



Hewlett-Packard Company

TPC Benchmark™ H
Full Disclosure Report
for
HP ProLiant DL785
using
Microsoft SQL Server 2008 Enterprise Edition for x64
and
Windows Server 2008 Enterprise Edition for x64

**First Edition
November 2008**

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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.

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Abstract

Overview

This report documents the methodology and results of the TPC Benchmark™ H test conducted on the HP ProLiant DL785 using Microsoft SQL Server 2008 Enterprise Edition for x64 in conformance with the requirements of the TPC Benchmark™ H Standard Specification, Revision 2.7.0. The operating system used for the benchmark was Microsoft Windows Server 2008 Enterprise Edition for x64.

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
Fax: (408) 295-9768

Standard and Executive Summary Statements

Pages iv - vii contain the Executive Summary and Numerical Quantities Summary of the benchmark results for the HP ProLiant DL785.

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 ProLiant DL785

TPC-H Rev. 2.7.0

Report Date: November 17, 2008

Total System Cost

Composite Query per Hour Rating

Price Performance

\$186,700 USD

57,684.7 QphH
@ 300G

\$3.24 USD
\$/ QphH @300G

Database size

Database Manager

Operating System

Other Software

Availability Date

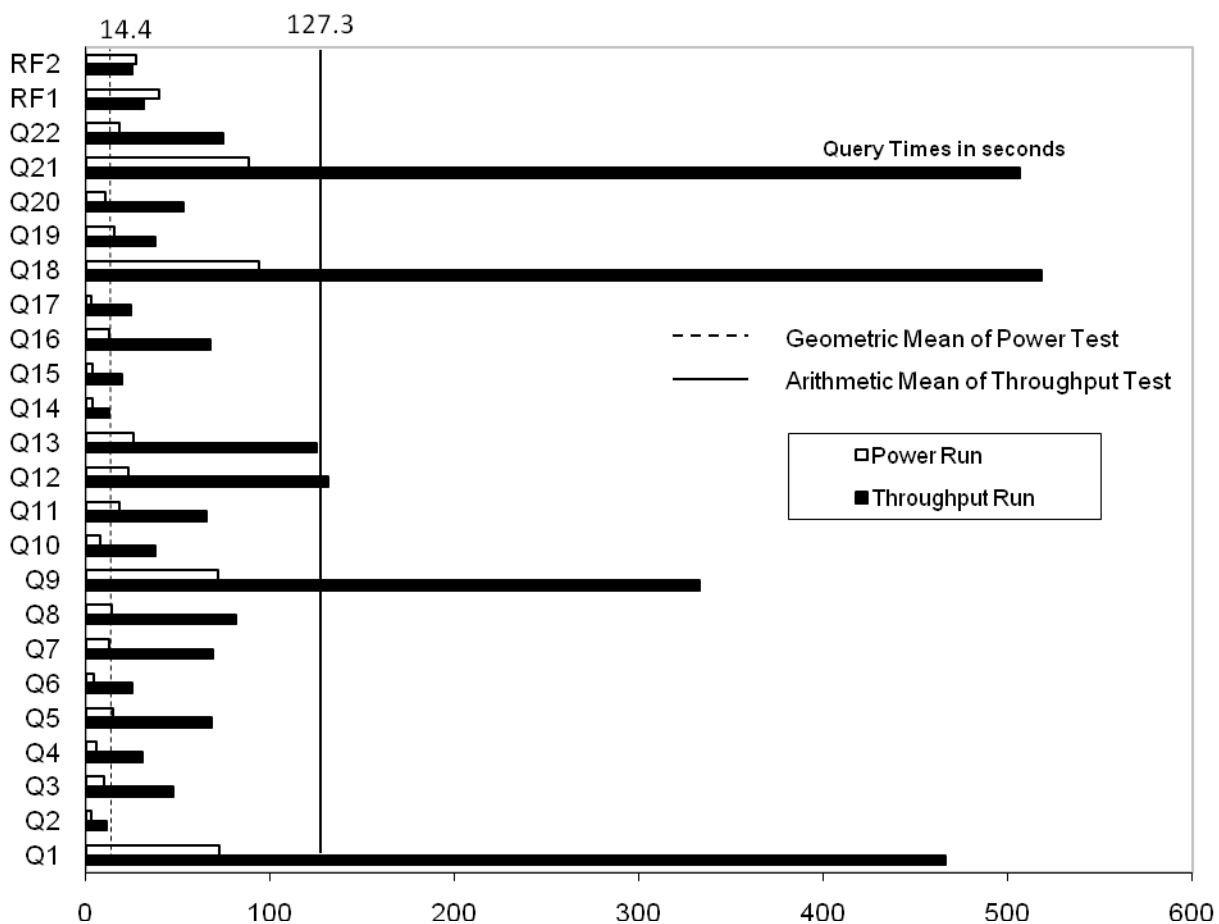
300G

Microsoft SQL Server 2008 Enterprise Edition for x64

Windows Server 2008 Enterprise Edition for x64

MS Visual Studio Standard

November 17, 2008



Database Load Time = 14h46m20s Load included backup: Y Total Data Storage / Database Size = 47.42
RAID(Base Tables): Y RAID(Base Tables and Auxiliary Data Structure): Y RAID(All)= Y

System Components	System Total	Per Node
Nodes:	1	n.a.
AMD Opteron™ 8384 Quad-Core 2.7GHz:	8	8
Cores:	32	32
Threads:	32	32
Memory:	256GB	256GB
OS Disk Drives(internal:4 x 36GB 15Krpm SAS, 2 x 72GB 15Krpm SAS):	6	6
Network Interfaces (on-board GigE):	2	2
Storage Controllers P800:	7	7
Storage Shelves MSA70:	13	n.a.
Storage Subsystem Disk Drives:	204	n.a.
Total Storage:	14,226GB	n.a.



HP ProLiant DL785

TPC-H Rev. 2.7.0
TPC Pricing 1.3.0

Report Date: November 17, 2008

Availability Date: November 17, 2008

Description	Price Key	Part Number	Unit Price	Qty.	Extended Price	3 Yr Maint Price
Server Hardware						
HP DL785 CTO Chassis	1	AH233A	\$9,999	1	\$9,999	
HP O8384 QC 2.7GHz DL785 4p FIO	1	468118-L21	\$15,399	1	\$15,399	
HP O8384 QC 2.7GHz DL785 4p Proc Kit	1	468118-B21	\$15,399	1	\$15,399	
HP 8GB Reg PC2-5300 2x4GB	1	408854-B21	\$599	32	\$19,168	
HP 36GB 15k 2.5 Single Port HP SAS Drive	1	431933-B21	\$349	4	\$1,396	
HP 3year 4h 24x7 ProLiant DL785 HW Support	1	HA104A3 Opt.6XP	\$3,208	1		\$3,208
HP s7540 17" CRT Monitor	1	PF997AA#ABA	\$139	1	\$139	
HP USB Keyboard	1	GM321AA#ABA	\$14	1	\$14	
HP Optical 4 Button USB Mouse	1	EW208AA#ABA	\$13	1	\$13	
Subtotal					\$61,527	\$3,208
Storage						
HP 5642 Unassembled Rack	1	358254-B21	\$865	1	\$865	
HP Smart Array Controller P800	1	381513-B21	\$949	7	\$6,643	
Storage MSA70	1	418800-B21	\$3,199	13	\$41,587	
Storage MSA70 10% Spares	1	418800-B21	\$3,199	2	\$6,398	
HP ext Mini SAS 4m Cable	1	432238-B21	\$142	13	\$1,846	
HP 72GB 15k 2.5 Single Port HP SAS Drive	1	431935-B21	\$359	206	\$73,954	
HP 72GB 15k 2.5 Single Port HP SAS Drive 10% spares	1	431935-B21	\$359	21	\$7,539	
Subtotal					\$138,832	\$0
Server Software						
Microsoft Windows Server 2008 Enterprise Edition (x64)	2	P72-03168	\$2,310	1	\$2,310	
Microsoft SQL Server 2008 Enterprise x64 Edition with 25 CALs	2	810-07578	\$8,318	1	\$8,318	\$245
Microsoft SQL Server 2008 Client License	2	359-01912	\$156	35	\$5,460	
Microsoft Visual Studio Standard 2005	2	127-00012	\$250	1	\$250	
Subtotal					\$16,338	\$245
Total Extended Price					\$216,697	\$3,453
Price Key: 1 - HP, 2 - Microsoft, Audited by Lorna Livingtree of Performance Metrics, Inc					\$32,873	\$577

Grand Total					\$183,824	\$2,876
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<p>All discounts are based on US list prices and for similar quantities and configurations. A 16.43% discount was based on the overall specific components pricing from vendor 1 in this single quotation. Discounts for similarly sized configurations will be similar to those quoted here, but may vary based on the components in the configuration.</p>	3 year cost of ownership USD:				\$186,700
	QphH @ 300GB:				57,684.7
	\$ USD/QphH @ 300GB				\$3.24

Sales contact: HP Sales Development, 19111 Pruneridge Ave., Cupertino, CA 95014 (408) 447 2320 or H-P direct: 800-203-6748

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



HP ProLiant DL785

TPC-H Rev. 2.7.0

Report Date: November 17, 2008

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Numerical Quantities

Measurement Results

Database Scale Factor	300GB
Total Data Storage / Database Size	47.42
Start of Database Load	11/06/08 14:40:43
End of Database Load	11/07/08 05:27:03
Database Load Time	14h46m20sec
Query Streams for Throughput Test	6
TPC-H Power	75,161.2
TPC-H Throughput	44,271.9
TPC-H Composite Query-per-Hour (QphH@300GB)	57,684.7
Total System Price over 3 Years	\$ 186,700
TPC-H Price/Performance Metric (USD / QphH@300GB)	\$ 3.24 / QphH@300GB

Measurement Interval

Measurement Interval in Throughput Test (Ts) = seconds 3220 seconds

Duration of Stream Execution

Power Stream	Seed	RF1 Start Time	Query Start Time	RF2 Start Time	Duration
		RF1 End Time	Query End Time	RF2 End Time	
	1107052703	11/07/08 11:01:21	11/07/08 11:02:11	11/07/08 11:11:00	0:10:07
		11/07/08 11:02:00	11/07/08 11:11:00	11/07/08 11:11:27	

Throughput Stream	Seed	Query Start Time	Duration	RF1 Start Time	RF2 Start Time
		Query End Time		RF1 End Time	RF2 End Time
1	1107052704	11/07/08 11:11:41	0:48:56	11/07/08 11:59:34	11/07/08 12:00:10
		11/07/08 11:57:43		11/07/08 12:00:09	11/07/08 12:00:37
2	1107052705	11/07/08 11:11:41	0:49:56	11/07/08 12:00:38	11/07/08 12:01:12
		11/07/08 11:59:25		11/07/08 12:01:11	11/07/08 12:01:37
3	1107052706	11/07/08 11:11:41	0:50:56	11/07/08 12:01:38	11/07/08 12:02:11
		11/07/08 11:57:29		11/07/08 12:02:11	11/07/08 12:02:37
4	1107052707	11/07/08 11:11:41	0:51:52	11/07/08 12:02:38	11/07/08 12:03:08
		11/07/08 11:59:34		11/07/08 12:03:07	11/07/08 12:03:33
5	1107052708	11/07/08 11:11:41	0:52:46	11/07/08 12:03:34	11/07/08 12:04:03
		01/00/00 11:57:00		11/07/08 12:04:03	11/07/08 12:04:27
6	1107052709	11/07/08 11:11:41	0:53:40	11/07/08 12:04:28	11/07/08 12:04:58
		11/07/08 11:58:58		11/07/08 12:04:58	11/07/08 12:05:21



HP ProLiant DL785

TPC-H Rev. 2.7.0

Report Date: November, 17, 2008

Availability Date: November 17, 2008

TPC-H Timing Intervals (in seconds):

Query	Stream 0	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5	Stream 6	Min Qi	Max Qi	Avg. Qi
Q1	72.5	473.2	464.3	496.0	452.4	460.5	449.1	449.1	496.0	465.9
Q2	2.5	8.4	11.8	8.6	12.5	12.9	11.6	8.4	12.9	11.0
Q3	9.4	53.2	37.6	56.8	16.8	69.4	49.3	16.8	69.4	47.2
Q4	5.8	27.4	26.5	36.8	27.5	35.2	31.5	26.5	36.8	30.8
Q5	14.7	64.1	69.0	69.5	65.3	69.7	69.1	64.1	69.7	67.8
Q6	4.1	20.9	28.4	22.6	24.1	28.4	23.8	20.9	28.4	24.7
Q7	12.3	106.0	57.3	75.6	36.0	68.4	68.1	36.0	106.0	68.6
Q8	14.0	70.7	80.7	87.1	86.5	81.9	79.4	70.7	87.1	81.1
Q9	71.8	262.8	272.1	398.5	479.3	279.3	302.6	262.8	479.3	332.4
Q10	7.8	30.8	41.5	37.5	44.4	34.4	37.3	30.8	44.4	37.7
Q11	18.4	57.6	70.6	62.8	69.3	64.1	65.4	57.6	70.6	65.0
Q12	23.0	139.0	125.4	142.6	135.4	92.1	152.8	92.1	152.8	131.2
Q13	25.4	129.3	96.6	106.2	122.9	166.0	130.5	96.6	166.0	125.3
Q14	3.3	11.6	12.6	13.0	14.2	13.8	10.4	10.4	14.2	12.6
Q15	3.3	20.1	19.0	18.0	16.8	21.4	21.0	16.8	21.4	19.4
Q16	12.8	71.2	68.2	64.5	68.3	71.0	60.1	60.1	71.2	67.2
Q17	2.8	35.8	27.4	18.3	27.6	20.9	15.2	15.2	35.8	24.2
Q18	94.0	437.9	774.9	362.7	523.7	373.6	634.3	362.7	774.9	517.9
Q19	15.4	41.8	33.0	23.7	43.5	53.1	28.8	23.7	53.1	37.3
Q20	10.2	66.4	58.1	63.8	12.5	61.2	55.5	12.5	66.4	52.9
Q21	88.1	559.8	409.8	485.9	555.1	561.8	465.7	409.8	561.8	506.4
Q22	18.0	74.5	79.4	97.7	38.9	80.0	75.0	38.9	97.7	74.3
UF1	39.4	35.0	32.8	32.6	29.4	28.2	29.7	28.2	35.0	31.3
UF2	27.0	27.6	25.7	25.6	25.6	23.9	23.0	23.0	27.6	25.2

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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 System Under Test (SUT), an HP ProLiant DL785, depicted in Figure 1.1, consisted of :

- 8 AMD Opteron™ 8384 Quad-Core 2.7GHz
- 256 GB RAM
- 7 P800 Smart Array Controllers
- 13 HP StorageWorks MSA 70 Enclosures
- 206 72GB Pluggable SAS Disks
- 4 36GB Pluggable SAS Disks

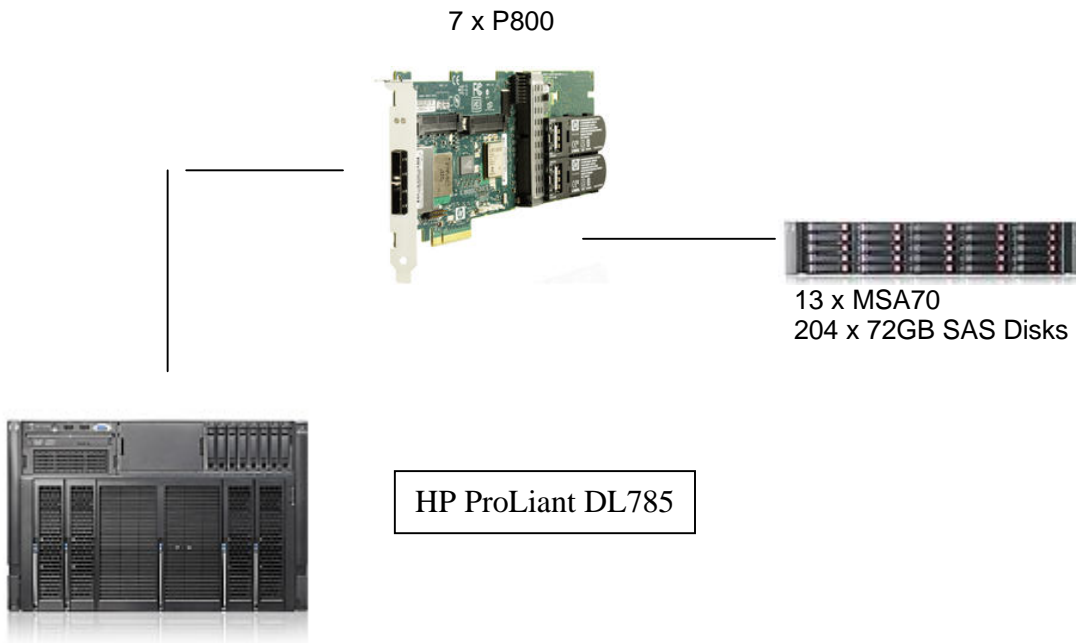


Figure 1.1 Benchmark and priced configuration for HP ProLiant DL785

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 2.7.0 and QGEN version 2.7.0 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 2.7.0 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:

- 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 level 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 steps performed are outlined below.

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:

$$O_TOTALPRICE = SUM(trunc(trunc((L_EXTENDEDPRICE - L_DISCOUNT) * (1 + L_TAX))))$$

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 test database log was stored on a logical volume on a RAID-10 array of 12 physical disks. The tables for the test database were stored on 32 logical volumes on RAID-0 arrays across 6 physical disks. A backup of the test database was taken. The backup was spread across 32 logical volumes on 32 RAID-5 arrays.

The tests were conducted on the qualification database. The qualification database was loaded in the same fashion as the test database but used fewer disks. The steps performed are shown below:

1. The complete database was backed up.
2. Seven 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 RAID-10 based 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 seven streams of ACID transactions failed and recorded their number of committed transaction in the 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 the RAID rebuild process started
9. When the 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. Seven streams of ACID transactions were started. Each stream executed a minimum of 100 transactions.
2. While the streams of ACID transactions were running a system hardware reset was issued.
3. 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	# of Rows
Lineitem	1,799,989,091
Orders	450,000,000
Partsupp	240,000,000
Part	60,000,000
Customer	45,000,000
Supplier	3,000,000
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 ProLiant DL785 with the following configuration:

7 P800 Smart Array Controllers
13 HP StorageWorks MSA 70 Enclosures
206 72GB SAS Disks
4 36GB SAS Disks

204 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 the Table below.

