
         rParam.Close

         rTemp.MoveNext
      Wend
   End If
   rTemp.Close

End Sub
Public Sub InitRunEngine()

   Set gRunEngine = New rdoEngine
   gRunEngine.rdoDefaultCursorDriver = rdUseServer

End Sub

Public Function DefaultDBFile() As String
   DefaultDBFile = GetSetting(App.Title, "Settings", STEPMASTER_SETTINGS_VAL_NAME_DBFILE, App.Path & msDefDBFile)
End Function

Public Sub CloseDatabase()

   Dim dbsInstance As Database
   Dim recInstance As Recordset

   On Error GoTo CloseDatabaseErr

   ' Close all open recordsets and databases in the workspace
   For Each dbsInstance In wrkJet.Databases

      For Each recInstance In dbsAttTool.Recordsets
         recInstance.Close
      Next recInstance
      dbsInstance.Close

   Next dbsInstance

   Set dbsAttTool = Nothing

   gblnDbOpen = False
   wrkJet.Close

   Exit Sub

CloseDatabaseErr:

   Call LogErrors(Errors)
   Resume Next

End Sub

Private Function NoDbChanges(sVerTo As String, sVerFrom As String) As Boolean

   If sVerTo = gsVersion242 And sVerFrom = gsVersion241 Then
      NoDbChanges = True
   ElseIf sVerTo = gsVersion242 And sVerFrom = gsVersion24 Then
      NoDbChanges = True
   ElseIf sVerTo = gsVersion253 And sVerFrom = gsVersion251 Then
      NoDbChanges = True
   ElseIf sVerTo = gsVersion255 And sVerFrom = gsVersion251 Then
      NoDbChanges = True
   Else
      NoDbChanges = False
   End If

End Function

Public Function SMOpenDatabase(Optional strDbName As String = gstrEmptyString) As Boolean
   Dim sVersion As String
   Dim bOpeningDb As Boolean ' This flag is used to check if OpenDatabase failed

   On Error GoTo OpenDatabaseErr

   bOpeningDb = False
   SMOpenDatabase = False

   ' Create Microsoft Jet Workspace object.
   If Not gblnDbOpen Then
      Set wrkJet = CreateWorkspace("att_tool_workspace_setup", "admin", gstrEmptyString, dbUseJet)
   End If

   ' Prompt the user for the database file if it is not passed in
   If StringEmpty(strDbName) Then
      strDbName = BrowseDBFile
      If StringEmpty(strDbName) Then
         Exit Function
      End If
   End If

   Do
      If gblnDbOpen Then
#If Not RUN_ONLY Then
         CloseOpenWorkspaces
#End If
         Set wrkJet = CreateWorkspace("att_tool_workspace_setup", "admin", gstrEmptyString, dbUseJet)
      End If

      ' Toggle the bOpeningDb flag around the OpenDatabase method - the value
      ' of this flag will be checked by the error handler to determine if it is
      ' the OpenDatabase that failed.
      BugMessage "DB File: " & strDbName

      bOpeningDb = True
      ' Open the database for exclusive use
      Set dbsAttTool = wrkJet.OpenDatabase(strDbName, Options:=True)
      bOpeningDb = False

      If dbsAttTool Is Nothing Then
         ' If the file is not present in the directory, display
         ' an error and ask the user to enter a new path
         Call ShowError(errOpenDbFailed, OptArgs:=strDbName)

         strDbName = BrowseDBFile
```

```
      Else
         sVersion = DBVersion(dbsAttTool)

         ' Make sure the application and db
version numbers match
         If sVersion = gsVersion Then
            Call InitializeData(strDbName)
            gblnDbOpen = True
            SMOpenDatabase = True
         Else
            If UpgradeDb(wrkJet, dbsAttTool,
gsVersion, sVersion) Then
               Call InitializeData(strDbName)
               gblnDbOpen = True
               SMOpenDatabase = True
            Else
               dbsAttTool.Close
               Set dbsAttTool = Nothing

               ShowError
errVersionMismatch, _
                  OptArgs:=" Please install
Version "' & gsVersion & "' of the
workspace definition file."
               strDbName = BrowseDBFile
            End If
         End If
      End If
   Loop While gblnDbOpen = False And
Not StringEmpty(strDbName)

   Exit Function

OpenDatabaseErr:
   Call DisplayErrors(Errors)

   ' If the OpenDatabase failed, continue
   If bOpeningDb Then
      Resume Next
   End If

   Call ShowError(errOpenDbFailed,
OptArgs:=strDbName)

End Function
Private Sub InitializeData(sDb As String)

   Set gcParameters = New cArrParameters
   Set gcParameters.ParamDatabase =
dbsAttTool

   Set gcSteps = New cArrSteps
   Set gcSteps.StepDB = dbsAttTool

   Set gcConstraints = New cArrConstraints
   Set gcConstraints.ConstraintDB =
dbsAttTool

   Set gcConnections = New cConnections
   Set gcConnections.ConnDb = dbsAttTool

   Set gcConnDtls = New cConnDtls
   Set gcConnDtls.ConnDb = dbsAttTool

   ' Disable the error handler since this is not
a critical step
   On Error GoTo 0
   SaveSetting App.Title, "Settings",
STEPMASTER_SETTINGS_VAL_NAME
_DBFILE, sDb
End Sub
Private Sub
UpdateContinuationCriteria(dbFile As
DAO.Database)
   Dim qyTemp As DAO.QueryDef
   Dim sBuf As String

   On Error GoTo
UpdateContinuationCriteriaErr

   sBuf = "Since this version of the executable
incorporates failure processing, " & _
         "the upgrade will update the On Failure
field for each of the steps " & _
         "to 'Continue' to be compatible with the
existing behaviour. " & _
         "Proceed?"
   If Not Confirm(Buttons:=vbYesNo,
strMessage:=sBuf, strTitle:="Upgrade
database") Then
      Exit Sub
   End If

   ' Create a recordset object to retrieve all
steps for
   ' the given workspace
   sBuf = " update att_steps a " & _
      " set continuation_criteria = " &
CStr(gintOnFailureContinue) & _
      " where archived_flag = [archived] "

   ' Find the highest X-component of the
version number
   sBuf = sBuf & " AND cint( mid(
version_no, 1, instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) - 1 ) ) = " &
_
      " ( select max( cint( mid( version_no, 1,
instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) - 1 ) ) ) " & _
      " from att_steps AS d " & _
      " WHERE a.step_id = d.step_id ) "

   ' Find the highest Y-component of the
version number for the highest X-component
   sBuf = sBuf & " AND cint( mid(
version_no, instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) + 1 ) ) = " &
_
      " ( select max( cint( mid( version_no,
instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) + 1 ) ) ) " &
_
      " from att_steps AS b " & _
      " Where a.step_id = b.step_id " & _
      " AND cint( mid( version_no, 1, instr(
version_no, " & gstrDQ & gstrVerSeparator &
gstrDQ & " ) - 1 ) ) = " & _
      " ( select max( cint( mid( version_no, 1,
instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) - 1 ) ) ) " & _
      " from att_steps AS c " & _
      " WHERE a.step_id = c.step_id ) ) "

   ' Create a temporary Querydef object
   Set qyTemp =
dbFile.CreateQueryDef(gstrEmptyString,
sBuf)
   qyTemp.Parameters("archived").Value =
False

   qyTemp.Execute dbFailOnError
   qyTemp.Close

   Exit Sub

UpdateContinuationCriteriaErr:
   Call LogErrors(Errors)
   Err.Raise vbObjectError + errModifyStepFailed,
mstrModuleName, _
      LoadResString(errModifyStepFailed)

End Sub

Private Sub UpdateDbDtls(dbFile As Database,
sNewVersion As String)

   Dim sSql As String
   Dim cTemp As New cStringSM

   On Error GoTo UpdateDbDtlsErr

   sSql = "update db_details " & _
      " set db_version = " &
cTemp.MakeStringFieldValid(sNewVersion)

   dbFile.Execute sSql, dbFailOnError

   Exit Sub

UpdateDbDtlsErr:
   Call LogErrors(Errors)
   Err.Raise vbObjectError + errUpgradeFailed,
mstrModuleName, _
      LoadResString(errUpgradeFailed)

End Sub

Private Sub Upgrade10to21(UpgradeWsp As
DAO.Workspace, dbFile As Database, sVersion As
String)

   Dim sSql As String

   On Error GoTo Upgrade10to21Err

   Call UpdateDbDtls(dbFile, sVersion)

   Call UpdateContinuationCriteria(dbFile)

   Exit Sub

Upgrade10to21Err:
   UpgradeWsp.Rollback
   Call LogErrors(Errors)
   Err.Raise vbObjectError + errUpgradeFailed,
mstrModuleName, _
      LoadResString(errUpgradeFailed)

End Sub
Private Sub Upgrade21to23(UpgradeWsp As
DAO.Workspace, dbFile As Database, sVersion As
String)

   Dim sBuf As String
   Dim cTempStr As New cStringSM

   On Error GoTo Upgrade21to23Err

   ' Add a parameter type field and a description
field to the parameter table
   sBuf = "alter table workspace_parameters " & _
      " add column description TEXT(255) "
   dbFile.Execute sBuf, dbFailOnError

   sBuf = "alter table workspace_parameters " & _
      " add column parameter_type INTEGER "
   dbFile.Execute sBuf, dbFailOnError

   ' Initialize the parameter type on all parameters to
indicate generic parameters
   sBuf = "update workspace_parameters " & _
```

```
        " set parameter_type = " &
CStr(gintParameterGeneric)
    dbFile.Execute sBuf, dbFailOnError

    sBuf = "Release 2.3 onwards, connection
string parameters will be " & _
        "displayed in a separate node. After
this upgrade, all connection " & _
        "string parameters will appear under
the Globals/Connection Strings " & _
        "node in the workspace. "
    Call MsgBox(sBuf, vbOKOnly +
vbApplicationModal, "Upgrade database")

    ' Update the parameter type on all
parameters that look like db connection
strings
    sBuf = "update workspace_parameters "
& _
        " set parameter_type = " &
CStr(gintParameterConnect) & _
        " where UCase(parameter_value)
like '*DRIVER*' " & _
        " or UCase(parameter_value) like
'*DSN*'"
    dbFile.Execute sBuf, dbFailOnError

    ' Add an elapsed time field to the
run_step_details table - this field is
    ' needed to store the elapsed time in
milliseconds.
    sBuf = "alter table run_step_details " & _
        " add column elapsed_time LONG "
    dbFile.Execute sBuf, dbFailOnError

    ' The failure_details field has some data
for the case when an ODBC failure
    ' threshold was specified. Since that's no
longer relevant, update the failure_details
    ' field for records with failure_criteria =
gintFailureODBC to empty.
    ' failure_criteria = gintFailureODBC = 1
    sBuf = "update att_steps " & _
        " set failure_details = " &
cTempStr.MakeStringFieldValid(gstrEmpty
String) & _
        " where failure_criteria = '1'"
    dbFile.Execute sBuf, dbFailOnError

    Call UpdateDbDtls(dbFile, sVersion)

    UpgradeWsp.CommitTrans

    On Error GoTo DropColumnErr

    UpgradeWsp.BeginTrans

    ' This ddl cannot be in the same
transaction as the failure_details update
    ' But we can do this in a separate
transaction since we do not expect this
    ' statement to fail - AND, it doesn't matter
if this transaction fails
    ' Drop the failure_criteria column from
the att_steps table
    sBuf = "alter table att_steps " & _
        " drop column failure_criteria "
    dbFile.Execute sBuf, dbFailOnError

    Exit Sub

DropColumnErr:
    Call LogErrors(Errors)
    ShowError errDeleteColumnFailed
    Exit Sub

Upgrade21to23Err:
    UpgradeWsp.Rollback
    Call LogErrors(Errors)
    Err.Raise vbObjectError +
errUpgradeFailed, mstrModuleName, _
        LoadResString(errUpgradeFailed)

End Sub
Private Sub Upgrade23to24(UpgradeWsp As
DAO.Workspace, dbFile As Database,
sVersion As String)

    Dim sBuf As String
    Dim lId As Long
    Dim rTemp As DAO.Recordset
    Dim cTempStr As New cStringSM

    On Error GoTo Upgrade23to24Err

    ' Add a new table for connection properties
    sBuf = CreateConnectionsTableScript()
    ' TODO: Not sure of column sizes for row
count, tsql_batch_separator and
server_language
    dbFile.Execute sBuf, dbFailOnError

    ' Move all connection parameters from the
parameter table to the connections tables
    ' Insert default values for the newly added
connection properties
    sBuf = "select * from workspace_parameters
" & _
        "where parameter_type = " &
CStr(gintParameterConnect)
    Set rTemp = dbFile.OpenRecordset(sBuf,
dbOpenSnapshot)
    lId = 1
    If rTemp.RecordCount <> 0 Then
        rTemp.MoveFirst

        While Not rTemp.EOF
            sBuf = "insert into
workspace_connections " & _
            "( workspace_id, connection_id, " & _
            "connection_name, connection_value,
" & _
            "description, no_count_display, " & _
            "no_execute, parse_query_only, " & _
            "ANSI_quoted_identifiers,
ANSI_nulls, " & _
            "show_query_plan, show_stats_time, "
& _
            "show_stats_io,
parse_odbc_msg_prefixes, " & _
            "row_count, tsql_batch_separator, " &
_
            "query_time_out, server_language, " &
_
            "character_translation,
regional_settings ) " & _
            " values ( " & _
            Str(rTemp!workspace_id) & ", " &
Str(lId) & ", " & _
            cTempStr.MakeStringFieldValid("" &
rTemp!parameter_name) & ", " & _
            cTempStr.MakeStringFieldValid("" &
rTemp!parameter_value) & ", " & _
            cTempStr.MakeStringFieldValid("" &
rTemp!Description) & ", " & _
            Str(DEF_NO_COUNT_DISPLAY) &
", " & _
            Str(DEF_NO_EXECUTE) & ", " &
Str(DEF_PARSE_QUERY_ONLY) & ", " & _
            Str(DEF_ANSI_QUOTED_IDENTIFIERS)
& ", " & Str(DEF_ANSI_NULLS) & ", " & _
            Str(DEF_SHOW_QUERY_PLAN) & ", " &
Str(DEF_SHOW_STATS_TIME) & ", " & _
            Str(DEF_SHOW_STATS_IO) & ", " &
Str(DEF_PARSE_ODBC_MSG_PREFIXES) & ",
" & _
            Str(DEF_ROW_COUNT) & ", " &
cTempStr.MakeStringFieldValid(DEF_TSQL_BAT
CH_SEPARATOR) & ", " & _
            Str(DEF_QUERY_TIME_OUT) & ", " &
cTempStr.MakeStringFieldValid(DEF_SERVER_L
ANGUAGE) & ", " & _
            Str(DEF_CHARACTER_TRANSLATION)
& ", " & Str(DEF_REGIONAL_SETTINGS) & _
            " ) "
            dbFile.Execute sBuf, dbFailOnError

            lId = lId + 1
            rTemp.MoveNext
        Wend
    End If
    rTemp.Close

    ' Add an identifier column for the connection_id
field
    sBuf = "alter table att_identifiers " & _
        " add column connection_id long "
    dbFile.Execute sBuf, dbFailOnError

    ' Initialize the value of the connection identifier,
initialized above
    sBuf = "update att_identifiers " & _
        " set connection_id = " & Str(lId)
    dbFile.Execute sBuf, dbFailOnError

    ' Delete all connection strings from the parameter
table
    sBuf = "delete from workspace_parameters " & _
        "where parameter_type = " &
CStr(gintParameterConnect)
    dbFile.Execute sBuf, dbFailOnError

    ' Create the built-in parameter, default directory,
for each workspace in the db
    Call InsertBuiltInParameter(dbFile,
PARAM_DEFAULT_DIR, gstrEmptyString,
PARAM_DEFAULT_DIR_DESC)

    Call UpdateDbDtls(dbFile, sVersion)

    Exit Sub

Upgrade23to24Err:
    UpgradeWsp.Rollback
    Call LogErrors(Errors)
    Err.Raise vbObjectError + errUpgradeFailed,
mstrModuleName, _
        LoadResString(errUpgradeFailed)

End Sub
Private Sub Upgrade243to25(UpgradeWsp As
DAO.Workspace, dbFile As Database, sVersion As
String)

    Dim sBuf As String
    Dim qy As DAO.QueryDef
    Dim rTemp As DAO.Recordset
    Dim lId As Long
    Dim cTempStr As New cStringSM

    On Error GoTo Upgrade243to25Err

    sBuf = "Release " & gsVersion25 & " onwards,
new 'Connections' must be created for all " & _
```

```
        "connection strings. " & vbCrLf &
vbCrLf & _
        "Connections will appear under the
Globals/Connections " & _
        "node in the workspace. " & vbCrLf
& _
        "A list of all 'Connections' (instead
of 'Connection Strings') " & _
        'in the workspace will be displayed
in the 'Connections' field for " & _
        "ODBC steps on the Step definition
screen. " & vbCrLf & vbCrLf & _
        "Each Connection can be marked as
static or dynamic. " & vbCrLf & _
        "Dynamic connections will be
created when a step starts execution and " &
_
        "closed once the step completes. " &
vbCrLf & _
        "Static connections will be kept open
till the run completes." & vbCrLf & vbCrLf
& _
        "Currently dynamic 'Connections'
have been created for all existing
'Connection Strings' " & _
        "with the suffix " &
CONNECTION_STRINGS_TO_NAME_S
UFFIX
    Call MsgBox(sBuf, vbOKOnly +
vbApplicationModal, "Upgrade database")

    ' Add a new table for the connection name
entity
    ' This table has been added in order to
satisfy the TPC-H requirement that
    ' all the queries in a stream need to be
executed on a single connection.
    sBuf =
CreateConnectionDtlsTableScript()
    dbFile.Execute sBuf, dbFailOnError

    ' Add an identifier column for the
connection_name_id field
    sBuf = "alter table att_identifiers " & _
        " add column " &
FLD_ID_CONN_NAME & " long "
    dbFile.Execute sBuf, dbFailOnError

    Call UpdateDbDtls(dbFile, sVersion)

    ' insert connection_dtl records for each of
the connection strings
    sBuf = "select * from " &
TBL_CONNECTION_STRINGS
    Set rTemp = dbFile.OpenRecordset(sBuf,
dbOpenSnapshot)

    sBuf = "insert into " &
TBL_CONNECTION_DTLS & _
        "( " & FLD_ID_WORKSPACE & _
        ", " & FLD_ID_CONN_NAME & _
        ", " &
FLD_CONN_DTL_CONNECTION_NAM
E & _
        ", " &
FLD_CONN_DTL_CONNECTION_STRI
NG & _
        ", " &
FLD_CONN_DTL_CONNECTION_TYPE
& " ) " & _
        " values ( [w_id], [c_id], [c_name],
[c_str], [c_type] ) "
    Set qy = dbFile.CreateQueryDef("", sBuf)

    lId = glMinId
    If rTemp.RecordCount <> 0 Then
        rTemp.MoveFirst

        While Not rTemp.EOF
            qy.Parameters("w_id").Value =
rTemp.Fields(FLD_ID_WORKSPACE)
            qy.Parameters("c_id").Value = lId
            qy.Parameters("c_name").Value =
rTemp.Fields(FLD_CONN_STR_CONNECTI
ON_NAME) &
CONNECTION_STRINGS_TO_NAME_SUF
FIX
            qy.Parameters("c_str").Value =
rTemp.Fields(FLD_CONN_STR_CONNECTI
ON_NAME)
            qy.Parameters("c_type").Value =
ConnTypeDynamic

            qy.Execute dbFailOnError

            lId = lId + 1
            rTemp.MoveNext
        Wend
    End If
    qy.Close
    rTemp.Close

    ' Initialize the value of the
connection_name_id
    sBuf = "update att_identifiers " & _
        " set " & FLD_ID_CONN_NAME & "
= " & Str(lId)
    dbFile.Execute sBuf, dbFailOnError

    ' Update the start_directory field in att_steps
to point to the newly
    ' created connections
    Call ReadStepsInWorkspace(rTemp, qy,
glInvalidId, dbLoad:=dbFile, _
        bSelectArchivedRecords:=False)

    sBuf = "update " & TBL_STEPS & _
        " set " & FLD_STEPS_EXEC_DTL & " =
[c_name] " & _
        " where " & FLD_ID_STEP & " = [s_id] "
& _
        " and " & FLD_STEPS_VERSION_NO
& " = [ver_no] "
    Set qy = dbFile.CreateQueryDef("", sBuf)

    If rTemp.RecordCount <> 0 Then
        rTemp.MoveFirst

        While Not rTemp.EOF
            If
rTemp.Fields(FLD_STEPS_EXEC_MECHAN
ISM).Value = gintExecuteODBC Then
                If Not (StringEmpty("" &
rTemp.Fields(FLD_STEPS_EXEC_DTL)))
Then
                    sBuf =
rTemp.Fields(FLD_STEPS_EXEC_DTL)
                    ' Strip the enclosing "%"
characters
                    sBuf = Mid(sBuf, 2, Len(sBuf) -
2) &
CONNECTION_STRINGS_TO_NAME_SUF
FIX

                    qy.Parameters("c_name").Value =
sBuf
                    qy.Parameters("s_id").Value =
rTemp.Fields(FLD_ID_STEP)
                    qy.Parameters("ver_no").Value =
rTemp.Fields(FLD_STEPS_VERSION_NO)
                    qy.Execute dbFailOnError
                End If
            End If
            rTemp.MoveNext
        Wend
    End If

    qy.Close
    rTemp.Close

    Exit Sub

Upgrade243to25Err:
    UpgradeWsp.Rollback
    Call LogErrors(Errors)
    Err.Raise vbObjectError + errUpgradeFailed,
mstrModuleName, _
        LoadResString(errUpgradeFailed)

End Sub
Private Sub Upgrade25to251(UpgradeWsp As
DAO.Workspace, dbFile As Database, sVersion As
String)

    On Error GoTo Upgrade25to251Err

    ' Create the built-in parameters, run_id and
output_dir, for each workspace in the db
    Call InsertBuiltInParameter(dbFile,
PARAM_RUN_ID, gstrEmptyString,
PARAM_RUN_ID_DESC)
    Call InsertBuiltInParameter(dbFile,
PARAM_OUTPUT_DIR, gstrEmptyString,
PARAM_OUTPUT_DIR_DESC)

    Call UpdateDbDtls(dbFile, sVersion)

    Exit Sub

Upgrade25to251Err:
    UpgradeWsp.Rollback
    Call LogErrors(Errors)
    Err.Raise vbObjectError + errUpgradeFailed,
mstrModuleName, _
        LoadResString(errUpgradeFailed)

End Sub

Private Sub Upgrade242to243(UpgradeWsp As
DAO.Workspace, dbFile As Database, sVersion As
String)

    Dim sBuf As String
    Dim cTempStr As New cStringSM
    Dim iResponse As Integer

    On Error GoTo DeleteHistoryErr

    Call DeleteRunHistory(dbFile)

    On Error GoTo Upgrade242to243Err

    UpgradeWsp.CommitTrans

    UpgradeWsp.BeginTrans

    ' Add a parameter type field and a description
field to the parameter table
    sBuf = "alter table run_step_details " & _
        " add column parent_instance_id LONG "

    dbFile.Execute sBuf, dbFailOnError

    sBuf = "alter table run_step_details " & _
```

```
        " add column iterator_value
TEXT(255) "

    dbFile.Execute sBuf, dbFailOnError

    Call AlterFieldType(dbFile,
TBL_RUN_STEP_DTLS, "start_time",
DATA_TYPE_CURRENCY)
    Call AlterFieldType(dbFile,
TBL_RUN_STEP_DTLS, "end_time",
DATA_TYPE_CURRENCY)
    Call AlterFieldType(dbFile,
TBL_RUN_STEP_HDR, "start_time",
DATA_TYPE_CURRENCY)
    Call AlterFieldType(dbFile,
TBL_RUN_STEP_HDR, "end_time",
DATA_TYPE_CURRENCY)

    Call UpdateDbDtls(dbFile, sVersion)

    Exit Sub

DeleteHistoryErr:
    ' This is not a critical error - continue with
upgrade
    Call LogErrors(Errors)
    Resume Next

Upgrade242to243Err:
    UpgradeWsp.Rollback
    Call LogErrors(Errors)
    Err.Raise vbObjectError +
errUpgradeFailed, mstrModuleName, _
          LoadResString(errUpgradeFailed)

End Sub
'**********************************
*******************************
' The AlterFieldType Sub procedure requires
three string
' parameters. The first string specifies the
name of the table
' containing the field to be changed. The
second string specifies
' the name of the field to be changed. The
third string specifies
' the new data type for the field.
'**********************************
*******************************

Private Sub AlterFieldType(dbFile As
Database, TblName As String, FieldName
As String, _
              NewDataType As String)
    Dim qdf As DAO.QueryDef
    Dim sSql As String

    ' Add a temporary field to the table.
    sSql = "ALTER TABLE [" & TblName &
_
          "] ADD COLUMN AlterTempField
" & NewDataType
    Set qdf = dbFile.CreateQueryDef("",
sSql)
    qdf.Execute

    ' Copy the data from old field into the new
field.
    qdf.SQL = "UPDATE DISTINCTROW
[" & TblName & "] SET AlterTempField =
[" & FieldName & "]"
    qdf.Execute

    ' Delete the old field.
    qdf.SQL = "ALTER TABLE [" & TblName
& "] DROP COLUMN [" & FieldName & "]"
    qdf.Execute

    ' Rename the temporary field to the old
field's name.
    dbFile.TableDefs("[" & TblName &
"]").Fields("AlterTempField").Name =
FieldName
    dbFile.TableDefs.Refresh

    ' Clean up.
End Sub
Private Sub Upgrade01to21(UpgradeWsp As
DAO.Workspace, dbFile As DAO.Database,
sVersion As String)
    Dim sSql As String

    On Error GoTo Upgrade01to21Err

    sSql = "Create table db_details (" & _
          "db_version              Text(50) " & _
    ");"

    dbFile.Execute sSql, dbFailOnError

    sSql = "insert into db_details " & _
          "( db_version ) values ( '" & sVersion
& "' ) "

    dbFile.Execute sSql, dbFailOnError

    Call UpdateContinuationCriteria(dbFile)

    Exit Sub

Upgrade01to21Err:
    Call LogErrors(Errors)
    UpgradeWsp.Rollback
    Err.Raise vbObjectError +
errUpgradeFailed, mstrModuleName, _
          LoadResString(errUpgradeFailed)

End Sub
Private Function UpgradeDb(UpgradeWsp As
DAO.Workspace, dbFile As Database, _
       sVerTo As String, sVerFrom As String)
As Boolean

    Dim sMsg As String

    On Error GoTo UpgradeDbErr

    UpgradeDb = False
    If Not ValidUpgrade(sVerTo, sVerFrom)
Then Exit Function

    If NoDbChanges(sVerTo, sVerFrom) Then
       UpgradeDb = True
       Exit Function
    End If

    sMsg = "The database needs to be upgraded
from Version " & sVerFrom & _
          " to Version " & sVerTo & "." &
vbCrLf & _
          "Proceed?"
    If Not Confirm(Buttons:=vbYesNo,
strMessage:=sMsg, strTitle:="Upgrade
database") Then
       Exit Function
    End If

    UpgradeWsp.BeginTrans

    Select Case sVerFrom
       Case gsVersion25
          Call Upgrade25to251(UpgradeWsp, dbFile,
gsVersion251)

       Case gsVersion243
          Call Upgrade243to25(UpgradeWsp, dbFile,
gsVersion25)
          Call Upgrade25to251(UpgradeWsp, dbFile,
gsVersion251)

       Case gsVersion24, gsVersion241,
gsVersion242
          sMsg = "After this upgrade, the run history
for previous runs will no longer be available. " & _
                "Continue?"
          If Not Confirm(Buttons:=vbYesNo,
strMessage:=sMsg, strTitle:="Upgrade database")
Then
             UpgradeWsp.CommitTrans
             Exit Function
          End If
          Call Upgrade242to243(UpgradeWsp,
dbFile, gsVersion243)
          Call Upgrade243to25(UpgradeWsp, dbFile,
gsVersion25)
          Call Upgrade25to251(UpgradeWsp, dbFile,
gsVersion251)

       Case gsVersion23
          Call Upgrade23to24(UpgradeWsp, dbFile,
gsVersion24)
          Call Upgrade242to243(UpgradeWsp,
dbFile, gsVersion242)
          Call Upgrade243to25(UpgradeWsp, dbFile,
gsVersion25)
          Call Upgrade25to251(UpgradeWsp, dbFile,
gsVersion251)

       Case gsVersion21
          Call Upgrade21to23(UpgradeWsp, dbFile,
gsVersion23)
          Call Upgrade23to24(UpgradeWsp, dbFile,
gsVersion24)
          Call Upgrade242to243(UpgradeWsp,
dbFile, gsVersion242)
          Call Upgrade243to25(UpgradeWsp, dbFile,
gsVersion25)
          Call Upgrade25to251(UpgradeWsp, dbFile,
gsVersion251)

       Case gsVersion10
          Call Upgrade10to21(UpgradeWsp, dbFile,
gsVersion21)
          Call Upgrade21to23(UpgradeWsp, dbFile,
gsVersion23)
          Call Upgrade23to24(UpgradeWsp, dbFile,
gsVersion24)
          Call Upgrade242to243(UpgradeWsp,
dbFile, gsVersion242)
          Call Upgrade243to25(UpgradeWsp, dbFile,
gsVersion25)
          Call Upgrade25to251(UpgradeWsp, dbFile,
gsVersion251)

       Case gsVersion01
          Call Upgrade01to21(UpgradeWsp, dbFile,
gsVersion21)
          Call Upgrade21to23(UpgradeWsp, dbFile,
gsVersion23)
          Call Upgrade23to24(UpgradeWsp, dbFile,
gsVersion24)
          Call Upgrade242to243(UpgradeWsp,
dbFile, gsVersion242)
```

```
        Call Upgrade243to25(UpgradeWsp,
dbFile, gsVersion25)
        Call Upgrade25to251(UpgradeWsp,
dbFile, gsVersion251)

    End Select

    UpgradeWsp.CommitTrans

    UpgradeDb = True
    Exit Function

UpgradeDbErr:
    Call LogErrors(Errors)
    ShowError errUpgradeFailed

End Function
Private Function DBVersion(TestDb As
Database) As String
    ' Retrieves the database version
    Dim rVersion As Recordset

    On Error GoTo DBVersionErr

    Set rVersion =
TestDb.OpenRecordset("Select db_version
from db_details ", _
        dbOpenForwardOnly)

    BugAssert rVersion.RecordCount <> 0
    DBVersion = rVersion!db_version

    rVersion.Close
    Exit Function

DBVersionErr:
    If Err.Number = merrDaoTableMissing
Then
        DBVersion = gsVersion01
    Else
        LogErrors Errors
        Err.Raise vbObjectError +
errUpgradeFailed, mstrModuleName, _
            LoadResString(errUpgradeFailed)
    End If

End Function

Private Function ValidUpgrade(sVerTo As
String, sVerFrom As String) As Boolean

    If sVerTo = gsVersion And sVerFrom =
gsVersion251 Then
        ValidUpgrade = True
    ElseIf sVerTo = gsVersion And
sVerFrom = gsVersion25 Then
        ValidUpgrade = True
    ElseIf sVerTo = gsVersion And
sVerFrom = gsVersion243 Then
        ValidUpgrade = True
    ElseIf sVerTo = gsVersion And
sVerFrom = gsVersion242 Then
        ValidUpgrade = True
    ElseIf sVerTo = gsVersion And
sVerFrom = gsVersion241 Then
        ValidUpgrade = True
    ElseIf sVerTo = gsVersion And
sVerFrom = gsVersion24 Then
        ValidUpgrade = True
    ElseIf sVerTo = gsVersion And
sVerFrom = gsVersion23 Then
        ValidUpgrade = True
    ElseIf sVerTo = gsVersion And
sVerFrom = gsVersion21 Then
        ValidUpgrade = True
    ElseIf sVerTo = gsVersion And sVerFrom =
gsVersion10 Then
        ValidUpgrade = True
    ElseIf sVerTo = gsVersion And sVerFrom =
gsVersion01 Then
        ValidUpgrade = True
    Else
        ValidUpgrade = False
    End If

End Function

Attribute VB_Name = "DebugSM"
'  FILE:      DebugSM.bas
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
'  PURPOSE:    Contains all the functions that
carry out error/debug
'              processing for the project.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
' Most of the functions in this module that
manipulate the
' error object do not have an On Error GoTo
statement - this
' is because it will clear the passed in error
object - let
' the calling functions handle the errors raised
by this
' module, if any
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this module
Private Const mstrModuleName As String =
"DebugSM."

Private mcLogFile As cFileSM
Private mcErrorFile As cFileSM

Private Const
FORMAT_MESSAGE_FROM_SYSTEM =
&H1000
Private Const
FORMAT_MESSAGE_IGNORE_INSERTS =
&H200
Private Const pNull = 0

Declare Function FormatMessage Lib
"kernel32" Alias "FormatMessageA" (ByVal
dwFlags As Long, lpSource As Any, ByVal
dwMessageId As Long, ByVal dwLanguageId
As Long, ByVal lpbuffer As String, ByVal
nSize As Long, Arguments As Long) As Long
Public Function Confirm(Optional
lngMessageCode As conConfirmMsgCodes, _
        Optional lngTitleCode As
conConfirmMsgTitleCodes, _
        Optional TitleParameter As String, _
        Optional ByVal Buttons As Integer = -1, _
        Optional strMessage As String =
gstrEmptyString, _
        Optional strTitle As String =
gstrEmptyString) _
        As Boolean
    ' Displays a confirmation message
corresponding to the
    ' passed in message code. Returns True if the
user says
    ' Ok and False otherwise

    Dim intResponse As Integer
    Dim intButtonStyle As Integer

    On Error GoTo ConfirmErr

    Confirm = False

    ' If the buttons style hasn't been specified, set the
    ' default style to display OK and Cancel buttons
    If Buttons = -1 Then
        intButtonStyle = vbOKCancel
    Else
        intButtonStyle = Buttons
    End If

    ' Find the message string for the passed in code
    If StringEmpty(strMessage) Then
        strMessage =
Trim$(LoadResString(lngMessageCode))
    End If

    If StringEmpty(strTitle) Then
        strTitle =
Trim$(LoadResString(lngTitleCode))
    End If

    If Not StringEmpty(TitleParameter) Then
        strTitle = strTitle & Chr$(vbKeySpace) & _
            gstrSQ & TitleParameter & gstrSQ
    End If

    ' Display the confirmation message with the
Cancel button
    ' set to the default - assume that we are
confirming
    ' potentially dangerous operations!
    intResponse = MsgBox(strMessage, _
        intButtonStyle + vbQuestion +
vbApplicationModal, _
        strTitle)

    ' Translate the user response into a True/False
return code
    If intButtonStyle = vbOKCancel Then
        If intResponse = vbOK Then
            Confirm = True
        Else
            Confirm = False
        End If
    Else
        If intResponse = vbYes Then
            Confirm = True
        Else
            Confirm = False
        End If
    End If

    Exit Function

ConfirmErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    gstrSource = mstrModuleName & "Confirm"
    Err.Raise vbObjectError + errConfirmFailed, _
        gstrSource, _
        LoadResString(errConfirmFailed)

End Function
Public Sub LogSystemError()
    Dim eErrCode As Long

    eErrCode = GetLastError()
    If eErrCode <> 0 Then
```

```
      WriteToFile "System Error: " &
eErrCode & vbCrLf & ApiError(eErrCode),
_
            blnError:=True
   End If

End Sub
Public Function ApiError(ByVal e As Long)
As String

   Dim s As String
   Dim c As Long

   s = String(256, 0)
   c =
FormatMessage(FORMAT_MESSAGE_FR
OM_SYSTEM Or _

FORMAT_MESSAGE_IGNORE_INSERT
S, _
         pNull, e, 0&, s, Len(s), ByVal pNull)
   If c Then ApiError = e & ": " & Left$(s,
c)

End Function

' Output flags determine output destination
of BugAsserts and messages
#Const afLogfile = 1
#Const afMsgBox = 2
#Const afDebugWin = 4
#Const afAppLog = 8

' Display appropriate error message, and
then stop
' program.  These errors should NOT be
possible in
' shipping product.
Sub BugAssert(ByVal fExpression As
Boolean, _
          Optional sExpression As String)
#If afDebug Then
   If fExpression Then Exit Sub
   BugMessage "BugAssert failed: " &
sExpression
   Stop
#End If
End Sub

Sub BugMessage(sMsg As String)

#If afDebug And afLogfile Then
   ' Since we are writing log messages, the
error flag is turned off
   Call WriteToFile(sMsg, False)
#End If
#If afDebug And afMsgBox Then
   MsgBox sMsg
#End If
#If afDebug And afDebugWin Then
   Debug.Print sMsg
#End If
#If afDebug And afAppLog Then
    App.LogEvent sMsg
#End If

End Sub
Public Function ProjectLogFile() As String

   ProjectLogFile = mcLogFile.FileName

End Function
Public Function ProjectErrorFile() As String

   ProjectErrorFile = mcErrorFile.FileName

End Function

Private Sub WriteToFile(sMsg As String,
Optional ByVal blnError As Boolean)

   ' Calls procedures to write the passed in
message to the log -
   ' The blnError flag is used to indicate that
the message
   ' should be logged to the error file - by
default the log
   ' file is used

   Dim mcFileObj As cFileSM
   Dim strFileName As String
   Dim strFileHdr As String

   On Error GoTo WriteToFileErr

   If blnError Then
      If mcErrorFile Is Nothing Then
         Set mcErrorFile = New cFileSM
      End If
      Set mcFileObj = mcErrorFile
   Else
      If mcLogFile Is Nothing Then
         Set mcLogFile = New cFileSM
      End If
      Set mcFileObj = mcLogFile
   End If

   If StringEmpty(mcFileObj.FileName) Then
      If blnError Then
         strFileName = gstrProjectPath & "\" &
App.EXEName & ".ERR"
         strFileHdr = "Stepmaster Errors"
      Else
         strFileName = gstrProjectPath & "\" &
App.EXEName & ".DBG"
         strFileHdr = "Stepmaster Log"
      End If

      mcFileObj.FileName = strFileName
      mcFileObj.WriteLine strFileHdr
      mcFileObj.WriteLine "Log start time : "
& Now
   End If

   mcFileObj.WriteLine sMsg

   Exit Sub

WriteToFileErr:
   ' Display the error code raised by Visual
Basic
   Call DisplayErrors(Errors)
   ' An error message would've been displayed
by the called
   ' procedures

End Sub
Public Sub WriteMessage(sMsg As String)

   Call WriteToFile(sMsg, True)

End Sub

Sub BugTerm()
#If afDebug And afLogfile Then
   ' Close log file
   mcLogFile.CloseFile
#End If
End Sub

Public Sub ShowError(ByVal ErrorCode As
errErrorConstants, _
      Optional ByVal ErrorSource As String =
gstrEmptyString, _
      Optional ByVal OptArgs As String =
gstrEmptyString, _
      Optional ByVal DoWriteError As Boolean =
True)

   If DoWriteError Then
      ' Call a procedure to write the error to a log file
      Call WriteError(ErrorCode, ErrorSource,
OptArgs)
   End If

   ' Re-initialize the values of the Error object
before
   ' displaying the error to the user
   Call InitErrObject(ErrorCode, ErrorSource,
OptArgs)

   Call DisplayErrors(Errors)

   Err.Clear

End Sub
Public Sub WriteError(ByVal ErrorCode As
errErrorConstants, _
      Optional ByVal ErrorSource As String =
gstrEmptyString, _
      Optional ByVal OptArgs As String =
gstrEmptyString)

   ' Initialize the values of the Error object before
   ' calling the log function
   Call InitErrObject(ErrorCode, ErrorSource,
OptArgs)

   Call LogErrors(Errors)

   Err.Clear

End Sub
Private Sub InitErrObject(ByVal ErrorCode As
errErrorConstants, _
      Optional ByVal ErrorSource As String =
gstrEmptyString, _
      Optional ByVal OptArgs As String =
gstrEmptyString)

   Dim lngError As Long

   lngError = IIf(ErrorCode > vbObjectError And
ErrorCode < vbObjectError + 65535, _
         ErrorCode - vbObjectError, ErrorCode)
   Err.Number = lngError + vbObjectError
   Err.Description = LoadResString(lngError) &
OptArgs
   Err.Source = App.EXEName & ErrorSource

End Sub
Public Sub ShowMessage(ByVal MessageCode As
errErrorConstants, _
      Optional ByVal OptArgs As String)

   Dim strMessage As String

   On Error GoTo ShowMessageErr

   strMessage = LoadResString(MessageCode) &
OptArgs

   ' Write the error to a log file
   BugMessage strMessage
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    MsgBox strMessage, vbOKOnly

    Exit Sub

ShowMessageErr:
    ' Log the error and exit
    Call DisplayErrors(Errors)

End Sub
Public Sub ShowMessageStr(sMessage As
String)

    ' Write the error to a log file
    BugMessage sMessage

    MsgBox sMessage, vbOKOnly

End Sub

Public Sub DisplayErrors(myErrCollection
As Errors)
    Dim strError As String
    Dim errLoop As Error
    Dim errCode As Long

    ' Enumerate Errors collection and display
properties of
    ' each Error object.
    If Err.Number <> 0 Then
        If Err.Number > vbObjectError And
Err.Number < (vbObjectError + 65536)
Then
            errCode = Err.Number -
vbObjectError
        Else
            errCode = Err.Number
        End If
        strError = "Error # " & Str(errCode) &
" was generated by " _
            & Err.Source & Chr(13) &
Err.Description
        MsgBox strError, , "Error",
Err.HelpFile, Err.HelpContext
    Else
        For Each errLoop In myErrCollection
            With errLoop
                If Err.Number > vbObjectError
And Err.Number < (vbObjectError + 65536)
Then
                    errCode = .Number -
vbObjectError
                Else
                    errCode = .Number
                End If
                strError = "Error #" & errCode &
vbCrLf
                strError = strError & "    " &
.Description & vbCrLf
                strError = strError & _
                    "    (Source: " & .Source & ")"
& vbCrLf
'                strError = strError & _
'                    "Press F1 to see topic " &
.HelpContext & vbCrLf
'                strError = strError & _
'                    "    in the file " & .HelpFile &
"."
            End With

            MsgBox strError
        Next
    End If

End Sub

Public Sub LogErrors(myErrCollection As
Errors)
    Dim cColErrors As cVectorStr
    Dim strError As String
    Dim errLoop As Error
    Dim errCode As Long
    Dim lngIndex As Long

    Set cColErrors = New cVectorStr

    ' Enumerate Errors collection and display
properties of
    ' each Error object.
    If Err.Number <> 0 Then
        If Err.Number > vbObjectError And
Err.Number < (vbObjectError + 65536) Then
            errCode = Err.Number - vbObjectError
        Else
            errCode = Err.Number
        End If
        strError = "Error # " & Str(errCode) & "
was generated by " _
            & Err.Source & vbCrLf &
Err.Description

        cColErrors.Add strError
    End If

    ' Log all database errors, if any
    For Each errLoop In myErrCollection
        With errLoop
            If Err.Number > vbObjectError And
Err.Number < (vbObjectError + 65536) Then
                errCode = .Number - vbObjectError
            Else
                errCode = .Number
            End If
            strError = "Error #" & errCode &
vbCrLf
            strError = strError & "    " &
.Description & vbCrLf
            strError = strError & _
                "    (Source: " & .Source & ")" &
vbCrLf
        End With

        cColErrors.Add strError
    Next

    ' We can have a error handler now that we
have stored all
    ' errors away safely! - having an error
handler before
    ' enumerating all the errors would have
cleared the error
    ' collection
    On Error GoTo LogErrorsErr
    gstrSource = mstrModuleName &
"LogErrors"

    For lngIndex = 0 To cColErrors.Count - 1
        strError = cColErrors(lngIndex)
        Debug.Print strError
        Call WriteToFile(strError, True)
    Next lngIndex

    Set cColErrors = Nothing

    Exit Sub

LogErrorsErr:
    ' Display the error code raised by Visual
Basic
    DisplayErrors Errors
    On Error GoTo 0
    ShowError errUnableToWriteError,
DoWriteError:=False

End Sub
Attribute VB_Name = "FileCommon"
'  FILE:       FileCommon.bas
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This module contains common
functionality to display
'              the File Open dialog.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name when
errors
' are raised by this module
Private Const mstrModuleName As String =
"FileCommon."

Private Enum EOpenFile
    OFN_OVERWRITEPROMPT = &H2
    OFN_HIDEREADONLY = &H4
    OFN_FILEMUSTEXIST = &H1000
    OFN_EXPLORER = &H80000
End Enum

' The locations for the different output files are
presented to
' the user in a list box. These constants are used
while loading the
' data and while reading the data from the list box.
' These constants also represent the different file
types that are
' displayed to the user in File Open dialogs
Public Enum gFileTypes
    gintOutputFile = 0
'    gintLogFile = 1
    gintErrorFile
    gintStepTextFile
    gintOutputCompareFile
    gintDBFile
    gintDBFileNew
    gintImportFile
    gintExportFile
End Enum

Public Const gsSqlFileSuffix = ".sql"
Public Const gsCmdFileSuffix = ".cmd"

Public Const gsOutputFileSuffix = ".out"
Public Const gstrLogFileSuffix = ".log"
Public Const gsErrorFileSuffix = ".err"
Public Function BrowseDBFile() As String
    ' Prompts the user for a database file with the
workspace information
    ' Call CallFileDialog to display the open file
dialog
    BrowseDBFile = CallFileDialog(gintDBFile)

End Function
Public Function CallFileDialog(intFileType As
Integer, _
        Optional ByVal strDefaultFile As String =
gstrEmptyString) As String
    ' This function initializes the values of the filter
property,
    ' the dialog title and flags for the File Open dialog
depending
    ' on the FileType passed in
```

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    ' It then calls ShowFileOpenDialog to set
these properties and
    ' display the File Open dialog to the user

    ' All the properties used by the File Open
dialog are defined
    ' as constants in this function and passed
to ShowFileOpenDialog
    ' as parameters. So if any of the dialog
properties need to be
    ' modified, these constants are what need
to be changed
    Const s_DLG_TITLE_OPEN = "Open"
    Const s_DLG_TITLE_NEW = "New"
    Const s_DLG_TITLE_IMPORT =
"Import From"
    Const s_DLG_TITLE_EXPORT =
"Export To"

    Const mlng_FILE_STEP_TEXT_FLAGS
= OFN_EXPLORER Or
OFN_FILEMUSTEXIST Or
OFN_HIDEREADONLY
    Const
mlng_FILE_OUTPUT_COMPARE_FLAG
S = mlng_FILE_STEP_TEXT_FLAGS
    Const mlng_FILE_DB_FLAGS =
mlng_FILE_STEP_TEXT_FLAGS
    Const mlng_FILE_OUTPUT_FLAGS =
OFN_EXPLORER Or
OFN_HIDEREADONLY Or
OFN_OVERWRITEPROMPT
    Const mlng_FILE_LOG_FLAGS =
mlng_FILE_OUTPUT_FLAGS
    Const mlng_FILE_ERROR_FLAGS =
mlng_FILE_OUTPUT_FLAGS
    Const mlng_FILE_DB_NEW_FLAGS =
mlng_FILE_OUTPUT_FLAGS

    Const mstr_FILE_ALL_FILTER = "|All
Files (*.*)|*.*"
    Const mstr_FILE_STEP_TEXT_FILTER
= "Query Files (*" & gsSqlFileSuffix & _
          ")|*" & gsSqlFileSuffix &
"|Command Script Files (*" &
gsCmdFileSuffix & _
          ")|*" & gsCmdFileSuffix
    Const
mstr_FILE_OUTPUT_COMPARE_FILTE
R = "Text Files (*.txt)|*.txt"
    Const mstr_FILE_OUTPUT_FILTER =
"Output Files (*.out)|*.out"
    Const mstr_FILE_LOG_FILTER = "Log
Files (*.log)|*.log"
    Const mstr_FILE_ERROR_FILTER =
"Error Files (*.err)|*.err"
    Const mstr_FILE_DB_FILTER =
"Stepmaster Workspace Files (*" &
gsDefDBFileExt & ")|*" & gsDefDBFileExt

    Dim strFileName As String

    On Error GoTo CallFileDialogErr

    Select Case intFileType
      Case gintStepTextFile
        strFileName =
ShowFileOpenDialog( _

mstr_FILE_STEP_TEXT_FILTER &
mstr_FILE_ALL_FILTER, _
            s_DLG_TITLE_OPEN, _

mlng_FILE_STEP_TEXT_FLAGS, _
            strDefaultFile)

      Case gintOutputCompareFile
        strFileName = ShowFileOpenDialog( _

mstr_FILE_OUTPUT_COMPARE_FILTER
& mstr_FILE_ALL_FILTER, _
            s_DLG_TITLE_OPEN, _

mlng_FILE_OUTPUT_COMPARE_FLAGS,
_
            strDefaultFile)

      Case gintOutputFile
        strFileName = ShowFileOpenDialog( _
          mstr_FILE_OUTPUT_FILTER &
mstr_FILE_ALL_FILTER, _
            s_DLG_TITLE_OPEN, _
            mlng_FILE_OUTPUT_FLAGS, _
            strDefaultFile)

'       Case gintLogFile
'         strFileName = ShowFileOpenDialog( _
'           mstr_FILE_LOG_FILTER &
mstr_FILE_ALL_FILTER, _
'           s_DLG_TITLE_OPEN, _
'           mlng_FILE_LOG_FLAGS, _
'           strDefaultFile)
'
      Case gintErrorFile
        strFileName = ShowFileOpenDialog( _
          mstr_FILE_ERROR_FILTER &
mstr_FILE_ALL_FILTER, _
            s_DLG_TITLE_OPEN, _
            mlng_FILE_ERROR_FLAGS, _
            strDefaultFile)

      Case gintDBFile
        strFileName = ShowFileOpenDialog( _
          mstr_FILE_DB_FILTER &
mstr_FILE_ALL_FILTER, _
            s_DLG_TITLE_OPEN, _
            mlng_FILE_DB_FLAGS, _
            strDefaultFile)

      Case gintDBFileNew
        strFileName = ShowFileOpenDialog( _
          mstr_FILE_DB_FILTER &
mstr_FILE_ALL_FILTER, _
            s_DLG_TITLE_NEW, _
            mlng_FILE_DB_NEW_FLAGS, _
            strDefaultFile)

      Case gintImportFile
        strFileName = ShowFileOpenDialog( _
          mstr_FILE_DB_FILTER &
mstr_FILE_ALL_FILTER, _
            s_DLG_TITLE_IMPORT, _
            mlng_FILE_DB_FLAGS, _
            strDefaultFile)

      Case gintExportFile
        strFileName = ShowFileOpenDialog( _
          mstr_FILE_DB_FILTER &
mstr_FILE_ALL_FILTER, _
            s_DLG_TITLE_EXPORT, _
            mlng_FILE_DB_FLAGS, _
            strDefaultFile)

      Case Else
        BugAssert True, "Incorrect file type
passed in."
        ' Default processing will be for the
output file
        strFileName = ShowFileOpenDialog( _
          mstr_FILE_OUTPUT_FILTER &
mstr_FILE_ALL_FILTER, _
            s_DLG_TITLE_OPEN, _
            mlng_FILE_OUTPUT_FLAGS, _
            strDefaultFile)

    End Select
    CallFileDialog = strFileName

    Exit Function

CallFileDialogErr:
    CallFileDialog = gstrEmptyString
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    gstrSource = mstrModuleName &
"CallFileDialog"
    Call ShowError(errBrowseFailed)

End Function

VERSION 5.00
Begin VB.Form frmSplash
   BorderStyle     =  3  'Fixed Dialog
   ClientHeight    =  4710
   ClientLeft      =  45
   ClientTop       =  45
   ClientWidth     =  7455
   ControlBox      =  0  'False
   Icon            =  "frmSplash.frx":0000
   LinkTopic       =  "Form1"
   LockControls    =  -1  'True
   MaxButton       =  0  'False
   MinButton       =  0  'False
   ScaleHeight     =  4710
   ScaleWidth      =  7455
   ShowInTaskbar   =  0  'False
   StartUpPosition =  2  'CenterScreen
   Visible         =  0  'False
   Begin VB.Frame fraMainFrame
      Height          =  4590
      Left            =  45
      TabIndex        =  0
      Top             =  -15
      Width           =  7380
      Begin VB.PictureBox picLogo
         Height          =  2385
         Left            =  510
         Picture         =  "frmSplash.frx":0442
         ScaleHeight     =  2325
         ScaleWidth      =  1755
         TabIndex        =  1
         Top             =  855
         Width           =  1815
      End
      Begin VB.Label lblReserved
         AutoSize        =  -1  'True
         Caption         =  "All Rights Reserved."
         Height          =  195
         Left            =  5520
         TabIndex        =  8
         Top             =  4080
         Width           =  1440
      End
      Begin VB.Label lblCopyright
         AutoSize        =  -1  'True
         Caption         =  "Copyright © 1998"
         BeginProperty Font
            Name            =  "Arial"
            Size            =  8.25
            Charset         =  0
            Weight          =  400
            Underline       =  0  'False
            Italic          =  0  'False
            Strikethrough   =  0  'False
```

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      EndProperty
      Height        =  210
      Left          =  5550
      TabIndex      =  7
      Tag           =  "Copyright"
      Top           =  3850
      Width         =  1380
      WordWrap      =  -1  'True
    End
    Begin VB.Label lblCompany
      AutoSize      =  -1  'True
      Caption       =  "Microsoft
Corporation"
      BeginProperty Font
        Name          =  "Arial"
        Size          =  8.25
        Charset       =  0
        Weight        =  400
        Underline     =  0   'False
        Italic        =  0   'False
        Strikethrough =  0   'False
      EndProperty
      Height        =  210
      Left          =  5460
      TabIndex      =  6
      Tag           =  "Company"
      Top           =  3640
      Width         =  1560
    End
    Begin VB.Label lblRestrictions
      AutoSize      =  -1  'True
      Caption       =  "See License
Agreement for Restrictions"
      Height        =  195
      Left          =  460
      TabIndex      =  5
      Top           =  4080
      Width         =  2790
    End
    Begin VB.Label lblProductName
      AutoSize      =  -1  'True
      Caption       =  "StepMaster"
      BeginProperty Font
        Name          =  "Arial"
        Size          =  32.25
        Charset       =  0
        Weight        =  700
        Underline     =  0   'False
        Italic        =  0   'False
        Strikethrough =  0   'False
      EndProperty
      Height        =  765
      Left          =  2670
      TabIndex      =  4
      Tag           =  "Product"
      Top           =  1200
      Width         =  3495
    End
    Begin VB.Label lblVersion
      Alignment     =  1  'Right Justify
      AutoSize      =  -1  'True
      Caption       =  "Version 2.4"
      BeginProperty Font
        Name          =  "Arial"
        Size          =  12
        Charset       =  0
        Weight        =  700
        Underline     =  0   'False
        Italic        =  0   'False
        Strikethrough =  0   'False
      EndProperty
      Height        =  285
      Left          =  4800
      TabIndex      =  3
      Tag           =  "Version"
      Top           =  2040
      Width         =  1275
    End
    Begin VB.Label lblWarning
      AutoSize      =  -1  'True
      Caption       =  "Do Not Redistribute"
      BeginProperty Font
        Name          =  "Arial"
        Size          =  8.25
        Charset       =  0
        Weight        =  400
        Underline     =  0   'False
        Italic        =  0   'False
        Strikethrough =  0   'False
      EndProperty
      Height        =  210
      Left          =  480
      TabIndex      =  2
      Tag           =  "Warning"
      Top           =  3850
      Width         =  1380
    End
  End
End
Attribute VB_Name = "frmSplash"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
' FILE:      frmSplash.frm
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:   Splash screen for StepMaster
' Contact:   Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit


Private Sub Form_Load()
'   lblVersion.Caption = "Version " &
App.Major & "." & App.Minor & "." &
App.Revision
    lblProductName.Caption = App.Title
    lblVersion.Caption = GetVersionString

End Sub



VERSION 5.00
Begin VB.Form frmWorkspaceOpen
  BorderStyle    =  3  'Fixed Dialog
  Caption        =  "Open Workspace"
  ClientHeight   =  2550
  ClientLeft     =  45
  ClientTop      =  330
  ClientWidth    =  4695
  LinkTopic      =  "Form1"
  LockControls   =  -1  'True
  MaxButton      =  0   'False
  MinButton      =  0   'False
  ScaleHeight    =  2550
  ScaleWidth     =  4695
  ShowInTaskbar  =  0   'False
  StartUpPosition =  1  'CenterOwner
  Begin VB.CommandButton cmdOK
    Caption        =  "OK"
    Default        =  -1  'True
    Height         =  375
    Left           =  2160
    TabIndex       =  2
    Top            =  2040
    Width          =  1095
  End
  Begin VB.CommandButton cmdCancel
    Cancel         =  -1  'True
    Caption        =  "Cancel"
    Height         =  375
    Left           =  3360
    TabIndex       =  3
    Top            =  2040
    Width          =  1095
  End
  Begin VB.ListBox lstWorkspaces
    Height         =  1425
    ItemData       =
"frmWorkspaceOpen.frx":0000
    Left           =  240
    List           =  "frmWorkspaceOpen.frx":0002
    MultiSelect    =  2  'Extended
    TabIndex       =  1
    Top            =  480
    Width          =  4215
  End
  Begin VB.Label lblWorkspaces
    AutoSize       =  -1  'True
    Caption        =  "Workspace"
    Height         =  195
    Left           =  240
    TabIndex       =  0
    Top            =  120
    Width          =  825
  End
End
Attribute VB_Name = "frmWorkspaceOpen"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
' FILE:      frmWorkspaceOpen.frm
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:   Used to display a list of all
workspaces in a
'            workspace definition file for Open, Import,
Export
'            and Run (in SMRunOnly) workspace
' Contact:   Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit
#If RUN_ONLY Then
    Private WithEvents cRunOnlyInst As cRunOnly
Attribute cRunOnlyInst.VB_VarHelpID = -1

Private Sub cRunOnlyInst_Done()
    ShowFree
End Sub

Private Sub Run()
    Dim iIndex As Integer

    Set cRunOnlyInst = New cRunOnly

    For iIndex = 0 To Me.lstWorkspaces.ListCount -
1
        If Me.lstWorkspaces.Selected(iIndex) Then
            ShowBusy
            cRunOnlyInst.WorkspaceId =
Me.lstWorkspaces.ItemData(Me.lstWorkspaces.List
Index)
```

```
        cRunOnlyInst.WspName =
Me.lstWorkspaces.List(Me.lstWorkspaces.L
istIndex)
        cRunOnlyInst.RunWsp
      End If
   Next iIndex

End Sub

#End If

Private Sub cmdCancel_Click()

   Unload Me

End Sub

Private Sub cmdOK_Click()

#If RUN_ONLY Then
   Call Run
#Else
   Call WorkspaceOpenOk
#End If

End Sub


Private Sub lstWorkspaces_DblClick()

   ' A double click on the workspaces list
box is considered
   ' equivalent to selecting an item in the list
and then selecting
   ' the OK command
   Call cmdOK_Click

End Sub

Attribute VB_Name = "IteratorCommon"
'  FILE:       IteratorCommon.bas
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Contains functionality
common across StepMaster and
'              SMRunOnly, pertaining to iterators
'              Specifically, functions to read
iterators records
'              in the workspace, load them in an
array and so on.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this module
Private Const mstrModuleName As String =
"IteratorCommon."

Public Const gintMinIteratorSequence As
Integer = 0

Public Sub RangeComplete(vntIterators As
Variant)
   ' This is a debug procedure
   ' Checks if the from, to and step values
are present in
   ' the array

   Dim bReset As Byte
   Dim bShift As Byte
   Dim lngIndex As Long

   ' Set the three lowest order bits to 1
   bReset = 7

   BugAssert IsArray(vntIterators) And Not
IsEmpty(vntIterators), _
         "Iterators not specified!"

   For lngIndex = LBound(vntIterators) To _
         UBound(vntIterators)
      bShift = 1
      bShift = bShift * (2 ^
(vntIterators(lngIndex).IteratorType - 1))

      bReset = bReset Xor bShift
   Next lngIndex

   ' Assert that all the elements are present
   BugAssert bReset = 0, "Range not
completely specified!"

End Sub
Public Sub LoadIteratorsForWsp(cStepsCol As
cArrSteps, _
      ByVal lngWorkspaceId As Long,
rstStepsInWsp As Recordset)
   ' Initializes the step records in with all the
iterator
   ' values for each step

   Dim recIterators As Recordset

   On Error GoTo LoadIteratorsForWspErr

#If QUERY_ALL Then
   Dim dtStart As Date

   dtStart = Now
   Set recIterators =
ReadWspIterators(lngWorkspaceId)

   Call LoadIteratorsArray(cStepsCol,
recIterators)

   recIterators.Close

   BugMessage "QueryAll Read + load took: "
& CStr(DateDiff("s", dtStart, Now))

#Else
   Dim dtStart As Date
   Dim qyIt As DAO.QueryDef
   Dim sSql As String

   dtStart = Now
   If rstStepsInWsp.RecordCount = 0 Then
      Exit Sub
   End If

   ' This method has the advantage that if the
steps are queried right, everything else follows
   sSql = "Select step_id, version_no, type,
iterator_value, " & _
      " sequence_no " & _
      " from iterator_values " & _
      " where step_id = [s_id] " & _
      " and version_no = [ver_no] "

   ' Order the iterators by sequence within a
step
   sSql = sSql & " order by sequence_no "

   Set qyIt =
dbsAttTool.CreateQueryDef(gstrEmptyString, sSql)
   rstStepsInWsp.MoveFirst

   While Not rstStepsInWsp.EOF

      qyIt.Parameters("s_id").Value =
rstStepsInWsp!step_id
      qyIt.Parameters("ver_no").Value =
rstStepsInWsp!version_no

      Set recIterators =
qyIt.OpenRecordset(dbOpenSnapshot)

      Call LoadIteratorsArray(cStepsCol,
recIterators)
      recIterators.Close

      rstStepsInWsp.MoveNext
   Wend

   qyIt.Close

   BugMessage "Query step at a time Read + load
took: " & CStr(DateDiff("s", dtStart, Now))

#End If

   Exit Sub

LoadIteratorsForWspErr:
   LogErrors Errors
   gstrSource = mstrModuleName &
"LoadIteratorsForWsp"
   On Error GoTo 0
   Err.Raise vbObjectError +
errLoadRsInArrayFailed, _
         gstrSource, _
         LoadResString(errLoadRsInArrayFailed)

End Sub
Private Function ReadWspIterators(ByVal
lngWorkspaceId As Long) As Recordset

   ' This function will return a recordset that is
populated
   ' with the iterators for all the steps in a given
workspace

   Dim recIterators As Recordset
   Dim qyIt As DAO.QueryDef
   Dim strSql As String

   On Error GoTo ReadWspIteratorsErr
   gstrSource = mstrModuleName &
"ReadWspIterators"

   strSql = "Select i.step_id, i.version_no, " & _
      " i.type, i.iterator_value, " & _
      " i.sequence_no " & _
      " from iterator_values i, att_steps a " & _
      " where i.step_id = a.step_id " & _
      " and i.version_no = a.version_no " & _
      " and a.workspace_id = [w_id] " & _
      " and a.archived_flag = [archived] "

   ' Find the highest X-component of the version
number
   strSql = strSql & " AND cint( mid( a.version_no,
1, instr( a.version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) - 1 ) ) = " & _
      " ( select max( cint( mid( version_no, 1, instr(
version_no, " & gstrDQ & gstrVerSeparator &
gstrDQ & " ) - 1 ) ) ) " & _
      " from att_steps AS d " & _
```

```
      " WHERE a.step_id = d.step_id ) "

   ' Find the highest Y-component of the
version number for the highest X-
component
   strSql = strSql & " AND cint( mid(
a.version_no, instr( a.version_no, " &
gstrDQ & gstrVerSeparator & gstrDQ & " )
+ 1 ) ) = " & _
      " ( select max( cint( mid( version_no,
instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) + 1 ) ) ) "
& _
      " from att_steps AS b " & _
      " Where a.step_id = b.step_id " & _
      " AND cint( mid( version_no, 1, instr(
version_no, " & gstrDQ & gstrVerSeparator
& gstrDQ & " ) - 1 ) ) = " & _
      " ( select max( cint( mid( version_no, 1,
instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) - 1 ) ) ) "
& _
      " from att_steps AS c " & _
      " WHERE a.step_id = c.step_id ) ) "


   ' Order the iterators by sequence within a
step
   strSql = strSql & " order by i.step_id,
i.sequence_no "

   Set qyIt =
dbsAttTool.CreateQueryDef(gstrEmptyStrin
g, strSql)
   qyIt.Parameters("w_id").Value =
lngWorkspaceId
   qyIt.Parameters("archived").Value =
False

   Set recIterators =
qyIt.OpenRecordset(dbOpenSnapshot)

   qyIt.Close
   Set ReadWspIterators = recIterators

   Exit Function

ReadWspIteratorsErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError +
errReadDataFailed, _
         gstrSource,
LoadResString(errReadDataFailed)

End Function
Private Sub LoadIteratorsArray(cStepsCol
As cArrSteps, _
      recIterators As Recordset)
   ' Initializes the step records with the
iterators for
   ' the step

   Dim cNewIt As cIterator
   Dim cStepRec As cStep
   Dim lngStepId As Long

   On Error GoTo LoadIteratorsArrayErr
   gstrSource = mstrModuleName &
"LoadIteratorsArray"

   If recIterators.RecordCount = 0 Then
      Exit Sub
   End If

   recIterators.MoveFirst
   While Not recIterators.EOF
      Set cNewIt = New cIterator

      lngStepId =
CLng(ErrorOnNullField(recIterators,
"step_id"))
      If Not cStepRec Is Nothing Then
         If cStepRec.StepId <> lngStepId Then
            Set cStepRec =
cStepsCol.QueryStep(lngStepId)
         End If
      Else
         Set cStepRec =
cStepsCol.QueryStep(lngStepId)
      End If

      ' Initialize iterator values
      cNewIt.IteratorType =
CInt(ErrorOnNullField(recIterators, "type"))
      cNewIt.Value =
CStr(ErrorOnNullField(recIterators,
"iterator_value"))
      cNewIt.SequenceNo =
CInt(ErrorOnNullField(recIterators,
"sequence_no"))

      ' Add this record to the array of iterators
      cStepRec.LoadIterator cNewIt

      Set cNewIt = Nothing
      recIterators.MoveNext
   Wend

   Exit Sub

LoadIteratorsArrayErr:
   LogErrors Errors
   gstrSource = mstrModuleName &
"LoadIteratorsArray"
   On Error GoTo 0
   Err.Raise vbObjectError +
errLoadRsInArrayFailed, _
         gstrSource, _

LoadResString(errLoadRsInArrayFailed)

End Sub


Attribute VB_Name = "MsgConfirm"
' FILE:      MsgConfirm.bas
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:    Contains constants for
confirmation messages that
'            will be displayed by StepMaster
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' A public enum containing the codes for all the
confirmation
' messages that will be used by the project -
each of the codes
' has the prefix, con
Public Enum conConfirmMsgCodes
   conWspDelete = 2000
   conSave
   conStopRun
   conSaveConnect
   conSaveDB
End Enum

' A public enum containing the titles for all the
confirmation
' messages that will be used by the project - each of
the codes
' has the prefix, cont - most confirmation message
codes will
' have a corresponding title code in here
Public Enum conConfirmMsgTitleCodes
   contWspDelete = 3000
   contSave
   contStopRun
   contSaveConnect
   contSaveDB
End Enum

Attribute VB_Name = "OpenFiles"
' FILE:      OpenFiles.bas
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:    This module holds a list of all files
that have been
'            opened by the project. This module is
needed since there
'            is no way to share static data between
different instances
'            of a class.
'            Many procedure in this module do not do
any error handling -
'            this is 'coz it is also used by procedures
that log error
'            messages and any error handler will erase
the collection
'            of errors!

' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit


' Used to indicate the source module name when
errors
' are raised by this class
Private Const mstrModuleName As String =
".OpenFiles."

Private mOpenFiles As cNodeCollections

Private Const mstrTempDir As String = "\Temp\"

' The maximum number of temporary files that we
can create in a
' session
Private Const mlngMaxFileIndex As Long =
999999
Private Const mstrFileIndexFormat As String =
"000000"
Private Const mstrTempFilePrefix As String =
"SM"
Private Const mstrTempFileSuffix As String =
".cmd"

Private Const merrFileNotFound As Long = 76
Private Function GetFileHandle(strFileName) As
cFileInfo

   Dim lngIndex As Long
```

```
    Dim blnFileOpen As Boolean

    If Not mOpenFiles Is Nothing Then

        blnFileOpen = False
        For lngIndex = 0 To mOpenFiles.Count
- 1
            If mOpenFiles(lngIndex).FileName
= strFileName Then
                blnFileOpen = True
                Exit For
            End If
        Next lngIndex

        If blnFileOpen Then
            Set GetFileHandle =
mOpenFiles(lngIndex)
        Else
            Set GetFileHandle = Nothing
        End If
    Else
        Set GetFileHandle = Nothing
    End If

End Function

Private Function GetTempFileDir() As
String

    Dim strTempFileDir As String

    On Error GoTo GetTempFileDirErr

    strTempFileDir = gstrProjectPath &
mstrTempDir

    If StringEmpty(Dir$(strTempFileDir,
vbDirectory)) Then
        MkDir strTempFileDir
    End If

    GetTempFileDir = strTempFileDir

    Exit Function

GetTempFileDirErr:
    ' Log the error code raised by Visual
Basic
    Call LogErrors(Errors)
    gstrSource = mstrModuleName &
"GetTempFileDir"
    On Error GoTo 0
    Err.Raise vbObjectError +
errProgramError, gstrSource, _
            LoadResString(errProgramError)

End Function
Public Function
MakePathValid(strFileName As String) As
String
    ' Checks if the passed in file path is valid

    Dim strFileDir As String
    Dim strTempDir As String
    Dim strTempFile As String
    Dim intPos As Integer
    Dim intStart As Integer

    On Error GoTo MakePathValidErr
    gstrSource = mstrModuleName &
"MakePathValid"

    strTempFile = strFileName
    intPos = InstrR(strFileName,
gstrFileSeparator)

    If intPos > 0 Then
        strFileDir = Left$(strTempFile, intPos - 1)
        If StringEmpty(Dir$(strFileDir,
vbDirectory)) Then
            ' Loop through the entire path starting
at the root
            ' since Mkdir can create only one level
of sub-directory
            ' at a time
            intStart = InStr(strFileDir,
gstrFileSeparator)

            Do While strTempDir <> strFileDir

                If intStart > 0 Then
                    strTempDir = Left$(strFileDir,
intStart - 1)
                Else
                    strTempDir = strFileDir
                End If

                If StringEmpty(Dir$(strTempDir,
vbDirectory)) Then
                    ' If the specified directory doesn't
exist, try to
                    ' create it.
                    MkDir strTempDir
                Else
                    ' The directory exists - go to it's
sub-directory
                End If
                intStart = InStr(intStart + 1,
strFileDir, gstrFileSeparator)
            Loop

            ' Sanity check
            If StringEmpty(Dir$(strFileDir,
vbDirectory)) Then
                ' We were unable to create the file
directory
                ShowError errCreateDirectoryFailed,
gstrSource, _
                        strFileDir, DoWriteError:=False
                MakePathValid = gstrEmptyString
            Else
                MakePathValid = strTempFile
            End If
        Else
            ' The specified directory exists - we
should be able
            ' to create the output file in it
            MakePathValid = strTempFile
        End If
    Else
        ' The user has only specified a filename -
VB will try
        ' to create it in the current directory
        MakePathValid = strTempFile
    End If

    Exit Function

MakePathValidErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    gstrSource = mstrModuleName &
"MakePathValid"
    ' Log the filename for debug
    Call WriteError(errInvalidFile, gstrSource,
strTempFile)
    On Error GoTo 0
    Err.Raise vbObjectError + errProgramError,
gstrSource, _
            LoadResString(errProgramError)

End Function
Public Function OpenFileSM(strFileName As
String) As Integer
    Dim intHFile As Integer
    Dim NewFileInfo As cFileInfo

    On Error GoTo OpenFileSMErr
    gstrSource = mstrModuleName & "OpenFileSM"

    If StringEmpty(strFileName) Then
        On Error GoTo 0
        Err.Raise vbObjectError + errInvalidFile,
gstrSource, _
                LoadResString(errInvalidFile)
    End If

    If mOpenFiles Is Nothing Then
        Set mOpenFiles = New cNodeCollections
    End If

    Set NewFileInfo = GetFileHandle(strFileName)

    If NewFileInfo Is Nothing Then
        ' The file has not been opened yet

        ' If the filename has not been initialized, do not
        ' attempt to open it
        strFileName = MakePathValid(strFileName)

        If strFileName <> gstrEmptyString Then
            intHFile = FreeFile
            Open strFileName For Output Shared As
intHFile

            Set NewFileInfo = New cFileInfo
            NewFileInfo.FileHandle = intHFile
            NewFileInfo.FileName = strFileName
            mOpenFiles.Load NewFileInfo
        Else
            ' Either the directory was invalid or s'thing
failed
            ' Display the error to the user instead of
trying
            ' to log to the file
            ShowError errInvalidFile, gstrSource,
strFileName, _
                    DoWriteError:=False
            intHFile = 0
        End If
    Else
        intHFile = NewFileInfo.FileHandle
    End If

    OpenFileSM = intHFile

    Exit Function

OpenFileSMErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    ' The Open command failed for some reason -
write an error
    ' and let the calling function handle the error
    ShowError errInvalidFile, gstrSource,
strFileName, _
            DoWriteError:=False
    OpenFileSM = 0

End Function
Public Function CreateTempFile() As String

    Dim strTempFileDir As String
    Dim strTempFileName As String
```

```
    Static lngLastFileIndex As Long

    On Error GoTo CreateTempFileErr

    strTempFileDir = GetTempFileDir()

    Do
        If lngLastFileIndex =
mlngMaxFileIndex Then
            On Error GoTo 0
            Err.Raise vbObjectError +
errMaxTempFiles, gstrSource, _

LoadResString(errMaxTempFiles)
        End If

        lngLastFileIndex = lngLastFileIndex +
1
        strTempFileName =
mstrTempFilePrefix & _
            Format$(lngLastFileIndex,
mstrFileIndexFormat) & _
            mstrTempFileSuffix

        If Not
StringEmpty(Dir$(strTempFileDir &
strTempFileName)) Then
            ' Remove any files left over from a
previous run,
            ' if they still exist
            Kill strTempFileDir &
strTempFileName
        End If

    ' Looping in case the file delete doesn't go
through for
    ' some reason
    Loop While Not
StringEmpty(Dir$(strTempFileDir &
strTempFileName))

    CreateTempFile =
GetShortName(strTempFileDir)
    CreateTempFile = CreateTempFile &
strTempFileName

    Exit Function

CreateTempFileErr:
    ' Log the error code raised by Visual
Basic
    Call LogErrors(Errors)
    gstrSource = gstrSource &
"CreateTempFile"
    On Error GoTo 0
    Err.Raise vbObjectError +
errProgramError, gstrSource, _
        LoadResString(errProgramError)

End Function
Public Sub CloseFileSM(strFileName As
String)
    Dim FileToClose As cFileInfo

    If Not mOpenFiles Is Nothing Then

        ' Get the handle to the open file, if it
exists
        Set FileToClose =
GetFileHandle(strFileName)

        If Not FileToClose Is Nothing Then
            Close FileToClose.FileHandle
            ' Remove the file info from the
collection of open files
            mOpenFiles.Unload
FileToClose.Position
        End If
    End If

End Sub
Public Sub CloseOpenFiles()
    Dim lIndex As Long

    If Not mOpenFiles Is Nothing Then
        For lIndex = mOpenFiles.Count - 1 To 0
            CloseFileSM
(mOpenFiles(lIndex).FileName)
        Next lIndex
    End If

End Sub

Attribute VB_Name = "ParameterCommon"
' FILE:      ParameterCommon.bas
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:   Contains functionality common
across StepMaster and
'            SMRunOnly, pertaining to parameters
'            Specifically, functions to load
parameter records
'            in an array.
' Contact:   Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this module
Private Const mstrModuleName As String =
"ParameterCommon."

Public Sub
LoadRecordsetInParameterArray(rstWorkSpac
eParameters As Recordset, _
    cParamCol As cArrParameters)

    Dim cNewParameter As cParameter

    On Error GoTo
LoadRecordsetInParameterArrayErr

    If rstWorkSpaceParameters.RecordCount =
0 Then
        Exit Sub
    End If

    rstWorkSpaceParameters.MoveFirst
    While Not rstWorkSpaceParameters.EOF

        Set cNewParameter = New cParameter

        ' Initialize parameter values
        cNewParameter.ParameterId =
rstWorkSpaceParameters.Fields(0)

        ' Call a procedure to raise an error if
mandatory fields are
        ' null.
        cNewParameter.ParameterName = CStr( _

ErrorOnNullField(rstWorkSpaceParameters,
"parameter_name"))
        cNewParameter.ParameterValue =
CheckForNullField( _
            rstWorkSpaceParameters,
"parameter_value")
        cNewParameter.WorkspaceId = CStr( _

ErrorOnNullField(rstWorkSpaceParameters,
FLD_ID_WORKSPACE))
        cNewParameter.ParameterType = CStr( _

ErrorOnNullField(rstWorkSpaceParameters,
"parameter_type"))
        cNewParameter.Description =
CheckForNullField( _
            rstWorkSpaceParameters, "description")

        cParamCol.Load cNewParameter

        Set cNewParameter = Nothing
        rstWorkSpaceParameters.MoveNext
    Wend

    Exit Sub

LoadRecordsetInParameterArrayErr:
    LogErrors Errors
    gstrSource = mstrModuleName &
"LoadRecordsetInParameterArray"
    On Error GoTo 0
    Err.Raise vbObjectError +
errLoadRsInArrayFailed, gstrSource, _
        LoadResString(errLoadRsInArrayFailed)
End Sub
Attribute VB_Name = "Public"
' FILE:      Public.bas
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:   This module contains all the public
constants for this project
' Contact:   Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Public Const gsVersion01 As String = "0.1"
Public Const gsVersion10 As String = "1.0"
Public Const gsVersion21 As String = "2.1"
Public Const gsVersion23 As String = "2.3"
Public Const gsVersion24 As String = "2.4"
Public Const gsVersion241 As String = "2.4.1"
Public Const gsVersion242 As String = "2.4.2"
Public Const gsVersion243 As String = "2.4.3"
Public Const gsVersion25 As String = "2.5"
Public Const gsVersion251 As String = "2.5.1"
Public Const gsVersion253 As String = "2.5.3"
Public Const gsVersion254 As String = "2.5.4"
Public Const gsVersion255 As String = "2.5.5"
Public Const gsVersion As String = gsVersion255

' The same form is used for the creation of new
nodes and
' updates to existing nodes (where each node can be
a parameter,
' global step, etc.) A tag is set on each flag is used to
indicate
' whether it is being called in the insert or update
mode. The
' constants for these modes are defined below
Public Const gstrInsertMode = "Insert"
Public Const gstrUpdateMode = "Update"
Public Const gstrPropertiesMode = "View"
```

```
Public Const gstrEmptyString = ""
Public Const gstrSQ = "'"
Public Const gstrDQ = """"
Public Const gstrVerSeparator = "."
Public Const gstrBlank = " "

' Constants used to indicate type of node
being processed
' The constants for the different objects
correspond to the
' indexes in the menu control arrays (for
both the main and popup
' menus) that are used to create new objects.
That way we can
' use the index passed in by the click event
to determine the
' type of node being processed
Public Const gintWorkspace = 1

' Decided to leave it here after some debate
over whether it
' actually belongs in the cStep class
definition
Public Enum gintStepType
   gintGlobalStep = 3
   gintManagerStep
   gintWorkerStep
End Enum

Public Const gintRunManager = 6
Public Const gintRunWorker = 7

Public Enum gintParameterNodeType
   gintParameter = 8
   gintNodeParamConnection
   gintNodeParamExtension
   gintNodeParamBuiltIn
End Enum

' Leave some constants free for newer types
of parameters (?)
Public Const gintConnectionDtl = 15

Public Enum gintLabelNodeType
   gintGlobalsLabel = 21
   gintParameterLabel
   gintParamConnectionLabel
   gintParamExtensionLabel
   gintParamBuiltInLabel
   gintConnDtlLabel
   gintGlobalStepLabel
   gintStepLabel
End Enum

Public Enum ConnectionType
   ConnTypeStatic = 1
   ConnTypeDynamic
End Enum

Public Const giDefaultConnType As Integer
= ConnTypeStatic

' The constants defined below are used to
identify the different
' tabs. If any more step properties and
thereby tabs are added
' to the tabbed dialog on the Step Properties
form, they should
' be defined here and accessed in the code
only using these
' pre-defined constants
' Note: These constants will mainly be used
by the functions that
' initialize, customize and display the Step
Properties form
Public Const gintDefinition = 0
Public Const gintExecution = 1
Public Const gintMgrDefinition = 2
Public Const gintPreExecutionSteps = 3
Public Const gintPostExecutionSteps = 4
Public Const gintFileLocations = 5

' These constants correspond to the index
values in the imagelist
' associated with the tree view control. The
imagelist contains
' the icons that will be displayed for each node.
Public Enum TreeImages
   gintImageWorkspaceClosed = 1
   gintImageWorkspaceOpen
   gintImageLabelClosed
   gintImageLabelOpen
   gintImageManagerClosedDis
   gintImageManagerClosedEn
   gintImageManagerOpenDis
   gintImageManagerOpenEn
   gintImageWorkerDis
   gintImageWorkerEn
   gintImageGlobalClosed
   gintImageGlobalOpen
   gintImageParameter
   gintImageRun
   gintImagePending
   gintImageStop
   gintImageDisabled
   gintImageAborted
   gintImageFailed
End Enum

' Public variable used to indicate the name of
the function
' that raises an error
Public gstrSource As String

' Public instances of the different collections
Public gcParameters As cArrParameters
Public gcSteps As cArrSteps
Public gcConstraints As cArrConstraints
Public gcConnections As cConnections
Public gcConnDtls As cConnDtls

' Public constants for the index values of the
different toolbar
' options. Will be used while dynamically
enabling/disabling
' these options.
Public Const tbNew = 1
Public Const tbOpen = 2
Public Const tbSave = 3

Public Const tbCut = 5
Public Const tbCopy = 6
Public Const tbPaste = 7
Public Const tbDelete = 8

Public Const tbProperties = 10
Public Const tbRun = 11
Public Const tbStop = 12

' The initial version #
Public Const gstrMinVersion As String = "0.0"
Public Const gstrGlobalParallelism As String =
"0"
Public Const gintMinParallelism As Integer =
1
Public Const gintMaxParallelism As Integer =
100

' Constant for the minimum identifier, used for
all identifier, viz.
' step, workspace, etc.
Public Const glMinId As Long = 1
Public Const glInvalidId As Long = -1

' A parameter that has a special meaning to
Stepmaster
' The system time will be substituted wherever it
occurs
' (typically as a part of the error, log ... file names
Public Const gstrTimeStamp As String =
"TIMESTAMP"
Public Const gstrEnvVarSeparator = "%"
Public Const gstrFileSeparator = "\"
Public Const gstrUnderscore = "_"

' Constants used by date and time formatting
functions
Public Const gsTimeSeparator = ":"
Public Const gsDateSeparator = "-"
Public Const gsMsSeparator = "."
Public Const gsDtFormat = "00"
Public Const gsYearFormat = "0000"
Public Const gsTmFormat = "00"
Public Const gsMSecondFormat = "000"

' Default nothing value for a date variable
Public Const gdtmEmpty As Currency = 0

Public Const FMT_WSP_LOG_FILE As String =
"yyyymmdd-hhnnss"

Public gsContCriteria() As String
' Note: Update the initialization of
gsExecutionStatus in Initialize() if the
' InstanceStatus values are modified - also the
boundary checks
Public gsExecutionStatus() As String

Public Const gsConnTypeStatic As String =
"Static"
Public Const gsConnTypeDynamic As String =
"Dynamic"

#If RUN_ONLY Then
Public Const gsCaptionRunWsp As String = "Run
Workspace"
#End If

' Valid operations on a cNode object
Public Enum Operation
   QueryOp = 1
   InsertOp = 2
   UpdateOp = 3
   DeleteOp = 4
End Enum

Attribute VB_Name = "RunCommon"
'  FILE:      RunCommon.bas
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
'  PURPOSE:   Contains common functions that are
used during the execution
'             of a workspace.
'  Contact:   Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name when
errors
' are raised by this class
```

```
Private Const mstrModuleName As String =
".RunCommon."


Public Function
GetInstanceItValue(cInstanceRec As
cInstance) As String

   ' Returns the iterator value for the
instance, if an
   ' iterator has been defined for it
   Dim cStepIt As cRunColIt
   Dim cRunIterator As cRunItNode

   On Error GoTo GetInstanceItValueErr

   ' Since we create a dummy instance for
Disabled and Pending steps,
   ' doesn't make sense to look at their
iterators
   If cInstanceRec.Status <> gintDisabled
And cInstanceRec.Status <> gintPending
Then
      Set cStepIt = cInstanceRec.Iterators

      If Not
StringEmpty(cInstanceRec.Step.IteratorNam
e) Then
         If cStepIt.Count > 0 Then
            Set cRunIterator = cStepIt(0)
            BugAssert
cRunIterator.IteratorName =
cInstanceRec.Step.IteratorName, _
                  "The first iterator in the
collection is the " & _
                  "one that has been defined for
the step."
            If cRunIterator.IteratorName =
cInstanceRec.Step.IteratorName Then
               GetInstanceItValue =
cRunIterator.Value
            Else
               GetInstanceItValue =
gstrEmptyString
            End If
         Else
            GetInstanceItValue =
gstrEmptyString
         End If
      Else
         GetInstanceItValue =
gstrEmptyString
      End If
   Else
      GetInstanceItValue = gstrEmptyString
   End If

   Exit Function

GetInstanceItValueErr:
   ' Log the error code raised by Visual
Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   gstrSource = mstrModuleName &
"GetInstanceItValue"
   Err.Raise vbObjectError +
errProgramError, gstrSource, _
         LoadResString(errProgramError)

End Function


Attribute VB_Name = "RunInstHelper"
' FILE:      RunInstHelper.bas
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:    This module contains helper
procedures that are called by
'            cRunInst.cls
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this class
Private Const mstrModuleName As String =
"RunInstHelper."

' Should be equal to the number of steps
defined in cRunInst.cls
Public Const glngNumConcurrentProcesses As
Long = 99
Public Const gintBitsPerByte = 8
Public Function AnyStepRunning(cFreeSteps
As cVectorLng, arrFree() As Byte) As Boolean

   Dim lngIndex As Long
   Dim intPosInByte As Integer
   Dim lngTemp As Long

   ' Check if there are any running instances to
wait for
   If cFreeSteps.Count <>
glngNumConcurrentProcesses Then

      ' For every free step, reset the
corresponding element
      ' in the byte array to 0
      For lngIndex = 0 To cFreeSteps.Count - 1

         lngTemp = cFreeSteps(lngIndex) \
gintBitsPerByte
         intPosInByte = cFreeSteps(lngIndex)
Mod gintBitsPerByte

         arrFree(lngTemp) = arrFree(lngTemp)
Xor 2 ^ intPosInByte
      Next lngIndex

      AnyStepRunning = False

      ' Check if we have a non-zero bit in the
byte array
      For lngIndex = LBound(arrFree) To
UBound(arrFree) Step 1
         If arrFree(lngIndex) <> 0 Then
            ' We are waiting for a step to
complete
            AnyStepRunning = True
            Exit For
         End If
      Next lngIndex

   Else
      AnyStepRunning = False
   End If

End Function


Public Function
OrderConstraints(vntTempCons() As Variant,
_
      intConsType As ConstraintType) As Variant
   ' Returns a variant containing all the constraint
records in the order
   ' in which they should be executed

   Dim vntTemp As Variant
   Dim lngOuter As Long
   Dim lngInner As Long
   Dim cTempConstraint As cConstraint
   Dim cConstraints() As cConstraint
   Dim lngConsCount As Long
   Dim lngLbound As Long
   Dim lngUbound As Long
   Dim lngStep As Long

   On Error GoTo OrderConstraintsErr

   If intConsType = gintPreStep Then
      ' Since we are travelling up and we need to
execute the constraints
      ' for the top-level steps first, reverse the order
that they
      ' have been stored in the array
      lngLbound = UBound(vntTempCons)
      lngUbound = LBound(vntTempCons)
      lngStep = -1
   Else
      lngLbound = LBound(vntTempCons)
      lngUbound = UBound(vntTempCons)
      lngStep = 1
   End If

   lngConsCount = 0

   For lngOuter = lngLbound To lngUbound Step
lngStep
      vntTemp = vntTempCons(lngOuter)

      If Not IsEmpty(vntTemp) Then
         ' Each of the elements is an array
         For lngInner = LBound(vntTemp) To
UBound(vntTemp) Step 1
            If Not IsEmpty(vntTemp(lngInner)) Then
               Set cTempConstraint =
vntTemp(lngInner)

               If Not cTempConstraint Is Nothing
Then
                  ReDim Preserve
cConstraints(lngConsCount)
                  Set cConstraints(lngConsCount) =
cTempConstraint
                  lngConsCount = lngConsCount + 1
               End If
            End If
         Next lngInner
      End If
   Next lngOuter

   ' Set the return value of the function to the array
of
   ' constraints that has been built above
   If lngConsCount = 0 Then
      OrderConstraints = Empty
   Else
      OrderConstraints = cConstraints()
   End If

   Exit Function

OrderConstraintsErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
```

```
    Err.Raise vbObjectError +
errExecInstanceFailed, _
           mstrModuleName,
LoadResString(errExecInstanceFailed)

End Function
Attribute VB_Name = "ShellSM"
' FILE:       ShellSM.bas
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    This module contains a
function that creates a process and
'             waits for it to complete.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Public Function SyncShell(CommandLine
As String, Optional Timeout As Long, _
    Optional WaitForInputIdle As Boolean)
As Boolean

    Dim proc As
PROCESS_INFORMATION
    Dim Start As STARTUPINFO
    Dim ret As Long
    Dim nMilliseconds As Long

    BugMessage "Executing: " &
CommandLine
    If Timeout > 0 Then
        nMilliseconds = Timeout
    Else
        nMilliseconds = INFINITE
    End If

    'Initialize the STARTUPINFO structure:
    Start.cb = Len(Start)
    Start.dwFlags =
STARTF_USESHOWWINDOW
    Start.wShowWindow =
SW_SHOWMINNOACTIVE

    'Start the shelled application:
    CreateProcessA 0&, CommandLine, 0&,
0&, 1&, _
        NORMAL_PRIORITY_CLASS, 0&,
0&, Start, proc

    If WaitForInputIdle Then
        'Wait for the shelled application to
finish setting up its UI:
        ret = InputIdle(proc.hProcess,
nMilliseconds)
    Else
        'Wait for the shelled application to
terminate:
        ret =
WaitForSingleObject(proc.hProcess,
nMilliseconds)
    End If

    CloseHandle proc.hProcess

    'Return True if the application finished.
Otherwise it timed out or erred.
    SyncShell = (ret = WAIT_OBJECT_0)
End Function

VERSION 1.0 CLASS
BEGIN
  MultiUse = -1  'True
END
Attribute VB_Name = "cArrConstraints"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE:Attribute VB_Name = "SMErr"
' FILE:       SMErr.bas
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
' PURPOSE:    This module contains error
code for all the errors that are
'             raised by StepMaster.
' Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' A public enum containing the codes for all the
error
' messages that will be displayed by the project
- each
' of the codes has the prefix, err
Public Enum errErrorConstants
    errParameterIdInvalid = 1000
    errParameterNameMandatory
    errParameterInsertFailed
    errStepLabelOrTextOrFileRequired
    errMandatoryNodeTextMissing
    errParameterUpdateFailed
    errDupConnDtlName
    errDummy14
    errContCriteriaMandatory
    errContCriteriaNullForGlobal
    errContCriteriaInvalid = 1010
    errParamSeparatorMissing
    errStepTextOrTextFileMandatory
    errStepTextOrFile
    errEnabledFlagFalseForGlobal
    errEnabledFlagLetFailed
    errDegParallelismNullForGlobal
    errInvalidDegParallelism
    errExecutionMechanismInvalid
    errExecutionMechanismLetFailed
    errStepLevelNull = 1020
    errStepLevelZeroForGlobal
    errStepLevelLetFailed
    errRowCountNumeric
    errConnNameInvalid
    errTimeoutNumeric
    errResetConnPropertiesFailed
    errFailureThresholdNumeric
    errConnectionUpdateFailed
    errGlobalRunMethodMandatory
    errGlobalRunMethodNull = 1030
    errGlobalRunMethodInvalid
    errGlobalRunMethodLetFailed
    errNoTrueOption
    errGetOptionFailed
    errSetEnabled
    errStepLabelTextAndFileNull
    errInvalidNodeType
    errSetOptionFailed
    errQueryParameterFailed
    errParamNotFound = 1040
    errQueryStepFailed
    errStepNotFound
    errReadFromScreenFailed
    errCopyPropertiesToFormFailed
    errMandatoryFieldNull
    errUnableToCheckNull
    errUpgradeFailed
    errFindStepSequenceFailed
    errFindParentStepIdFailed
    errCircularReference = 1050
    errAddStepFailed
    errModifyStepFailed
    errDeleteColumnFailed
    errFindPositionFailed
    errDeleteStepFailed
    errRunExistsForStepFailed
    errCreateNewParentFailed
    errInsertNewStepVersionFailed
    errCreateNewStepFailed
    errDuplicateParameterName = 1060
    errCheckDupParameterNameFailed
    errConstraintTypeInvalid
    errConstraintTypeLetFailed
    errAddConstraintFailed
    errWorkspaceIdMandatory
    errInvalidWorkspaceData
    errGetWorkspaceDetailsFailed
    errNoWorkspaceLoaded
    errWorkspaceAlreadyOpen
    errDuplicateWorkspaceName = 1070
    errWorkspaceNameMandatory
    errWorkspaceNameSetFailed
    errWorkspaceIdInvalid
    errWorkspaceIdSetFailed
    errWorkspaceInsertFailed
    errWorkspaceDeleteFailed
    errWorkspaceUpdateFailed
    errInvalidFile
    errCheckWorkspaceOpenFailed
    errWriteFailed = 1080
    errDeleteParameterRecordFailed
    errUnableToLogOutput
    errDeleteDBRecordFailed
    errRunExistsForWorkspaceFailed
    errClearHistoryFailed
    errCreateDBFailed
    errImportWspFailed
    errStepModifyFailed
    errStepDeleteFailed
    errDummy3 = 1090
    errUnableToGetWorkspace
    errInvalidNode
    errUnableToRemoveSubtree
    errSetFileNameFailed
    errStepTypeInvalid
    errObjectMandatory
    errBuiltInUpdateOnly
    errInvalidStep
    errTypeOfStepFailed
    errGetParentKeyFailed = 1100
    errLabelTextAndFileCheckFailed
    errStepTextAndFileNull
    errTextOrFileCheckFailed
    errParentStepManager
    errDeleteSubStepsFailed
    errWorkspaceNameDuplicateFailed
    errNewConstraintVersionFailed
    errDeleteStepConstraintsFailed
    errOldVersionMandatory
    errLoadConstraintsInListFailed = 1110
    errLoadGlobalStepsFailed
    errDeleteConstraintFailed
    errUpdateConstraintFailed
    errConstraintIdInvalid
    errConstraintIdSetFailed
    errGlobalStepIdInvalid
    errGlobalStepIdSetFailed
    errUpdateVersionFailed
    errQueryAdjacentConsFailed
    errConstraintNotFound = 1120
    errQueryConstraintFailed
```

errSetDBBeforeLoad
errLoadDataFailed
errLoadRsInArrayFailed
errConstraintsForStepFailed
errPreConstraintsForStepFailed
errPostConstraintsForStepFailed
errExecuteConstraintMethodFailed
errIdOrKeyMandatory
errInListFailed = 1130
errUnableToWriteChanges
errQuickSortFailed
errCheckParentValidFailed
errLogErrorFailed
errCopyListFailed
errConnected
errVersionMismatch
errStepNodeFailed
errWorkspaceSelectedFailed
errIdentifierSelectedFailed = 1140
errCheckForNullFieldFailed
errInstanceInUse
errSetVisiblePropertyFailed
errExportWspFailed
errMakeKeyValidFailed
errDummy16
errRunApplicationFailed
errStepLabelUnique
errDeleteSingleFile
errMakeIdentifierValidFailed = 1150
errTypeOfNodeFailed
errConstraintCommandFailed
errOpenDbFailed
errInsertNewConstraintsFailed
errLoadPostExecutionStepsFailed
errLoadPreExecutionStepsFailed
errCreateNewNodeFailed
errDeleteNodeFailed
errDisplayPopupFailed
errDisplayPropertiesFailed = 1160
errUnableToCreateNewObject
errDiffFailed
errLoadWorkspaceFailed
errTerminateProcessFailed
errCompareFailed
errCreateConnectionFailed
errShowFormFailed
errAbortFailed
errDeleteParameterFailed
errUpdateViewFailed = 1170
errParameterNewFailed
errCopyNodeFailed
errCutNodeFailed
errCheckObjectValidFailed
errDeleteViewNodeFailed
errMainFailed
errNewStepFailed
errProcessStepModifyFailed
errCustomizeStepFormFailed
errInitializeStepFormFailed = 1180
errInsertStepFailed
errIncVersionYFailed
errIncVersionXFailed
errShowCreateStepFormFailed
errShowStepFormFailed
errStepNewFailed
errUnableToApplyChanges
errUnableToCommitChanges
errGetStepNodeTextFailed
errSelectGlobalRunMethodFailed = 1190
errConnectionNameMandatory
errUpdateStepFailed
errBrowseFailed
errDummy4
errDummy1
errDummy2
errDummy
errUnableToPreviewFile
errCopyWorkspaceFailed
errCopyParameterFailed = 1200
errGetStepTypeAndPositionFailed
errCopyStepFailed
errMandatoryParameterMissing
errDeleteWorkspaceRecordsFailed
errCreateDirectoryFailed
errConfirmDeleteOrMoveFailed
errCreateWorkspaceFailed
errTypeOfObjectFailed
errCreateNodeFailed
errCreateParameterFailed = 1210
errInsertParameterFailed
errCreateStepFailed
errNoConstraintsCreated
errCopyFailed
errCloneFailed
errCloneGlobalFailed
errCloneWorkerFailed
errCloneManagerFailed
errLetStepTypeFailed
errUnableToCloseWorkspace = 1220
errUnableToModifyWorkspace
errUnableToCreateWorkspace
errAddArrayElementFailed
errUpdateSequenceFailed
errCannotCopySubSteps
errSubStepsFailed
errModifyInArrayFailed
errUpdateParentVersionFailed
errGetNodeTextFailed
errAddToArrayFailed = 1230
errDeleteFromArrayFailed
errQueryIndexFailed
errCreateNewConstraintVersionFailed
errGetRootNodeFailed
errPopulateWspDetailsFailed
errLoadRsInTreeFailed
errAddNodeToTreeFailed
errMaxTempFiles
errMoveFailed
errRootNodeKeyInvalid = 1240
errNextNodeFailed
errBranchWillMove
errMoveBranchInvalid
errCreateIdRecordsetFailed
errIdentifierColumnFailed
errGetIdentifierFailed
errGetStepTypeFailed
errUpdateConstraintSeqFailed
errDelParamsInWspFailed
errDuplicateConnectionName = 1250
errOpenWorkspaceFailed
errShowWorkspaceNewFailed
errShowWorkspaceModifyFailed
errPopulateListFailed
errExploreNodeFailed
errInitializeListNodeFailed
errMakeListColumnsFailed
errRefreshViewFailed
errExploreFailed
errCollapseNodeFailed = 1260
errUnableToProcessListViewClick
errSetEnabledForStepFailed
errDisplayStepFormFailed
errSetEnabledPropertyFailed
errInvalidDB
errDeleteConnectionFailed
errInvalidOperation
errLetOperationFailed
errIdGetFailed
errCommitFailed = 1270
errSaveParametersInWspFailed
errDeleteArrayElementFailed
errSaveWorkspaceFailed
errInitializeFailed
errLoadInArrayFailed
errSaveStepsInWspFailed
errCommitStepFailed
errStepIdGetFailed
errUnloadFromArrayFailed
errValidateFailed = 1280
errTextEnteredFailed
errStepLabelMandatory
errTextAndFileNullForManager
errFailureDetailsNullForMgr
errSetTabOrderFailed
errSaveWspConstraintsFailed
errCommitConstraintFailed
errUnloadStepConstraintsFailed
errUnableToModifyMenu
errConfirmFailed = 1290
errInitSubItemsFailed
errUpdateListNodeFailed
errAddNodeFailed
errLoadListNodeFailed
errAddListNodeFailed
errExecutionFailed
errSetListViewStyleFailed
errSetCheckedFailed
errGetCheckedFailed
errUnableToProcessListViewDblClick = 1300
errDefaultPosition
errShellFailed
errOpenFileFailed
errSetTBar97Failed
errConnectFailed
errApiFailed
errRegEntryInvalid
errParseStringFailed
errConstraintsForWspFailed
errPostConstraintsForWspFailed = 1310
errPreConstraintsForWspFailed
errLoadWspPostExecStepsFailed
errLoadWspPreExecStepsFailed
errLoadConstraintsOnFormFailed
errQueryFailed
errPasteNodeFailed
errShowAllWorkspacesFailed
errMakeFieldValidFailed
errInitializeTree
errRootNodeFailed = 1320
errDirectionInvalid
errUnableToDetListProperty
errUnableToGetListData
errItemNotFound
errItemDoesNotExist
errParamNameInvalid
errGetParamValueFailed
errSubValuesFailed
errStringOpFailed
errReadWorkspaceDataFailed = 1330
errUpdateRunDataFailed
errProgramError
errUnableToOpenFile
errLoadRunDataFailed
errExecuteODBCCommandFailed
errRunWorkspaceFailed
errExecuteStepFailed
errUnableToWriteError
errRunStepFailed
errSaveChanges = 1340
errDragDropFailed
errInvalidParameter
errAssignParametersFailed
errLoadLabelsInTreeFailed
errInstrRFailed
errInsertIteratorFailed

```
    errDeleteIteratorFailed
    errTypeInvalid
    errLoadFailed
    errDeleteFailed = 1350
    errModifyFailed
    errIteratorsFailed
    errInsertFailed
    errUpdateFailed
    errDuplicateIterator
    errSaveFailed
    errReadDataFailed
    errUnloadFailed
    errAddFailed
    errExecuteBranchFailed = 1360
    errRangeNumeric
    errRangeInvalid
    errNextStepFailed
    errUpdateDisplayFailed
    errDateToStringFailed
    errGetElapsedTimeFailed
    errMaxProcessesExceeded
    errInvalidProperty
    errInvalidChild
    errCreateInstanceFailed = 1370
    errInvalidForWorker
    errInstanceOpFailed
    errNavInstancesFailed
    errIterateFailed
    errExecInstanceFailed
    errDupIterator
End Enum
Attribute VB_Name = "SortSM"
'  FILE:       SortSM.bas
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This module contains an
implementation of QuickSort.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Comment out for case-sensitive sorts
Option Compare Text

' Used to indicate the source module name
when errors
' are raised by this module
Private Const mstrModuleName As String =
"SortSM."

Private Function Compare(ByVal
vntToCompare1 As Variant, _
        ByVal vntToCompare2 As Variant) As
Integer

    On Error GoTo CompareErr

    Compare = 0

    If vntToCompare1.SequenceNo <
vntToCompare2.SequenceNo Then
        Compare = -1
    ElseIf vntToCompare1.SequenceNo >
vntToCompare2.SequenceNo Then
        Compare = 1
    End If

    Exit Function

CompareErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errCompareFailed, _
            gstrSource, _
            LoadResString(errCompareFailed)

End Function

Private Sub Swap(ByRef vntToSwap1 As
Variant, _
        ByRef vntToSwap2 As Variant)

    Dim vntTemp As Variant

    On Error GoTo SwapErr

    If IsObject(vntToSwap1) And
IsObject(vntToSwap2) Then
        Set vntTemp = vntToSwap1
        Set vntToSwap1 = vntToSwap2
        Set vntToSwap2 = vntTemp
    Else
        vntTemp = vntToSwap1
        vntToSwap1 = vntToSwap2
        vntToSwap2 = vntTemp
    End If

    Exit Sub

SwapErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errQuickSortFailed, mstrModuleName &
"Swap", _
        LoadResString(errQuickSortFailed)

End Sub

Public Sub QuickSort(vntArray As Variant, _
        Optional ByVal intLBound As Integer, _
        Optional ByVal intUBound As Integer)
    ' Sorts a variant array using Quicksort

    Dim i As Integer
    Dim j As Integer
    Dim vntMid As Variant

    On Error GoTo QuickSortErr

    If IsEmpty(vntArray) Or _
            Not IsArray(vntArray) Then
        Exit Sub
    End If

    ' Set default boundary values for first time
through
    If intLBound = 0 And intUBound = 0 Then
        intLBound = LBound(vntArray)
        intUBound = UBound(vntArray)
    End If

    ' BugMessage "Sorting elements " &
Str(intLBound) & " and " & Str(intUBound)

    If intLBound > intUBound Then
        Exit Sub
    End If

    ' Only two elements in this subdivision;
exchange if they
    ' are out of order and end recursive calls
    If (intUBound - intLBound) = 1 Then
        If Compare(vntArray(intLBound),
vntArray(intUBound)) > 0 Then
            Call Swap(vntArray(intLBound),
vntArray(intUBound))
        End If
        Exit Sub
    End If

    ' Set the pivot point
    Set vntMid = vntArray(intUBound)
    i = intLBound
    j = intUBound

    Do
        ' Move in from both sides towards pivot
element
        Do While (i < j) And Compare(vntArray(i),
vntMid) <= 0
            i = i + 1
        Loop

        Do While (j > i) And Compare(vntArray(j),
vntMid) >= 0
            j = j - 1
        Loop

        If i < j Then
            Call Swap(vntArray(i), vntArray(j))
        End If
    Loop While i < j

    ' Since i has been adjusted, swap element i with
element,
    ' intUBound
    Call Swap(vntArray(i), vntArray(intUBound))

    ' Recursively call sort array - pass smaller
subdivision
    ' first to conserve stack space
    If (i - intLBound) < (intUBound - 1) Then
        ' Recursively sort with adjusted values for
upper and
        ' lower bounds
        Call QuickSort(vntArray, intLBound, i - 1)
        Call QuickSort(vntArray, i + 1, intUBound)
    Else
        Call QuickSort(vntArray, i + 1, intUBound)
        Call QuickSort(vntArray, intLBound, i - 1)
    End If
    Exit Sub

QuickSortErr:
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError + errQuickSortFailed,
mstrModuleName & "QuickSort", _
        LoadResString(errQuickSortFailed)

End Sub
Attribute VB_Name = "Startup"
'  FILE:       Startup.bas
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    This module contains startup and
cleanup functions for the project.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Public Const LISTVIEW_BUTTON = 14
```

```
Public gstrProjectPath As String

' Used to indicate the source module name when errors
' are raised by this module
Private Const mstrModuleName As String = "Startup."

Private Sub Initialize()

    On Error GoTo InitializeErr

    ReDim gsContCriteria(gintOnFailureAbort To gintOnFailureAsk) As String
    gsContCriteria(gintOnFailureAbort) = "Abort"
    gsContCriteria(gintOnFailureContinue) = "Continue"

gsContCriteria(gintOnFailureCompleteSiblings) = "Execute sibling steps and stop"

gsContCriteria(gintOnFailureAbortSiblings) = "Abort sibling steps and execute next parent"

gsContCriteria(gintOnFailureSkipSiblings) = "Skip sibling steps and execute next parent"
    gsContCriteria(gintOnFailureAsk) = "Ask"

    ReDim gsExecutionStatus(gintDisabled To gintAborted) As String
    gsExecutionStatus(gintDisabled) = "Disabled"
    gsExecutionStatus(gintPending) = "Pending"
    gsExecutionStatus(gintRunning) = "Running"
    gsExecutionStatus(gintComplete) = "Complete"
    gsExecutionStatus(gintFailed) = "Failed"
    gsExecutionStatus(gintAborted) = "Stopped"

#If Not RUN_ONLY Then
    ' Call a procedure to change the style of the toolbar
    ' on the Step Properties form
    Call SetTBar97(frmSteps.tblConstraintCommands)

#End If

    Call InitRunEngine

    Exit Sub

InitializeErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    gstrSource = mstrModuleName & "Initialize"
    Call ShowError(errInitializeFailed)

End Sub
Sub Main()

    On Error GoTo MainErr

    ' Mousepointer should indicate busy
    Call ShowBusy

    ' Display the Splash screen while we carry out some initialization
    frmSplash.Show
    frmSplash.Refresh

    gstrProjectPath = App.Path

    ' Open the database
    If OpenDBFile() = False Then
        Unload frmSplash
        Exit Sub
    End If

#If Not RUN_ONLY Then
    Load frmMain

    ' Enable the Stop Run menu options only when a workspace is
    ' actually running
    Call EnableStop(False)

    ' Clear all application extension menu items
    Call ClearToolsMenu
#End If

    Call Initialize

    ' Mousepointer - ready to accept user input
    Call ShowFree

    ' Unload the Splash screen and display the main form
    Unload frmSplash

#If RUN_ONLY Then
    frmWorkspaceOpen.Caption = gsCaptionRunWsp

    Call ShowWorkspacesInDb(dbsAttTool)
#Else
    frmMain.Show
#End If

    Exit Sub

MainErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    Call ShowFree
    Call ShowError(errMainFailed)

End Sub
Private Function OpenDBFile() As Boolean
    Dim sDb As String

    On Error GoTo OpenDBFileErr

#If RUN_ONLY Then
    ' Always use the registry setting for the run_only mode
    sDb = DefaultDBFile()
#Else
    ' Check if the user has specified the workspace defn. file to open on the command line
    ' Else, use the registry setting
    sDb = IIf(StringEmpty(Command), DefaultDBFile(), Command)

    If Len(sDb) > 0 Then
        ' Trim off the enclosing double-quotes if any
        If Mid(sDb, 1, 1) = gstrDQ Then
            If Len(sDb) > 1 Then
                sDb = Mid(sDb, 2)
            Else
                sDb = gstrEmptyString
            End If
        End If
    End If

    If Len(sDb) > 0 Then
        If Mid(sDb, Len(sDb), 1) = gstrDQ Then
            If Len(sDb) > 1 Then
                sDb = Mid(sDb, 1, Len(sDb) - 1)
            Else
                sDb = gstrEmptyString
            End If
        End If
    End If
#End If

    ' Open the database
    OpenDBFile = SMOpenDatabase(sDb)

    Exit Function

OpenDBFileErr:
    Call LogErrors(Errors)
    OpenDBFile = False

End Function
Public Sub Cleanup()

    On Error GoTo CleanupErr

    ' Set the mousepointer to indicate Busy
    Call ShowBusy

#If Not RUN_ONLY Then
    ' Close all open workspaces - will also prompt for unsaved
    ' changes
    Call CloseOpenWorkspaces
#End If

    ' Close all open files
    Call CloseOpenFiles

    ' Reset the mousepointer
    Call ShowFree

    Exit Sub

CleanupErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    Resume Next

End Sub
Attribute VB_Name = "StepCommon"
'  FILE:       StepCommon.bas
'              Microsoft TPC-H Kit Ver. 1.00
'              Copyright Microsoft, 1999
'              All Rights Reserved
'
'
'  PURPOSE:    Contains functionality common across StepMaster and
'              SMRunOnly, pertaining to steps
'              Specifically, functions to load iterators records
'              in an array, determine the type of step, etc.
'  Contact:    Reshma Tharamal (reshmat@microsoft.com)
'
Option Explicit
```

```
' Used to indicate the source module name when errors
' are raised by this module
Private Const mstrModuleName As String = "StepCommon."

' Step property constants
Private Const mintMinFailureThreshold As Integer = 1
Public Const gintMinSequenceNo As Integer = 1
Public Const gintMinLevel As Integer = 0
Public Function ValidateParallelism(sParallelism As String, lWorkspace As Long, _
      Optional ParamsInWsp As cArrParameters = Nothing) As String
   ' Returns the degree of parallelism for the step if the user input is valid
   Dim sTemp As String

   On Error GoTo ValidateParallelismErr
   gstrSource = mstrModuleName & "ValidateParallelism"

   sTemp = SubstituteParameters(Trim$(sParallelism), lWorkspace,
WspParameters:=ParamsInWsp)

   If Not IsNumeric(sTemp) Then
      ShowError errInvalidDegParallelism
      On Error GoTo 0
      Err.Raise vbObjectError + errInvalidDegParallelism, gstrSource, _

LoadResString(errInvalidDegParallelism)
   Else
      If (CInt(sTemp) < gintMinParallelism) Or (CInt(sTemp) > gintMaxParallelism) Then
         ShowError errInvalidDegParallelism
         On Error GoTo 0
         Err.Raise vbObjectError + errInvalidDegParallelism, gstrSource, _

LoadResString(errInvalidDegParallelism)
      Else
         ValidateParallelism = Trim$(sParallelism)
      End If
   End If

   Exit Function

ValidateParallelismErr:
   ' Log the error code raised by Visual Basic
   gstrSource = mstrModuleName & "ValidateParallelism"
   If Err.Number = vbObjectError + errSubValuesFailed Then
      ShowError errInvalidDegParallelism
   End If

   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError + errInvalidDegParallelism, gstrSource, _

LoadResString(errInvalidDegParallelism)

End Function
Public Function IsGlobal( _
      Optional ByVal StepClass As cStep = Nothing, _
      Optional ByVal StepRecord As Recordset = Nothing, _
      Optional ByVal StepKey As String = gstrEmptyString, _
      Optional ByVal StepId As Long = 0, _
      Optional StepForm As Form = Nothing) As Boolean

   ' This function contains all the possible checks for whether
   ' a step is global - The check that will be made depends on
   ' the parameter passed in

   Dim cStepRecord As cStep

   If Not StepClass Is Nothing Then
      IsGlobal = StepClass.GlobalFlag
      Exit Function
   End If

   If Not StepRecord Is Nothing Then
      IsGlobal = StepRecord![global_flag]
      Exit Function
   End If

   If Not StringEmpty(StepKey) Then
      IsGlobal = InStr(StepKey, gstrGlobalStepPrefix) > 0
      Exit Function
   End If

   If StepId <> 0 Then
      Set cStepRecord = gcSteps.QueryStep(StepId)
      IsGlobal = cStepRecord.GlobalFlag
      Set cStepRecord = Nothing
      Exit Function
   End If

   If Not StepForm Is Nothing Then
      IsGlobal = (StepForm.lblStepType.Caption = Str(gintGlobalStep))
      Exit Function
   End If

   ' Not a single object was passed in! - raise an error
   On Error GoTo 0
   Err.Raise vbObjectError + errObjectMandatory, _
         mstrModuleName & "IsGlobal", _
         LoadResString(errObjectMandatory)

End Function
Public Function TypeOfStep(Optional ByVal StepClass As cStep = Nothing, _
      Optional ByVal StepRecord As Recordset = Nothing, _
      Optional ByVal StepKey As String = gstrEmptyString, _
      Optional ByVal StepId As Long = 0, _
      Optional StepForm As Form = Nothing) As Integer
   ' Calls functions to determine the type of step
   ' The check that will be made depends on the parameter passed in

   On Error GoTo TypeOfStepErr

   ' Make the check whether a step is global first - both
   ' worker and global steps have the step text or file name
   ' not null - but only the global step will have the global
   ' flag set
   If IsGlobal(StepClass, StepRecord, StepKey, StepId, StepForm) Then
      TypeOfStep = gintGlobalStep
   ElseIf IsManager(StepClass, StepRecord, StepKey, StepId, StepForm) Then
      TypeOfStep = gintManagerStep
   ElseIf IsWorker(StepClass, StepRecord, StepKey, StepId, StepForm) Then
      TypeOfStep = gintWorkerStep
   Else
      On Error GoTo 0
      Err.Raise vbObjectError + errInvalidStep, _
            mstrModuleName & "TypeOfStep", _
            LoadResString(errInvalidStep)
   End If

   Exit Function

TypeOfStepErr:
   ' Log the error code raised by Visual Basic
   Call LogErrors(Errors)
   On Error GoTo 0
   Err.Raise vbObjectError + errTypeOfStepFailed, _
         mstrModuleName & "TypeOfStep", _
         LoadResString(errTypeOfStepFailed)

End Function

Public Function IsStep(intNodeType As Integer) As Boolean
   ' Returns true if the node type corresponds to a global, manager
   ' or worker step
   IsStep = (intNodeType = gintGlobalStep) Or (intNodeType = gintManagerStep) Or _
      (intNodeType = gintWorkerStep)

End Function

Public Function IsManager(Optional ByVal StepClass As cStep = Nothing, _
      Optional ByVal StepRecord As Recordset = Nothing, _
      Optional ByVal StepKey As String = gstrEmptyString, _
      Optional ByVal StepId As Long = 0, _
      Optional StepForm As Form = Nothing) As Boolean

   ' This function contains all the possible checks for whether
   ' a step is a manager step - The check that will be made depends
   ' on the parameter passed in

   Dim cStepRecord As cStep

   If Not StepClass Is Nothing Then
      IsManager = (StepClass.StepType = gintManagerStep)
      Exit Function
   End If

   If Not StepRecord Is Nothing Then
      IsManager = (IsNull(StepRecord![step_text]) And IsNull(StepRecord![step_file_name]))
      Exit Function
```

```
    End If

    If Not StringEmpty(StepKey) Then
        IsManager = (InStr(StepKey,
gstrManagerStepPrefix) > 0)
        Exit Function
    End If

    If StepId <> 0 Then
        Set cStepRecord =
gcSteps.QueryStep(StepId)
        IsManager = (cStepRecord.StepType =
gintManagerStep)
        Set cStepRecord = Nothing
        Exit Function
    End If

    If Not StepForm Is Nothing Then
        IsManager =
(StepForm.lblStepType.Caption =
Str(gintManagerStep))
        Exit Function
    End If

    ' Not a single object was passed in! - raise
an error
    On Error GoTo 0
    Err.Raise vbObjectError +
errObjectMandatory, _
            "Step.IsManager", _
            LoadResString(errObjectMandatory)

End Function
Public Function IsWorker( _
        Optional ByVal StepClass As cStep =
Nothing, _
        Optional ByVal StepRecord As
Recordset = Nothing, _
        Optional ByVal StepKey As String =
gstrEmptyString, _
        Optional ByVal StepId As Long = 0, _
        Optional StepForm As Form =
Nothing) As Boolean

    ' This function contains all the possible
checks for whether
    ' a step is a Worker step - The check that
will be made depends
    ' on the parameter passed in

    Dim cStepRecord As cStep

    If Not StepClass Is Nothing Then
        IsWorker = (StepClass.StepType =
gintWorkerStep)
        Exit Function
    End If

    If Not StepRecord Is Nothing Then
        IsWorker = (Not
StepRecord![global_flag] And _
              (Not
IsNull(StepRecord![step_text]) Or Not
IsNull(StepRecord![step_file_name])))
        Exit Function
    End If

    If Not StringEmpty(StepKey) Then
        IsWorker = InStr(StepKey,
gstrWorkerStepPrefix) > 0
        Exit Function
    End If

    If StepId <> 0 Then
        Set cStepRecord =
gcSteps.QueryStep(StepId)
        IsWorker = (cStepRecord.StepType =
gintWorkerStep)
        Set cStepRecord = Nothing
        Exit Function
    End If

    If Not StepForm Is Nothing Then
        IsWorker =
(StepForm.lblStepType.Caption =
Str(gintWorkerStep))
        Exit Function
    End If

    ' Not a single object was passed in! - raise an
error
    On Error GoTo 0
    Err.Raise vbObjectError +
errObjectMandatory, _
            "Step.IsWorker", _
            LoadResString(errObjectMandatory)

End Function
Public Function GetStepNodeText(ByVal
cStepNode As cStep) As String

    On Error GoTo GetStepNodeTextErr

    ' Returns the string that will be displayed as
the text
    ' in the tree view node to the user
    If StringEmpty(cStepNode.StepLabel) Then

        If StringEmpty(cStepNode.StepTextFile)
Then

            If StringEmpty(cStepNode.StepText)
Then
                ' This should never happen
                On Error GoTo 0
                Err.Raise vbObjectError +
errStepLabelTextAndFileNull, _
                    gstrSource, _

LoadResString(errStepLabelTextAndFileNull)
            Else
                GetStepNodeText =
cStepNode.StepText
            End If
        Else
            GetStepNodeText =
cStepNode.StepTextFile
        End If
    Else
        GetStepNodeText = cStepNode.StepLabel
    End If

    Exit Function

GetStepNodeTextErr:
    ' Log the error code raised by Visual Basic
    Call LogErrors(Errors)
    On Error GoTo 0
    Err.Raise vbObjectError +
errGetStepNodeTextFailed, _
            gstrSource, _

LoadResString(errGetStepNodeTextFailed)

End Function

Public Function
LoadRecordsetInStepsArray(rstSteps As
Recordset, _
    cStepCol As cArrSteps) As Boolean

    Dim cNewStep As cStep
    Dim cNewGlobal As cGlobalStep
    Dim cNewManager As cManager
    Dim cNewWorker As cWorker

    On Error GoTo LoadRecordsetInStepsArrayErr

    If rstSteps.RecordCount = 0 Then
        Exit Function
    End If

    rstSteps.MoveFirst
    While Not rstSteps.EOF
        ' For fields that should not be null, a procedure
is first
        ' called to raise an error if the field is null

        Set cNewStep = New cStep

        cNewStep.StepType =
TypeOfStep(StepRecord:=rstSteps)

        If cNewStep.StepType = gintGlobalStep Then
            Set cNewGlobal = New cGlobalStep
            Set cNewStep = cNewGlobal
        ElseIf cNewStep.StepType = gintManagerStep
Then
            Set cNewManager = New cManager
            Set cNewStep = cNewManager
        Else
            Set cNewWorker = New cWorker
            Set cNewStep = cNewWorker
        End If

        ' Initialize the global flag first, since
subsequent
        ' validations might depend on whether the step
is global
        cNewStep.GlobalFlag =
CBool(ErrorOnNullField(rstSteps, "global_flag"))

        ' Initialize step values
        cNewStep.StepId =
CLng(ErrorOnNullField(rstSteps, "step_id"))
        cNewStep.VersionNo =
CStr(ErrorOnNullField(rstSteps, "version_no"))

        cNewStep.StepLabel =
CheckForNullField(rstSteps, "step_label")
        cNewStep.StepTextFile =
CheckForNullField(rstSteps, "step_file_name")
        cNewStep.StepText =
CheckForNullField(rstSteps, "step_text")
        cNewStep.StartDir =
CheckForNullField(rstSteps, "start_directory")

        cNewStep.WorkspaceId =
CLng(ErrorOnNullField(rstSteps,
FLD_ID_WORKSPACE))
        cNewStep.ParentStepId =
CLng(ErrorOnNullField(rstSteps,
"parent_step_id"))
        cNewStep.ParentVersionNo =
CStr(ErrorOnNullField(rstSteps,
"parent_version_no"))

        cNewStep.SequenceNo =
CInt(ErrorOnNullField(rstSteps, "sequence_no"))
        cNewStep.StepLevel =
CInt(ErrorOnNullField(rstSteps, "step_level"))
        cNewStep.EnabledFlag =
CBool(ErrorOnNullField(rstSteps, "enabled_flag"))
```

```
    ' Initialize the execution details for the
step
    cNewStep.DegreeParallelism =
CheckForNullField(rstSteps,
"degree_parallelism")
    cNewStep.ExecutionMechanism =
CInt(ErrorOnNullField(rstSteps,
"execution_mechanism"))
    cNewStep.FailureDetails =
CheckForNullField(rstSteps,
"failure_details")
    cNewStep.ContinuationCriteria =
CInt(ErrorOnNullField(rstSteps,
"continuation_criteria"))

    ' Initialize the output file locations for
the step
    cNewStep.OutputFile =
CheckForNullField(rstSteps,
"output_file_name")
    ' cNewStep.LogFile =
CheckForNullField(rstSteps,
"log_file_name")
    cNewStep.ErrorFile =
CheckForNullField(rstSteps,
"error_file_name")

    ' Initialize the iterator name for the
step, if any
    cNewStep.IteratorName =
CheckForNullField(rstSteps,
"iterator_name")

    ' Add this record to the array of steps
    cStepCol.Load cNewStep

    Set cNewStep = Nothing
    rstSteps.MoveNext
  Wend

  Exit Function

LoadRecordsetInStepsArrayErr:

  LogErrors Errors
  gstrSource = mstrModuleName &
"LoadRecordsetInStepsArray"
  On Error GoTo 0
  Err.Raise vbObjectError +
errLoadRsInArrayFailed, gstrSource, _

LoadResString(errLoadRsInArrayFailed)

End Function


Attribute VB_Name = "TimerSM"
' FILE:      TimerSM.bas
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:   This module contains
wrapper functions for Timer APIs.
' Contact:   Reshma Tharamal
(reshmat@microsoft.com)
'

Option Explicit

Private Declare Function SetTimer Lib
"user32" (ByVal hWnd As Long, _
  ByVal nIDEvent As Long, ByVal uElapse
As Long, ByVal lpTimerFunc As Long) _
  As Long
Private Declare Function KillTimer Lib
"user32" (ByVal hWnd As Long, _
  ByVal nIDEvent As Long) As Long
Private Declare Sub CopyMemory Lib
"kernel32" Alias "RtlMoveMemory" ( _
  pDest As Any, pSource As Any, ByVal
ByteLen As Long)

Public gcTimerObjects As Collection

Private Sub TimerProc(ByVal lHwnd As Long,
ByVal lMsg As Long, _
  ByVal lTimerID As Long, ByVal lTime As
Long)

  Dim nPtr As Long
  Dim oTimerObject As cTimerSM

  'Create a Timer object from the pointer
  nPtr = gcTimerObjects.Item(Str$(lTimerID))
  CopyMemory oTimerObject, nPtr, 4
  'Call a method which will fire the Timer
event
  oTimerObject.Tick
  'Get rid of the Timer object so that VB will
not try to release it
  CopyMemory oTimerObject, 0&, 4
End Sub

Public Function StartTimer(lInterval As Long)
As Long
  StartTimer = SetTimer(0, 0, lInterval,
AddressOf TimerProc)
End Function

Public Sub StopTimer(lTimerID As Long)
  KillTimer 0, lTimerID
End Sub

Public Sub SetInterval(lInterval As Long,
lTimerID As Long)
  SetTimer 0, lTimerID, lInterval, AddressOf
TimerProc
End Sub
Attribute VB_Name = "ToolsCommon"
' FILE:      ToolsCommon.bas
'            Microsoft TPC-H Kit Ver. 1.00
'            Copyright Microsoft, 1999
'            All Rights Reserved
'
'
' PURPOSE:   Contains functions to remove
run history and initialize
'            table creation scripts
' Contact:   Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

Public sCreateTables() As String

Public Const gsExtSeparator As String = "."

Public Sub DeleteRunHistory(dbFile As
DAO.Database)
  ' Delete all run history records from the
database, viz. the records in
  ' run_header, run_step_details and
run_parameters

  Dim sDelete As String

  On Error GoTo DeleteRunHistoryErr

  sDelete = "delete from run_header "
  dbFile.Execute sDelete, dbFailOnError

  sDelete = "delete from run_step_details "
  dbFile.Execute sDelete, dbFailOnError

  sDelete = "delete from run_parameters "
  dbFile.Execute sDelete, dbFailOnError

  sDelete = "update att_identifiers " & _
      " set run_id = " & CStr(glMinId)
  dbFile.Execute sDelete, dbFailOnError

  Exit Sub

DeleteRunHistoryErr:
  LogErrors Errors
  Err.Raise vbObjectError +
errDeleteDBRecordFailed, "DeleteRunHistory", _
        LoadResString(errDeleteDBRecordFailed)

End Sub

Public Function CreateConnectionsTableScript() As
String
  ' Returns the table creation script for the
workspace_connections table

  Call InitCreateSQLArray
  CreateConnectionsTableScript =
sCreateTables(10)
  ReDim sCreateTables(0)

End Function
Public Function CreateConnectionDtlsTableScript()
As String
  ' Returns the table creation script for the
connection_dtls table

  Call InitCreateSQLArray
  CreateConnectionDtlsTableScript =
sCreateTables(11)
  ReDim sCreateTables(0)

End Function

Public Sub InitCreateSQLArray()

ReDim sCreateTables(0 To 11)

sCreateTables(0) = "Create table att_identifiers (" &
_
      "workspace_id          Long, " & _
      "parameter_id          Long, " & _
      "step_id               Long, " & _
      "constraint_id         Long, " & _
      "run_id                Long, " & _
      "connection_id         Long " & _
      ", " & FLD_ID_CONN_NAME & gstrBlank
& DATA_TYPE_LONG & _
");"

sCreateTables(1) = "Create table att_steps (step_id
Long, " & _
      "version_no            Text(255), " & _
      "step_label            Text(255), " & _
      "step_file_name        Text(255), " & _
      "step_text             Memo, " & _
      "start_directory       Text(255), " & _
      "workspace_id          Long, " & _
      "parent_step_id        Long, " & _
      "parent_version_no     Text(255), " & _
      "step_level            Long, " & _
      "sequence_no           Integer, " & _
      "enabled_flag          Bit, " & _
```

```
        "degree_parallelism        Text(255), " & _
        "execution_mechanism       Text(50), " & _
        "failure_details           Text(255), " & _
        "continuation_criteria     Text(50), " & _
        "global_flag               Long, " & _
        "archived_flag             Bit, " & _
        "output_file_name          Text(255), " & _
        "error_file_name           Text(255), " & _
        "iterator_name             Text(255), " & _
        "CONSTRAINT pk_steps PRIMARY KEY (step_id, version_no) " & _
');"

'       "log_file_name             Text(255), " & _

sCreateTables(2) = "Create table att_workspaces (" & _
        "workspace_id              Long, " & _
        "workspace_name            Text(255), " & _
        "archived_flag             Bit, " & _
        "CONSTRAINT pk_workspaces PRIMARY KEY (workspace_id) " & _
');"

sCreateTables(3) = "Create table iterator_values (" & _
        "step_id                   Long, " & _
        "version_no                Text(255), " & _
        "type                      Integer, " & _
        "iterator_value            Text(255), " & _
        "sequence_no               Integer " & _
');"

sCreateTables(4) = "Create table run_header (" & _
        "run_id                    Long, " & _
        "workspace_id              Long, " & _
        "start_time                Currency, " & _
        "end_time                  Currency, " & _
        "CONSTRAINT pk_run_header PRIMARY KEY (run_id) " & _
');"

sCreateTables(5) = "Create table run_parameters (" & _
        "run_id                    Long, " & _
        "parameter_name            Text(255), " & _
        "parameter_value           Text(255) " & _
');"

sCreateTables(6) = "Create table run_step_details (" & _
        "run_id                    Long, " & _
        "step_id                   Long, " & _
        "version_no                Text(255), " & _
        "instance_id               Long, " & _
        "parent_instance_id        Long, " & _
        "command                   Memo, " & _
        "iterator_value            Text(255), " & _
        "start_time                Currency, " & _
        "end_time                  Currency, " & _
        "elapsed_time              Long " & _
');"

sCreateTables(7) = "Create table step_constraints (" & _
        "constraint_id             Long, " & _
        "step_id                   Long, " & _
        "version_no                Text(255), " & _
        "constraint_type           Integer, " & _
        "global_step_id            Long, " & _
        "global_version_no         Text(255), " & _
        "sequence_no               Integer " & _
');"

sCreateTables(8) = "Create table workspace_parameters (" & _
        "workspace_id              Long, " & _
        "parameter_id              Long, " & _
        "parameter_name            Text(255), " & _
        "parameter_value           Text(255), " & _
        "description               Text(255), " & _
        "parameter_type            Integer, " & _
        "CONSTRAINT pk_parameters PRIMARY KEY (parameter_id) " & _
');"

sCreateTables(9) = "Create table db_details (" & _
        "db_version                Text(50) " & _
');"

sCreateTables(10) = "Create table " & TBL_CONNECTION_STRINGS & " (" & _
        "workspace_id              Long, " & _
        "connection_id             Long, " & _
        "connection_name           Text(255), " & _
        "connection_value          Text(255), " & _
        "description               Text(255), " & _
        "no_count_display          Bit, " & _
        "no_execute                Bit, " & _
        "parse_query_only          Bit, " & _
        "ANSI_quoted_identifiers   Bit, " & _
        "ANSI_nulls                Bit, " & _
        "show_query_plan           Bit, " & _
        "show_stats_time           Bit, " & _
        "show_stats_io             Bit, " & _
        "parse_odbc_msg_prefixes   Bit, " & _
        "row_count                 long, " & _
        "tsql_batch_separator      Text(255), " & _
        "query_time_out            long, " & _
        "server_language           Text(255), " & _
        "character_translation     Bit, " & _
        "regional_settings         Bit, " & _
        "CONSTRAINT pk_connections PRIMARY KEY (connection_id) " & _
');"

' This table has been added in order to satisfy the TPC-H requirement that
' all the queries in a stream need to be executed on a single connection.
' Specify a connection for each odbc step. If the connection is of type,
' static, it should be kept open till the step execution is complete.
sCreateTables(11) = "Create table " & TBL_CONNECTION_DTLS & " (" & _
        FLD_ID_WORKSPACE & gstrBlank & DATA_TYPE_LONG & ", " & _
        FLD_ID_CONN_NAME & gstrBlank & DATA_TYPE_LONG & ", " & _
        FLD_CONN_DTL_CONNECTION_NAME & gstrBlank & DATA_TYPE_TEXT255 & ", " & _

FLD_CONN_DTL_CONNECTION_STRING & gstrBlank & DATA_TYPE_TEXT255 & ", " & _
        FLD_CONN_DTL_CONNECTION_TYPE & gstrBlank & DATA_TYPE_INTEGER & ", " & _
        "CONSTRAINT pk_connection_name PRIMARY KEY (" & FLD_ID_CONN_NAME & ") " & _
');"

End Sub
Attribute VB_Name = "WindowsApiCommon"
'  FILE:      WindowsApiCommon.bas
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
'  PURPOSE:   This module contains functions that are wrappers around the
'             Windows API and are used by both StepMaster and SMRunOnly.
'  Contact:   Reshma Tharamal (reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name when errors
' are raised by this module
Private Const mstrModuleName As String = "WindowsApiCommon."