Slot Controller/Channel	# of Disks	Array Fault Tolerance	Size in GB	Partition Format	Content
Slot 0	2	RAID 1	36	NTFS	OS, SQL
P400 (onboard)	2	RAID 1	36	NTFS	Tools, Mount Points
	2	RAID1	72	NTFS	Tools etc.
Slot 1 A/B P800	36	RAID 0	6 x 32	RAW	TPCH300G LI
				RAW	TPCH300G GEN
				RAW	TPCH300G TempDB
		RAID 5	6 x 315	NTFS	Backup, Flatfiles
Slot 2 A P800	12	RAID 10	1 x 45	RAW	Log
			1 x 40	RAW	TempLog
Slot 5 A/B P800	36	RAID 0	6 x 32	RAW	TPCH300G LI
				RAW	TPCH300G GEN
				RAW	TPCH300G TempDB
		RAID 5	6 x 315	NTFS	Backup, Flatfiles
Slot 8 A/B P800	36	RAID 0	6 x 32	RAW	TPCH300G LI
				RAW	TPCH300G GEN
				RAW	TPCH300G TempDB
		RAID 5	6 x 315	NTFS	Backup, Flatfiles
Slot 9 A/B P800	24	RAID 0	4 x 32	RAW	TPCH300G LI
				RAW	TPCH300G GEN
				RAW	TPCH300G TempDB
		RAID 5	4 x 315	NTFS	Backup, Flatfiles
Slot 10 A/B P800	36	RAID 0	6 x 32	RAW	TPCH300G LI
				RAW	TPCH300G GEN
				RAW	TPCH300G TempDB
		RAID 5	6 x 315	NTFS	Backup, Flatfiles
Slot 11 A/B P800	24	RAID 0	4 x 32	RAW	TPCH300G LI
				RAW	TPCH300G GEN
				RAW	TPCH300G TempDB
		RAID 5	4 x 315	NTFS	Backup, Flatfiles

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 the Backup drives.

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.

DBGEN version 2.7.0 was used

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 14h46m20s

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)
36 GB 15K rpm SAS	4	135.6
72 GB 15K rpm SAS	206	14,090.4
Total		14,226

Size of test database: 300G

Data Storage Ratio: 47.42

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.

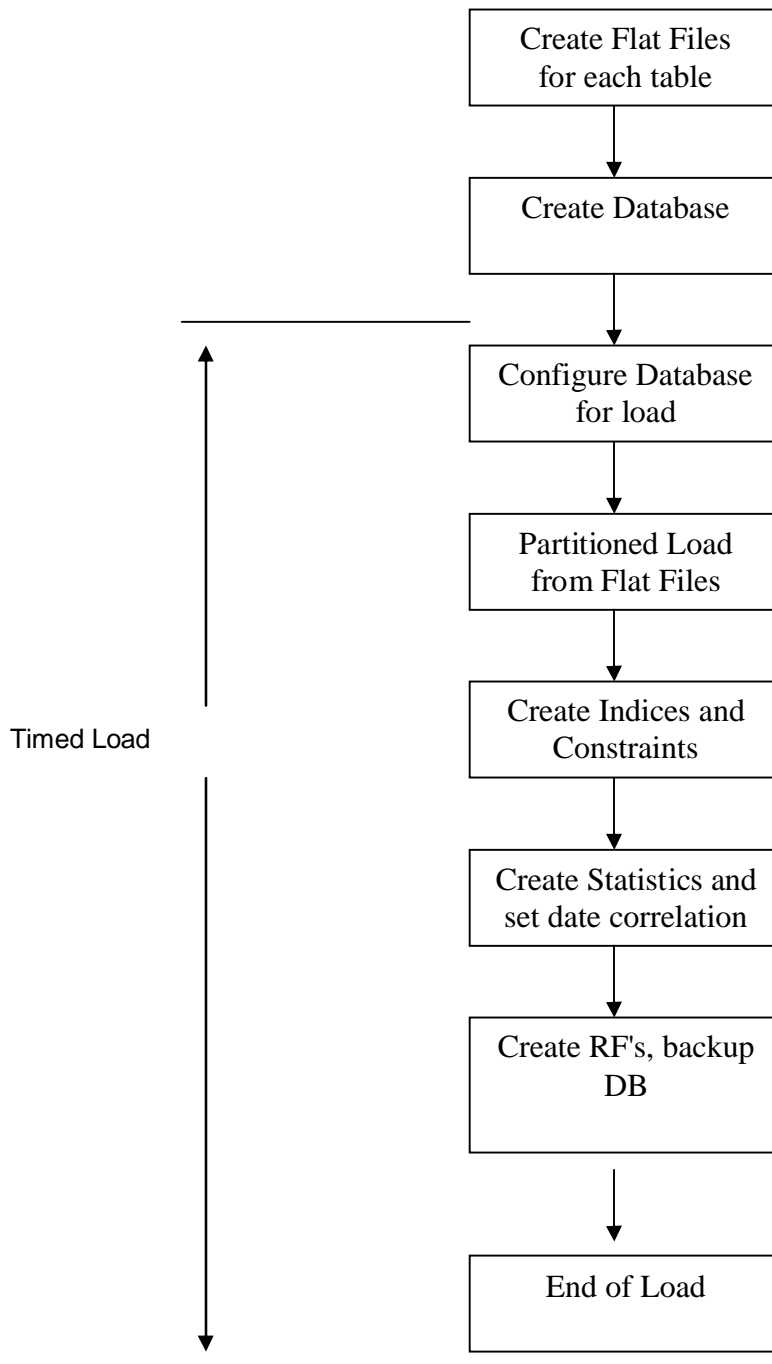


Figure 5.8: Block Diagram of Database Load Process

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. The system was rebooted and SQL Server was restarted.

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 0 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.

6 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 vii 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

The performance metric (QphH@Size) and the numerical quantities (TPC-H Power@Size and TPC-H Throughput@ Size) from both of the runs must be disclosed

Run ID	QppH@300G	QthH@300G	QphH@300G
Run 1	75,161.2	44,271.9	57,684.7
Run 2	76,087.7	44,181.4	57,979.8

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.

Auditor requested queries were run against the database and the log was truncated.

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. 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 refresh functions were executed using multiple batch scripts. The initial script is invoked by StepMaster, subsequent scripts are called from within the scripts.

The source code for both StepMaster and the RF Scripts is disclosed on Appendix E/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 following steps are performed, to accomplish the Power and Throughput Runs:

1. Power Run

- Execute 64 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. A checkpoint was issued after RF1 completion.
- Execute the Stream 0 queries in the order according to TPC Benchmark H Specification, Appendix A
- Execute 64 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. A checkpoint was issued after RF2 completion.

2. Throughput Run

- Execute 6 concurrent query streams. Each stream executes queries in the order according to TPC Benchmark H Specification, Appendix A, for the appropriate Stream ID (01-06). Upon completion of each stream, a semaphore is signaled to indicate completion.
- Execute 6 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 during the query execution 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 use 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 ProLiant DL785, 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 H.

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	Now (date of publication)

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. 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



PERFORMANCE METRICS INC.
TPC Certified Auditors

November 13, 2008

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 Proliant DL785
Database Manager: Microsoft SQL Server 2008 Enterprise Edition for x64
Operating System: Microsoft Windows Server 2008 for x64



CPU's	Memory	Total Disks	Qpph@ 300GB	QthH@ 300GB	QphH@ 300GB
8 AMD quad core @ 2.7 Ghz	256 GB	206 @ 72GB 4 @ 36GB	75,161.2	44,271.9	57,684.7

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 300 GB using DBGEN. The version of DBGEN was 2.7.0.
- The sample data produce by DBGEN was successfully compared to the reference data for this scale factor.
- 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 2.7.0. The sample |

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TPC Certified Auditors

parameters produced by QGEN were successfully compared to the reference data for this scale factor.

- 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 demonstrated and verified.
- 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:
11/11/08 10:07:28
System Name: OCTANE1
[System Summary]

Item Value
OS Name Microsoft® Windows
Server® 2008 Enterprise
Version 6.0.6001 Service Pack 1 Build
6001
Other OS Description Not Available
OS Manufacturer Microsoft
Corporation
System Name OCTANE1
System Manufacturer HP
System Model ProLiant DL785 G5
System Type x64-based PC
Processor Quad-Core AMD
Opteron(tm) Processor 8384, 2700 Mhz,
4 Core(s), 4 Logical Processor(s)
Processor Quad-Core AMD
Opteron(tm) Processor 8384, 2700 Mhz,
4 Core(s), 4 Logical Processor(s)
Processor Quad-Core AMD
Opteron(tm) Processor 8384, 2700 Mhz,
4 Core(s), 4 Logical Processor(s)
Processor Quad-Core AMD
Opteron(tm) Processor 8384, 2700 Mhz,
4 Core(s), 4 Logical Processor(s)
Processor Quad-Core AMD
Opteron(tm) Processor 8384, 2700 Mhz,
4 Core(s), 4 Logical Processor(s)
Processor Quad-Core AMD
Opteron(tm) Processor 8384, 2700 Mhz,
4 Core(s), 4 Logical Processor(s)
BIOS Version/Date HP A15,
10/17/2008
SMBIOS Version 2.5
Windows Directory E:\Windows
System Directory
E:\Windows\system32
Boot Device\Device\HarddiskVolume38
Locale United States
Hardware Abstraction Layer Version =
"6.0.6001.18000"
User Name OCTANE1\Administrator
Time Zone Pacific Standard Time
Installed Physical Memory (RAM) 256
GB
Total Physical Memory 4.00 GB
Available Physical Memory 652 MB
Total Virtual Memory 252 GB
Available Virtual Memory 3.96 GB
Page File Space 4.00 GB
Page File E:\pagefile.sys

[Hardware Resources]

[Conflicts/Sharing]

Resource Device

I/O Port 0x0000A000-0x0000FFFF PCI
bus
I/O Port 0x0000A000-0x0000FFFF
ServerWorks (Broadcom) HT-2100
HT-PCI-E Bridge 0
I/O Port 0x0000A000-0x0000FFFF
Smart Array P800 Controller

Memory Address 0xFD800000-
0xFDBFFFFFF PCI bus
Memory Address 0xFD800000-
0xFDBFFFFFF ServerWorks
(Broadcom) HT-2100 HT-PCI-E Bridge
0

IRQ 41 HP iLO Management Channel
Interface Driver
IRQ 41 Standard Universal PCI to USB
Host Controller

I/O Port 0x00000000-0x000003AF PCI
bus
I/O Port 0x00000000-0x000003AF
Direct memory access controller

Memory Address 0xFDC00000-
0xFDFFFFFF PCI bus
Memory Address 0xFDC00000-
0xFDFFFFFF ServerWorks
(Broadcom) HT-2100 HT-PCI-E Bridge
0

I/O Port 0x000003C0-0x000003DF PCI
bus
I/O Port 0x000003C0-0x000003DF ATI
ES1000

IRQ 5 Standard OpenHCD USB Host
Controller
IRQ 5 Standard OpenHCD USB Host
Controller
IRQ 5 Standard Enhanced PCI to USB
Host Controller

Memory Address 0xE8000000-
0xFD5FFFFFF PCI bus
Memory Address 0xE8000000-
0xFD5FFFFFF ATI ES1000

I/O Port 0x00009000-0x00009FFF
ServerWorks (Broadcom) HT-2100
HT-PCI-E Bridge 1&3
I/O Port 0x00009000-0x00009FFF
Smart Array P800 Controller

I/O Port 0x00006000-0x00006FFF
ServerWorks (Broadcom) HT-2100
HT-PCI-E Bridge 2&4
I/O Port 0x00006000-0x00006FFF
Smart Array P800 Controller

Memory Address 0xFD600000-
0xFD7FFFFFF PCI bus
Memory Address 0xFD600000-
0xFD7FFFFFF ServerWorks
(Broadcom) HT-2100 HT-PCI-E Bridge
0

I/O Port 0x0000B000-0x0000BFFF
ServerWorks (Broadcom) HT-2100
HT-PCI-E Bridge 1&3
I/O Port 0x0000B000-0x0000BFFF
Smart Array P800 Controller

I/O Port 0x00005000-0x00005FFF
ServerWorks (Broadcom) HT-2100
HT-PCI-E Bridge 0
I/O Port 0x00005000-0x00005FFF
Smart Array P800 Controller

I/O Port 0x000000A0-0x000000BF
Motherboard resources
I/O Port 0x000000A0-0x000000BF
Programmable interrupt controller

Memory Address 0xA0000-0xBFFFF
PCI bus
Memory Address 0xA0000-0xBFFFF
ATI ES1000

I/O Port 0x00007000-0x00007FFF PCI
bus
I/O Port 0x00007000-0x00007FFF
ServerWorks (Broadcom) HT-2100
HT-PCI-E Bridge 0
I/O Port 0x00007000-0x00007FFF
Smart Array P800 Controller

Memory Address 0xF8000000-
0xFBFFFFFF ServerWorks
(Broadcom) HT-1000 HT-PCI-X Bridge
0
Memory Address 0xF8000000-
0xFBFFFFFF ServerWorks
(Broadcom) HT-1000 HT-PCI-X Bridge
Memory Address 0xF8000000-
0xFBFFFFFF Broadcom BCM5706C
NetXtreme II GigE

I/O Port 0x00003B00-0x00003BB PCI
bus
I/O Port 0x00003B00-0x00003BB ATI
ES1000

I/O Port 0x00001000-0x00006FFF PCI
bus
I/O Port 0x00001000-0x00006FFF ATI
ES1000

I/O Port 0x00004000-0x00004FFF
ServerWorks (Broadcom) HT-2100
HT-PCI-E Bridge 1&3
I/O Port 0x00004000-0x00004FFF
Smart Array P400 Controller

I/O Port 0x00008000-0x00009FFF PCI
bus
I/O Port 0x00008000-0x00009FFF
ServerWorks (Broadcom) HT-2100
HT-PCI-E Bridge 0
I/O Port 0x00008000-0x00009FFF
Smart Array P800 Controller

I/O Port 0x00000600-0x0000067F	0x000000F0-0x000000F0	0x00000660-0x0000067F	Extended
Motherboard resources	Motherboard resources	IO Bus	OK
I/O Port 0x00000600-0x0000067F	0x00000379-0x0000037A	0x00000300-0x0000030F	Extended
Extended IO Bus	Motherboard resources	IO Bus	OK
	0x00000408-0x0000040F	0x000003F8-0x000003FF	
I/O Port 0x00000020-0x0000003F	Motherboard resources	Communications Port (COM1)	OK
Motherboard resources	0x0000040B-0x0000040B	0x00001C00-0x00001CFF	Standard
I/O Port 0x00000020-0x0000003F	Motherboard resources	OpenHCD USB Host Controller	OK
Programmable interrupt controller	0x000004D0-0x000004D1	0x00003000-0x000030FF	Standard
	Motherboard resources	OpenHCD USB Host Controller	OK
	0x000004D6-0x000004D6	0x00003400-0x000034FF	Standard
[DMA]	Motherboard resources	Enhanced PCI to USB Host Controller	OK
	0x00000520-0x00000520	OK	
Resource Device Status	Motherboard resources	0x00005000-0x00005FFF	
Channel 7	0x00000580-0x0000059F	ServerWorks (Broadcom) HT-2100	
Direct memory access	Motherboard resources	HT-PCI-E Bridge 0	OK
controller	0x00000600-0x0000067F	0x00005000-0x00005FFF	Smart Array
	Motherboard resources	P800 Controller	OK
[Forced Hardware]	0x00000600-0x0000067F	0x00004000-0x00004FFF	
	IO Bus	ServerWorks (Broadcom) HT-2100	
Device PNP Device ID	0x00000700-0x00000703	HT-PCI-E Bridge 1&3	OK
	Motherboard resources	0x00004000-0x00004FFF	Smart Array
[I/O]	0x00000820-0x0000082F	P400 Controller	OK
	Motherboard resources	0x00006000-0x00006FFF	
Resource Device Status	0x00000900-0x000009FE	ServerWorks (Broadcom) HT-2100	
0x00001000-0x00006FFF	Motherboard resources	HT-PCI-E Bridge 2&4	OK
0x00001000-0x00006FFF	0x00000C06-0x00000C07	0x00006000-0x00006FFF	Smart Array
OK	Motherboard resources	P800 Controller	OK
0x00000000-0x000003AF	0x00000C14-0x00000C14	0x00007000-0x00007FFF	PCI busOK
0x00000000-0x000003AF	Motherboard resources	0x00007000-0x00007FFF	
Direct	0x00000C4A-0x00000C4A	ServerWorks (Broadcom) HT-2100	
memory access controller	Motherboard resources	HT-PCI-E Bridge 0	OK
0x000003E0-0x00000CF7	0x00000C50-0x00000C52	0x00007000-0x00007FFF	Smart Array
0x00000D00-0x00000FFF	Motherboard resources	P800 Controller	OK
0x000003B0-0x000003BB	0x00000C6C-0x00000C6C	0x00008000-0x00009FFF	PCI busOK
0x000003B0-0x000003BB	Motherboard resources	0x00008000-0x00009FFF	
OK	0x00000C6F-0x00000C6F	ServerWorks (Broadcom) HT-2100	
0x000003C0-0x000003DF	Motherboard resources	HT-PCI-E Bridge 0	OK
0x000003C0-0x000003DF	0x00000C80-0x00000C83	0x00008000-0x00009FFF	Smart Array
OK	Motherboard resources	P800 Controller	OK
0x00002800-0x000028FF	0x00000C90-0x00000C9F	0x00009000-0x00009FFF	
HP ProLiant	Motherboard resources	ServerWorks (Broadcom) HT-2100	
iLO 2 Legacy Support Function	0x00000CA0-0x00000CA5	HT-PCI-E Bridge 1&3	OK
OK	Motherboard resources	0x00009000-0x00009FFF	Smart Array
0x00001400-0x000014FF	0x00000CD4-0x00000CD7	P800 Controller	OK
HP iLO	Motherboard resources	0x0000A000-0x0000FFFF	PCI busOK
Management Channel Interface Driver	0x00000F50-0x00000F58	0x0000A000-0x0000FFFF	
OK	Motherboard resources	ServerWorks (Broadcom) HT-2100	
0x00001800-0x0000181F	0x000002F8-0x000002FF	HT-PCI-E Bridge 0	OK
Standard	Motherboard resources	0x0000A000-0x0000FFFF	Smart Array
Universal PCI to USB Host Controller	0x00000CA2-0x00000CA3	P800 Controller	OK
OK	Generic IPMI Compliant Device	0x0000B000-0x0000BFFF	
0x00000500-0x0000050F	0x00000040-0x00000043	ServerWorks (Broadcom) HT-2100	
Standard	timer	HT-PCI-E Bridge 1&3	OK
Dual Channel PCI IDE Controller	0x00000080-0x0000008F	0x0000B000-0x0000BFFF	Smart Array
OK	memory access controller	P800 Controller	OK
0x000001F0-0x000001F7	0x000000C0-0x000000DF		
ATA	memory access controller	[IRQs]	
Channel 0	0x00000061-0x00000061	Resource Device Status	
OK	speakerOK	IRQ 81	Microsoft ACPI-Compliant
0x000003F6-0x000003F6	0x00000C00-0x00000C01	System	OK
ATA	Programmable interrupt controller	IRQ 82	Microsoft ACPI-Compliant
Channel 0	OK	System	OK
OK	0x00000060-0x00000060	IRQ 83	Microsoft ACPI-Compliant
0x00000170-0x00000177	Standard	System	OK
ATA	PS/2 Keyboard	IRQ 84	Microsoft ACPI-Compliant
Channel 1	OK	System	OK
OK	0x00000064-0x00000064	IRQ 85	Microsoft ACPI-Compliant
0x00000376-0x00000376	Standard	System	OK
Channel 1	PS/2 Keyboard	IRQ 86	Microsoft ACPI-Compliant
OK	OK	System	OK
0x00000010-0x0000001F	0x0000002E-0x0000002F	IRQ 87	Microsoft ACPI-Compliant
Motherboard resources	IO Bus	System	OK
OK	OK		
0x00000020-0x0000003F	0x0000004E-0x0000004F		
Motherboard resources	IO Bus		
OK	OK		
0x00000020-0x0000003F	0x00000620-0x0000065F		
Programmable interrupt controller	IO Bus		
OK	OK		
0x000000A0-0x000000BF	0x00000680-0x0000069F		
Motherboard resources	IO Bus		
OK	OK		
0x000000A0-0x000000BF	0x00000680-0x0000069F		
Programmable interrupt controller	IO Bus		
OK	OK		
0x00000050-0x00000053			
Motherboard resources			
OK			
0x00000070-0x00000079			
Motherboard resources			
OK			
0x00000090-0x0000009F			
Motherboard resources			
OK			

IRQ 88	Microsoft ACPI-Compliant System OK	IRQ 125	Microsoft ACPI-Compliant System OK	IRQ 162	Microsoft ACPI-Compliant System OK
IRQ 89	Microsoft ACPI-Compliant System OK	IRQ 126	Microsoft ACPI-Compliant System OK	IRQ 163	Microsoft ACPI-Compliant System OK
IRQ 90	Microsoft ACPI-Compliant System OK	IRQ 127	Microsoft ACPI-Compliant System OK	IRQ 164	Microsoft ACPI-Compliant System OK
IRQ 91	Microsoft ACPI-Compliant System OK	IRQ 128	Microsoft ACPI-Compliant System OK	IRQ 165	Microsoft ACPI-Compliant System OK
IRQ 92	Microsoft ACPI-Compliant System OK	IRQ 129	Microsoft ACPI-Compliant System OK	IRQ 166	Microsoft ACPI-Compliant System OK
IRQ 93	Microsoft ACPI-Compliant System OK	IRQ 130	Microsoft ACPI-Compliant System OK	IRQ 167	Microsoft ACPI-Compliant System OK
IRQ 94	Microsoft ACPI-Compliant System OK	IRQ 131	Microsoft ACPI-Compliant System OK	IRQ 168	Microsoft ACPI-Compliant System OK
IRQ 95	Microsoft ACPI-Compliant System OK	IRQ 132	Microsoft ACPI-Compliant System OK	IRQ 169	Microsoft ACPI-Compliant System OK
IRQ 96	Microsoft ACPI-Compliant System OK	IRQ 133	Microsoft ACPI-Compliant System OK	IRQ 170	Microsoft ACPI-Compliant System OK
IRQ 97	Microsoft ACPI-Compliant System OK	IRQ 134	Microsoft ACPI-Compliant System OK	IRQ 171	Microsoft ACPI-Compliant System OK
IRQ 98	Microsoft ACPI-Compliant System OK	IRQ 135	Microsoft ACPI-Compliant System OK	IRQ 172	Microsoft ACPI-Compliant System OK
IRQ 99	Microsoft ACPI-Compliant System OK	IRQ 136	Microsoft ACPI-Compliant System OK	IRQ 173	Microsoft ACPI-Compliant System OK
IRQ 100	Microsoft ACPI-Compliant System OK	IRQ 137	Microsoft ACPI-Compliant System OK	IRQ 174	Microsoft ACPI-Compliant System OK
IRQ 101	Microsoft ACPI-Compliant System OK	IRQ 138	Microsoft ACPI-Compliant System OK	IRQ 175	Microsoft ACPI-Compliant System OK
IRQ 102	Microsoft ACPI-Compliant System OK	IRQ 139	Microsoft ACPI-Compliant System OK	IRQ 176	Microsoft ACPI-Compliant System OK
IRQ 103	Microsoft ACPI-Compliant System OK	IRQ 140	Microsoft ACPI-Compliant System OK	IRQ 177	Microsoft ACPI-Compliant System OK
IRQ 104	Microsoft ACPI-Compliant System OK	IRQ 141	Microsoft ACPI-Compliant System OK	IRQ 178	Microsoft ACPI-Compliant System OK
IRQ 105	Microsoft ACPI-Compliant System OK	IRQ 142	Microsoft ACPI-Compliant System OK	IRQ 179	Microsoft ACPI-Compliant System OK
IRQ 106	Microsoft ACPI-Compliant System OK	IRQ 143	Microsoft ACPI-Compliant System OK	IRQ 180	Microsoft ACPI-Compliant System OK
IRQ 107	Microsoft ACPI-Compliant System OK	IRQ 144	Microsoft ACPI-Compliant System OK	IRQ 181	Microsoft ACPI-Compliant System OK
IRQ 108	Microsoft ACPI-Compliant System OK	IRQ 145	Microsoft ACPI-Compliant System OK	IRQ 182	Microsoft ACPI-Compliant System OK
IRQ 109	Microsoft ACPI-Compliant System OK	IRQ 146	Microsoft ACPI-Compliant System OK	IRQ 183	Microsoft ACPI-Compliant System OK
IRQ 110	Microsoft ACPI-Compliant System OK	IRQ 147	Microsoft ACPI-Compliant System OK	IRQ 184	Microsoft ACPI-Compliant System OK
IRQ 111	Microsoft ACPI-Compliant System OK	IRQ 148	Microsoft ACPI-Compliant System OK	IRQ 185	Microsoft ACPI-Compliant System OK
IRQ 112	Microsoft ACPI-Compliant System OK	IRQ 149	Microsoft ACPI-Compliant System OK	IRQ 186	Microsoft ACPI-Compliant System OK
IRQ 113	Microsoft ACPI-Compliant System OK	IRQ 150	Microsoft ACPI-Compliant System OK	IRQ 187	Microsoft ACPI-Compliant System OK
IRQ 114	Microsoft ACPI-Compliant System OK	IRQ 151	Microsoft ACPI-Compliant System OK	IRQ 188	Microsoft ACPI-Compliant System OK
IRQ 115	Microsoft ACPI-Compliant System OK	IRQ 152	Microsoft ACPI-Compliant System OK	IRQ 189	Microsoft ACPI-Compliant System OK
IRQ 116	Microsoft ACPI-Compliant System OK	IRQ 153	Microsoft ACPI-Compliant System OK	IRQ 190	Microsoft ACPI-Compliant System OK
IRQ 117	Microsoft ACPI-Compliant System OK	IRQ 154	Microsoft ACPI-Compliant System OK	IRQ 39	ATI ES1000OK
IRQ 118	Microsoft ACPI-Compliant System OK	IRQ 155	Microsoft ACPI-Compliant System OK	IRQ 11	HP ProLiant iLO 2 Legacy Support Function OK
IRQ 119	Microsoft ACPI-Compliant System OK	IRQ 156	Microsoft ACPI-Compliant System OK	IRQ 41	HP iLO Management Channel Interface Driver OK
IRQ 120	Microsoft ACPI-Compliant System OK	IRQ 157	Microsoft ACPI-Compliant System OK	IRQ 41	Standard Universal PCI to USB Host Controller OK
IRQ 121	Microsoft ACPI-Compliant System OK	IRQ 158	Microsoft ACPI-Compliant System OK	IRQ 40	HP ProLiant iLO 2 Management Controller Driver OK
IRQ 122	Microsoft ACPI-Compliant System OK	IRQ 159	Microsoft ACPI-Compliant System OK	IRQ 37	Broadcom BCM5706C NetXtreme II GigE OK
IRQ 123	Microsoft ACPI-Compliant System OK	IRQ 160	Microsoft ACPI-Compliant System OK	IRQ 38	Broadcom BCM5706C NetXtreme II GigE OK
IRQ 124	Microsoft ACPI-Compliant System OK	IRQ 161	Microsoft ACPI-Compliant System OK	IRQ 14	ATA Channel 0 OK
				IRQ 15	ATA Channel 1 OK
				IRQ 0	System timer OK
				IRQ 1	Standard PS/2 Keyboard OK

IRQ 12 PS/2 Compatible Mouse OK
 IRQ 4 Communications Port (COM1) OK
 IRQ 5 Standard OpenHCD USB Host Controller OK
 IRQ 5 Standard OpenHCD USB Host Controller OK
 IRQ 5 Standard Enhanced PCI to USB Host Controller OK
 IRQ 22 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 0 OK
 IRQ 4294967294 Smart Array P800 Controller OK
 IRQ 25 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 1&3 OK
 IRQ 4294967293 Smart Array P400 Controller OK
 IRQ 30 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 2&4 OK
 IRQ 4294967292 Smart Array P800 Controller OK
 IRQ 31 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 1&3 OK
 IRQ 32 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 2&4 OK
 IRQ 16 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 0 OK
 IRQ 4294967291 Smart Array P800 Controller OK
 IRQ 34 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 1&3 OK
 IRQ 26 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 2&4 OK
 IRQ 19 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 1&3 OK
 IRQ 20 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 2&4 OK
 IRQ 17 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 0 OK
 IRQ 4294967290 Smart Array P800 Controller OK
 IRQ 35 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 1&3 OK
 IRQ 29 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 2&4 OK
 IRQ 21 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 1&3 OK
 IRQ 4294967289 Smart Array P800 Controller OK
 IRQ 27 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 2&4 OK
 IRQ 18 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 0 OK
 IRQ 4294967288 Smart Array P800 Controller OK
 IRQ 36 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 1&3 OK
 IRQ 33 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 2&4 OK
 IRQ 23 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 1&3 OK
 IRQ 4294967287 Smart Array P800 Controller OK
 IRQ 28 ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 2&4 OK

[Memory]

Resource	Device	Status
0xE8000000-0xFD5FFFFFF	PCI bus	OK
0xE8000000-0xFD5FFFFFF	ATI ES1000	OK
0xA0000-0xBFFFF	PCI bus	OK
0xA0000-0xBFFFF	ATI ES1000	OK

0xF7FF0000-0xF7FFFFFF ATI ES1000 OK
 0xF7FE0000-0xF7FE01FF HP ProLiant iLO 2 Legacy Support Function OK
 0xF7FD0000-0xF7FD07FF HP iLO Management Channel Interface Driver OK
 0xF7FC0000-0xF7FC1FFF HP iLO Management Channel Interface Driver OK
 0xF7F00000-0xF7F7FFFF HP iLO Management Channel Interface Driver OK
 0xF7EF0000-0xF7EF00FF HP ProLiant iLO 2 Management Controller Driver OK
 0xF8000000-0xFBFFFFFF ServerWorks (Broadcom) HT-1000 HT-PCI-X Bridge 0 OK
 0xF8000000-0xFBFFFFFF ServerWorks (Broadcom) HT-1000 HT-PCI-X Bridge OK
 0xF8000000-0xFBFFFFFF Broadcom BCM5706C NetXtreme II GigE OK
 0xFA000000-0xFBFFFFFF Broadcom BCM5706C NetXtreme II GigE OK
 0xD0000000-0xDFFFFFF Motherboard resources OK
 0xFED00000-0xFED003FF High precision event timer OK
 0xF7EE0000-0xF7EE0FFF Standard OpenHCD USB Host Controller OK
 0xF7ED0000-0xF7ED0FFF Standard OpenHCD USB Host Controller OK
 0xF7EC0000-0xF7EC0FFF Standard Enhanced PCI to USB Host Controller OK
 0xFD200000-0xFD3FFFFFF ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 0 OK
 0xFD300000-0xFD3FFFFFF Smart Array P800 Controller OK
 0xFD2F0000-0xFD2F0FFF Smart Array P800 Controller OK
 0xFD000000-0xFD1FFFFFF ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 1&3 OK
 0xFD100000-0xFD1FFFFFF Smart Array P400 Controller OK
 0xFD0F0000-0xFD0F0FFF Smart Array P400 Controller OK
 0xFD400000-0xFD5FFFFFF ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 2&4 OK
 0xFD500000-0xFD5FFFFFF Smart Array P800 Controller OK
 0xFD4F0000-0xFD4F0FFF Smart Array P800 Controller OK
 0xFD600000-0xFD7FFFFFF PCI bus OK
 0xFD600000-0xFD7FFFFFF ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 0 OK
 0xFD700000-0xFD7FFFFFF Smart Array P800 Controller OK
 0xFD6F0000-0xFD6F0FFF Smart Array P800 Controller OK
 0xFD800000-0xFDBFFFFFF PCI bus OK
 0xFD800000-0xFDBFFFFFF ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 0 OK
 0xFD900000-0xFD9FFFFFF Smart Array P800 Controller OK
 0xFD8F0000-0xFD8F0FFF Smart Array P800 Controller OK

0xFDA00000-0xFDBFFFFFF ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 1&3 OK
 0xFDB00000-0xFDBFFFFFF Smart Array P800 Controller OK
 0xFDAF0000-0xFDAF0FFF Smart Array P800 Controller OK
 0xFDC00000-0xFDDFFFFFF PCI bus OK
 0xFDC00000-0xFDDFFFFFF ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 0 OK
 0xFDD00000-0xFDDFFFFFF Smart Array P800 Controller OK
 0xFDCF0000-0xFDCF0FFF Smart Array P800 Controller OK
 0xFDE00000-0xFDDFFFFFF ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 1&3 OK
 0xFDF00000-0xFDFFFFFFF Smart Array P800 Controller OK
 0xFDEF0000-0xFDEF0FFF Smart Array P800 Controller OK

[Components]

[Multimedia]

[Audio Codecs]

CODEC	Manufacturer	Description	Status	File	Version	Size	Creation Date
e:\windows\system32\msgsm32.acm	Microsoft Corporation	OK		E:\Windows\system32\MSGSM32.ACM	6.0.6000.16386	28.00 KB (28,672 bytes)	1/18/2008 10:43 PM
e:\windows\system32\msg711.acm	Microsoft Corporation	OK		E:\Windows\system32\MSG711.AC	6.0.6000.16386	14.00 KB (14,336 bytes)	1/18/2008 10:43 PM
e:\windows\system32\msadp32.acm	Microsoft Corporation	OK		E:\Windows\system32\MSADP32.ACM	6.0.6000.16386	22.00 KB (22,528 bytes)	1/18/2008 10:43 PM
e:\windows\system32\imaadp32.acm	Microsoft Corporation	OK		E:\Windows\system32\IMAADP32.ACM	6.0.6000.16386	21.00 KB (21,504 bytes)	1/18/2008 10:43 PM

[Video Codecs]

CODEC	Manufacturer	Description	Status	File	Version	Size	Creation Date
e:\windows\system32\msvidc32.dll	Microsoft Corporation	OK		E:\Windows\system32\MSVIDC32.DLL	6.0.6001.18000	37.50 KB (38,400 bytes)	1/18/2008 10:43 PM
e:\windows\system32\iyuv_32.dll	Microsoft Corporation	OK		E:\Windows\system32\IYUV_32.DLL	6.0.6000.16386	52.50 KB (53,760 bytes)	1/18/2008 10:34 PM
e:\windows\system32\msyuv.dll	Microsoft Corporation	OK		E:\Windows\system32\MSYUV.DLL			

6.0.6000.16386 24.50 KB (25,088 bytes) 1/18/2008 10:34 PM
 e:\windows\system32\msrle32.dll
 Microsoft Corporation OK
 E:\Windows\system32\MSRLE32.DLL 6.0.6000.16386 15.50 KB (15,872 bytes) 1/18/2008 10:43 PM
 e:\windows\system32\tsbyuv.dll
 Microsoft Corporation OK
 E:\Windows\system32\TSBYUV.DLL 6.0.6000.16386 13.50 KB (13,824 bytes) 1/18/2008 10:34 PM

[CD-ROM]

Item	Value
Drive D:	
Description	CD-ROM Drive
Media Loaded	No
Media Type	UNKNOWN
Name	TSSTcorp DVD-ROM TS-L332A
ATA Device	
Manufacturer	(Standard CD-ROM drives)
Status	OK
Transfer Rate	-1.00 kbytes/sec
SCSI Target ID	0
PNP Device ID	IDECROMTSSTCORP_DVD-ROM_TS-L332A_____HG00____\5&2274845F&0&0.0.0
Driver	e:\windows\system32\drivers\cdrom.sys (6.0.6001.18000, 78.00 KB (79,872 bytes), 1/18/2008 10:29 PM)

[Sound Device]

Item	Value
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[Display]

Item	Value
Name	ATI ES1000
PNP Device ID	PCI\VEN_1002&DEV_515E&SUBSYS_31FB103C&REV_02\3&C04C483&0&18
Adapter Type	Not Available, ATI Technologies Inc. compatible
Adapter Description	ATI ES1000
Adapter RAM	Not Available
Installed Drivers	Not Available
Driver Version	6.14.10.6744
INF File	oem1.inf (ati2mtag_RN50 section)
Color Planes	Not Available
Color Table Entries	Not Available
Resolution	Not Available
Bits/Pixel	Not Available
Memory Address	0xE8000000-0xFD5FFFFF
I/O Port	0x00001000-0x00006FFF
Memory Address	0xF7FF0000-0xF7FFFFFF
IRQ Channel	IRQ 39
I/O Port	0x000003B0-0x000003BB
I/O Port	0x000003C0-0x000003DF
Memory Address	0xA0000-0xBFFFF
Driver	e:\windows\system32\drivers\ati2mtag.sys (6.14.10.6744, 2.11 MB (2,210,816 bytes), 3/11/2008 11:37 PM)

[Infrared]

Item	Value
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[Input]

[Keyboard]

Item	Value
Description	USB Human Interface Device
Name	Enhanced (101- or 102-key)
Layout	00000409
PNP Device ID	USB\VID_03F0&PID_1027&MI_00&6&174A8EC&0&0000
Number of Function Keys	12
Driver	e:\windows\system32\drivers\hidusb.sys (6.0.6001.18000, 15.50 KB (15,872 bytes), 1/18/2008 10:33 PM)
Description	Standard PS/2 Keyboard
Name	Enhanced (101- or 102-key)
Layout	00000409
PNP Device ID	ACPI\PNP0303\4&63ACF31&0
Number of Function Keys	12
I/O Port	0x00000060-0x00000060
I/O Port	0x00000064-0x00000064
IRQ Channel	IRQ 1
Driver	e:\windows\system32\drivers\i8042prt.sys (6.0.6001.18000, 62.50 KB (64,000 bytes), 1/18/2008 10:28 PM)

[Pointing Device]

Item	Value
Hardware Type	USB Human Interface Device
Number of Buttons	0
Status	OK
PNP Device ID	USB\VID_03F0&PID_1027&MI_01&6&174A8EC&0&0001
Power Management Supported	No
Double Click Threshold	Not Available
Handedness	Not Available
Driver	e:\windows\system32\drivers\hidusb.sys (6.0.6001.18000, 15.50 KB (15,872 bytes), 1/18/2008 10:33 PM)
Hardware Type	PS/2 Compatible Mouse
Number of Buttons	0
Status	OK
PNP Device ID	ACPI\PNP0F13\4&63ACF31&0
Power Management Supported	No
Double Click Threshold	Not Available
Handedness	Not Available
IRQ Channel	IRQ 12
Driver	e:\windows\system32\drivers\i8042prt.sys (6.0.6001.18000, 62.50 KB (64,000 bytes), 1/18/2008 10:28 PM)

[Modem]

Item	Value
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[Network]

[Adapter]

Item	Value
Name	[00000000] WAN Miniport (SSTP)
Adapter Type	Not Available
Product Type	WAN Miniport (SSTP)
Installed	Yes
PNP Device ID	ROOT\MS_SSTP\MINIPORT\0000
Last Reset	11/10/2008 2:37 PM
Index	0
Service Name	RasSstp
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	e:\windows\system32\drivers\rasstp.p.sys (6.0.6001.18000, 76.50 KB (78,336 bytes), 1/18/2008 10:37 PM)
Name	[00000001] WAN Miniport (L2TP)
Adapter Type	Not Available
Product Type	WAN Miniport (L2TP)
Installed	Yes
PNP Device ID	ROOT\MS_L2TP\MINIPORT\0000
Last Reset	11/10/2008 2:37 PM
Index	1
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	e:\windows\system32\drivers\rasl2tp.sys (6.0.6001.18000, 122.00 KB (124,928 bytes), 1/18/2008 10:37 PM)
Name	[00000002] WAN Miniport (PPTP)
Adapter Type	Wide Area Network (WAN)
Product Type	WAN Miniport (PPTP)
Installed	Yes
PNP Device ID	ROOT\MS_PPTP\MINIPORT\0000
Last Reset	11/10/2008 2:37 PM
Index	2
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	e:\windows\system32\drivers\rasppptp.sys (6.0.6001.18000, 96.50 KB (98,816 bytes), 1/18/2008 10:37 PM)