Public Type PROCESS_INFORMATION
   hProcess    As Long
   hThread     As Long
   dwProcessID As Long
   dwThreadID  As Long
End Type

' Used by GetShortName to return the short file name for a given file
Private Declare Function GetShortPathName Lib "kernel32" _
    Alias "GetShortPathNameA" (ByVal lpszLongPath As String, _
    ByVal lpszShortPath As String, ByVal cchBuffer As Long) As Long

Public Declare Function GetExitCodeProcess Lib "kernel32" ( _
   ByVal hProcess As Long, lpExitCode As Long) As Long
Public Declare Function TerminateProcess Lib "kernel32" ( _
      hProcess As Long, uExitCode As Long) As Long
Public Declare Function CloseHandle Lib "kernel32" ( _
   ByVal hObject As Long) As Long

Public Const NORMAL_PRIORITY_CLASS As Long = &H20&
Public Const INFINITE              As Long = -1&

Public Const STATUS_WAIT_0         As Long = &H0
Public Const STATUS_ABANDONED_WAIT_0 As Long = &H80
Public Const STATUS_USER_APC       As Long = &HC0
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Public Const STATUS_TIMEOUT
As Long = &H102
Public Const STATUS_PENDING
As Long = &H103

Public Const WAIT_FAILED              As
Long = &HFFFFFFFF
Public Const WAIT_OBJECT_0            As
Long = STATUS_WAIT_0
Public Const WAIT_TIMEOUT             As
Long = STATUS_TIMEOUT

Public Const WAIT_ABANDONED
As Long =
STATUS_ABANDONED_WAIT_0
Public Const WAIT_ABANDONED_0
As Long =
STATUS_ABANDONED_WAIT_0

Public Const WAIT_IO_COMPLETION
As Long = STATUS_USER_APC
Public Const STILL_ACTIVE             As
Long = STATUS_PENDING

Public Const
PROCESS_QUERY_INFORMATION  As
Long = &H400
Public Const
STANDARD_RIGHTS_REQUIRED   As
Long = &HF0000

'-------------------------------------------------------
-------------------------
'Declarations for shelling:

Public Type STARTUPINFO
   cb              As Long
   lpReserved      As String
   lpDesktop       As String
   lpTitle         As String
   dwX             As Long
   dwY             As Long
   dwXSize         As Long
   dwYSize         As Long
   dwXCountChars   As Long
   dwYCountChars   As Long
   dwFillAttribute As Long
   dwFlags         As Long
   wShowWindow     As Integer
   cbReserved2     As Integer
   lpReserved2     As Long
   hStdInput       As Long
   hStdOutput      As Long
   hStdError       As Long
End Type

Public Declare Function
WaitForSingleObject Lib "kernel32" ( _
   ByVal hProcess As Long, ByVal
dwMilliseconds As Long) As Long

Public Declare Function InputIdle Lib
"user32" Alias "WaitForInputIdle" ( _
   ByVal hProcess As Long, ByVal
dwMilliseconds As Long) As Long

Public Declare Function CreateProcessA Lib
"kernel32" ( _
   ByVal lpApplicationName As Long,
ByVal lpCommandLine As String, _
   ByVal lpProcessAttributes As Long,
ByVal lpThreadAttributes As Long, _
   ByVal bInheritHandles As Long, ByVal
dwCreationFlags As Long, _
   ByVal lpEnvironment As Long, ByVal
lpCurrentDirectory As Long, _
   lpStartupInfo As STARTUPINFO,
lpProcessInformation As _
   PROCESS_INFORMATION) As Long

Public Declare Function GetLastError Lib
"kernel32" () As Long

Private Type OPENFILENAME
   lStructSize As Long
   hwndOwner As Long
   hInstance As Long
   lpstrFilter As String
   lpstrCustomFilter As String
   nMaxCustFilter As Long
   nFilterIndex As Long
   lpstrFile As String
   nMaxFile As Long
   lpstrFileTitle As String
   nMaxFileTitle As Long
   lpstrInitialDir As String
   lpstrTitle As String
   Flags As Long
   nFileOffset As Integer
   nFileExtension As Integer
   lpstrDefExt As String
   lCustData As Long
   lpfnHook As Long
   lpTemplateName As Long
End Type

Private Declare Function GetOpenFileName
Lib "COMDLG32" _
      Alias "GetOpenFileNameA" (file As
OPENFILENAME) As Long

Private Declare Function lstrlen Lib "kernel32"
(lpsz As String) As Long

Public Const MAX_PATH = 255

' Used when creating a process
Public Const SW_SHOWMINNOACTIVE = 7
Public Const STARTF_USESHOWWINDOW
= &H1

Public Const MB_YESNOCANCEL = &H3&
Public Const MB_ABORTRETRYIGNORE =
&H2&
Public Const MB_OK = &H0&

Public Const MB_APPLMODAL = &H0&

Public Const MB_ICONQUESTION =
&H20&
Public Const MB_ICONEXCLAMATION =
&H30&

Public Const IDABORT = 3
Public Const IDRETRY = 4
Public Const IDIGNORE = 5
Public Const IDYES = 6
Public Const IDNO = 7
Public Const IDCANCEL = 2

Private Declare Function MessageBox Lib
"user32" Alias "MessageBoxA" ( _
      ByVal hWnd As Long, ByVal lpText As
String, _
      ByVal lpCaption As String, ByVal wType
As Long) As Long

Private Type SYSTEMTIME
      wYear As Integer
      wMonth As Integer
      wDayOfWeek As Integer
      wDay As Integer
      wHour As Integer
      wMinute As Integer
      wSecond As Integer
      wMilliseconds As Integer
End Type

Private Declare Function Get64BitTime Lib
"smtime.dll" ( _
      ByVal lpInitTime As Any) As Currency

Public Function ShowMessageBox(hWnd As Long,
strText As String, _
      strTitle As String, wType As Integer) As Long
   ' Using the Windows MessageBox Api since the
VB Msgbox function suppresses
   ' all events
   ShowMessageBox = MessageBox(hWnd, ByVal
strText, ByVal strTitle, wType)

   If ShowMessageBox = 0 Then
      LogSystemError
      Err.Raise vbObjectError + errConfirmFailed,
App.EXEName, _
            LoadResString(errConfirmFailed)
   End If

End Function
Public Function ShowFileOpenDialog(ByVal
strFilter As String, _
      ByVal strDialogTitle As String, ByVal
lngFlags As Long, _
      Optional ByVal strOldFile As String =
gstrEmptyString) As String
   ' Returns the file name selected by the user
   Dim strInitDir As String
   Dim intPos As Integer
   Dim opfile As OPENFILENAME
   Dim sFile As String

   On Error GoTo ShowFileOpenDialogErr

   If Not StringEmpty(strOldFile) Then
      intPos = InstrR(strOldFile, gstrFileSeparator)
      If intPos > 0 Then
         strInitDir = Left$(strOldFile, intPos - 1)
      End If
   End If

   With opfile
      .lStructSize = Len(opfile)
      .Flags = lngFlags
      .lpstrInitialDir = strInitDir
      .lpstrTitle = strDialogTitle
      .lpstrFilter = MakeWindowsFilter(strFilter)
      sFile = strOldFile & String$(MAX_PATH -
Len(strOldFile), 0)
      .lpstrFile = sFile
      .nMaxFile = MAX_PATH
   End With

   If GetOpenFileName(opfile) Then
      ShowFileOpenDialog = Left$(opfile.lpstrFile,
InStr(opfile.lpstrFile, vbNullChar) - 1)
   Else
      ShowFileOpenDialog = strOldFile
   End If

   Exit Function

ShowFileOpenDialogErr:
   Call LogErrors(Errors)
   ' Reset the selection to the passed in file, if any
```

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    ShowFileOpenDialog = strOldFile

End Function

Private Function
MakeWindowsFilter(sFilter As String) As
String

    Dim s As String, ch As String, iTemp As
Integer

    On Error GoTo MakeWindowsFilterErr

    ' To make Windows-style filter, replace |
and : with nulls
    For iTemp = 1 To Len(sFilter)
        ch = Mid$(sFilter, iTemp, 1)
        If ch = "|" Then
            s = s & vbNullChar
        Else
            s = s & ch
        End If
    Next iTemp

    ' Put double null at end
    s = s & vbNullChar & vbNullChar
    MakeWindowsFilter = s

    Exit Function

MakeWindowsFilterErr:
    Call LogErrors(Errors)
    gstrSource = mstrModuleName &
"MakeWindowsFilter"
    On Error GoTo 0
    Err.Raise vbObjectError + errApiFailed,
gstrSource, _
            LoadResString(errApiFailed)

End Function



Public Function GetShortName(ByVal
sLongFileName As String) As String
    ' Returns the short name for the passed in
file - will only work
    ' if the passed in path/file exists

    Dim lRetVal As Long, sShortPathName
As String, iLen As Integer
    Dim sLongFile As String
    Dim sDir As String
    Dim sFile As String
    Dim intPos As Integer

    On Error GoTo GetShortNameErr

    sFile = gstrEmptyString
    sLongFile =
MakePathValid(sLongFileName)
    If StringEmpty(Dir$(sLongFile,
vbNormal + vbDirectory)) Then
        ' The passed in path is a file that does
not exist - since
        ' the GetShortPathName api does not
work on non-existent files
        ' on Win2K, use the directory as an
argument to the api and
        ' then append the file
        intPos = InstrR(sLongFile,
gstrFileSeparator)
        sDir = Mid$(sLongFile, 1, intPos - 1)
        sFile = Right(sLongFile,
Len(sLongFile) - intPos + 1)
        sLongFile = sDir
    End If

    'Set up buffer area for API function call
return
    sShortPathName = Space(MAX_PATH)
    iLen = Len(sShortPathName)

    'Call the function
    lRetVal = GetShortPathName(sLongFile,
sShortPathName, iLen)
    If lRetVal = 0 Then
        Call LogSystemError
    End If

    GetShortName = IIf(lRetVal = 0, sLongFile,
Left(sShortPathName, lRetVal))
    If Not StringEmpty(sFile) Then
        GetShortName = GetShortName & sFile
    End If

    Exit Function

GetShortNameErr:
    Call LogErrors(Errors)
    gstrSource = mstrModuleName &
"GetShortName"
    On Error GoTo 0
    Err.Raise vbObjectError + errApiFailed,
gstrSource, _
            LoadResString(errApiFailed)

End Function
Public Function Determine64BitTime() As
Currency

    Determine64BitTime =
Get64BitTime(ByVal 0&)

End Function



Attribute VB_Name = "WorkspaceCommon"
'  FILE:      WorkspaceCommon.bas
'             Microsoft TPC-H Kit Ver. 1.00
'             Copyright Microsoft, 1999
'             All Rights Reserved
'
'
'  PURPOSE:    Contains functionality common
across StepMaster and
'              SMRunOnly, pertaining to
workspaces
'              Specifically, functions to read
workspace records from
'              the database and so on.
'  Contact:    Reshma Tharamal
(reshmat@microsoft.com)
'
Option Explicit

' Used to indicate the source module name
when errors
' are raised by this module
Private Const mstrModuleName As String =
"WorkspaceCommon."



Public Function GetWorkspaceDetails( _
    Optional ByVal WorkspaceId As Long, _
    Optional WorkspaceName As String =
gstrEmptyString _
    ) As Variant
    ' Depending on the passed in parameter, it
returns
    ' either the workspace name or the workspace
identifier
    ' in a variant. The calling function must convert
the
    ' return value to the appropriate type

    Dim rstWorkspace As Recordset
    Dim qyWsp As DAO.QueryDef
    Dim strSql As String
    Dim cTempStr As cStringSM

    On Error GoTo GetWorkspaceDetailsErr
    gstrSource = mstrModuleName &
"GetWorkspaceDetails"

    If WorkspaceId = 0 And _
        WorkspaceName = gstrEmptyString Then
        On Error GoTo 0
        Err.Raise vbObjectError +
errMandatoryParameterMissing, _
            gstrSource, _

LoadResString(errMandatoryParameterMissing)
    End If

    Set cTempStr = New cStringSM

    If WorkspaceId = 0 Then
        strSql = " Select workspace_id from
att_workspaces " & _
            " where workspace_name = [w_name] "
        Set qyWsp =
dbsAttTool.CreateQueryDef(gstrEmptyString,
strSql)
        qyWsp.Parameters("w_name").Value =
WorkspaceName
    Else
        strSql = " Select workspace_name from
att_workspaces " & _
            " where workspace_id = [w_id] "
        Set qyWsp =
dbsAttTool.CreateQueryDef(gstrEmptyString,
strSql)
        qyWsp.Parameters("w_id").Value =
WorkspaceId
    End If

    Set cTempStr = Nothing

    Set rstWorkspace =
qyWsp.OpenRecordset(dbOpenForwardOnly)

    If rstWorkspace.RecordCount <> 0 Then
        GetWorkspaceDetails =
rstWorkspace.Fields(0)
    Else
        rstWorkspace.Close
        qyWsp.Close
        On Error GoTo 0
        Err.Raise vbObjectError +
errInvalidWorkspaceData, _
            gstrSource, _

LoadResString(errInvalidWorkspaceData)
    End If

    rstWorkspace.Close
    qyWsp.Close
    Exit Function

GetWorkspaceDetailsErr:
    Call LogErrors(Errors)
    gstrSource = mstrModuleName &
"GetWorkspaceDetails"
    On Error GoTo 0
```

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   Err.Raise vbObjectError +
errGetWorkspaceDetailsFailed, _
          gstrSource, _

LoadResString(errGetWorkspaceDetailsFail
ed)

End Function

Public Sub
ReadStepsInWorkspace(rstStepsInWorkSpa
ce As Recordset, _
       qySteps As DAO.QueryDef, _
       Optional lngWorkspaceId As Long =
glInvalidId, _
       Optional dbLoad As DAO.Database =
Nothing, _
       Optional ByVal
bSelectArchivedRecords As Boolean =
False)

   ' This function will populate the passed in
recordset with
   ' all the steps for a given workspace (if
one is passed in, else all workspaces)

   Dim strSql As String

   On Error GoTo
ReadStepsInWorkspaceErr

   ' Create a recordset object to retrieve all
steps for
   ' the given workspace
   strSql = "Select step_id, step_label,
step_file_name, step_text, " & _
       " start_directory, version_no,
workspace_id, " & _
       " parent_step_id, parent_version_no, "
& _
       " sequence_no, step_level, " & _
       " enabled_flag, degree_parallelism, " &
_
       " execution_mechanism, " & _
       " failure_details, continuation_criteria,
" & _
       " global_flag, archived_flag, " & _
       " output_file_name, " & _
       " error_file_name, iterator_name " & _
       " from att_steps a " & _
       " where "

       ' log_file_name,

   If lngWorkspaceId <> glInvalidId Then
       strSql = strSql & " workspace_id =
[w_id] AND "
   End If

   If Not bSelectArchivedRecords Then
       strSql = strSql & " archived_flag =
[archived] AND "
   End If

   ' Find the highest X-component of the
version number
   strSql = strSql & " cint( mid( version_no,
1, instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) - 1 ) ) = "
& _
       " ( select max( cint( mid( version_no, 1,
instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) - 1 ) ) ) "
& _
       " from att_steps AS d " & _
       " WHERE a.step_id = d.step_id ) "

   ' Find the highest Y-component of the
version number for the highest X-component
   strSql = strSql & " AND cint( mid(
version_no, instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) + 1 ) ) = " &
_
       " ( select max( cint( mid( version_no,
instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) + 1 ) ) ) " &
_
       " from att_steps AS b " & _
       " Where a.step_id = b.step_id " & _
       " AND cint( mid( version_no, 1, instr(
version_no, " & gstrDQ & gstrVerSeparator &
gstrDQ & " ) - 1 ) ) = " & _
       " ( select max( cint( mid( version_no, 1,
instr( version_no, " & gstrDQ &
gstrVerSeparator & gstrDQ & " ) - 1 ) ) ) " & _
       " from att_steps AS c " & _
       " WHERE a.step_id = c.step_id ) ) "

   ' Append the order clause as follows
   ' First, separate all global/non-global steps
   ' Order the worker and manager steps by
step_level to
   ' ensure that the parent steps are populated
before
   ' any sub-steps within it
   ' Further ordering by parent_step_id and
sequence_no
   ' ensures that all the children within a parent
are
   ' selected in the necessary order
   strSql = strSql & " order by global_flag,
step_level, " & _
       " parent_step_id, sequence_no "

   If dbLoad Is Nothing Then Set dbLoad =
dbsAttTool

   ' Create a temporary Querydef object
   Set qySteps =
dbLoad.CreateQueryDef(gstrEmptyString,
strSql)

   ' Initialize the parameter values
   If lngWorkspaceId <> glInvalidId Then
       qySteps.Parameters("w_id").Value =
lngWorkspaceId
   End If

   If Not bSelectArchivedRecords Then
       qySteps.Parameters("archived").Value =
False
   End If

   Set rstStepsInWorkSpace =
qySteps.OpenRecordset(dbOpenSnapshot)

   Exit Sub

ReadStepsInWorkspaceErr:

   LogErrors Errors
   gstrSource = mstrModuleName &
"ReadStepsInWorkspace"
   On Error GoTo 0
   Err.Raise vbObjectError +
errReadWorkspaceDataFailed, _
          gstrSource, _

LoadResString(errReadWorkspaceDataFailed)

End Sub
Public Sub ReadWorkspaces(dbLoad As Database,
rstWsp As Recordset, _
       qyWsp As DAO.QueryDef, _
       Optional ByVal bSelectArchivedRecords As
Boolean = False)

   ' This function will populate the passed in
recordset with all workspace records

   Dim strSql As String

   On Error GoTo ReadWorkspacesErr

   ' Create a recordset object containing all the
workspaces
   ' (that haven't been archived) in the database
   strSql = " Select workspace_id,
workspace_name, archived_flag " & _
          " from att_workspaces "

   If Not bSelectArchivedRecords Then
       strSql = strSql & " where archived_flag =
[archived]"
   End If
   strSql = strSql & " order by workspace_name"

   Set qyWsp =
dbLoad.CreateQueryDef(gstrEmptyString, strSql)
   If Not bSelectArchivedRecords Then
       qyWsp.Parameters("archived").Value = False
   End If

   Set rstWsp =
qyWsp.OpenRecordset(dbOpenForwardOnly)

   Exit Sub

ReadWorkspacesErr:

   LogErrors Errors
   gstrSource = mstrModuleName &
"ReadWorkspaces"
   On Error GoTo 0
   Err.Raise vbObjectError +
errReadWorkspaceDataFailed, _
          gstrSource, _

LoadResString(errReadWorkspaceDataFailed)

End Sub
Public Sub ShowWorkspacesInDb(dbLoad As
Database)

   Dim recWorkspaces As Recordset
   Dim qryAllWsp As QueryDef

   On Error GoTo ShowWorkspacesInDbErr

   ' Set the mousepointer to indicate Busy
   Call ShowBusy

   Load frmWorkspaceOpen

   Call ReadWorkspaces(dbLoad, recWorkspaces,
qryAllWsp)

   frmWorkspaceOpen.lstWorkspaces.Clear

   ' Load all the workspaces into the listbox
   If recWorkspaces.RecordCount <> 0 Then
       Do
          ' Add the workspace name to the list and
store
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        ' the corresponding workspace id as
the ItemData
        ' property of the item.
        ' The workspace id will be used for
all further
        ' processing of the workspace

frmWorkspaceOpen.lstWorkspaces.AddItem
recWorkspaces![workspace_name]

frmWorkspaceOpen.lstWorkspaces.ItemDat
a(frmWorkspaceOpen.lstWorkspaces.NewIn
dex) = _
            recWorkspaces![workspace_id]
        recWorkspaces.MoveNext

    Loop Until recWorkspaces.EOF
  End If
  recWorkspaces.Close
  qryAllWsp.Close

  ' Reset the mousepointer
  ShowFree

  #If RUN_ONLY Then
    frmWorkspaceOpen.Show vbModal
  #Else
    frmWorkspaceOpen.Show vbModal,
frmMain
  #End If

  Exit Sub

ShowWorkspacesInDbErr:
  LogErrors Errors
  Call ShowFree
  Err.Raise vbObjectError +
errProgramError, mstrModuleName &
"ShowWorkspacesInDb", _
        LoadResString(errProgramError)

End Sub
Private Sub
ReadWorkspaceParameters(lngWorkspaceId
As Long, _
  rstWorkSpaceParameters As Recordset, _
  qyWspParams As DAO.QueryDef)

  ' Will populate the recordset with all the
parameters for
  ' a given workspace

  Dim strSql As String

  On Error GoTo
ReadWorkspaceParametersErr

  strSql = "Select parameter_id,
parameter_name, " & _
        " parameter_value, workspace_id,
parameter_type, description " & _
        " from workspace_parameters " & _
        " where workspace_id = [w_id] " &
_
        " order by parameter_name,
parameter_value "

  ' Create a temporary Querydef object and
initialize
  ' it's parameter values
  Set qyWspParams =
dbsAttTool.CreateQueryDef(gstrEmptyStrin
g, strSql)
  qyWspParams.Parameters("w_id").Value
= lngWorkspaceId

  Set rstWorkSpaceParameters =
qyWspParams.OpenRecordset(dbOpenSnapsh
ot)

  Exit Sub

ReadWorkspaceParametersErr:

  LogErrors Errors
  gstrSource = mstrModuleName &
"ReadWorkspaceParameters"
  On Error GoTo 0
  Err.Raise vbObjectError +
errReadWorkspaceDataFailed, _
        gstrSource, _

LoadResString(errReadWorkspaceDataFailed)

End Sub
Private Sub ReadConnections(lngWorkspaceId
As Long, rstConns As Recordset, _
  qyConns As DAO.QueryDef)

  ' Will populate the recordset with all the
parameters for
  ' a given workspace

  Dim strSql As String

  On Error GoTo
ReadWorkspaceParametersErr

  strSql = "Select connection_id, " & _
        " connection_name, connection_value,
workspace_id, description, " & _
        " no_count_display, no_execute,
parse_query_only, ANSI_quoted_identifiers, "
& _
        " ANSI_nulls, show_query_plan,
show_stats_time, show_stats_io, " & _
        " parse_odbc_msg_prefixes,
row_count, tsql_batch_separator,
query_time_out, " & _
        " server_language,
character_translation, regional_settings " & _
        " from workspace_connections " & _
        " where workspace_id = [w_id] " & _
        " order by connection_name,
connection_value "

  ' Create a temporary Querydef object and
initialize
  ' it's parameter values
  Set qyConns =
dbsAttTool.CreateQueryDef(gstrEmptyString,
strSql)
  qyConns.Parameters("w_id").Value =
lngWorkspaceId

  Set rstConns =
qyConns.OpenRecordset(dbOpenSnapshot)

  Exit Sub

ReadWorkspaceParametersErr:

  LogErrors Errors
  On Error GoTo 0
  Err.Raise vbObjectError +
errReadWorkspaceDataFailed, _
        mstrModuleName &
"ReadConnections",
LoadResString(errReadWorkspaceDataFailed)
End Sub
Private Sub ReadConnectionDtls(lngWorkspaceId
As Long, rstConns As Recordset, _
  qyConns As DAO.QueryDef)

  ' Will populate the recordset with all the
connection_dtls records for
  ' a given workspace

  Dim strSql As String

  On Error GoTo ReadWorkspaceParametersErr

  strSql = "Select " & FLD_ID_CONN_NAME &
", " & _

FLD_CONN_DTL_CONNECTION_NAME & ", "
& _

FLD_CONN_DTL_CONNECTION_STRING & ",
" & _
        FLD_ID_WORKSPACE & ", " & _
        FLD_CONN_DTL_CONNECTION_TYPE
& _
        " from " & TBL_CONNECTION_DTLS &
_
        " where " & FLD_ID_WORKSPACE & " =
[w_id] " & _
        " order by " &
FLD_CONN_DTL_CONNECTION_NAME

  ' Create a temporary Querydef object and
initialize
  ' it's parameter values
  Set qyConns =
dbsAttTool.CreateQueryDef(gstrEmptyString,
strSql)
  qyConns.Parameters("w_id").Value =
lngWorkspaceId
  Set rstConns =
qyConns.OpenRecordset(dbOpenSnapshot)
  Exit Sub

ReadWorkspaceParametersErr:

  LogErrors Errors
  On Error GoTo 0
  Err.Raise vbObjectError +
errReadWorkspaceDataFailed, _
        mstrModuleName & "ReadConnectionDtls",
LoadResString(errReadWorkspaceDataFailed)

End Sub

Public Sub ReadWorkspaceData(lngWorkspaceId
As Long, _
      cStepsCol As cArrSteps, _
      cParamsCol As cArrParameters, _
      cConsCol As cArrConstraints, _
      cConns As cConnections, _
      cConnDetails As cConnDtls, _
      rstStepsInWsp As Recordset, _
      qyStepsInWsp As DAO.QueryDef, _
      rstParamsInWsp As Recordset, _
      qyParamsInWsp As DAO.QueryDef, _
      rstConns As Recordset, _
      qyConns As DAO.QueryDef, _
      rstConnDtls As Recordset, _
      qyConnDtls As DAO.QueryDef)
  ' Loads the passed in structures with all the data
for
  ' the workspace. It also initializes the recordsets
  ' with the step and parameter records for the
workspace.
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    On Error GoTo ReadWorkspaceDataErr

    ShowBusy

    Call
ReadStepsInWorkspace(rstStepsInWsp,
qyStepsInWsp, lngWorkspaceId)

    ' Load all the steps in the array
    LoadRecordsetInStepsArray
rstStepsInWsp, cStepsCol

    ' Initialize the steps with all the iterator
    ' records for each step
    Call LoadIteratorsForWsp(cStepsCol,
lngWorkspaceId, rstStepsInWsp)
        ReadWorkspaceParameters
lngWorkspaceId, rstParamsInWsp,
qyParamsInWsp

        ' Load all the workspace parameters in the
array
    LoadRecordsetInParameterArray
rstParamsInWsp, cParamsCol
    ' Read and load connection strings
    ReadConnections lngWorkspaceId,
rstConns, qyConns
    LoadRecordsetInConnectionArray rstConns,
cConns
    ' Read and load connection information
    ReadConnectionDtls lngWorkspaceId,
rstConnDtls, qyConnDtls
    LoadRSInConnDtlArray rstConnDtls,
cConnDetails
    ' Finally, load the step constraints collection
class with
    ' all the constraints for the steps in the
workspace
    cConsCol.LoadConstraints lngWorkspaceId,
rstStepsInWsp

    ShowFree
    Exit Sub

ReadWorkspaceDataErr:
    ' Log the error code raised by Visual Basic
    ShowFree
    Call LogErrors(Errors)
    On Error GoTo 0
    gstrSource = mstrModuleName &
"ReadWorkspaceData"
    Err.Raise vbObjectError +
errReadWorkspaceDataFailed, _
            gstrSource, _

LoadResString(errReadWorkspaceDataFailed)

End Sub
```

```
// FILE:      LogWriter.cpp
//            Microsoft TPC-H Kit Ver. 1.00
//            Copyright Microsoft, 1999
//            All Rights Reserved
//
// PURPOSE:    Implementation of DLL Exports.
// Contact:    Reshma Tharamal (reshmat@microsoft.com)
//
// LogWriter.cpp : Implementation of DLL Exports.

// Note: Proxy/Stub Information
//     To build a separate proxy/stub DLL,
//     run nmake -f LogWriterps.mk in the project directory.

#include "stdafx.h"
#include "resource.h"
#include <initguid.h>
#include "LogWriter.h"

#include "LogWriter_i.c"
#include "SMLog.h"

CComModule _Module;

BEGIN_OBJECT_MAP(ObjectMap)
OBJECT_ENTRY(CLSID_SMLog, CSMLog)
END_OBJECT_MAP()

////////////////////////////////////////////////////////////////////////////
// DLL Entry Point

extern "C"
BOOL WINAPI DllMain(HINSTANCE hInstance, DWORD
dwReason, LPVOID /*lpReserved*/)
{
   if (dwReason == DLL_PROCESS_ATTACH)
   {
      _Module.Init(ObjectMap, hInstance,
&LIBID_LOGWRITERLib);
      DisableThreadLibraryCalls(hInstance);
   }
   else if (dwReason == DLL_PROCESS_DETACH)
      _Module.Term();
   return TRUE;    // ok
}
////////////////////////////////////////////////////////////////////////////
// Used to determine whether the DLL can be unloaded by OLE

STDAPI DllCanUnloadNow(void)
{
   return (_Module.GetLockCount()==0) ? S_OK : S_FALSE;
}

////////////////////////////////////////////////////////////////////////////
// Returns a class factory to create an object of the requested type

STDAPI DllGetClassObject(REFCLSID rclsid, REFIID riid,
LPVOID* ppv)
{
   return _Module.GetClassObject(rclsid, riid, ppv);
}
////////////////////////////////////////////////////////////////////////////
// DllRegisterServer - Adds entries to the system registry

STDAPI DllRegisterServer(void)
{
   // registers object, typelib and all interfaces in typelib
   return _Module.RegisterServer(TRUE);
}
////////////////////////////////////////////////////////////////////////////
// DllUnregisterServer - Removes entries from the system
registry

STDAPI DllUnregisterServer(void)
{
   return _Module.UnregisterServer(TRUE);
}


/* this ALWAYS GENERATED file contains the definitions for
the interfaces */


/* File created by MIDL compiler version 5.01.0164 */
/* at Thu Sep 19 17:49:50 2002
 */
/* Compiler settings for
C:\charles\Stepmaster\LogWriter\LogWriter.idl:
   Oicf (OptLev=i2), W1, Zp8, env=Win32, ms_ext, c_ext
   error checks: allocation ref bounds_check enum stub_data
*/
//@@MIDL_FILE_HEADING(  )


/* verify that the <rpcndr.h> version is high enough to compile
this file*/
#ifndef __REQUIRED_RPCNDR_H_VERSION__
#define __REQUIRED_RPCNDR_H_VERSION__ 440
#endif

#include "rpc.h"
#include "rpcndr.h"

#ifndef __RPCNDR_H_VERSION__
#error this stub requires an updated version of <rpcndr.h>
#endif // __RPCNDR_H_VERSION__

#ifndef COM_NO_WINDOWS_H
#include "windows.h"
#include "ole2.h"
#endif /*COM_NO_WINDOWS_H*/

#ifndef __LogWriter_h__
#define __LogWriter_h__

#ifdef __cplusplus
extern "C"{
#endif

/* Forward Declarations */

#ifndef __ISMLog_FWD_DEFINED__
#define __ISMLog_FWD_DEFINED__
typedef interface ISMLog ISMLog;
#endif      /* __ISMLog_FWD_DEFINED__ */


#ifndef ___ISMLogEvents_FWD_DEFINED__
#define ___ISMLogEvents_FWD_DEFINED__
typedef interface _ISMLogEvents _ISMLogEvents;
#endif      /* ___ISMLogEvents_FWD_DEFINED__ */


#ifndef __SMLog_FWD_DEFINED__
#define __SMLog_FWD_DEFINED__
```

```
#ifdef __cplusplus
typedef class SMLog SMLog;
#else
typedef struct SMLog SMLog;
#endif /* __cplusplus */

#endif      /* __SMLog_FWD_DEFINED__ */

/* header files for imported files */
#include "oaidl.h"
#include "ocidl.h"

void __RPC_FAR * __RPC_USER MIDL_user_allocate(size_t);
void __RPC_USER MIDL_user_free( void __RPC_FAR * );

#ifndef __ISMLog_INTERFACE_DEFINED__
#define __ISMLog_INTERFACE_DEFINED__

/* interface ISMLog */
/* [unique][helpstring][dual][uuid][object] */

EXTERN_C const IID IID_ISMLog;

#if defined(__cplusplus) && !defined(CINTERFACE)

   MIDL_INTERFACE("5AC75DAD-1936-11D3-BC2D-
00A0C90D2CA5")
   ISMLog : public IDispatch
   {
   public:
      virtual /* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE put_FileHeader(
         /* [in] */ BSTR newVal) = 0;

      virtual /* [helpstring][id] */ HRESULT
STDMETHODCALLTYPE WriteLine(
         BSTR szMsg) = 0;

      virtual /* [helpstring][id] */ HRESULT
STDMETHODCALLTYPE WriteField(
         BSTR szMsg) = 0;

      virtual /* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE put_FileName(
         /* [in] */ BSTR newVal) = 0;

      virtual /* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE put_Append(
         /* [in] */ BOOL newVal) = 0;

   };
#else      /* C style interface */

   typedef struct ISMLogVtbl
   {
      BEGIN_INTERFACE

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*QueryInterface )(
         ISMLog __RPC_FAR * This,
         /* [in] */ REFIID riid,
         /* [iid_is][out] */ void __RPC_FAR *__RPC_FAR
*ppvObject);

      ULONG ( STDMETHODCALLTYPE __RPC_FAR
*AddRef )(
         ISMLog __RPC_FAR * This);

      ULONG ( STDMETHODCALLTYPE __RPC_FAR
*Release )(
         ISMLog __RPC_FAR * This);

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfoCount )(
         ISMLog __RPC_FAR * This,
         /* [out] */ UINT __RPC_FAR *pctinfo);

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfo )(
         ISMLog __RPC_FAR * This,
         /* [in] */ UINT iTInfo,
         /* [in] */ LCID lcid,
         /* [out] */ ITypeInfo __RPC_FAR *__RPC_FAR
*ppTInfo);

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetIDsOfNames )(
         ISMLog __RPC_FAR * This,
         /* [in] */ REFIID riid,
         /* [size_is][in] */ LPOLESTR __RPC_FAR *rgszNames,
         /* [in] */ UINT cNames,
         /* [in] */ LCID lcid,
         /* [size_is][out] */ DISPID __RPC_FAR *rgDispId);

      /* [local] */ HRESULT ( STDMETHODCALLTYPE
__RPC_FAR *Invoke )(
         ISMLog __RPC_FAR * This,
         /* [in] */ DISPID dispIdMember,
         /* [in] */ REFIID riid,
         /* [in] */ LCID lcid,
         /* [in] */ WORD wFlags,
         /* [out][in] */ DISPPARAMS __RPC_FAR
*pDispParams,
         /* [out] */ VARIANT __RPC_FAR *pVarResult,
         /* [out] */ EXCEPINFO __RPC_FAR *pExcepInfo,
         /* [out] */ UINT __RPC_FAR *puArgErr);

      /* [helpstring][id][propput] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *put_FileHeader )(
         ISMLog __RPC_FAR * This,
         /* [in] */ BSTR newVal);

      /* [helpstring][id] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *WriteLine )(
         ISMLog __RPC_FAR * This,
         BSTR szMsg);

      /* [helpstring][id] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *WriteField )(
         ISMLog __RPC_FAR * This,
         BSTR szMsg);

      /* [helpstring][id][propput] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *put_FileName )(
         ISMLog __RPC_FAR * This,
         /* [in] */ BSTR newVal);

      /* [helpstring][id][propput] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *put_Append )(
         ISMLog __RPC_FAR * This,
         /* [in] */ BOOL newVal);

      END_INTERFACE
   } ISMLogVtbl;
```

```
    interface ISMLog
    {
        CONST_VTBL struct ISMLogVtbl __RPC_FAR *lpVtbl;
    };



#ifdef COBJMACROS


#define ISMLog_QueryInterface(This,riid,ppvObject)   \
    (This)->lpVtbl -> QueryInterface(This,riid,ppvObject)

#define ISMLog_AddRef(This)   \
    (This)->lpVtbl -> AddRef(This)

#define ISMLog_Release(This)   \
    (This)->lpVtbl -> Release(This)

#define ISMLog_GetTypeInfoCount(This,pctinfo)        \
    (This)->lpVtbl -> GetTypeInfoCount(This,pctinfo)

#define ISMLog_GetTypeInfo(This,iTInfo,lcid,ppTInfo)
              \
    (This)->lpVtbl -> GetTypeInfo(This,iTInfo,lcid,ppTInfo)

#define
ISMLog_GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rgD
ispId)        \
    (This)->lpVtbl ->
GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rgDispId)

#define
ISMLog_Invoke(This,dispIdMember,riid,lcid,wFlags,pDispPara
ms,pVarResult,pExcepInfo,puArgErr)          \
    (This)->lpVtbl ->
Invoke(This,dispIdMember,riid,lcid,wFlags,pDispParams,pVarR
esult,pExcepInfo,puArgErr)


#define ISMLog_put_FileHeader(This,newVal)            \
    (This)->lpVtbl -> put_FileHeader(This,newVal)

#define ISMLog_WriteLine(This,szMsg)     \
    (This)->lpVtbl -> WriteLine(This,szMsg)

#define ISMLog_WriteField(This,szMsg)    \
    (This)->lpVtbl -> WriteField(This,szMsg)

#define ISMLog_put_FileName(This,newVal)              \
    (This)->lpVtbl -> put_FileName(This,newVal)

#define ISMLog_put_Append(This,newVal)\
    (This)->lpVtbl -> put_Append(This,newVal)

#endif /* COBJMACROS */


#endif      /* C style interface */


/* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE ISMLog_put_FileHeader_Proxy(
    ISMLog __RPC_FAR * This,
    /* [in] */ BSTR newVal);


void __RPC_STUB ISMLog_put_FileHeader_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring][id] */ HRESULT STDMETHODCALLTYPE
ISMLog_WriteLine_Proxy(
    ISMLog __RPC_FAR * This,
    BSTR szMsg);


void __RPC_STUB ISMLog_WriteLine_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring][id] */ HRESULT STDMETHODCALLTYPE
ISMLog_WriteField_Proxy(
    ISMLog __RPC_FAR * This,
    BSTR szMsg);


void __RPC_STUB ISMLog_WriteField_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE ISMLog_put_FileName_Proxy(
    ISMLog __RPC_FAR * This,
    /* [in] */ BSTR newVal);

void __RPC_STUB ISMLog_put_FileName_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE ISMLog_put_Append_Proxy(
    ISMLog __RPC_FAR * This,
    /* [in] */ BOOL newVal);

void __RPC_STUB ISMLog_put_Append_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);

#endif      /* __ISMLog_INTERFACE_DEFINED__ */

#ifndef __LOGWRITERLib_LIBRARY_DEFINED__
#define __LOGWRITERLib_LIBRARY_DEFINED__
EXTERN_C const IID LIBID_LOGWRITERLib;

#ifndef ___ISMLogEvents_DISPINTERFACE_DEFINED__
#define ___ISMLogEvents_DISPINTERFACE_DEFINED__
```

```
EXTERN_C const IID DIID__ISMLogEvents;

#if defined(__cplusplus) && !defined(CINTERFACE)

    MIDL_INTERFACE("5AC75DB1-1936-11D3-BC2D-
00A0C90D2CA5")
    _ISMLogEvents : public IDispatch
    {
    };

#else       /* C style interface */

    typedef struct _ISMLogEventsVtbl
    {
        BEGIN_INTERFACE

        HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*QueryInterface )(
            _ISMLogEvents __RPC_FAR * This,
            /* [in] */ REFIID riid,
            /* [iid_is][out] */ void __RPC_FAR *__RPC_FAR
*ppvObject);

        ULONG ( STDMETHODCALLTYPE __RPC_FAR
*AddRef )(
            _ISMLogEvents __RPC_FAR * This);

        ULONG ( STDMETHODCALLTYPE __RPC_FAR
*Release )(
            _ISMLogEvents __RPC_FAR * This);

        HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfoCount )(
            _ISMLogEvents __RPC_FAR * This,
            /* [out] */ UINT __RPC_FAR *pctinfo);

        HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfo )(
            _ISMLogEvents __RPC_FAR * This,
            /* [in] */ UINT iTInfo,
            /* [in] */ LCID lcid,
            /* [out] */ ITypeInfo __RPC_FAR *__RPC_FAR
*ppTInfo);

        HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetIDsOfNames )(
            _ISMLogEvents __RPC_FAR * This,
            /* [in] */ REFIID riid,
            /* [size_is][in] */ LPOLESTR __RPC_FAR *rgszNames,
            /* [in] */ UINT cNames,
            /* [in] */ LCID lcid,
            /* [size_is][out] */ DISPID __RPC_FAR *rgDispId);

        /* [local] */ HRESULT ( STDMETHODCALLTYPE
__RPC_FAR *Invoke )(
            _ISMLogEvents __RPC_FAR * This,
            /* [in] */ DISPID dispIdMember,
            /* [in] */ REFIID riid,
            /* [in] */ LCID lcid,
            /* [in] */ WORD wFlags,
            /* [out][in] */ DISPPARAMS __RPC_FAR
*pDispParams,
            /* [out] */ VARIANT __RPC_FAR *pVarResult,
            /* [out] */ EXCEPINFO __RPC_FAR *pExcepInfo,
            /* [out] */ UINT __RPC_FAR *puArgErr);

        END_INTERFACE
    } _ISMLogEventsVtbl;


    interface _ISMLogEvents
    {
        CONST_VTBL struct _ISMLogEventsVtbl __RPC_FAR
*lpVtbl;
    };



#ifdef COBJMACROS


#define _ISMLogEvents_QueryInterface(This,riid,ppvObject)
            \
    (This)->lpVtbl -> QueryInterface(This,riid,ppvObject)

#define _ISMLogEvents_AddRef(This)      \
    (This)->lpVtbl -> AddRef(This)

#define _ISMLogEvents_Release(This)     \
    (This)->lpVtbl -> Release(This)


#define _ISMLogEvents_GetTypeInfoCount(This,pctinfo)
            \
    (This)->lpVtbl -> GetTypeInfoCount(This,pctinfo)

#define _ISMLogEvents_GetTypeInfo(This,iTInfo,lcid,ppTInfo)
            \
    (This)->lpVtbl -> GetTypeInfo(This,iTInfo,lcid,ppTInfo)

#define
_ISMLogEvents_GetIDsOfNames(This,riid,rgszNames,cNames,l
cid,rgDispId)           \
    (This)->lpVtbl ->
GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rgDispId)

#define
_ISMLogEvents_Invoke(This,dispIdMember,riid,lcid,wFlags,pD
ispParams,pVarResult,pExcepInfo,puArgErr)               \
    (This)->lpVtbl ->
Invoke(This,dispIdMember,riid,lcid,wFlags,pDispParams,pVarR
esult,pExcepInfo,puArgErr)

#endif /* COBJMACROS */


#endif      /* C style interface */


#endif      /*
___ISMLogEvents_DISPINTERFACE_DEFINED__ */


EXTERN_C const CLSID CLSID_SMLog;

#ifdef __cplusplus

class DECLSPEC_UUID("5AC75DB0-1936-11D3-BC2D-
00A0C90D2CA5")
SMLog;
#endif
#endif /* __LOGWRITERLib_LIBRARY_DEFINED__ */

/* Additional Prototypes for ALL interfaces */
```

```
unsigned long __RPC_USER  BSTR_UserSize(unsigned long
__RPC_FAR *, unsigned long , BSTR __RPC_FAR * );
unsigned char __RPC_FAR * __RPC_USER
BSTR_UserMarshal(unsigned long __RPC_FAR *,
unsigned char __RPC_FAR *, BSTR __RPC_FAR * );
unsigned char __RPC_FAR * __RPC_USER
BSTR_UserUnmarshal(unsigned long __RPC_FAR *,
unsigned char __RPC_FAR *, BSTR __RPC_FAR * );
void     __RPC_USER  BSTR_UserFree(     unsigned long
__RPC_FAR *, BSTR __RPC_FAR * );

/* end of Additional Prototypes */

#ifdef __cplusplus
}
#endif

#endif
//  FILE:      LogWriter.cpp
//             Microsoft TPC-H Kit Ver. 1.00
//             Copyright Microsoft, 1999
//             All Rights Reserved
//
//
//  PURPOSE:    Implementation of DLL Exports.
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
//
// LogWriter.cpp : Implementation of DLL Exports.


// Note: Proxy/Stub Information
//      To build a separate proxy/stub DLL,
//      run nmake -f LogWriterps.mk in the project directory.

#include "stdafx.h"
#include "resource.h"
#include <initguid.h>
#include "LogWriter.h"

#include "LogWriter_i.c"
#include "SMLog.h"


CComModule _Module;

BEGIN_OBJECT_MAP(ObjectMap)
OBJECT_ENTRY(CLSID_SMLog, CSMLog)
END_OBJECT_MAP()

////////////////////////////////////////////////////////////////////////////
// DLL Entry Point

extern "C"
BOOL WINAPI DllMain(HINSTANCE hInstance, DWORD
dwReason, LPVOID /*lpReserved*/)
{
   if (dwReason == DLL_PROCESS_ATTACH)
   {
      _Module.Init(ObjectMap, hInstance,
&LIBID_LOGWRITERLib);
      DisableThreadLibraryCalls(hInstance);
   }
   else if (dwReason == DLL_PROCESS_DETACH)
      _Module.Term();
   return TRUE;    // ok
}
////////////////////////////////////////////////////////////////////////////
// Used to determine whether the DLL can be unloaded by OLE

STDAPI DllCanUnloadNow(void)
{
   return (_Module.GetLockCount()==0) ? S_OK : S_FALSE;
}

////////////////////////////////////////////////////////////////////////////
// Returns a class factory to create an object of the requested type

STDAPI DllGetClassObject(REFCLSID rclsid, REFIID riid,
LPVOID* ppv)
{
   return _Module.GetClassObject(rclsid, riid, ppv);
}

////////////////////////////////////////////////////////////////////////////
// DllRegisterServer - Adds entries to the system registry

STDAPI DllRegisterServer(void)
{
   // registers object, typelib and all interfaces in typelib
   return _Module.RegisterServer(TRUE);
}

////////////////////////////////////////////////////////////////////////////
// DllUnregisterServer - Removes entries from the system
registry

STDAPI DllUnregisterServer(void)
{
   return _Module.UnregisterServer(TRUE);
}


/* this ALWAYS GENERATED file contains the definitions for
the interfaces */


/* File created by MIDL compiler version 5.01.0164 */
/* at Thu Sep 19 17:49:50 2002
 */
/* Compiler settings for
C:\charles\Stepmaster\LogWriter\LogWriter.idl:
   Oicf (OptLev=i2), W1, Zp8, env=Win32, ms_ext, c_ext
   error checks: allocation ref bounds_check enum stub_data
*/
//@@MIDL_FILE_HEADING(  )


/* verify that the <rpcndr.h> version is high enough to compile
this file*/
#ifndef __REQUIRED_RPCNDR_H_VERSION__
#define __REQUIRED_RPCNDR_H_VERSION__ 440
#endif

#include "rpc.h"
#include "rpcndr.h"

#ifndef __RPCNDR_H_VERSION__
#error this stub requires an updated version of <rpcndr.h>
#endif // __RPCNDR_H_VERSION__
#ifndef COM_NO_WINDOWS_H
#include "windows.h"
#include "ole2.h"
#endif /*COM_NO_WINDOWS_H*/
```

```
#ifndef __LogWriter_h__
#define __LogWriter_h__

#ifdef __cplusplus
extern "C"{
#endif

/* Forward Declarations */

#ifndef __ISMLog_FWD_DEFINED__
#define __ISMLog_FWD_DEFINED__
typedef interface ISMLog ISMLog;
#endif      /* __ISMLog_FWD_DEFINED__ */

#ifndef ___ISMLogEvents_FWD_DEFINED__
#define ___ISMLogEvents_FWD_DEFINED__
typedef interface _ISMLogEvents _ISMLogEvents;
#endif      /* ___ISMLogEvents_FWD_DEFINED__ */


#ifndef __SMLog_FWD_DEFINED__
#define __SMLog_FWD_DEFINED__

#ifdef __cplusplus
typedef class SMLog SMLog;
#else
typedef struct SMLog SMLog;
#endif /* __cplusplus */
#endif      /* __SMLog_FWD_DEFINED__ */

/* header files for imported files */
#include "oaidl.h"
#include "ocidl.h"

void __RPC_FAR * __RPC_USER MIDL_user_allocate(size_t);
void __RPC_USER MIDL_user_free( void __RPC_FAR * );

#ifndef __ISMLog_INTERFACE_DEFINED__
#define __ISMLog_INTERFACE_DEFINED__
/* interface ISMLog */
/* [unique][helpstring][dual][uuid][object] */

EXTERN_C const IID IID_ISMLog;

#if defined(__cplusplus) && !defined(CINTERFACE)

   MIDL_INTERFACE("5AC75DAD-1936-11D3-BC2D-
00A0C90D2CA5")
   ISMLog : public IDispatch
   {
   public:
      virtual /* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE put_FileHeader(
         /* [in] */ BSTR newVal) = 0;
      virtual /* [helpstring][id] */ HRESULT
STDMETHODCALLTYPE WriteLine(
         BSTR szMsg) = 0;
      virtual /* [helpstring][id] */ HRESULT
STDMETHODCALLTYPE WriteField(
         BSTR szMsg) = 0;
      virtual /* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE put_FileName(
         /* [in] */ BSTR newVal) = 0;
      virtual /* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE put_Append(
         /* [in] */ BOOL newVal) = 0;
   };
#else       /* C style interface */
   typedef struct ISMLogVtbl
   {
      BEGIN_INTERFACE
      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*QueryInterface )(
         ISMLog __RPC_FAR * This,
         /* [in] */ REFIID riid,
         /* [iid_is][out] */ void __RPC_FAR *__RPC_FAR
*ppvObject);
      ULONG ( STDMETHODCALLTYPE __RPC_FAR
*AddRef )(
         ISMLog __RPC_FAR * This);
      ULONG ( STDMETHODCALLTYPE __RPC_FAR
*Release )(
         ISMLog __RPC_FAR * This);
      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfoCount )(
         ISMLog __RPC_FAR * This,
         /* [out] */ UINT __RPC_FAR *pctinfo);
      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfo )(
         ISMLog __RPC_FAR * This,
         /* [in] */ UINT iTInfo,
         /* [in] */ LCID lcid,
         /* [out] */ ITypeInfo __RPC_FAR *__RPC_FAR
*ppTInfo);
      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetIDsOfNames )(
         ISMLog __RPC_FAR * This,
         /* [in] */ REFIID riid,
         /* [size_is][in] */ LPOLESTR __RPC_FAR *rgszNames,
         /* [in] */ UINT cNames,
         /* [in] */ LCID lcid,
         /* [size_is][out] */ DISPID __RPC_FAR *rgDispId);
      /* [local] */ HRESULT ( STDMETHODCALLTYPE
__RPC_FAR *Invoke )(
         ISMLog __RPC_FAR * This,
         /* [in] */ DISPID dispIdMember,
         /* [in] */ REFIID riid,
         /* [in] */ LCID lcid,
         /* [in] */ WORD wFlags,
         /* [out][in] */ DISPPARAMS __RPC_FAR
*pDispParams,
         /* [out] */ VARIANT __RPC_FAR *pVarResult,
         /* [out] */ EXCEPINFO __RPC_FAR *pExcepInfo,
         /* [out] */ UINT __RPC_FAR *puArgErr);
      /* [helpstring][id][propput] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *put_FileHeader )(
         ISMLog __RPC_FAR * This,
         /* [in] */ BSTR newVal);
      /* [helpstring][id] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *WriteLine )(
         ISMLog __RPC_FAR * This,
         BSTR szMsg);
      /* [helpstring][id] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *WriteField )(
         ISMLog __RPC_FAR * This,
         BSTR szMsg);
      /* [helpstring][id][propput] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *put_FileName )(
         ISMLog __RPC_FAR * This,
         /* [in] */ BSTR newVal);
      /* [helpstring][id][propput] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *put_Append )(
         ISMLog __RPC_FAR * This,
         /* [in] */ BOOL newVal);
      END_INTERFACE
   } ISMLogVtbl;
```

```
    interface ISMLog
    {
        CONST_VTBL struct ISMLogVtbl __RPC_FAR *lpVtbl;
    };



#ifdef COBJMACROS


#define ISMLog_QueryInterface(This,riid,ppvObject)   \
    (This)->lpVtbl -> QueryInterface(This,riid,ppvObject)

#define ISMLog_AddRef(This)   \
    (This)->lpVtbl -> AddRef(This)

#define ISMLog_Release(This)   \
    (This)->lpVtbl -> Release(This)


#define ISMLog_GetTypeInfoCount(This,pctinfo)        \
    (This)->lpVtbl -> GetTypeInfoCount(This,pctinfo)

#define ISMLog_GetTypeInfo(This,iTInfo,lcid,ppTInfo)
              \
    (This)->lpVtbl -> GetTypeInfo(This,iTInfo,lcid,ppTInfo)

#define
ISMLog_GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rgD
ispId)        \
    (This)->lpVtbl ->
GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rgDispId)

#define
ISMLog_Invoke(This,dispIdMember,riid,lcid,wFlags,pDispPara
ms,pVarResult,pExcepInfo,puArgErr)          \
    (This)->lpVtbl ->
Invoke(This,dispIdMember,riid,lcid,wFlags,pDispParams,pVarR
esult,pExcepInfo,puArgErr)


#define ISMLog_put_FileHeader(This,newVal)            \
    (This)->lpVtbl -> put_FileHeader(This,newVal)

#define ISMLog_WriteLine(This,szMsg)      \
    (This)->lpVtbl -> WriteLine(This,szMsg)

#define ISMLog_WriteField(This,szMsg)     \
    (This)->lpVtbl -> WriteField(This,szMsg)

#define ISMLog_put_FileName(This,newVal)              \
    (This)->lpVtbl -> put_FileName(This,newVal)

#define ISMLog_put_Append(This,newVal)\
    (This)->lpVtbl -> put_Append(This,newVal)

#endif /* COBJMACROS */

#endif       /* C style interface */

/* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE ISMLog_put_FileHeader_Proxy(
    ISMLog __RPC_FAR * This,
    /* [in] */ BSTR newVal);

void __RPC_STUB ISMLog_put_FileHeader_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);

/* [helpstring][id] */ HRESULT STDMETHODCALLTYPE
ISMLog_WriteLine_Proxy(
    ISMLog __RPC_FAR * This,
    BSTR szMsg);


void __RPC_STUB ISMLog_WriteLine_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring][id] */ HRESULT STDMETHODCALLTYPE
ISMLog_WriteField_Proxy(
    ISMLog __RPC_FAR * This,
    BSTR szMsg);


void __RPC_STUB ISMLog_WriteField_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE ISMLog_put_FileName_Proxy(
    ISMLog __RPC_FAR * This,
    /* [in] */ BSTR newVal);


void __RPC_STUB ISMLog_put_FileName_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE ISMLog_put_Append_Proxy(
    ISMLog __RPC_FAR * This,
    /* [in] */ BOOL newVal);


void __RPC_STUB ISMLog_put_Append_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);

#endif       /* __ISMLog_INTERFACE_DEFINED__ */


#ifndef __LOGWRITERLib_LIBRARY_DEFINED__
#define __LOGWRITERLib_LIBRARY_DEFINED__
```

```
/* library LOGWRITERLib */
/* [helpstring][version][uuid] */


EXTERN_C const IID LIBID_LOGWRITERLib;

#ifndef ___ISMLogEvents_DISPINTERFACE_DEFINED__
#define ___ISMLogEvents_DISPINTERFACE_DEFINED__

/* dispinterface _ISMLogEvents */
/* [helpstring][uuid] */


EXTERN_C const IID DIID__ISMLogEvents;

#if defined(__cplusplus) && !defined(CINTERFACE)

    MIDL_INTERFACE("5AC75DB1-1936-11D3-BC2D-
00A0C90D2CA5")
    _ISMLogEvents : public IDispatch
    {
    };

#else       /* C style interface */

    typedef struct _ISMLogEventsVtbl
    {
        BEGIN_INTERFACE

        HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*QueryInterface )(
            _ISMLogEvents __RPC_FAR * This,
            /* [in] */ REFIID riid,
            /* [iid_is][out] */ void __RPC_FAR *__RPC_FAR
*ppvObject);

        ULONG ( STDMETHODCALLTYPE __RPC_FAR
*AddRef )(
            _ISMLogEvents __RPC_FAR * This);

        ULONG ( STDMETHODCALLTYPE __RPC_FAR
*Release )(
            _ISMLogEvents __RPC_FAR * This);

        HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfoCount )(
            _ISMLogEvents __RPC_FAR * This,
            /* [out] */ UINT __RPC_FAR *pctinfo);

        HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfo )(
            _ISMLogEvents __RPC_FAR * This,
            /* [in] */ UINT iTInfo,
            /* [in] */ LCID lcid,
            /* [out] */ ITypeInfo __RPC_FAR *__RPC_FAR
*ppTInfo);

        HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetIDsOfNames )(
            _ISMLogEvents __RPC_FAR * This,
            /* [in] */ REFIID riid,
            /* [size_is][in] */ LPOLESTR __RPC_FAR *rgszNames,
            /* [in] */ UINT cNames,
            /* [in] */ LCID lcid,
            /* [size_is][out] */ DISPID __RPC_FAR *rgDispId);

        /* [local] */ HRESULT ( STDMETHODCALLTYPE
__RPC_FAR *Invoke )(
            _ISMLogEvents __RPC_FAR * This,
            /* [in] */ DISPID dispIdMember,
            /* [in] */ REFIID riid,
            /* [in] */ LCID lcid,
            /* [in] */ WORD wFlags,
            /* [out][in] */ DISPPARAMS __RPC_FAR
*pDispParams,
            /* [out] */ VARIANT __RPC_FAR *pVarResult,
            /* [out] */ EXCEPINFO __RPC_FAR *pExcepInfo,
            /* [out] */ UINT __RPC_FAR *puArgErr);

        END_INTERFACE
    } _ISMLogEventsVtbl;

    interface _ISMLogEvents
    {
        CONST_VTBL struct _ISMLogEventsVtbl __RPC_FAR
*lpVtbl;
    };



#ifdef COBJMACROS


#define _ISMLogEvents_QueryInterface(This,riid,ppvObject)
            \
    (This)->lpVtbl -> QueryInterface(This,riid,ppvObject)

#define _ISMLogEvents_AddRef(This)      \
    (This)->lpVtbl -> AddRef(This)

#define _ISMLogEvents_Release(This)     \
    (This)->lpVtbl -> Release(This)


#define _ISMLogEvents_GetTypeInfoCount(This,pctinfo)
            \
    (This)->lpVtbl -> GetTypeInfoCount(This,pctinfo)

#define _ISMLogEvents_GetTypeInfo(This,iTInfo,lcid,ppTInfo)
            \
    (This)->lpVtbl -> GetTypeInfo(This,iTInfo,lcid,ppTInfo)

#define
_ISMLogEvents_GetIDsOfNames(This,riid,rgszNames,cNames,l
cid,rgDispId)           \
    (This)->lpVtbl ->
GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rgDispId)

#define
_ISMLogEvents_Invoke(This,dispIdMember,riid,lcid,wFlags,pD
ispParams,pVarResult,pExcepInfo,puArgErr)               \
    (This)->lpVtbl ->
Invoke(This,dispIdMember,riid,lcid,wFlags,pDispParams,pVarR
esult,pExcepInfo,puArgErr)

#endif /* COBJMACROS */


#endif      /* C style interface */


#endif      /*
___ISMLogEvents_DISPINTERFACE_DEFINED__ */
```

```
EXTERN_C const CLSID CLSID_SMLog;

#ifdef __cplusplus
class DECLSPEC_UUID("5AC75DB0-1936-11D3-BC2D-
00A0C90D2CA5")
SMLog;
#endif
#endif /* __LOGWRITERLib_LIBRARY_DEFINED__ */

unsigned long __RPC_USER  BSTR_UserSize(unsigned long
__RPC_FAR *,
unsigned long   , BSTR __RPC_FAR * );
unsigned char __RPC_FAR * __RPC_USER
BSTR_UserMarshal(  unsigned long __RPC_FAR *,
unsigned char __RPC_FAR *, BSTR __RPC_FAR * );
unsigned char __RPC_FAR * __RPC_USER
BSTR_UserUnmarshal(unsigned long __RPC_FAR *,
unsigned char __RPC_FAR *, BSTR __RPC_FAR * );
void     __RPC_USER  BSTR_UserFree(     unsigned long
__RPC_FAR *, BSTR __RPC_FAR * );

/* end of Additional Prototypes */

#ifdef __cplusplus
}
#endif
#endif
//  FILE:      LogWriter.cpp
///  FILE:      LogWriterCP.h
//             Microsoft TPC-H Kit Ver. 1.00
//             Copyright Microsoft, 1999
//             All Rights Reserved
//  PURPOSE:    Connection point implementation
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
#ifndef _LOGWRITERCP_H_
#define _LOGWRITERCP_H_

template <class T>
class CProxy_ISMLogEvents : public IConnectionPointImpl<T,
&DIID__ISMLogEvents, CComDynamicUnkArray>
{
                //Warning this class may be recreated by the wizard.
public:
};
#endif
//  FILE:      resource.h
//             Microsoft TPC-H Kit Ver. 1.00
//             Copyright Microsoft, 1999
//             All Rights Reserved
//  PURPOSE:    Resource file
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
//
//{{NO_DEPENDENCIES}}
// Microsoft Developer Studio generated include file.
// Used by LogWriter.rc
//
#define IDS_PROJNAME                100
#define IDR_SMLOG                   101
// Next default values for new objects
//
#ifdef APSTUDIO_INVOKED
#ifndef APSTUDIO_READONLY_SYMBOLS
#define _APS_NEXT_RESOURCE_VALUE       201
#define _APS_NEXT_COMMAND_VALUE        32768
#define _APS_NEXT_CONTROL_VALUE        201
#define _APS_NEXT_SYMED_VALUE          102
#endif
#endif
```

```
//  FILE:      SMLog.cpp
//             Microsoft TPC-H Kit Ver. 1.00
//             Copyright Microsoft, 1999
//             All Rights Reserved
//
//
//  PURPOSE:    Implementation of CSMLog
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
//
// SMLog.cpp : Implementation of CSMLog
#include "stdafx.h"
#include <stdio.h>
#include "LogWriter.h"
#include "SMLog.h"

////////////////////////////////////////////////////////////////////////
// CSMLog

STDMETHODIMP
CSMLog::InterfaceSupportsErrorInfo(REFIID riid)
{
static const IID* arr[] =
{
&IID_ISMLog
};
for (int i=0; i < sizeof(arr) / sizeof(arr[0]); i++)
{
if (InlineIsEqualGUID(*arr[i],riid))
return S_OK;
}
return S_FALSE;
}

STDMETHODIMP CSMLog::WriteToFile(BSTR szMsg)
{
   // Writes the passed in string to the file
              _bstr_t szTempMsg(szMsg);
              return(Write((PBYTE)(LPSTR)szTempMsg,
SysStringLen(szMsg)));
}

HRESULT CSMLog::Init()
{
char          szDrive[256];
char          szDir[256];
char          szLogDir[256];
HANDLE  hLogThread;
DWORD   dwThreadID;
_bstr_t szFile(m_szFile);
DWORD   lDisposition;

//create transaction log directory
_splitpath((LPCTSTR)szFile, szDrive, szDir, NULL, NULL);
_makepath(szLogDir, szDrive, szDir, NULL, NULL);
CreateDirectory(szLogDir, NULL);
   iBufferSize = WRITE_BUFFER_SIZE;
iBytesFreeInBuffer     = iBufferSize;

// use VirtualAlloc to get page aligned buffers //
for (int i=0;i<MAX_NUM_BUFFERS;i++)
{
// use VirtualAlloc to get page aligned buffers //
pBuffer[i] = (BYTE *)VirtualAlloc(NULL, iBufferSize,
MEM_COMMIT, PAGE_READWRITE );
if (pBuffer[i] == NULL)
return RaiseSystemError();
}
```

```
        iActiveBuffer = 0;
        pCurrent = pBuffer[iActiveBuffer];

        lDisposition = m_bAppend ? OPEN_ALWAYS :
CREATE_ALWAYS;
        m_hTxnFile = CreateFile((LPCTSTR)szFile,
GENERIC_WRITE, FILE_SHARE_READ,
                NULL, lDisposition,
FILE_ATTRIBUTE_NORMAL, NULL);
        if ( m_hTxnFile == INVALID_HANDLE_VALUE )
                return (RaiseSystemError());

        if (m_bAppend)
                if ( SetFilePointer(m_hTxnFile, 0, NULL,
FILE_END) == ERR_SET_FILE_POINTER )
                        return (RaiseSystemError());

        hIoComplete  = CreateEvent(NULL, TRUE, TRUE,
NULL);
        if ( hIoComplete == NULL)
                return RaiseSystemError();

        hLogFileIo = CreateEvent(NULL, FALSE, FALSE,
NULL);
        if ( hLogFileIo == NULL)
                return RaiseSystemError();

        hLogThread = CreateThread( NULL, 0,
(LPTHREAD_START_ROUTINE)LogFileIO, this, 0,
&dwThreadID );
        if (hLogThread == NULL)
                return RaiseSystemError();

        if (m_szHeader != NULL)
                WriteLine(m_szHeader);

        return S_OK;
}

void CSMLog::LogFileIO(void *ptr)
{
        unsigned long           BytesWritten;
        CSMLog *p=(CSMLog *)ptr;

        while( TRUE )
        {
        WaitForSingleObject(p->hLogFileIo, INFINITE);
        if ( p->m_hTxnFile ==
INVALID_HANDLE_VALUE )
                break;