Name [00000003] WAN Miniport (PPPOE)
 Adapter Type Wide Area Network (WAN)
 Product Type WAN Miniport (PPPOE)
 Installed Yes
 PNP Device ID
 ROOT\MS_PPPOEMINIPOINT\0000
 Last Reset 11/10/2008 2:37 PM
 Index 3
 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
 e:\windows\system32\drivers\raspppoe.sys (6.0.6001.18000, 49.00 KB (50,176 bytes), 1/18/2008 10:37 PM)

Name [00000004] WAN Miniport (IPv6)
 Adapter Type Not Available
 Product Type WAN Miniport (IPv6)
 Installed Yes
 PNP Device ID
 ROOT\MS_NDISWANIPV6\0000
 Last Reset 11/10/2008 2:37 PM
 Index 4
 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
 e:\windows\system32\drivers\ndiswan.sys (6.0.6001.18000, 165.50 KB (169,472 bytes), 1/18/2008 10:37 PM)

Name [00000005] WAN Miniport (Network Monitor)
 Adapter Type Not Available
 Product Type WAN Miniport (Network Monitor)
 Installed Yes
 PNP Device ID
 ROOT\MS_NDISWANBH\0000
 Last Reset 11/10/2008 2:37 PM
 Index 5
 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
 e:\windows\system32\drivers\ndiswan.sys (6.0.6001.18000, 165.50 KB (169,472 bytes), 1/18/2008 10:37 PM)

Name [00000006] Broadcom BCM5706C NetXtreme II GigE (NDIS VBD Client)
 Adapter Type Ethernet 802.3

Product Type Broadcom BCM5706C NetXtreme II GigE (NDIS VBD Client)
 Installed Yes
 PNP Device ID
 B06BDRV\L2ND&PCI_164A14E4&SUBSYS_1709103C&REV_02\6&2FFF06&0&20050203
 Last Reset 11/10/2008 2:37 PM
 Index 6
 Service Name l2nd
 IP Address 192.168.1.1,
 fe80::b188:1e1d:ee03:837a
 IP Subnet 255.255.255.0, 64
 Default IP Gateway Not Available
 DHCP Enabled No
 DHCP Server Not Available
 DHCP Lease Expires Not Available
 DHCP Lease Obtained Not Available
 MAC Address 00:1C:C4:F3:97:2C
 Driver
 e:\windows\system32\drivers\bxnd0a.sys (3.7.19.0, 63.00 KB (64,512 bytes), 1/19/2008 5:53 AM)

Name [00000007] Broadcom BCM5706C NetXtreme II GigE (NDIS VBD Client)
 Adapter Type Ethernet 802.3
 Product Type Broadcom BCM5706C NetXtreme II GigE (NDIS VBD Client)
 Installed Yes
 PNP Device ID
 B06BDRV\L2ND&PCI_164A14E4&SUBSYS_1709103C&REV_02\6&23BF5E65&0&20050204
 Last Reset 11/10/2008 2:37 PM
 Index 7
 Service Name l2nd
 IP Address 15.1.101.44,
 fe80::29ba:ecb9:ded9:1825
 IP Subnet 255.255.0.0, 64
 Default IP Gateway Not Available
 DHCP Enabled Yes
 DHCP Server 15.1.101.1
 DHCP Lease Expires 11/18/2008 2:43 PM
 DHCP Lease Obtained 11/10/2008 2:43 PM
 MAC Address 00:1C:C4:F3:97:2E
 Driver
 e:\windows\system32\drivers\bxnd0a.sys (3.7.19.0, 63.00 KB (64,512 bytes), 1/19/2008 5:53 AM)

Name [00000008] WAN Miniport (IP)
 Adapter Type Not Available
 Product Type WAN Miniport (IP)
 Installed Yes
 PNP Device ID
 ROOT\MS_NDISWANIP\0000
 Last Reset 11/10/2008 2:37 PM
 Index 8
 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
 e:\windows\system32\drivers\ndiswan.sys (6.0.6001.18000, 165.50 KB (169,472 bytes), 1/18/2008 10:37 PM)

Name [00000009] Microsoft ISATAP Adapter
 Adapter Type Tunnel
 Product Type Microsoft ISATAP Adapter
 Installed Yes
 PNP Device ID ROOT*ISATAP\0000
 Last Reset 11/10/2008 2:37 PM
 Index 9
 Service Name tunnel
 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
 e:\windows\system32\drivers\tunnel.sys (6.0.6001.18000, 27.50 KB (28,160 bytes), 1/18/2008 10:36 PM)

Name [00000010] Microsoft ISATAP Adapter
 Adapter Type Tunnel
 Product Type Microsoft ISATAP Adapter
 Installed Yes
 PNP Device ID ROOT*ISATAP\0001
 Last Reset 11/10/2008 2:37 PM
 Index 10
 Service Name tunnel
 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
 e:\windows\system32\drivers\tunnel.sys (6.0.6001.18000, 27.50 KB (28,160 bytes), 1/18/2008 10:36 PM)

Name [00000011] RAS Async Adapter
 Adapter Type Wide Area Network (WAN)
 Product Type RAS Async Adapter
 Installed Yes
 PNP Device ID SW\{EEAB7790-C514-11D1-B42B-00805FC1270E}\ASYNCMAC
 Last Reset 11/10/2008 2:37 PM
 Index 11
 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 20:41:53:59:4E:FF
 Driver
 e:\windows\system32\drivers\asyncmac.sys (6.0.6001.18000, 21.50 KB (22,016 bytes), 1/18/2008 10:37 PM)

Name [00000012] Microsoft 6to4 Adapter
 Adapter Type Tunnel
 Product Type Microsoft 6to4 Adapter

Installed Yes
 PNP Device ID ROOT*6TO4MP\0000
 Last Reset 11/10/2008 2:37 PM
 Index 12
 Service Name tunnel
 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
 e:\windows\system32\drivers\tunnel.
 sys (6.0.6001.18000, 27.50 KB (28,160
 bytes), 1/18/2008 10:36 PM)

[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 63.99 KB
 (65,527 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 MSAFD Tcpip [TCP/IPv6]
 Connectionless Service No
 Guarantees Delivery Yes
 Guarantees Sequencing Yes
 Maximum Address Size 28 bytes
 Maximum Message Size 0 bytes
 Message Oriented No
 Minimum Address Size 28 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/IPv6]
 Connectionless Service Yes
 Guarantees Delivery No
 Guarantees Sequencing No
 Maximum Address Size 28 bytes
 Maximum Message Size 63.99 KB
 (65,527 bytes)
 Message Oriented Yes
 Minimum Address Size 28 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 TCPv6 Service Provider
 Connectionless Service No
 Guarantees Delivery Yes
 Guarantees Sequencing Yes
 Maximum Address Size 28 bytes
 Maximum Message Size 0 bytes
 Message Oriented No
 Minimum Address Size 28 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

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

Name RSVP UDPv6 Service Provider
 Connectionless Service Yes
 Guarantees Delivery No
 Guarantees Sequencing No
 Maximum Address Size 28 bytes
 Maximum Message Size 63.99 KB
 (65,527 bytes)
 Message Oriented Yes
 Minimum Address Size 28 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 UDP Service Provider
 Connectionless Service Yes
 Guarantees Delivery No
 Guarantees Sequencing No
 Maximum Address Size 16 bytes
 Maximum Message Size 63.99 KB
 (65,527 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

[WinSock]

Item Value
 File e:\windows\syswow64\wsoc32.dll
 Size 15.00 KB (15,360 bytes)
 Version 6.0.6001.18000

 File e:\windows\system32\wsoc32.dll
 Size 18.00 KB (18,432 bytes)
 Version 6.0.6001.18000

[Ports]

[Serial]

Item Value
 Name Communications Port (COM1)
 Status OK
 PNP Device ID ACPI\PNP0501\0
 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
IRQ Channel IRQ 4
I/O Port 0x00003F8-0x00003FF
Driver
e:\windows\system32\drivers\serial.
sys (6.0.6001.18000, 92.00 KB (94,208
bytes), 1/18/2008 10:28 PM)

[Parallel]

Item Value

[Storage]

[Drives]

Item Value
Drive C:
Description Local Fixed Disk
Compressed No
File System NTFS
Size 33.87 GB (36,372,967,424
bytes)
Free Space 24.27 GB (26,061,582,336
bytes)
Volume Name WS03
Volume Serial Number 1C26471D

Drive D:
Description CD-ROM Disc

Drive E:
Description Local Fixed Disk
Compressed No
File System NTFS
Size 33.88 GB (36,382,437,376
bytes)
Free Space 12.45 GB (13,370,347,520
bytes)
Volume Name WS08
Volume Serial Number 88E38FFD

Drive F:
Description Local Fixed Disk
Compressed No
File System NTFS
Size 326.88 GB (350,980,538,368
bytes)
Free Space 92.73 GB (99,563,339,776
bytes)
Volume Name Spare
Volume Serial Number CC067E2D

Drive G:
Description Local Fixed Disk
Compressed No
File System NTFS
Size 68.33 GB (73,369,464,832
bytes)
Free Space 45.09 GB (48,414,302,208
bytes)
Volume Name G Drive
Volume Serial Number B6B01694

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 T:
Description Local Fixed Disk
Compressed No
File System NTFS
Size 39.06 GB (41,942,974,464
bytes)
Free Space 3.97 GB (4,267,376,640
bytes)
Volume Name Templog
Volume Serial Number C6F52B7F

[Disks]

Item Value
Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 5
SCSI Target ID 4
Sectors/Track 63
Size 31.25 GB (33,550,917,120
bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #16, Partition #0
Partition Size 14.65 GB
(15,728,640,000 bytes)
Partition Starting Offset 135,266,304
bytes
Partition Disk #16, Partition #1
Partition Size 5.86 GB (6,291,456,000
bytes)
Partition Starting Offset 15,863,906,304
bytes
Partition Disk #16, Partition #2
Partition Size 10.61 GB
(11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 5
SCSI Target ID 5
Sectors/Track 63
Size 315.63 GB (338,906,211,840
bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #17, Partition #0
Partition Size 315.51 GB
(338,775,040,512 bytes)
Partition Starting Offset 135,266,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 5
SCSI Target ID 6
Sectors/Track 63
Size 31.25 GB (33,550,917,120
bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #18, Partition #0
Partition Size 14.65 GB
(15,728,640,000 bytes)
Partition Starting Offset 135,266,304
bytes
Partition Disk #18, Partition #1
Partition Size 5.86 GB (6,291,456,000
bytes)
Partition Starting Offset 15,863,906,304
bytes
Partition Disk #18, Partition #2
Partition Size 10.61 GB
(11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 5
SCSI Target ID 7
Sectors/Track 63
Size 315.63 GB (338,906,211,840
bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #19, Partition #0
Partition Size 315.51 GB
(338,775,040,512 bytes)
Partition Starting Offset 135,266,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 5
SCSI Target ID 8
Sectors/Track 63
Size 31.25 GB (33,550,917,120
bytes)

Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #20, Partition #0
Partition Size 14.65 GB
(15,728,640,000 bytes)
Partition Starting Offset 135,266,304
bytes
Partition Disk #20, Partition #1
Partition Size 5.86 GB (6,291,456,000
bytes)
Partition Starting Offset 15,863,906,304
bytes
Partition Disk #20, Partition #2
Partition Size 10.61 GB
(11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 5
SCSI Target ID 9
Sectors/Track 63
Size 315.63 GB (338,906,211,840
bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #21, Partition #0
Partition Size 315.51 GB
(338,775,040,512 bytes)
Partition Starting Offset 135,266,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 5
SCSI Target ID 10
Sectors/Track 63
Size 31.25 GB (33,550,917,120
bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #22, Partition #0
Partition Size 14.65 GB
(15,728,640,000 bytes)
Partition Starting Offset 135,266,304
bytes
Partition Disk #22, Partition #1
Partition Size 5.86 GB (6,291,456,000
bytes)
Partition Starting Offset 15,863,906,304
bytes
Partition Disk #22, Partition #2

Partition Size 10.61 GB
(11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 5
SCSI Target ID 11
Sectors/Track 63
Size 315.63 GB (338,906,211,840
bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #23, Partition #0
Partition Size 315.51 GB
(338,775,040,512 bytes)
Partition Starting Offset 135,266,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 5
SCSI Target ID 12
Sectors/Track 63
Size 31.25 GB (33,550,917,120
bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #24, Partition #0
Partition Size 14.65 GB
(15,728,640,000 bytes)
Partition Starting Offset 135,266,304
bytes
Partition Disk #24, Partition #1
Partition Size 5.86 GB (6,291,456,000
bytes)
Partition Starting Offset 15,863,906,304
bytes
Partition Disk #24, Partition #2
Partition Size 10.61 GB
(11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0

SCSI Port 5
SCSI Target ID 13
Sectors/Track 63
Size 315.63 GB (338,906,211,840
bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #25, Partition #0
Partition Size 315.51 GB
(338,775,040,512 bytes)
Partition Starting Offset 135,266,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 5
SCSI Target ID 14
Sectors/Track 63
Size 31.25 GB (33,550,917,120
bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #26, Partition #0
Partition Size 14.65 GB
(15,728,640,000 bytes)
Partition Starting Offset 135,266,304
bytes
Partition Disk #26, Partition #1
Partition Size 5.86 GB (6,291,456,000
bytes)
Partition Starting Offset 15,863,906,304
bytes
Partition Disk #26, Partition #2
Partition Size 10.61 GB
(11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 5
SCSI Target ID 15
Sectors/Track 63
Size 315.63 GB (338,906,211,840
bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #27, Partition #0
Partition Size 315.51 GB
(338,775,040,512 bytes)
Partition Starting Offset 135,266,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 7
SCSI Target ID 4
Sectors/Track 63
Size 31.25 GB (33,550,917,120 bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #40, Partition #0
Partition Size 14.65 GB
(15,728,640,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #40, Partition #1
Partition Size 5.86 GB (6,291,456,000 bytes)
Partition Starting Offset 15,863,906,304 bytes
Partition Disk #40, Partition #2
Partition Size 10.61 GB
(11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 7
SCSI Target ID 5
Sectors/Track 63
Size 315.63 GB (338,906,211,840 bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #41, Partition #0
Partition Size 315.51 GB
(338,775,040,512 bytes)
Partition Starting Offset 135,266,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 7
SCSI Target ID 6
Sectors/Track 63
Size 31.25 GB (33,550,917,120 bytes)

Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #42, Partition #0
Partition Size 14.65 GB
(15,728,640,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #42, Partition #1
Partition Size 5.86 GB (6,291,456,000 bytes)
Partition Starting Offset 15,863,906,304 bytes
Partition Disk #42, Partition #2
Partition Size 10.61 GB
(11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 7
SCSI Target ID 7
Sectors/Track 63
Size 315.63 GB (338,906,211,840 bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #43, Partition #0
Partition Size 315.51 GB
(338,775,040,512 bytes)
Partition Starting Offset 135,266,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 7
SCSI Target ID 8
Sectors/Track 63
Size 31.25 GB (33,550,917,120 bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #44, Partition #0
Partition Size 14.65 GB
(15,728,640,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #44, Partition #1
Partition Size 5.86 GB (6,291,456,000 bytes)
Partition Starting Offset 15,863,906,304 bytes
Partition Disk #44, Partition #2

Partition Size 10.61 GB
(11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 7
SCSI Target ID 9
Sectors/Track 63
Size 315.63 GB (338,906,211,840 bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #45, Partition #0
Partition Size 315.51 GB
(338,775,040,512 bytes)
Partition Starting Offset 135,266,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 7
SCSI Target ID 10
Sectors/Track 63
Size 31.25 GB (33,550,917,120 bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #46, Partition #0
Partition Size 14.65 GB
(15,728,640,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #46, Partition #1
Partition Size 5.86 GB (6,291,456,000 bytes)
Partition Starting Offset 15,863,906,304 bytes
Partition Disk #46, Partition #2
Partition Size 10.61 GB
(11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0

SCSI Port 7
SCSI Target ID 11
Sectors/Track 63
Size 315.63 GB (338,906,211,840 bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #47, Partition #0
Partition Size 315.51 GB (338,775,040,512 bytes)
Partition Starting Offset 135,266,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 2
SCSI Target ID 4
Sectors/Track 63
Size 31.25 GB (33,550,917,120 bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #0, Partition #0
Partition Size 14.65 GB (15,728,640,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #0, Partition #1
Partition Size 5.86 GB (6,291,456,000 bytes)
Partition Starting Offset 15,863,906,304 bytes
Partition Disk #0, Partition #2
Partition Size 10.61 GB (11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 2
SCSI Target ID 5
Sectors/Track 63
Size 315.63 GB (338,906,211,840 bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #1, Partition #0
Partition Size 315.51 GB (338,775,040,512 bytes)
Partition Starting Offset 135,266,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 2
SCSI Target ID 6
Sectors/Track 63
Size 31.25 GB (33,550,917,120 bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #2, Partition #0
Partition Size 14.65 GB (15,728,640,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #2, Partition #1
Partition Size 5.86 GB (6,291,456,000 bytes)
Partition Starting Offset 15,863,906,304 bytes
Partition Disk #2, Partition #2
Partition Size 10.61 GB (11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 2
SCSI Target ID 7
Sectors/Track 63
Size 315.63 GB (338,906,211,840 bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #3, Partition #0
Partition Size 315.51 GB (338,775,040,512 bytes)
Partition Starting Offset 135,266,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 2
SCSI Target ID 8
Sectors/Track 63
Size 31.25 GB (33,550,917,120 bytes)

Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #4, Partition #0
Partition Size 14.65 GB (15,728,640,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #4, Partition #1
Partition Size 5.86 GB (6,291,456,000 bytes)
Partition Starting Offset 15,863,906,304 bytes
Partition Disk #4, Partition #2
Partition Size 10.61 GB (11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 2
SCSI Target ID 9
Sectors/Track 63
Size 315.63 GB (338,906,211,840 bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #5, Partition #0
Partition Size 315.51 GB (338,775,040,512 bytes)
Partition Starting Offset 135,266,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 2
SCSI Target ID 10
Sectors/Track 63
Size 31.25 GB (33,550,917,120 bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #6, Partition #0
Partition Size 14.65 GB (15,728,640,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #6, Partition #1
Partition Size 5.86 GB (6,291,456,000 bytes)
Partition Starting Offset 15,863,906,304 bytes
Partition Disk #6, Partition #2

Partition Size 10.61 GB
(11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 2
SCSI Target ID 11
Sectors/Track 63
Size 315.63 GB (338,906,211,840
bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #7, Partition #0
Partition Size 315.51 GB
(338,775,040,512 bytes)
Partition Starting Offset 135,266,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 2
SCSI Target ID 12
Sectors/Track 63
Size 31.25 GB (33,550,917,120
bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #8, Partition #0
Partition Size 14.65 GB
(15,728,640,000 bytes)
Partition Starting Offset 135,266,304
bytes
Partition Disk #8, Partition #1
Partition Size 5.86 GB (6,291,456,000
bytes)
Partition Starting Offset 15,863,906,304
bytes
Partition Disk #8, Partition #2
Partition Size 10.61 GB
(11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0