        // do synchronous (blocking) write to log file
        if ( !WriteFile(p->m_hTxnFile, p->pBuffer[p-
>iIoBuffer],p->iWriteSize,&BytesWritten,NULL) )
        {
        // set error code in this thread, but don't throw an
exception
        // because no one will catch it.
        p->dwError = GetLastError();

        }
        SetEvent(p->hIoComplete);
        }

        SetEvent(p->hIoComplete);
}
```

```
HRESULT CSMLog::Write(BYTE *ptr, DWORD iSize)
{
        int             StartPos, Remainder;
        int             dwErrorLocal = 0;

        if (!m_bInitialized)
        {
                HRESULT hr = Init();
                m_bInitialized = TRUE;

                if (FAILED(hr))
                        return hr;
        }

        if ( m_hTxnFile == INVALID_HANDLE_VALUE )
                return S_OK;

        if ( iBytesFreeInBuffer >= iSize )
        {
                memcpy(pCurrent, ptr, iSize);
                pCurrent += iSize;
                iBytesFreeInBuffer -= iSize;
        }
        else
        {
                // We don't expect to ever have to wait
here, but just in case...
                WaitForSingleObject(hIoComplete,
INFINITE);

                // check for an error from the log writer
thread
                if (dwError != 0)
                {
                        SetLastError(dwError);
                        return RaiseSystemError();
                }

                assert( iSize <= iBufferSize );
                memcpy(pCurrent, ptr,
iBytesFreeInBuffer);
                StartPos = iBytesFreeInBuffer;
                Remainder = iSize - iBytesFreeInBuffer;

                // trigger an IO on the current buffer and
roll to the next buffer
                iIoBuffer = iActiveBuffer;
                iWriteSize = iBufferSize;
                ResetEvent(hIoComplete);
                SetEvent( hLogFileIo );
        // wake up IO writer

                iActiveBuffer = (iActiveBuffer+1) %
MAX_NUM_BUFFERS;
                pCurrent = pBuffer[iActiveBuffer];

                memcpy(pCurrent, ((BYTE
*)ptr+StartPos), Remainder);
                pCurrent += Remainder;
                iBytesFreeInBuffer = iBufferSize -
Remainder;
        }

        return S_OK;
}
```

```
void CSMLog::CloseLogFile(void)
{

if ( m_hTxnFile != INVALID_HANDLE_VALUE )
{
		if ( iBytesFreeInBuffer < iBufferSize )
		{
		WaitForSingleObject(hIoComplete, INFINITE);
		ResetEvent(hIoComplete);

		// check for an error from the log writer thread
		if (dwError != 0)
		{
		SetLastError( dwError );
		goto exit_SpinLock;
		}

		//zero fill remainder of buffer
		ZeroMemory(pCurrent, iBytesFreeInBuffer);

		iIoBuffer = iActiveBuffer;
		iWriteSize = iBufferSize - iBytesFreeInBuffer;
		SetEvent(hLogFileIo); // wake up IO writer
		}

		WaitForSingleObject(hIoComplete, INFINITE);
// check for an error from the log writer thread if (dwError != 0)
		goto exit_SpinLock;

		pCurrent = pBuffer[iActiveBuffer];
		ZeroMemory(pCurrent, iBufferSize);
		iIoBuffer = iActiveBuffer;

		CloseHandle(m_hTxnFile);
		m_hTxnFile = INVALID_HANDLE_VALUE;
		//handle to open transaction log file

// wake up IO writer one more time for it to terminate
		ResetEvent(hIoComplete);
		SetEvent(hLogFileIo);		// wake up IO writer
			WaitForSingleObject(hIoComplete,
INFINITE);
		}

exit_SpinLock:

		if (dwError != 0)
		{
			if (m_hTxnFile !=
INVALID_HANDLE_VALUE)
		{
		CloseHandle(m_hTxnFile);
		m_hTxnFile = INVALID_HANDLE_VALUE;
		}

		SetLastError( dwError );
// TODO: Don't know yet what to do with an error on the file
close, since this function is called by the desctructor (which does
 not return a value)
		//throw new CSystemErr( CSystemErr::eWriteFile,
"CTxnLog::CloseTransactionLogFile" );
}

}
```

```
// Wrapper function that raises an error if a Windows Api fails
STDMETHODIMP CSMLog::RaiseSystemError(void)
{
		char s[ERR_BUFFER_SIZE];
		long c;
		DWORD e;

		e = GetLastError();

		c = sprintf(s, "Error code: %ld. ", e);
		c =
FormatMessage(FORMAT_MESSAGE_FROM_SYSTEM |
FORMAT_MESSAGE_IGNORE_INSERTS,
			NULL, e, 0, s + c, sizeof(s) - c, NULL);

		return Error(s, 0, NULL, GUID_NULL);
}

//DEL STDMETHODIMP CSMLog::get_FileName(BSTR
*pVal)
//DEL {
//DEL	*pVal = m_szFile;
//DEL	return S_OK;
//DEL }

STDMETHODIMP CSMLog::put_FileName(BSTR newVal)
{
		m_szFile = SysAllocString(newVal);

		return S_OK;
}

//DEL STDMETHODIMP CSMLog::get_FileHeader(BSTR
*pVal)
//DEL {
//DEL	*pVal = m_szHeader;
//DEL	return S_OK;
//DEL }

STDMETHODIMP CSMLog::put_FileHeader(BSTR newVal)
{
		m_szHeader = SysAllocString(newVal);
		return S_OK;
}

STDMETHODIMP CSMLog::WriteLine(BSTR szMsg)
{
		_bstr_t szTmp(szMsg);

		szTmp += "\r";
		szTmp += "\n";
		return(WriteToFile(szTmp));
}

STDMETHODIMP CSMLog::WriteField(BSTR szMsg)
{
		return(WriteToFile(szMsg));
}

//DEL STDMETHODIMP CSMLog::get_Append(BOOL *pVal)
//DEL {
//DEL	*pVal = m_bAppend;
//DEL	return S_OK;
//DEL }
```

```
STDMETHODIMP CSMLog::put_Append(BOOL newVal)
{
        m_bAppend = newVal;
        return S_OK;
}
//  FILE:      SMExecute.h
//          Microsoft TPC-H Kit Ver. 1.00
//          Copyright Microsoft, 1999
//          All Rights Reserved
//
//  PURPOSE:    Declaration of the CSMLog
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
//
// SMLog.h : Declaration of the CSMLog

#ifndef __SMLOG_H_
#define __SMLOG_H_
#include "resource.h"       // main symbols
#include "assert.h"
#include "comdef.h"
#include "LogWriterCP.h"
#define     WRITE_BUFFER_SIZE           8*1024
#define     MAX_NUM_BUFFERS             2
#define ERR_BUFFER_SIZE                 512
#define ERR_SET_FILE_POINTER            0xFFFFFFFF

/////////////////////////////////////////////////////////////////////////////
// CSMLog
class ATL_NO_VTABLE CSMLog :
public CComObjectRootEx<CComSingleThreadModel>,
public CComCoClass<CSMLog, &CLSID_SMLog>,
public ISupportErrorInfo,
public IConnectionPointContainerImpl<CSMLog>,
public IDispatchImpl<ISMLog, &IID_ISMLog,
&LIBID_LOGWRITERLib>,
public CProxy_ISMLogEvents< CSMLog >
{
public:
CSMLog()
{
        m_bAppend = FALSE;
        m_bInitialized = FALSE;
    m_hTxnFile = INVALID_HANDLE_VALUE;
    hIoComplete = NULL;
    hLogFileIo = NULL;
for (int i=0;i<MAX_NUM_BUFFERS;i++)
        pBuffer[i] = NULL;
    pCurrent = NULL;
    m_szFile = NULL;
    m_szHeader = NULL;
    dwError = 0;
        }
private:
BOOL    m_bAppend;
BOOL    m_bInitialized;
HANDLE m_hTxnFile; //handle to log file
HANDLE hIoComplete; //event to signify that there are no
pending IOs
HANDLE hLogFileIo; //event to signal the IO thread to write the
inactive buffer
BYTE    *pBuffer[MAX_NUM_BUFFERS];
BYTE    *pCurrent;  //ptr to current buffer
int     iActiveBuffer;//indicates which buffer is active: 0 or
1int     iIoBuffer;  //buffer for any pending IO operation
DWORD   dwError;
DWORD   iBufferSize; //buffer allocated size
DWORD   iBytesFreeInBuffer; // bytes available for use in buffer
DWORD   iWriteSize;         //bytes to write to file
BSTR  m_szFile;             //name of the file to write to
BSTR  m_szHeader; //header to be printed to the file (optional)
private:
static void         LogFileIO(void *p);
HRESULT             Write(BYTE *ptr, DWORD iSize);
STDMETHODIMP    WriteToFile(BSTR szMsg);
void        CloseLogFile(void);
STDMETHODIMP    RaiseSystemError(void);
};

#endif //__SMLOG_H_
//  FILE:      stdafx.cpp
//          Microsoft TPC-H Kit Ver. 1.00
//          Copyright Microsoft, 1999
//          All Rights Reserved
//  PURPOSE:    source file that includes just the standard
includes
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
// stdafx.cpp : source file that includes just the standard includes
//  stdafx.pch will be the pre-compiled header
//  stdafx.obj will contain the pre-compiled type information

#include "stdafx.h"
#ifdef _ATL_STATIC_REGISTRY
#include <statreg.h>
#include <statreg.cpp>
#endif
#include <atlimpl.cpp>
//  FILE:      stdafx.h
//          Microsoft TPC-H Kit Ver. 1.00
//          Copyright Microsoft, 1999
//          All Rights Reserved
//  PURPOSE:    include file for standard system include files,
//      or project specific include files that are used frequently,
//      but are changed infrequently
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
//
#if
!defined(AFX_STDAFX_H__5AC75DA4_1936_11D3_BC2D_
00A0C90D2CA5__INCLUDED_)
#define
AFX_STDAFX_H__5AC75DA4_1936_11D3_BC2D_00A0C90
D2CA5__INCLUDED_

#if _MSC_VER > 1000
#pragma once
#endif // _MSC_VER > 1000

#define STRICT
#ifndef _WIN32_WINNT
#define _WIN32_WINNT 0x0400
#endif
#define _ATL_APARTMENT_THREADED

#include <atlbase.h>
//You may derive a class from CComModule and use it if you
//want to override something, but do not change the name of
//_Module extern CComModule _Module;
#include <atlcom.h>
//{{AFX_INSERT_LOCATION}}
// Microsoft Visual C++ will insert additional declarations
immediately before the previous line.
#endif //
!defined(AFX_STDAFX_H__5AC75DA4_1936_11D3_BC2D_
00A0C90D2CA5__INCLUDED)
```

```
// FILE:      Execute.cpp
//            Microsoft TPC-H Kit Ver. 1.00
//            Copyright Microsoft, 1999
//            All Rights Reserved
//
// PURPOSE:   Implementation of CExecute.
// Contact:   Reshma Tharamal (reshmat@microsoft.com)
//
#include "stdafx.h"

#include "ExecuteDll.h"
#include "SMExecute.h"
#include "Execute.h"

extern SQLHENV henv;

extern SM_Connection_Info       *p_Connections;
            // Pointer to open connections
extern int                      iConnectionCount;     //
Number of open connections
extern CRITICAL_SECTION                 hConnections;
                        // Critical section to serialize

                        // access to available connections

#ifdef _TPCH_AUDIT
            extern FILE *pfLogFile;                     // Log
file containing timestamps
            extern CRITICAL_SECTION hLogFileWrite;
            // Handle to critical section
#endif

////////////////////////////////////////////////////////////////////////
// CExecute

char * g_szOdbcOps[] = {
            "SQLAllocHandle",
            "SQLDriverConnect",
            "SQLExecDirect",
            "SQLSetStmtAttr",
            "SQLCancel",
            "SQLNumResultCols",
            "SQLDescribeCol",
            "SQLColAttribute",
            "SQLFetch",
            "SQLGetData",
            "SQLRowCount",
            "SQLMoreResults",
            "SQLBindCol"
            };

char * CExecError::m_szExecErrorDesc[] = {
                        "Connection is already in use."
            };
STDMETHODIMP
CExecute::InterfaceSupportsErrorInfo(REFIID riid)
{
            static const IID* arr[] =
            {
                        &IID_IExecute
            };
            for (int i=0; i < sizeof(arr) / sizeof(arr[0]); i++)
            {
                        if (InlineIsEqualGUID(*arr[i],riid))
                                    return S_OK;
            }
            return S_FALSE;
}
STDMETHODIMP CExecute::put_OutputFile(BSTR newVal)
{
            assert(m_pOutputFile);
            m_OutputFile = newVal;
            HRESULT             hr = m_pOutputFile-
>put_FileName(newVal);
            if FAILED(hr)
            {
                        m_pOutputFile->Release();
                        m_pOutputFile = NULL;
            }
            return hr;
}
//DEL STDMETHODIMP CExecute::put_LogFile(BSTR
newVal)
//DEL {
//DEL       assert(m_pLogFile);
//DEL
//DEL       m_pLogFile->put_FileName(newVal);
//DEL       return S_OK;
//DEL }

STDMETHODIMP CExecute::put_ErrorFile(BSTR newVal)
{
            assert(m_pErrorFile);
            m_ErrorFile = newVal;

            HRESULT             hr = m_pErrorFile-
>put_FileName(newVal);
            if FAILED(hr)
            {
                        m_pErrorFile->Release();
                        m_pErrorFile = NULL;
            }
            return hr;
}
STDMETHODIMP CExecute::DoExecute(BSTR szCommand,
BSTR szExecutionDtls, ExecutionType ExecMethod, \
 BOOL bNoCount, BOOL bNoExecute, BOOL bParseOnly,
BOOL bQuotedIds, \
BOOL bAnsiNulls, BOOL bShowQP, BOOL bStatsTime, BOOL
bStatsIO, \
long lRowCount, long lQueryTmout, BSTR szConnection)
{
HANDLE              hThrd;
DWORD               tid;

  _CrtSetReportFile(_CRT_WARN,
_CRTDBG_FILE_STDOUT);
            m_szCommand = szCommand;
            m_szExecDtls = szExecutionDtls;

            m_ExecMthd = ExecMethod;
            if (m_ExecMthd == execODBC)
   {
      m_bNoCount = bNoCount;
            m_bNoExecute = bNoExecute;
            m_bParseOnly = bParseOnly;
            m_bQuotedIds = bQuotedIds;
            m_bAnsiNulls = bAnsiNulls;
            m_bShowQP = bShowQP;
            m_bStatsTime = bStatsTime;
            m_bStatsIO = bStatsIO;
            m_lRowCount = lRowCount;
            m_lQueryTmout = lQueryTmout;
            m_szConnection = szConnection;
   }
```

```
        if((hThrd = CreateThread( 0, 0,
(LPTHREAD_START_ROUTINE)ExecutionThread,
        this, 0, &tid)) == NULL)
        return(RaiseSystemError());
        CloseHandle(hThrd);
        return S_OK;
}

STDMETHODIMP CExecute::Abort()
{
        if (m_ExecMthd == execShell)
                return(AbortShell());
        else
                return(AbortODBC());
}
void ExecutionThread(LPVOID lpParameter)
{
        CExecute  *MyExecute = (CExecute*)lpParameter;
        MyExecute->m_tElapsedTime = 0;
        GetLocalTime(&MyExecute->m_tStartTime);
        MyExecute->PostMessage(WM_TASK_START, 0,
0);

#ifdef _TPCH_AUDIT
        char
        szBuffer[MAXLOGCMDBUF];
        char                    szFmt[MAXBUFLEN];

        sprintf(szFmt, "Start Step: '%%.%ds' at '%d/%d/%d
%d:%d:%d:%d'\n",
MAXLOGCMDLEN,
MyExecute->m_tStartTime.wMonth, MyExecute-
>m_tStartTime.wDay,
MyExecute->m_tStartTime.wYear, MyExecute-
>m_tStartTime.wHour,
                MyExecute->m_tStartTime.wMinute,
MyExecute->m_tStartTime.wSecond,
                MyExecute-
>m_tStartTime.wMilliseconds);
if (MyExecute->m_ExecMthd == execShell)
        WriteFileToTpchLog((LPSTR)MyExecute-
>m_szCommand, szFmt);
else
{
sprintf(szBuffer, szFmt, (LPSTR)MyExecute->m_szCommand);
WriteToTpchLog(szBuffer);
}
#endif

        // Initialize the run status for the step to running. The
completion status for
        // the step will be initialized by the Shell and ODBC
execution functions.
   MyExecute->m_StepStatus = gintRunning;
if (MyExecute->m_ExecMthd == execShell)
MyExecute->m_tElapsedTime = MyExecute->ExecuteShell();
else
MyExecute->m_tElapsedTime = MyExecute->ExecuteODBC();
// Close the output, log and error files
if (MyExecute->m_pOutputFile)
        MyExecute->m_pOutputFile->Release();
        MyExecute->m_pOutputFile = NULL;

        MyExecute->m_ExecTime = NULL;
        GetLocalTime(&MyExecute->m_tEndTime);
#ifdef _TPCH_AUDIT
        sprintf(szFmt, "Complete Step: '%%.%ds' at
'%d/%d/%d %d:%d:%d:%d'\n",
        MAXLOGCMDLEN,
        MyExecute->m_tEndTime.wMonth, MyExecute-
>m_tEndTime.wDay,
        MyExecute->m_tEndTime.wYear, MyExecute-
>m_tEndTime.wHour,
        MyExecute->m_tEndTime.wMinute, MyExecute-
>m_tEndTime.wSecond,
        MyExecute->m_tEndTime.wMilliseconds);
        if (MyExecute->m_ExecMthd == execShell)
        WriteFileToTpchLog((LPSTR)MyExecute-
>m_szCommand, szFmt);
        else
        {
        sprintf(szBuffer, szFmt, (LPSTR)MyExecute-
>m_szCommand);
        WriteToTpchLog(szBuffer);
        }
#endif

MyExecute->PostMessage(WM_TASK_FINISH, 0, 0);

return;
}
#ifdef _TPCH_AUDIT
void WriteFileToTpchLog(LPSTR szFile, LPSTR szFmt)
{
        // Reads a maximum of MAXLOGCMDBUF
characters from the command file and writes it to the log
        FILE        *fpCmd;
        int                     iRead;
        char        szBuf[MAXLOGCMDBUF];
        char        szCmd[MAXLOGCMDLEN];
        if ( pfLogFile != NULL )
        {
                if ( (fpCmd = fopen(szFile,
FILE_ACCESS_READ)) != NULL)
{
iRead = fread(szCmd, sizeof(char), sizeof(szCmd) / sizeof(char),
fpCmd);
        if (iRead < MAXLOGCMDLEN)
        szCmd[iRead] = '\0';
        else
        szCmd[MAXLOGCMDLEN - 1] = '\0';
        sprintf(szBuf, szFmt, szCmd);
        WriteToTpchLog(szBuf);
        fclose(fpCmd);
        }
}
}
void WriteToTpchLog(char *szMsg)
{
        if (pfLogFile != NULL)
        {
                EnterCriticalSection(&hLogFileWrite);
                fprintf(pfLogFile, szMsg);
                LeaveCriticalSection(&hLogFileWrite);
        }

        return;
}
#endif
```

```
TC_TIME CExecute::ExecuteShell()
{
	STARTUPINFOA			Start;
	PROCESS_INFORMATION		proc;
	DWORD
	exitCode;
	TC_TIME
	tElapsed = 0;
	_bstr_t
	szCommand("cmd /c ");
	LPSTR
	szStartDir;
	CURRENCY
	Elapsed;

	szCommand += m_szCommand;

	// Redirect output and error information
	szCommand += " > " + m_OutputFile + " 2> " +
m_ErrorFile;

	// Initialize the STARTUPINFO structure:
	memset(&Start, 0, sizeof(STARTUPINFOA)) ;
	Start.cb		= sizeof(Start);
	Start.dwFlags	=
STARTF_USESHOWWINDOW;
	Start.wShowWindow	=
SW_SHOWMINNOACTIVE;

	memset(&proc, 0,
sizeof(PROCESS_INFORMATION)) ;

	szStartDir = strcmp((LPCTSTR)m_szExecDtls, "")
== 0 ? NULL : (LPSTR)m_szExecDtls;

	m_ExecTime->Start();

	// Start the shelled application:
	if (!CreateProcessA( NULL, (LPSTR)szCommand,
NULL, NULL, FALSE,
			NORMAL_PRIORITY_CLASS, NULL,
szStartDir, &Start, &proc ))
	{
		m_StepStatus = gintFailed;
		LogSystemError(m_pErrorFile);

		m_ExecTime->Stop(&Elapsed);
		return((TC_TIME)Elapsed.int64);
	}

	m_hHandle = proc.hProcess;
	// Give the process time to execute and finish
	WaitForSingleObject(m_hHandle, INFINITE);
	m_ExecTime->Stop(&Elapsed);

	if (!GetExitCodeProcess(m_hHandle, &exitCode))
	{
		m_StepStatus = gintFailed;
		LogSystemError(m_pErrorFile);
	}
	else
		m_StepStatus = gintComplete;

	// Close all open handles to the shelled process
	CloseHandle(m_hHandle);

	return((TC_TIME)Elapsed.int64);
}
```

```
STDMETHODIMP CExecute::AbortShell()
{
	if (m_hHandle != SQL_NULL_HSTMT)
		if (!TerminateProcess(m_hHandle, 0))
			return(RaiseSystemError());

	return(S_OK);
}

TC_TIME CExecute::ExecuteODBC()
{
	TC_TIME				tElapsed
= 0;
	HDBC				m_hdbc;
	SQLRETURN			rc;
	LPSTR				szCmd;
	CURRENCY			Elapsed;
	BOOL
	bDoConnect = FALSE;

	// ODBC specific initialization
	m_hdbc = SQL_NULL_HDBC;

	try
	{
		// Allocate a new connection if we are
creating a dynamic connection or if
		// the named connection doesn't exist
		InitializeConnection(&m_hdbc,
&bDoConnect);

		// Ensure that the connection is valid.
#ifdef _DEBUG
		_CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLDriverConnect.\n");
#endif

		if (bDoConnect)
		{
			// Allocate connection handle,
open a connection and set connection attributes.
#ifdef _DEBUG
			_CrtDbgReport(_CRT_WARN,
NULL, 0, NULL, "Executing SQLDriverConnect.\n");
#endif

			if (m_bAbort)
				return(tElapsed);

			// Connect to the server using
the passed in connection string
			rc =
SQLDriverConnect(m_hdbc, NULL,
				(unsigned char
*)(LPSTR)m_szExecDtls, SQL_NTS,
				NULL, 0, NULL,
SQL_DRIVER_NOPROMPT);
			HandleODBCError(rc,
SQL_HANDLE_DBC, m_hdbc, SMSQLDriverConnect);
		}

		ReConnectDeadConnection(&m_hdbc);

#ifdef _DEBUG
		_CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLAllocHandle for hdbc.\n");
#endif
```

```
if (!m_bAbort && (rc =
SQLAllocHandle(SQL_HANDLE_STMT, m_hdbc,
&m_hHandle)) != SQL_SUCCESS)
HandleODBCError(rc, SQL_HANDLE_DBC, m_hdbc,
SMSQLAllocHandle);

// Set connection attributes if any have been modified from the
default values
if (m_lRowCount > 0)
{
char                    szConnOptions[512];
        sprintf(szConnOptions, "SET ROWCOUNT %d ",
m_lRowCount);
        SetConnectionOption(szConnOptions, &m_hdbc);
        }

        if (m_bQuotedIds)
        SetConnectionOption("SET QUOTED_IDENTIFIER
ON ", &m_hdbc);

        if (!m_bAnsiNulls)
        SetConnectionOption("SET
ANSI_NULL_DFLT_OFF ON ", &m_hdbc);

        if (!m_bAbort && m_lQueryTmout > 0)
        {
#ifdef _DEBUG
        _CrtDbgReport(_CRT_WARN, NULL, 0, NULL,
"Executing SQLSetStmtAttr.\n");
#endif
// Set the query timeout on the statement handle
rc = SQLSetStmtAttr(m_hHandle,
SQL_ATTR_QUERY_TIMEOUT, &m_lQueryTmout,
SQL_IS_UINTEGER);
HandleODBCError(rc, SQL_HANDLE_STMT, m_hHandle,
SMSQLSetStmtAttr);
}

                if (m_bNoExecute)
                        SetConnectionOption("SET
NOEXEC ON ", &m_hdbc);
else if (m_bParseOnly)
SetConnectionOption("SET PARSEONLY ON ", &m_hdbc);
else if (m_bShowQP)
// Important to ensure that this is the last connection attributes
being set - otherwise showplans are generated for all remaining
SET statements  SetConnectionOption("SET
SHOWPLAN_TEXT ON ", &m_hdbc);
else
{
if (m_bNoCount)
SetConnectionOption("SET NOCOUNT ON ", &m_hdbc);

if (m_bStatsIO)
SetConnectionOption("SET STATISTICS IO ON ", &m_hdbc);
// Important to ensure that this is the last connection attributes
being set - // otherwise timing statistics are generated for all
remaining SET statements if (m_bStatsTime)
SetConnectionOption("SET STATISTICS TIME ON ",
&m_hdbc);
}

m_szCmd = (LPSTR)m_szCommand;
m_ExecTime->Start();

while ((szCmd = NextCmdInBatch((LPSTR)m_szCommand)) !=
NULL && !m_bAbort)
{
#ifdef _DEBUG
                        _CrtDbgReport(_CRT_WARN,
NULL, 0, NULL, "Executing SQLExecDirect.\n");
#endif

        // Execute the ODBC command
        rc = SQLExecDirect(m_hHandle, (unsigned char
*)szCmd, SQL_NTS);
        HandleODBCError(rc, SQL_HANDLE_STMT,
m_hHandle, SMSQLExecDirect);

        free(szCmd);

        // Call a procedure to log the results to the output file
        ProcessResultsets();

                }
                m_ExecTime->Stop(&Elapsed);

                ResetConnectionProperties(&m_hdbc);
        }
        catch(CODBCError *pErr)
        {
                m_StepStatus = gintFailed;
                delete pErr;
        }
        catch(CExecError *pErr)
        {
                m_StepStatus = gintFailed;
                pErr->LogErrors(this);
                delete pErr;
        }

        ODBCCleanup(&m_hdbc, &m_hHandle);

        if (m_StepStatus != gintFailed)
                m_StepStatus = gintComplete;

        return((DWORD)Elapsed.int64);
}

void CExecute::InitializeConnection(HDBC *phdbc, BOOL
*pbDoConnect)
{
        SQLRETURN                               rc;

        *pbDoConnect = TRUE;

        if (IsDynamicConnection())
        {
#ifdef _DEBUG
                        _CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLAllocHandle for m_hdbc.\n");
#endif

                        rc =
SQLAllocHandle(SQL_HANDLE_DBC, henv, phdbc);
                        HandleODBCError(rc,
SQL_HANDLE_ENV, henv, SMSQLAllocHandle);

                        return;
        }
```

```
	EnterCriticalSection(&hConnections);
	// Returns the connection handle if the connection,
m_szConnection, exists
	for (m_iConnectionIndex = iConnectionCount - 1;
m_iConnectionIndex >= 0; m_iConnectionIndex--)
	{
		if (!strcmp( (p_Connections +
m_iConnectionIndex)->szConnectionName,
			(LPSTR)m_szConnection))
		{
			if (!(p_Connections +
m_iConnectionIndex)->bInUse)
			{
				*phdbc =
(p_Connections + m_iConnectionIndex)->hdbc;
				(p_Connections +
m_iConnectionIndex)->bInUse = TRUE;

				*pbDoConnect =
FALSE;
				break;
			}
			else
			{

	LeaveCriticalSection(&hConnections);


				throw new
CExecError(CExecError::SM_ERR_CONN_IN_USE);
			}
		}
	}

	if (m_iConnectionIndex < 0)
	{
		// Connection was not found. Allocate
connection handle and add it to list of
		// available connections.
#ifdef _DEBUG
		_CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLAllocHandle for m_hdbc.\n");
#endif

	rc = SQLAllocHandle(SQL_HANDLE_DBC, henv,
phdbc);
	HandleODBCError(rc, SQL_HANDLE_ENV, henv,
SMSQLAllocHandle);

	m_iConnectionIndex = iConnectionCount++;

	p_Connections = (SM_Connection_Info
*)realloc(p_Connections,
	iConnectionCount * sizeof(SM_Connection_Info));
	strcpy((p_Connections + m_iConnectionIndex)-
>szConnectionName, (LPSTR)m_szConnection);
	(p_Connections + m_iConnectionIndex)->hdbc =
*phdbc;
	(p_Connections + m_iConnectionIndex)->bInUse =
TRUE;
	}
	LeaveCriticalSection(&hConnections);

	return;
}
```

```
void CExecute::ReConnectDeadConnection(HDBC *phdbc)
{
	SQLRETURN		rc;
	SQLUINTEGER		uConnDead;

	// Connect to the server using the passed in connection
string
	rc = SQLGetConnectAttr(*phdbc,
SQL_ATTR_CONNECTION_DEAD,
		&uConnDead, SQL_IS_UINTEGER,
NULL);
	HandleODBCError(rc, SQL_HANDLE_DBC,
*phdbc, SMSQLDriverConnect);

	if (uConnDead == SQL_CD_TRUE)
	{
		// Cleanup the old connection and re-
connect.
#ifdef _DEBUG
		_CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLDisconnect.\n");
#endif
		rc = SQLDisconnect(*phdbc);
#ifdef _DEBUG
		_CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLFreeHandle for hdbc.\n");
#endif
		SQLFreeHandle(SQL_HANDLE_DBC,
*phdbc);
		*phdbc = SQL_NULL_HDBC;

#ifdef _DEBUG
		_CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLDriverConnect.\n");
#endif

		rc =
SQLAllocHandle(SQL_HANDLE_DBC, henv, phdbc);
		HandleODBCError(rc,
SQL_HANDLE_ENV, henv, SMSQLAllocHandle);

		// Connect to the server using the passed in
connection string
		rc = SQLDriverConnect(*phdbc, NULL,
			(unsigned char
*)(LPSTR)m_szExecDtls, SQL_NTS,
			NULL, 0, NULL,
SQL_DRIVER_NOPROMPT);
		HandleODBCError(rc,
SQL_HANDLE_DBC, *phdbc, SMSQLDriverConnect);
	}

	return;
}
void CExecute::ResetConnectionUsage()
{
	if(m_iConnectionIndex >= 0 &&
m_iConnectionIndex < iConnectionCount)
	{
		EnterCriticalSection(&hConnections);
		(p_Connections + m_iConnectionIndex)-
>bInUse = FALSE;
		LeaveCriticalSection(&hConnections);
	}

	return;
}
```

```
void CExecute::ResetConnectionProperties(HDBC *p_hdbc)
{
	SQLRETURN	rc;

// Reset connection attributes if any have been modified from the
default values
if (m_bNoExecute)
SetConnectionOption("SET NOEXEC OFF ", p_hdbc);
else if (m_bParseOnly)
SetConnectionOption("SET PARSEONLY OFF ", p_hdbc);
else if (m_bShowQP)
// Reset connection attributes in reverse order
SetConnectionOption("SET SHOWPLAN_TEXT OFF ",
p_hdbc);
else
{
// Reset connection attributes in reverse order
if (m_bStatsTime)
SetConnectionOption("SET STATISTICS TIME OFF ",
p_hdbc);

		if (m_bNoCount)
			SetConnectionOption("SET
NOCOUNT OFF ", p_hdbc);

		if (m_bStatsIO)
			SetConnectionOption("SET
STATISTICS IO OFF ", p_hdbc);
	}

	if (m_lRowCount > 0)
	{
		char
	szConnOptions[512];

		sprintf(szConnOptions, "SET
ROWCOUNT 0 ");
		SetConnectionOption(szConnOptions,
p_hdbc);
	}

	if (m_bQuotedIds)
		SetConnectionOption("SET
QUOTED_IDENTIFIER OFF ", p_hdbc);

	if (!m_bAnsiNulls)
		SetConnectionOption("SET
ANSI_NULL_DFLT_OFF OFF ", p_hdbc);

	if (m_lQueryTmout > 0)
	{
		SQLUINTEGER
	lQueryTmout = 0;

#ifdef _DEBUG
		_CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLSetStmtAttr.\n");
#endif
// Set the query timeout on the statement handle
		rc = SQLSetStmtAttr(m_hHandle,
SQL_ATTR_QUERY_TIMEOUT, &lQueryTmout,
			SQL_IS_UINTEGER);
		HandleODBCError(rc,
SQL_HANDLE_STMT, m_hHandle, SMSQLSetStmtAttr);
	}

	return;
}

LPSTR CExecute::NextCmdInBatch(LPSTR szBatch)
{
	LPSTR	szCmd, szSeparator, szStart;
	char	szNext;

	szStart = m_szCmd;

	while ( (szSeparator = strstr(szStart,
CMD_SEPARATOR)) != NULL)
	{
		szNext = *(szSeparator +
strlen(CMD_SEPARATOR));
		if ( szNext == '\n' || szNext == '\r' || szNext
== '\0')
			break;
		else
			szStart = szSeparator +
strlen(CMD_SEPARATOR);
	}

	if (!szSeparator)
	{
		// No more GO's
		if (strlen(m_szCmd) > 0)
		{
			szCmd =
(LPSTR)malloc(strlen(m_szCmd) + 1);
			strcpy(szCmd, m_szCmd);
			m_szCmd +=
strlen(m_szCmd);
		}
		else
			szCmd = NULL;
	}
	else if (szSeparator - m_szCmd > 0)
	{
// Strip the succeeding newline
szCmd = (LPSTR)malloc(szSeparator - m_szCmd);
strncpy(szCmd, m_szCmd, szSeparator - m_szCmd - 1);
*(szCmd + (szSeparator - m_szCmd - 1)) = '\0';
m_szCmd += szSeparator - m_szCmd +
strlen(CMD_SEPARATOR);
		if ( szNext == '\n' || szNext == '\r')
			m_szCmd += 1;
	}
	else
		szCmd = NULL;

	return(szCmd);
}

void CExecute::SetConnectionOption(LPSTR szConn, HDBC
*pHdbc)
{
	// Executes the passed in connection options 'set'
statement. Returns True if it succeeded
	char
	szConnOptions[512];
	SQLRETURN		rc;

	sprintf(szConnOptions, szConn);

#ifdef _DEBUG
	_CrtDbgReport(_CRT_WARN, NULL, 0, NULL,
"Executing SQLExecDirect for connection option.\n");
#endif
```

```
	if (m_bAbort)
		return;

	rc = SQLExecDirect(m_hHandle, (unsigned char
*)szConnOptions, SQL_NTS);
	HandleODBCError(rc, SQL_HANDLE_STMT,
m_hHandle, SMSQLExecDirect);

	return;
}

STDMETHODIMP CExecute::AbortODBC()
{
	m_bAbort = TRUE;

	try
	{
		if (m_hHandle != SQL_NULL_HSTMT)
		{
#ifdef _DEBUG
			_CrtDbgReport(_CRT_WARN,
NULL, 0, NULL, "Executing SQLCancel.\n");
#endif

			SQLRETURN rc =
SQLCancel(m_hHandle);
			HandleODBCError(rc,
SQL_HANDLE_STMT, m_hHandle, SMSQLCancel);
		}
	}
	catch(CODBCError *pErr)
	{
		delete pErr;
	}

	return(S_OK);
}

void CExecute::ProcessResultsets()
{
  SQLSMALLINT		*CTypeArray, *CScaleArray;
  SQLINTEGER		*ColLenArray,
*DispLenArray, *OffsetArray;
	SQLSMALLINT		iColNameLen,
SQLType, iColNull, i, NumCols = 0;
	SQLINTEGER		iDispLen,
iRowCount;
  SQLRETURN		rc;
	char
	szColName[MAX_DATA_LEN + 1];
  void			*DataPtr;
	SQLINTEGER		iLenOrInd =
ALIGNBUF(sizeof(SQLINTEGER));
	SQLUINTEGER		iRowArraySize,
iArrayElementSize;
//	SQLUINTEGER		NumRowsFetched;
//	SQLUSMALLINT	*RowStatusArray;


	if (!m_pOutputFile || m_bAbort)
		return;
	do
	{
#ifdef _DEBUG
		_CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLNumResultCols.\n");
#endif
		// Determine the number of result set
columns.
		rc = SQLNumResultCols(m_hHandle,
&NumCols);
		HandleODBCError(rc,
SQL_HANDLE_STMT, m_hHandle, SMSQLNumResultCols);

		if (NumCols > 0)
		{

			// Allocate arrays to hold the C
type, scale, column and display length of the data
			CTypeArray =
(SQLSMALLINT *) malloc(NumCols *
sizeof(SQLSMALLINT));
			CScaleArray =
(SQLSMALLINT *) malloc(NumCols *
sizeof(SQLSMALLINT));
			ColLenArray =
(SQLINTEGER *) malloc(NumCols * sizeof(SQLINTEGER));
			DispLenArray =
(SQLINTEGER *) malloc(NumCols * sizeof(SQLINTEGER));

			OffsetArray = (SQLINTEGER
*) malloc(NumCols * sizeof(SQLINTEGER));
			OffsetArray[0] = 0;

			for (i = 0; i < NumCols &&
!m_bAbort; i++)
			{
#ifdef _DEBUG

		_CrtDbgReport(_CRT_WARN, NULL, 0, NULL,
"Executing SQLDescribeCol.\n");
#endif
// Get the column description, include the SQL type
// Determine the column's byte length. Calculate the offset in the
//buffer to the data as the offset to the previous column, plus the
//byte length of the previous column, plus the byte length of the
//previous column's length/indicator buffer.
// Note that the byte length of the column and the length/indicator
//buffer are increasedso that, assuming they start on an alignment
//boundary, they will end on the byte before the next alignment
//boundary. Although this might leave some holes in the buffer, it
//is a relatively inexpensive way to guarantee alignment.
rc = SQLDescribeCol(m_hHandle, ((SQLUSMALLINT) i)+1,
(unsigned char *)szColName, sizeof(szColName),
&iColNameLen,
&SQLType, (unsigned long *)&ColLenArray[i],
&CScaleArray[i], &iColNull);
HandleODBCError(rc, SQL_HANDLE_STMT, m_hHandle,
SMSQLDescribeCol);
#ifdef _DEBUG
_CrtDbgReport(_CRT_WARN, NULL, 0, NULL, "Executing
SQLColAttribute.\n");
#endif
if (m_bAbort)
return;
rc = SQLColAttribute(m_hHandle, ((SQLUSMALLINT) i)+1,
SQL_DESC_DISPLAY_SIZE, NULL, 0, NULL, &iDispLen);
		HandleODBCError(rc, SQL_HANDLE_STMT,
m_hHandle, SMSQLColAttribute);
```

```
// GetDefaultCType contains a switch statement that returns the
//default C type for each SQL type.
CTypeArray[i] = GetDefaultCType(SQLType);
if ( (CTypeArray[i] == SQL_C_CHAR || CTypeArray[i] ==
SQL_C_BINARY) && ColLenArray[i] > MAX_DATA_LEN)
{
ColLenArray[i] = MAX_DATA_LEN;
iDispLen = MAX_DATA_LEN;
}

DispLenArray[i] = max(iColNameLen, iDispLen);
DispLenArray[i] = max(DispLenArray[i], sizeof(S_NULL));
// Print the column names in the header
PrintData(szColName, SQL_C_CHAR, DispLenArray[i], 0,
m_pOutputFile);
// Add a byte for the null-termination character
ColLenArray[i] += 1;
ColLenArray[i] = ALIGNBUF(ColLenArray[i]);
// Calculate the offset in the buffer to the data as the offset to the
previous column,
// plus the byte length of the previous column, plus the byte
//length of the previous column's length/indicator buffer.
if (i) OffsetArray[i] = OffsetArray[i-1] + ColLenArray[i-1] +
iLenOrInd;
}
m_pOutputFile->WriteLine(NULL);
iArrayElementSize = OffsetArray[NumCols-1] +
ColLenArray[NumCols-1] + iLenOrInd;
iRowArraySize = 1;
// Allocate the data buffer. The size of the buffer is equal to the
//offset to the data buffer for the final column, plus the byte
//length o f the data buffer and length/indicator
// buffer for the last column.
DataPtr = malloc(iRowArraySize * iArrayElementSize);
// Specify the size of the structure with the
SQL_ATTR_ROW_BIND_TYPE
            // statement attribute. This also declares that row-wise
binding will
                        // be used. Declare the rowset size with the
SQL_ATTR_ROW_ARRAY_SIZE
                        // statement attribute. Set the
SQL_ATTR_ROW_STATUS_PTR statement
                        // attribute to point to the row status array.
Set the
                        // SQL_ATTR_ROWS_FETCHED_PTR
statement attribute to point to
                        // NumRowsFetched.
                        /*
                        RowStatusArray = (SQLUSMALLINT
*)malloc(iRowArraySize * sizeof(SQLUSMALLINT));

                        SQLSetStmtAttr(m_hHandle,
SQL_ATTR_ROW_BIND_TYPE, &iArrayElementSize,
SQL_IS_UINTEGER);
                        SQLSetStmtAttr(m_hHandle,
SQL_ATTR_ROW_ARRAY_SIZE, &iRowArraySize,
SQL_IS_UINTEGER);
                        SQLSetStmtAttr(m_hHandle,
SQL_ATTR_ROW_STATUS_PTR, RowStatusArray,
SQL_IS_POINTER);
                        SQLSetStmtAttr(m_hHandle,
SQL_ATTR_ROWS_FETCHED_PTR, &NumRowsFetched,
SQL_IS_POINTER);
                        */
```

```
// For each column, bind the address in the buffer at the start of
the memory allocated
// for that column's data and the address at the start of the
memory allocated for that
// column's length/indicator buffer.
for (i = 0; i < NumCols; i++)
{
SQLBindCol(m_hHandle, i + 1, CTypeArray[i],
(SQLPOINTER)((SQLCHAR *)DataPtr + OffsetArray[i]),
                        ColLenArray[i], (SQLINTEGER
*)((SQLCHAR *)DataPtr + OffsetArray[i] + ColLenArray[i]));
                        HandleODBCError(rc,
SQL_HANDLE_STMT, m_hHandle, SMSQLBindCol);

                        // Underline each column name
                        memset(szColName, '-', DispLenArray[i]);
                        *(szColName + DispLenArray[i]) = '\0';
                        PrintData(szColName, SQL_C_CHAR,
DispLenArray[i], 0, m_pOutputFile);
                        }
                        m_pOutputFile->WriteLine(NULL);

#ifdef _DEBUG
                        _CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLFetch.\n");
#endif
while (!m_bAbort && (rc = SQLFetch(m_hHandle)) !=
SQL_NO_DATA)
{
HandleODBCError(rc, SQL_HANDLE_STMT, m_hHandle,
SMSQLFetch);
/*
for (i = 0; i < NumRowsFetched; i++)
{
if (RowStatusArray[i] == SQL_ROW_SUCCESS||
RowStatusArray[i] == SQL_ROW_SUCCESS_WITH_INFO)
{
*/
for (i = 0; i < NumCols; i++)
{
// Retrieve and print each row. PrintData accepts a pointer to the
data, its C type, and its byte length/indicator.
if ( *((SQLINTEGER *)((SQLCHAR *)DataPtr + OffsetArray[i]
+ ColLenArray[i])) == SQL_NULL_DATA)
PrintData(S_NULL, SQL_C_CHAR, DispLenArray[i], 0,
m_pOutputFile);
else
PrintData((LPVOID)((SQLCHAR *)DataPtr + OffsetArray[i]),
CTypeArray[i],
DispLenArray[i], CScaleArray[i], m_pOutputFile);
}
            m_pOutputFile->WriteLine(NULL);
            }
            m_pOutputFile->WriteLine(NULL);
            free(DataPtr);
            free(CTypeArray);
            free(CScaleArray);
            free(ColLenArray);
            free(DispLenArray);
            }
            // Write io statistics, if applicable
            LogODBCErrors(rc, SQL_HANDLE_STMT,
m_hHandle, SMSQLFetch);
#ifdef _DEBUG
_CrtDbgReport(_CRT_WARN, NULL, 0, NULL, "Executing
SQLRowCount.\n");
#endif
```

```
                        if (m_bAbort)
                                break;

                        // action (insert, update, delete) query
                        rc = SQLRowCount(m_hHandle,
&iRowCount);
                        HandleODBCError(rc,
SQL_HANDLE_STMT, m_hHandle, SMSQLRowCount);

                        if (!m_bNoCount && iRowCount != -1)
                        {
sprintf(szColName, "(%d row(s) affected)", iRowCount);
_bstr_t temp(szColName);
m_pOutputFile->WriteLine((BSTR)temp);
m_pOutputFile->WriteLine(NULL);
}
#ifdef _DEBUG
                        _CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLFreeStmt.\n");
#endif

                        if (m_bAbort)
                                break;

                        SQLFreeStmt(m_hHandle,
SQL_UNBIND);

#ifdef _DEBUG
                        _CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLMoreResults.\n");
#endif

                        if (m_bAbort)
                                break;

                        // Process the next resultset. This function
returns 'success with info' even
                        // if there is no other resultset and there are
statistics messages to be printed.
                        // Hence the check for -1 rows before
printing.
                        rc=SQLMoreResults(m_hHandle);
                        if (rc != SQL_NO_DATA)
                                HandleODBCError(rc,
SQL_HANDLE_STMT, m_hHandle, SMSQLMoreResults);

   } while (rc != SQL_NO_DATA);

        return;
}

void CExecute::PrintData(void *vData, SQLSMALLINT CType,
SQLINTEGER IndPtr, SQLSMALLINT iScale, ISMLog
*pOutput)
{
        // PrintData accepts a pointer to the data, its C type,
        // and its byte length/indicator. It contains a switch
statement that casts and prints
        // the data according to its type.

        char            *s;
        char            fmt[MAXBUFLEN];
        int                     j = 0;
        SQLINTEGER      iColLen = IndPtr + 1;
        assert(iColLen);
        s = (LPSTR)malloc(iColLen + 1);

        if (s)
{
if (vData)
{
        switch(CType)
        {
        case SQL_C_CHAR:
        case SQL_C_WCHAR:
        case SQL_C_TYPE_DATE:
        case SQL_C_TYPE_TIME:
        case SQL_C_TYPE_TIMESTAMP:
        case SQL_C_INTERVAL_YEAR:
        case SQL_C_INTERVAL_MONTH:
        case SQL_C_INTERVAL_YEAR_TO_MONTH:
        case SQL_C_INTERVAL_DAY:
        case SQL_C_INTERVAL_HOUR:
        case SQL_C_INTERVAL_MINUTE:
        case SQL_C_INTERVAL_SECOND:
        case SQL_C_INTERVAL_DAY_TO_HOUR:
        case SQL_C_INTERVAL_DAY_TO_MINUTE:
        case SQL_C_INTERVAL_DAY_TO_SECOND:
        case SQL_C_INTERVAL_HOUR_TO_MINUTE:
        case SQL_C_INTERVAL_HOUR_TO_SECOND:
        case SQL_C_INTERVAL_MINUTE_TO_SECOND:
        case SQL_C_BINARY:
                sprintf(fmt, "%%.%ds", iColLen);
                j = sprintf(s, fmt, (char *)vData);
                break;

        case SQL_C_SHORT:
                j = sprintf(s, "%d", *(short *)vData);
                break;

        case SQL_C_LONG:
                j = sprintf(s, "%ld", *(long *)vData);
                break;

        case SQL_C_UBIGINT:
                j = sprintf(s, "%I64d", *(__int64 *)vData);
                break;

        case SQL_C_FLOAT:
        j = sprintf(s, "%f", *(float *)vData);
                break;

        case SQL_C_DOUBLE:
                j = sprintf(s, "%f", *(double *)vData);
                        break;
                case SQL_C_NUMERIC:
        sprintf(fmt, "%%.0%df", iScale);
        j = sprintf(s, fmt, *(double *)vData);
        break;
        default:
        j = sprintf(s, "%s", vData);
        break;
        }
        }
        if (iColLen - j > 0)
                memset(s + j, ' ', iColLen - j);

        *(s + iColLen) = '\0';

        // Write the field to the output file
        _bstr_t temp(s);
        pOutput->WriteField((BSTR)temp);
        free(s);
}
return;
}
```

```
SQLSMALLINT CExecute::GetDefaultCType(SQLINTEGER
SQLType)
{
        // GetDefaultCType returns the C type for the passed
in SQL datatype.

  switch(SQLType)
  {
  case SQL_CHAR:
        case SQL_VARCHAR:
        case SQL_LONGVARCHAR:
        case SQL_WCHAR:
        case SQL_WVARCHAR:
        case SQL_WLONGVARCHAR:
      return(SQL_C_CHAR);

  case SQL_TINYINT:
                        return(SQL_C_CHAR);

  case SQL_SMALLINT:
                        return(SQL_C_SHORT);

  case SQL_INTEGER:
                        return(SQL_C_LONG);

  case SQL_BIGINT:
                        return(SQL_C_UBIGINT);

  case SQL_REAL:
                        return(SQL_C_FLOAT);

  case SQL_FLOAT:
  case SQL_DOUBLE:
//      case SQL_DECIMAL:
                        return(SQL_C_DOUBLE);

        case SQL_DECIMAL:
                        return(SQL_C_CHAR);

        case SQL_BIT:
                        return(SQL_C_CHAR);

  case SQL_BINARY:
        case SQL_VARBINARY:
        case SQL_LONGVARBINARY:
                        return(SQL_C_CHAR);
//                      return(SQL_C_BINARY);

  case SQL_TYPE_DATE:
                        return(SQL_C_CHAR);
//                      return(SQL_C_TYPE_DATE);

  case SQL_TYPE_TIME:
                        return(SQL_C_CHAR);
//                      return(SQL_C_TYPE_TIME);

  case SQL_TYPE_TIMESTAMP:
                        return(SQL_C_CHAR);
//
        return(SQL_C_TYPE_TIMESTAMP);

        case SQL_NUMERIC:
      return(SQL_C_FLOAT);

  case SQL_INTERVAL_YEAR:
                        return(SQL_C_CHAR);
//
        return(SQL_C_INTERVAL_YEAR);

  case SQL_INTERVAL_MONTH:
                        return(SQL_C_CHAR);
//
        return(SQL_C_INTERVAL_MONTH);

  case SQL_INTERVAL_YEAR_TO_MONTH:
                        return(SQL_C_CHAR);
// return(SQL_C_INTERVAL_YEAR_TO_MONTH);

  case SQL_INTERVAL_DAY:
                        return(SQL_C_CHAR);
//
        return(SQL_C_INTERVAL_DAY);

  case SQL_INTERVAL_HOUR:
                        return(SQL_C_CHAR);
// return(SQL_C_INTERVAL_HOUR);

  case SQL_INTERVAL_MINUTE:
                        return(SQL_C_CHAR);
// return(SQL_C_INTERVAL_MINUTE);

  case SQL_INTERVAL_SECOND:
                        return(SQL_C_CHAR);
//  return(SQL_C_INTERVAL_SECOND);

  case SQL_INTERVAL_DAY_TO_HOUR:
                        return(SQL_C_CHAR);
// return(SQL_C_INTERVAL_DAY_TO_HOUR);

  case SQL_INTERVAL_DAY_TO_MINUTE:
                        return(SQL_C_CHAR);
// return(SQL_C_INTERVAL_DAY_TO_MINUTE);

  case SQL_INTERVAL_DAY_TO_SECOND:
                        return(SQL_C_CHAR);
// return(SQL_C_INTERVAL_DAY_TO_SECOND);

  case SQL_INTERVAL_HOUR_TO_MINUTE:
                        return(SQL_C_CHAR);
// return(SQL_C_INTERVAL_HOUR_TO_MINUTE);

  case SQL_INTERVAL_HOUR_TO_SECOND:
                        return(SQL_C_CHAR);
//
        return(SQL_C_INTERVAL_HOUR_TO_SECOND);

  case SQL_INTERVAL_MINUTE_TO_SECOND:
                        return(SQL_C_CHAR);
// r eturn(SQL_C_INTERVAL_MINUTE_TO_SECOND);

        default:
                assert(TRUE);
                return(SQL_C_CHAR);
                break;
  }
}
```

```
/*
   FUNCTION: LogODBCErrors(SQLRETURN rc, SWORD
fHandleType, SQLHANDLE handle)
   COMMENTS: Formats ODBC errors or warnings and logs
them. Also initializes the
                                    completion status for the step
to failure, if an ODBC error has occurred.
*/

void CExecute::LogODBCErrors(SQLRETURN nResult,
SWORD fHandleType, SQLHANDLE handle, OdbcOperations
FailedOp)
{
        // Messages returned by the server (e.g. Print
statements) will be logged to the output file
        // ODBC warnings will be logged to the log file
        // All other ODBC errors will be logged to the error
file.

        UCHAR
        szErrState[SQL_SQLSTATE_SIZE+1];
        // SQL Error State string
        UCHAR
        szErrText[SQL_MAX_MESSAGE_LENGTH+1];
// SQL Error Text string
        char
        szBuffer[SQL_SQLSTATE_SIZE+SQL_MAX_MES
SAGE_LENGTH+MAXBUFLEN+1] = "";
                                // formatted Error text Buffer
        SWORD           wErrMsgLen;
                                        // Error message
length
        SQLINTEGER      dwErrCode;
                                        // Native Error code
        SQLRETURN       nErrResult;
                                        // Return Code from
SQLGetDiagRec
        SWORD           sMsgNum = 1;
                                        // Error sequence
number
        _bstr_t         temp;

        if (IsErrorReturn(nResult))
        {
                sprintf(szBuffer, "ODBC Operation: '%s'
returned error code: %d",
                                g_szOdbcOps[FailedOp],
nResult);
                temp = szBuffer;
                m_pErrorFile->WriteLine((BSTR) temp);
                m_StepStatus = gintFailed;
        }

        if (handle == SQL_NULL_HSTMT)
                return;

#ifdef _DEBUG
        _CrtDbgReport(_CRT_WARN, NULL, 0, NULL,
"Executing SQLGetDiagRec.\n");
#endif

        // call SQLGetDiagRec function with proper ODBC
handles, repeatedly until
        // function returns SQL_NO_DATA.
        while (!m_bAbort && (nErrResult =
SQLGetDiagRec(fHandleType, handle, sMsgNum++,
                szErrState, &dwErrCode, szErrText,
SQL_MAX_MESSAGE_LENGTH-1, &wErrMsgLen))
                != SQL_NO_DATA)
        {
                if (!SQL_SUCCEEDED(nErrResult))
                        break;

                if (m_pOutputFile &&
IsServerMessage(dwErrCode, szErrText))
                {
                        wsprintf(szBuffer,
SM_SQLMSG_FORMAT, (LPSTR)szErrText);
                        temp = szBuffer;
                        m_pOutputFile-
>WriteLine((BSTR) temp);
                }
                else if (IsODBCWarning(szErrState) &&
dwErrCode != SM_SQL_ERR_CHANGED_DB &&
                dwErrCode !=
SM_SQL_ERR_CHANGED_LANG)
                {
                        // Suppress warnings -
'Changed database context to...' and 'Changed language setting
to...'
                        wsprintf(szBuffer,
SM_SQLMSG_FORMAT,
ParseOdbcMsgPrefixes((LPCSTR)szErrText));
                        temp = szBuffer;
                        m_pOutputFile-
>WriteLine((BSTR) temp);
                }
                else if (m_pErrorFile &&
!IsODBCWarning(szErrState))
                {
                        wsprintf(szBuffer,
SM_SQLERR_FORMAT, (LPSTR)szErrState, dwErrCode,
(LPSTR)szErrText);
                        temp = szBuffer;
                        m_pErrorFile-
>WriteLine((BSTR) temp);
                }
        }
}

/*
   FUNCTION: LogErrors(SQLRETURN rc, SWORD
fHandleType, SQLHANDLE handle)
   COMMENTS: Writes the error message to the error log
*/

void CExecError::LogErrors(CExecute *p)
{
        _bstr_t temp(m_szExecErrorDesc[m_iErrCode]);

        if (p->m_pErrorFile)
                p->m_pErrorFile-
>WriteLine((BSTR)temp);

        return;
}
```

```
/*
   FUNCTION: ODBCCleanup(HDBC *hdbc, HSTMT *hstmt)
   COMMENTS: Cleanup of all ODBC structures
*/

void CExecute::ODBCCleanup(HDBC *hdbc, HSTMT *hstmt)
{
	SQLRETURN	lReturn;

#ifdef _DEBUG
	_CrtDbgReport(_CRT_WARN, NULL, 0, NULL,
"Executing ODBCCleanup.\n");
#endif

	if (*hstmt != SQL_NULL_HSTMT)
	{
#ifdef _DEBUG
		_CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLCloseCursor.\n");
#endif
		SQLCloseCursor(hstmt);
#ifdef _DEBUG
		_CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLFreeHandle for hstmt.\n");
#endif
		SQLFreeHandle(SQL_HANDLE_STMT,
hstmt);
		*hstmt = SQL_NULL_HSTMT;
	}

	// Cleanup connection if it is a dynamic connection
	if (IsDynamicConnection())
	{
		if (*hdbc != SQL_NULL_HDBC)
		{
#ifdef _DEBUG
			_CrtDbgReport(_CRT_WARN,
NULL, 0, NULL, "Executing SQLDisconnect.\n");
#endif
			lReturn =
SQLDisconnect(*hdbc);
#ifdef _DEBUG
			_CrtDbgReport(_CRT_WARN,
NULL, 0, NULL, "Executing SQLFreeHandle for hdbc.\n");
#endif

	SQLFreeHandle(SQL_HANDLE_DBC, hdbc);
			*hdbc = SQL_NULL_HDBC;
		}
	}
	else
		ResetConnectionUsage();

	return;
}

// Wrapper function that raises an error if a Windows Api fails
STDMETHODIMP CExecute::RaiseSystemError(void)
{
	char s[MAXBUFLEN];

	GetSystemError(s);
	return Error(s, 0, NULL, GUID_NULL);
}

// Wrapper function that logs the error raised by an Api function
to the passed in file
void CExecute::LogSystemError(ISMLog *pFile)
{
	if (pFile)
	{
		char s[MAXBUFLEN];
		GetSystemError(s);

		_bstr_t temp(s);
		pFile->WriteLine((BSTR)temp);
	}
}

// Populates the passed in string with the last Windows Api error
that occurred
void CExecute::GetSystemError(LPSTR s)
{
	long c;
	DWORD e;

	e = GetLastError();

	c = sprintf(s, "Error code: %ld. ", e);
	c =
FormatMessage(FORMAT_MESSAGE_FROM_SYSTEM |
FORMAT_MESSAGE_IGNORE_INSERTS,
		NULL, e, 0, s + c, MAXBUFLEN - c,
NULL);

	return;
}

STDMETHODIMP CExecute::get_StepStatus(InstanceStatus
*pVal)
{
	*pVal = m_StepStatus;
	return S_OK;
}

STDMETHODIMP CExecute::WriteError(BSTR szMsg)
{
	if (m_pErrorFile)
		return(m_pErrorFile->WriteLine(szMsg));

	return S_OK;
}
```

```
//  FILE:      Execute.h
//             Microsoft TPC-H Kit Ver. 1.00
//             Copyright Microsoft, 1999
//             All Rights Reserved
//
//
//  PURPOSE:    Declaration of the CExecute
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
//
// Execute.h : Declaration of the CExecute

#ifndef __EXECUTE_H_
#define __EXECUTE_H_

#include <atlwin.h>
#include <comdef.h>
#include <stdio.h>
#include "resource.h"       // main symbols
#include "ExecuteDllCP.h"
#include "..\LogWriter\LogWriter.h"
#include "..\LogWriter\SMLog.h"
#include "..\common\SMTime\SMTime.h"
#include "..\common\SMTime\SMTimer.h"

// ODBC-specific includes
#define DBNTWIN32
#include <sqltypes.h>
#include <sql.h>
#include <sqlext.h>

/////////////////////////////////////////////////////////////////////////////
// CExecute

#define WM_TASK_START  (WM_USER + 101)
#define WM_TASK_FINISH  (WM_USER + 102)

#define SM_SQLERR_FORMAT                    "SQL
Error State:%s, Native Error Code: %ld\r\nODBC Error: %s"
// format for ODBC error messages
#define SM_SQLWARN_FORMAT SM_SQLERR_FORMAT
// format for ODBC warnings
#define SM_SQLMSG_FORMAT "%s" // format for messages
from the server

#define SM_SQL_STATE_WARNING       "01000"
#define SM_MSG_SERVER "[Microsoft][ODBC SQL Server
Driver][SQL Server]"

#define SM_SQL_ERR_CHANGED_DB     5701
#define SM_SQL_ERR_CHANGED_LANG 5703

#define SM_STEPMASTER_ERROR
            "StepMaster Error: "

#define CMD_SEPARATOR                       "\nGO"
#define INV_ARRAY_INDEX     -1
            // invalid index into an array
#define MAXBUFLEN           256        // display buffer size
#define MAXLOGCMDLEN        256        // maximum
characters in command that will be // printed to log
#define MAXLOGCMDBUF        512        // maximum
characters in command that will be // printed to log
#define MAX_DATA_LEN        4000       // maximum buffer
size for variable-length data types // viz. character and binary
fields
#define FILE_ACCESS_READ    "r" // Open file for read access
#define S_NULL        "NULL"
```

```
// Define a macro to increase the size of a buffer so it is a
multiple of teh alignment size.
// Thus, if a buffer starts on an alignment boundary, it will end
just before the next
// alignment boundary. Here, an alignment size of 4 is used
because this is the size of the
// largest data type used in the application's buffer - the size of an
SDWORD and of the largest
// default C data type are both 4. If a larger data type (such as
__int64) is used, it will be
// necessary to align for that size.
#define ALIGNSIZE 4
#define ALIGNBUF(Length) ((Length) % ALIGNSIZE) ? \
   ((Length) + ALIGNSIZE - ((Length) % ALIGNSIZE)) :
(Length)

#define MAX_BUFFER_SIZE                 64000

typedef enum OdbcOperations
{
            SMSQLAllocHandle,
            SMSQLDriverConnect,
            SMSQLExecDirect,
            SMSQLSetStmtAttr,
            SMSQLCancel,
            SMSQLNumResultCols,
            SMSQLDescribeCol,
            SMSQLColAttribute,
            SMSQLFetch,
            SMSQLGetData,
            SMSQLRowCount,
            SMSQLMoreResults,
            SMSQLBindCol,
};

class CODBCError
{
public:
            CODBCError(SQLRETURN nResult, SWORD
fHandleType, SQLHANDLE handle, OdbcOperations FailedOp)
            {
                        m_fHandleType       = fHandleType;
                        m_handle            = handle;
                        m_FailedOp                  =
FailedOp;
                        m_nResult           = nResult;
            };

private:
            SWORD                       m_fHandleType;
            SQLHANDLE                   m_handle;
            OdbcOperations      m_FailedOp;
            SQLRETURN                   m_nResult;

private:
inline BOOL IsServerMessage(SQLINTEGER lNativeError,
UCHAR *szErr){
            return( (strstr((LPCTSTR)szErr,
SM_MSG_SERVER) != NULL) ? (lNativeError == 0) :
FALSE); }
inline BOOL IsODBCWarning(UCHAR *szSqlState){
            return(strcmp((LPCSTR)szSqlState,
SM_SQL_STATE_WARNING) == 0);}
inline LPCSTR ParseOdbcMsgPrefixes(LPCSTR szMsg){ char
*pDest;
            return( (pDest = strstr(szMsg, SM_MSG_SERVER))
== NULL ? szMsg : pDest + strlen(SM_MSG_SERVER));}
};
```

```
class ATL_NO_VTABLE CExecute :
	public CWindowImpl<CExecute>,
	public
CComObjectRootEx<CComSingleThreadModel>,
	public CComCoClass<CExecute,
&CLSID_Execute>,
	public IConnectionPointContainerImpl<CExecute>,
	public ISupportErrorInfo,
	public IDispatchImpl<IExecute, &IID_IExecute,
&LIBID_EXECUTEDLLLib>,
	public CProxy_IExecuteEvents< CExecute >
{
public:
	CExecute()
	{
		m_pErrorFile = NULL;
		//m_pLogFile = NULL;
		m_pOutputFile = NULL;

		// Initialize the elapsed time for the step
		m_tElapsedTime = 0;

		// Initialize the run status for the step
		m_StepStatus = gintPending;

		m_hHandle = SQL_NULL_HSTMT;
		m_bAbort = FALSE;

		m_iConnectionIndex =
INV_ARRAY_INDEX;
	}

	~CExecute()
	{
	}

	friend class CExecError;

public:
	DECLARE_WND_CLASS("Execute")

		BEGIN_MSG_MAP(CExecute)

	MESSAGE_HANDLER(WM_TASK_FINISH,
OnTaskFinished)

	MESSAGE_HANDLER(WM_TASK_START,
OnTaskStarted)
		END_MSG_MAP()
public:

	LRESULT OnTaskStarted(UINT uMsg, WPARAM
wParam,
		LPARAM lParam, BOOL& bHandled)
	{
		CURRENCY	CStartTime =
Get64BitTime(&m_tStartTime);

		Fire_Start(CStartTime);
		return 0;
	}
	LRESULT OnTaskFinished(UINT uMsg, WPARAM
wParam,
		LPARAM lParam, BOOL& bHandled)
	{
		CURRENCY	CEndTime =
Get64BitTime(&m_tEndTime);

		Fire_Complete(CEndTime,
(long)m_tElapsedTime);
		return 0;
	}

	HRESULT FinalConstruct()
	{
		HRESULT			hr;
		RECT		rect;

		rect.left=0;
		rect.right=100;
		rect.top=0;
		rect.bottom=100;

		HWND hwnd = Create( NULL, rect,
"ExecuteWindow", WS_POPUP);

		if (!hwnd)
			return
HRESULT_FROM_WIN32(GetLastError());

		hr = CoCreateInstance(CLSID_SMLog,
NULL, CLSCTX_INPROC,
			IID_ISMLog, (void
**)&m_pErrorFile);
		if FAILED(hr)
			return(hr);
		m_pErrorFile->put_Append(TRUE);

		//hr = CoCreateInstance(CLSID_SMLog,
NULL, CLSCTX_INPROC,
		//	IID_ISMLog, (void
**)&m_pLogFile);
		//if FAILED(hr)
		//	return(hr);

		hr = CoCreateInstance(CLSID_SMLog,
NULL, CLSCTX_INPROC,
			IID_ISMLog, (void
**)&m_pOutputFile);
		if FAILED(hr)
			return(hr);
		m_pOutputFile->put_Append(TRUE);

		hr = CoCreateInstance(CLSID_SMTimer,
NULL, CLSCTX_INPROC,
			IID_ISMTimer, (void
**)&m_ExecTime);
		if FAILED(hr)
			return(hr);

		return S_OK;
	}
```

```
        void FinalRelease()
        {
                if (m_hWnd != NULL)
                DestroyWindow();
                // Close the log and error files
                if (m_pErrorFile)
                m_pErrorFile->Release();
                m_pErrorFile = NULL;
                if (m_ExecTime)
                m_ExecTime->Release();
                m_ExecTime = NULL;
        }

DECLARE_REGISTRY_RESOURCEID(IDR_EXECUTE)
DECLARE_PROTECT_FINAL_CONSTRUCT()
BEGIN_COM_MAP(CExecute)
COM_INTERFACE_ENTRY(IExecute)
COM_INTERFACE_ENTRY(ISupportErrorInfo)
COM_INTERFACE_ENTRY(IDispatch)
COM_INTERFACE_ENTRY(IConnectionPointContainer)
COM_INTERFACE_ENTRY_IMPL(IConnectionPointContaine
r)
END_COM_MAP()
BEGIN_CONNECTION_POINT_MAP(CExecute)
CONNECTION_POINT_ENTRY(DIID__IExecuteEvents)
END_CONNECTION_POINT_MAP()
// ISupportsErrorInfo
STDMETHOD(InterfaceSupportsErrorInfo)(REFIID riid);
// IExecute
public:
STDMETHOD(put_ErrorFile)(/*[in]*/ BSTR newVal);
STDMETHOD(put_OutputFile)(/*[in]*/ BSTR newVal);
STDMETHOD(WriteError)(BSTR szMsg);
STDMETHOD(Abort)();
STDMETHOD(get_StepStatus)(/*[out, retval]*/ InstanceStatus
*pVal);
STDMETHOD(DoExecute)(/*[in]*/ BSTR szCommand, /*[in]*/
BSTR szExecutionDtls,
/*[in]*/ ExecutionType ExecMethod,
/*[in]*/ BOOL bNoCount, /*[in]*/ BOOL bNoExecute, /*[in]*/
BOOL bParseOnly,
/*[in]*/ BOOL bQuotedIds, /*[in]*/ BOOL bAnsiNulls, /*[in]*/
BOOL bShowQP,
/*[in]*/ BOOL bStatsTime, /*[in]*/ BOOL bStatsIO, /*[in]*/
long lRowCount,
/*[in]*/ long lQueryTmout, /*[in]*/ BSTR szConnection);
TC_TIME                 ExecuteShell();
TC_TIME                 ExecuteODBC();
STDMETHODIMP    AbortShell();
STDMETHODIMP    AbortODBC();
_bstr_t                 m_szCommand;
_bstr_t                 m_szExecDtls;
_bstr_t                 m_szConnection;
DWORD                   m_lMode;
SYSTEMTIME              m_tStartTime;
SYSTEMTIME              m_tEndTime;
TC_TIME                 m_tElapsedTime;
ISMLog                  *m_pErrorFile;
//ILog                  *m_pLogFile;
ISMLog                  *m_pOutputFile;
ISMTimer        *m_ExecTime;
ExecutionType   m_ExecMthd;
InstanceStatus  m_StepStatus;
HANDLE          m_hHandle; // Process handle for shell
commands and
//Statement handle for ODBC commands LPSTRm_szCmd;
private:
        LPSTR
        NextCmdInBatch(LPSTR szBatch);
        void                    ProcessResultsets();
        SQLSMALLINT
        GetDefaultCType(SQLINTEGER SQLType);
        void                    PrintData(void
*vData, SQLSMALLINT CType, SQLINTEGER IndPtr,
                                SQLSMALLINT
iScale, ISMLog *pOutput);
        void
        LogODBCErrors(SQLRETURN nResult, SWORD
fHandleType, SQLHANDLE handle,
                                OdbcOperations
FailedOp);
        void
        ODBCCleanup(HDBC *hdbc, HSTMT *hstmt);
        STDMETHODIMP
        RaiseSystemError(void);
        void
        LogSystemError(ISMLog *pFile);
        void
        GetSystemError(LPSTR s);
        void
        SetConnectionOption(LPSTR szConn, HDBC
*pHdbc);
        void
        ResetConnectionProperties(HDBC *p_hdbc);

        void
        InitializeConnection(HDBC *phdbc, BOOL
*pbDoConnect);
        void
        ReConnectDeadConnection(HDBC *phdbc);

        void
        ResetConnectionUsage();

        int
        m_iConnectionIndex;

        BOOL                    m_bNoCount,
m_bNoExecute, m_bParseOnly, m_bQuotedIds, m_bAnsiNulls, \

        m_bShowQP, m_bStatsTime, m_bStatsIO;
        long                    m_lRowCount;
        SQLUINTEGER             m_lQueryTmout;
        _bstr_t                 m_ErrorFile,
m_OutputFile;
        BOOL                    m_bAbort;
```

```
private:
inline BOOL IsServerMessage(SQLINTEGER lNativeError,
UCHAR *szErr){
        return( (strstr((LPCTSTR)szErr,
SM_MSG_SERVER) != NULL) ? (lNativeError == 0) :
FALSE); }
inline BOOL IsODBCWarning(UCHAR *szSqlState){
        return(strcmp((LPCSTR)szSqlState,
SM_SQL_STATE_WARNING) == 0);}
inline BOOL IsErrorReturn(SQLRETURN iRetCode){
        return( (!SQL_SUCCEEDED(iRetCode)) &&
(iRetCode != SQL_NO_DATA) );}
inline LPCSTR ParseOdbcMsgPrefixes(LPCSTR szMsg){ char
*pDest;
        return( (pDest = strstr(szMsg, SM_MSG_SERVER))
== NULL ? szMsg : pDest + strlen(SM_MSG_SERVER));}
inline BOOL IsDynamicConnection(){
return(!strcmp((LPSTR)m_szConnection, ""));}
inline void HandleODBCError(SQLRETURN rc, SWORD
fHandleType, SQLHANDLE handle, OdbcOperations OdbcOp)
{
        if (rc != SQL_SUCCESS)
   {
                LogODBCErrors(rc, fHandleType, handle,
OdbcOp);
                if (IsErrorReturn(rc))
                        throw new CODBCError(rc,
fHandleType, handle, OdbcOp);
   }
        return;
}

};

class CExecError
{
public:
        typedef enum ExecErrorCodes
        {
                SM_ERR_CONN_IN_USE,
        };

        CExecError(int iError)
        {
                m_iErrCode          = iError;
        };

        void
        LogErrors(CExecute *p);

private:
        int
        m_iErrCode;
        static char         *m_szExecErrorDesc[];
};

void                        ExecutionThread(LPVOID
lpParameter);

#ifdef _TPCH_AUDIT
        void
        WriteFileToTpchLog(LPSTR szFile, LPSTR szFmt);
        void
        WriteToTpchLog(char *szMsg);
#endif
```

```
#endif //__EXECUTE_H_
//  FILE:       ExecuteDll.cpp
//              Microsoft TPC-H Kit Ver. 1.00
//              Copyright Microsoft, 1999
//              All Rights Reserved
//
//
//  PURPOSE:    Implementation of DLL Exports.
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
//



// Note: Proxy/Stub Information
//      To build a separate proxy/stub DLL,
//      run nmake -f ExecuteDllps.mk in the project directory.