SCSI Port 2
SCSI Target ID 13
Sectors/Track 63
Size 315.63 GB (338,906,211,840
bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #9, Partition #0
Partition Size 315.51 GB
(338,775,040,512 bytes)
Partition Starting Offset 135,266,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 2
SCSI Target ID 14
Sectors/Track 63
Size 31.25 GB (33,550,917,120
bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #10, Partition #0
Partition Size 14.65 GB
(15,728,640,000 bytes)
Partition Starting Offset 135,266,304
bytes
Partition Disk #10, Partition #1
Partition Size 5.86 GB (6,291,456,000
bytes)
Partition Starting Offset 15,863,906,304
bytes
Partition Disk #10, Partition #2
Partition Size 10.61 GB
(11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 2
SCSI Target ID 15
Sectors/Track 63
Size 315.63 GB (338,906,211,840
bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #11, Partition #0
Partition Size 315.51 GB
(338,775,040,512 bytes)
Partition Starting Offset 135,266,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 6
SCSI Target ID 4
Sectors/Track 63
Size 31.25 GB (33,550,917,120
bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #28, Partition #0
Partition Size 14.65 GB
(15,728,640,000 bytes)
Partition Starting Offset 135,266,304
bytes
Partition Disk #28, Partition #1
Partition Size 5.86 GB (6,291,456,000
bytes)
Partition Starting Offset 15,863,906,304
bytes
Partition Disk #28, Partition #2
Partition Size 10.61 GB
(11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 6
SCSI Target ID 5
Sectors/Track 63
Size 315.63 GB (338,906,211,840
bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #29, Partition #0
Partition Size 315.51 GB
(338,775,040,512 bytes)
Partition Starting Offset 135,266,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 6
SCSI Target ID 6
Sectors/Track 63
Size 31.25 GB (33,550,917,120
bytes)

Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #30, Partition #0
Partition Size 14.65 GB
(15,728,640,000 bytes)
Partition Starting Offset 135,266,304
bytes
Partition Disk #30, Partition #1
Partition Size 5.86 GB (6,291,456,000
bytes)
Partition Starting Offset 15,863,906,304
bytes
Partition Disk #30, Partition #2
Partition Size 10.61 GB
(11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 6
SCSI Target ID 7
Sectors/Track 63
Size 315.63 GB (338,906,211,840
bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #31, Partition #0
Partition Size 315.51 GB
(338,775,040,512 bytes)
Partition Starting Offset 135,266,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 6
SCSI Target ID 8
Sectors/Track 63
Size 31.25 GB (33,550,917,120
bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #32, Partition #0
Partition Size 14.65 GB
(15,728,640,000 bytes)
Partition Starting Offset 135,266,304
bytes
Partition Disk #32, Partition #1
Partition Size 5.86 GB (6,291,456,000
bytes)
Partition Starting Offset 15,863,906,304
bytes
Partition Disk #32, Partition #2

Partition Size 10.61 GB
(11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 6
SCSI Target ID 9
Sectors/Track 63
Size 315.63 GB (338,906,211,840
bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #33, Partition #0
Partition Size 315.51 GB
(338,775,040,512 bytes)
Partition Starting Offset 135,266,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 6
SCSI Target ID 10
Sectors/Track 63
Size 31.25 GB (33,550,917,120
bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #34, Partition #0
Partition Size 14.65 GB
(15,728,640,000 bytes)
Partition Starting Offset 135,266,304
bytes
Partition Disk #34, Partition #1
Partition Size 5.86 GB (6,291,456,000
bytes)
Partition Starting Offset 15,863,906,304
bytes
Partition Disk #34, Partition #2
Partition Size 10.61 GB
(11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0

SCSI Port 6
SCSI Target ID 11
Sectors/Track 63
Size 315.63 GB (338,906,211,840
bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #35, Partition #0
Partition Size 315.51 GB
(338,775,040,512 bytes)
Partition Starting Offset 135,266,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 6
SCSI Target ID 12
Sectors/Track 63
Size 31.25 GB (33,550,917,120
bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #36, Partition #0
Partition Size 14.65 GB
(15,728,640,000 bytes)
Partition Starting Offset 135,266,304
bytes
Partition Disk #36, Partition #1
Partition Size 5.86 GB (6,291,456,000
bytes)
Partition Starting Offset 15,863,906,304
bytes
Partition Disk #36, Partition #2
Partition Size 10.61 GB
(11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 6
SCSI Target ID 13
Sectors/Track 63
Size 315.63 GB (338,906,211,840
bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #37, Partition #0
Partition Size 315.51 GB
(338,775,040,512 bytes)
Partition Starting Offset 135,266,304
bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 6
SCSI Target ID 14
Sectors/Track 63
Size 31.25 GB (33,550,917,120 bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #38, Partition #0
Partition Size 14.65 GB (15,728,640,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #38, Partition #1
Partition Size 5.86 GB (6,291,456,000 bytes)
Partition Starting Offset 15,863,906,304 bytes
Partition Disk #38, Partition #2
Partition Size 10.61 GB (11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 6
SCSI Target ID 15
Sectors/Track 63
Size 315.63 GB (338,906,211,840 bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #39, Partition #0
Partition Size 315.51 GB (338,775,040,512 bytes)
Partition Starting Offset 135,266,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 3
SCSI Target ID 4
Sectors/Track 32
Size 33.89 GB (36,385,505,280 bytes)

Total Cylinders 8,709
Total Sectors 71,065,440
Total Tracks 2,220,795
Tracks/Cylinder 255
Partition Disk #12, Partition #0
Partition Size 7.81 MB (8,193,024 bytes)
Partition Starting Offset 32,256 bytes
Partition Disk #12, Partition #1
Partition Size 33.87 GB (36,372,971,520 bytes)
Partition Starting Offset 8,355,840 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 3
SCSI Target ID 5
Sectors/Track 32
Size 33.89 GB (36,385,505,280 bytes)
Total Cylinders 8,709
Total Sectors 71,065,440
Total Tracks 2,220,795
Tracks/Cylinder 255
Partition Disk #13, Partition #0
Partition Size 33.88 GB (36,382,441,472 bytes)
Partition Starting Offset 1,048,576 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 3
SCSI Target ID 6
Sectors/Track 32
Size 68.33 GB (73,372,631,040 bytes)
Total Cylinders 17,562
Total Sectors 143,305,920
Total Tracks 4,478,310
Tracks/Cylinder 255
Partition Disk #14, Partition #0
Partition Size 68.33 GB (73,369,465,344 bytes)
Partition Starting Offset 32,256 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 9
SCSI Target ID 4
Sectors/Track 63

Size 31.25 GB (33,550,917,120 bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #60, Partition #0
Partition Size 14.65 GB (15,728,640,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #60, Partition #1
Partition Size 5.86 GB (6,291,456,000 bytes)
Partition Starting Offset 15,863,906,304 bytes
Partition Disk #60, Partition #2
Partition Size 10.61 GB (11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 9
SCSI Target ID 5
Sectors/Track 63
Size 315.63 GB (338,906,211,840 bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #61, Partition #0
Partition Size 315.51 GB (338,775,040,512 bytes)
Partition Starting Offset 135,266,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 9
SCSI Target ID 6
Sectors/Track 63
Size 31.25 GB (33,550,917,120 bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #62, Partition #0
Partition Size 14.65 GB (15,728,640,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #62, Partition #1
Partition Size 5.86 GB (6,291,456,000 bytes)

Partition Starting Offset 15,863,906,304 bytes
Partition Disk #62, Partition #2
Partition Size 10.61 GB (11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 9
SCSI Target ID 7
Sectors/Track 63
Size 315.63 GB (338,906,211,840 bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #63, Partition #0
Partition Size 315.51 GB (338,775,040,512 bytes)
Partition Starting Offset 135,266,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 9
SCSI Target ID 8
Sectors/Track 63
Size 31.25 GB (33,550,917,120 bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #64, Partition #0
Partition Size 14.65 GB (15,728,640,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #64, Partition #1
Partition Size 5.86 GB (6,291,456,000 bytes)
Partition Starting Offset 15,863,906,304 bytes
Partition Disk #64, Partition #2
Partition Size 10.61 GB (11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk

Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 9
SCSI Target ID 9
Sectors/Track 63
Size 315.63 GB (338,906,211,840 bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #65, Partition #0
Partition Size 315.51 GB (338,775,040,512 bytes)
Partition Starting Offset 135,266,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 9
SCSI Target ID 10
Sectors/Track 63
Size 31.25 GB (33,550,917,120 bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #66, Partition #0
Partition Size 14.65 GB (15,728,640,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #66, Partition #1
Partition Size 5.86 GB (6,291,456,000 bytes)
Partition Starting Offset 15,863,906,304 bytes
Partition Disk #66, Partition #2
Partition Size 10.61 GB (11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 9
SCSI Target ID 11
Sectors/Track 63
Size 315.63 GB (338,906,211,840 bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #67, Partition #0
Partition Size 315.51 GB (338,775,040,512 bytes)

Partition Starting Offset 135,266,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 8
SCSI Target ID 4
Sectors/Track 63
Size 31.25 GB (33,550,917,120 bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #48, Partition #0
Partition Size 14.65 GB (15,728,640,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #48, Partition #1
Partition Size 5.86 GB (6,291,456,000 bytes)
Partition Starting Offset 15,863,906,304 bytes
Partition Disk #48, Partition #2
Partition Size 10.61 GB (11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 8
SCSI Target ID 5
Sectors/Track 63
Size 315.63 GB (338,906,211,840 bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #49, Partition #0
Partition Size 315.51 GB (338,775,040,512 bytes)
Partition Starting Offset 135,266,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 8
SCSI Target ID 6

Sectors/Track 63
Size 31.25 GB (33,550,917,120 bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #50, Partition #0
Partition Size 14.65 GB (15,728,640,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #50, Partition #1
Partition Size 5.86 GB (6,291,456,000 bytes)
Partition Starting Offset 15,863,906,304 bytes
Partition Disk #50, Partition #2
Partition Size 10.61 GB (11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 8
SCSI Target ID 7
Sectors/Track 63
Size 315.63 GB (338,906,211,840 bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #51, Partition #0
Partition Size 315.51 GB (338,775,040,512 bytes)
Partition Starting Offset 135,266,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 8
SCSI Target ID 8
Sectors/Track 63
Size 31.25 GB (33,550,917,120 bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #52, Partition #0
Partition Size 14.65 GB (15,728,640,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #52, Partition #1
Partition Size 5.86 GB (6,291,456,000 bytes)

Partition Starting Offset 15,863,906,304 bytes
Partition Disk #52, Partition #2
Partition Size 10.61 GB (11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304 bytes
Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 8
SCSI Target ID 9
Sectors/Track 63
Size 315.63 GB (338,906,211,840 bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #53, Partition #0
Partition Size 315.51 GB (338,775,040,512 bytes)
Partition Starting Offset 135,266,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 8
SCSI Target ID 10
Sectors/Track 63
Size 31.25 GB (33,550,917,120 bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #54, Partition #0
Partition Size 14.65 GB (15,728,640,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #54, Partition #1
Partition Size 5.86 GB (6,291,456,000 bytes)
Partition Starting Offset 15,863,906,304 bytes
Partition Disk #54, Partition #2
Partition Size 10.61 GB (11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk

Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 8
SCSI Target ID 11
Sectors/Track 63
Size 315.63 GB (338,906,211,840 bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #55, Partition #0
Partition Size 315.51 GB (338,775,040,512 bytes)
Partition Starting Offset 135,266,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 8
SCSI Target ID 12
Sectors/Track 63
Size 31.25 GB (33,550,917,120 bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #56, Partition #0
Partition Size 14.65 GB (15,728,640,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #56, Partition #1
Partition Size 5.86 GB (6,291,456,000 bytes)
Partition Starting Offset 15,863,906,304 bytes
Partition Disk #56, Partition #2
Partition Size 10.61 GB (11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 8
SCSI Target ID 13
Sectors/Track 63
Size 315.63 GB (338,906,211,840 bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #57, Partition #0
Partition Size 315.51 GB (338,775,040,512 bytes)

Partition Starting Offset 135,266,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 8
SCSI Target ID 14
Sectors/Track 63
Size 31.25 GB (33,550,917,120 bytes)
Total Cylinders 4,079
Total Sectors 65,529,135
Total Tracks 1,040,145
Tracks/Cylinder 255
Partition Disk #58, Partition #0
Partition Size 14.65 GB (15,728,640,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #58, Partition #1
Partition Size 5.86 GB (6,291,456,000 bytes)
Partition Starting Offset 15,863,906,304 bytes
Partition Disk #58, Partition #2
Partition Size 10.61 GB (11,397,496,320 bytes)
Partition Starting Offset 22,155,362,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME SCSI
Disk Device
Bytes/Sector 512
Media Loaded Yes
Media Type Fixed hard disk
Partitions 1
SCSI Bus 0
SCSI Logical Unit 0
SCSI Port 8
SCSI Target ID 15
Sectors/Track 63
Size 315.63 GB (338,906,211,840 bytes)
Total Cylinders 41,203
Total Sectors 661,926,195
Total Tracks 10,506,765
Tracks/Cylinder 255
Partition Disk #59, Partition #0
Partition Size 315.51 GB (338,775,040,512 bytes)
Partition Starting Offset 135,266,304 bytes

Description Disk drive
Manufacturer (Standard disk drives)
Model HP LOGICAL VOLUME 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 4

Sectors/Track 63
Size 410.01 GB (440,241,661,440 bytes)
Total Cylinders 53,523
Total Sectors 859,846,995
Total Tracks 13,648,365
Tracks/Cylinder 255
Partition Disk #15, Partition #0
Partition Size 43.95 GB (47,185,920,000 bytes)
Partition Starting Offset 135,266,304 bytes
Partition Disk #15, Partition #1
Partition Size 39.06 GB (41,943,040,000 bytes)
Partition Starting Offset 47,321,186,304 bytes
Partition Disk #15, Partition #2
Partition Size 326.88 GB (350,980,596,224 bytes)
Partition Starting Offset 89,264,226,304 bytes

[SCSI]

Item Value
Name Smart Array P800 Controller
Manufacturer Hewlett-Packard
Company
Status OK
PNP Device ID
PCI\VEN_103C&DEV_3230&SUBS_YS_3223103C&REV_03\4&359FAD9&0&0098
Memory Address 0xFD300000-0xFD3FFFFFF
I/O Port 0x00005000-0x00005FFF
Memory Address 0xFD2F0000-0xFD2F0FFF
IRQ Channel IRQ 4294967294
Driver
e:\windows\system32\drivers\hpciss
s2.sys (6.12.0.64, 79.04 KB (80,936 bytes), 3/11/2008 11:11 PM)

Name Smart Array P400 Controller
Manufacturer Hewlett-Packard
Company
Status OK
PNP Device ID
PCI\VEN_103C&DEV_3230&SUBS_YS_3234103C&REV_03\4&322FE8E2&0&00A0
Memory Address 0xFD100000-0xFD1FFFFFF
I/O Port 0x00004000-0x00004FFF
Memory Address 0xFD0F0000-0xFD0F0FFF
IRQ Channel IRQ 4294967293
Driver
e:\windows\system32\drivers\hpciss
s2.sys (6.12.0.64, 79.04 KB (80,936 bytes), 3/11/2008 11:11 PM)

Name Smart Array P800 Controller
Manufacturer Hewlett-Packard
Company
Status OK
PNP Device ID
PCI\VEN_103C&DEV_3230&SUBS_YS_3223103C&REV_03\4&2EC1D6CF&0&00A8
Memory Address 0xFD500000-0xFD5FFFFFF
I/O Port 0x00006000-0x00006FFF

Memory Address 0xFD4F0000-0xFD4F0FFF
IRQ Channel IRQ 4294967292
Driver
e:\windows\system32\drivers\hpciss
s2.sys (6.12.0.64, 79.04 KB (80,936 bytes), 3/11/2008 11:11 PM)

Name Smart Array P800 Controller
Manufacturer Hewlett-Packard
Company
Status OK
PNP Device ID
PCI\VEN_103C&DEV_3230&SUBS_YS_3223103C&REV_03\4&31E04343&0&0098
Memory Address 0xFD700000-0xFD7FFFFFF
I/O Port 0x00007000-0x00007FFF
Memory Address 0xFD6F0000-0xFD6F0FFF
IRQ Channel IRQ 4294967291
Driver
e:\windows\system32\drivers\hpciss
s2.sys (6.12.0.64, 79.04 KB (80,936 bytes), 3/11/2008 11:11 PM)

Name Smart Array P800 Controller
Manufacturer Hewlett-Packard
Company
Status OK
PNP Device ID
PCI\VEN_103C&DEV_3230&SUBS_YS_3223103C&REV_03\4&234B80F1&0&0098
Memory Address 0xFD900000-0xFD9FFFFFF
I/O Port 0x00008000-0x00009FFF
Memory Address 0xFD8F0000-0xFD8F0FFF
IRQ Channel IRQ 4294967290
Driver
e:\windows\system32\drivers\hpciss
s2.sys (6.12.0.64, 79.04 KB (80,936 bytes), 3/11/2008 11:11 PM)

Name Smart Array P800 Controller
Manufacturer Hewlett-Packard
Company
Status OK
PNP Device ID
PCI\VEN_103C&DEV_3230&SUBS_YS_3223103C&REV_03\4&16D9858&0&00B0
Memory Address 0xFDB00000-0xFDBFFFFFF
I/O Port 0x00009000-0x00009FFF
Memory Address 0xFDAF0000-0xFDAF0FFF
IRQ Channel IRQ 4294967289
Driver
e:\windows\system32\drivers\hpciss
s2.sys (6.12.0.64, 79.04 KB (80,936 bytes), 3/11/2008 11:11 PM)

Name Smart Array P800 Controller
Manufacturer Hewlett-Packard
Company
Status OK
PNP Device ID
PCI\VEN_103C&DEV_3230&SUBS_YS_3223103C&REV_03\4&E9161B2&0&0098
Memory Address 0xFDD00000-0xFDDFFFFFF

I/O Port 0x0000A000-0x0000FFFF
 Memory Address 0xFDC0F000-0xFDC0FFFF
 IRQ Channel IRQ 4294967288
 Driver
 e:\windows\system32\drivers\hpciss
 s2.sys (6.12.0.64, 79.04 KB (80,936 bytes), 3/11/2008 11:11 PM)

Name Smart Array P800 Controller
 Manufacturer Hewlett-Packard
 Company
 Status OK
 PNP Device ID
 PCI\VEN_103C&DEV_3230&SUBS
 YS_3223103C&REV_03\4&30576D44&
 0&00B0
 Memory Address 0xFDF00000-0xFDF0FFFF
 I/O Port 0x0000B000-0x0000BFFF
 Memory Address 0xFDEF0000-0xFDEF0FFF
 IRQ Channel IRQ 4294967287
 Driver
 e:\windows\system32\drivers\hpciss
 s2.sys (6.12.0.64, 79.04 KB (80,936 bytes), 3/11/2008 11:11 PM)

Name Microsoft iSCSI Initiator
 Manufacturer Microsoft
 Status OK
 PNP Device ID ROOT\ISCSIPRT\0000
 Driver
 e:\windows\system32\drivers\msiscs
 i.sys (6.0.6001.18000, 210.05 KB (215,096 bytes), 1/18/2008 10:30 PM)

[IDE]

Item Value
 Name Standard Dual Channel PCI IDE
 Controller
 Manufacturer (Standard IDE
 ATA/ATAPI controllers)
 Status OK
 PNP Device ID
 PCI\VEN_1166&DEV_0214&SUBS
 YS_320B103C&REV_00\3&C04C483&
 0&31
 I/O Port 0x00000500-0x0000050F
 Driver
 e:\windows\system32\drivers\pciide.
 sys (6.0.6000.16386, 13.10 KB (13,416 bytes), 1/18/2008 10:28 PM)

Name ATA Channel 0
 Manufacturer (Standard IDE
 ATA/ATAPI controllers)
 Status OK
 PNP Device ID
 PCI\IDE\IDECHANNEL\4&148384D
 D&0&0
 I/O Port 0x000001F0-0x000001F7
 I/O Port 0x000003F6-0x000003F6
 IRQ Channel IRQ 14
 Driver
 e:\windows\system32\drivers\atapi.s
 ys (6.0.6001.18000, 22.05 KB (22,584 bytes), 1/18/2008 10:28 PM)

Name ATA Channel 1
 Manufacturer (Standard IDE
 ATA/ATAPI controllers)
 Status OK

PNP Device ID
 PCI\IDE\IDECHANNEL\4&148384D
 D&0&1
 I/O Port 0x00000170-0x00000177
 I/O Port 0x00000376-0x00000376
 IRQ Channel IRQ 15
 Driver
 e:\windows\system32\drivers\atapi.s
 ys (6.0.6001.18000, 22.05 KB (22,584 bytes), 1/18/2008 10:28 PM)

[Printing]

Can't Collect Information

[Problem Devices]

Device PNP Device ID Error Code
 Not Available ACPI\PNP0C0F1 The
 drivers for this device are not installed.