#include "stdafx.h"
#include "resource.h"
#include <initguid.h>

#include "..\LogWriter\LogWriter.h"
#include "..\LogWriter\LogWriter_i.c"

#include "..\common\SMTime\SMTime.h"
#include "..\common\SMTime\SMTime_i.c"

#include "ExecuteDll.h"
#include "SMExecute.h"

#include "ExecuteDll_i.c"
#include "Execute.h"

CComModule _Module;

BEGIN_OBJECT_MAP(ObjectMap)
OBJECT_ENTRY(CLSID_Execute, CExecute)
END_OBJECT_MAP()
SQLHENV henv = NULL; // ODBC environment handle

static char szCaption[] = "StepMaster";         // Message box
caption

CRITICAL_SECTION hConnections;                  // Critical
section to serialize access to available connections
SM_Connection_Info *p_Connections = NULL;
        // Pointer to open connections
int
        iConnectionCount = 0;           // Number of open
connections

#ifdef _TPCH_AUDIT
        FILE *pfLogFile = NULL;
        // Log file containing timestamps
        CRITICAL_SECTION hLogFileWrite;
        // Critical section to serialize writes to log
        static char szFileOpenModeAppend[] = "a+";
        // Log file open mode
        static char szEnvVarLogFile[] =
"TPCH_LOG_FILE";// Environment variable - initialized to
                // log file name if timing information
                // is to be logged
#endif

void ShowODBCErrors(SWORD fHandleType, SQLHANDLE
handle);
void CloseOpenConnections();
```

```
////////////////////////////////////////////////////////////////////////
// DLL Entry Point
extern "C"
BOOL WINAPI DllMain(HINSTANCE hInstance, DWORD
dwReason, LPVOID /*lpReserved*/)
{
   if (dwReason == DLL_PROCESS_ATTACH)
   {
      _Module.Init(ObjectMap, hInstance,
&LIBID_EXECUTEDLLLib);
      DisableThreadLibraryCalls(hInstance);
#ifdef _TPCH_AUDIT
            char szMsg[MAXBUFLEN];
            LPSTR szLogFileName = getenv(szEnvVarLogFile);
            if (szLogFileName == NULL)
            {
            sprintf(szMsg, "The environment variable '%s' does
not exist. "
            "Step timing information will not be written to a log.",
szEnvVarLogFile);
 MessageBox(NULL, szMsg, szCaption, MB_OK);
            }
            else
            {
            if ( (pfLogFile = fopen(szLogFileName,
szFileOpenModeAppend)) == NULL )
            {
            sprintf(szMsg, "The file '%s' does not exist. "
            "Step timing information will not be written to log.",
szLogFileName);
            MessageBox(NULL, szMsg, szCaption, MB_OK);
            }
            else
            InitializeCriticalSection(&hLogFileWrite);
            }
#endif
            InitializeCriticalSection(&hConnections);
            p_Connections = NULL;
            iConnectionCount = 0;
            if (!SQL_SUCCEEDED(SQLSetEnvAttr(NULL,
            SQL_ATTR_CONNECTION_POOLING,
            (SQLPOINTER)SQL_CP_ONE_PER_HENV , 0)))
            ShowODBCErrors(SQL_HANDLE_ENV, henv);
            if
(!SQL_SUCCEEDED(SQLAllocHandle(SQL_HANDLE_ENV,
SQL_NULL_HANDLE, &henv)))
            {
            ShowODBCErrors(SQL_HANDLE_ENV, henv);
            return FALSE;
            }
            if (!SQL_SUCCEEDED(SQLSetEnvAttr(henv,
SQL_ATTR_ODBC_VERSION, (LPVOID)SQL_OV_ODBC3,
0)))
            ShowODBCErrors(SQL_HANDLE_ENV, henv);
            SQLUINTEGER CpMatch;
            if (!SQL_SUCCEEDED(SQLGetEnvAttr(henv,
SQL_ATTR_CP_MATCH, &CpMatch, 0, NULL)))
            ShowODBCErrors(SQL_HANDLE_ENV, henv);

            if (!SQL_SUCCEEDED(SQLSetEnvAttr(henv,
SQL_ATTR_CP_MATCH,
(SQLPOINTER)SQL_CP_STRICT_MATCH,
SQL_IS_INTEGER)))
ShowODBCErrors(SQL_HANDLE_ENV, henv);
   }
   else if (dwReason == DLL_PROCESS_DETACH)
            {

#ifdef _TPCH_AUDIT
                        if (pfLogFile != NULL)
                        {
                                    fclose(pfLogFile);


            DeleteCriticalSection(&hLogFileWrite);
                        }
#endif

                        CloseOpenConnections();

                        if (henv != NULL)
                                    SQLFreeEnv(henv);

                        DeleteCriticalSection(&hConnections);

      _Module.Term();
            }
   return TRUE;    // ok
}

void ShowODBCErrors(SWORD fHandleType, SQLHANDLE
handle)
{
            UCHAR
            szErrState[SQL_SQLSTATE_SIZE+1];       // SQL
Error State string
            UCHAR
            szErrText[SQL_MAX_MESSAGE_LENGTH+1];
// SQL Error Text string
            char
            szBuffer[SQL_SQLSTATE_SIZE+SQL_MAX_MES
SAGE_LENGTH+MAXBUFLEN+1] = "";

                                    // formatted Error text Buffer
            SWORD                   wErrMsgLen;
                                    // Error message length
            SQLINTEGER              dwErrCode;
                                    // Native Error code
            SQLRETURN               nErrResult;
                                    // Return Code from
SQLGetDiagRec
            SWORD                   sMsgNum = 1;
                                    // Error sequence number

            // call SQLGetDiagRec function with proper ODBC
handles, repeatedly until
            // function returns SQL_NO_DATA.
            while ((nErrResult = SQLGetDiagRec(fHandleType,
handle, sMsgNum++,
                        szErrState, &dwErrCode, szErrText,
SQL_MAX_MESSAGE_LENGTH-1, &wErrMsgLen))
                        != SQL_NO_DATA)
            {
            if (!SQL_SUCCEEDED(nErrResult))
                        break;

            wsprintf(szBuffer, SM_SQLERR_FORMAT,
(LPSTR)szErrState, dwErrCode, (LPSTR)szErrText);
            MessageBox(NULL, szBuffer, szCaption, MB_OK);
            }
}
```

```
void CloseOpenConnections()
{
	// Closes all open connections

	if (p_Connections)
	{
		for (int iConnIndex = iConnectionCount -
1; iConnIndex >= 0; iConnIndex--)
		{
			if ((p_Connections +
iConnIndex)->hdbc != SQL_NULL_HDBC)
			{
#ifdef _DEBUG
			_CrtDbgReport(_CRT_WARN,
NULL, 0, NULL, "Executing SQLDisconnect.\n");
#endif

	SQLDisconnect((p_Connections + iConnIndex)-
>hdbc);
#ifdef _DEBUG
			_CrtDbgReport(_CRT_WARN,
NULL, 0, NULL, "Executing SQLFreeHandle for hdbc.\n");
#endif

	SQLFreeHandle(SQL_HANDLE_DBC,
(p_Connections + iConnIndex)->hdbc );
			(p_Connections + iConnIndex)-
>hdbc = SQL_NULL_HDBC;
			}

		}

		free(p_Connections);
	}
	p_Connections = NULL;

	return;
}

////////////////////////////////////////////////////////////////////////
// Used to determine whether the DLL can be unloaded by OLE

STDAPI DllCanUnloadNow(void)
{
   return (_Module.GetLockCount()==0) ? S_OK : S_FALSE;
}

////////////////////////////////////////////////////////////////////////
// Returns a class factory to create an object of the requested type

STDAPI DllGetClassObject(REFCLSID rclsid, REFIID riid,
LPVOID* ppv)
{
   return _Module.GetClassObject(rclsid, riid, ppv);
}

////////////////////////////////////////////////////////////////////////
// DllRegisterServer - Adds entries to the system registry

STDAPI DllRegisterServer(void)
{
   // registers object, typelib and all interfaces in typelib
   return _Module.RegisterServer(TRUE);
}
```

```
////////////////////////////////////////////////////////////////////////
// DllUnregisterServer - Removes entries from the system
registry

STDAPI DllUnregisterServer(void)
{
   return _Module.UnregisterServer(TRUE);
}
/* this ALWAYS GENERATED file contains the definitions for
the interfaces */


/* File created by MIDL compiler version 5.01.0164 */
/* at Mon Jun 09 19:33:03 2003
 */
/* Compiler settings for
C:\charles\Stepmaster\ExecuteDll\ExecuteDll.idl:
    Oicf (OptLev=i2), W1, Zp8, env=Win32, ms_ext, c_ext
    error checks: allocation ref bounds_check enum stub_data
*/
//@@MIDL_FILE_HEADING(  )


/* verify that the <rpcndr.h> version is high enough to compile
this file*/
#ifndef __REQUIRED_RPCNDR_H_VERSION__
#define __REQUIRED_RPCNDR_H_VERSION__ 440
#endif

#include "rpc.h"
#include "rpcndr.h"

#ifndef __ExecuteDll_h__
#define __ExecuteDll_h__

#ifdef __cplusplus
extern "C"{
#endif

/* Forward Declarations */

#ifndef ___IExecuteEvents_FWD_DEFINED__
#define ___IExecuteEvents_FWD_DEFINED__
typedef interface _IExecuteEvents _IExecuteEvents;
#endif       /* ___IExecuteEvents_FWD_DEFINED__ */


#ifndef __IExecute_FWD_DEFINED__
#define __IExecute_FWD_DEFINED__
typedef interface IExecute IExecute;
#endif       /* __IExecute_FWD_DEFINED__ */


#ifndef __Execute_FWD_DEFINED__
#define __Execute_FWD_DEFINED__

#ifdef __cplusplus
typedef class Execute Execute;
#else
typedef struct Execute Execute;
#endif /* __cplusplus */

#endif       /* __Execute_FWD_DEFINED__ */
```

```
/* header files for imported files */
#include "oaidl.h"
#include "ocidl.h"

void __RPC_FAR * __RPC_USER MIDL_user_allocate(size_t);
void __RPC_USER MIDL_user_free( void __RPC_FAR * );

/* interface __MIDL_itf_ExecuteDll_0000 */
/* [local] */

typedef /* [helpstring][uuid] */
enum ExecutionType
   {        execODBC            = 0x1,
            execShell  = 0x2
   }        ExecutionType;

typedef /* [helpstring][uuid] */
enum InstanceStatus
   {        gintDisabled        = 0x1,
            gintPending         = 0x2,
            gintRunning         = 0x3,
            gintComplete        = 0x4,
            gintFailed  = 0x5,
            gintAborted         = 0x6
   }        InstanceStatus;

extern RPC_IF_HANDLE
__MIDL_itf_ExecuteDll_0000_v0_0_c_ifspec;
extern RPC_IF_HANDLE
__MIDL_itf_ExecuteDll_0000_v0_0_s_ifspec;

#ifndef __EXECUTEDLLLib_LIBRARY_DEFINED__
#define __EXECUTEDLLLib_LIBRARY_DEFINED__

/* library EXECUTEDLLLib */
/* [helpstring][version][uuid] */

EXTERN_C const IID LIBID_EXECUTEDLLLib;

#ifndef ___IExecuteEvents_DISPINTERFACE_DEFINED__
#define ___IExecuteEvents_DISPINTERFACE_DEFINED__

/* dispinterface _IExecuteEvents */
/* [helpstring][uuid] */

EXTERN_C const IID DIID__IExecuteEvents;

#if defined(__cplusplus) && !defined(CINTERFACE)

   MIDL_INTERFACE("551AC532-AB1C-11D2-BC0C-
00A0C90D2CA5")
   _IExecuteEvents : public IDispatch
   {
   };
#else       /* C style interface */
   typedef struct _IExecuteEventsVtbl
   {
      BEGIN_INTERFACE
      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*QueryInterface )(
         _IExecuteEvents __RPC_FAR * This,
         /* [in] */ REFIID riid,
         /* [iid_is][out] */ void __RPC_FAR *__RPC_FAR
*ppvObject);

      ULONG ( STDMETHODCALLTYPE __RPC_FAR
*AddRef )(
         _IExecuteEvents __RPC_FAR * This);

      ULONG ( STDMETHODCALLTYPE __RPC_FAR
*Release )(
         _IExecuteEvents __RPC_FAR * This);

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfoCount )(
         _IExecuteEvents __RPC_FAR * This,
         /* [out] */ UINT __RPC_FAR *pctinfo);

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfo )(
         _IExecuteEvents __RPC_FAR * This,
         /* [in] */ UINT iTInfo,
         /* [in] */ LCID lcid,
         /* [out] */ ITypeInfo __RPC_FAR *__RPC_FAR
*ppTInfo);

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetIDsOfNames )(
         _IExecuteEvents __RPC_FAR * This,
         /* [in] */ REFIID riid,
         /* [size_is][in] */ LPOLESTR __RPC_FAR *rgszNames,
         /* [in] */ UINT cNames,
         /* [in] */ LCID lcid,
         /* [size_is][out] */ DISPID __RPC_FAR *rgDispId);

      /* [local] */ HRESULT ( STDMETHODCALLTYPE
__RPC_FAR *Invoke )(
         _IExecuteEvents __RPC_FAR * This,
         /* [in] */ DISPID dispIdMember,
         /* [in] */ REFIID riid,
         /* [in] */ LCID lcid,
         /* [in] */ WORD wFlags,
         /* [out][in] */ DISPPARAMS __RPC_FAR
*pDispParams,
         /* [out] */ VARIANT __RPC_FAR *pVarResult,
         /* [out] */ EXCEPINFO __RPC_FAR *pExcepInfo,
         /* [out] */ UINT __RPC_FAR *puArgErr);

      END_INTERFACE
   } _IExecuteEventsVtbl;

   interface _IExecuteEvents
   {
      CONST_VTBL struct _IExecuteEventsVtbl __RPC_FAR
*lpVtbl;
   };



#ifdef COBJMACROS
#define _IExecuteEvents_QueryInterface(This,riid,ppvObject)
            \
   (This)->lpVtbl -> QueryInterface(This,riid,ppvObject)

#define _IExecuteEvents_AddRef(This)      \
   (This)->lpVtbl -> AddRef(This)
```

```
#define _IExecuteEvents_Release(This)       \
   (This)->lpVtbl -> Release(This)

#define _IExecuteEvents_GetTypeInfoCount(This,pctinfo)
               \
   (This)->lpVtbl -> GetTypeInfoCount(This,pctinfo)

#define _IExecuteEvents_GetTypeInfo(This,iTInfo,lcid,ppTInfo)
               \
   (This)->lpVtbl -> GetTypeInfo(This,iTInfo,lcid,ppTInfo)

#define
_IExecuteEvents_GetIDsOfNames(This,riid,rgszNames,cNames,
lcid,rgDispId)            \
   (This)->lpVtbl ->
GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rgDispId)

#define
_IExecuteEvents_Invoke(This,dispIdMember,riid,lcid,wFlags,pD
ispParams,pVarResult,pExcepInfo,puArgErr)               \
   (This)->lpVtbl ->
Invoke(This,dispIdMember,riid,lcid,wFlags,pDispParams,pVarR
esult,pExcepInfo,puArgErr)

#endif /* COBJMACROS */

#endif       /* C style interface */

#endif       /*
___IExecuteEvents_DISPINTERFACE_DEFINED__ */

#ifndef __IExecute_INTERFACE_DEFINED__
#define __IExecute_INTERFACE_DEFINED__

/* interface IExecute */
/* [unique][helpstring][dual][uuid][object] */

EXTERN_C const IID IID_IExecute;

#if defined(__cplusplus) && !defined(CINTERFACE)

   MIDL_INTERFACE("551AC531-AB1C-11D2-BC0C-
00A0C90D2CA5")
   IExecute : public IDispatch
   {
   public:
      virtual /* [helpstring][id] */ HRESULT
STDMETHODCALLTYPE DoExecute(
         /* [in] */ BSTR szCommand,
         /* [in] */ BSTR szExecutionDtls,
         /* [in] */ ExecutionType ExecMethod,
         /* [in] */ BOOL bNoCount,
         /* [in] */ BOOL bNoExecute,
         /* [in] */ BOOL bParseOnly,
         /* [in] */ BOOL bQuotedIds,
         /* [in] */ BOOL bAnsiNulls,
         /* [in] */ BOOL bShowQP,
         /* [in] */ BOOL bStatsTime,
         /* [in] */ BOOL bStatsIO,
         /* [in] */ long lRowCount,
         /* [in] */ long lQueryTmout,
         /* [in] */ BSTR szConnection) = 0;

      virtual /* [helpstring][id][propget] */ HRESULT
STDMETHODCALLTYPE get_StepStatus(
         /* [retval][out] */ InstanceStatus __RPC_FAR *pVal) =
0;

      virtual /* [helpstring][id] */ HRESULT
STDMETHODCALLTYPE Abort( void) = 0;

      virtual /* [helpstring][id] */ HRESULT
STDMETHODCALLTYPE WriteError(
         BSTR szMsg) = 0;

      virtual /* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE put_OutputFile(
         /* [in] */ BSTR newVal) = 0;

      virtual /* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE put_ErrorFile(
         /* [in] */ BSTR newVal) = 0;
   };
#else        /* C style interface */

   typedef struct IExecuteVtbl
   {
      BEGIN_INTERFACE

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*QueryInterface )(
         IExecute __RPC_FAR * This,
         /* [in] */ REFIID riid,
         /* [iid_is][out] */ void __RPC_FAR *__RPC_FAR
*ppvObject);

      ULONG ( STDMETHODCALLTYPE __RPC_FAR
*AddRef )(
         IExecute __RPC_FAR * This);
      ULONG ( STDMETHODCALLTYPE __RPC_FAR
*Release )(
         IExecute __RPC_FAR * This);
      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfoCount )(
         IExecute __RPC_FAR * This,
         /* [out] */ UINT __RPC_FAR *pctinfo);

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfo )(
         IExecute __RPC_FAR * This,
         /* [in] */ UINT iTInfo,
         /* [in] */ LCID lcid,
         /* [out] */ ITypeInfo __RPC_FAR *__RPC_FAR
*ppTInfo);
      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetIDsOfNames )(
         IExecute __RPC_FAR * This,
         /* [in] */ REFIID riid,
         /* [size_is][in] */ LPOLESTR __RPC_FAR *rgszNames,
         /* [in] */ UINT cNames,
         /* [in] */ LCID lcid,
         /* [size_is][out] */ DISPID __RPC_FAR *rgDispId);
      /* [local] */ HRESULT ( STDMETHODCALLTYPE
__RPC_FAR *Invoke )(
         IExecute __RPC_FAR * This,
         /* [in] */ DISPID dispIdMember,
         /* [in] */ REFIID riid,
         /* [in] */ LCID lcid,
         /* [in] */ WORD wFlags,
         /* [out][in] */ DISPPARAMS __RPC_FAR
*pDispParams,
         /* [out] */ VARIANT __RPC_FAR *pVarResult,
         /* [out] */ EXCEPINFO __RPC_FAR *pExcepInfo,
         /* [out] */ UINT __RPC_FAR *puArgErr);
```

```
      /* [helpstring][id] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *DoExecute )(
         IExecute __RPC_FAR * This,
         /* [in] */ BSTR szCommand,
         /* [in] */ BSTR szExecutionDtls,
         /* [in] */ ExecutionType ExecMethod,
         /* [in] */ BOOL bNoCount,
         /* [in] */ BOOL bNoExecute,
         /* [in] */ BOOL bParseOnly,
         /* [in] */ BOOL bQuotedIds,
         /* [in] */ BOOL bAnsiNulls,
         /* [in] */ BOOL bShowQP,
         /* [in] */ BOOL bStatsTime,
         /* [in] */ BOOL bStatsIO,
         /* [in] */ long lRowCount,
         /* [in] */ long lQueryTmout,
         /* [in] */ BSTR szConnection);

      /* [helpstring][id][propget] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *get_StepStatus )(
         IExecute __RPC_FAR * This,
         /* [retval][out] */ InstanceStatus __RPC_FAR *pVal);

      /* [helpstring][id] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *Abort )(
         IExecute __RPC_FAR * This);

      /* [helpstring][id] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *WriteError )(
         IExecute __RPC_FAR * This,
         BSTR szMsg);

      /* [helpstring][id][propput] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *put_OutputFile )(
         IExecute __RPC_FAR * This,
         /* [in] */ BSTR newVal);

      /* [helpstring][id][propput] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *put_ErrorFile )(
         IExecute __RPC_FAR * This,
         /* [in] */ BSTR newVal);

      END_INTERFACE
   } IExecuteVtbl;

   interface IExecute
   {
      CONST_VTBL struct IExecuteVtbl __RPC_FAR *lpVtbl;
   };



#ifdef COBJMACROS
#define IExecute_QueryInterface(This,riid,ppvObject)  \
   (This)->lpVtbl -> QueryInterface(This,riid,ppvObject)

#define IExecute_AddRef(This)  \
   (This)->lpVtbl -> AddRef(This)

#define IExecute_Release(This)  \
   (This)->lpVtbl -> Release(This)

#define IExecute_GetTypeInfoCount(This,pctinfo)       \
   (This)->lpVtbl -> GetTypeInfoCount(This,pctinfo)

#define IExecute_GetTypeInfo(This,iTInfo,lcid,ppTInfo)
            \
   (This)->lpVtbl -> GetTypeInfo(This,iTInfo,lcid,ppTInfo)
```

```
#define
IExecute_GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rgD
ispId)       \
   (This)->lpVtbl ->
GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rgDispId)

#define
IExecute_Invoke(This,dispIdMember,riid,lcid,wFlags,pDispPara
ms,pVarResult,pExcepInfo,puArgErr)          \
   (This)->lpVtbl ->
Invoke(This,dispIdMember,riid,lcid,wFlags,pDispParams,pVarR
esult,pExcepInfo,puArgErr)

#define
IExecute_DoExecute(This,szCommand,szExecutionDtls,ExecMe
thod,bNoCount,
            bNoExecute,bParseOnly,bQuotedIds,bAnsiNulls,bSh
owQP,bStatsTime,bStatsIO,lRowCount,lQueryTmout,szConnecti
on)\
   (This)->lpVtbl ->
DoExecute(This,szCommand,szExecutionDtls,ExecMethod,bNo
Count,bNoExecute,bParseOnly,bQuotedIds,
            bAnsiNulls,bShowQP,bStatsTime,bStatsIO,lRowCou
nt,lQueryTmout,szConnection)

#define IExecute_get_StepStatus(This,pVal) \
   (This)->lpVtbl -> get_StepStatus(This,pVal)

#define IExecute_Abort(This)     \
   (This)->lpVtbl -> Abort(This)

#define IExecute_WriteError(This,szMsg)    \
   (This)->lpVtbl -> WriteError(This,szMsg)

#define IExecute_put_OutputFile(This,newVal)           \
   (This)->lpVtbl -> put_OutputFile(This,newVal)

#define IExecute_put_ErrorFile(This,newVal)            \
   (This)->lpVtbl -> put_ErrorFile(This,newVal)

#endif /* COBJMACROS */

#endif       /* C style interface */

/* [helpstring][id] */ HRESULT STDMETHODCALLTYPE
IExecute_DoExecute_Proxy(
   IExecute __RPC_FAR * This,
   /* [in] */ BSTR szCommand,
   /* [in] */ BSTR szExecutionDtls,
   /* [in] */ ExecutionType ExecMethod,
   /* [in] */ BOOL bNoCount,
   /* [in] */ BOOL bNoExecute,
   /* [in] */ BOOL bParseOnly,
   /* [in] */ BOOL bQuotedIds,
   /* [in] */ BOOL bAnsiNulls,
   /* [in] */ BOOL bShowQP,
   /* [in] */ BOOL bStatsTime,
   /* [in] */ BOOL bStatsIO,
   /* [in] */ long lRowCount,
   /* [in] */ long lQueryTmout,
   /* [in] */ BSTR szConnection);

void __RPC_STUB IExecute_DoExecute_Stub(
   IRpcStubBuffer *This,
   IRpcChannelBuffer *_pRpcChannelBuffer,
   PRPC_MESSAGE _pRpcMessage,
   DWORD *_pdwStubPhase);
```

```
/* [helpstring][id][propget] */ HRESULT
STDMETHODCALLTYPE IExecute_get_StepStatus_Proxy(
    IExecute __RPC_FAR * This,
    /* [retval][out] */ InstanceStatus __RPC_FAR *pVal);


void __RPC_STUB IExecute_get_StepStatus_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);

/* [helpstring][id] */ HRESULT STDMETHODCALLTYPE
IExecute_Abort_Proxy(
    IExecute __RPC_FAR * This);

void __RPC_STUB IExecute_Abort_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);

/* [helpstring][id] */ HRESULT STDMETHODCALLTYPE
IExecute_WriteError_Proxy(
    IExecute __RPC_FAR * This,
    BSTR szMsg);

void __RPC_STUB IExecute_WriteError_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);

/* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE IExecute_put_OutputFile_Proxy(
    IExecute __RPC_FAR * This,
    /* [in] */ BSTR newVal);

void __RPC_STUB IExecute_put_OutputFile_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE IExecute_put_ErrorFile_Proxy(
    IExecute __RPC_FAR * This,
    /* [in] */ BSTR newVal);

void __RPC_STUB IExecute_put_ErrorFile_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);
#endif      /* __IExecute_INTERFACE_DEFINED__ */
EXTERN_C const CLSID CLSID_Execute;
ifdef __cplusplus
class DECLSPEC_UUID("2EFC198E-AA8D-11D2-BC0C-
00A0C90D2CA5")
Execute;
#endif
#endif /* __EXECUTEDLLLib_LIBRARY_DEFINED__ */
/* Additional Prototypes for ALL interfaces */
/* end of Additional Prototypes */
#ifdef __cplusplus
}
#endif
```

```
//  FILE:      Execute.cpp
//             Microsoft TPC-H Kit Ver. 1.00
//             Copyright Microsoft, 1999
//             All Rights Reserved
//
//
//  PURPOSE:    Implementation of CExecute.
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
//
#include "stdafx.h"

#include "ExecuteDll.h"
#include "SMExecute.h"
#include "Execute.h"

extern SQLHENV henv;
extern SM_Connection_Info       *p_Connections;         //
Pointer to open connections
extern int  iConnectionCount;// Number of open connections
extern CRITICAL_SECTION                 hConnections;
            // Critical section to serialize
            // access to available connections

#ifdef _TPCH_AUDIT
            extern FILE *pfLogFile;
            // Log file containing timestamps
            extern CRITICAL_SECTION hLogFileWrite;
            // Handle to critical section
#endif

////////////////////////////////////////////////////////////////////////
// CExecute

char * g_szOdbcOps[] = {
                        "SQLAllocHandle",
                        "SQLDriverConnect",
                        "SQLExecDirect",
                        "SQLSetStmtAttr",
                        "SQLCancel",
                        "SQLNumResultCols",
                        "SQLDescribeCol",
                        "SQLColAttribute",
                        "SQLFetch",
                        "SQLGetData",
                        "SQLRowCount",
                        "SQLMoreResults",
                        "SQLBindCol"
            };

char * CExecError::m_szExecErrorDesc[] = {
                        "Connection is already in use."
            };
STDMETHODIMP
CExecute::InterfaceSupportsErrorInfo(REFIID riid)
{
            static const IID* arr[] =
            {
            &IID_IExecute
            };
            for (int i=0; i < sizeof(arr) / sizeof(arr[0]); i++)
            {
                        if (InlineIsEqualGUID(*arr[i],riid))
                                    return S_OK;
            }
            return S_FALSE;
}
```

```
STDMETHODIMP CExecute::put_OutputFile(BSTR newVal)
{
	assert(m_pOutputFile);
	m_OutputFile = newVal;

	HRESULT		hr = m_pOutputFile->put_FileName(newVal);
	if FAILED(hr)
	{
		m_pOutputFile->Release();
		m_pOutputFile = NULL;
	}
	return hr;
}

//DEL STDMETHODIMP CExecute::put_LogFile(BSTR newVal)
//DEL {
//DEL	assert(m_pLogFile);
//DEL
//DEL	m_pLogFile->put_FileName(newVal);
//DEL	return S_OK;
//DEL }

STDMETHODIMP CExecute::put_ErrorFile(BSTR newVal)
{
	assert(m_pErrorFile);
	m_ErrorFile = newVal;

	HRESULT		hr = m_pErrorFile->put_FileName(newVal);
	if FAILED(hr)
	{
		m_pErrorFile->Release();
		m_pErrorFile = NULL;
	}
	return hr;
}

STDMETHODIMP CExecute::DoExecute(BSTR szCommand, BSTR szExecutionDtls, ExecutionType ExecMethod, \
 BOOL bNoCount, BOOL bNoExecute, BOOL bParseOnly, BOOL bQuotedIds, \
 BOOL bAnsiNulls, BOOL bShowQP, BOOL bStatsTime, BOOL bStatsIO, \
 long lRowCount, long lQueryTmout, BSTR szConnection)
{
   HANDLE			hThrd;
   DWORD			tid;
  _CrtSetReportFile(_CRT_WARN, _CRTDBG_FILE_STDOUT);
	m_szCommand = szCommand;
	m_szExecDtls = szExecutionDtls;
	m_ExecMthd = ExecMethod;
	if (m_ExecMthd == execODBC)
   {
      m_bNoCount = bNoCount;
			m_bNoExecute = bNoExecute;
			m_bParseOnly = bParseOnly;
			m_bQuotedIds = bQuotedIds;
			m_bAnsiNulls = bAnsiNulls;
			m_bShowQP = bShowQP;
			m_bStatsTime = bStatsTime;
			m_bStatsIO = bStatsIO;
			m_lRowCount = lRowCount;
			m_lQueryTmout = lQueryTmout;
			m_szConnection = szConnection;
   }

	if((hThrd = CreateThread( 0, 0, (LPTHREAD_START_ROUTINE)ExecutionThread,
				this, 0, &tid)) == NULL)
		return(RaiseSystemError());

	CloseHandle(hThrd);

	return S_OK;
}

STDMETHODIMP CExecute::Abort()
{
	if (m_ExecMthd == execShell)
		return(AbortShell());
	else
		return(AbortODBC());
}

void ExecutionThread(LPVOID lpParameter)
{

	CExecute  *MyExecute = (CExecute*)lpParameter;

	MyExecute->m_tElapsedTime = 0;

	GetLocalTime(&MyExecute->m_tStartTime);
	MyExecute->PostMessage(WM_TASK_START, 0, 0);

#ifdef _TPCH_AUDIT
	char
	szBuffer[MAXLOGCMDBUF];
	char			szFmt[MAXBUFLEN];

	sprintf(szFmt, "Start Step: '%%.%ds' at '%d/%d/%d %d:%d:%d:%d'\n",
			MAXLOGCMDLEN,
			MyExecute->m_tStartTime.wMonth, MyExecute->m_tStartTime.wDay,
			MyExecute->m_tStartTime.wYear, MyExecute->m_tStartTime.wHour,
			MyExecute->m_tStartTime.wMinute, MyExecute->m_tStartTime.wSecond,
			MyExecute->m_tStartTime.wMilliseconds);
	if (MyExecute->m_ExecMthd == execShell)

	WriteFileToTpchLog((LPSTR)MyExecute->m_szCommand, szFmt);
	else
	{
		sprintf(szBuffer, szFmt, (LPSTR)MyExecute->m_szCommand);
		WriteToTpchLog(szBuffer);
	}
#endif
```

```
// Initialize the run status for the step to running. The completion
status for the step will be initialized by the Shell and ODBC
//execution functions.
   MyExecute->m_StepStatus = gintRunning;

            if (MyExecute->m_ExecMthd == execShell)
                        MyExecute->m_tElapsedTime =
MyExecute->ExecuteShell();
            else
                        MyExecute->m_tElapsedTime =
MyExecute->ExecuteODBC();

            // Close the output, log and error files
            if (MyExecute->m_pOutputFile)
                        MyExecute->m_pOutputFile->Release();
            MyExecute->m_pOutputFile = NULL;

            MyExecute->m_ExecTime = NULL;

            GetLocalTime(&MyExecute->m_tEndTime);

#ifdef _TPCH_AUDIT
            sprintf(szFmt, "Complete Step: '%%.%ds' at
'%d/%d/%d %d:%d:%d:%d'\n",
                        MAXLOGCMDLEN,
                        MyExecute->m_tEndTime.wMonth,
MyExecute->m_tEndTime.wDay,
                        MyExecute->m_tEndTime.wYear,
MyExecute->m_tEndTime.wHour,
                        MyExecute->m_tEndTime.wMinute,
MyExecute->m_tEndTime.wSecond,
                        MyExecute-
>m_tEndTime.wMilliseconds);
            if (MyExecute->m_ExecMthd == execShell)

            WriteFileToTpchLog((LPSTR)MyExecute-
>m_szCommand, szFmt);
            else
            {
                        sprintf(szBuffer, szFmt,
(LPSTR)MyExecute->m_szCommand);
                        WriteToTpchLog(szBuffer);
            }
#endif

            MyExecute->PostMessage(WM_TASK_FINISH, 0,
0);

            return;
}

#ifdef _TPCH_AUDIT

void WriteFileToTpchLog(LPSTR szFile, LPSTR szFmt)
{
            // Reads a maximum of MAXLOGCMDBUF
characters from the command file and writes it to the log
            FILE        *fpCmd;
            int                     iRead;
            char        szBuf[MAXLOGCMDBUF];
            char        szCmd[MAXLOGCMDLEN];
            if ( pfLogFile != NULL )
            {
                        if ( (fpCmd = fopen(szFile,
FILE_ACCESS_READ)) != NULL)
                        {
                                    iRead = fread(szCmd,
sizeof(char), sizeof(szCmd) / sizeof(char), fpCmd);
                                    if (iRead <
MAXLOGCMDLEN)
            szCmd[iRead] = '\0';
            else
            szCmd[MAXLOGCMDLEN - 1] = '\0';
            sprintf(szBuf, szFmt, szCmd);
            WriteToTpchLog(szBuf);
            fclose(fpCmd);
            }
            }
}

void WriteToTpchLog(char *szMsg)
{
            if (pfLogFile != NULL)
            {
            EnterCriticalSection(&hLogFileWrite);
            fprintf(pfLogFile, szMsg);
            LeaveCriticalSection(&hLogFileWrite);
            }

            return;
}
#endif

TC_TIME CExecute::ExecuteShell()
{
            STARTUPINFOA                Start;
            PROCESS_INFORMATION     proc;
            DWORD                       exitCode;
            TC_TIME                     tElapsed = 0;
            _bstr_t                     szCommand("cmd /c ");
            LPSTR                       szStartDir;
            CURRENC                     Elapsed;
            szCommand += m_szCommand;
// Redirect output and error information
szCommand += " > " + m_OutputFile + " 2> " + m_ErrorFile;
// Initialize the STARTUPINFO structure:
memset(&Start, 0, sizeof(STARTUPINFOA)) ;
Start.cb            = sizeof(Start);
Start.dwFlags       = STARTF_USESHOWWINDOW;
Start.wShowWindow   = SW_SHOWMINNOACTIVE;
memset(&proc, 0, sizeof(PROCESS_INFORMATION)) ;
szStartDir = strcmp((LPCTSTR)m_szExecDtls, "") == 0 ? NULL
: (LPSTR)m_szExecDtls;
m_ExecTime->Start();
// Start the shelled application:
if (!CreateProcessA( NULL, (LPSTR)szCommand, NULL,
NULL, FALSE,
NORMAL_PRIORITY_CLASS, NULL, szStartDir, &Start,
&proc ))
{
                        m_StepStatus = gintFailed;
                        LogSystemError(m_pErrorFile);

                        m_ExecTime->Stop(&Elapsed);
                        return((TC_TIME)Elapsed.int64);
            }
```

```
		m_hHandle = proc.hProcess;
		// Give the process time to execute and finish
		WaitForSingleObject(m_hHandle, INFINITE);
		m_ExecTime->Stop(&Elapsed);

		if (!GetExitCodeProcess(m_hHandle, &exitCode))
		{
			m_StepStatus = gintFailed;
			LogSystemError(m_pErrorFile);
		}
		else
			m_StepStatus = gintComplete;

		// Close all open handles to the shelled process
		CloseHandle(m_hHandle);

		return((TC_TIME)Elapsed.int64);
}

STDMETHODIMP CExecute::AbortShell()
{
		if (m_hHandle != SQL_NULL_HSTMT)
			if (!TerminateProcess(m_hHandle, 0))
				return(RaiseSystemError());

		return(S_OK);
}

TC_TIME CExecute::ExecuteODBC()
{
		TC_TIME				tElapsed
= 0;
		HDBC				m_hdbc;
		SQLRETURN			rc;
		LPSTR				szCmd;
		CURRENCY			Elapsed;
		BOOL
		bDoConnect = FALSE;

		// ODBC specific initialization
		m_hdbc = SQL_NULL_HDBC;

		try
		{
			// Allocate a new connection if we are
creating a dynamic connection or if
			// the named connection doesn't exist
			InitializeConnection(&m_hdbc,
&bDoConnect);

			// Ensure that the connection is valid.

#ifdef _DEBUG
			_CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLDriverConnect.\n");
#endif

			if (bDoConnect)
			{
				// Allocate connection handle,
open a connection and set connection attributes.
#ifdef _DEBUG
				_CrtDbgReport(_CRT_WARN,
NULL, 0, NULL, "Executing SQLDriverConnect.\n");
#endif
if (m_bAbort)
return(tElapsed);
// Connect to the server using the passed in connection string
rc = SQLDriverConnect(m_hdbc, NULL,
(unsigned char *)(LPSTR)m_szExecDtls, SQL_NTS,
NULL, 0, NULL, SQL_DRIVER_NOPROMPT);
HandleODBCError(rc, SQL_HANDLE_DBC, m_hdbc,
SMSQLDriverConnect);
			}

			ReConnectDeadConnection(&m_hdbc);

#ifdef _DEBUG
_CrtDbgReport(_CRT_WARN, NULL, 0, NULL, "Executing
SQLAllocHandle for hdbc.\n");
#endif
if (!m_bAbort && (rc =
SQLAllocHandle(SQL_HANDLE_STMT, m_hdbc,
&m_hHandle)) != SQL_SUCCESS)
HandleODBCError(rc, SQL_HANDLE_DBC, m_hdbc,
SMSQLAllocHandle);
// Set connection attributes if any have been modified from the
default values
			if (m_lRowCount > 0)
			{
			char			szConnOptions[512];
					sprintf(szConnOptions, "SET
ROWCOUNT %d ", m_lRowCount);
			SetConnectionOption(szConnOptions, &m_hdbc);
			}

			if (m_bQuotedIds)
			SetConnectionOption("SET QUOTED_IDENTIFIER
ON ", &m_hdbc);
			if (!m_bAnsiNulls)
			SetConnectionOption("SET
ANSI_NULL_DFLT_OFF ON ", &m_hdbc);

			if (!m_bAbort && m_lQueryTmout > 0)
			{
#ifdef _DEBUG
			_CrtDbgReport(_CRT_WARN, NULL, 0, NULL,
"Executing SQLSetStmtAttr.\n");
#endif
			// Set the query timeout on the statement handle
			rc = SQLSetStmtAttr(m_hHandle,
SQL_ATTR_QUERY_TIMEOUT, &m_lQueryTmout,
			SQL_IS_UINTEGER);
			HandleODBCError(rc, SQL_HANDLE_STMT,
m_hHandle, SMSQLSetStmtAttr);
			}

			if (m_bNoExecute)
			SetConnectionOption("SET NOEXEC ON ",
&m_hdbc);
			else if (m_bParseOnly)
			SetConnectionOption("SET PARSEONLY ON ",
&m_hdbc);
			else if (m_bShowQP)
			// Important to ensure that this is the last connection
attributes being set -
			// otherwise showplans are generated for all remaining
SET statements
			SetConnectionOption("SET SHOWPLAN_TEXT ON
", &m_hdbc);
			else
			{
```

```
                                if (m_bNoCount)

        SetConnectionOption("SET NOCOUNT ON ",
&m_hdbc);

                                if (m_bStatsIO)

        SetConnectionOption("SET STATISTICS IO ON ",
&m_hdbc);

                                // Important to ensure that this
is the last connection attributes being set -
                                // otherwise timing statistics are
generated for all remaining SET statements
                                if (m_bStatsTime)

        SetConnectionOption("SET STATISTICS TIME ON
", &m_hdbc);
                        }

                        m_szCmd = (LPSTR)m_szCommand;
                        m_ExecTime->Start();

                        while ((szCmd =
NextCmdInBatch((LPSTR)m_szCommand)) != NULL &&
!m_bAbort)
                        {
#ifdef _DEBUG
                                _CrtDbgReport(_CRT_WARN,
NULL, 0, NULL, "Executing SQLExecDirect.\n");
#endif

                                // Execute the ODBC command
                                rc =
SQLExecDirect(m_hHandle, (unsigned char *)szCmd,
SQL_NTS);
                                HandleODBCError(rc,
SQL_HANDLE_STMT, m_hHandle, SMSQLExecDirect);

                                free(szCmd);

                                // Call a procedure to log the
results to the output file
                                ProcessResultsets();
                        }
                        m_ExecTime->Stop(&Elapsed);

                        ResetConnectionProperties(&m_hdbc);
                }
                catch(CODBCError *pErr)
                {
                        m_StepStatus = gintFailed;
                        delete pErr;
                }
                catch(CExecError *pErr)
                {
                        m_StepStatus = gintFailed;
                        pErr->LogErrors(this);
                        delete pErr;
                }

                ODBCCleanup(&m_hdbc, &m_hHandle);

                if (m_StepStatus != gintFailed)
                        m_StepStatus = gintComplete;

                return((DWORD)Elapsed.int64);
}
```

```
void CExecute::InitializeConnection(HDBC *phdbc, BOOL
*pbDoConnect)
{
        SQLRETURN                               rc;

        *pbDoConnect = TRUE;

        if (IsDynamicConnection())
        {
#ifdef _DEBUG
                _CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLAllocHandle for m_hdbc.\n");
#endif

                rc =
SQLAllocHandle(SQL_HANDLE_DBC, henv, phdbc);
                HandleODBCError(rc,
SQL_HANDLE_ENV, henv, SMSQLAllocHandle);

                return;
        }

        EnterCriticalSection(&hConnections);
        // Returns the connection handle if the connection,
m_szConnection, exists
        for (m_iConnectionIndex = iConnectionCount - 1;
m_iConnectionIndex >= 0; m_iConnectionIndex--)
        {
                if (!strcmp( (p_Connections +
m_iConnectionIndex)->szConnectionName,
(LPSTR)m_szConnection))
                {
                        if (!(p_Connections +
m_iConnectionIndex)->bInUse)
                        {
                                *phdbc =
(p_Connections + m_iConnectionIndex)->hdbc;
                                (p_Connections +
m_iConnectionIndex)->bInUse = TRUE;

                                *pbDoConnect =
FALSE;
                                break;
                        }
                        else
                        {

        LeaveCriticalSection(&hConnections);


                                throw new
CExecError(CExecError::SM_ERR_CONN_IN_USE);
                        }
                }
        }

        if (m_iConnectionIndex < 0)
        {
                // Connection was not found. Allocate
connection handle and add it to list of
                // available connections.
#ifdef _DEBUG
                _CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLAllocHandle for m_hdbc.\n");
#endif
```

```
                        rc =
SQLAllocHandle(SQL_HANDLE_DBC, henv, phdbc);
                        HandleODBCError(rc,
SQL_HANDLE_ENV, henv, SMSQLAllocHandle);

                        m_iConnectionIndex =
iConnectionCount++;

                        p_Connections = (SM_Connection_Info
*)realloc(p_Connections,
                                                iConnectionCount *
sizeof(SM_Connection_Info));

                        strcpy((p_Connections +
m_iConnectionIndex)->szConnectionName,
(LPSTR)m_szConnection);
                        (p_Connections + m_iConnectionIndex)-
>hdbc = *phdbc;
                        (p_Connections + m_iConnectionIndex)-
>bInUse = TRUE;
                }

                LeaveCriticalSection(&hConnections);

                return;
}

void CExecute::ReConnectDeadConnection(HDBC *phdbc)
{
                SQLRETURN                       rc;
                SQLUINTEGER                     uConnDead;

                // Connect to the server using the passed in connection
string
                rc = SQLGetConnectAttr(*phdbc,
SQL_ATTR_CONNECTION_DEAD,
                        &uConnDead, SQL_IS_UINTEGER,
NULL);
                HandleODBCError(rc, SQL_HANDLE_DBC,
*phdbc, SMSQLDriverConnect);

                if (uConnDead == SQL_CD_TRUE)
                {
                        // Cleanup the old connection and re-
connect.
#ifdef _DEBUG
                        _CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLDisconnect.\n");
#endif
                        rc = SQLDisconnect(*phdbc);
#ifdef _DEBUG
                        _CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLFreeHandle for hdbc.\n");
#endif
                        SQLFreeHandle(SQL_HANDLE_DBC,
*phdbc);
                        *phdbc = SQL_NULL_HDBC;

#ifdef _DEBUG
                        _CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLDriverConnect.\n");
#endif
                        rc =
SQLAllocHandle(SQL_HANDLE_DBC, henv, phdbc);
                        HandleODBCError(rc,
SQL_HANDLE_ENV, henv, SMSQLAllocHandle);

                        // Connect to the server using the passed in
connection string
                        rc = SQLDriverConnect(*phdbc, NULL,
                                (unsigned char
*)(LPSTR)m_szExecDtls, SQL_NTS,
                                NULL, 0, NULL,
SQL_DRIVER_NOPROMPT);
                        HandleODBCError(rc,
SQL_HANDLE_DBC, *phdbc, SMSQLDriverConnect);
                }

                return;
}

void CExecute::ResetConnectionUsage()
{
                if(m_iConnectionIndex >= 0 &&
m_iConnectionIndex < iConnectionCount)
                {
                        EnterCriticalSection(&hConnections);
                        (p_Connections + m_iConnectionIndex)-
>bInUse = FALSE;
                        LeaveCriticalSection(&hConnections);
                }

                return;
}

void CExecute::ResetConnectionProperties(HDBC *p_hdbc)
{
                SQLRETURN                               rc;

                // Reset connection attributes if any have been
modified from the default values

                if (m_bNoExecute)
                        SetConnectionOption("SET NOEXEC
OFF ", p_hdbc);
                else if (m_bParseOnly)
                        SetConnectionOption("SET PARSEONLY
OFF ", p_hdbc);
                else if (m_bShowQP)
                        // Reset connection attributes in reverse
order
                        SetConnectionOption("SET
SHOWPLAN_TEXT OFF ", p_hdbc);
                else
                {
                        // Reset connection attributes in reverse
order
                        if (m_bStatsTime)
                                SetConnectionOption("SET
STATISTICS TIME OFF ", p_hdbc);

                        if (m_bNoCount)
                                SetConnectionOption("SET
NOCOUNT OFF ", p_hdbc);

                        if (m_bStatsIO)
                                SetConnectionOption("SET
STATISTICS IO OFF ", p_hdbc);
                }
```

```
        if (m_lRowCount > 0)
        {
                char
        szConnOptions[512];

                sprintf(szConnOptions, "SET
ROWCOUNT 0 ");
                SetConnectionOption(szConnOptions,
p_hdbc);
        }

        if (m_bQuotedIds)
                SetConnectionOption("SET
QUOTED_IDENTIFIER OFF ", p_hdbc);

        if (!m_bAnsiNulls)
                SetConnectionOption("SET
ANSI_NULL_DFLT_OFF OFF ", p_hdbc);

        if (m_lQueryTmout > 0)
        {
                SQLUINTEGER
        lQueryTmout = 0;

#ifdef _DEBUG
                _CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLSetStmtAttr.\n");
#endif

                // Set the query timeout on the statement
handle
                rc = SQLSetStmtAttr(m_hHandle,
SQL_ATTR_QUERY_TIMEOUT, &lQueryTmout,
                        SQL_IS_UINTEGER);
                HandleODBCError(rc,
SQL_HANDLE_STMT, m_hHandle, SMSQLSetStmtAttr);
        }

        return;
}

LPSTR CExecute::NextCmdInBatch(LPSTR szBatch)
{
        LPSTR     szCmd, szSeparator, szStart;
        char      szNext;

        szStart = m_szCmd;

        while ( (szSeparator = strstr(szStart,
CMD_SEPARATOR)) != NULL)
        {
                szNext = *(szSeparator +
strlen(CMD_SEPARATOR));
                if ( szNext == '\n' || szNext == '\r' || szNext
== '\0')
                        break;
                else
                        szStart = szSeparator +
strlen(CMD_SEPARATOR);
        }

        if (!szSeparator)
        {
                // No more GO's
                if (strlen(m_szCmd) > 0)
                {
                        szCmd =
(LPSTR)malloc(strlen(m_szCmd) + 1);
                        strcpy(szCmd, m_szCmd);
                        m_szCmd +=
strlen(m_szCmd);
                }
                else
                        szCmd = NULL;
        }
        else if (szSeparator - m_szCmd > 0)
        {
                // Strip the succeeding newline
                szCmd = (LPSTR)malloc(szSeparator -
m_szCmd);
                strncpy(szCmd, m_szCmd, szSeparator -
m_szCmd - 1);
                *(szCmd + (szSeparator - m_szCmd - 1))
= '\0';
                m_szCmd += szSeparator - m_szCmd +
strlen(CMD_SEPARATOR);
                if ( szNext == '\n' || szNext == '\r')
                        m_szCmd += 1;
        }
        else
                szCmd = NULL;

        return(szCmd);
}

void CExecute::SetConnectionOption(LPSTR szConn, HDBC
*pHdbc)
{
        // Executes the passed in connection options 'set'
statement. Returns True if it succeeded
        char
        szConnOptions[512];
        SQLRETURN                rc;

        sprintf(szConnOptions, szConn);

#ifdef _DEBUG
        _CrtDbgReport(_CRT_WARN, NULL, 0, NULL,
"Executing SQLExecDirect for connection option.\n");
#endif

        if (m_bAbort)
                return;

        rc = SQLExecDirect(m_hHandle, (unsigned char
*)szConnOptions, SQL_NTS);
        HandleODBCError(rc, SQL_HANDLE_STMT,
m_hHandle, SMSQLExecDirect);

        return;
}
```

```
STDMETHODIMP CExecute::AbortODBC()
{
	m_bAbort = TRUE;

	try
	{
		if (m_hHandle != SQL_NULL_HSTMT)
		{
#ifdef _DEBUG
			_CrtDbgReport(_CRT_WARN,
NULL, 0, NULL, "Executing SQLCancel.\n");
#endif

			SQLRETURN rc =
SQLCancel(m_hHandle);
			HandleODBCError(rc,
SQL_HANDLE_STMT, m_hHandle, SMSQLCancel);
		}
	}
	catch(CODBCError *pErr)
	{
		delete pErr;
	}

	return(S_OK);
}

void CExecute::ProcessResultsets()
{
  SQLSMALLINT		*CTypeArray, *CScaleArray;
  SQLINTEGER		*ColLenArray,
*DispLenArray, *OffsetArray;
	SQLSMALLINT		iColNameLen,
SQLType, iColNull, i, NumCols = 0;
	SQLINTEGER		iDispLen,
iRowCount;
  SQLRETURN		rc;
	char
	szColName[MAX_DATA_LEN + 1];
  void			*DataPtr;
	SQLINTEGER		iLenOrInd =
ALIGNBUF(sizeof(SQLINTEGER));
	SQLUINTEGER		iRowArraySize,
iArrayElementSize;
//	SQLUINTEGER		NumRowsFetched;
//	SQLUSMALLINT	*RowStatusArray;


	if (!m_pOutputFile || m_bAbort)
		return;

	do
	{
#ifdef _DEBUG
		_CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLNumResultCols.\n");
#endif
		// Determine the number of result set
columns.
		rc = SQLNumResultCols(m_hHandle,
&NumCols);
		HandleODBCError(rc,
SQL_HANDLE_STMT, m_hHandle, SMSQLNumResultCols);
		if (NumCols > 0)
		{
		// Allocate arrays to hold the C type, scale, column
and display length of the data
		CTypeArray = (SQLSMALLINT *) malloc(NumCols
* sizeof(SQLSMALLINT));
		CScaleArray = (SQLSMALLINT *) malloc(NumCols
* sizeof(SQLSMALLINT));
		ColLenArray = (SQLINTEGER *) malloc(NumCols
* sizeof(SQLINTEGER));
		DispLenArray = (SQLINTEGER *) malloc(NumCols
* sizeof(SQLINTEGER));
		OffsetArray = (SQLINTEGER *) malloc(NumCols *
sizeof(SQLINTEGER));
		OffsetArray[0] = 0;

		for (i = 0; i < NumCols && !m_bAbort; i++)
		{
#ifdef _DEBUG
		_CrtDbgReport(_CRT_WARN, NULL, 0, NULL,
"Executing SQLDescribeCol.\n");
#endif

		// Get the column description, include the SQL type
		// Determine the column's byte length. Calculate the
offset in the buffer to the
		// data as the offset to the previous column, plus the
byte length of the previous
		// column, plus the byte length of the previous
column's length/indicator buffer.
		// Note that the byte length of the column and the
length/indicator buffer are increased
		// so that, assuming they start on an alignment
boundary, they will end on the byte
		// before the next alignment boundary. Although this
might leave some holes in the
		// buffer, it is a relatively inexpensive way to
guarantee alignment.
		rc = SQLDescribeCol(m_hHandle,
((SQLUSMALLINT) i)+1,
			(unsigned char *)szColName,
sizeof(szColName), &iColNameLen,
			&SQLType, (unsigned long
*)&ColLenArray[i], &CScaleArray[i], &iColNull);
		HandleODBCError(rc, SQL_HANDLE_STMT,
m_hHandle, SMSQLDescribeCol);

#ifdef _DEBUG
		_CrtDbgReport(_CRT_WARN, NULL, 0, NULL,
"Executing SQLColAttribute.\n");
#endif

		if (m_bAbort)
			return;

			rc = SQLColAttribute(m_hHandle,
((SQLUSMALLINT) i)+1, SQL_DESC_DISPLAY_SIZE,
NULL, 0,
			    NULL, &iDispLen);
			HandleODBCError(rc,
SQL_HANDLE_STMT, m_hHandle, SMSQLColAttribute);
```

```
                        // GetDefaultCType contains a switch
statement that returns the default C type
                        // for each SQL type.
                        CTypeArray[i] =
GetDefaultCType(SQLType);
                        if ( (CTypeArray[i] == SQL_C_CHAR ||
CTypeArray[i] == SQL_C_BINARY) &&

                ColLenArray[i] > MAX_DATA_LEN)
                        {
                                ColLenArray[i] =
MAX_DATA_LEN;
                                iDispLen =
MAX_DATA_LEN;
                        }

                        DispLenArray[i] = max(iColNameLen,
iDispLen);
                        DispLenArray[i] = max(DispLenArray[i],
sizeof(S_NULL));

                        // Print the column names in the header
                        PrintData(szColName, SQL_C_CHAR,
DispLenArray[i], 0, m_pOutputFile);

                        // Add a byte for the null-termination
character
                        ColLenArray[i] += 1;
                        ColLenArray[i] =
ALIGNBUF(ColLenArray[i]);

                        // Calculate the offset in the buffer to the
data as the offset to the previous column,
                        // plus the byte length of the previous
column, plus the byte length of the previous
                        // column's length/indicator buffer.
                        if (i)          OffsetArray[i] = OffsetArray[i-
1] + ColLenArray[i-1] + iLenOrInd;
                        }
                        m_pOutputFile->WriteLine(NULL);
                        iArrayElementSize =
OffsetArray[NumCols-1] + ColLenArray[NumCols-1] +
iLenOrInd;
                        iRowArraySize = 1;
                        // Allocate the data buffer. The size of the
buffer is equal to the offset to the data
                        // buffer for the final column, plus the byte
length of the data buffer and length/indicator
                        // buffer for the last column.
                        DataPtr = malloc(iRowArraySize *
iArrayElementSize);
                        // Specify the size of the structure with the
SQL_ATTR_ROW_BIND_TYPE
                        // statement attribute. This also declares
that row-wise binding will
                        // be used. Declare the rowset size with the
SQL_ATTR_ROW_ARRAY_SIZE
                        // statement attribute. Set the
SQL_ATTR_ROW_STATUS_PTR statement
                        // attribute to point to the row status array.
Set the
                        // SQL_ATTR_ROWS_FETCHED_PTR
statement attribute to point to
                        // NumRowsFetched.
                        /*
                        RowStatusArray = (SQLUSMALLINT
*)malloc(iRowArraySize * sizeof(SQLUSMALLINT));
                SQLSetStmtAttr(m_hHandle,
SQL_ATTR_ROW_BIND_TYPE, &iArrayElementSize,
SQL_IS_UINTEGER);
                SQLSetStmtAttr(m_hHandle,
SQL_ATTR_ROW_ARRAY_SIZE, &iRowArraySize,
SQL_IS_UINTEGER);
                SQLSetStmtAttr(m_hHandle,
SQL_ATTR_ROW_STATUS_PTR, RowStatusArray,
SQL_IS_POINTER);
                SQLSetStmtAttr(m_hHandle,
SQL_ATTR_ROWS_FETCHED_PTR, &NumRowsFetched,
SQL_IS_POINTER);
                */

                // For each column, bind the address in the buffer at
the start of the memory allocated
                // for that column's data and the address at the start of
the memory allocated for that
                // column's length/indicator buffer.
                for (i = 0; i < NumCols; i++)
                {
                SQLBindCol(m_hHandle, i + 1, CTypeArray[i],
(SQLPOINTER)((SQLCHAR *)DataPtr + OffsetArray[i]),
                ColLenArray[i], (SQLINTEGER *)((SQLCHAR
*)DataPtr + OffsetArray[i] + ColLenArray[i]));
                HandleODBCError(rc, SQL_HANDLE_STMT,
m_hHandle, SMSQLBindCol);
                // Underline each column name
                memset(szColName, '-', DispLenArray[i]);
                *(szColName + DispLenArray[i]) = '\0';
                PrintData(szColName, SQL_C_CHAR,
DispLenArray[i], 0, m_pOutputFile);
                }
                m_pOutputFile->WriteLine(NULL);

#ifdef _DEBUG
                _CrtDbgReport(_CRT_WARN, NULL, 0, NULL,
"Executing SQLFetch.\n");
#endif

                while (!m_bAbort && (rc = SQLFetch(m_hHandle))
!= SQL_NO_DATA)
                {
                HandleODBCError(rc, SQL_HANDLE_STMT,
m_hHandle, SMSQLFetch);
                                        /*
                for (i = 0; i < NumRowsFetched; i++)
                {
                if (RowStatusArray[i] == SQL_ROW_SUCCESS||
RowStatusArray[i] == SQL_ROW_SUCCESS_WITH_INFO)
                {
                */
                for (i = 0; i < NumCols; i++)
                                                        {
                // Retrieve and print each row. PrintData accepts a
pointer to the data, its C type,
                // and its byte length/indicator.
                if ( *((SQLINTEGER *)((SQLCHAR *)DataPtr +
OffsetArray[i] + ColLenArray[i])) == SQL_NULL_DATA)
                                PrintData(S_NULL, SQL_C_CHAR,
DispLenArray[i], 0, m_pOutputFile);
                else
                                PrintData((LPVOID)((SQLCHAR
*)DataPtr + OffsetArray[i]), CTypeArray[i],