[USB]

Device PNP Device ID
 Standard Universal PCI to USB Host
 Controller
 PCI\VEN_103C&DEV_3300&SUBS
 YS_3305103C&REV_00\3&C04C483&
 0&24
 Standard OpenHCD USB Host
 Controller
 PCI\VEN_1166&DEV_0223&SUBS
 YS_320C103C&REV_01\3&C04C483&
 0&38
 Standard OpenHCD USB Host
 Controller
 PCI\VEN_1166&DEV_0223&SUBS
 YS_320C103C&REV_01\3&C04C483&
 0&39
 Standard Enhanced PCI to USB Host
 Controller
 PCI\VEN_1166&DEV_0223&SUBS
 YS_320D103C&REV_01\3&C04C483&
 0&3A

[Software Environment]

[System Drivers]

Name	Description	File Type	Started
Control	Accept	Pause	Accept
acpi	Microsoft ACPI Driver		
e:\windows\system32\drivers\acpi.s	Kernel Driver	Yes	Boot
adp94xx	adp94xx	Running	OK Critical No Yes
e:\windows\system32\drivers\adp94	Kernel Driver	No	Disabled
xx.sys	Stopped	OK	Normal No No
adpahci	adpahci	Running	OK Normal No No
e:\windows\system32\drivers\adpah	Kernel Driver	No	Disabled
ci.sys	Stopped	OK	Normal No No
adpu160m	adpu160m	Running	OK Normal No No
e:\windows\system32\drivers\adpu1	Kernel Driver	No	Disabled
60m.sys	Stopped	OK	Normal No No
adpu320	adpu320	Running	OK Normal No No
e:\windows\system32\drivers\adpu3			

20.sys	Kernel Driver	No	Disabled
afd	Stopped	OK	Normal No No
afd	Kernel Driver	Yes	System
afds	Running	OK	Normal No Yes
agp440	Intel AGP Bus Filter		
e:\windows\system32\drivers\agp44	Kernel Driver	No	Manual
0.sys	Stopped	OK	Normal No No
aic78xx	aic78xx	Running	OK Normal No No
e:\windows\system32\drivers\djsvs.s	Kernel Driver	No	Disabled
ys	Stopped	OK	Normal No No
aliide	aliide	Running	OK Normal No No
e:\windows\system32\drivers\aliide.s	Kernel Driver	No	Disabled
ys	Stopped	OK	Critical No No
amdide	amdide	Running	OK Normal No No
e:\windows\system32\drivers\amdide	Kernel Driver	No	Disabled
e.sys	Stopped	OK	Critical No No
amd8	AMD K8 Processor Driver		
e:\windows\system32\drivers\amd8	Kernel Driver	No	Disabled
.sys	Stopped	OK	Normal No No
arc	arc	Running	OK Normal No No
e:\windows\system32\drivers\arc.sy	Kernel Driver	No	Disabled
s	Stopped	OK	Normal No No
arcsas	arcsas	Running	OK Normal No No
e:\windows\system32\drivers\arcsas	Kernel Driver	No	Disabled
.sys	Stopped	OK	Normal No No
asynmac	RAS Asynchronous Media		
Driver			
e:\windows\system32\drivers\asyn	Kernel Driver	Yes	Manual
mac.sys	Running	OK	Normal No Yes
atapi	IDE Channel		
e:\windows\system32\drivers\atapi.s	Kernel Driver	Yes	Boot
ys	Running	OK	Critical No Yes
ati2mtag	ati2mtag	Running	OK Normal No No
e:\windows\system32\drivers\ati2mt	Kernel Driver	Yes	Manual
ag.sys	Running	OK	Ignore No Yes
b06bdrv	Broadcom NetXtreme II		
VBD			
e:\windows\system32\drivers\bxvbd	Kernel Driver	Yes	Manual
a.sys	Running	OK	Normal No Yes
blbdrive	blbdrive	Running	OK Normal No Yes
e:\windows\system32\drivers\blbdrv	Kernel Driver	No	Disabled
e.sys	Stopped	OK	Normal No No
bowser	Bowser	Running	OK Normal No Yes
e:\windows\system32\drivers\bowse	File System Driver	Yes	Manual
r.sys	Running	OK	Normal No Yes
brfiltlo	Brother USB Mass-Storage		
Lower Filter Driver			
e:\windows\system32\drivers\brfiltlo.	Kernel Driver	No	Manual
sys	Stopped	OK	Normal No No
brfiltup	Brother USB Mass-Storage		
Upper Filter Driver			
e:\windows\system32\drivers\brfiltup	Kernel Driver	No	Manual
.sys	Stopped	OK	Normal No No
brserid	Brother MFC Serial Port		
Interface Driver (WDM)			
e:\windows\system32\drivers\brserid			

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.sysKernel Driver No Disabled
Stopped OK Normal No No
brserwdm Brother WDM Serial driver
e:\windows\system32\drivers\brserw
dm.sys Kernel Driver No Disabled
Stopped OK Normal No No
brusbmdm Brother MFC USB Fax Only
Modem
e:\windows\system32\drivers\brusb
mdm.sys Kernel Driver No
Disabled Stopped OK Normal
No No
brusbser Brother MFC USB Serial
WDM Driver
e:\windows\system32\drivers\brusb
ser.sys Kernel Driver No Manual
Stopped OK Normal No No
cdfs CD/DVD File System Reader
e:\windows\system32\drivers\cdfs.sy
s File System Driver Yes Disabled
Running OK Normal No Yes
cdrom CD-ROM Driver
e:\windows\system32\drivers\cdrom.
sys Kernel Driver Yes System
Running OK Normal No Yes
circlass Consumer IR Devices
e:\windows\system32\drivers\circlas
s.sys Kernel Driver No Disabled
Stopped OK Normal No No
clfs Common Log (CLFS)
e:\windows\system32\clfs.sys
Kernel Driver Yes Boot
Running OK Critical No Yes
cmdide cmdide
e:\windows\system32\drivers\cmdid
e.sys Kernel Driver No Disabled
Stopped OK Critical No No
compbatt Microsoft Composite Battery
Driver
e:\windows\system32\drivers\compb
att.sys Kernel Driver No Disabled
Stopped OK Critical No No
cpqcidrv HP iLO Management
Channel Interface Driver
e:\windows\system32\drivers\cpqcid
rv.sys Kernel Driver Yes Manual
Running OK Normal No Yes
cpuspy3 CpuSpy3 Driver
\??\e:\windows\system32\drivers\cp
uspy3.sys Kernel Driver No Manual
Stopped OK Normal No No
crcdisk Crcdisk Filter Driver
e:\windows\system32\drivers\crcdisk
.sysKernel Driver Yes Boot
Running OK Normal No Yes
csc Offline Files Driver
e:\windows\system32\drivers\csc.sy
s Kernel Driver No Disabled
Stopped OK Normal No No
dfsc DFS Namespace Client Driver
e:\windows\system32\drivers\dfsc.sy
s File System Driver Yes System
Running OK Normal No Yes
diskDisk Driver
e:\windows\system32\drivers\disk.sy
s Kernel Driver Yes Boot
Running OK Normal No Yes
dxgknl LDDM Graphics Subsystem
e:\windows\system32\drivers\dxgknl
l.sys Kernel Driver No Manual
Stopped OK Ignore No No
e1g60 Intel(R) PRO/1000 NDIS 6
Adapter Driver
e:\windows\system32\drivers\le1g60
32e.sys Kernel Driver No Manual
Stopped OK Normal No No
elxstor elxstor
e:\windows\system32\drivers\elxstor
.sysKernel Driver No Disabled
Stopped OK Normal No No
errdev Microsoft Hardware Error
Device Driver
e:\windows\system32\drivers\errdev.
sys Kernel Driver No Disabled
Stopped OK Normal No No
exfat exFAT File System Driver
e:\windows\system32\drivers\exfat.s
ys File System Driver No Manual
Stopped OK Normal No No
fastfat FAT12/16/32 File System Driver
e:\windows\system32\drivers\fastfat.
sys File System Driver No Manual
Stopped OK Normal No No
fdc Floppy Disk Controller Driver
e:\windows\system32\drivers\fdc.sys
Kernel Driver No Disabled
Stopped OK Normal No No
fileinfo File Information FS MiniFilter
e:\windows\system32\drivers\fileinfo
.sysFile System Driver No Manual
Stopped OK Normal No No
filetrace FileTrace
e:\windows\system32\drivers\filetrac
e.sys File System Driver No Manual
Stopped OK Normal No No
flpydisk Floppy Disk Driver
e:\windows\system32\drivers\flpydis
k.sys Kernel Driver No Disabled
Stopped OK Normal No No
fltmgr FltMgr
e:\windows\system32\drivers\fltmgr.
sys File System Driver Yes Boot
Running OK Critical No Yes
gagp30kx Microsoft Generic AGPv3.0
Filter for K8 Processor Platforms
e:\windows\system32\drivers\gagp3
0kx.sys Kernel Driver No Manual
Stopped OK Normal No No
hdaudbus Microsoft UAA Bus Driver
for High Definition Audio
e:\windows\system32\drivers\hdaud
bus.sys Kernel Driver No Disabled
Stopped OK Normal No No
hidbth Microsoft Bluetooth HID Miniport
e:\windows\system32\drivers\hidbth.
sys Kernel Driver No Disabled
Stopped OK Ignore No No
hidir Microsoft Infrared HID Driver
e:\windows\system32\drivers\hidir.s
ys Kernel Driver No Disabled
Stopped OK Ignore No No
hidusb Microsoft HID Class Driver
e:\windows\system32\drivers\hidusb
.sysKernel Driver Yes Manual
Running OK Ignore No Yes
hpcisss HpCiSSs
e:\windows\system32\drivers\hpciss
s.sys Kernel Driver Yes Boot
Running OK Normal No Yes
hpcisss2 HpCiSSs2
e:\windows\system32\drivers\hpciss
s2.sys Kernel Driver Yes Boot
Running OK Normal No Yes
hpqilo2 hpqilo2
e:\windows\system32\drivers\hpqilo
2.sys Kernel Driver Yes Manual
Running OK Normal No Yes
httpHTTP
e:\windows\system32\drivers\http.sy
s Kernel Driver Yes Manual
Running OK Normal No Yes
i2omp i2omp
e:\windows\system32\drivers\i2omp.
sys Kernel Driver No Disabled
Stopped OK Normal No No
i8042prt i8042 Keyboard and PS/2
Mouse Port Driver
e:\windows\system32\drivers\i8042p
rt.sys Kernel Driver Yes System
Running OK Normal No Yes
iastorv Intel RAID Controller Vista
e:\windows\system32\drivers\iastorv
.sysKernel Driver No Disabled
Stopped OK Normal No No
iirsp iirsp
e:\windows\system32\drivers\iirsp.sp
s Kernel Driver No Disabled
Stopped OK Normal No No
intelide intelide
e:\windows\system32\drivers\intelig
e.sys Kernel Driver No Disabled
Stopped OK Critical No No
intelppm Intel Processor Driver
e:\windows\system32\drivers\intelpp
m.sys Kernel Driver No Disabled
Stopped OK Normal No No
ioatdmaIntel(R) QuickData Technology
Device
e:\windows\system32\drivers\qd260
x64.sys Kernel Driver No Disabled
Stopped OK Normal No No
ipfilterdriver IP Traffic Filter Driver
e:\windows\system32\drivers\ipfltdrv
.sysKernel Driver No Manual
Stopped OK Normal No No
ipmidrv IPMIDRV
e:\windows\system32\drivers\ipmidr
v.sys Kernel Driver Yes Manual
Running OK Normal No Yes
ipnat IP Network Address Translator
e:\windows\system32\drivers\ipnat.s
ys Kernel Driver No Manual
Stopped OK Normal No No
irenum IR Bus Enumerator
e:\windows\system32\drivers\irenum
.sysKernel Driver No Manual
Stopped OK Ignore No No
isapnp PnP ISA/EISA Bus Driver
e:\windows\system32\drivers\isapnp
.sysKernel Driver No Disabled
Stopped OK Critical No No
iscsiprt iScsiPort Driver
e:\windows\system32\drivers\msiscc
i.sys Kernel Driver Yes Manual
Running OK Normal No Yes
iteatapi ITEATAPI_Service_Install
e:\windows\system32\drivers\iteatap
i.sys Kernel Driver No Disabled
Stopped OK Normal No No
iteraid ITERAID_Service_Install
e:\windows\system32\drivers\iteraid.
sys Kernel Driver No Disabled
Stopped OK Normal No No
kbdclass Keyboard Class Driver
e:\windows\system32\drivers\kbdcla
ss.sys Kernel Driver Yes System
Running OK Normal No Yes
kbdhid Keyboard HID Driver
e:\windows\system32\drivers\kbdhid
.sysKernel Driver Yes System
Running OK Ignore No Yes
ksecdd KSecDD
e:\windows\system32\drivers\ksecdd