                DispLenArray[i], CScaleArray[i], m_pOutputFile);
                }
                m_pOutputFile->WriteLine(NULL);
```

```
            }
            m_pOutputFile->WriteLine(NULL);
            /*
            free(RowStatusArray);
            */
                        free(DataPtr);

            free(CTypeArray);
            free(CScaleArray);
            free(ColLenArray);
            free(DispLenArray);
            }

            // Write io statistics, if applicable
            LogODBCErrors(rc, SQL_HANDLE_STMT,
m_hHandle, SMSQLFetch);

#ifdef _DEBUG
                        _CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLRowCount.\n");
#endif

                        if (m_bAbort)
                                    break;

                        // action (insert, update, delete) query
                        rc = SQLRowCount(m_hHandle,
&iRowCount);
                        HandleODBCError(rc,
SQL_HANDLE_STMT, m_hHandle, SMSQLRowCount);

                        if (!m_bNoCount && iRowCount != -1)
                        {
                                    sprintf(szColName, "(%d
row(s) affected)", iRowCount);
                                    _bstr_t temp(szColName);
                                    m_pOutputFile-
>WriteLine((BSTR)temp);
                                    m_pOutputFile-
>WriteLine(NULL);
                        }

#ifdef _DEBUG
                        _CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLFreeStmt.\n");
#endif

            if (m_bAbort)
            break;
            SQLFreeStmt(m_hHandle, SQL_UNBIND);

#ifdef _DEBUG
                        _CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLMoreResults.\n");
#endif
if (m_bAbort)
break;
// Process the next resultset. This function returns 'success with
//info' even if there is no other resultset and there are statistics
//messages to be printed. Hence the check for -1 rows before
//printing.
            rc=SQLMoreResults(m_hHandle);
            if (rc != SQL_NO_DATA)
            HandleODBCError(rc, SQL_HANDLE_STMT,
m_hHandle, SMSQLMoreResults);
   } while (rc != SQL_NO_DATA);
            return;
}
```

```
void CExecute::PrintData(void *vData, SQLSMALLINT CType,
SQLINTEGER IndPtr, SQLSMALLINT iScale, ISMLog
*pOutput)
{
// PrintData accepts a pointer to the data, its C type,
// and its byte length/indicator. It contains a switch statement that
casts and prints
// the data according to its type.

char                    *s;
char                    fmt[MAXBUFLEN];
int                                 j = 0;
SQLINTEGER              iColLen = IndPtr + 1;
assert(iColLen);
s = (LPSTR)malloc(iColLen + 1);
if (s)
{
            if (vData)
            {
                        switch(CType)
                        {
                        case SQL_C_CHAR:
                        case SQL_C_WCHAR:
                        case SQL_C_TYPE_DATE:
                        case SQL_C_TYPE_TIME:
                        case SQL_C_TYPE_TIMESTAMP:
                        case SQL_C_INTERVAL_YEAR:
                        case SQL_C_INTERVAL_MONTH:
                        case
SQL_C_INTERVAL_YEAR_TO_MONTH:
                        case SQL_C_INTERVAL_DAY:
                        case SQL_C_INTERVAL_HOUR:
                        case SQL_C_INTERVAL_MINUTE:
                        case SQL_C_INTERVAL_SECOND:
                        case
SQL_C_INTERVAL_DAY_TO_HOUR:
                        case
SQL_C_INTERVAL_DAY_TO_MINUTE:
                        case
SQL_C_INTERVAL_DAY_TO_SECOND:
                        case
SQL_C_INTERVAL_HOUR_TO_MINUTE:
                        case
SQL_C_INTERVAL_HOUR_TO_SECOND:
                        case
SQL_C_INTERVAL_MINUTE_TO_SECOND:
                        case SQL_C_BINARY:
                                    sprintf(fmt, "%%.%ds",
iColLen);
                                    j = sprintf(s, fmt, (char
*)vData);
                                    break;

                        case SQL_C_SHORT:
                                    j = sprintf(s, "%d", *(short
*)vData);
                                    break;

                        case SQL_C_LONG:
                                    j = sprintf(s, "%ld", *(long
*)vData);
                                    break;

                        case SQL_C_UBIGINT:
                                    j = sprintf(s, "%I64d",
*(__int64 *)vData);
                                    break;
```

```
                        case SQL_C_FLOAT:
                                j = sprintf(s, "%f", *(float
*)vData);
                                break;

                        case SQL_C_DOUBLE:
                                j = sprintf(s, "%f", *(double
*)vData);
                                break;

                        case SQL_C_NUMERIC:
                                sprintf(fmt, "%%.0%df",
iScale);
                                j = sprintf(s, fmt, *(double
*)vData);
                                break;

                        default:
                                j = sprintf(s, "%s", vData);
                                break;
                        }
                }

                // Strip off terminating null character and pad the
string with blanks
                        if (iColLen - j > 0)
                                memset(s + j, ' ', iColLen - j);

                        *(s + iColLen) = '\0';

                        // Write the field to the output file
                        _bstr_t temp(s);
                        pOutput->WriteField((BSTR)temp);
                        free(s);
                }

                return;
}

SQLSMALLINT CExecute::GetDefaultCType(SQLINTEGER
SQLType)
{
                // GetDefaultCType returns the C type for the passed
in SQL datatype.

   switch(SQLType)
   {
   case SQL_CHAR:
                case SQL_VARCHAR:
                case SQL_LONGVARCHAR:
                case SQL_WCHAR:
                case SQL_WVARCHAR:
                case SQL_WLONGVARCHAR:
          return(SQL_C_CHAR);

   case SQL_TINYINT:
                                return(SQL_C_CHAR);
   case SQL_SMALLINT:
                                return(SQL_C_SHORT);
   case SQL_INTEGER:
                                return(SQL_C_LONG);
   case SQL_BIGINT:
                return(SQL_C_UBIGINT);

   case SQL_REAL:
                                return(SQL_C_FLOAT);
   case SQL_FLOAT:
   case SQL_DOUBLE:
//                case SQL_DECIMAL:
                                return(SQL_C_DOUBLE);

                case SQL_DECIMAL:
                                return(SQL_C_CHAR);

                case SQL_BIT:
                                return(SQL_C_CHAR);

   case SQL_BINARY:
                case SQL_VARBINARY:
                case SQL_LONGVARBINARY:
                                return(SQL_C_CHAR);
//                              return(SQL_C_BINARY);

   case SQL_TYPE_DATE:
                                return(SQL_C_CHAR);
//                              return(SQL_C_TYPE_DATE);

   case SQL_TYPE_TIME:
                                return(SQL_C_CHAR);
//                              return(SQL_C_TYPE_TIME);

   case SQL_TYPE_TIMESTAMP:
                                return(SQL_C_CHAR);
//
                return(SQL_C_TYPE_TIMESTAMP);

                case SQL_NUMERIC:
              return(SQL_C_FLOAT);

   case SQL_INTERVAL_YEAR:
                                return(SQL_C_CHAR);
//
                return(SQL_C_INTERVAL_YEAR);

   case SQL_INTERVAL_MONTH:
                                return(SQL_C_CHAR);
//
                return(SQL_C_INTERVAL_MONTH);

   case SQL_INTERVAL_YEAR_TO_MONTH:
                                return(SQL_C_CHAR);
//
                return(SQL_C_INTERVAL_YEAR_TO_MONTH);

   case SQL_INTERVAL_DAY:
                                return(SQL_C_CHAR);
//
                return(SQL_C_INTERVAL_DAY);
   case SQL_INTERVAL_HOUR:
                                return(SQL_C_CHAR);
//
                return(SQL_C_INTERVAL_HOUR);

   case SQL_INTERVAL_MINUTE:
                                return(SQL_C_CHAR);
//
                return(SQL_C_INTERVAL_MINUTE);

   case SQL_INTERVAL_SECOND:
                                return(SQL_C_CHAR);
//
                return(SQL_C_INTERVAL_SECOND);
```

```
   case SQL_INTERVAL_DAY_TO_HOUR:
                                    return(SQL_C_CHAR);
//
            return(SQL_C_INTERVAL_DAY_TO_HOUR);

   case SQL_INTERVAL_DAY_TO_MINUTE:
                                    return(SQL_C_CHAR);
//
            return(SQL_C_INTERVAL_DAY_TO_MINUTE);

   case SQL_INTERVAL_DAY_TO_SECOND:
                                    return(SQL_C_CHAR);
//
            return(SQL_C_INTERVAL_DAY_TO_SECOND);

   case SQL_INTERVAL_HOUR_TO_MINUTE:
                                    return(SQL_C_CHAR);
//
            return(SQL_C_INTERVAL_HOUR_TO_MINUTE);

   case SQL_INTERVAL_HOUR_TO_SECOND:
                                    return(SQL_C_CHAR);
//
            return(SQL_C_INTERVAL_HOUR_TO_SECOND);

   case SQL_INTERVAL_MINUTE_TO_SECOND:
                                    return(SQL_C_CHAR);
//
            return(SQL_C_INTERVAL_MINUTE_TO_SECON
D);

            default:
                        assert(TRUE);
                        return(SQL_C_CHAR);
                        break;
   }
}

/*
   FUNCTION: LogODBCErrors(SQLRETURN rc, SWORD
fHandleType, SQLHANDLE handle)
   COMMENTS: Formats ODBC errors or warnings and logs
them. Also initializes the
                                    completion status for the step
to failure, if an ODBC error has occurred.
*/

void CExecute::LogODBCErrors(SQLRETURN nResult,
SWORD fHandleType, SQLHANDLE handle, OdbcOperations
FailedOp)
{
            // Messages returned by the server (e.g. Print
statements) will be logged to the output file
            // ODBC warnings will be logged to the log file
            // All other ODBC errors will be logged to the error
file.

UCHAR               szErrState[SQL_SQLSTATE_SIZE+1];
            // SQL Error State string
UCHAR
            szErrText[SQL_MAX_MESSAGE_LENGTH+1];
// SQL Error Text string
char
            szBuffer[SQL_SQLSTATE_SIZE+SQL_MAX_MES
SAGE_LENGTH+MAXBUFLEN+1] = "";

                                    // formatted Error text Buffer
SWORD               wErrMsgLen; // Error message length
SQLINTEGER          dwErrCode;  // Native Error code
SQLRETURN           nErrResult;                 // Return
Code from SQLGetDiagRec
SWORD               sMsgNum = 1; // Error sequence number
_bstr_t             temp;
if (IsErrorReturn(nResult))
{
sprintf(szBuffer, "ODBC Operation: '%s' returned error code:
%d",
                        g_szOdbcOps[FailedOp], nResult);
            temp = szBuffer;
            m_pErrorFile->WriteLine((BSTR) temp);
            m_StepStatus = gintFailed;
}

            if (handle == SQL_NULL_HSTMT)
                        return;

#ifdef _DEBUG
            _CrtDbgReport(_CRT_WARN, NULL, 0, NULL,
"Executing SQLGetDiagRec.\n");
#endif
            // call SQLGetDiagRec function with proper ODBC
handles, repeatedly until
            // function returns SQL_NO_DATA.
            while (!m_bAbort && (nErrResult =
SQLGetDiagRec(fHandleType, handle, sMsgNum++,
                        szErrState, &dwErrCode, szErrText,
SQL_MAX_MESSAGE_LENGTH-1, &wErrMsgLen))
                        != SQL_NO_DATA)
            {
                        if (!SQL_SUCCEEDED(nErrResult))
                                    break;

                        if (m_pOutputFile &&
IsServerMessage(dwErrCode, szErrText))
            {
            wsprintf(szBuffer, SM_SQLMSG_FORMAT,
(LPSTR)szErrText);
            temp = szBuffer;
            m_pOutputFile->WriteLine((BSTR) temp);
                        }
            else if (IsODBCWarning(szErrState) && dwErrCode
!= SM_SQL_ERR_CHANGED_DB &&
                                    dwErrCode !=
SM_SQL_ERR_CHANGED_LANG)
                        {
                        // Suppress warnings - 'Changed database
context to...' and 'Changed language setting to...'
                        wsprintf(szBuffer,
SM_SQLMSG_FORMAT,
ParseOdbcMsgPrefixes((LPCSTR)szErrText));
                        temp = szBuffer;
                        m_pOutputFile->WriteLine((BSTR)
temp);
                        }
                        else if (m_pErrorFile &&
!IsODBCWarning(szErrState))
                        {
                        wsprintf(szBuffer,
SM_SQLERR_FORMAT, (LPSTR)szErrState, dwErrCode,
(LPSTR)szErrText);
                        temp = szBuffer;
                        m_pErrorFile->WriteLine((BSTR) temp);
                        }
            }
}
```

```
/*
   FUNCTION: LogErrors(SQLRETURN rc, SWORD
fHandleType, SQLHANDLE handle)
   COMMENTS: Writes the error message to the error log
*/
void CExecError::LogErrors(CExecute *p)
{
	_bstr_t temp(m_szExecErrorDesc[m_iErrCode]);
	if (p->m_pErrorFile)
		p->m_pErrorFile-
>WriteLine((BSTR)temp);
return;
}
/*
   FUNCTION: ODBCCleanup(HDBC *hdbc, HSTMT *hstmt)
   COMMENTS: Cleanup of all ODBC structures
*/

void CExecute::ODBCCleanup(HDBC *hdbc, HSTMT *hstmt)
{
SQLRETURN	lReturn;

#ifdef _DEBUG
	_CrtDbgReport(_CRT_WARN, NULL, 0, NULL,
"Executing ODBCCleanup.\n");
#endif

	if (*hstmt != SQL_NULL_HSTMT)
	{
#ifdef _DEBUG
		_CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLCloseCursor.\n");
#endif
		SQLCloseCursor(hstmt);
#ifdef _DEBUG
		_CrtDbgReport(_CRT_WARN, NULL, 0,
NULL, "Executing SQLFreeHandle for hstmt.\n");
#endif
		SQLFreeHandle(SQL_HANDLE_STMT,
hstmt);
		*hstmt = SQL_NULL_HSTMT;
	}
	// Cleanup connection if it is a dynamic connection
	if (IsDynamicConnection())
	{
		if (*hdbc != SQL_NULL_HDBC)
		{
#ifdef _DEBUG
	_CrtDbgReport(_CRT_WARN, NULL, 0, NULL,
"Executing SQLDisconnect.\n");
#endif
	lReturn = SQLDisconnect(*hdbc);
#ifdef _DEBUG
				_CrtDbgReport(_CRT_WARN,
NULL, 0, NULL, "Executing SQLFreeHandle for hdbc.\n");
#endif

	SQLFreeHandle(SQL_HANDLE_DBC, hdbc);
				*hdbc = SQL_NULL_HDBC;
		}
	}
	else
		ResetConnectionUsage();

	return;
}
```

```
// Wrapper function that raises an error if a Windows Api fails
STDMETHODIMP CExecute::RaiseSystemError(void)
{
	char s[MAXBUFLEN];

	GetSystemError(s);
	return Error(s, 0, NULL, GUID_NULL);
}
// Wrapper function that logs the error raised by an Api function
to the passed in file
void CExecute::LogSystemError(ISMLog *pFile)
{
	if (pFile)
	{
		char s[MAXBUFLEN];
		GetSystemError(s);

		_bstr_t temp(s);
		pFile->WriteLine((BSTR)temp);
	}
}

// Populates the passed in string with the last Windows Api error
that occurred
void CExecute::GetSystemError(LPSTR s)
{
	long c;
	DWORD e;

	e = GetLastError();

	c = sprintf(s, "Error code: %ld. ", e);
	c =
FormatMessage(FORMAT_MESSAGE_FROM_SYSTEM |
FORMAT_MESSAGE_IGNORE_INSERTS,
		NULL, e, 0, s + c, MAXBUFLEN - c,
NULL);

	return;
}

STDMETHODIMP CExecute::get_StepStatus(InstanceStatus
*pVal)
{
	*pVal = m_StepStatus;
	return S_OK;
}

STDMETHODIMP CExecute::WriteError(BSTR szMsg)
{
	if (m_pErrorFile)
		return(m_pErrorFile->WriteLine(szMsg));

	return S_OK;
}
```

```
//  FILE:      Execute.h
//             Microsoft TPC-H Kit Ver. 1.00
//             Copyright Microsoft, 1999
//             All Rights Reserved
//
//
//  PURPOSE:    Declaration of the CExecute
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
//
// Execute.h : Declaration of the CExecute

#ifndef __EXECUTE_H_
#define __EXECUTE_H_

#include <atlwin.h>
#include <comdef.h>
#include <stdio.h>
#include "resource.h"       // main symbols
#include "ExecuteDllCP.h"
#include "..\LogWriter\LogWriter.h"
#include "..\LogWriter\SMLog.h"
#include "..\common\SMTime\SMTime.h"
#include "..\common\SMTime\SMTimer.h"

// ODBC-specific includes
#define DBNTWIN32
#include <sqltypes.h>
#include <sql.h>
#include <sqlext.h>

/////////////////////////////////////////////////////////////////////////////
// CExecute

#define WM_TASK_START  (WM_USER + 101)
#define WM_TASK_FINISH  (WM_USER + 102)

#define SM_SQLERR_FORMAT                "SQL Error
State:%s, Native Error Code: %ld\r\nODBC Error: %s"

                        // format for ODBC error messages
#define SM_SQLWARN_FORMA
                SM_SQLERR_FORMAT            // format for ODBC
warnings
#define SM_SQLMSG_FORMAT                "%s"
                        // format for messages from the server

#define SM_SQL_STATE_WARNING        "01000"
#define SM_MSG_SERVER
                "[Microsoft][ODBC SQL Server Driver][SQL
Server]"
#define SM_SQL_ERR_CHANGED_DB    5701
#define SM_SQL_ERR_CHANGED_LANG                5703
#define SM_STEPMASTER_ERROR "StepMaster Error: "
#define CMD_SEPARATOR       "\nGO"
#define INV_ARRAY_INDEX     -1 // invalid index into an
array
#define MAXBUFLEN           256         // display buffer size
#define MAXLOGCMDLEN        256         // maximum
//characters in command that will be  printed to log
#define MAXLOGCMDBUF        512         // maximum
//characters in command that will be printed to log
#define MAX_DATA_LEN        4000        // maximum buffer
//size for variable-length data types // viz. character and binary
//fields
#define FILE_ACCESS_READ    "r" // Open file for read access
#define S_NULL        "NULL"
```

```
// Define a macro to increase the size of a buffer so it is a
multiple of teh alignment size.
// Thus, if a buffer starts on an alignment boundary, it will end
just before the next
// alignment boundary. Here, an alignment size of 4 is used
because this is the size of the
// largest data type used in the application's buffer - the size of an
SDWORD and of the largest
// default C data type are both 4. If a larger data type (such as
__int64) is used, it will be
// necessary to align for that size.
#define ALIGNSIZE 4
#define ALIGNBUF(Length) ((Length) % ALIGNSIZE) ? \
   ((Length) + ALIGNSIZE - ((Length) % ALIGNSIZE)) :
(Length)

#define MAX_BUFFER_SIZE                 64000

typedef enum OdbcOperations
{
            SMSQLAllocHandle,
            SMSQLDriverConnect,
            SMSQLExecDirect,
            SMSQLSetStmtAttr,
            SMSQLCancel,
            SMSQLNumResultCols,
            SMSQLDescribeCol,
            SMSQLColAttribute,
            SMSQLFetch,
            SMSQLGetData,
            SMSQLRowCount,
            SMSQLMoreResults,
            SMSQLBindCol,
};

class CODBCError
{
public:
            CODBCError(SQLRETURN nResult, SWORD
fHandleType, SQLHANDLE      handle, OdbcOperations
FailedOp)
            {
            m_fHandleType       = fHandleType;
            m_handle            = handle;
            m_FailedOp                  = FailedOp;
            m_nResult           = nResult;
            };

private:
            SWORD                       m_fHandleType;
            SQLHANDLE                   m_handle;
            OdbcOperations      m_FailedOp;
            SQLRETURN                   m_nResult;

private:
inline BOOL IsServerMessage(SQLINTEGER lNativeError,
UCHAR *szErr){
            return( (strstr((LPCTSTR)szErr,
SM_MSG_SERVER) != NULL) ? (lNativeError == 0) :
FALSE); }
inline BOOL IsODBCWarning(UCHAR *szSqlState){
            return(strcmp((LPCSTR)szSqlState,
SM_SQL_STATE_WARNING) == 0);}
inline LPCSTR ParseOdbcMsgPrefixes(LPCSTR szMsg){ char
*pDest;
            return( (pDest = strstr(szMsg, SM_MSG_SERVER))
== NULL ? szMsg : pDest + strlen(SM_MSG_SERVER));}
};
```

```
class ATL_NO_VTABLE CExecute :
	public CWindowImpl<CExecute>,
	public
CComObjectRootEx<CComSingleThreadModel>,
	public CComCoClass<CExecute,
&CLSID_Execute>,
	public IConnectionPointContainerImpl<CExecute>,
	public ISupportErrorInfo,
	public IDispatchImpl<IExecute, &IID_IExecute,
&LIBID_EXECUTEDLLLib>,
	public CProxy_IExecuteEvents< CExecute >
{
public:
	CExecute()
	{
		m_pErrorFile = NULL;
		//m_pLogFile = NULL;
		m_pOutputFile = NULL;

		// Initialize the elapsed time for the step
		m_tElapsedTime = 0;

		// Initialize the run status for the step
		m_StepStatus = gintPending;

		m_hHandle = SQL_NULL_HSTMT;
		m_bAbort = FALSE;

		m_iConnectionIndex =
INV_ARRAY_INDEX;
	}

	~CExecute()
	{
	}

	friend class CExecError;

public:
	DECLARE_WND_CLASS("Execute")

		BEGIN_MSG_MAP(CExecute)

	MESSAGE_HANDLER(WM_TASK_FINISH,
OnTaskFinished)

	MESSAGE_HANDLER(WM_TASK_START,
OnTaskStarted)
		END_MSG_MAP()
public:

	LRESULT OnTaskStarted(UINT uMsg, WPARAM
wParam,
		LPARAM lParam, BOOL& bHandled)
	{
		CURRENCY	CStartTime =
Get64BitTime(&m_tStartTime);

		Fire_Start(CStartTime);
		return 0;
	}
```

```
LRESULT OnTaskFinished(UINT uMsg, WPARAM wParam,
	LPARAM lParam, BOOL& bHandled)
{
	CURRENCY	CEndTime =
Get64BitTime(&m_tEndTime);
		Fire_Complete(CEndTime,
(long)m_tElapsedTime);
	return 0;
}

HRESULT FinalConstruct()
{
	HRESULT			hr;
	RECT			rect;
		rect.left=0;
	rect.right=100;
	rect.top=0;
	rect.bottom=100;
		HWND hwnd = Create( NULL, rect,
"ExecuteWindow", WS_POPUP);

	if (!hwnd)
		return
HRESULT_FROM_WIN32(GetLastError());
		hr = CoCreateInstance(CLSID_SMLog,
NULL, CLSCTX_INPROC,
		IID_ISMLog, (void **)&m_pErrorFile);
	if FAILED(hr)
		return(hr);
	m_pErrorFile->put_Append(TRUE);
		//hr = CoCreateInstance(CLSID_SMLog,
NULL, CLSCTX_INPROC,
	//	IID_ISMLog, (void **)&m_pLogFile);
	//if FAILED(hr)
	//	return(hr);
		hr = CoCreateInstance(CLSID_SMLog,
NULL, CLSCTX_INPROC,
		IID_ISMLog, (void **)&m_pOutputFile);
	if FAILED(hr)
		return(hr);
	m_pOutputFile->put_Append(TRUE);
		hr = CoCreateInstance(CLSID_SMTimer,
NULL, CLSCTX_INPROC,
		IID_ISMTimer, (void **)&m_ExecTime);
	if FAILED(hr)
		return(hr);

	return S_OK;
}
```

```
void FinalRelease()
{
	if (m_hWnd != NULL)
		DestroyWindow();
		// Close the log and error files
	if (m_pErrorFile)
		m_pErrorFile->Release();
	m_pErrorFile = NULL;

		//if (m_pLogFile)
		//	m_pLogFile->Release();
		//m_pLogFile = NULL;

		if (m_ExecTime)
			m_ExecTime->Release();
		m_ExecTime = NULL;
	}

DECLARE_REGISTRY_RESOURCEID(IDR_EXECUTE)

DECLARE_PROTECT_FINAL_CONSTRUCT()

BEGIN_COM_MAP(CExecute)
	COM_INTERFACE_ENTRY(IExecute)
	COM_INTERFACE_ENTRY(ISupportErrorInfo)
	COM_INTERFACE_ENTRY(IDispatch)
	COM_INTERFACE_ENTRY(IConnectionPointCont
ainer)
	COM_INTERFACE_ENTRY_IMPL(IConnectionPoi
ntContainer)
END_COM_MAP()
BEGIN_CONNECTION_POINT_MAP(CExecute)
CONNECTION_POINT_ENTRY(DIID__IExecuteEvents)
END_CONNECTION_POINT_MAP()

// ISupportsErrorInfo
STDMETHOD(InterfaceSupportsErrorInfo)(REFIID riid);

// IExecute
public:
	STDMETHOD(put_ErrorFile)(/*[in]*/ BSTR
newVal);
	STDMETHOD(put_OutputFile)(/*[in]*/ BSTR
newVal);
	STDMETHOD(WriteError)(BSTR szMsg);
	STDMETHOD(Abort)();
	STDMETHOD(get_StepStatus)(/*[out, retval]*/
InstanceStatus *pVal);
	STDMETHOD(DoExecute)(/*[in]*/ BSTR
szCommand, /*[in]*/ BSTR szExecutionDtls,
		/*[in]*/ ExecutionType ExecMethod,
		/*[in]*/ BOOL bNoCount, /*[in]*/ BOOL
bNoExecute, /*[in]*/ BOOL bParseOnly,
		/*[in]*/ BOOL bQuotedIds, /*[in]*/
BOOL bAnsiNulls, /*[in]*/ BOOL bShowQP,
		/*[in]*/ BOOL bStatsTime, /*[in]*/ BOOL
bStatsIO, /*[in]*/ long lRowCount,
		/*[in]*/ long lQueryTmout, /*[in]*/ BSTR
szConnection);
	TC_TIME			ExecuteShell();
	TC_TIME			ExecuteODBC();
	STDMETHODIMP	AbortShell();
	STDMETHODIMP	AbortODBC();
	_bstr_t			m_szCommand;
	_bstr_t			m_szExecDtls;
	_bstr_t			m_szConnection;
	DWORD			m_lMode;
	//DATE			m_CurTime;
	SYSTEMTIME		m_tStartTime;
	SYSTEMTIME		m_tEndTime;
	TC_TIME			m_tElapsedTime;
	ISMLog			*m_pErrorFile;
	//ILog			*m_pLogFile;
	ISMLog			*m_pOutputFile;
	ISMTimer		*m_ExecTime;
	ExecutionType	m_ExecMthd;
	InstanceStatus	m_StepStatus;
	HANDLE			m_hHandle;
		// Process handle for shell commands and

		// Statement handle
for ODBC commands
	LPSTR			m_szCmd;

private:
	LPSTR
	NextCmdInBatch(LPSTR szBatch);
	void			ProcessResultsets();
	SQLSMALLINT
	GetDefaultCType(SQLINTEGER SQLType);
	void			PrintData(void
*vData, SQLSMALLINT CType, SQLINTEGER IndPtr,
		SQLSMALLINT
iScale, ISMLog *pOutput);
	void
	LogODBCErrors(SQLRETURN nResult, SWORD
fHandleType, SQLHANDLE handle,
		OdbcOperations
FailedOp);
	void
	ODBCCleanup(HDBC *hdbc, HSTMT *hstmt);
	STDMETHODIMP	RaiseSystemError(void);
	void
	LogSystemError(ISMLog *pFile);
	void
	GetSystemError(LPSTR s);
	void
	SetConnectionOption(LPSTR szConn, HDBC
*pHdbc);
	void
	ResetConnectionProperties(HDBC *p_hdbc);

	void
	InitializeConnection(HDBC *phdbc, BOOL
*pbDoConnect);
	void
	ReConnectDeadConnection(HDBC *phdbc);

	void
	ResetConnectionUsage();

	int		m_iConnectionIndex;
	BOOL	m_bNoCount, m_bNoExecute,
m_bParseOnly, m_bQuotedIds, m_bAnsiNulls, \

	m_bShowQP, m_bStatsTime, m_bStatsIO;
	long			m_lRowCount;
	SQLUINTEGER		m_lQueryTmout;
	_bstr_t			m_ErrorFile,
m_OutputFile;
	BOOL			m_bAbort;
```

```
private:
inline BOOL IsServerMessage(SQLINTEGER lNativeError,
UCHAR *szErr){
        return( (strstr((LPCTSTR)szErr,
SM_MSG_SERVER) != NULL) ? (lNativeError == 0) :
FALSE); }
inline BOOL IsODBCWarning(UCHAR *szSqlState){
        return(strcmp((LPCSTR)szSqlState,
SM_SQL_STATE_WARNING) == 0);}
inline BOOL IsErrorReturn(SQLRETURN iRetCode){
        return( (!SQL_SUCCEEDED(iRetCode)) &&
(iRetCode != SQL_NO_DATA) );}
inline LPCSTR ParseOdbcMsgPrefixes(LPCSTR szMsg){ char
*pDest;
        return( (pDest = strstr(szMsg, SM_MSG_SERVER))
== NULL ? szMsg : pDest + strlen(SM_MSG_SERVER));}
inline BOOL IsDynamicConnection(){
return(!strcmp((LPSTR)m_szConnection, ""));}
inline void HandleODBCError(SQLRETURN rc, SWORD
fHandleType, SQLHANDLE handle, OdbcOperations OdbcOp)
{
        if (rc != SQL_SUCCESS)
   {
                LogODBCErrors(rc, fHandleType, handle,
OdbcOp);
                if (IsErrorReturn(rc))
                        throw new CODBCError(rc,
fHandleType, handle, OdbcOp);
   }
        return;
}

};

class CExecError
{
public:
        typedef enum ExecErrorCodes
        {
                SM_ERR_CONN_IN_USE,
        };

        CExecError(int iError)
        {
                m_iErrCode          = iError;
        };

        void
        LogErrors(CExecute *p);

private:
        int
        m_iErrCode;
        static char         *m_szExecErrorDesc[];
};

void                        ExecutionThread(LPVOID
lpParameter);

#ifdef _TPCH_AUDIT
        void
        WriteFileToTpchLog(LPSTR szFile, LPSTR szFmt);
        void
        WriteToTpchLog(char *szMsg);
#endif
```

```
#endif //__EXECUTE_H_
//  FILE:       ExecuteDll.cpp
//              Microsoft TPC-H Kit Ver. 1.00
//              Copyright Microsoft, 1999
//              All Rights Reserved
//
//
//  PURPOSE:    Implementation of DLL Exports.
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
//



// Note: Proxy/Stub Information
//      To build a separate proxy/stub DLL,
//      run nmake -f ExecuteDllps.mk in the project directory.

#include "stdafx.h"
#include "resource.h"
#include <initguid.h>

#include "..\LogWriter\LogWriter.h"
#include "..\LogWriter\LogWriter_i.c"

#include "..\common\SMTime\SMTime.h"
#include "..\common\SMTime\SMTime_i.c"

#include "ExecuteDll.h"
#include "SMExecute.h"

#include "ExecuteDll_i.c"
#include "Execute.h"

CComModule _Module;

BEGIN_OBJECT_MAP(ObjectMap)
OBJECT_ENTRY(CLSID_Execute, CExecute)
END_OBJECT_MAP()

SQLHENV henv = NULL;
                        // ODBC environment handle
static char szCaption[] = "StepMaster";
        // Message box caption

CRITICAL_SECTION hConnections;
                        // Critical section to serialize access


                        // to available connections
SM_Connection_Info *p_Connections = NULL;
        // Pointer to open connections
int
        iConnectionCount = 0;// Number of open connections

#ifdef _TPCH_AUDIT
        FILE *pfLogFile = NULL;
                        // Log file containing timestamps
        CRITICAL_SECTION hLogFileWrite;
                        // Critical section to serialize writes to log
        static char szFileOpenModeAppend[] = "a+";
        // Log file open mode

        static char szEnvVarLogFile[] =
"TPCH_LOG_FILE";// Environment variable - initialized to


                        // log file name if timing information


                        // is to be logged
#endif
```

```
void ShowODBCErrors(SWORD fHandleType, SQLHANDLE
handle);
void CloseOpenConnections();

////////////////////////////////////////////////////////////////////////
// DLL Entry Point

extern "C"
BOOL WINAPI DllMain(HINSTANCE hInstance, DWORD
dwReason, LPVOID /*lpReserved*/)
{

  if (dwReason == DLL_PROCESS_ATTACH)
  {
    _Module.Init(ObjectMap, hInstance,
&LIBID_EXECUTEDLLLib);
    DisableThreadLibraryCalls(hInstance);

#ifdef _TPCH_AUDIT
                char szMsg[MAXBUFLEN];
                LPSTR szLogFileName =
getenv(szEnvVarLogFile);

                if (szLogFileName == NULL)
                {
                        sprintf(szMsg, "The
environment variable '%s' does not exist. "
                                "Step timing
information will not be written to a log.", szEnvVarLogFile);
                        MessageBox(NULL, szMsg,
szCaption, MB_OK);
                }
                else
                {
if ( (pfLogFile = fopen(szLogFileName,
szFileOpenModeAppend)) == NULL )
{
        sprintf(szMsg, "The file '%s' does not exist. "
"Step timing information will not be written to log.",
szLogFileName);
        MessageBox(NULL, szMsg, szCaption, MB_OK);
        }
        else
        InitializeCriticalSection(&hLogFileWrite);
        }
#endif
        InitializeCriticalSection(&hConnections);
        p_Connections = NULL;
        iConnectionCount = 0;
        if (!SQL_SUCCEEDED(SQLSetEnvAttr(NULL,
SQL_ATTR_CONNECTION_POOLING,

        (SQLPOINTER)SQL_CP_ONE_PER_HENV , 0)))

        ShowODBCErrors(SQL_HANDLE_ENV, henv);

                if
(!SQL_SUCCEEDED(SQLAllocHandle(SQL_HANDLE_ENV,
SQL_NULL_HANDLE, &henv)))
                {

        ShowODBCErrors(SQL_HANDLE_ENV, henv);
                        return FALSE;
                }
        if (!SQL_SUCCEEDED(SQLSetEnvAttr(henv,
SQL_ATTR_ODBC_VERSION, (LPVOID)SQL_OV_ODBC3,
0)))
        ShowODBCErrors(SQL_HANDLE_ENV, henv);
SQLUINTEGER CpMatch;
if (!SQL_SUCCEEDED(SQLGetEnvAttr(henv,
SQL_ATTR_CP_MATCH, &CpMatch, 0, NULL)))
        ShowODBCErrors(SQL_HANDLE_ENV, henv);
        if (!SQL_SUCCEEDED(SQLSetEnvAttr(henv,
SQL_ATTR_CP_MATCH,

        (SQLPOINTER)SQL_CP_STRICT_MATCH,
SQL_IS_INTEGER)))
        ShowODBCErrors(SQL_HANDLE_ENV, henv);

  }
  else if (dwReason == DLL_PROCESS_DETACH)
        {
#ifdef _TPCH_AUDIT
                if (pfLogFile != NULL)
                {
                fclose(pfLogFile);

                DeleteCriticalSection(&hLogFileWrite);
                }
#endif
        CloseOpenConnections();
                if (henv != NULL)
                SQLFreeEnv(henv);
                DeleteCriticalSection(&hConnections);
    _Module.Term();
        }
  return TRUE;    // ok
}
void ShowODBCErrors(SWORD fHandleType, SQLHANDLE
handle)
{
        UCHAR
        szErrState[SQL_SQLSTATE_SIZE+1];       // SQL
Error State string
        UCHAR
        szErrText[SQL_MAX_MESSAGE_LENGTH+1];
// SQL Error Text string
        char
        szBuffer[SQL_SQLSTATE_SIZE+SQL_MAX_MES
SAGE_LENGTH+MAXBUFLEN+1] = "";
                        // formatted Error text Buffer
        SWORD           wErrMsgLen;  // Error message
length
        SQLINTEGER      dwErrCode;
                        // Native Error code
        SQLRETURN       nErrResult;
                        // Return Code from
SQLGetDiagRec
SWORD   sMsgNum = 1; // Error sequence number
        // call SQLGetDiagRec function with proper ODBC
handles, repeatedly until
        // function returns SQL_NO_DATA.
        while ((nErrResult = SQLGetDiagRec(fHandleType,
handle, sMsgNum++,
                szErrState, &dwErrCode, szErrText,
SQL_MAX_MESSAGE_LENGTH-1, &wErrMsgLen))
                != SQL_NO_DATA)
        {
                if (!SQL_SUCCEEDED(nErrResult))
                break;
                wsprintf(szBuffer,
SM_SQLERR_FORMAT, (LPSTR)szErrState, dwErrCode,
(LPSTR)szErrText);
        MessageBox(NULL, szBuffer, szCaption, MB_OK);
        }
}
```

```
void CloseOpenConnections()
{
	// Closes all open connections

	if (p_Connections)
	{
		for (int iConnIndex = iConnectionCount -
1; iConnIndex >= 0; iConnIndex--)
		{
			if ((p_Connections +
iConnIndex)->hdbc != SQL_NULL_HDBC)
			{
#ifdef _DEBUG
			_CrtDbgReport(_CRT_WARN,
NULL, 0, NULL, "Executing SQLDisconnect.\n");
#endif

	SQLDisconnect((p_Connections + iConnIndex)-
>hdbc);
#ifdef _DEBUG
			_CrtDbgReport(_CRT_WARN,
NULL, 0, NULL, "Executing SQLFreeHandle for hdbc.\n");
#endif

	SQLFreeHandle(SQL_HANDLE_DBC,
(p_Connections + iConnIndex)->hdbc );
			(p_Connections + iConnIndex)-
>hdbc = SQL_NULL_HDBC;
			}

		}

		free(p_Connections);
	}
	p_Connections = NULL;

	return;
}

////////////////////////////////////////////////////////////////////////
// Used to determine whether the DLL can be unloaded by OLE

STDAPI DllCanUnloadNow(void)
{
   return (_Module.GetLockCount()==0) ? S_OK : S_FALSE;
}

////////////////////////////////////////////////////////////////////////
// Returns a class factory to create an object of the requested type

STDAPI DllGetClassObject(REFCLSID rclsid, REFIID riid,
LPVOID* ppv)
{
   return _Module.GetClassObject(rclsid, riid, ppv);
}

////////////////////////////////////////////////////////////////////////
// DllRegisterServer - Adds entries to the system registry

STDAPI DllRegisterServer(void)
{
   // registers object, typelib and all interfaces in typelib
   return _Module.RegisterServer(TRUE);
}
```

```
////////////////////////////////////////////////////////////////////////
// DllUnregisterServer - Removes entries from the system
registry

STDAPI DllUnregisterServer(void)
{
   return _Module.UnregisterServer(TRUE);
}
/* this ALWAYS GENERATED file contains the definitions for
the interfaces */


/* File created by MIDL compiler version 5.01.0164 */
/* at Mon Jun 09 19:33:03 2003
 */
/* Compiler settings for
C:\charles\Stepmaster\ExecuteDll\ExecuteDll.idl:
    Oicf (OptLev=i2), W1, Zp8, env=Win32, ms_ext, c_ext
    error checks: allocation ref bounds_check enum stub_data
*/
//@@MIDL_FILE_HEADING(  )


/* verify that the <rpcndr.h> version is high enough to compile
this file*/
#ifndef __REQUIRED_RPCNDR_H_VERSION__
#define __REQUIRED_RPCNDR_H_VERSION__ 440
#endif

#include "rpc.h"
#include "rpcndr.h"

#ifndef __ExecuteDll_h__
#define __ExecuteDll_h__

#ifdef __cplusplus
extern "C"{
#endif

/* Forward Declarations */

#ifndef ___IExecuteEvents_FWD_DEFINED__
#define ___IExecuteEvents_FWD_DEFINED__
typedef interface _IExecuteEvents _IExecuteEvents;
#endif	/* ___IExecuteEvents_FWD_DEFINED__ */


#ifndef __IExecute_FWD_DEFINED__
#define __IExecute_FWD_DEFINED__
typedef interface IExecute IExecute;
#endif	/* __IExecute_FWD_DEFINED__ */


#ifndef __Execute_FWD_DEFINED__
#define __Execute_FWD_DEFINED__

#ifdef __cplusplus
typedef class Execute Execute;
#else
typedef struct Execute Execute;
#endif /* __cplusplus */

#endif	/* __Execute_FWD_DEFINED__ */
```

```
/* header files for imported files */
#include "oaidl.h"
#include "ocidl.h"

void __RPC_FAR * __RPC_USER MIDL_user_allocate(size_t);
void __RPC_USER MIDL_user_free( void __RPC_FAR * );

/* interface __MIDL_itf_ExecuteDll_0000 */
/* [local] */

typedef /* [helpstring][uuid] */
enum ExecutionType
   {        execODBC            = 0x1,
            execShell  = 0x2
   }        ExecutionType;

typedef /* [helpstring][uuid] */
enum InstanceStatus
   {        gintDisabled        = 0x1,
            gintPending         = 0x2,
            gintRunning         = 0x3,
            gintComplete        = 0x4,
            gintFailed  = 0x5,
            gintAborted         = 0x6
   }        InstanceStatus;



extern RPC_IF_HANDLE
__MIDL_itf_ExecuteDll_0000_v0_0_c_ifspec;
extern RPC_IF_HANDLE
__MIDL_itf_ExecuteDll_0000_v0_0_s_ifspec;


#ifndef __EXECUTEDLLLib_LIBRARY_DEFINED__
#define __EXECUTEDLLLib_LIBRARY_DEFINED__

/* library EXECUTEDLLLib */
/* [helpstring][version][uuid] */


EXTERN_C const IID LIBID_EXECUTEDLLLib;

#ifndef ___IExecuteEvents_DISPINTERFACE_DEFINED__
#define ___IExecuteEvents_DISPINTERFACE_DEFINED__

/* dispinterface _IExecuteEvents */
/* [helpstring][uuid] */


EXTERN_C const IID DIID__IExecuteEvents;


#if defined(__cplusplus) && !defined(CINTERFACE)

   MIDL_INTERFACE("551AC532-AB1C-11D2-BC0C-
00A0C90D2CA5")
   _IExecuteEvents : public IDispatch
   {
   };
```

```
#else       /* C style interface */

   typedef struct _IExecuteEventsVtbl
   {
      BEGIN_INTERFACE

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*QueryInterface )(
         _IExecuteEvents __RPC_FAR * This,
         /* [in] */ REFIID riid,
         /* [iid_is][out] */ void __RPC_FAR *__RPC_FAR
*ppvObject);

      ULONG ( STDMETHODCALLTYPE __RPC_FAR
*AddRef )(
         _IExecuteEvents __RPC_FAR * This);

      ULONG ( STDMETHODCALLTYPE __RPC_FAR
*Release )(
         _IExecuteEvents __RPC_FAR * This);

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfoCount )(
         _IExecuteEvents __RPC_FAR * This,
         /* [out] */ UINT __RPC_FAR *pctinfo);

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfo )(
         _IExecuteEvents __RPC_FAR * This,
         /* [in] */ UINT iTInfo,
         /* [in] */ LCID lcid,
         /* [out] */ ITypeInfo __RPC_FAR *__RPC_FAR
*ppTInfo);

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetIDsOfNames )(
         _IExecuteEvents __RPC_FAR * This,
         /* [in] */ REFIID riid,
         /* [size_is][in] */ LPOLESTR __RPC_FAR *rgszNames,
         /* [in] */ UINT cNames,
         /* [in] */ LCID lcid,
         /* [size_is][out] */ DISPID __RPC_FAR *rgDispId);

      /* [local] */ HRESULT ( STDMETHODCALLTYPE
__RPC_FAR *Invoke )(
         _IExecuteEvents __RPC_FAR * This,
         /* [in] */ DISPID dispIdMember,
         /* [in] */ REFIID riid,
         /* [in] */ LCID lcid,
         /* [in] */ WORD wFlags,
         /* [out][in] */ DISPPARAMS __RPC_FAR
*pDispParams,
         /* [out] */ VARIANT __RPC_FAR *pVarResult,
         /* [out] */ EXCEPINFO __RPC_FAR *pExcepInfo,
         /* [out] */ UINT __RPC_FAR *puArgErr);

      END_INTERFACE
   } _IExecuteEventsVtbl;

   interface _IExecuteEvents
   {
      CONST_VTBL struct _IExecuteEventsVtbl __RPC_FAR
*lpVtbl;
   };
```

```
#ifdef COBJMACROS

#define _IExecuteEvents_QueryInterface(This,riid,ppvObject)
            \
   (This)->lpVtbl -> QueryInterface(This,riid,ppvObject)

#define _IExecuteEvents_AddRef(This)       \
   (This)->lpVtbl -> AddRef(This)

#define _IExecuteEvents_Release(This)       \
   (This)->lpVtbl -> Release(This)


#define _IExecuteEvents_GetTypeInfoCount(This,pctinfo)
            \
   (This)->lpVtbl -> GetTypeInfoCount(This,pctinfo)

#define _IExecuteEvents_GetTypeInfo(This,iTInfo,lcid,ppTInfo)
            \
   (This)->lpVtbl -> GetTypeInfo(This,iTInfo,lcid,ppTInfo)

#define
_IExecuteEvents_GetIDsOfNames(This,riid,rgszNames,cNames,
lcid,rgDispId)            \
   (This)->lpVtbl ->
GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rgDispId)

#define
_IExecuteEvents_Invoke(This,dispIdMember,riid,lcid,wFlags,pD
ispParams,pVarResult,pExcepInfo,puArgErr)              \
   (This)->lpVtbl ->
Invoke(This,dispIdMember,riid,lcid,wFlags,pDispParams,pVarR
esult,pExcepInfo,puArgErr)

#endif /* COBJMACROS */
#endif       /* C style interface */
#endif       /*
___IExecuteEvents_DISPINTERFACE_DEFINED__ */

#ifndef __IExecute_INTERFACE_DEFINED__
#define __IExecute_INTERFACE_DEFINED__

/* interface IExecute */
/* [unique][helpstring][dual][uuid][object] */
EXTERN_C const IID IID_IExecute;
#if defined(__cplusplus) && !defined(CINTERFACE)

   MIDL_INTERFACE("551AC531-AB1C-11D2-BC0C-
00A0C90D2CA5")
   IExecute : public IDispatch
   {
   public:
      virtual /* [helpstring][id] */ HRESULT
STDMETHODCALLTYPE DoExecute(
         /* [in] */ BSTR szCommand,
         /* [in] */ BSTR szExecutionDtls,
         /* [in] */ ExecutionType ExecMethod,
         /* [in] */ BOOL bNoCount,
         /* [in] */ BOOL bNoExecute,
         /* [in] */ BOOL bParseOnly,
         /* [in] */ BOOL bQuotedIds,
         /* [in] */ BOOL bAnsiNulls,
         /* [in] */ BOOL bShowQP,
         /* [in] */ BOOL bStatsTime,
         /* [in] */ BOOL bStatsIO,
         /* [in] */ long lRowCount,
         /* [in] */ long lQueryTmout,
         /* [in] */ BSTR szConnection) = 0;

      virtual /* [helpstring][id][propget] */ HRESULT
STDMETHODCALLTYPE get_StepStatus(
         /* [retval][out] */ InstanceStatus __RPC_FAR *pVal) =
0;

      virtual /* [helpstring][id] */ HRESULT
STDMETHODCALLTYPE Abort( void) = 0;

      virtual /* [helpstring][id] */ HRESULT
STDMETHODCALLTYPE WriteError(
         BSTR szMsg) = 0;

      virtual /* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE put_OutputFile(
         /* [in] */ BSTR newVal) = 0;

      virtual /* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE put_ErrorFile(
         /* [in] */ BSTR newVal) = 0;

   };

#else       /* C style interface */

   typedef struct IExecuteVtbl
   {
      BEGIN_INTERFACE

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*QueryInterface )(
         IExecute __RPC_FAR * This,
         /* [in] */ REFIID riid,
         /* [iid_is][out] */ void __RPC_FAR *__RPC_FAR
*ppvObject);

      ULONG ( STDMETHODCALLTYPE __RPC_FAR
*AddRef )(
         IExecute __RPC_FAR * This);

      ULONG ( STDMETHODCALLTYPE __RPC_FAR
*Release )(
         IExecute __RPC_FAR * This);

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfoCount )(
         IExecute __RPC_FAR * This,
         /* [out] */ UINT __RPC_FAR *pctinfo);

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfo )(
         IExecute __RPC_FAR * This,
         /* [in] */ UINT iTInfo,
         /* [in] */ LCID lcid,
         /* [out] */ ITypeInfo __RPC_FAR *__RPC_FAR
*ppTInfo);

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetIDsOfNames )(
         IExecute __RPC_FAR * This,
         /* [in] */ REFIID riid,
         /* [size_is][in] */ LPOLESTR __RPC_FAR *rgszNames,
         /* [in] */ UINT cNames,
         /* [in] */ LCID lcid,
         /* [size_is][out] */ DISPID __RPC_FAR *rgDispId);
```

```
      /* [local] */ HRESULT ( STDMETHODCALLTYPE
__RPC_FAR *Invoke )(
          IExecute __RPC_FAR * This,
          /* [in] */ DISPID dispIdMember,
          /* [in] */ REFIID riid,
          /* [in] */ LCID lcid,
          /* [in] */ WORD wFlags,
          /* [out][in] */ DISPPARAMS __RPC_FAR
*pDispParams,
          /* [out] */ VARIANT __RPC_FAR *pVarResult,
          /* [out] */ EXCEPINFO __RPC_FAR *pExcepInfo,
          /* [out] */ UINT __RPC_FAR *puArgErr);

      /* [helpstring][id] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *DoExecute )(
          IExecute __RPC_FAR * This,
          /* [in] */ BSTR szCommand,
          /* [in] */ BSTR szExecutionDtls,
          /* [in] */ ExecutionType ExecMethod,
          /* [in] */ BOOL bNoCount,
          /* [in] */ BOOL bNoExecute,
          /* [in] */ BOOL bParseOnly,
          /* [in] */ BOOL bQuotedIds,
          /* [in] */ BOOL bAnsiNulls,
          /* [in] */ BOOL bShowQP,
          /* [in] */ BOOL bStatsTime,
          /* [in] */ BOOL bStatsIO,
          /* [in] */ long lRowCount,
          /* [in] */ long lQueryTmout,
          /* [in] */ BSTR szConnection);

      /* [helpstring][id][propget] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *get_StepStatus )(
          IExecute __RPC_FAR * This,
          /* [retval][out] */ InstanceStatus __RPC_FAR *pVal);

      /* [helpstring][id] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *Abort )(
          IExecute __RPC_FAR * This);

      /* [helpstring][id] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *WriteError )(
          IExecute __RPC_FAR * This,
          BSTR szMsg);

      /* [helpstring][id][propput] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *put_OutputFile )(
          IExecute __RPC_FAR * This,
          /* [in] */ BSTR newVal);

      /* [helpstring][id][propput] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *put_ErrorFile )(
          IExecute __RPC_FAR * This,
          /* [in] */ BSTR newVal);

      END_INTERFACE
   } IExecuteVtbl;

   interface IExecute
   {
      CONST_VTBL struct IExecuteVtbl __RPC_FAR *lpVtbl;
   };
```

```
#ifdef COBJMACROS

#define IExecute_QueryInterface(This,riid,ppvObject)  \
   (This)->lpVtbl -> QueryInterface(This,riid,ppvObject)

#define IExecute_AddRef(This)  \
   (This)->lpVtbl -> AddRef(This)

#define IExecute_Release(This)  \
   (This)->lpVtbl -> Release(This)

#define IExecute_GetTypeInfoCount(This,pctinfo)       \
   (This)->lpVtbl -> GetTypeInfoCount(This,pctinfo)

#define IExecute_GetTypeInfo(This,iTInfo,lcid,ppTInfo)
            \
   (This)->lpVtbl -> GetTypeInfo(This,iTInfo,lcid,ppTInfo)

#define
IExecute_GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rgD
ispId)       \
   (This)->lpVtbl ->
GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rgDispId)

#define
IExecute_Invoke(This,dispIdMember,riid,lcid,wFlags,pDispPara
ms,pVarResult,pExcepInfo,puArgErr)          \
   (This)->lpVtbl ->
Invoke(This,dispIdMember,riid,lcid,wFlags,pDispParams,pVarR
esult,pExcepInfo,puArgErr)


#define
IExecute_DoExecute(This,szCommand,szExecutionDtls,ExecMe
thod,bNoCount,bNoExecute,
            bParseOnly,bQuotedIds,bAnsiNulls,bShowQP,bStats
Time,bStatsIO,lRowCount,lQueryTmout,szConnection)\
   (This)->lpVtbl ->
DoExecute(This,szCommand,szExecutionDtls,ExecMethod,bNo
Count,bNoExecute,bParseOnly,
            bQuotedIds,bAnsiNulls,bShowQP,bStatsTime,bStatsI
O,lRowCount,lQueryTmout,szConnection)

#define IExecute_get_StepStatus(This,pVal)\
   (This)->lpVtbl -> get_StepStatus(This,pVal)

#define IExecute_Abort(This)     \
   (This)->lpVtbl -> Abort(This)

#define IExecute_WriteError(This,szMsg)    \
   (This)->lpVtbl -> WriteError(This,szMsg)

#define IExecute_put_OutputFile(This,newVal)           \
   (This)->lpVtbl -> put_OutputFile(This,newVal)

#define IExecute_put_ErrorFile(This,newVal)            \
   (This)->lpVtbl -> put_ErrorFile(This,newVal)

#endif /* COBJMACROS */


#endif       /* C style interface */
```

```
/* [helpstring][id] */ HRESULT STDMETHODCALLTYPE
IExecute_DoExecute_Proxy(
    IExecute __RPC_FAR * This,
    /* [in] */ BSTR szCommand,
    /* [in] */ BSTR szExecutionDtls,
    /* [in] */ ExecutionType ExecMethod,
    /* [in] */ BOOL bNoCount,
    /* [in] */ BOOL bNoExecute,
    /* [in] */ BOOL bParseOnly,
    /* [in] */ BOOL bQuotedIds,
    /* [in] */ BOOL bAnsiNulls,
    /* [in] */ BOOL bShowQP,
    /* [in] */ BOOL bStatsTime,
    /* [in] */ BOOL bStatsIO,
    /* [in] */ long lRowCount,
    /* [in] */ long lQueryTmout,
    /* [in] */ BSTR szConnection);


void __RPC_STUB IExecute_DoExecute_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring][id][propget] */ HRESULT
STDMETHODCALLTYPE IExecute_get_StepStatus_Proxy(
    IExecute __RPC_FAR * This,
    /* [retval][out] */ InstanceStatus __RPC_FAR *pVal);


void __RPC_STUB IExecute_get_StepStatus_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring][id] */ HRESULT STDMETHODCALLTYPE
IExecute_Abort_Proxy(
    IExecute __RPC_FAR * This);


void __RPC_STUB IExecute_Abort_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);

/* [helpstring][id] */ HRESULT STDMETHODCALLTYPE
IExecute_WriteError_Proxy(
    IExecute __RPC_FAR * This,
    BSTR szMsg);

void __RPC_STUB IExecute_WriteError_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);

/* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE IExecute_put_OutputFile_Proxy(
    IExecute __RPC_FAR * This,
    /* [in] */ BSTR newVal);
```

```
void __RPC_STUB IExecute_put_OutputFile_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring][id][propput] */ HRESULT
STDMETHODCALLTYPE IExecute_put_ErrorFile_Proxy(
    IExecute __RPC_FAR * This,
    /* [in] */ BSTR newVal);


void __RPC_STUB IExecute_put_ErrorFile_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);



#endif      /* __IExecute_INTERFACE_DEFINED__ */


EXTERN_C const CLSID CLSID_Execute;

#ifdef __cplusplus

class DECLSPEC_UUID("2EFC198E-AA8D-11D2-BC0C-
00A0C90D2CA5")
Execute;
#endif
#endif /* __EXECUTEDLLLib_LIBRARY_DEFINED__ */

/* Additional Prototypes for ALL interfaces */

/* end of Additional Prototypes */

#ifdef __cplusplus
}
#endif

#endif
// FILE:      Execute.cpp
//   // FILE:      ExecuteDllCP.h
//            Microsoft TPC-H Kit Ver. 1.00
//            Copyright Microsoft, 1999
//            All Rights Reserved
//
//
// PURPOSE:    Connection point implementation
// Contact:    Reshma Tharamal (reshmat@microsoft.com)
//
#ifndef _EXECUTEDLLCP_H_
#define _EXECUTEDLLCP_H_
```

```
template <class T>
class CProxy_IExecuteEvents : public IConnectionPointImpl<T,
&DIID__IExecuteEvents, CComDynamicUnkArray>
{
	//Warning this class may be recreated by the wizard.
public:
	VOID Fire_Start(CY StartTime)
	{
		T* pT = static_cast<T*>(this);
		int nConnectionIndex;
		CComVariant* pvars = new
CComVariant[1];
		int nConnections = m_vec.GetSize();

		for (nConnectionIndex = 0;
nConnectionIndex < nConnections; nConnectionIndex++)
		{
			pT->Lock();
			CComPtr<IUnknown> sp =
m_vec.GetAt(nConnectionIndex);
			pT->Unlock();
			IDispatch* pDispatch =
reinterpret_cast<IDispatch*>(sp.p);
			if (pDispatch != NULL)
			{
			pvars[0] = StartTime;
			DISPPARAMS disp = { pvars,
NULL, 1, 0 };
			pDispatch->Invoke(0x1,
IID_NULL, LOCALE_USER_DEFAULT,
DISPATCH_METHOD,
			&disp, NULL, NULL, NULL);
			}
		}
		delete[] pvars;

	}
	VOID Fire_Complete(CY EndTime, LONG Elapsed)
	{
		T* pT = static_cast<T*>(this);
		int nConnectionIndex;
		CComVariant* pvars = new
CComVariant[2];
		int nConnections = m_vec.GetSize();
		for (nConnectionIndex = 0;
nConnectionIndex < nConnections; nConnectionIndex++)
		{
			pT->Lock();
			CComPtr<IUnknown> sp =
m_vec.GetAt(nConnectionIndex);
			pT->Unlock();
			IDispatch* pDispatch =
reinterpret_cast<IDispatch*>(sp.p);
	if (pDispatch != NULL)
	{
	pvars[1] = EndTime;
	pvars[0] = Elapsed;
	DISPPARAMS disp = { pvars, NULL, 2, 0 };
			pDispatch->Invoke(0x2,
IID_NULL, LOCALE_USER_DEFAULT,
DISPATCH_METHOD,
&disp, NULL, NULL, NULL);
}
}
delete[] pvars;
}
};
```

```
#endif//  FILE:      resource.h
//            Microsoft TPC-H Kit Ver. 1.00
//            Copyright Microsoft, 1999
//            All Rights Reserved
//
//
//  PURPOSE:    Resource file
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
//
//{{NO_DEPENDENCIES}}
// Microsoft Developer Studio generated include file.
// Used by ExecuteDll.rc
//
#define IDS_PROJNAME                100
#define IDR_EXECUTE                 101
#define IDR_LOG                     102
#define IDR_EXECUTESHELL            103

#define SM_SYSTEM_ERROR             0x0201

// Next default values for new objects
//
#ifdef APSTUDIO_INVOKED
#ifndef APSTUDIO_READONLY_SYMBOLS
#define _APS_NEXT_RESOURCE_VALUE       201
#define _APS_NEXT_COMMAND_VALUE        32768
#define _APS_NEXT_CONTROL_VALUE        201
#define _APS_NEXT_SYMED_VALUE          104
#endif
#endif
//  FILE:      SMExecute.h
//            Microsoft TPC-H Kit Ver. 1.00
//            Copyright Microsoft, 1999
//            All Rights Reserved
//
//
//  PURPOSE:    Common include file for Execute.cpp and
ExecuteDll.cpp
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
//

#pragma once

// ODBC-specific includes
#define DBNTWIN32
#include <sqltypes.h>
#include <sql.h>
#include <sqlext.h>

#define CONNECTION_NAME_LEN 256        // connection
name length

typedef struct _SM_Connection_Info
{
	char
	szConnectionName[CONNECTION_NAME_LEN];
	HDBC      hdbc;
	BOOL      bInUse;
} SM_Connection_Info;
```

```
// FILE:      stdafx.cpp
//            Microsoft TPC-H Kit Ver. 1.00
//            Copyright Microsoft, 1999
//            All Rights Reserved
//
//
// PURPOSE:    source file that includes just the standard
includes
// Contact:    Reshma Tharamal (reshmat@microsoft.com)
//
// stdafx.cpp : source file that includes just the standard includes
//  stdafx.pch will be the pre-compiled header
//  stdafx.obj will contain the pre-compiled type information

#include "stdafx.h"

#ifdef _ATL_STATIC_REGISTRY
#include <statreg.h>
#include <statreg.cpp>
#endif

#include <atlimpl.cpp>
// FILE:      stdafx.h
//            Microsoft TPC-H Kit Ver. 1.00
//            Copyright Microsoft, 1999
//            All Rights Reserved
//
//
// PURPOSE:    include file for standard system include files,
//     or project specific include files that are used frequently,
//     but are changed infrequently
// Contact:    Reshma Tharamal (reshmat@microsoft.com)
//

#if
!defined(AFX_STDAFX_H__551AC528_AB1C_11D2_BC0C_
00A0C90D2CA5__INCLUDED_)
#define
AFX_STDAFX_H__551AC528_AB1C_11D2_BC0C_00A0C90
D2CA5__INCLUDED_

#if _MSC_VER > 1000
#pragma once
#endif // _MSC_VER > 1000

#define STRICT
#ifndef _WIN32_WINNT
#define _WIN32_WINNT 0x0400
#endif
#define _ATL_APARTMENT_THREADED

#include <atlbase.h>
//You may derive a class from CComModule and use it if you
want to override
//something, but do not change the name of _Module
extern CComModule _Module;
#include <atlcom.h>

//{{AFX_INSERT_LOCATION}}
// Microsoft Visual C++ will insert additional declarations
immediately before the previous line.

#endif //
!defined(AFX_STDAFX_H__551AC528_AB1C_11D2_BC0C_
00A0C90D2CA5__INCLUDED)
```

```
//  FILE:      resource.h
//             Microsoft TPC-H Kit Ver. 1.00
//             Copyright Microsoft, 1999
//             All Rights Reserved
//
//
//  PURPOSE:    Resource file
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
//
//{{NO_DEPENDENCIES}}
// Microsoft Developer Studio generated include file.
// Used by SMTime.rc
//
#define IDS_PROJNAME                100
#define IDR_SMTIMER                 102

// Next default values for new objects
//
#ifdef APSTUDIO_INVOKED
#ifndef APSTUDIO_READONLY_SYMBOLS
#define _APS_NEXT_RESOURCE_VALUE        201
#define _APS_NEXT_COMMAND_VALUE         32768
#define _APS_NEXT_CONTROL_VALUE         201
#define _APS_NEXT_SYMED_VALUE           103
#endif
#endif
//  FILE:      SMTime.cpp
//             Microsoft TPC-H Kit Ver. 1.00
//             Copyright Microsoft, 1999
//             All Rights Reserved
//
//
//  PURPOSE:    Implementation of DLL Exports.
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
//
// SMTime.cpp : Implementation of DLL Exports.


// Note: Proxy/Stub Information
//      To build a separate proxy/stub DLL,
//      run nmake -f SMTimeps.mk in the project directory.