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d.sys Kernel Driver Yes Boot
Running OK Critical No Yes
ksthunk Kernel Streaming Thunks
e:\windows\system32\drivers\ksthun
k.sys Kernel Driver No Manual
Stopped OK Normal No No
l2nd Broadcom NetXtreme II BXND
e:\windows\system32\drivers\l2nd6
0a.sys Kernel Driver Yes Manual
Running OK Normal No Yes
ltdio Link-Layer Topology Discovery
Mapper I/O Driver
e:\windows\system32\drivers\ltdio.s
ys Kernel Driver Yes Auto
Running OK Normal No Yes
lsi_fc LSI_FC
e:\windows\system32\drivers\lsi_fc.s
ys Kernel Driver No Disabled
Stopped OK Normal No No
lsi_sas LSI_SAS
e:\windows\system32\drivers\lsi_sas
.sys Kernel Driver No Disabled
Stopped OK Normal No No
lsi_scsi LSI_SCSI
e:\windows\system32\drivers\lsi_scs
i.sys Kernel Driver No Disabled
Stopped OK Normal No No
luafv UAC File Virtualization
e:\windows\system32\drivers\luafv.s
ys File System Driver Yes Auto
Running OK Normal No Yes
megasas megasas
e:\windows\system32\drivers\megas
as.sys Kernel Driver No Disabled
Stopped OK Normal No No
megasr MegaSR
e:\windows\system32\drivers\megas
r.sys Kernel Driver No Disabled
Stopped OK Normal No No
modem Modem
e:\windows\system32\drivers\mode
m.sys Kernel Driver No Manual
Stopped OK Ignore No No
monitor Microsoft Monitor Class
Function Driver Service
e:\windows\system32\drivers\monito
r.sys Kernel Driver Yes Manual
Running OK Normal No Yes
mouclass Mouse Class Driver
e:\windows\system32\drivers\moucl
ass.sys Kernel Driver Yes System
Running OK Normal No Yes
mouhid Mouse HID Driver
e:\windows\system32\drivers\mouhi
d.sys Kernel Driver Yes Manual
Running OK Ignore No Yes
mountmgr Mount Point Manager
e:\windows\system32\drivers\mount
mgr.sys Kernel Driver Yes Boot
Running OK Critical No Yes
mpio Microsoft Multi-Path Bus Driver
e:\windows\system32\drivers\mpio.s
ys Kernel Driver No Disabled
Stopped OK Normal No No
mpsdrv Windows Firewall Authorization
Driver
e:\windows\system32\drivers\mpsdr
v.sys Kernel Driver No Manual
Stopped OK Normal No No
mraid35x Mraid35x
e:\windows\system32\drivers\mraid3
5x.sys Kernel Driver No Disabled
Stopped OK Normal No No
mrxsm SMB MiniRedirector Wrapper
and Engine
e:\windows\system32\drivers\mrxsm
b.sys File System Driver Yes Manual
Running OK Normal No Yes
mrxsm10 SMB 1.x MiniRedirector
e:\windows\system32\drivers\mrxsm
b10.sys File System Driver Yes Manual
Running OK Normal No Yes
mrxsm20 SMB 2.0 MiniRedirector
e:\windows\system32\drivers\mrxsm
b20.sys File System Driver Yes Manual
Running OK Normal No Yes
msahci msahci
e:\windows\system32\drivers\msahc
i.sys Kernel Driver No Disabled
Stopped OK Critical No No
msdms Microsoft Multi-Path Device
Specific Module
e:\windows\system32\drivers\msds
m.sys Kernel Driver No Disabled
Stopped OK Normal No No
msfs Msfs
e:\windows\system32\drivers\msfs.s
ys File System Driver Yes System
Running OK Normal No Yes
msisadv ISA/EISA Class Driver
e:\windows\system32\drivers\msisa
drv.sys Kernel Driver Yes Boot
Running OK Critical No Yes
msrpc MsRPC
e:\windows\system32\drivers\msrpc.
sys Kernel Driver No Manual
Stopped OK Normal No No
mssmbios Microsoft System
Management BIOS Driver
e:\windows\system32\drivers\mssm
bios.sys Kernel Driver Yes Manual
Running OK Normal No Yes
multevent MultEvent Driver
\??\e:\windows\system32\drivers\mu
lteventdriver.sys Kernel Driver No
Manual Stopped OK Normal No
No
mup Mup
e:\windows\system32\drivers\mup.s
ys File System Driver Yes Boot
Running OK Normal No Yes
ndis NDIS System Driver
e:\windows\system32\drivers\ndis.y
s Kernel Driver Yes Boot
Running OK Critical No Yes
ndistapi Remote Access NDIS TAPI
Driver
e:\windows\system32\drivers\ndista
pi.sys Kernel Driver Yes Manual
Running OK Normal No Yes
ndisui NDIS Usermode I/O Protocol
e:\windows\system32\drivers\ndisui
o.sys Kernel Driver No Manual
Stopped OK Normal No No
ndiswan Remote Access NDIS WAN
Driver
e:\windows\system32\drivers\ndiswa
n.sys Kernel Driver Yes Manual
Running OK Normal No Yes
ndproxy NDIS Proxy
e:\windows\system32\drivers\ndprox
y.sys Kernel Driver Yes Manual
Running OK Normal No Yes
netbios NetBIOS Interface
e:\windows\system32\drivers\netbio
s.sys File System Driver Yes System
Running OK Normal No Yes
netbt NETBT
e:\windows\system32\drivers\netbt.s
ys Kernel Driver Yes System
Running OK Normal No Yes
nfrd960 nfrd960
e:\windows\system32\drivers\nfrd96
0.sys Kernel Driver No Disabled
Stopped OK Normal No No
npfs Npfs
e:\windows\system32\drivers\npfs.s
ys File System Driver Yes System
Running OK Normal No Yes
nsiproxy NSI proxy service
e:\windows\system32\drivers\nsipro
xy.sys Kernel Driver Yes System
Running OK Normal No Yes
ntfs Ntfs
e:\windows\system32\drivers\ntfs.y
s File System Driver Yes Manual
Running OK Normal No Yes
null Null
e:\windows\system32\drivers\null.y
s Kernel Driver Yes System
Running OK Normal No Yes
nvraid NVIDIA nForce RAID Driver
e:\windows\system32\drivers\nvraid.
sys Kernel Driver No Disabled
Stopped OK Normal No No
nvstor nvstor
e:\windows\system32\drivers\nvstor.
sys Kernel Driver No Disabled
Stopped OK Critical No No
nv_agp NVIDIA nForce AGP Bus Filter
e:\windows\system32\drivers\nv_ag
p.sys Kernel Driver No Manual
Stopped OK Normal No No
ohci1394 NEC FireWarden OHCI
Compliant IEEE 1394 Host Controller
e:\windows\system32\drivers\ohci13
94.sys Kernel Driver No Disabled
Stopped OK Normal No No
parport Parallel port driver
e:\windows\system32\drivers\parpor
t.sys Kernel Driver No Disabled
Stopped OK Normal No No
partmgr Partition Manager
e:\windows\system32\drivers\partmg
r.sys Kernel Driver Yes Boot
Running OK Critical No Yes
pci PCI Bus Driver
e:\windows\system32\drivers\pci.sys
Kernel Driver Yes Boot
Running OK Critical No Yes
pciide pciide
e:\windows\system32\drivers\pciide.
sys Kernel Driver Yes Boot
Running OK Critical No Yes
pcmcia pcmcia
e:\windows\system32\drivers\pcmci
a.sys Kernel Driver No Disabled
Stopped OK Normal No No
peauth PEAUTH
e:\windows\system32\drivers\peauth
.sys Kernel Driver Yes Auto
Running OK Normal No Yes
pptpminiport WAN Miniport (PPTP)
e:\windows\system32\drivers\rasppt
p.sys Kernel Driver Yes Manual
Running OK Normal No Yes
processor Processor Driver
e:\windows\system32\drivers\proces
sr.sys Kernel Driver Yes Manual
Running OK Normal No Yes
procinfo Proclnfo
e:\windows\system32\drivers\proci
nfo.sys Kernel Driver No Manual
Stopped OK Normal No No

```

psched QoS Packet Scheduler
e:\windows\system32\drivers\pacer.
sys Kernel Driver Yes System
Running OK Normal No Yes
ql2300 QLogic Fibre Channel Miniport
Driver
e:\windows\system32\drivers\ql2300
.sys Kernel Driver No Disabled
Stopped OK Normal No No
ql40xx QLogic iSCSI Miniport Driver
e:\windows\system32\drivers\ql40xx
.sys Kernel Driver No Disabled
Stopped OK Normal No No
rasacd Remote Access Auto
Connection Driver
e:\windows\system32\drivers\rasacd
.sys Kernel Driver Yes System
Running OK Normal No Yes
rasl2tp WAN Miniport (L2TP)
e:\windows\system32\drivers\rasl2tp
.sys Kernel Driver Yes Manual
Running OK Normal No Yes
rasppoe Remote Access PPPOE
Driver
e:\windows\system32\drivers\raspp
oe.sys Kernel Driver Yes Manual
Running OK Normal No Yes
rasstp WAN Miniport (SSTP)
e:\windows\system32\drivers\rasstp
p.sys Kernel Driver Yes Manual
Running OK Normal No Yes
rdbss Redirected Buffering Sub
System
e:\windows\system32\drivers\rdbss.
sys File System Driver Yes System
Running OK Normal No Yes
rdpccd RDPCCDD
e:\windows\system32\drivers\rdpccd
.sys Kernel Driver Yes System
Running OK Ignore No Yes
rdpdr Terminal Server Device
Redirector Driver
e:\windows\system32\drivers\rdpdr.s
ys Kernel Driver Yes Manual
Running OK Normal No Yes
rdpencdd RDP Encoder Mirror Driver
e:\windows\system32\drivers\rdpenc
dd.sys Kernel Driver Yes System
Running OK Ignore No Yes
rdpwd RDP Winstation Driver
e:\windows\system32\drivers\rdpwd.
sys Kernel Driver Yes Manual
Running OK Ignore No Yes
rsfx0102 RsFx0102 Driver
e:\windows\system32\drivers\rsfx01
02.sys File System Driver No
Disabled Stopped OK Normal
No No
rspnldr Link-Layer Topology Discovery
Responder
e:\windows\system32\drivers\rspnldr.
sys Kernel Driver Yes Auto
Running OK Normal No Yes
s3cap Microsoft Emulated S3 Device
Cap Driver
e:\windows\system32\drivers\s3cap.
sys Kernel Driver No Disabled
Stopped OK Normal No No
sacdrv sacdrv
e:\windows\system32\drivers\sacdrv
.sys Kernel Driver No Boot
Stopped OK Ignore No No
sbp2port SBP-2 Transport/Protocol
Bus Driver
e:\windows\system32\drivers\sbp2p
ort.sys Kernel Driver No Disabled
Stopped OK Normal No No
secdrv Security Driver
e:\windows\system32\drivers\secdrv
.sys Kernel Driver Yes Auto
Running OK Normal No Yes
serenum Serenum Filter Driver
e:\windows\system32\drivers\serenu
m.sys Kernel Driver Yes Manual
Running OK Normal No Yes
serial Serial port driver
e:\windows\system32\drivers\serial.
sys Kernel Driver Yes System
Running OK Ignore No Yes
sermouse Serial Mouse Driver
e:\windows\system32\drivers\sermo
use.sys Kernel Driver No Disabled
Stopped OK Normal No No
sffdisk SFF Storage Class Driver
e:\windows\system32\drivers\sffdisk.
sys Kernel Driver No Disabled
Stopped OK Normal No No
sffp_mmc SFF Storage Protocol Driver
for MMC
e:\windows\system32\drivers\sffp_m
mc.sys Kernel Driver No Manual
Stopped OK Normal No No
sffp_sd SFF Storage Protocol Driver for
SDBus
e:\windows\system32\drivers\sffp_s
d.sys Kernel Driver No Manual
Stopped OK Normal No No
sfloppy High-Capacity Floppy Disk Drive
e:\windows\system32\drivers\sflopp
y.sys Kernel Driver No Disabled
Stopped OK Normal No No
sisraid2 SiSRaid2
e:\windows\system32\drivers\sisraid
2.sys Kernel Driver No Disabled
Stopped OK Normal No No
sisraid4 SiSRaid4
e:\windows\system32\drivers\sisraid
4.sys Kernel Driver No Disabled
Stopped OK Normal No No
slowmemory Slow Memory
Measurement
e:\windows\system32\drivers\slowm
emory.sys Kernel Driver No Manual
Stopped OK Normal No No
smb Message-oriented TCP/IP and
TCP/IPv6 Protocol (SMB session)
e:\windows\system32\drivers\smb.s
ys Kernel Driver Yes System
Running OK Normal No Yes
spldr Security Processor Loader
Driver
e:\windows\system32\drivers\spldr.s
ys Kernel Driver Yes Boot
Running OK Critical No Yes
srv srv
e:\windows\system32\drivers\srv.sys
File System Driver Yes Manual
Running OK Normal No Yes
srv2 srv2
e:\windows\system32\drivers\srv2.s
ys File System Driver Yes Manual
Running OK Normal No Yes
srvnet srvnet
e:\windows\system32\drivers\srvnet.
sys File System Driver Yes Manual
Running OK Normal No Yes
storflt Disk VMBUS Acceleration Filter
Driver
e:\windows\system32\drivers\storflt.
sys Kernel Driver Yes Boot
Running OK Normal No Yes
storvsc storvsc
e:\windows\system32\drivers\storvs
c.sys Kernel Driver No Disabled
Stopped OK Normal No No
storvsp Microsoft Virtual Disk Server
Driver
e:\windows\system32\drivers\storvs
p.sys Kernel Driver No Disabled
Stopped OK Normal No No
swenum Software Bus Driver
e:\windows\system32\drivers\swenu
m.sys Kernel Driver Yes Manual
Running OK Normal No Yes
symc8xx Symc8xx
e:\windows\system32\drivers\symc8
xx.sys Kernel Driver No Disabled
Stopped OK Normal No No
sym_hi Sym_hi
e:\windows\system32\drivers\sym_h
i.sys Kernel Driver No Disabled
Stopped OK Normal No No
sym_u3 Sym_u3
e:\windows\system32\drivers\sym_u
3.sys Kernel Driver No Disabled
Stopped OK Normal No No
tcpip TCP/IP Protocol Driver
e:\windows\system32\drivers\tcpip.s
ys Kernel Driver Yes Boot
Running OK Normal No Yes
tcpip6 Microsoft IPv6 Protocol Driver
e:\windows\system32\drivers\tcpip.s
ys Kernel Driver No Manual
Stopped OK Normal No No
tcpipreg TCP/IP Registry Compatibility
e:\windows\system32\drivers\tcpipr
g.sys Kernel Driver Yes Auto
Running OK Normal No Yes
tdpipe TDIPIPE
e:\windows\system32\drivers\tdpipe.
sys Kernel Driver No Manual
Stopped OK Normal No No
tdtcp TDTCPP
e:\windows\system32\drivers\tdtcp.s
ys Kernel Driver Yes Manual
Running OK Normal No Yes
tdx NetIO Legacy TDI Support Driver
e:\windows\system32\drivers\tdx.sys
Kernel Driver Yes System
Running OK Normal No Yes
termdd Terminal Device Driver
e:\windows\system32\drivers\termdd
.sys Kernel Driver Yes System
Running OK Normal No Yes
tssecsrv Terminal Services Security
Filter Driver
e:\windows\system32\drivers\tssecs
rv.sys Kernel Driver Yes Manual
Running OK Ignore No Yes
tunnel Microsoft IPv6 Tunnel Miniport
Adapter Driver
e:\windows\system32\drivers\tunnel.
sys Kernel Driver Yes Manual
Running OK Normal No Yes
uagp35 Microsoft AGPv3.5 Filter
e:\windows\system32\drivers\uagp3
5.sys Kernel Driver No Manual
Stopped OK Normal No No
udfs udfs
e:\windows\system32\drivers\udfs.s
ys File System Driver No Disabled
Stopped OK Normal No No
uliagpkx Uli AGP Bus Filter
e:\windows\system32\drivers\uliagp

Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{237AE960-89E2-4941-8177-8E56795A636A}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{542A1BD7-768F-45C9-A898-52E9CCC7A8BC}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{9B29D1A8-8E93-4B4B-8346-C85198A8EB95}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{13D3AD1C-5E2D-40F2-B67C-5126E995E45A}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{79C57849-111A-49DD-BBF4-3F98A051D675}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{18B386F4-9F11-4B28-9688-0C6BAFDA98A4}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{9D798B18-E810-4889-B014-18E26DA091E3}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{7F280BC0-5A07-4063-A136-A5A10B86087A}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{D984B9C0-4AE7-49CC-8BD7-7A0B04F084E7}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{E9A96C98A-D8EC-48A7-8A94-2566A425E6AD}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{ADB421FD-0F3B-40F8-9557-33ED2C47EDCB}

Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{7396839A-6EA2-4CB4-ACF2-8788C8291FF8}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{3D985F1C-F7E5-4E2F-A563-391B37BAB0A1}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{82EC5D3D-10C2-424E-A565-2233C331B445}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{776B8384-BE8E-46D9-8071-03B6659F672F}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{C7B0D61A-B6B1-4248-9749-2B1D52851AEC}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{991D5586-D3FC-429D-8D59-9C917F4DCA6D}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{43408178-72A3-4605-AB47-C5E9A39ED48A}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{F6CA1D9A-32B4-4929-9C07-8A5FA89F993A}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{8E454CAF-A4CD-481E-8C13-DE06E0377D0C}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{5C9460ED-696B-4B72-8DE7-848D918D079C}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C

&0&GPTPARTITION{81309693-0D48-4B5A-AB18-B10C621F665A}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{2E68C6F2-866D-4A98-80CA-67DEF3951159}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{768AE950-CC5D-493F-AF67-7F2484854DF8}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{D0D4C361-D9A0-4FBC-BB9D-87263F25765E}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{B250E09E-B105-4BCA-A2D8-14706354DD1E}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{9DDC4DEE-F649-4A08-898E-E023B192092C}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{18D755C8-30EC-43C1-9FBC-2DB3EF333921}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{7F61C92A-F479-4972-92F7-D9369FF5E82D}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{F27076AB-089E-4816-B414-CC2EDE1D0681}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{AA7476A4-B29D-457B-822D-72768C46658C}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{98207F62-059C-44B9-A53D-E18A93E97450}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not

Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{16EA9B2B-4BA2-4F67-A10B-CBCB57DA75E4}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{15E9A087-4258-4E29-9ADC-9ADA79D096D6}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{4BCBF901-94BB-4970-AAAF-0641952DED33}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{58379FB6-B300-4048-8F41-F52847CF3867}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{6466A6EF-7496-492F-BD09-AA9193D00ED9}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{F5B688ED-374D-4186-80F0-3F6819F9AA6B}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{A32A5FA3-15D2-414F-8FC5-8409E4DB056B}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{8883CC67-1274-440A-88D1-BA6BBD808CF3}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{FA92A990-E6D0-4474-B5CE-8F76BA5BE207}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
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Generic volume No VOLUME
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&0&GPTPARTITION{F24A73B0-D0FF-47E9-AFDE-F4A0F9EE8E29}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
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6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
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6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
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&0&GPTPARTITION{0A7761CD-CA08-4BBE-A1C3-D95B08052FBE}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
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STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{E57F49C5-B9E1-4157-B805-4F25322707CF}

Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
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&0&GPTPARTITION{AFD28B0E-BBFF-4CBD-9177-BC29B14AB079}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
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STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{6E5595FE-051B-4E41-B96C-02ED18059322}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
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STORAGE\VOLUME\1&19F7E59C
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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
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6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
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6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
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STORAGE\VOLUME\1&19F7E59C
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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
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&0&GPTPARTITION{B2CF0AF9-DD0A-4F5F-9240-B07D40D9B2D5}
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6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
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STORAGE\VOLUME\1&19F7E59C
&0&SIGNATURE61BAA311OFFSET7E
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6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
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&0&SIGNATURE6B5401A7OFFSET10
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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
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STORAGE\VOLUME\1&19F7E59C
&0&SIGNATUREB4BCB4BCOFFSET7
F8000LENGTH877FF8000
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
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6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{7D571170-FD1A-4860-9314-3420E8691AFE}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
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Generic volume No VOLUME
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Microsoft volume.inf Not
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STORAGE\VOLUME\1&19F7E59C
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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not

Available
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Generic volume No VOLUME
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Microsoft volume.inf Not
Available