#include "stdafx.h"
#include "resource.h"
#include <initguid.h>
#include "SMTime.h"

#include "SMTime_i.c"
#include "SMTimer.h"


CComModule _Module;

BEGIN_OBJECT_MAP(ObjectMap)
OBJECT_ENTRY(CLSID_SMTimer, CSMTimer)
END_OBJECT_MAP()
```

```
/////////////////////////////////////////////////////////////////////////////
// DLL Entry Point

extern "C"
BOOL WINAPI DllMain(HINSTANCE hInstance, DWORD
dwReason, LPVOID /*lpReserved*/)
{
   if (dwReason == DLL_PROCESS_ATTACH)
   {
      _Module.Init(ObjectMap, hInstance,
&LIBID_SMTIMELib);
      DisableThreadLibraryCalls(hInstance);
   }
   else if (dwReason == DLL_PROCESS_DETACH)
      _Module.Term();
   return TRUE;    // ok
}

/////////////////////////////////////////////////////////////////////////////
// Used to determine whether the DLL can be unloaded by OLE

STDAPI DllCanUnloadNow(void)
{
   return (_Module.GetLockCount()==0) ? S_OK : S_FALSE;
}

/////////////////////////////////////////////////////////////////////////////
// Returns a class factory to create an object of the requested type

STDAPI DllGetClassObject(REFCLSID rclsid, REFIID riid,
LPVOID* ppv)
{
   return _Module.GetClassObject(rclsid, riid, ppv);
}

/////////////////////////////////////////////////////////////////////////////
// DllRegisterServer - Adds entries to the system registry

STDAPI DllRegisterServer(void)
{
   // registers object, typelib and all interfaces in typelib
   return _Module.RegisterServer(TRUE);
}

/////////////////////////////////////////////////////////////////////////////
// DllUnregisterServer - Removes entries from the system
registry

STDAPI DllUnregisterServer(void)
{
   return _Module.UnregisterServer(TRUE);
}


/* this ALWAYS GENERATED file contains the definitions for
the interfaces */


/* File created by MIDL compiler version 5.01.0164 */
/* at Thu Sep 19 17:49:55 2002
 */
/* Compiler settings for
C:\charles\Stepmaster\COMMON\SMTime\SMTime.idl:
   Oicf (OptLev=i2), W1, Zp8, env=Win32, ms_ext, c_ext
   error checks: allocation ref bounds_check enum stub_data
*/
//@@MIDL_FILE_HEADING(  )
```

```
/* verify that the <rpcndr.h> version is high enough to compile
this file*/
#ifndef __REQUIRED_RPCNDR_H_VERSION__
#define __REQUIRED_RPCNDR_H_VERSION__ 440
#endif

#include "rpc.h"
#include "rpcndr.h"

#ifndef __RPCNDR_H_VERSION__
#error this stub requires an updated version of <rpcndr.h>
#endif // __RPCNDR_H_VERSION__

#ifndef COM_NO_WINDOWS_H
#include "windows.h"
#include "ole2.h"
#endif /*COM_NO_WINDOWS_H*/

#ifndef __SMTime_h__
#define __SMTime_h__

#ifdef __cplusplus
extern "C"{
#endif

/* Forward Declarations */

#ifndef __ISMTimer_FWD_DEFINED__
#define __ISMTimer_FWD_DEFINED__
typedef interface ISMTimer ISMTimer;
#endif      /* __ISMTimer_FWD_DEFINED__ */


#ifndef __SMTimer_FWD_DEFINED__
#define __SMTimer_FWD_DEFINED__

#ifdef __cplusplus
typedef class SMTimer SMTimer;
#else
typedef struct SMTimer SMTimer;
#endif /* __cplusplus */

#endif      /* __SMTimer_FWD_DEFINED__ */


/* header files for imported files */
#include "oaidl.h"
#include "ocidl.h"

void __RPC_FAR * __RPC_USER MIDL_user_allocate(size_t);
void __RPC_USER MIDL_user_free( void __RPC_FAR * );

#ifndef __ISMTimer_INTERFACE_DEFINED__
#define __ISMTimer_INTERFACE_DEFINED__

/* interface ISMTimer */
/* [unique][helpstring][dual][uuid][object] */

EXTERN_C const IID IID_ISMTimer;

#if defined(__cplusplus) && !defined(CINTERFACE)

   MIDL_INTERFACE("1A6D0AE4-8528-453B-B8E3-
8DAD1F0561B7")
   ISMTimer : public IDispatch
   {
   public:
      virtual /* [helpstring][id] */ HRESULT
STDMETHODCALLTYPE Start( void) = 0;

      virtual /* [helpstring][id] */ HRESULT
STDMETHODCALLTYPE Stop(
         CURRENCY __RPC_FAR *pElapsedTime) = 0;

      virtual /* [helpstring][id][propget] */ HRESULT
STDMETHODCALLTYPE get_Running(
         /* [retval][out] */ BOOL __RPC_FAR *pVal) = 0;

   };

#else       /* C style interface */

   typedef struct ISMTimerVtbl
   {
      BEGIN_INTERFACE

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*QueryInterface )(
         ISMTimer __RPC_FAR * This,
         /* [in] */ REFIID riid,
         /* [iid_is][out] */ void __RPC_FAR *__RPC_FAR
*ppvObject);

      ULONG ( STDMETHODCALLTYPE __RPC_FAR
*AddRef )(
         ISMTimer __RPC_FAR * This);

      ULONG ( STDMETHODCALLTYPE __RPC_FAR
*Release )(
         ISMTimer __RPC_FAR * This);

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfoCount )(
         ISMTimer __RPC_FAR * This,
         /* [out] */ UINT __RPC_FAR *pctinfo);

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfo )(
         ISMTimer __RPC_FAR * This,
         /* [in] */ UINT iTInfo,
         /* [in] */ LCID lcid,
         /* [out] */ ITypeInfo __RPC_FAR *__RPC_FAR
*ppTInfo);

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetIDsOfNames )(
         ISMTimer __RPC_FAR * This,
         /* [in] */ REFIID riid,
         /* [size_is][in] */ LPOLESTR __RPC_FAR *rgszNames,
         /* [in] */ UINT cNames,
         /* [in] */ LCID lcid,
         /* [size_is][out] */ DISPID __RPC_FAR *rgDispId);

      /* [local] */ HRESULT ( STDMETHODCALLTYPE
__RPC_FAR *Invoke )(
         ISMTimer __RPC_FAR * This,
         /* [in] */ DISPID dispIdMember,
         /* [in] */ REFIID riid,
         /* [in] */ LCID lcid,
         /* [in] */ WORD wFlags,
         /* [out][in] */ DISPPARAMS __RPC_FAR
*pDispParams,
         /* [out] */ VARIANT __RPC_FAR *pVarResult,
         /* [out] */ EXCEPINFO __RPC_FAR *pExcepInfo,
         /* [out] */ UINT __RPC_FAR *puArgErr);
```

```
      /* [helpstring][id] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *Start )(
          ISMTimer __RPC_FAR * This);

      /* [helpstring][id] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *Stop )(
          ISMTimer __RPC_FAR * This,
          CURRENCY __RPC_FAR *pElapsedTime);

      /* [helpstring][id][propget] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *get_Running )(
          ISMTimer __RPC_FAR * This,
          /* [retval][out] */ BOOL __RPC_FAR *pVal);

      END_INTERFACE
   } ISMTimerVtbl;

   interface ISMTimer
   {
      CONST_VTBL struct ISMTimerVtbl __RPC_FAR *lpVtbl;
   };

#ifdef COBJMACROS

#define ISMTimer_QueryInterface(This,riid,ppvObject)
            \
   (This)->lpVtbl -> QueryInterface(This,riid,ppvObject)

#define ISMTimer_AddRef(This)              \
   (This)->lpVtbl -> AddRef(This)

#define ISMTimer_Release(This)             \
   (This)->lpVtbl -> Release(This)

#define ISMTimer_GetTypeInfoCount(This,pctinfo)    \
   (This)->lpVtbl -> GetTypeInfoCount(This,pctinfo)

#define ISMTimer_GetTypeInfo(This,iTInfo,lcid,ppTInfo)
            \
   (This)->lpVtbl -> GetTypeInfo(This,iTInfo,lcid,ppTInfo)

#define
ISMTimer_GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rg
DispId)    \
   (This)->lpVtbl ->
GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rgDispId)

#define
ISMTimer_Invoke(This,dispIdMember,riid,lcid,wFlags,pDispPar
ams,pVarResult,pExcepInfo,puArgErr)       \
   (This)->lpVtbl ->
Invoke(This,dispIdMember,riid,lcid,wFlags,pDispParams,pVarR
esult,pExcepInfo,puArgErr)

#define ISMTimer_Start(This)    \
   (This)->lpVtbl -> Start(This)

#define ISMTimer_Stop(This,pElapsedTime)             \
   (This)->lpVtbl -> Stop(This,pElapsedTime)

#define ISMTimer_get_Running(This,pVal) \
   (This)->lpVtbl -> get_Running(This,pVal)

#endif /* COBJMACROS */

#endif      /* C style interface */
```

```
/* [helpstring][id] */ HRESULT STDMETHODCALLTYPE
ISMTimer_Start_Proxy(
   ISMTimer __RPC_FAR * This);

void __RPC_STUB ISMTimer_Start_Stub(
   IRpcStubBuffer *This,
   IRpcChannelBuffer *_pRpcChannelBuffer,
   PRPC_MESSAGE _pRpcMessage,
   DWORD *_pdwStubPhase);

/* [helpstring][id] */ HRESULT STDMETHODCALLTYPE
ISMTimer_Stop_Proxy(
   ISMTimer __RPC_FAR * This,
   CURRENCY __RPC_FAR *pElapsedTime);

void __RPC_STUB ISMTimer_Stop_Stub(
   IRpcStubBuffer *This,
   IRpcChannelBuffer *_pRpcChannelBuffer,
   PRPC_MESSAGE _pRpcMessage,
   DWORD *_pdwStubPhase);

/* [helpstring][id][propget] */ HRESULT
STDMETHODCALLTYPE ISMTimer_get_Running_Proxy(
   ISMTimer __RPC_FAR * This,
   /* [retval][out] */ BOOL __RPC_FAR *pVal);

void __RPC_STUB ISMTimer_get_Running_Stub(
   IRpcStubBuffer *This,
   IRpcChannelBuffer *_pRpcChannelBuffer,
   PRPC_MESSAGE _pRpcMessage,
   DWORD *_pdwStubPhase);

#endif      /* __ISMTimer_INTERFACE_DEFINED__ */
#ifndef __SMTIMELib_LIBRARY_DEFINED__
#define __SMTIMELib_LIBRARY_DEFINED__

/* library SMTIMELib */
/* [helpstring][version][uuid] */


EXTERN_C const IID LIBID_SMTIMELib;


#ifndef __StepMasterTimeFunctions_MODULE_DEFINED__
#define __StepMasterTimeFunctions_MODULE_DEFINED__


/* module StepMasterTimeFunctions */
/* [dllname][version][helpstring] */

/* [entry][helpstring] */ CURRENCY __stdcall Get64BitTime(
   /* [in] */ LPSYSTEMTIME lpInitTime);

/* [entry][helpstring] */ void __stdcall JulianToTime(
   /* [in] */ CURRENCY julianTS,
   /* [out][in] */ int __RPC_FAR *yr,
   /* [out][in] */ int __RPC_FAR *mm,
   /* [out][in] */ int __RPC_FAR *dd,
   /* [out][in] */ int __RPC_FAR *hh,
   /* [out][in] */ int __RPC_FAR *mi,
   /* [out][in] */ int __RPC_FAR *ss,
   /* [out][in] */ int __RPC_FAR *ms);
```

```
#endif /* __StepMasterTimeFunctions_MODULE_DEFINED__
*/

EXTERN_C const CLSID CLSID_SMTimer;

#ifdef __cplusplus

class DECLSPEC_UUID("27BAB71B-89E1-4A78-8854-
FDFFBDC8037E")
SMTimer;
#endif
#endif /* __SMTIMELib_LIBRARY_DEFINED__ */

/* Additional Prototypes for ALL interfaces */

/* end of Additional Prototypes */

#ifdef __cplusplus
}
#endif

#endif
//  FILE:      resource.h
//             Microsoft TPC-H Kit Ver. 1.00
//             Copyright Microsoft, 1999
//             All Rights Reserved
//
//
//  PURPOSE:    Resource file
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
//
//{{NO_DEPENDENCIES}}
// Microsoft Developer Studio generated include file.
// Used by SMTime.rc
//
#define IDS_PROJNAME                100
#define IDR_SMTIMER                 102

// Next default values for new objects
//
#ifdef APSTUDIO_INVOKED
#ifndef APSTUDIO_READONLY_SYMBOLS
#define _APS_NEXT_RESOURCE_VALUE       201
#define _APS_NEXT_COMMAND_VALUE        32768
#define _APS_NEXT_CONTROL_VALUE        201
#define _APS_NEXT_SYMED_VALUE          103
#endif
#endif
```

```
//  FILE:      SMTime.cpp
//             Microsoft TPC-H Kit Ver. 1.00
//             Copyright Microsoft, 1999
//             All Rights Reserved
//
//
//  PURPOSE:    Implementation of DLL Exports.
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
//
// SMTime.cpp : Implementation of DLL Exports.


// Note: Proxy/Stub Information
//      To build a separate proxy/stub DLL,
//      run nmake -f SMTimeps.mk in the project directory.

#include "stdafx.h"
#include "resource.h"
#include <initguid.h>
#include "SMTime.h"

#include "SMTime_i.c"
#include "SMTimer.h"


CComModule _Module;

BEGIN_OBJECT_MAP(ObjectMap)
OBJECT_ENTRY(CLSID_SMTimer, CSMTimer)
END_OBJECT_MAP()

////////////////////////////////////////////////////////////////////////////
// DLL Entry Point

extern "C"
BOOL WINAPI DllMain(HINSTANCE hInstance, DWORD
dwReason, LPVOID /*lpReserved*/)
{
   if (dwReason == DLL_PROCESS_ATTACH)
   {
      _Module.Init(ObjectMap, hInstance,
&LIBID_SMTIMELib);
      DisableThreadLibraryCalls(hInstance);
   }
   else if (dwReason == DLL_PROCESS_DETACH)
      _Module.Term();
   return TRUE;    // ok
}

////////////////////////////////////////////////////////////////////////////
// Used to determine whether the DLL can be unloaded by OLE

STDAPI DllCanUnloadNow(void)
{
   return (_Module.GetLockCount()==0) ? S_OK : S_FALSE;
}

////////////////////////////////////////////////////////////////////////////
// Returns a class factory to create an object of the requested type

STDAPI DllGetClassObject(REFCLSID rclsid, REFIID riid,
LPVOID* ppv)
{
   return _Module.GetClassObject(rclsid, riid, ppv);
}
```

```
////////////////////////////////////////////////////////////////////////
// DllRegisterServer - Adds entries to the system registry

STDAPI DllRegisterServer(void)
{
   // registers object, typelib and all interfaces in typelib
   return _Module.RegisterServer(TRUE);
}

////////////////////////////////////////////////////////////////////////
// DllUnregisterServer - Removes entries from the system
registry

STDAPI DllUnregisterServer(void)
{
   return _Module.UnregisterServer(TRUE);
}


/* this ALWAYS GENERATED file contains the definitions for
the interfaces */


/* File created by MIDL compiler version 5.01.0164 */
/* at Thu Sep 19 17:49:55 2002
 */
/* Compiler settings for
C:\charles\Stepmaster\COMMON\SMTime\SMTime.idl:
   Oicf (OptLev=i2), W1, Zp8, env=Win32, ms_ext, c_ext
   error checks: allocation ref bounds_check enum stub_data
*/
//@@MIDL_FILE_HEADING(  )


/* verify that the <rpcndr.h> version is high enough to compile
this file*/
#ifndef __REQUIRED_RPCNDR_H_VERSION__
#define __REQUIRED_RPCNDR_H_VERSION__ 440
#endif

#include "rpc.h"
#include "rpcndr.h"

#ifndef __RPCNDR_H_VERSION__
#error this stub requires an updated version of <rpcndr.h>
#endif // __RPCNDR_H_VERSION__

#ifndef COM_NO_WINDOWS_H
#include "windows.h"
#include "ole2.h"
#endif /*COM_NO_WINDOWS_H*/

#ifndef __SMTime_h__
#define __SMTime_h__

#ifdef __cplusplus
extern "C"{
#endif
```

```
/* Forward Declarations */

#ifndef __ISMTimer_FWD_DEFINED__
#define __ISMTimer_FWD_DEFINED__
typedef interface ISMTimer ISMTimer;
#endif      /* __ISMTimer_FWD_DEFINED__ */


#ifndef __SMTimer_FWD_DEFINED__
#define __SMTimer_FWD_DEFINED__

#ifdef __cplusplus
typedef class SMTimer SMTimer;
#else
typedef struct SMTimer SMTimer;
#endif /* __cplusplus */

#endif      /* __SMTimer_FWD_DEFINED__ */


/* header files for imported files */
#include "oaidl.h"
#include "ocidl.h"

void __RPC_FAR * __RPC_USER MIDL_user_allocate(size_t);
void __RPC_USER MIDL_user_free( void __RPC_FAR * );

#ifndef __ISMTimer_INTERFACE_DEFINED__
#define __ISMTimer_INTERFACE_DEFINED__

/* interface ISMTimer */
/* [unique][helpstring][dual][uuid][object] */


EXTERN_C const IID IID_ISMTimer;

#if defined(__cplusplus) && !defined(CINTERFACE)

   MIDL_INTERFACE("1A6D0AE4-8528-453B-B8E3-
8DAD1F0561B7")
   ISMTimer : public IDispatch
   {
   public:
      virtual /* [helpstring][id] */ HRESULT
STDMETHODCALLTYPE Start( void) = 0;

      virtual /* [helpstring][id] */ HRESULT
STDMETHODCALLTYPE Stop(
         CURRENCY __RPC_FAR *pElapsedTime) = 0;

      virtual /* [helpstring][id][propget] */ HRESULT
STDMETHODCALLTYPE get_Running(
         /* [retval][out] */ BOOL __RPC_FAR *pVal) = 0;

   };
#else       /* C style interface */
   typedef struct ISMTimerVtbl
   {
      BEGIN_INTERFACE

      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*QueryInterface )(
         ISMTimer __RPC_FAR * This,
         /* [in] */ REFIID riid,
         /* [iid_is][out] */ void __RPC_FAR *__RPC_FAR
```

```
*ppvObject);
      ULONG ( STDMETHODCALLTYPE __RPC_FAR
*AddRef )(
          ISMTimer __RPC_FAR * This);
      ULONG ( STDMETHODCALLTYPE __RPC_FAR
*Release )(
          ISMTimer __RPC_FAR * This);
      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfoCount )(
          ISMTimer __RPC_FAR * This,
          /* [out] */ UINT __RPC_FAR *pctinfo);
      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetTypeInfo )(
          ISMTimer __RPC_FAR * This,
          /* [in] */ UINT iTInfo,
          /* [in] */ LCID lcid,
          /* [out] */ ITypeInfo __RPC_FAR *__RPC_FAR
*ppTInfo);
      HRESULT ( STDMETHODCALLTYPE __RPC_FAR
*GetIDsOfNames )(
          ISMTimer __RPC_FAR * This,
          /* [in] */ REFIID riid,
          /* [size_is][in] */ LPOLESTR __RPC_FAR *rgszNames,
          /* [in] */ UINT cNames,
          /* [in] */ LCID lcid,
          /* [size_is][out] */ DISPID __RPC_FAR *rgDispId);
      /* [local] */ HRESULT ( STDMETHODCALLTYPE
__RPC_FAR *Invoke )(
          ISMTimer __RPC_FAR * This,
          /* [in] */ DISPID dispIdMember,
          /* [in] */ REFIID riid,
          /* [in] */ LCID lcid,
          /* [in] */ WORD wFlags,
          /* [out][in] */ DISPPARAMS __RPC_FAR
*pDispParams,
          /* [out] */ VARIANT __RPC_FAR *pVarResult,
          /* [out] */ EXCEPINFO __RPC_FAR *pExcepInfo,
          /* [out] */ UINT __RPC_FAR *puArgErr);
      END_INTERFACE
   } ISMTimerVtbl;
   interface ISMTimer
   {
      CONST_VTBL struct ISMTimerVtbl __RPC_FAR *lpVtbl;
   };
      /* [helpstring][id] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *Start )(
          ISMTimer __RPC_FAR * This);
      /* [helpstring][id] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *Stop )(
          ISMTimer __RPC_FAR * This,
          CURRENCY __RPC_FAR *pElapsedTime);
      /* [helpstring][id][propget] */ HRESULT (
STDMETHODCALLTYPE __RPC_FAR *get_Running )(
          ISMTimer __RPC_FAR * This,
          /* [retval][out] */ BOOL __RPC_FAR *pVal);

#ifdef COBJMACROS

#define ISMTimer_QueryInterface(This,riid,ppvObject)
              \
   (This)->lpVtbl -> QueryInterface(This,riid,ppvObject)

#define ISMTimer_AddRef(This)              \
   (This)->lpVtbl -> AddRef(This)
```

```
#define ISMTimer_Release(This)             \
   (This)->lpVtbl -> Release(This)

#define ISMTimer_GetTypeInfoCount(This,pctinfo)     \
   (This)->lpVtbl -> GetTypeInfoCount(This,pctinfo)

#define ISMTimer_GetTypeInfo(This,iTInfo,lcid,ppTInfo)
              \
   (This)->lpVtbl -> GetTypeInfo(This,iTInfo,lcid,ppTInfo)

#define
ISMTimer_GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rg
DispId)     \
   (This)->lpVtbl ->
GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rgDispId)

#define
ISMTimer_Invoke(This,dispIdMember,riid,lcid,wFlags,pDispPar
ams,pVarResult,pExcepInfo,puArgErr)        \
   (This)->lpVtbl ->
Invoke(This,dispIdMember,riid,lcid,wFlags,pDispParams,pVarR
esult,pExcepInfo,puArgErr)


#define ISMTimer_Start(This)    \
   (This)->lpVtbl -> Start(This)

#define ISMTimer_Stop(This,pElapsedTime)              \
   (This)->lpVtbl -> Stop(This,pElapsedTime)

#define ISMTimer_get_Running(This,pVal) \
   (This)->lpVtbl -> get_Running(This,pVal)

#endif /* COBJMACROS */


#endif       /* C style interface */



/* [helpstring][id] */ HRESULT STDMETHODCALLTYPE
ISMTimer_Start_Proxy(
   ISMTimer __RPC_FAR * This);


void __RPC_STUB ISMTimer_Start_Stub(
   IRpcStubBuffer *This,
   IRpcChannelBuffer *_pRpcChannelBuffer,
   PRPC_MESSAGE _pRpcMessage,
   DWORD *_pdwStubPhase);


/* [helpstring][id] */ HRESULT STDMETHODCALLTYPE
ISMTimer_Stop_Proxy(
   ISMTimer __RPC_FAR * This,
   CURRENCY __RPC_FAR *pElapsedTime);

void __RPC_STUB ISMTimer_Stop_Stub(
   IRpcStubBuffer *This,
   IRpcChannelBuffer *_pRpcChannelBuffer,
   PRPC_MESSAGE _pRpcMessage,
   DWORD *_pdwStubPhase);
```

```
/* [helpstring][id][propget] */ HRESULT
STDMETHODCALLTYPE ISMTimer_get_Running_Proxy(
    ISMTimer __RPC_FAR * This,
    /* [retval][out] */ BOOL __RPC_FAR *pVal);

void __RPC_STUB ISMTimer_get_Running_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);

#endif      /* __ISMTimer_INTERFACE_DEFINED__ */

#ifndef __SMTIMELib_LIBRARY_DEFINED__
#define __SMTIMELib_LIBRARY_DEFINED__

/* library SMTIMELib */
/* [helpstring][version][uuid] */

EXTERN_C const IID LIBID_SMTIMELib;

#ifndef __StepMasterTimeFunctions_MODULE_DEFINED__
#define __StepMasterTimeFunctions_MODULE_DEFINED__


/* module StepMasterTimeFunctions */
/* [dllname][version][helpstring] */

/* [entry][helpstring] */ CURRENCY __stdcall Get64BitTime(
    /* [in] */ LPSYSTEMTIME lpInitTime);

/* [entry][helpstring] */ void __stdcall JulianToTime(
    /* [in] */ CURRENCY julianTS,
    /* [out][in] */ int __RPC_FAR *yr,
    /* [out][in] */ int __RPC_FAR *mm,
    /* [out][in] */ int __RPC_FAR *dd,
    /* [out][in] */ int __RPC_FAR *hh,
    /* [out][in] */ int __RPC_FAR *mi,
    /* [out][in] */ int __RPC_FAR *ss,
    /* [out][in] */ int __RPC_FAR *ms);

#endif /* __StepMasterTimeFunctions_MODULE_DEFINED__
*/

EXTERN_C const CLSID CLSID_SMTimer;

#ifdef __cplusplus

class DECLSPEC_UUID("27BAB71B-89E1-4A78-8854-
FDFFBDC8037E")
SMTimer;
#endif
#endif /* __SMTIMELib_LIBRARY_DEFINED__ */

/* Additional Prototypes for ALL interfaces */

/* end of Additional Prototypes */

#ifdef __cplusplus
}
#endif
```

```
//  FILE:      resource.h
//      //  FILE:      SMTimer.cpp
//          Microsoft TPC-H Kit Ver. 1.00
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//
//
//  PURPOSE:    Implementation of CSMTimer
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
//
// SMTimer.cpp : Implementation of CSMTimer
#include "stdafx.h"
#include "SMTime.h"
#include "SMTimer.h"

/////////////////////////////////////////////////////////////////////////////
// CSMTimer

/////////////////////////////////////////////////////////////////////////////
// Construction/Destruction
/////////////////////////////////////////////////////////////////////////////

CSMTimer::~CSMTimer()
{

}

STDMETHODIMP CSMTimer::Start()
{
        // Starts the timer
        assert(!m_bInProcess);
        m_bInProcess = TRUE;

        m_lStartTime = MyTickCount();

        return S_OK;
}

STDMETHODIMP CSMTimer::Stop(CURRENCY
*pElapsedTime)
{
        TC_TIME         lEndTime = MyTickCount();

        // Stops the timer and returns the elapsed time
        assert(m_bInProcess);
        m_bInProcess = FALSE;

        pElapsedTime->int64 = lEndTime - m_lStartTime;

        return S_OK;
}
```

```
TC_TIME CSMTimer::MyTickCount(void)
{
	TC_TIME currentTC;
	LARGE_INTEGER	l;
	__int64 count;

	//The purpose of this function is to prevent the 49 day
wrapping effect of the
	//system API GetTickCount(). This function
essentially provides a monotonically
	//increasing timer value which is milliseconds from
class instantiation.

	if ( m_bCountUnavailable )
	{
		count = (__int64)GetTickCount();
		currentTC = (TC_TIME)(count-
m_baseTC);
	}
	else
	{
		QueryPerformanceCounter(&l);
		count = (__int64)l.HighPart << 32 |
(__int64)l.LowPart;
		currentTC = (TC_TIME)(((count-
m_baseTC) * 1000) / m_Timerfreq);
	}

	return currentTC;
}

STDMETHODIMP CSMTimer::get_Running(BOOL *pVal)
{
	*pVal = m_bInProcess;

	return S_OK;
}

CURRENCY __stdcall Get64BitTime(LPSYSTEMTIME
lpInitTime)
{
	__int64	ms_day, ms_hour, ms_minute,
ms_seconds, ms_milliseconds, ms_total;
	int		day;
	SYSTEMTIME	tim;
	CURRENCY	tmReturn;
	if ( lpInitTime )
		memcpy(&tim, lpInitTime,
sizeof(SYSTEMTIME));
	else
	GetLocalTime(&tim);
	day = JulianDay((int)tim.wYear, (int)tim.wMonth,
(int)tim.wDay);
ms_day		= (__int64)day * (__int64)(24 *
1000 * 60 * 60);
	ms_hour		=
(__int64)tim.wHour	* (__int64)(1000 * 3600);
	ms_minute	= (__int64)tim.wMinute *
(1000 * 60);
	ms_seconds		=
(__int64)(tim.wSecond * 1000);
	ms_milliseconds	= (__int64)tim.wMilliseconds;
	ms_total = ms_day + ms_hour + ms_minute +
ms_seconds + ms_milliseconds;
	tmReturn.int64 = ms_total;
	return tmReturn;
}
```

```
// JulianDay computes the number of days since Jan 1, 1900.
// This function is valid for dates from 1-Jan-1900 to 1-Jan-2100.
// 1-Jan-1900 = 0
int JulianDay( int yr, int mm, int dd )
{
	// MonthArray contains cumulative days for months in
a non leap-year
	int MonthArray[12] = { 0, 31, 59, 90, 120, 151, 181,
212, 243, 273, 304, 334};
	int j1, j2;

	// compute day of year (j1)
	j1 = MonthArray[mm-1] + dd - 1;
	// adjust day of year if this is a leap year and it is after
February
	if ((yr % 4)==0 && (yr != 1900) && (mm > 2))
		j1++;
	// compute number of days from 1/1/1900 to
beginning of present year
	j2 = (yr-1900)*365 + (yr-1901)/4;
	return j1+j2;

}

// Breaks up the Julian Time into it's sub-components
void __stdcall SMTime_JulianToTime( CURRENCY CurJulian,
int* yr, int* mm, int* dd,
                                    int *hh,
int *mi, int *ss, int *ms )
{
	int julianDay, msLeft;
	JULIAN_TIME		julianTS =
CurJulian.int64;

	*ms = julianTS % 1000;

	julianTS /= 1000;

	julianDay = (int)(julianTS / ( 60 * 60 * 24 ));

	JulianToCalendar(julianDay, yr, mm, dd );

	msLeft = (int)(julianTS - (julianDay * (__int64)( 60 *
60 * 24 )));

	*hh = msLeft / (60 * 60);
	msLeft = msLeft - *hh * 3600;
	*mi = msLeft / (60);
	*ss = msLeft % 60;
}
// JulianToCalendar converts a day index (from the JulianDay
function) to
// its corresponding calendar value (mm/dd/yr).  The valid range
for days
// is { 0 .. 73049 } for dates from 1-Jan-1900 to 1-Jan-2100.
void JulianToCalendar( int day, int* yr, int* mm, int* dd )
{
	int y, m, d;
	// month array contains days of months for months in
a non leap-year
	int month[12] = { 31, 28, 31, 30, 31, 30, 31, 31, 30,
31, 30, 31 };
```

```
        // compute year from days
        if (day < 365)
        y = 1900;
        else
        y = 1901 + ((day-365)/1461)*4 + (4*((day-
365)%1461)+3)/1461;
        // adjust February if this year is a leap year
        if ((y % 4)==0 && (y != 1900))
                month[1] = 29;
        else
                month[1] = 28;

        d = day - JulianDay( y, 1, 1 ) + 1;
        m = 1;

        while (d > month[m-1])
        {
                d = d - month[m-1];
                m++;
        }

        *yr = y;
        *mm = m;
        *dd = d;
}//  FILE:      SMTimer.h
//          Microsoft TPC-H Kit Ver. 1.00
//          Copyright Microsoft, 1999
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//
//
//  PURPOSE:    Declaration of the CSMTimer
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
//
// SMTimer.h : Declaration of the CSMTimer

#ifndef __SMTIMER_H_
#define __SMTIMER_H_

#include "resource.h"       // main symbols

#include "assert.h"

#define     MAX_JULIAN_TIME  0x7FFFFFFFFFFFFFFF
#define JULIAN_TIME             __int64
#define     TC_TIME             DWORD

#ifdef SMTIMER
#define DLL_LINK    __declspec( dllexport )
#else
#define DLL_LINK    __declspec( dllimport )
#endif

#ifdef __cplusplus
extern "C"
{
#endif
//DLL_LINK          CURRENCY          __stdcall
SMTime_Get64BitTime(LPSYSTEMTIME lpInitTime);
int                             JulianDay( int yr, int mm, int
dd );
void                JulianToCalendar( int day, int* yr, int*
mm, int* dd );
#ifdef __cplusplus
}
#endif
```

```
/////////////////////////////////////////////////////////////////////////////
// CSMTimer
class ATL_NO_VTABLE CSMTimer :
        public
CComObjectRootEx<CComSingleThreadModel>,
        public CComCoClass<CSMTimer,
&CLSID_SMTimer>,
        public IDispatchImpl<ISMTimer, &IID_ISMTimer,
&LIBID_SMTIMELib>
{
public:
        CSMTimer()
        {
                LARGE_INTEGER    l;

                if ( !QueryPerformanceFrequency(&l) )
                {
                        m_baseTC =
(__int64)GetTickCount();
                        m_bCountUnavailable =
TRUE;
                }
                else
                {
                        m_bCountUnavailable =
FALSE;

                        m_Timerfreq =
(__int64)l.HighPart << 32 | (__int64)l.LowPart;

        QueryPerformanceCounter(&l);
                        m_baseTC =
(__int64)l.HighPart << 32 | (__int64)l.LowPart;
                }
                m_bInProcess = FALSE;
        }

DECLARE_REGISTRY_RESOURCEID(IDR_SMTIMER)

DECLARE_PROTECT_FINAL_CONSTRUCT()

BEGIN_COM_MAP(CSMTimer)
        COM_INTERFACE_ENTRY(ISMTimer)
        COM_INTERFACE_ENTRY(IDispatch)
//      COM_INTERFACE_ENTRY2(IDispatch,
ISMTimer)
END_COM_MAP()

// ISMTimer
public:
        STDMETHOD(get_Running)(/*[out, retval]*/ BOOL
*pVal);
        STDMETHOD(Stop)(CURRENCY *pElapsedTime);
        STDMETHOD(Start)();
        virtual ~CSMTimer();

private:
        __int64             m_baseTC;
        __int64             m_Timerfreq;
        BOOL                m_bCountUnavailable;
        TC_TIME             m_lStartTime;
        BOOL                m_bInProcess;

        TC_TIME             MyTickCount(void);
};
```

```
#endif //__SMTIMER_H_
// stdafx.cpp : source file that includes just the standard includes
//  stdafx.pch will be the pre-compiled header
//  stdafx.obj will contain the pre-compiled type information

#include "stdafx.h"

#ifdef _ATL_STATIC_REGISTRY
#include <statreg.h>
#include <statreg.cpp>
#endif

#include <atlimpl.cpp>
//  FILE:      stdafx.h
//             Microsoft TPC-H Kit Ver. 1.00
//             Copyright Microsoft, 1999
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//
//
//  PURPOSE:    include file for standard system include files,
//      or project specific include files that are used frequently,
//      but are changed infrequently
//  Contact:    Reshma Tharamal (reshmat@microsoft.com)
//

#if
!defined(AFX_STDAFX_H__4CDF88F4_EE9C_4F29_8212_61
557F251BDD__INCLUDED_)
#define
AFX_STDAFX_H__4CDF88F4_EE9C_4F29_8212_61557F251
BDD__INCLUDED_

#if _MSC_VER > 1000
#pragma once
#endif // _MSC_VER > 1000

#define STRICT
#ifndef _WIN32_WINNT
#define _WIN32_WINNT 0x0400
#endif
#define _ATL_APARTMENT_THREADED

#include <atlbase.h>
//You may derive a class from CComModule and use it if you
want to override
//something, but do not change the name of _Module
extern CComModule _Module;
#include <atlcom.h>

//{{AFX_INSERT_LOCATION}}
// Microsoft Visual C++ will insert additional declarations
immediately before the previous line.

#endif //
!defined(AFX_STDAFX_H__4CDF88F4_EE9C_4F29_8212_61
557F251BDD__INCLUDED)
```

Workspace_parameters

workspace_id =	12	***parameter_id***	202	***parameter_type =***	0
parameter_name	FLATFILE_DIR_16				
parameter_valu	G:\mnt\ntfs\16\flat16				
workspace_id =	12	***parameter_id***	204	***parameter_type =***	0
parameter_name	BCP_ROWS				
parameter_valu	10000				
workspace_id =	12	***parameter_id***	203	***parameter_type =***	0
parameter_name	FLAT_FILE_PARALLELISM				
parameter_valu	4				
workspace_id =	12	***parameter_id***	195	***parameter_type =***	0
parameter_name	FLATFILE_DIR_9				
parameter_valu	G:\mnt\ntfs\9\flat9				
workspace_id =	12	***parameter_id***	196	***parameter_type =***	0
parameter_name	FLATFILE_DIR_10				
parameter_valu	G:\mnt\ntfs\10\flat10				
workspace_id =	12	***parameter_id***	197	***parameter_type =***	0
parameter_name	FLATFILE_DIR_11				
parameter_valu	G:\mnt\ntfs\11\flat11				
workspace_id =	12	***parameter_id***	198	***parameter_type =***	0
parameter_name	FLATFILE_DIR_12				
parameter_valu	G:\mnt\ntfs\12\flat12				
workspace_id =	12	***parameter_id***	199	***parameter_type =***	0
parameter_name	FLATFILE_DIR_13				
parameter_valu	G:\mnt\ntfs\13\flat13				
workspace_id =	12	***parameter_id***	168	***parameter_type =***	0
parameter_name	FLATFILE_DIR_1				
parameter_valu	G:\mnt\ntfs\1\flat1				
workspace_id =	12	***parameter_id***	201	***parameter_type =***	0
parameter_name	FLATFILE_DIR_15				
parameter_valu	G:\mnt\ntfs\15\flat15				
workspace_id =	12	***parameter_id***	147	***parameter_type =***	0
parameter_name	SETUP_DIR				
parameter_valu	%KIT_DIR%\Setup				
workspace_id =	12	***parameter_id***	191	***parameter_type =***	0
parameter_name	FLATFILE_DIR_5				
parameter_valu	G:\mnt\ntfs\5\flat5				
workspace_id =	12	***parameter_id***	192	***parameter_type =***	0
parameter_name	FLATFILE_DIR_6				
parameter_valu	G:\mnt\ntfs\6\flat6				

workspace_id = 12 ***parameter_id*** 193 ***parameter_type*** = 0
parameter_name FLATFILE_DIR_7
parameter_valu G:\mnt\ntfs\7\flat7

workspace_id = 12 ***parameter_id*** 194 ***parameter_type*** = 0
parameter_name FLATFILE_DIR_8
parameter_valu G:\mnt\ntfs\8\flat8

workspace_id = 12 ***parameter_id*** 190 ***parameter_type*** = 0
parameter_name TOTAL_LOAD_FILES_PER_TABLE
parameter_valu 64

workspace_id = 12 ***parameter_id*** 189 ***parameter_type*** = 0
parameter_name FILES_PER_UPDATE_SET
parameter_valu 16

workspace_id = 12 ***parameter_id*** 185 ***parameter_type*** = 0
parameter_name SERVER
parameter_valu .

workspace_id = 12 ***parameter_id*** 200 ***parameter_type*** = 0
parameter_name FLATFILE_DIR_14
parameter_valu G:\mnt\ntfs\14\flat14

workspace_id = 12 ***parameter_id*** 157 ***parameter_type*** = 3
parameter_name DEFAULT_DIR
parameter_valu %KIT_DIR%\OUTPUT

workspace_id = 12 ***parameter_id*** 166 ***parameter_type*** = 0
parameter_name FLATFILE_DIR_3
parameter_valu G:\mnt\ntfs\3\flat3

workspace_id = 12 ***parameter_id*** 165 ***parameter_type*** = 0
parameter_name FLATFILE_DIR_4
parameter_valu G:\mnt\ntfs\4\flat4

workspace_id = 12 ***parameter_id*** 164 ***parameter_type*** = 3
parameter_name RUN_ID
parameter_valu 471

workspace_id = 12 ***parameter_id*** 163 ***parameter_type*** = 0
parameter_name KIT_DIR
parameter_valu g:\kit

workspace_id = 12 ***parameter_id*** 162 ***parameter_type*** = 0
parameter_name RUN_DIR
parameter_valu %KIT_DIR%\run

workspace_id = 12 ***parameter_id*** 161 ***parameter_type*** = 0
parameter_name QUERY_DIR
parameter_valu %RUN_DIR%\Queries

workspace_id = 12 ***parameter_id*** 160 ***parameter_type*** = 0
parameter_name TEMPLATE_DIR
parameter_valu %RUN_DIR%\templates

workspace_id = 12 ***parameter_id*** 145 ***parameter_type*** = 0
parameter_name TRACEFLAGS

parameter_valu -c -E -x -T697

workspace_id = 12 *parameter_id* 158 *parameter_type* = 0
parameter_name TOOLS_DIR
parameter_valu %KIT_DIR%\tools

workspace_id = 12 *parameter_id* 146 *parameter_type* = 0
parameter_name DBNAME
parameter_valu tpch1000g

workspace_id = 12 *parameter_id* 156 *parameter_type* = 0
parameter_name RF_FLATFILE_DIR
parameter_valu g:\mnt\ntfs\17\rf1000g

workspace_id = 12 *parameter_id* 155 *parameter_type* = 0
parameter_name TABLE_LOAD_PARALLELISM
parameter_valu 16

workspace_id = 12 *parameter_id* 154 *parameter_type* = 0
parameter_name INDEX_CREATE_PARALLELISM
parameter_valu 4

workspace_id = 12 *parameter_id* 153 *parameter_type* = 0
parameter_name VALIDATION_DIR
parameter_valu %SETUP_DIR%\Validation

workspace_id = 12 *parameter_id* 150 *parameter_type* = 0
parameter_name UPDATE_SETS
parameter_valu 16

workspace_id = 12 *parameter_id* 149 *parameter_type* = 0
parameter_name SCALEFACTOR
parameter_valu 1000

workspace_id = 12 *parameter_id* 148 *parameter_type* = 3
parameter_name OUTPUT_DIR
parameter_valu g:\kit\OUTPUT\471

workspace_id = 12 *parameter_id* 167 *parameter_type* = 0
parameter_name FLATFILE_DIR_2
parameter_valu G:\mnt\ntfs\2\flat2

workspace_id = 12 *parameter_id* 159 *parameter_type* = 0
parameter_name MAX_STREAMS
parameter_valu 7

Connection_dtls

workspace_id	*connection_name_id*	*connection_name*	*connection_string_name*	*connection_type*
12	70	Static_Connection_to_Master	MASTERDBCONNECTION	1
12	69	Static_Connection_to_DB	DBCONNECTION	1
12	68	Dynamic_Connection_to_Master	MASTERDBCONNECTION	2
12	67	Dynamic_Connection_to_DB	DBCONNECTION	2

Workspace_connections

workspace_i	12
connection_i	19
connection_name	MASTERDBCONNECTION
connection_valu	DRIVER=SQL Server;SERVER=%SERVER%;UID=sa;PWD=sql*perf1;
descriptio	
no_count_display	0
no_execute	0
parse_query_onl	0
ANSI_quoted_identifiers	0
ANSI_nulls	-1
show_query_pla	0
show_stats_tim	0
show_stats_i	0
parse_odbc_msg_prefix	-1
row_count	0
tsql_batch_separat	GO
query_time_out	0
server_languag	(Default)
character_translation	-1
regional_settings	0

workspace_i	12
connection_i	18
connection_name	DBCONNECTION
connection_valu	DRIVER=SQL
descriptio	
no_count_display	0
no_execute	0
parse_query_onl	0
ANSI_quoted_identifiers	0
ANSI_nulls	-1
show_query_pla	0
show_stats_tim	0
show_stats_i	0
parse_odbc_msg_prefix	-1
row_count	0
tsql_batch_separat	GO
query_time_out	0
server_languag	(Default)
character_translation	-1
regional_settings	0

Att_steps

workspace_id = 12

step_label = SqlServer Startup ***step_id =*** 1087 ***global_flag =*** -1

sequence_no = 1 ***step_level =*** 0 ***parent_step_id =*** 0 ***enabled_flag =*** 0

iterator_name = ***degree_parallelism*** 0

execution_mechanism = 2 ***continuation_criteria =*** 0 ***failure_details =***

step_file_name = ***version_no =*** 2.0

start_directory = C:\Program Files\Microsoft SQL Server\MSSQL.1\MSSQL\Binn\ ***parent_version_no =*** 0.0

step_text = start sqlservr %TRACEFLAGS%

step_label = SqlServer Shutdown ***step_id =*** 1088 ***global_flag =*** -1
sequence_no = 2 ***step_level =*** 0 ***parent_step_id =*** 0 ***enabled_flag =*** 0
iterator_name = ***degree_parallelism*** 0
execution_mechanism = 2 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 5.0
start_directory = ***parent_version_no =*** 0.0
step_text = osql -Usa -Psql*perf1 -t10 -Q"shutdown"

step_label = Configure SqlServer ***step_id =*** 1093 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 0 ***parent_step_id =*** 0 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 62.0
start_directory = ***parent_version_no =*** 0.0
step_text =

step_label = Create and Load Tables ***step_id =*** 1094 ***global_flag =*** 0
sequence_no = 3 ***step_level =*** 0 ***parent_step_id =*** 0 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 91.0
start_directory = ***parent_version_no =*** 0.0
step_text =

step_label = Create Indexes and Statistics ***step_id =*** 1095 ***global_flag =*** 0
sequence_no = 4 ***step_level =*** 0 ***parent_step_id =*** 0 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 42.0
start_directory = ***parent_version_no =*** 0.0
step_text =

step_label = Prep Database, End of Load ***step_id =*** 1096 ***global_flag =*** 0
sequence_no = 5 ***step_level =*** 0 ***parent_step_id =*** 0 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 71.0
start_directory = ***parent_version_no =*** 0.0
step_text =

step_label = Generate Queries via QGen ***step_id =*** 1099 ***global_flag =*** 0
sequence_no = 6 ***step_level =*** 0 ***parent_step_id =*** 0 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***

step_file_name = ***version_no =*** 12.0

start_directory = ***parent_version_no =*** 0.0

step_text =

step_label = Begin of Timed Load ***step_id =*** 1107 ***global_flag =*** 0

sequence_no = 1 ***step_level =*** 1 ***parent_step_id =*** 1093 ***enabled_flag =*** -1

iterator_name = ***degree_parallelism*** 1

execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***

step_file_name = ***version_no =*** 19.0

start_directory = Dynamic_Connection_to_Master ***parent_version_no =*** 62.0

step_text =

```
--    Create temporary table for timing in the Master Database
--
--          This is just temporary until we build the TPCH_AUX_TABLE later
--

--
-- Delete any existing tpch_temp_timer table
--
if exists ( select name from sysobjects where name = 'tpch_temp_timer' )
     drop table tpch_temp_timer

--
-- Create the temporary table
--
create table tpch_temp_timer
(
     load_start_time                         datetime
)

--
-- Store the starting time in the temporary table
--
insert          into tpch_temp_timer values (getdate())
```

step_label = (Drop/)Create Tables ***step_id =*** 1111 ***global_flag =*** 0

sequence_no = 1 ***step_level =*** 1 ***parent_step_id =*** 1094 ***enabled_flag =*** -1

iterator_name = ***degree_parallelism*** 1

execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***

step_file_name = ***version_no =*** 12.1

start_directory = ***parent_version_no =*** 91.0

step_text =

step_label = Parallel Partitioned Table Load ***step_id =*** 1112 ***global_flag =*** 0

sequence_no = 2 ***step_level =*** 1 ***parent_step_id =*** 1094 ***enabled_flag =*** -1

iterator_name = TABLE ***degree_parallelism*** %TABLE_LOAD_PARALLELISM%

execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***

step_file_name = ***version_no =*** 33.0

start_directory = ***parent_version_no =*** 91.0

step_text =

step_label = Parallel Load Simple Tables ***step_id =*** 1113 ***global_flag =*** 0

sequence_no = 3 ***step_level =*** 1 ***parent_step_id =*** 1094 ***enabled_flag =*** -1

iterator_name = ***degree_parallelism*** %TABLE_LOAD_PARALLELISM%

execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***

step_file_name = ***version_no =*** 13.1

start_directory = ***parent_version_no =*** 91.0
step_text =

step_label = Create Clustered Indexes ***step_id =*** 1115 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 1 ***parent_step_id =*** 1095 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = %SETUP_DIR%\%DBNAME%\CreateClusteredIndexes.sql ***version_no =*** 12.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 42.0
step_text =

step_label = Create NC Indexes in Parallel ***step_id =*** 1116 ***global_flag =*** 0
sequence_no = 6 ***step_level =*** 1 ***parent_step_id =*** 1095 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %INDEX_CREATE_PARALLELISM%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 7.2
start_directory = ***parent_version_no =*** 42.0
step_text =

step_label = Reset DB_Option "Trunc" ***step_id =*** 1119 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 1 ***parent_step_id =*** 1096 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = ***version_no =*** 9.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 71.0
step_text = sp_dboption %DBNAME%, 'trunc. ',false

step_label = Install Refresh Function Stored Procedures ***step_id =*** 1120 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 1 ***parent_step_id =*** 1096 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %MAX_STREAMS%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 7.0
start_directory = ***parent_version_no =*** 71.0
step_text =

step_label = Backup TPC-H Database (Only if using backup to satisfy ***step_id =*** 1121 ***global_flag =*** 0
sequence_no = 3 ***step_level =*** 1 ***parent_step_id =*** 1096 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 5.0
start_directory = ***parent_version_no =*** 71.0
step_text =

step_label = End of timed Load ***step_id =*** 1122 ***global_flag =*** 0
sequence_no = 4 ***step_level =*** 1 ***parent_step_id =*** 1096 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***

step_file_name = ***version_no =*** 8.0

start_directory = Static_Connection_to_DB ***parent_version_no =*** 71.0

step_text =
```
UPDATE TPCH_AUX_TABLE SET LoadFinish = getdate()
GO

SELECT      LoadStart    AS 'Load Start TimeStamp',
     LoadFinish  AS 'Load Finish TimeStamp',
     QgenSeed  AS 'Generated QGen Seed'
FROM    TPCH_AUX_TABLE
GO
```

step_label = Generate QGEN Seed ***step_id =*** 1124 ***global_flag =*** 0

sequence_no = 1 ***step_level =*** 1 ***parent_step_id =*** 1099 ***enabled_flag =*** -1

iterator_name = ***degree_parallelism*** 1

execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***

step_file_name = ***version_no =*** 4.0

start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 12.0

step_text =
```
DECLARE @Finish datetime
DECLARE @seed0 integer

--
-- Get ending time of database load
--
SELECT @Finish=LoadFinish FROM TPCH_AUX_TABLE

--
-- Calculate seed per clause 2.1.3.3
--
SET @seed0 =
CONVERT(integer,100000000*DATEPART(MM,@Finish)+1000000*DATEPART(DD,@Finish)+10000*DAT
EPART(HH,@Finish)+100*DATEPART(MI,@Finish)+DATEPART(SS,@Finish))

--
-- Update the benchmark auxillary table
--
UPDATE TPCH_AUX_TABLE SET QgenSeed=@seed0

SELECT * from TPCH_AUX_TABLE
```

step_label = Generate Power Queries ***step_id =*** 1132 ***global_flag =*** 0

sequence_no = 2 ***step_level =*** 1 ***parent_step_id =*** 1099 ***enabled_flag =*** -1

iterator_name = ***degree_parallelism*** 1

execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***

step_file_name = ***version_no =*** 2.2

start_directory = ***parent_version_no =*** 12.0

step_text =

step_label = Generate Stream Queries ***step_id =*** 1133 ***global_flag =*** 0

sequence_no = 3 ***step_level =*** 1 ***parent_step_id =*** 1099 ***enabled_flag =*** -1

iterator_name = STREAM_NUM ***degree_parallelism*** 1

execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***

step_file_name = ***version_no =*** 2.3

start_directory = ***parent_version_no =*** 12.0

step_text =

step_label = Drop Tables ***step_id =*** 1144 ***global_flag =*** 0

sequence_no = 1 ***step_level =*** 2 ***parent_step_id =*** 1111 ***enabled_flag =*** -1

iterator_name = *degree_parallelism* 1
execution_mechanism = 1 *continuation_criteria* = 1 *failure_details* =
step_file_name = *version_no* = 8.0
start_directory = Dynamic_Connection_to_DB *parent_version_no* = 12.1
step_text = declare @table sysname

```
declare tables cursor for
select name from sysobjects
  where sysobjects.type='U'

open tables
fetch tables into @table
while @@fetch_status = 0
  begin
    exec('drop table '+@table)
    fetch tables into @table
  end

-- clean up after ourselves
close tables
deallocate tables
```

step_label = Create Auxilliary Table *step_id* = 1145 *global_flag* = 0
sequence_no = 2 *step_level* = 2 *parent_step_id* = 1111 *enabled_flag* = -1
iterator_name = *degree_parallelism* 1
execution_mechanism = 1 *continuation_criteria* = 1 *failure_details* =
step_file_name = %SETUP_DIR%\Utility\CreateBuildTimer.sql *version_no* = 8.0
start_directory = Dynamic_Connection_to_DB *parent_version_no* = 12.1
step_text =

step_label = Create Base Tables *step_id* = 1146 *global_flag* = 0
sequence_no = 3 *step_level* = 2 *parent_step_id* = 1111 *enabled_flag* = -1
iterator_name = *degree_parallelism* 1
execution_mechanism = 1 *continuation_criteria* = 1 *failure_details* =
step_file_name = %SETUP_DIR%\%DBNAME%\CreateTables.sql *version_no* = 7.0
start_directory = Dynamic_Connection_to_DB *parent_version_no* = 12.1
step_text =

step_label = Load Nation Table *step_id* = 1155 *global_flag* = 0
sequence_no = 1 *step_level* = 2 *parent_step_id* = 1113 *enabled_flag* = -1
iterator_name = *degree_parallelism* 1
execution_mechanism = 1 *continuation_criteria* = 1 *failure_details* =
step_file_name = *version_no* = 2.0
start_directory = Dynamic_Connection_to_DB *parent_version_no* = 13.1
step_text =

```
bulk insert %DBNAME%..NATION
from '%FLATFILE_DIR_1%\nation.tbl'
with (FieldTerminator = '|', RowTerminator ='|\n',tablock)
```

step_label = Load Region Table *step_id* = 1156 *global_flag* = 0
sequence_no = 2 *step_level* = 2 *parent_step_id* = 1113 *enabled_flag* = -1
iterator_name = *degree_parallelism* 1
execution_mechanism = 1 *continuation_criteria* = 1 *failure_details* =
step_file_name = *version_no* = 2.0

start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 13.1

step_text = bulk insert %DBNAME%..REGION
from '%FLATFILE_DIR_1%\region.tbl'
with (FieldTerminator = '|', RowTerminator ='|\n',tablock)

step_label = CreateIndexStream1 ***step_id =*** 1157 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 2 ***parent_step_id =*** 1116 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = %SETUP_DIR%\%DBNAME%\CreateIndexesStream1.sql ***version_no =*** 6.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 7.2
step_text =

step_label = CreateIndexStream2 ***step_id =*** 1158 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 2 ***parent_step_id =*** 1116 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = %SETUP_DIR%\%DBNAME%\CreateIndexesStream2.sql ***version_no =*** 5.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 7.2
step_text =

step_label = CreateIndexStream3 ***step_id =*** 1159 ***global_flag =*** 0
sequence_no = 3 ***step_level =*** 2 ***parent_step_id =*** 1116 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = %SETUP_DIR%\%DBNAME%\CreateIndexesStream3.sql ***version_no =*** 4.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 7.2
step_text =

step_label = Execute the backup (For ACID) ***step_id =*** 1165 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 2 ***parent_step_id =*** 1121 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = %SETUP_DIR%\%DBNAME%\BackupDatabase.sql ***version_no =*** 5.0
start_directory = Dynamic_Connection_to_Master ***parent_version_no =*** 5.0
step_text =

step_label = Install RF1 Stored Procedure(s) ***step_id =*** 1166 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 2 ***parent_step_id =*** 1120 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = G:\kit\setup\StoredProcs\CreateRF1Proc.sql ***version_no =*** 15.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 7.0
step_text =

step_label = Install RF2 Stored Procedure(s) ***step_id =*** 1167 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 2 ***parent_step_id =*** 1120 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1

execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = G:\kit\setup\StoredProcs\CreateRF2Proc.sql ***version_no =*** 12.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 7.0
step_text =

step_label = Generate Power Query Directory ***step_id =*** 1168 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 2 ***parent_step_id =*** 1132 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 2 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = ***version_no =*** 1.0
start_directory = %RUN_DIR% ***parent_version_no =*** 2.2
step_text = if not exist %QUERY_DIR%\Power mkdir %QUERY_DIR%\Power

step_label = Generate QGen Command File ***step_id =*** 1169 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 2 ***parent_step_id =*** 1132 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 2 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = ***version_no =*** 2.0
start_directory = %TEMPLATE_DIR% ***parent_version_no =*** 2.2
step_text =
```
::
:: First use OSQL to grab the QgenSeed value from TPCH_AUX_TABLE
::
osql -Usa -Psql*perf1 -n -d%DBNAME% -w 255 -i%SETUP_DIR%\Generate\GenQGENcmd.sql >
%SETUP_DIR%\Generate\QgenCmd.cmd
```

step_label = Parallel Power Query Generation ***step_id =*** 1170 ***global_flag =*** 0
sequence_no = 3 ***step_level =*** 2 ***parent_step_id =*** 1132 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %MAX_STREAMS%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 0.1
start_directory = ***parent_version_no =*** 2.2
step_text =

step_label = Set Seed Value for Stream ***step_id =*** 1171 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 2 ***parent_step_id =*** 1133 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = ***version_no =*** 1.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 2.3
step_text =
```
--
--   Increment QGen Seed in TPCH_AUX_TABLE
--
UPDATE   TPCH_AUX_TABLE
SET          QgenSeed = QgenSeed + %STREAM_NUM%
```

step_label = Create Query Stream Directories ***step_id =*** 1172 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 2 ***parent_step_id =*** 1133 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 2 ***continuation_criteria =*** 1 ***failure_details =***

step_file_name = ***version_no =*** 1.0

start_directory = %QUERY_DIR% ***parent_version_no =*** 2.3

step_text = if not exist %QUERY_DIR%\STREAM%STREAM_NUM% mkdir
%QUERY_DIR%\STREAM%STREAM_NUM%

step_label = Generate QGen Stream Command File ***step_id =*** 1173 ***global_flag =*** 0

sequence_no = 3 ***step_level =*** 2 ***parent_step_id =*** 1133 ***enabled_flag =*** -1

iterator_name = ***degree_parallelism*** 1

execution_mechanism = 2 ***continuation_criteria =*** 1 ***failure_details =***

step_file_name = ***version_no =*** 3.0

start_directory = %TEMPLATE_DIR% ***parent_version_no =*** 2.3

step_text = ::
:: First use OSQL to grab the QgenSeed value from TPCH_AUX_TABLE
::
osql -Usa -Psql*perf1 -n -d%DBNAME% -w 255 -i%SETUP_DIR%\Generate\GenQgenStreamCmd.sql >
%SETUP_DIR%\Generate\QgenStreamCmd.cmd

step_label = Parallel Stream Query Generation ***step_id =*** 1174 ***global_flag =*** 0

sequence_no = 4 ***step_level =*** 2 ***parent_step_id =*** 1133 ***enabled_flag =*** -1

iterator_name = ***degree_parallelism*** %MAX_STREAMS%

execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***

step_file_name = ***version_no =*** 0.1

start_directory = ***parent_version_no =*** 2.3

step_text =

step_label = Re-set QGen Seed Value ***step_id =*** 1175 ***global_flag =*** 0

sequence_no = 5 ***step_level =*** 2 ***parent_step_id =*** 1133 ***enabled_flag =*** -1

iterator_name = ***degree_parallelism*** 1

execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***

step_file_name = ***version_no =*** 1.0

start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 2.3

step_text = --
-- Resets the QGen seed kept in the temporary table
--
UPDATE TPCH_AUX_TABLE
SET QgenSeed = QgenSeed - %STREAM_NUM%

step_label = Power - Execute Generated QGen Command File ***step_id =*** 1199 ***global_flag =*** 0

sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1170 ***enabled_flag =*** -1

iterator_name = QUERY ***degree_parallelism*** 1

execution_mechanism = 2 ***continuation_criteria =*** 1 ***failure_details =***

step_file_name = %SETUP_DIR%\Generate\QgenCmd.cmd ***version_no =*** 1.0

start_directory = %TEMPLATE_DIR% ***parent_version_no =*** 0.1

step_text =

step_label = Throughput - Execute Generated QGen Command File ***step_id =*** 1200 ***global_flag =*** 0

sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1174 ***enabled_flag =*** -1

iterator_name = QUERY ***degree_parallelism*** 1

execution_mechanism = 2 ***continuation_criteria =*** 1 ***failure_details =***

step_file_name = %SETUP_DIR%\Generate\QgenStreamCmd.cmd ***version_no =*** 1.0

start_directory = %TEMPLATE_DIR% ***parent_version_no =*** 0.1

step_text =

step_label = Set Correlation ***step_id =*** 1343 ***global_flag =*** 0
sequence_no = 8 ***step_level =*** 1 ***parent_step_id =*** 1095 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = ***version_no =*** 3.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 42.0
step_text = alter database %DBNAME% set date_correlation_optimization ON

step_label = Create Statistics ***step_id =*** 1358 ***global_flag =*** 0
sequence_no = 7 ***step_level =*** 1 ***parent_step_id =*** 1095 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = ***version_no =*** 2.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 42.0
step_text = sp_createstats

step_label = Load Partitioned Tables from FlatFile_Dir_1 ***step_id =*** 1363 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1388 ***enabled_flag =*** -1
iterator_name = PARALLEL_PROCESS ***degree_parallelism*** 4
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = ***version_no =*** 22.0
start_directory = Dynamic_Connection_to_Master ***parent_version_no =*** 2.1
step_text = bulk insert %DBNAME%..%TABLE%
from '%FLATFILE_DIR_1%\%TABLE%.tbl.%PARALLEL_PROCESS%'
with (FieldTerminator = '|', RowTerminator ='|\n',tablock,ROWS_PER_BATCH=%BCP_ROWS%)

step_label = Load Partitioned Tables from FlatFile_Dir_2 ***step_id =*** 1364 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1389 ***enabled_flag =*** -1
iterator_name = PARALLEL_PROCESS ***degree_parallelism*** 4
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = ***version_no =*** 22.0
start_directory = Dynamic_Connection_to_Master ***parent_version_no =*** 3.1
step_text = bulk insert %DBNAME%..%TABLE%
from '%FLATFILE_DIR_2%\%TABLE%.tbl.%PARALLEL_PROCESS%'
with (FieldTerminator = '|', RowTerminator ='|\n',tablock,ROWS_PER_BATCH=%BCP_ROWS%)

step_label = Load Partitioned Tables from FlatFile_Dir_3 ***step_id =*** 1365 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1390 ***enabled_flag =*** -1
iterator_name = PARALLEL_PROCESS ***degree_parallelism*** 4
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = ***version_no =*** 20.0
start_directory = Dynamic_Connection_to_Master ***parent_version_no =*** 4.1
step_text = bulk insert %DBNAME%..%TABLE%
from '%FLATFILE_DIR_3%\%TABLE%.tbl.%PARALLEL_PROCESS%'
with (FieldTerminator = '|', RowTerminator ='|\n',tablock,ROWS_PER_BATCH=%BCP_ROWS%)

step_label = Load Partitioned Tables from FlatFile_Dir_4 ***step_id =*** 1366 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1391 ***enabled_flag =*** -1

iterator_name = PARALLEL_PROCESS *degree_parallelism* 4

execution_mechanism = 1 *continuation_criteria* = 1 *failure_details* =

step_file_name = *version_no* = 20.0

start_directory = Dynamic_Connection_to_Master *parent_version_no* = 4.1

step_text = bulk insert %DBNAME%..%TABLE%
from '%FLATFILE_DIR_4%\%TABLE%.tbl.%PARALLEL_PROCESS%'
with (FieldTerminator = '|', RowTerminator ='|\n',tablock,ROWS_PER_BATCH=%BCP_ROWS%)

step_label = Load Partitioned Tables from FlatFile_Dir_5 *step_id* = 1367 *global_flag* = 0

sequence_no = 1 *step_level* = 3 *parent_step_id* = 1392 *enabled_flag* = -1

iterator_name = PARALLEL_PROCESS *degree_parallelism* 4

execution_mechanism = 1 *continuation_criteria* = 1 *failure_details* =

step_file_name = *version_no* = 20.0

start_directory = Dynamic_Connection_to_Master *parent_version_no* = 4.1

step_text = bulk insert %DBNAME%..%TABLE%
from '%FLATFILE_DIR_5%\%TABLE%.tbl.%PARALLEL_PROCESS%'
with (FieldTerminator = '|', RowTerminator ='|\n',tablock,ROWS_PER_BATCH=%BCP_ROWS%)

step_label = Load Partitioned Tables from FlatFile_Dir_6 *step_id* = 1368 *global_flag* = 0

sequence_no = 1 *step_level* = 3 *parent_step_id* = 1393 *enabled_flag* = -1

iterator_name = PARALLEL_PROCESS *degree_parallelism* 4

execution_mechanism = 1 *continuation_criteria* = 1 *failure_details* =

step_file_name = *version_no* = 20.0

start_directory = Dynamic_Connection_to_Master *parent_version_no* = 4.1

step_text = bulk insert %DBNAME%..%TABLE%
from '%FLATFILE_DIR_6%\%TABLE%.tbl.%PARALLEL_PROCESS%'
with (FieldTerminator = '|', RowTerminator ='|\n',tablock,ROWS_PER_BATCH=%BCP_ROWS%)

step_label = Load Partitioned Tables from FlatFile_Dir_7 *step_id* = 1369 *global_flag* = 0

sequence_no = 1 *step_level* = 3 *parent_step_id* = 1394 *enabled_flag* = -1

iterator_name = PARALLEL_PROCESS *degree_parallelism* 4

execution_mechanism = 1 *continuation_criteria* = 1 *failure_details* =

step_file_name = *version_no* = 20.0

start_directory = Dynamic_Connection_to_Master *parent_version_no* = 4.1

step_text = bulk insert %DBNAME%..%TABLE%
from '%FLATFILE_DIR_7%\%TABLE%.tbl.%PARALLEL_PROCESS%'
with (FieldTerminator = '|', RowTerminator ='|\n',tablock,ROWS_PER_BATCH=%BCP_ROWS%)

step_label = Load Partitioned Tables from FlatFile_Dir_8 *step_id* = 1370 *global_flag* = 0

sequence_no = 1 *step_level* = 3 *parent_step_id* = 1395 *enabled_flag* = -1

iterator_name = PARALLEL_PROCESS *degree_parallelism* 4

execution_mechanism = 1 *continuation_criteria* = 1 *failure_details* =

step_file_name = *version_no* = 20.0

start_directory = Dynamic_Connection_to_Master *parent_version_no* = 4.1

step_text = bulk insert %DBNAME%..%TABLE%
from '%FLATFILE_DIR_8%\%TABLE%.tbl.%PARALLEL_PROCESS%'
with (FieldTerminator = '|', RowTerminator ='|\n',tablock,ROWS_PER_BATCH=%BCP_ROWS%)

step_label = Load Partitioned Tables from FlatFile_Dir_9 *step_id* = 1371 *global_flag* = 0

sequence_no = 1 *step_level* = 3 *parent_step_id* = 1396 *enabled_flag* = -1

iterator_name = PARALLEL_PROCESS *degree_parallelism* 4

execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***

step_file_name = ***version_no =*** 20.0

start_directory = Dynamic_Connection_to_Master ***parent_version_no =*** 4.1

step_text = bulk insert %DBNAME%..%TABLE%
from '%FLATFILE_DIR_9%\%TABLE%.tbl.%PARALLEL_PROCESS%'
with (FieldTerminator = '|', RowTerminator ='|\n',tablock,ROWS_PER_BATCH=%BCP_ROWS%)

step_label = Load Partitioned Tables from FlatFile_Dir_10 ***step_id =*** 1372 ***global_flag =*** 0

sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1397 ***enabled_flag =*** -1

iterator_name = PARALLEL_PROCESS ***degree_parallelism*** 4

execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***

step_file_name = ***version_no =*** 20.0

start_directory = Dynamic_Connection_to_Master ***parent_version_no =*** 4.1

step_text = bulk insert %DBNAME%..%TABLE%
from '%FLATFILE_DIR_10%\%TABLE%.tbl.%PARALLEL_PROCESS%'
with (FieldTerminator = '|', RowTerminator ='|\n',tablock,ROWS_PER_BATCH=%BCP_ROWS%)

step_label = Load Partitioned Tables from FlatFile_Dir_11 ***step_id =*** 1373 ***global_flag =*** 0

sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1398 ***enabled_flag =*** -1

iterator_name = PARALLEL_PROCESS ***degree_parallelism*** 4

execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***

step_file_name = ***version_no =*** 20.0

start_directory = Dynamic_Connection_to_Master ***parent_version_no =*** 4.1

step_text = bulk insert %DBNAME%..%TABLE%
from '%FLATFILE_DIR_11%\%TABLE%.tbl.%PARALLEL_PROCESS%'
with (FieldTerminator = '|', RowTerminator ='|\n',tablock,ROWS_PER_BATCH=%BCP_ROWS%)

step_label = Load Partitioned Tables from FlatFile_Dir_12 ***step_id =*** 1374 ***global_flag =*** 0

sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1399 ***enabled_flag =*** -1

iterator_name = PARALLEL_PROCESS ***degree_parallelism*** 4

execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***

step_file_name = ***version_no =*** 20.0

start_directory = Dynamic_Connection_to_Master ***parent_version_no =*** 4.1

step_text = bulk insert %DBNAME%..%TABLE%
from '%FLATFILE_DIR_12%\%TABLE%.tbl.%PARALLEL_PROCESS%'
with (FieldTerminator = '|', RowTerminator ='|\n',tablock,ROWS_PER_BATCH=%BCP_ROWS%)

step_label = Load Partitioned Tables from FlatFile_Dir_13 ***step_id =*** 1375 ***global_flag =*** 0

sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1400 ***enabled_flag =*** -1

iterator_name = PARALLEL_PROCESS ***degree_parallelism*** 4

execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***

step_file_name = ***version_no =*** 20.0

start_directory = Dynamic_Connection_to_Master ***parent_version_no =*** 4.1

step_text = bulk insert %DBNAME%..%TABLE%
from '%FLATFILE_DIR_13%\%TABLE%.tbl.%PARALLEL_PROCESS%'
with (FieldTerminator = '|', RowTerminator ='|\n',tablock,ROWS_PER_BATCH=%BCP_ROWS%)

step_label = Load Partitioned Tables from FlatFile_Dir_14 ***step_id =*** 1376 ***global_flag =*** 0

sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1401 ***enabled_flag =*** -1

iterator_name = PARALLEL_PROCESS ***degree_parallelism*** 4

execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***

step_file_name = ***version_no =*** 21.0

start_directory = Dynamic_Connection_to_Master ***parent_version_no =*** 4.1

step_text = bulk insert %DBNAME%..%TABLE%
from '%FLATFILE_DIR_14%\%TABLE%.tbl.%PARALLEL_PROCESS%'
with (FieldTerminator = '|', RowTerminator ='|\n',tablock,ROWS_PER_BATCH=%BCP_ROWS%)

step_label = Load Partitioned Tables from FlatFile_Dir_15 ***step_id =*** 1377 ***global_flag =*** 0

sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1402 ***enabled_flag =*** -1

iterator_name = PARALLEL_PROCESS ***degree_parallelism*** 4

execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***

step_file_name = ***version_no =*** 20.0

start_directory = Dynamic_Connection_to_Master ***parent_version_no =*** 4.1

step_text = bulk insert %DBNAME%..%TABLE%
from '%FLATFILE_DIR_15%\%TABLE%.tbl.%PARALLEL_PROCESS%'
with (FieldTerminator = '|', RowTerminator ='|\n',tablock,ROWS_PER_BATCH=%BCP_ROWS%)

step_label = Load Partitioned Tables from FlatFile_Dir_16 ***step_id =*** 1378 ***global_flag =*** 0

sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1403 ***enabled_flag =*** -1

iterator_name = PARALLEL_PROCESS ***degree_parallelism*** 4

execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***

step_file_name = ***version_no =*** 20.0

start_directory = Dynamic_Connection_to_Master ***parent_version_no =*** 4.1

step_text = bulk insert %DBNAME%..%TABLE%
from '%FLATFILE_DIR_16%\%TABLE%.tbl.%PARALLEL_PROCESS%'
with (FieldTerminator = '|', RowTerminator ='|\n',tablock,ROWS_PER_BATCH=%BCP_ROWS%)

step_label = Files 1 ***step_id =*** 1388 ***global_flag =*** 0

sequence_no = 1 ***step_level =*** 2 ***parent_step_id =*** 1112 ***enabled_flag =*** -1

iterator_name = ***degree_parallelism*** %FLAT_FILE_PARALLELISM%

execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***

step_file_name = ***version_no =*** 2.1

start_directory = ***parent_version_no =*** 33.0

step_text =

step_label = Files 2 ***step_id =*** 1389 ***global_flag =*** 0

sequence_no = 2 ***step_level =*** 2 ***parent_step_id =*** 1112 ***enabled_flag =*** -1

iterator_name = ***degree_parallelism*** %FLAT_FILE_PARALLELISM%

execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***

step_file_name = ***version_no =*** 3.1

start_directory = ***parent_version_no =*** 33.0

step_text =

step_label = Files 3 ***step_id =*** 1390 ***global_flag =*** 0

sequence_no = 3 ***step_level =*** 2 ***parent_step_id =*** 1112 ***enabled_flag =*** -1

iterator_name = ***degree_parallelism*** %FLAT_FILE_PARALLELISM%

execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***

step_file_name = ***version_no =*** 4.1

start_directory = ***parent_version_no =*** 33.0
step_text =

step_label = Files 4 ***step_id =*** 1391 ***global_flag =*** 0
sequence_no = 4 ***step_level =*** 2 ***parent_step_id =*** 1112 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %FLAT_FILE_PARALLELISM%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 4.1
start_directory = ***parent_version_no =*** 33.0
step_text =

step_label = Files 5 ***step_id =*** 1392 ***global_flag =*** 0
sequence_no = 5 ***step_level =*** 2 ***parent_step_id =*** 1112 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %FLAT_FILE_PARALLELISM%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 4.1
start_directory = ***parent_version_no =*** 33.0
step_text =

step_label = Files 6 ***step_id =*** 1393 ***global_flag =*** 0
sequence_no = 6 ***step_level =*** 2 ***parent_step_id =*** 1112 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %FLAT_FILE_PARALLELISM%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 4.1
start_directory = ***parent_version_no =*** 33.0
step_text =

step_label = Files 7 ***step_id =*** 1394 ***global_flag =*** 0
sequence_no = 7 ***step_level =*** 2 ***parent_step_id =*** 1112 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %FLAT_FILE_PARALLELISM%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 4.1
start_directory = ***parent_version_no =*** 33.0
step_text =

step_label = Files 8 ***step_id =*** 1395 ***global_flag =*** 0
sequence_no = 8 ***step_level =*** 2 ***parent_step_id =*** 1112 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %FLAT_FILE_PARALLELISM%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 4.1
start_directory = ***parent_version_no =*** 33.0
step_text =

step_label = Files 9 ***step_id =*** 1396 ***global_flag =*** 0
sequence_no = 9 ***step_level =*** 2 ***parent_step_id =*** 1112 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %FLAT_FILE_PARALLELISM%

execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 4.1
start_directory = ***parent_version_no =*** 33.0
step_text =

step_label = Files 10 ***step_id =*** 1397 ***global_flag =*** 0
sequence_no = 10 ***step_level =*** 2 ***parent_step_id =*** 1112 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %FLAT_FILE_PARALLELISM%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 4.1
start_directory = ***parent_version_no =*** 33.0
step_text =

step_label = Files 11 ***step_id =*** 1398 ***global_flag =*** 0
sequence_no = 11 ***step_level =*** 2 ***parent_step_id =*** 1112 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %FLAT_FILE_PARALLELISM%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 4.1
start_directory = ***parent_version_no =*** 33.0
step_text =

step_label = Files 12 ***step_id =*** 1399 ***global_flag =*** 0
sequence_no = 12 ***step_level =*** 2 ***parent_step_id =*** 1112 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %FLAT_FILE_PARALLELISM%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 4.1
start_directory = ***parent_version_no =*** 33.0
step_text =

step_label = Files 13 ***step_id =*** 1400 ***global_flag =*** 0
sequence_no = 13 ***step_level =*** 2 ***parent_step_id =*** 1112 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %FLAT_FILE_PARALLELISM%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 4.1
start_directory = ***parent_version_no =*** 33.0
step_text =

step_label = Files 14 ***step_id =*** 1401 ***global_flag =*** 0
sequence_no = 14 ***step_level =*** 2 ***parent_step_id =*** 1112 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %FLAT_FILE_PARALLELISM%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 4.1
start_directory = ***parent_version_no =*** 33.0
step_text =

step_label = Files 15 ***step_id =*** 1402 ***global_flag =*** 0
sequence_no = 15 ***step_level =*** 2 ***parent_step_id =*** 1112 ***enabled_flag =*** -1

iterator_name = ***degree_parallelism*** %FLAT_FILE_PARALLELISM%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 4.1
start_directory = ***parent_version_no =*** 33.0
step_text =

step_label = Files 16 ***step_id =*** 1403 ***global_flag =*** 0
sequence_no = 16 ***step_level =*** 2 ***parent_step_id =*** 1112 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %FLAT_FILE_PARALLELISM%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 4.1
start_directory = ***parent_version_no =*** 33.0
step_text =

step_label = Set sp_configure Options ***step_id =*** 1439 ***global_flag =*** 0
sequence_no = 3 ***step_level =*** 1 ***parent_step_id =*** 1093 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = %SETUP_DIR%\Utility\conf_tpch.sql ***version_no =*** 23.0
start_directory = Dynamic_Connection_to_Master ***parent_version_no =*** 62.0
step_text =

step_label = Create FK Constraints ***step_id =*** 1441 ***global_flag =*** 0
sequence_no = 5 ***step_level =*** 1 ***parent_step_id =*** 1095 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = %SETUP_DIR%\%DBNAME%\createFK.sql ***version_no =*** 1.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 42.0
step_text =

step_label = Create Clustered Indexes2 ***step_id =*** 1442 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 1 ***parent_step_id =*** 1095 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = ***version_no =*** 10.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 42.0
step_text = create clustered index O_ORDERDATE_CLUIDX
on ORDERS(O_ORDERDATE)
with FILLFACTOR=95,SORT_IN_TEMPDB
on GENERAL_FG

step_label = Primary Key Small Tables ***step_id =*** 1443 ***global_flag =*** 0
sequence_no = 3 ***step_level =*** 1 ***parent_step_id =*** 1095 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = ***version_no =*** 11.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 42.0
step_text = alter table NATION add constraint PK_N_NATIONKEY primary key (N_NATIONKEY)

alter table REGION add constraint PK_R_REGIONKEY primary key (R_REGIONKEY)

alter table SUPPLIER add constraint PK_S_SUPPKEY primary key (S_SUPPKEY)

alter table CUSTOMER add constraint PK_C_CUSTKEY primary key (C_CUSTKEY)

step_label = Primary Key Large Tables ***step_id =*** 1444 ***global_flag =*** 0
sequence_no = 4 ***step_level =*** 1 ***parent_step_id =*** 1095 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = ***version_no =*** 9.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 42.0
step_text = alter table PART add constraint PK_P_PARTKEY primary key (P_PARTKEY)

alter table PARTSUPP add constraint PK_PS_PARTKEY_PS_SUPPKEY primary key (PS_PARTKEY, PS_SUPPKEY)

alter table ORDERS add constraint PK_O_ORDERKEY primary key (O_ORDERKEY) WITH (FILLFACTOR = 95) ON GENERAL_FG

step_label = Wait for SQL to shutdown ***step_id =*** 1445 ***global_flag =*** 0
sequence_no = 5 ***step_level =*** 1 ***parent_step_id =*** 1093 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 2 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = ***version_no =*** 10.0
start_directory = G:\kit\tools\Utility ***parent_version_no =*** 62.0
step_text = g:\kit\tools\utility\sleep 90

step_label = Wait for SQL to startup ***step_id =*** 1446 ***global_flag =*** 0
sequence_no = 7 ***step_level =*** 1 ***parent_step_id =*** 1093 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 2 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = ***version_no =*** 10.0
start_directory = G:\kit\tools\Utility ***parent_version_no =*** 62.0
step_text = g:\kit\tools\utility\sleep 720

step_label = Start SQL ***step_id =*** 1447 ***global_flag =*** 0
sequence_no = 6 ***step_level =*** 1 ***parent_step_id =*** 1093 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 2 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = ***version_no =*** 7.0
start_directory = C:\Program Files\Microsoft SQL Server\MSSQL.1\MSSQL\Binn ***parent_version_no =*** 62.0
step_text = start sqlservr %TRACEFLAGS%

step_label = Shutdown SQL ***step_id =*** 1448 ***global_flag =*** 0
sequence_no = 4 ***step_level =*** 1 ***parent_step_id =*** 1093 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 2 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = ***version_no =*** 9.0

start_directory = G:\kit\tools\Utility ***parent_version_no =*** 62.0

step_text = osql -SSQLOLY2 -Usa -Psql*perf1 -t10 -Q"shutdown"

step_label = Set Database Options ***step_id =*** 1449 ***global_flag =*** 0

sequence_no = 2 ***step_level =*** 1 ***parent_step_id =*** 1093 ***enabled_flag =*** -1

iterator_name = ***degree_parallelism*** 1

execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***

step_file_name = ***version_no =*** 22.0

start_directory = Static_Connection_to_Master ***parent_version_no =*** 62.0

step_text =
```
alter database %DBNAME% set PAGE_VERIFY NONE
GO
sp_dboption %DBNAME%, 'trunc. log on chkpt.',true
GO
sp_dboption '%DBNAME%','auto create statistics','OFF'
GO
sp_dboption '%DBNAME%','auto update statistics','OFF'
GO
```

step_label = Verify TPC-H Load ***step_id =*** 1450 ***global_flag =*** 0

sequence_no = 5 ***step_level =*** 1 ***parent_step_id =*** 1096 ***enabled_flag =*** -1

iterator_name = ***degree_parallelism*** 1

execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***

step_file_name = G:\kit\setup\Utility\VerifyTpchLoad.sql ***version_no =*** 0.0

start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 71.0

step_text =

step_label = Create Database ***step_id =*** 1451 ***global_flag =*** 0

sequence_no = 1 ***step_level =*** 0 ***parent_step_id =*** 0 ***enabled_flag =*** -1

iterator_name = ***degree_parallelism*** 1

execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***

step_file_name = ***version_no =*** 3.0

start_directory = ***parent_version_no =*** 0.0

step_text =

step_label = Create TPC-H Database ***step_id =*** 1452 ***global_flag =*** 0

sequence_no = 1 ***step_level =*** 1 ***parent_step_id =*** 1451 ***enabled_flag =*** -1

iterator_name = ***degree_parallelism*** 1

execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***

step_file_name = %SETUP_DIR%\%DBNAME%\CreateDataBase.sql ***version_no =*** 1.0

start_directory = Static_Connection_to_Master ***parent_version_no =*** 3.0

step_text =

Iterator_values

workspace_id	*step_id*	*version_no*	*type*	*iterator_value*	*sequence_no*
12	1377	20.0	1	57	0
12	1372	20.0	3	1	0

12	1372	20.0	2	40		0
12	1372	20.0	1	37		0
12	1373	20.0	1	41		0
12	1373	20.0	3	1		0
12	1373	20.0	2	44		0
12	1374	20.0	1	45		0
12	1374	20.0	3	1		0
12	1374	20.0	2	48		0
12	1375	20.0	2	52		0
12	1375	20.0	1	49		0
12	1375	20.0	3	1		0
12	1376	21.0	2	56		0
12	1199	1.0	1	1		0
12	1133	2.3	3	1		0
12	1199	1.0	2	22		0
12	1199	1.0	3	1		0
12	1200	1.0	1	1		0
12	1200	1.0	3	1		0
12	1200	1.0	2	22		0
12	1376	21.0	3	1		0
12	1133	2.3	2	%MAX_STREAMS%		0
12	1376	21.0	1	53		0
12	1378	20.0	1	61		0
12	1378	20.0	2	64		0
12	1378	20.0	3	1		0
12	1377	20.0	2	60		0
12	1377	20.0	3	1		0
12	1371	20.0	2	36		0
12	1133	2.3	1	1		0
12	1365	20.0	3	1		0
12	1371	20.0	1	33		0
12	1112	33.0	4	PARTSUPP		2
12	1112	33.0	4	ORDERS		1
12	1112	33.0	4	LINEITEM		0
12	1112	33.0	4	PART		3
12	1366	20.0	3	1		0
12	1365	20.0	2	12		0
12	1366	20.0	1	13		0
12	1365	20.0	1	9		0
12	1364	22.0	1	5		0

12	1364	22.0	2	8		0
12	1364	22.0	3	1		0
12	1363	22.0	3	1		0
12	1363	22.0	1	1		0
12	1112	33.0	4	SUPPLIER		5
12	1368	20.0	3	1		0
12	1363	22.0	2	4		0
12	1370	20.0	3	1		0
12	1370	20.0	2	32		0
12	1370	20.0	1	29		0
12	1369	20.0	1	25		0
12	1112	33.0	4	CUSTOMER		4
12	1369	20.0	3	1		0
12	1371	20.0	3	1		0
12	1368	20.0	1	21		0
12	1368	20.0	2	24		0
12	1367	20.0	3	1		0
12	1367	20.0	2	20		0
12	1367	20.0	1	17		0
12	1366	20.0	2	16		0
12	1369	20.0	2	28		0
13	Runs - Real Deal				0	

Workspace_parameters

workspace_id =	13	***parameter_id***	180	***parameter_type =***	0
parameter_name	TOOLS_DIR				
parameter_valu	%KIT_DIR%\Tools				
workspace_id =	13	***parameter_id***	170	***parameter_type =***	3
parameter_name	OUTPUT_DIR				
parameter_valu	G:\kit\output\474				
workspace_id =	13	***parameter_id***	171	***parameter_type =***	0
parameter_name	QUERY_DIR				
parameter_valu	%RUN_DIR%\Queries				
workspace_id =	13	***parameter_id***	172	***parameter_type =***	0
parameter_name	DBNAME				
parameter_valu	tpch1000g				
workspace_id =	13	***parameter_id***	173	***parameter_type =***	0
parameter_name	DELETE_PARALLELISM				
parameter_valu	48				
workspace_id =	13	***parameter_id***	174	***parameter_type =***	0
parameter_name	INSERT_PARALLELISM				
parameter_valu	48				
workspace_id =	13	***parameter_id***	175	***parameter_type =***	0
parameter_name	DELETE_EXECUTIONS				
parameter_valu	144				
workspace_id =	13	***parameter_id***	176	***parameter_type =***	0
parameter_name	INSERT_EXECUTIONS				
parameter_valu	144				
workspace_id =	13	***parameter_id***	169	***parameter_type =***	0
parameter_name	RUN_DIR				
parameter_valu	%KIT_DIR%\Run				
workspace_id =	13	***parameter_id***	178	***parameter_type =***	3
parameter_name	DEFAULT_DIR				
parameter_valu	%KIT_DIR%\output				
workspace_id =	13	***parameter_id***	208	***parameter_type =***	0
parameter_name	UPDATE_SETS				
parameter_valu	16				
workspace_id =	13	***parameter_id***	181	***parameter_type =***	0
parameter_name	BATCH_SIZE				
parameter_valu	40				
workspace_id =	13	***parameter_id***	182	***parameter_type =***	0
parameter_name	KIT_DIR				
parameter_valu	G:\kit				
workspace_id =	13	***parameter_id***	183	***parameter_type =***	3

parameter_name RUN_ID
parameter_valu 474

workspace_id = 13 *parameter_id* 184 *parameter_type* = 0
parameter_name TRACEFLAGS
parameter_valu -c -x -E -T697

workspace_id = 13 *parameter_id* 186 *parameter_type* = 0
parameter_name SETUP_DIR
parameter_valu %KIT_DIR%\Setup

workspace_id = 13 *parameter_id* 206 *parameter_type* = 0
parameter_name RF_FLATFILE_DIR
parameter_valu G:\mnt\ntfs\17\rf1000g

workspace_id = 13 *parameter_id* 207 *parameter_type* = 0
parameter_name FILES_PER_UPDATE_SET
parameter_valu 16

workspace_id = 13 *parameter_id* 177 *parameter_type* = 0
parameter_name MAX_STREAMS
parameter_valu 7

Connection_dtls

workspace_id	*connection_name_id*	*connection_name*	*connection_string_name*	*connection_type*
13	84	Power_Dynamic_DB_Connection	DBCONNECTION	2
13	87	Dynamic_Connection_to_Master	MASTERCONNECTION	2
13	83	Throughput_Static_Stream_10_Connection	DBCONNECTION	1
13	82	Throughput_Static_Stream_9_Connection	DBCONNECTION	1
13	81	Throughput_Static_Stream_8_Connection	DBCONNECTION	1
13	80	Throughput_Static_Stream_7_Connection	DBCONNECTION	1
13	79	Throughput_Static_Stream_6_Connection	DBCONNECTION	1
13	78	Throughput_Static_Stream_5_Connection	DBCONNECTION	1
13	77	Throughput_Static_Stream_4_Connection	DBCONNECTION	1
13	76	Throughput_Static_Stream_3_Connection	DBCONNECTION	1
13	75	Throughput_Static_Stream_2_Connection	DBCONNECTION	1
13	74	Throughput_Static_Stream_1_Connection	DBCONNECTION	1
13	73	Throughput_RF_Connection	DBCONNECTION	2
13	72	Dynamic_Connection_to_DB	DBCONNECTION	2
13	71	Power_Static_DB_Connection	DBCONNECTION	1

Workspace_connections

workspace_i	13
connection_i	21
connection_name	MASTERCONNECTION
connection_valu	DRIVER=SQL Server;SERVER=(local);UID=sa;PWD=sql*perf1;
descriptio	
no_count_display	0
no_execute	0
parse_query_onl	0
ANSI_quoted_identifiers	0
ANSI_nulls	-1
show_query_pla	0
show_stats_tim	0
show_stats_i	0
parse_odbc_msg_prefix	-1
row_count	0
tsql_batch_separat	GO
query_time_out	0
server_languag	(Default)
character_translation	-1
regional_settings	0

workspace_i	13
connection_i	20
connection_name	DBCONNECTION
connection_valu	DRIVER=SQL Server;SERVER=(local);UID=sa;PWD=sql*perf1;DATABASE=%DBNAME%;
descriptio	
no_count_display	0
no_execute	0
parse_query_onl	0
ANSI_quoted_identifiers	0
ANSI_nulls	-1
show_query_pla	0
show_stats_tim	0
show_stats_i	0
parse_odbc_msg_prefix	-1
row_count	0
tsql_batch_separat	GO
query_time_out	0
server_languag	(Default)
character_translation	-1
regional_settings	0

Att_steps

workspace_id = 13

step_label = Clear any Outstanding Semaphores *step_id =* 1201 *global_flag =* 0
sequence_no = 1 *step_level =* 0 *parent_step_id =* 0 *enabled_flag =* -1
iterator_name = *degree_parallelism* 1
execution_mechanism = 2 *continuation_criteria =* 2 *failure_details =*
step_file_name = *version_no =* 76.0

start_directory = %TOOLS_DIR% ***parent_version_no =*** 0.0

step_text = ::
:: This step must always be run to insure that a semaphore.exe was not left open by a
:: previous run
::
:: If there are no open semaphore.exe's then the 'KILL' will do nothing.
::
%TOOLS_DIR%\Utility\KILL.EXE SEMAPHORE.EXE

step_label = Execute Power Run ***step_id =*** 1202 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 0 ***parent_step_id =*** 0 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 122.2
start_directory = ***parent_version_no =*** 0.0
step_text =

step_label = Execute Throughput Run ***step_id =*** 1203 ***global_flag =*** 0
sequence_no = 3 ***step_level =*** 0 ***parent_step_id =*** 0 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 2
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 44.0
start_directory = ***parent_version_no =*** 0.0
step_text =

step_label = Power - Sequential Query Execution ***step_id =*** 1205 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 1 ***parent_step_id =*** 1202 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 27.1
start_directory = ***parent_version_no =*** 122.2
step_text =

step_label = Power - Increment Update Set ***step_id =*** 1207 ***global_flag =*** 0
sequence_no = 4 ***step_level =*** 1 ***parent_step_id =*** 1202 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = ***version_no =*** 47.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 122.2
step_text = UPDATE TPCH_AUX_TABLE SET updateset=updateset+1

step_label = Sequential Refresh Stream Execution ***step_id =*** 1208 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 1 ***parent_step_id =*** 1203 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***

step_file_name = ***version_no =*** 1.3
start_directory = ***parent_version_no =*** 44.0
step_text =

step_label = Parallel Stream Execution ***step_id =*** 1209 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 1 ***parent_step_id =*** 1203 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %MAX_STREAMS%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 2.0
start_directory = ***parent_version_no =*** 44.0
step_text =

step_label = Power - Execute Query 14 ***step_id =*** 1211 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 2 ***parent_step_id =*** 1205 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = %QUERY_DIR%\Power\14.sql ***version_no =*** 15.0
start_directory = Power_Static_DB_Connection ***parent_version_no =*** 27.1
step_text =

step_label = Power - Execute Query 02 ***step_id =*** 1212 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 2 ***parent_step_id =*** 1205 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = %QUERY_DIR%\Power\2.sql ***version_no =*** 16.0
start_directory = Power_Static_DB_Connection ***parent_version_no =*** 27.1
step_text =

step_label = Power - Execute Query 09 ***step_id =*** 1213 ***global_flag =*** 0
sequence_no = 3 ***step_level =*** 2 ***parent_step_id =*** 1205 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = %QUERY_DIR%\Power\9.sql ***version_no =*** 14.0
start_directory = Power_Static_DB_Connection ***parent_version_no =*** 27.1
step_text =

step_label = Power - Execute Query 20 ***step_id =*** 1214 ***global_flag =*** 0
sequence_no = 4 ***step_level =*** 2 ***parent_step_id =*** 1205 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = %QUERY_DIR%\Power\20.sql ***version_no =*** 13.0
start_directory = Power_Static_DB_Connection ***parent_version_no =*** 27.1
step_text =

step_label = Power - Execute Query 06 ***step_id =*** 1215 ***global_flag =*** 0

sequence_no = 5 *step_level* = 2 *parent_step_id* = 1205 *enabled_flag* = -1
iterator_name = *degree_parallelism* 1
execution_mechanism = 1 *continuation_criteria* = 2 *failure_details* =
step_file_name = %QUERY_DIR%\Power\6.sql *version_no* = 12.0
start_directory = Power_Static_DB_Connection *parent_version_no* = 27.1
step_text =

step_label = Power - Execute Query 17 *step_id* = 1216 *global_flag* = 0
sequence_no = 6 *step_level* = 2 *parent_step_id* = 1205 *enabled_flag* = -1
iterator_name = *degree_parallelism* 1
execution_mechanism = 1 *continuation_criteria* = 2 *failure_details* =
step_file_name = %QUERY_DIR%\Power\17.sql *version_no* = 12.0
start_directory = Power_Static_DB_Connection *parent_version_no* = 27.1
step_text =

step_label = Power - Execute Query 18 *step_id* = 1217 *global_flag* = 0
sequence_no = 7 *step_level* = 2 *parent_step_id* = 1205 *enabled_flag* = -1
iterator_name = *degree_parallelism* 1
execution_mechanism = 1 *continuation_criteria* = 2 *failure_details* =
step_file_name = %QUERY_DIR%\Power\18.sql *version_no* = 12.0
start_directory = Power_Static_DB_Connection *parent_version_no* = 27.1
step_text =

step_label = Power - Execute Query 08 *step_id* = 1218 *global_flag* = 0
sequence_no = 8 *step_level* = 2 *parent_step_id* = 1205 *enabled_flag* = -1
iterator_name = *degree_parallelism* 1
execution_mechanism = 1 *continuation_criteria* = 2 *failure_details* =
step_file_name = %QUERY_DIR%\Power\8.sql *version_no* = 12.0
start_directory = Power_Static_DB_Connection *parent_version_no* = 27.1
step_text =

step_label = Power - Execute Query 21 *step_id* = 1219 *global_flag* = 0
sequence_no = 9 *step_level* = 2 *parent_step_id* = 1205 *enabled_flag* = -1
iterator_name = *degree_parallelism* 1
execution_mechanism = 1 *continuation_criteria* = 2 *failure_details* =
step_file_name = %QUERY_DIR%\Power\21.sql *version_no* = 12.0
start_directory = Power_Static_DB_Connection *parent_version_no* = 27.1
step_text =

step_label = Power - Execute Query 13 *step_id* = 1220 *global_flag* = 0
sequence_no = 10 *step_level* = 2 *parent_step_id* = 1205 *enabled_flag* = -1
iterator_name = *degree_parallelism* 1
execution_mechanism = 1 *continuation_criteria* = 2 *failure_details* =
step_file_name = %QUERY_DIR%\Power\13.sql *version_no* = 12.0
start_directory = Power_Static_DB_Connection *parent_version_no* = 27.1

step_text =

step_label = Power - Execute Query 03 ***step_id =*** 1221 ***global_flag =*** 0
sequence_no = 11 ***step_level =*** 2 ***parent_step_id =*** 1205 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\Power\3.sql ***version_no =*** 13.0
start_directory = Power_Static_DB_Connection ***parent_version_no =*** 27.1
step_text =

step_label = Power - Execute Query 22 ***step_id =*** 1222 ***global_flag =*** 0
sequence_no = 12 ***step_level =*** 2 ***parent_step_id =*** 1205 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\Power\22.sql ***version_no =*** 12.0
start_directory = Power_Static_DB_Connection ***parent_version_no =*** 27.1
step_text =

step_label = Power - Execute Query 16 ***step_id =*** 1223 ***global_flag =*** 0
sequence_no = 13 ***step_level =*** 2 ***parent_step_id =*** 1205 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = %QUERY_DIR%\Power\16.sql ***version_no =*** 15.0
start_directory = Power_Static_DB_Connection ***parent_version_no =*** 27.1
step_text =

step_label = Power - Execute Query 04 ***step_id =*** 1224 ***global_flag =*** 0
sequence_no = 14 ***step_level =*** 2 ***parent_step_id =*** 1205 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\Power\4.sql ***version_no =*** 13.0
start_directory = Power_Static_DB_Connection ***parent_version_no =*** 27.1
step_text =

step_label = Power - Execute Query 11 ***step_id =*** 1225 ***global_flag =*** 0
sequence_no = 15 ***step_level =*** 2 ***parent_step_id =*** 1205 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\Power\11.sql ***version_no =*** 13.0
start_directory = Power_Static_DB_Connection ***parent_version_no =*** 27.1
step_text =

step_label = Power - Execute Query 15 ***step_id =*** 1226 ***global_flag =*** 0
sequence_no = 16 ***step_level =*** 2 ***parent_step_id =*** 1205 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1

execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\Power\15.sql ***version_no =*** 12.0
start_directory = Power_Static_DB_Connection ***parent_version_no =*** 27.1
step_text =

step_label = Power - Execute Query 01 ***step_id =*** 1227 ***global_flag =*** 0
sequence_no = 17 ***step_level =*** 2 ***parent_step_id =*** 1205 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\Power\1.sql ***version_no =*** 12.0
start_directory = Power_Static_DB_Connection ***parent_version_no =*** 27.1
step_text =

step_label = Power - Execute Query 10 ***step_id =*** 1228 ***global_flag =*** 0
sequence_no = 18 ***step_level =*** 2 ***parent_step_id =*** 1205 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\Power\10.sql ***version_no =*** 12.0
start_directory = Power_Static_DB_Connection ***parent_version_no =*** 27.1
step_text =

step_label = Power - Execute Query 19 ***step_id =*** 1229 ***global_flag =*** 0
sequence_no = 19 ***step_level =*** 2 ***parent_step_id =*** 1205 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\Power\19.sql ***version_no =*** 12.0
start_directory = Power_Static_DB_Connection ***parent_version_no =*** 27.1
step_text =

step_label = Power - Execute Query 05 ***step_id =*** 1230 ***global_flag =*** 0
sequence_no = 20 ***step_level =*** 2 ***parent_step_id =*** 1205 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\Power\5.sql ***version_no =*** 12.0
start_directory = Power_Static_DB_Connection ***parent_version_no =*** 27.1
step_text =

step_label = Power - Execute Query 07 ***step_id =*** 1231 ***global_flag =*** 0
sequence_no = 21 ***step_level =*** 2 ***parent_step_id =*** 1205 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\Power\7.sql ***version_no =*** 12.0
start_directory = Power_Static_DB_Connection ***parent_version_no =*** 27.1
step_text =

step_label = Power - Execute Query 12 ***step_id =*** 1232 ***global_flag =*** 0
sequence_no = 22 ***step_level =*** 2 ***parent_step_id =*** 1205 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\Power\12.sql ***version_no =*** 12.0
start_directory = Power_Static_DB_Connection ***parent_version_no =*** 27.1
step_text =

step_label = Throughput - Semaphore Loop for RF Delay ***step_id =*** 1234 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 2 ***parent_step_id =*** 1208 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 2 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = ***version_no =*** 2.0
start_directory = %TOOLS_DIR% ***parent_version_no =*** 1.3
step_text = %TOOLS_DIR%\Utility\semaphore -waitgroup S -count %MAX_STREAMS%

step_label = Throughput - Refresh Streams ***step_id =*** 1235 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 2 ***parent_step_id =*** 1208 ***enabled_flag =*** -1
iterator_name = STREAM_NUM ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 0.3
start_directory = ***parent_version_no =*** 1.3
step_text =

step_label = Stream 1 Manager ***step_id =*** 1236 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 2 ***parent_step_id =*** 1209 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 0.3
start_directory = ***parent_version_no =*** 2.0
step_text =

step_label = Stream 2 Manager ***step_id =*** 1237 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 2 ***parent_step_id =*** 1209 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 0.2
start_directory = ***parent_version_no =*** 2.0
step_text =

step_label = Stream 3 Manager ***step_id =*** 1238 ***global_flag =*** 0
sequence_no = 3 ***step_level =*** 2 ***parent_step_id =*** 1209 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***

step_file_name = ***version_no =*** 0.1
start_directory = ***parent_version_no =*** 2.0
step_text =

step_label = Stream 4 Manager ***step_id =*** 1239 ***global_flag =*** 0
sequence_no = 4 ***step_level =*** 2 ***parent_step_id =*** 1209 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 0.2
start_directory = ***parent_version_no =*** 2.0
step_text =

step_label = Stream 5 Manager ***step_id =*** 1240 ***global_flag =*** 0
sequence_no = 5 ***step_level =*** 2 ***parent_step_id =*** 1209 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 0.2
start_directory = ***parent_version_no =*** 2.0
step_text =

step_label = Stream 6 Manager ***step_id =*** 1241 ***global_flag =*** 0
sequence_no = 6 ***step_level =*** 2 ***parent_step_id =*** 1209 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 2.1
start_directory = ***parent_version_no =*** 2.0
step_text =

step_label = Stream 7 Manager ***step_id =*** 1242 ***global_flag =*** 0
sequence_no = 7 ***step_level =*** 2 ***parent_step_id =*** 1209 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 1.1
start_directory = ***parent_version_no =*** 2.0
step_text =

step_label = Stream 8 Manager ***step_id =*** 1243 ***global_flag =*** 0
sequence_no = 8 ***step_level =*** 2 ***parent_step_id =*** 1209 ***enabled_flag =*** 0
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 1.0
start_directory = ***parent_version_no =*** 2.0
step_text =

step_label = Stream 9 Manager ***step_id =*** 1244 ***global_flag =*** 0

sequence_no = 9 ***step_level =*** 2 ***parent_step_id =*** 1209 ***enabled_flag =*** 0
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 1.0
start_directory = ***parent_version_no =*** 2.0
step_text =

step_label = Stream 10 Manager ***step_id =*** 1245 ***global_flag =*** 0
sequence_no = 10 ***step_level =*** 2 ***parent_step_id =*** 1209 ***enabled_flag =*** 0
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 1.0
start_directory = ***parent_version_no =*** 2.0
step_text =

step_label = Throughput - RF1 - Stream%STREAM_NUM% ***step_id =*** 1246 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 3 ***parent_step_id =*** 1235 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %INSERT_PARALLELISM%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 1.2
start_directory = ***parent_version_no =*** 0.3
step_text =

step_label = Throughput - RF2 - Stream%STREAM_NUM% ***step_id =*** 1247 ***global_flag =*** 0
sequence_no = 4 ***step_level =*** 3 ***parent_step_id =*** 1235 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %DELETE_PARALLELISM%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 1.1
start_directory = ***parent_version_no =*** 0.3
step_text =

step_label = Throughput - Stream - Increment Update Set ***step_id =*** 1248 ***global_flag =*** 0
sequence_no = 5 ***step_level =*** 3 ***parent_step_id =*** 1235 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = ***version_no =*** 1.0
start_directory = Throughput_RF_Connection ***parent_version_no =*** 0.3
step_text = UPDATE TPCH_AUX_TABLE SET updateset=updateset+1

step_label = Throughput - Query Stream 1 ***step_id =*** 1249 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1236 ***enabled_flag =*** -1
iterator_name = QUERY ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***

step_file_name = %QUERY_DIR%\STREAM1\Stream1Q%QUERY%.sql ***version_no =*** 2.0
start_directory = Throughput_Static_Stream_1_Connection ***parent_version_no =*** 0.3
step_text =

step_label = Throughput - Post to Semaphore (S1) ***step_id =*** 1250 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 3 ***parent_step_id =*** 1236 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 2 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = ***version_no =*** 2.0
start_directory = %TOOLS_DIR% ***parent_version_no =*** 0.3
step_text = %TOOLS_DIR%\Utility\semaphore -signal S.1

step_label = Throughput - Query Stream 2 ***step_id =*** 1251 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1237 ***enabled_flag =*** -1
iterator_name = QUERY ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\STREAM2\Stream2Q%QUERY%.sql ***version_no =*** 2.0
start_directory = Throughput_Static_Stream_2_Connection ***parent_version_no =*** 0.2
step_text =

step_label = Throughput - Post to Semaphore (S2) ***step_id =*** 1252 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 3 ***parent_step_id =*** 1237 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 2 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = ***version_no =*** 1.0
start_directory = %TOOLS_DIR% ***parent_version_no =*** 0.2
step_text = %TOOLS_DIR%\Utility\semaphore -signal S.2

step_label = Throughput - Query Stream 3 ***step_id =*** 1253 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1238 ***enabled_flag =*** -1
iterator_name = QUERY ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\STREAM3\Stream3Q%QUERY%.sql ***version_no =*** 1.0
start_directory = Throughput_Static_Stream_3_Connection ***parent_version_no =*** 0.1
step_text =

step_label = Throughput - Post to Semaphore (S3) ***step_id =*** 1254 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 3 ***parent_step_id =*** 1238 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 2 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = ***version_no =*** 0.0
start_directory = %TOOLS_DIR% ***parent_version_no =*** 0.1
step_text = %TOOLS_DIR%\Utility\semaphore -signal S.3

step_label = Throughput - Query Stream 4 ***step_id =*** 1255 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1239 ***enabled_flag =*** -1
iterator_name = QUERY ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\STREAM4\Stream4Q%QUERY%.sql ***version_no =*** 1.0
start_directory = Throughput_Static_Stream_4_Connection ***parent_version_no =*** 0.2
step_text =

step_label = Throughput - Post to Semaphore (S4) ***step_id =*** 1256 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 3 ***parent_step_id =*** 1239 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 2 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = ***version_no =*** 1.0
start_directory = %TOOLS_DIR% ***parent_version_no =*** 0.2
step_text = %TOOLS_DIR%\Utility\semaphore -signal S.4

step_label = Throughput - Query Stream 5 ***step_id =*** 1257 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1240 ***enabled_flag =*** -1
iterator_name = QUERY ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\STREAM5\Stream5Q%QUERY%.sql ***version_no =*** 1.0
start_directory = Throughput_Static_Stream_5_Connection ***parent_version_no =*** 0.2
step_text =

step_label = Throughput - Post to Semaphore (S5) ***step_id =*** 1258 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 3 ***parent_step_id =*** 1240 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 2 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = ***version_no =*** 1.0
start_directory = %TOOLS_DIR% ***parent_version_no =*** 0.2
step_text = %TOOLS_DIR%\Utility\semaphore -signal S.5

step_label = Throughput - Query Stream 6 ***step_id =*** 1259 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1241 ***enabled_flag =*** -1
iterator_name = QUERY ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\STREAM6\Stream6Q%QUERY%.sql ***version_no =*** 1.0
start_directory = Throughput_Static_Stream_6_Connection ***parent_version_no =*** 2.1
step_text =

step_label = Throughput - Post to Semaphore (S6) ***step_id =*** 1260 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 3 ***parent_step_id =*** 1241 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1

execution_mechanism = 2 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = ***version_no =*** 0.0
start_directory = %TOOLS_DIR% ***parent_version_no =*** 2.1
step_text = %TOOLS_DIR%\Utility\semaphore -signal S.6

step_label = Throughput - Query Stream 7 ***step_id =*** 1261 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1242 ***enabled_flag =*** -1
iterator_name = QUERY ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\STREAM7\Stream7Q%QUERY%.sql ***version_no =*** 1.0
start_directory = Throughput_Static_Stream_7_Connection ***parent_version_no =*** 1.1
step_text =

step_label = Throughput - Post to Semaphore (S7) ***step_id =*** 1262 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 3 ***parent_step_id =*** 1242 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 2 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = ***version_no =*** 0.0
start_directory = %TOOLS_DIR% ***parent_version_no =*** 1.1
step_text = %TOOLS_DIR%\Utility\semaphore -signal S.7

step_label = Throughput - Query Stream 8 ***step_id =*** 1263 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1243 ***enabled_flag =*** 0
iterator_name = QUERY ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\STREAM8\Stream8Q%QUERY%.sql ***version_no =*** 0.0
start_directory = Throughput_Static_Stream_8_Connection ***parent_version_no =*** 1.0
step_text =

step_label = Throughput - Post to Semaphore (S8) ***step_id =*** 1264 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 3 ***parent_step_id =*** 1243 ***enabled_flag =*** 0
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 2 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = ***version_no =*** 0.0
start_directory = %TOOLS_DIR% ***parent_version_no =*** 1.0
step_text = %TOOLS_DIR%\Utility\semaphore -signal S.8

step_label = Throughput - Query Stream 9 ***step_id =*** 1265 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1244 ***enabled_flag =*** 0
iterator_name = QUERY ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\STREAM9\Stream9Q%QUERY%.sql ***version_no =*** 0.0
start_directory = Throughput_Static_Stream_9_Connection ***parent_version_no =*** 1.0
step_text =

step_label = Throughput - Post to Semaphore (S9) ***step_id =*** 1266 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 3 ***parent_step_id =*** 1244 ***enabled_flag =*** 0
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 2 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = ***version_no =*** 0.0
start_directory = %TOOLS_DIR% ***parent_version_no =*** 1.0
step_text = %TOOLS_DIR%\Utility\semaphore -signal S.9

step_label = Throughput - Query Stream 10 ***step_id =*** 1267 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1245 ***enabled_flag =*** 0
iterator_name = QUERY ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = %QUERY_DIR%\STREAM10\Stream10Q%QUERY%.sql ***version_no =*** 0.0
start_directory = Throughput_Static_Stream_10_Connection ***parent_version_no =*** 1.0
step_text =

step_label = Throughput - Post to Semaphore (S10) ***step_id =*** 1268 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 3 ***parent_step_id =*** 1245 ***enabled_flag =*** 0
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 2 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = ***version_no =*** 0.0
start_directory = %TOOLS_DIR% ***parent_version_no =*** 1.0
step_text = %TOOLS_DIR%\Utility\semaphore -signal S.10

step_label = Throughput - Execute Stream%STREAM_NUM% RF1 ***step_id =*** 1269 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 4 ***parent_step_id =*** 1246 ***enabled_flag =*** -1
iterator_name = INSERT_SEGMENT ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = ***version_no =*** 6.0
start_directory = Throughput_RF_Connection ***parent_version_no =*** 1.2
step_text =
```
--
-- Execute the Refresh RF1 Stored Procedure
--
EXEC  RF1 %INSERT_SEGMENT%, %BATCH_SIZE%, %INSERT_PARALLELISM%,
%INSERT_EXECUTIONS%
```

step_label = Throughput - Execute Stream%STREAM_NUM% RF2 ***step_id =*** 1270 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 4 ***parent_step_id =*** 1247 ***enabled_flag =*** -1
iterator_name = DELETE_SEGMENT ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = ***version_no =*** 5.0
start_directory = Throughput_RF_Connection ***parent_version_no =*** 1.1
step_text =
```
--
-- Execute the Refresh RF2 Stored Procedure
--
EXEC RF2 %DELETE_SEGMENT%, %BATCH_SIZE%, %DELETE_PARALLELISM%,
%DELETE_EXECUTIONS%
```

step_label = SqlServer Startup ***step_id =*** 1294 ***global_flag =*** -1
sequence_no = 1 ***step_level =*** 0 ***parent_step_id =*** 0 ***enabled_flag =*** 0
iterator_name = ***degree_parallelism*** 0
execution_mechanism = 2 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 0.0
start_directory = ***parent_version_no =*** 0.0
step_text = start "SqlServer" sqlservr -c %TRACEFLAGS%
%TOOLS_DIR%\Utility\wait4sql 40000

step_label = SqlServer Shutdown ***step_id =*** 1295 ***global_flag =*** -1
sequence_no = 2 ***step_level =*** 0 ***parent_step_id =*** 0 ***enabled_flag =*** 0
iterator_name = ***degree_parallelism*** 0
execution_mechanism = 2 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 0.0
start_directory = ***parent_version_no =*** 0.0
step_text = isql -Usa -P -t10 -Q"shutdown"
%TOOLS_DIR%\Utility\wait4sql 10000

step_label = Wait For SQL Server ***step_id =*** 1296 ***global_flag =*** -1
sequence_no = 3 ***step_level =*** 0 ***parent_step_id =*** 0 ***enabled_flag =*** 0
iterator_name = ***degree_parallelism*** 0
execution_mechanism = 2 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 0.0
start_directory = %TOOLS_DIR% ***parent_version_no =*** 0.0
step_text = %TOOLS_DIR%\Utility\wait4sql.exe 60000

step_label = Power - Execute RF1 ***step_id =*** 1405 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 1 ***parent_step_id =*** 1202 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 20.0
start_directory = ***parent_version_no =*** 122.2
step_text =

step_label = Parallel RF1 Execution ***step_id =*** 1406 ***global_flag =*** 0
sequence_no = 4 ***step_level =*** 2 ***parent_step_id =*** 1405 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %INSERT_PARALLELISM%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 3.0
start_directory = ***parent_version_no =*** 20.0
step_text =

step_label = Execute RF1 ***step_id =*** 1407 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1406 ***enabled_flag =*** -1
iterator_name = INSERT_SEGMENT ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = ***version_no =*** 13.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 3.0

step_text = --
-- Execute the Refresh RF1 Stored Procedure
--

EXEC RF1 %INSERT_SEGMENT%, %BATCH_SIZE%, %INSERT_PARALLELISM%,
%INSERT_EXECUTIONS%

step_label = Create RF1 Tables ***step_id =*** 1411 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 2 ***parent_step_id =*** 1405 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = %SETUP_DIR%\storedprocs\RF1_init.sql ***version_no =*** 11.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 20.0
step_text =

step_label = Parallel Load RF1 Input ***step_id =*** 1414 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 2 ***parent_step_id =*** 1405 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %FILES_PER_UPDATE_SET%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 2.0
start_directory = ***parent_version_no =*** 20.0
step_text =

step_label = Throughput - Load RF1 Input ***step_id =*** 1415 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 5 ***parent_step_id =*** 1431 ***enabled_flag =*** -1
iterator_name = SEGMENT ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = G:\kit\setup\StoredProcs\RF1_load.sql ***version_no =*** 4.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 0.1
step_text =

step_label = Create RF1 Indices ***step_id =*** 1417 ***global_flag =*** 0
sequence_no = 3 ***step_level =*** 2 ***parent_step_id =*** 1405 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = G:\kit\setup\StoredProcs\RF1_index.sql ***version_no =*** 5.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 20.0
step_text =

step_label = Power - Execute RF2 ***step_id =*** 1419 ***global_flag =*** 0
sequence_no = 3 ***step_level =*** 1 ***parent_step_id =*** 1202 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 17.0
start_directory = ***parent_version_no =*** 122.2
step_text =

step_label = Create RF2 Tables ***step_id =*** 1420 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 2 ***parent_step_id =*** 1419 ***enabled_flag =*** -1

iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = %SETUP_DIR%\StoredProcs\RF2_init.sql ***version_no =*** 6.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 17.0
step_text =

step_label = Parallel Load RF2 Input ***step_id =*** 1421 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 2 ***parent_step_id =*** 1419 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %FILES_PER_UPDATE_SET%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 2.0
start_directory = ***parent_version_no =*** 17.0
step_text =

step_label = Load RF2 Input ***step_id =*** 1422 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1421 ***enabled_flag =*** -1
iterator_name = SEGMENT ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = %SETUP_DIR%\StoredProcs\RF2_load.sql ***version_no =*** 4.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 2.0
step_text =

step_label = Create RF2 Indices ***step_id =*** 1424 ***global_flag =*** 0
sequence_no = 3 ***step_level =*** 2 ***parent_step_id =*** 1419 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = G:\kit\setup\StoredProcs\RF2_index.sql ***version_no =*** 4.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 17.0
step_text =

step_label = Parallel RF2 Execution ***step_id =*** 1425 ***global_flag =*** 0
sequence_no = 4 ***step_level =*** 2 ***parent_step_id =*** 1419 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %DELETE_PARALLELISM%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 2.0
start_directory = ***parent_version_no =*** 17.0
step_text =

step_label = Execute RF2 ***step_id =*** 1426 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1425 ***enabled_flag =*** -1
iterator_name = DELETE_SEGMENT ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = ***version_no =*** 11.0
start_directory = Power_Dynamic_DB_Connection ***parent_version_no =*** 2.0
step_text = --
-- Execute the Refresh RF2 Stored Procedure

```
--
EXEC RF2 %DELETE_SEGMENT%, %BATCH_SIZE%, %DELETE_PARALLELISM%,
%DELETE_EXECUTIONS%
```

step_label = Throughput - Init RF1 Input ***step_id =*** 1428 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1235 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 0.1
start_directory = ***parent_version_no =*** 0.3
step_text =

step_label = Throughput - Init RF2 Input ***step_id =*** 1429 ***global_flag =*** 0
sequence_no = 3 ***step_level =*** 3 ***parent_step_id =*** 1235 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 0.1
start_directory = ***parent_version_no =*** 0.3
step_text =

step_label = Throughput - Create RF1 Tables ***step_id =*** 1430 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 4 ***parent_step_id =*** 1428 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = G:\kit\setup\StoredProcs\RF1_init.sql ***version_no =*** 8.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 0.1
step_text =

step_label = Throughput - Parallel Load RF1 Input ***step_id =*** 1431 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 4 ***parent_step_id =*** 1428 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %FILES_PER_UPDATE_SET%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 0.1
start_directory = ***parent_version_no =*** 0.1
step_text =

step_label = Load RF1 Input ***step_id =*** 1432 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 3 ***parent_step_id =*** 1414 ***enabled_flag =*** -1
iterator_name = SEGMENT ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 1 ***failure_details =***
step_file_name = %SETUP_DIR%\StoredProcs\RF1_load.sql ***version_no =*** 3.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 2.0
step_text =

step_label = Throughput - Create RF1 Indices ***step_id =*** 1434 ***global_flag =*** 0
sequence_no = 3 ***step_level =*** 4 ***parent_step_id =*** 1428 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = ***version_no =*** 0.0

start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 0.1

step_text = create clustered index NEWORDERS_CLUIDX
on NEWORDERS (O_ORDERDATE)
on GENERAL_FG
create clustered index NEWLINEITEM_CLUIDX
on NEWLINEITEM (L_ORDERKEY)
on GENERAL_FG

step_label = Throughput - Create RF2 Tables ***step_id =*** 1435 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 4 ***parent_step_id =*** 1429 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = G:\kit\setup\StoredProcs\RF2_init.sql ***version_no =*** 5.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 0.1
step_text =

step_label = Throughput - Parallel Load RF2 Input ***step_id =*** 1436 ***global_flag =*** 0
sequence_no = 2 ***step_level =*** 4 ***parent_step_id =*** 1429 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** %FILES_PER_UPDATE_SET%
execution_mechanism = 0 ***continuation_criteria =*** 0 ***failure_details =***
step_file_name = ***version_no =*** 0.1
start_directory = ***parent_version_no =*** 0.1
step_text =

step_label = Throughput - Load RF2 Input ***step_id =*** 1437 ***global_flag =*** 0
sequence_no = 1 ***step_level =*** 5 ***parent_step_id =*** 1436 ***enabled_flag =*** -1
iterator_name = SEGMENT ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = G:\kit\setup\StoredProcs\RF2_load.sql ***version_no =*** 3.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 0.1
step_text =

step_label = Throughput - Create RF2 Indices ***step_id =*** 1438 ***global_flag =*** 0
sequence_no = 3 ***step_level =*** 4 ***parent_step_id =*** 1429 ***enabled_flag =*** -1
iterator_name = ***degree_parallelism*** 1
execution_mechanism = 1 ***continuation_criteria =*** 2 ***failure_details =***
step_file_name = G:\kit\setup\StoredProcs\RF2_index.sql ***version_no =*** 3.0
start_directory = Dynamic_Connection_to_DB ***parent_version_no =*** 0.1
step_text =

Iterator_values

workspace_id	step_id	version_no	type	iterator_value	sequence_no
13	1269	6.0	3	1	0
13	1432	3.0	3	1	0
13	1432	3.0	2	%FILES_PER_UPDATE_SET%	0
13	1432	3.0	1	1	0
13	1235	0.3	2	%MAX_STREAMS%	0
13	1235	0.3	3	1	0
13	1235	0.3	1	1	0
13	1265	0.0	3	1	0
13	1265	0.0	2	22	0
13	1265	0.0	1	1	0
13	1263	0.0	1	1	0
13	1263	0.0	2	22	0
13	1267	0.0	3	1	0
13	1269	6.0	1	1	0
13	1422	4.0	3	1	0
13	1269	6.0	2	%INSERT_EXECUTIONS%	0
13	1270	5.0	3	1	0
13	1270	5.0	1	1	0
13	1270	5.0	2	%DELETE_EXECUTIONS%	0
13	1415	4.0	3	1	0
13	1415	4.0	2	%FILES_PER_UPDATE_SET%	0
13	1415	4.0	1	1	0
13	1437	3.0	2	%FILES_PER_UPDATE_SET%	0
13	1437	3.0	3	1	0
13	1437	3.0	1	1	0
13	1267	0.0	1	1	0
13	1267	0.0	2	22	0
13	1263	0.0	3	1	0
13	1259	1.0	3	1	0
13	1249	2.0	1	1	0
13	1249	2.0	3	1	0
13	1251	2.0	1	1	0
13	1251	2.0	2	22	0
13	1251	2.0	3	1	0
13	1253	1.0	3	1	0
13	1253	1.0	2	22	0

13	1253	1.0	1	1		0
13	1255	1.0	3	1		0
13	1255	1.0	2	22		0
13	1255	1.0	1	1		0
13	1257	1.0	2	22		0
13	1422	4.0	1	1		0
13	1257	1.0	3	1		0
13	1422	4.0	2	%FILES_PER_UPDATE_SET%		0
13	1259	1.0	1	1		0
13	1259	1.0	2	22		0
13	1261	1.0	1	1		0
13	1261	1.0	2	22		0
13	1261	1.0	3	1		0
13	1407	13.0	1	1		0
13	1407	13.0	3	1		0
13	1407	13.0	2	%INSERT_EXECUTIONS%		0
13	1426	11.0	3	1		0
13	1426	11.0	2	%DELETE_EXECUTIONS%		0
13	1426	11.0	1	1		0
13	1249	2.0	2	22		0
13	1257	1.0	1	1		0

Semaphore.cpp

```
#define _WIN32_WINNT 0x0400
#include <windows.h>
#include <string.h>
#include <iostream.h>
#include <stdlib.h>
#include <stdio.h>
#include <assert.h>
void main(int argc, char **argv)
{
typedef enum { eUnknown, eWait, eSignal, eRelease, eWaitList,
eWaitGroup } OPERATION;
OPERATION eOP = eUnknown;
int iCount;
int i;
HANDLE hSemaphore;
HANDLE *pHandles;
SYSTEMTIME Time;
if (argc < 3)
goto usage;
if (_stricmp(argv[1], "-wait") == 0)
eOP = eWait;
else if (_stricmp(argv[1], "-signal") == 0)
eOP = eSignal;
else if (_stricmp(argv[1], "-release") == 0)
eOP = eRelease;
else if (_stricmp(argv[1], "-waitlist") == 0)
eOP = eWaitList;
else if (_stricmp(argv[1], "-waitgroup") == 0)
eOP = eWaitGroup;
else goto usage;
if ((eOP == eWait) || (eOP == eRelease))
{
// argv[2] is the semaphore name
// if -count option specified, then there must be exactly 5 args
if ((argc == 5) && (_stricmp(argv[3], "-count") == 0))
{
iCount = atoi(argv[4]);
if (iCount < 1)
goto usage;
}
// check that
else if (argc != 3)
goto usage;
else
iCount = 1;
}
else if (eOP == eWaitGroup)
{
if ((argc != 5) || (_stricmp(argv[3], "-count") != 0))
goto usage;
iCount = atoi(argv[4]);
if (iCount < 1)
goto usage;
}
else
// eWaitList or eSignal
iCount = argc - 2;
if (eOP == eWait)
{
printf( "semaphore name = %s\n", argv[2] );
printf( "semaphore count = %d\n", iCount );
hSemaphore = CreateSemaphore( NULL, 0, 2000000000, argv[2] );
if (hSemaphore == NULL)
{
DWORD dwError = GetLastError();
cout << "*ERROR* CreateSemaphore returned " << dwError << endl;
exit(EXIT_FAILURE);
}
for (i=0; i<iCount; i++)
{
WaitForSingleObject( hSemaphore, INFINITE );
GetLocalTime( &Time );
printf( "%4.4d-%2.2d-%2.2d %2.2d:%2.2d:%2.2d - released \n",
Time.wYear, Time.wMonth, Time.wDay, Time.wHour, Time.wMinute,
Time.wSecond );
}
CloseHandle( hSemaphore );
}
else if ((eOP == eWaitGroup) || (eOP == eWaitList))
{
char **szEventNames;
szEventNames = new char*[iCount];
char szTmp[128];
printf( "event-list =" );
for (i=0; i<iCount; i++)
{
if (eOP == eWaitGroup)
{
wsprintf( szTmp, "%s.%d", argv[2], i+1 );
szEventNames[i] = new char[strlen(szTmp)+1];
strcpy( szEventNames[i], szTmp );
}
else
{
szEventNames[i] = new char[strlen(argv[i+2])+1];
strcpy( szEventNames[i], argv[i+2] );
}
printf( " %s", szEventNames[i] );
}
printf( "\n" );
pHandles = new HANDLE[iCount-1];
for (i=0; i<iCount; i++)
{
pHandles[i] = CreateEvent( NULL, TRUE /* manual reset */, FALSE /*
initially non-signaled */, szEventNames[i] );
if (pHandles[i] == NULL)
{
DWORD dwError = GetLastError();
cout << "*ERROR* CreateEvent returned " << dwError << endl;
exit(EXIT_FAILURE);
}
}
for (i=iCount; i>0;i--)
{
int idx = WaitForMultipleObjects( i, pHandles, FALSE /* wait for all */,
INFINITE ) - WAIT_OBJECT_0;
GetLocalTime( &Time );
printf( "%4.4d-%2.2d-%2.2d %2.2d:%2.2d:%2.2d - signaled: %s \n",
Time.wYear, Time.wMonth, Time.wDay, Time.wHour, Time.wMinute,
Time.wSecond, szEventNames[idx] );
HANDLE hTmp = pHandles[idx];
pHandles[idx] = pHandles[i-1];
pHandles[i-1] = hTmp;
char* szTmp = szEventNames[idx];
szEventNames[idx] = szEventNames[i-1];
szEventNames[i-1] = szTmp;
}
for (i=0; i<iCount; i++)
CloseHandle( pHandles[i] );
}
else if (eOP == eRelease)
{
hSemaphore = OpenSemaphore( SEMAPHORE_MODIFY_STATE,
FALSE, argv[2] );
if (hSemaphore == NULL)
{
```

```
DWORD dwError = GetLastError();
cout << "*ERROR* OpenSemaphore returned " << dwError << endl;
exit(EXIT_FAILURE);
}
if (!ReleaseSemaphore( hSemaphore, iCount, NULL ))
{
DWORD dwError = GetLastError();
cout << "*ERROR* ReleaseSemaphore returned " << dwError <<
endl;
exit(EXIT_FAILURE);
}
CloseHandle( hSemaphore );
}
else if (eOP == eSignal)
{
for (i=0; i<iCount; i++)
{
HANDLE hHandle = OpenEvent( EVENT_MODIFY_STATE, FALSE,
argv[i+2] );
if (hHandle == NULL)
{
DWORD dwError = GetLastError();
cout << "*ERROR* OpenEvent returned " << dwError << endl;
exit(EXIT_FAILURE);
}
SetEvent( hHandle );
CloseHandle( hHandle );
}
}
exit(EXIT_SUCCESS);
// syntax was bad; show usage and quit
usage:
printf(
"Semaphore Utility - Ver. 1.2 - 26-Jul-99 \n"
"Copyright (C) Microsoft Corp 1999. All rights reserved.\n\n"
"usage: \n"
" semaphore { -wait | -release } <semaphore-name> [ -count <count>
] \n"
" semaphore { -waitlist | -signal } <event-list> \n"
" semaphore -waitgroup <event-prefix> -count <count>\n"
"\n"
" <semaphore-name> == alpha-numeric identifier \n"
" <count> == integer > 0; default value = 1 \n"
" <event-list> == { <event-name> ... } \n"
" <event-name> == alpha-numeric identifier \n"
" <event-prefix> == alpha-numeric identifier \n"
"\n"
"There are two modes to choose from: a semaphore or a list of
events. \n"
"\n"
"Semaphore mode: \n"
"A semaphore is a single identifier with an associated count. Each
time \n"
"the semaphore is released, the count is decremented by one (or the
amount \n"
"specified). When the count reaches zero, the waiter completes. If
there \n"
"are multiple waiters on the same semaphore, each release releases
only \n"
"the number of waiters specified in count.\n"
"\n"
"List of Events: \n"
"A list of events (alpha-numeric tags) is specified for the waiter. The
\n"
"waiter doesn't complete until all of the events have been signaled. A
\n"
"given event may be signaled more than once. There are two ways to
define \n"
"the list of events, either explicitly (-waitlist) by naming all of them or
\n"
"implicitly (-waitgroup) with a prefix and a count. Using the -waitgroup
\n"
"option, you provide an alpha-numeric tag which is used as the prefix
for a \n"
"group of events. The event names are generated by concatenating
the prefix \n"
"with \".<n>\", where <n> is 1 to the specified count. \n"
);
exit(EXIT_FAILURE);
}
```

Appendix G: Price Quotations

Microsoft Corporation
One Microsoft Way
Redmond, WA 98052-6399

Tel 425 882 8080
Fax 425 936 7329
http://www.microsoft.com/

Microsoft

May 23, 2005

Hewlett-Packard Company
Gunter Zink
One Microsoft Way
Redmond, WA 98052

Mr. Zink:

Here is the information you requested regarding pricing for several Microsoft products to be used in conjunction with your TPC-H benchmark testing.

All pricing shown is in US Dollars ($).

Part Number	Description	Unit Price	Quantity	Price
810-00652	SQL Server 2005 Enterprise Edition Server License Only Discount Schedule: Open Program - No Level Unit Price reflects a 15% discount from the retail unit price of $8,509.	$7,233	1	$7,233
359-00532	SQL Server 2005 Client License Discount Schedule: Open Program - No Level Unit Price reflects a 15% discount from the retail unit price of $163.	$139	70	$9,730
254-00170	Visual C++ Standard Edition Discount Schedule: No Discounts Applied	$109	1	$109
	Microsoft Problem Resolution Services Professional Support (1 incident)	$245	1	$245

Some products may not be currently orderable but will be available through Microsoft's normal distribution channels by November 8, 2005.

This quote is valid for the next 90 days.

If we can be of any further assistance, please contact Jamie Reding at (425) 703-0510 or jamiere@microsoft.com.

Reference ID: PHGuzi0516055757.
Please include this Reference ID in any correspondence regarding this price quote.

Description	Price Key	Part Number	Unit Price	Qty	Extended Price	3 Yr Maint Price
rx8620 16-way SMP Base System, incl cell boards, core IO, power supplies, PCI-X backplane, 16x1.6ghz Intel Madison 9M processors	1	AB240A-002	$263,995	1	$263,995	$154,128
HP 8GB HD SyncDRAM Midrange Memory	1	AB309A-0D1	$14,000	8	$112,000	
36GB, 15K hard disk for rx76/86	1	A9880A	$1,800	2	$3,600	
DVD+RW Drive for rx76/86	1	AB351A	$850	1	$850	
Server Expansion Unit: PCI-x I/O chassis	1	A6434A	$29,995	1	$29,995	$2,950
core I/O for SEU	1	A7109A	$5,000	2	$10,000	
HP Smart Array Controller 6402	1	A9890A-0D1	$1,669	12	$20,028	
2Gb PCI-X FC HBA for Windows, 64-bit	1	AB232A-0D1	$1,550	1	$1,550	
Field Rack Mount Kit - rx86xx	1	J1528A	$520	1	$520	
Field Rack Mount Kit - SEU	1	J1530B	$392	1	$392	
MSA 30	1	302969-B21	$2,978	24	$71,472	
MSA1000	1	201723-B22	$6,995	1	$6,995	
MSA1000 Controller	1	218231-B22	$4,290	1	$4,290	
Support 3yrs 24x7 (MSA1000) 4hr	1	HA101A3 6FG	$3,222	1		$3,222
Support 3yrs 24x7 (MSA30) 4hr	1	HA101A3 7GT	$1,827	24		$43,848
72.8GB, 15krpm Ultra320 SCSI disk	1	286778-B22	$569	336	$191,184	
146GB, 10krpm disk	1	286716-B22	$599	6	$3,594	
HP Rack 10642 42U pallet	1	245161-B21	$1,359	2	$2,718	
Storage Works LC/LC 2m Cable	1	221692-B21	$77.00	1	$77	
HP 16A High Voltage Modular PDU	1	252663-B24	$299	4	$1,196	
Microsoft Windows Server 2003, Datacenter edition (64-bit)	1	T2372A opt016	$32,000	1	$32,000	
	Server Subtotal				**$756,456**	**$204,148**
HP's Large Configuration Discount *	*** Discounts:**				$184,231	$53,770
	Total:				**$572,225**	**$150,378**
*All discounts are based on US list prices and for similar quantities and configurations		**3 Year cost of Ownership**				**$722,604**