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&0&GPTPARTITION{7FC17EC7-08A2-472F-899F-D76645D6EEAD}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{85E56274-D813-4BFD-A508-0C762D795A12}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{73015DA1-C227-4E4B-AE34-920D918ABC70}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{C5E19F73-2A61-4EBE-890A-B7E64046A6A2}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{75288D90-00B2-4A9D-A867-5F55C2FCE300}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
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6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{765D9F00-F64E-4273-AE73-064EF897BE9B}

Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{A5AF89EE-66E7-4F21-88AF-A9467060C63}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{60685B9C-BCF7-4873-85CA-CA94F8568753}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{7CD7F1D3-31DA-460E-853D-4B2701CC355E}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{81316DEA-3C1D-45EB-9C51-7A3986482576}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{FC5630AD-D3AF-472A-BDC1-810A1C2FD509}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{F8387CA9-68E5-4184-B8BE-A1774BE2554D}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C

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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{FC730597-DB6D-4B97-A754-ED95D94AE911}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{B919B6BF-6B87-40F5-824C-E8232451103D}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{D4DA2978-0CAF-492F-8C88-D43A70D8DA6B}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
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&0&GPTPARTITION{74EB3CD9-863C-4A7F-8709-764B16125AF5}
Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
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Generic volume No VOLUME
6.0.6001.18000 6/21/2006
Microsoft volume.inf Not
Available
STORAGE\VOLUME\1&19F7E59C
&0&GPTPARTITION{459C4913-67AF-435A-AD16-F02D60E1FA8F}
Volume Manager No SYSTEM
6.0.6001.18000 6/21/2006
(Standard system devices)
machine.inf Not Available
ROOT\VOLMGR\0000
UMBus Enumerator No SYSTEM
6.0.6001.18000 6/21/2006
Microsoft umbus.inf Not
Available
UMB\UMB\1&841921D&0&TSBUS
UMBus Root Bus Enumerator No
SYSTEM 6.0.6001.18000
6/21/2006 Microsoft umbus.inf
Not Available
ROOT\UMBUS\0000
Microsoft System Management BIOS
Driver No SYSTEM 6.0.6001.18000
6/21/2006 (Standard system
devices) machine.inf Not Available
ROOT\SYSTEM\0002
RAS Async Adapter No NET
6.0.6001.18000 6/21/2006
Microsoft netrasa.inf Not
Available SW\{EEAB7790-C514-
11D1-B42B-
00805FC1270E}\ASYNCMAC
Plug and Play Software Device
Enumerator No SYSTEM
6.0.6001.18000 6/21/2006
(Standard system devices)

machine.inf Not Available	VgaSave Not Available	Available Not Available
ROOT\SYSTEM\0000	LEGACYDRIVER Not Available	ROOT\LEGACY_RDP_CDD\0000
Terminal Server Mouse Driver No	Not Available Not Available Not	Remote Access Auto Connection Driver
SYSTEM 6.0.6001.18000	Available Not Available	Not Available LEGACYDRIVER
6/21/2006 (Standard system	ROOT\LEGACY_VGASAVE\0000	Not Available Not Available Not
devices) machine.inf Not Available	Terminal Services Security Filter Driver	Available Not Available Not
ROOT\RDP_MOU\0000	Not Available LEGACYDRIVER	Available
Terminal Server Keyboard Driver No	Not Available Not Available Not	ROOT\LEGACY_RASACD\0000
SYSTEM 6.0.6001.18000	Available Not Available Not	QoS Packet Scheduler Not Available
6/21/2006 (Standard system	Available	LEGACYDRIVER Not Available
devices) machine.inf Not Available	ROOT\LEGACY_TSSECSRV\0000	Not Available Not Available Not
ROOT\RDP_KBD\0000	NetIO Legacy TDI Support Driver Not	Available Not Available
Terminal Server Device Redirector No	Available LEGACYDRIVER Not	ROOT\LEGACY_PSCHEM\0000
SYSTEM 6.0.6001.18000	Available Not Available Not	PEAUTH Not Available
6/21/2006 (Standard system	Available Not Available Not	LEGACYDRIVER Not Available
devices) machine.inf Not Available	Available ROOT\LEGACY_TDX\0000	Not Available Not Available Not
ROOT\RDPDR\0000	TDTCP Not Available	Available Not Available
WAN Miniport (SSTP) No NET	LEGACYDRIVER Not Available	ROOT\LEGACY_PEAUTH\0000
6.0.6001.18000 6/21/2006	Not Available Not Available Not	Null Not Available LEGACYDRIVER
Microsoft netsstpa.inf Not	Available Not Available	Not Available Not Available Not
Available	ROOT\LEGACY_TDTCP\0000	Available
ROOT\MS_SSTP_MINI_PORT\0000	TCP/IP Registry Compatibility Not	ROOT\LEGACY_NULL\0000
WAN Miniport (PPTP) No NET	Available LEGACYDRIVER Not	NSI proxy service Not Available
6.0.6001.18000 6/21/2006	Available Not Available Not	LEGACYDRIVER Not Available
Microsoft netrasa.inf Not	Available Not Available Not	Not Available Not Available Not
Available	Available	Available Not Available
ROOT\MS_PPTP_MINI_PORT\0000	ROOT\LEGACY_TCPIPREG\0000	ROOT\LEGACY_NSIPROXY\0000
WAN Miniport (PPPOE) No NET	TCP/IP Protocol Driver Not Available	NETBT Not Available
6.0.6001.18000 6/21/2006	LEGACYDRIVER Not Available	LEGACYDRIVER Not Available
Microsoft netrasa.inf Not	Not Available Not Available Not	Not Available Not Available Not
Available	Available Not Available	Available Not Available
ROOT\MS_PPPOE_MINI_PORT\0000	ROOT\LEGACY_TCPIP\0000	ROOT\LEGACY_NETBT\0000
WAN Miniport (IPv6) No NET	Disk VMBUS Acceleration Filter Driver	NDProxy Not Available
6.0.6001.18000 6/21/2006	Not Available LEGACYDRIVER	LEGACYDRIVER Not Available
Microsoft netrasa.inf Not	Not Available Not Available Not	Not Available Not Available Not
Available	Available Not Available Not	Available Not Available
ROOT\MS_NDISWANIPV6\0000	Available	ROOT\LEGACY_NDPROXY\0000
WAN Miniport (IP) No NET	ROOT\LEGACY_STORFLT\0000	NDIS System Driver Not Available
6.0.6001.18000 6/21/2006	Security Processor Loader Driver Not	LEGACYDRIVER Not Available
Microsoft netrasa.inf Not	Available LEGACYDRIVER Not	Not Available Not Available Not
Available	Available Not Available Not	Available Not Available
ROOT\MS_NDISWANIP\0000	Available Not Available Not	ROOT\LEGACY_NDIS\0000
WAN Miniport (Network Monitor) No	Available	MultEvent Driver Not Available
NET 6.0.6001.18000 6/21/2006	ROOT\LEGACY_SPLDR\0000	LEGACYDRIVER Not Available
Microsoft netrasa.inf Not	Message-oriented TCP/IP and	Not Available Not Available Not
Available	TCP/IPV6 Protocol (SMB session) Not	Available Not Available
ROOT\MS_NDISWANBH\0000	Available LEGACYDRIVER Not	ROOT\LEGACY_MULTIEVENT\0000
WAN Miniport (L2TP) No NET	Available Not Available Not	0
6.0.6001.18000 6/21/2006	Available Not Available Not	ISA/EISA Class Driver Not Available
Microsoft netrasa.inf Not	Available ROOT\LEGACY_SMB\0000	LEGACYDRIVER Not Available
Available	Security Driver Not Available	Not Available Not Available Not
ROOT\MS_L2TP_MINI_PORT\0000	LEGACYDRIVER Not Available	Available Not Available
Kernel Mode Driver Frameworks service	Not Available Not Available Not	ROOT\LEGACY_MSISADRV\0000
Not Available LEGACYDRIVER	Available Not Available	Windows Firewall Authorization Driver
Not Available Not Available Not	ROOT\LEGACY_SECDRV\0000	Not Available LEGACYDRIVER
Available Not Available Not	Link-Layer Topology Discovery	Not Available Not Available Not
Available	Responder Not Available	Available Not Available Not
ROOT\LEGACY_WDF01000\0000	LEGACYDRIVER Not Available	Available
Remote Access IPv6 ARP Driver Not	Not Available Not Available Not	ROOT\LEGACY_MP_SDRV\0000
Available LEGACYDRIVER Not	Available Not Available	Mount Point Manager Not Available
Available Not Available Not	ROOT\LEGACY_RSPNDR\0000	LEGACYDRIVER Not Available
Available Not Available Not	RDP Winstation Driver Not Available	Not Available Not Available Not
Available	LEGACYDRIVER Not Available	Available Not Available
ROOT\LEGACY_WANARPV6\0000	Not Available Not Available Not	ROOT\LEGACY_MOUNTMGR\0000
Storage volumes Not Available	Available Not Available	0
LEGACYDRIVER Not Available	ROOT\LEGACY_RDPWD\0000	Link-Layer Topology Discovery Mapper
Not Available Not Available Not	RDP Encoder Mirror Driver Not	I/O Driver Not Available
Available Not Available	Available LEGACYDRIVER Not	LEGACYDRIVER Not Available
ROOT\LEGACY_VOLS_NAP\0000	Available Not Available Not	Not Available Not Available Not
Dynamic Volume Manager Not	Available Not Available Not	Available Not Available
Available LEGACYDRIVER Not	Available	ROOT\LEGACY_LLTDIO\0000
Available Not Available Not	ROOT\LEGACY_RDPENCDD\0000	KSecDD Not Available
Available Not Available Not	RDPCDD Not Available	LEGACYDRIVER Not Available
Available	LEGACYDRIVER Not Available	Not Available Not Available Not
ROOT\LEGACY_VOLMGRX\0000	Not Available Not Available Not	

Available	Not Available	Disk drive	No DISKDRIVE	Disk drive	No DISKDRIVE
ROOTLEGACY_KSECCD\0000		6.0.6001.18000 6/21/2006		6.0.6001.18000 6/21/2006	
HTTP	Not Available	(Standard disk drives)	disk.inf Not Available	(Standard disk drives)	disk.inf Not Available
LEGACYDRIVER	Not Available	SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&3C92DC8&0&000700	SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&41EDE1&0&000D00
Not Available	Not Available	Disk drive	No DISKDRIVE	Disk drive	No DISKDRIVE
Available	Not Available	6.0.6001.18000 6/21/2006		6.0.6001.18000 6/21/2006	
ROOTLEGACY_HTTP\0000		(Standard disk drives)	disk.inf Not Available	(Standard disk drives)	disk.inf Not Available
HpCISSs	Not Available	SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&3C92DC8&0&000600	SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&41EDE1&0&000C00
LEGACYDRIVER	Not Available	Disk drive	No DISKDRIVE	Disk drive	No DISKDRIVE
Not Available	Not Available	6.0.6001.18000 6/21/2006		6.0.6001.18000 6/21/2006	
Available	Not Available	(Standard disk drives)	disk.inf Not Available	(Standard disk drives)	disk.inf Not Available
ROOTLEGACY_HPCISSS\0000		SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&3C92DC8&0&000500	SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&41EDE1&0&000B00
Crcdisk Filter Driver	Not Available	Disk drive	No DISKDRIVE	Disk drive	No DISKDRIVE
LEGACYDRIVER	Not Available	6.0.6001.18000 6/21/2006		6.0.6001.18000 6/21/2006	
Not Available	Not Available	(Standard disk drives)	disk.inf Not Available	(Standard disk drives)	disk.inf Not Available
Available	Not Available	SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&3C92DC8&0&000400	SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&41EDE1&0&000A00
ROOTLEGACY_CRCDISK\0000		HP Virtual LUN	No SYSTEM	Disk drive	No DISKDRIVE
CpuSpy3 Driver	Not Available	6.0.6001.18000 6/21/2006		6.0.6001.18000 6/21/2006	
LEGACYDRIVER	Not Available	Compaq	scsdev.inf Not Available	(Standard disk drives)	disk.inf Not Available
Not Available	Not Available	SCSI\OTHER&VEN_COMPAQ&PR	OD_SCSI_COMMUNICATE\5&3C92DC8&0&000000	SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&41EDE1&0&000900
Available	Not Available	Smart Array P800 Controller	Yes	Disk drive	No DISKDRIVE
Available	Not Available	SCSIADAPTER 6.12.0.64	1/16/2008 Hewlett-Packard	6.0.6001.18000 6/21/2006	
ROOTLEGACY_AFD\0000		Company	oem4.inf Not Available	(Standard disk drives)	disk.inf Not Available
Microsoft iSCSI Initiator	No	PCIVEN_103C&DEV_3230&SUBS	YS_3223103C&REV_03\4&30576D44&0&00B0	SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&41EDE1&0&000800
SCSIADAPTER 6.0.6001.18000	6/21/2006	ServerWorks (Broadcom)	HT-2100 HT-PCI-E Bridge 1&3	Disk drive	No DISKDRIVE
Microsoft	iscsi.inf Not Available	6.0.6001.18000 6/21/2006	No SYSTEM	6.0.6001.18000 6/21/2006	
ROOT\ISCSIPRT\0000		ServerWorks (RCC)	machine.inf Not Available	(Standard disk drives)	disk.inf Not Available
ACPI Fixed Feature Button	No	PCIVEN_1166&DEV_0142&SUBS	YS_3116103C&REV_A2\3&8970C6B&0&B8	SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&41EDE1&0&000700
SYSTEM 6.0.6001.18000	6/21/2006	ServerWorks (Broadcom)	HT-2100 HT-PCI-E Bridge 2&4	Disk drive	No DISKDRIVE
(Standard system devices)	machine.inf Not Available	6.0.6001.18000 6/21/2006	No SYSTEM	6.0.6001.18000 6/21/2006	
ACPI\FIXEDBUTTON\2&DABA3FF		ServerWorks (RCC)	machine.inf Not Available	(Standard disk drives)	disk.inf Not Available
&1		PCIVEN_1166&DEV_0144&SUBS	YS_3117103C&REV_A2\3&8970C6B&0&B8	SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&41EDE1&0&000600
ServerWorks (Broadcom)	HT-2100 HT-PCI-E Bridge 2&4	ServerWorks (RCC)	machine.inf Not Available	SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&41EDE1&0&000500
6.0.6001.18000 6/21/2006		PCIVEN_1166&DEV_0142&SUBS	YS_3115103C&REV_A2\3&8970C6B&0&A8	Disk drive	No DISKDRIVE
ServerWorks (RCC)	machine.inf Not Available	ServerWorks (Broadcom)	HT-2100 HT-PCI-E Bridge 1&3	6.0.6001.18000 6/21/2006	
PCI\VEN_1166&DEV_0144&SUBS		6.0.6001.18000 6/21/2006	No SYSTEM	(Standard disk drives)	disk.inf Not Available
YS_3117103C&REV_A2\3&8970C6B&0&B8		ServerWorks (RCC)	machine.inf Not Available	SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&41EDE1&0&000500
Disk drive	No DISKDRIVE	PCIVEN_1166&DEV_0144&SUBS	YS_3115103C&REV_A2\3&8970C6B&0&A8	Disk drive	No DISKDRIVE
6.0.6001.18000 6/21/2006		ServerWorks (Broadcom)	HT-2100 HT-PCI-E Bridge 1&3	6.0.6001.18000 6/21/2006	
(Standard disk drives)	disk.inf Not Available	6.0.6001.18000 6/21/2006	No SYSTEM	(Standard disk drives)	disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&3C92DC8&0&000B00	ServerWorks (RCC)	machine.inf Not Available	SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&41EDE1&0&000400
CAL_VOLUME\5&3C92DC8&0&000B00		PCIVEN_1166&DEV_0142&SUBS	YS_3114103C&REV_A2\3&8970C6B&0&A0	HP Virtual LUN	No SYSTEM
Disk drive	No DISKDRIVE	ServerWorks (RCC)	machine.inf Not Available	6.0.6001.18000 6/21/2006	
6.0.6001.18000 6/21/2006		Disk drive	No DISKDRIVE	Compaq	scsdev.inf Not Available
(Standard disk drives)	disk.inf Not Available	6.0.6001.18000 6/21/2006		SCSI\OTHER&VEN_COMPAQ&PR	OD_SCSI_COMMUNICATE\5&41EDE1&0&000000
Available		(Standard disk drives)	disk.inf Not Available	Smart Array P800 Controller	Yes
SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&3C92DC8&0&000A00	SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&41EDE1&0&000F00	SCSIADAPTER 6.12.0.64	1/16/2008 Hewlett-Packard
CAL_VOLUME\5&3C92DC8&0&000A00		Disk drive	No DISKDRIVE	Company	oem4.inf Not Available
Disk drive	No DISKDRIVE	6.0.6001.18000 6/21/2006		PCIVEN_103C&DEV_3230&SUBS	YS_3223103C&REV_03\4&E9161B2&0&0098
6.0.6001.18000 6/21/2006		(Standard disk drives)	disk.inf Not Available	YS_3223103C&REV_03\4&E9161B2&0&0098	
(Standard disk drives)	disk.inf Not Available	SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&41EDE1&0&000E00		
Available		SCSI\DISK&VEN_HP&PROD_LOGI	CAL_VOLUME\5&41EDE1&0&000E00		

ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 0 No SYSTEM
6.0.6001.18000 6/21/2006
ServerWorks (RCC) machine.inf Not Available
PCI\VEN_1166&DEV_0140&SUBS_Y3_3113103C&REV_A2\3&8970C6B&0&98
PCI busNo SYSTEM 6.0.6001.18000 6/21/2006 (Standard system devices) machine.inf Not Available
ACPI\PNP0A03\73
ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 2&4 No SYSTEM
6.0.6001.18000 6/21/2006
ServerWorks (RCC) machine.inf Not Available
PCI\VEN_1166&DEV_0144&SUBS_Y3_3117103C&REV_A2\3&317825CD&0&B8
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&19F7889D&0&000B00
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&19F7889D&0&000A00
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&19F7889D&0&000900
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&19F7889D&0&000800
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&19F7889D&0&000700
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&19F7889D&0&000600
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&19F7889D&0&000500
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&19F7889D&0&000000

CAL_VOLUME\5&19F7889D&0&000400
HP Virtual LUN No SYSTEM
6.0.6001.18000 6/21/2006
Compaq scsdev.inf Not Available
SCSI\OTHER&VEN_COMPAQ&PROD_SCSI_COMMUNICATE\5&19F7889D&0&000000
Smart Array P800 ControllerYes
SCSIADAPTER 6.12.0.64
1/16/2008 Hewlett-Packard Company oem4.inf Not Available
PCI\VEN_103C&DEV_3230&SUBS_Y3_3223103C&REV_03\4&16D9858&0&00B0
ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 1&3 No SYSTEM
6.0.6001.18000 6/21/2006
ServerWorks (RCC) machine.inf Not Available
PCI\VEN_1166&DEV_0142&SUBS_Y3_3116103C&REV_A2\3&317825CD&0&B0
ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 2&4 No SYSTEM
6.0.6001.18000 6/21/2006
ServerWorks (RCC) machine.inf Not Available
PCI\VEN_1166&DEV_0144&SUBS_Y3_3115103C&REV_A2\3&317825CD&0&A8
ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 1&3 No SYSTEM
6.0.6001.18000 6/21/2006
ServerWorks (RCC) machine.inf Not Available
PCI\VEN_1166&DEV_0142&SUBS_Y3_3114103C&REV_A2\3&317825CD&0&A0
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&32BF63B0&0&000F00
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&32BF63B0&0&000E00
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&32BF63B0&0&000D00
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&32BF63B0&0&000C00
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&32BF63B0&0&000B00
0

Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&32BF63B0&0&000A00
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&32BF63B0&0&000900
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&32BF63B0&0&000800
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&32BF63B0&0&000700
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&32BF63B0&0&000600
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&32BF63B0&0&000500
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&32BF63B0&0&000400
HP Virtual LUN No SYSTEM
6.0.6001.18000 6/21/2006
Compaq scsdev.inf Not Available
SCSI\OTHER&VEN_COMPAQ&PROD_SCSI_COMMUNICATE\5&32BF63B0&0&000000
Smart Array P800 ControllerYes
SCSIADAPTER 6.12.0.64
1/16/2008 Hewlett-Packard Company oem4.inf Not Available
PCI\VEN_103C&DEV_3230&SUBS_Y3_3223103C&REV_03\4&234B80F1&0&0098
ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 0 No SYSTEM
6.0.6001.18000 6/21/2006
ServerWorks (RCC) machine.inf Not Available
PCI\VEN_1166&DEV_0140&SUBS_Y3_3113103C&REV_A2\3&317825CD&0&98
PCI busNo SYSTEM 6.0.6001.18000 6/21/2006 (Standard system devices) machine.inf Not Available
ACPI\PNP0A03\72

ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 2&4 No SYSTEM
6.0.6001.18000 6/21/2006
ServerWorks (RCC) machine.inf Not Available
PCI\VEN_1166&DEV_0144&SUBS_Y3117103C&REV_A2\3&1EBE7528&0&B8
ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 1&3 No SYSTEM
6.0.6001.18000 6/21/2006
ServerWorks (RCC) machine.inf Not Available
PCI\VEN_1166&DEV_0142&SUBS_Y3116103C&REV_A2\3&1EBE7528&0&B0
ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 2&4 No SYSTEM
6.0.6001.18000 6/21/2006
ServerWorks (RCC) machine.inf Not Available
PCI\VEN_1166&DEV_0144&SUBS_Y3115103C&REV_A2\3&1EBE7528&0&A8
ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 1&3 No SYSTEM
6.0.6001.18000 6/21/2006
ServerWorks (RCC) machine.inf Not Available
PCI\VEN_1166&DEV_0142&SUBS_Y3114103C&REV_A2\3&1EBE7528&0&A0
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&15B00B1C&0&000F00
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&15B00B1C&0&000E00
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&15B00B1C&0&000C00
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&15B00B1C&0&000B00
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&15B00B1C&0&000A00

Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&15B00B1C&0&000900
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&15B00B1C&0&000800
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&15B00B1C&0&000700
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&15B00B1C&0&000600
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&15B00B1C&0&000500
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not Available
SCSI\DISK&VEN_HP&PROD_LOGI_CAL_VOLUME\5&15B00B1C&0&000400
HP Virtual LUN No SYSTEM
6.0.6001.18000 6/21/2006
Compaq scsudev.inf Not Available
SCSI\OTHER&VEN_COMPAQ&PROD_SCSI_COMMUNICATE\5&15B00B1C&0&000000
Smart Array P800 Controller Yes
SCSI\ADAPTER 6.12.0.64
1/16/2008 Hewlett-Packard
Company oem4.inf Not Available
PCI\VEN_103C&DEV_3230&SUBS_Y3223103C&REV_03\4&31E04343&0&0098
ServerWorks (Broadcom) HT-2100 HT-PCI-E Bridge 0 No SYSTEM
6.0.6001.18000 6/21/2006
ServerWorks (RCC) machine.inf Not Available
PCI\VEN_1166&DEV_0140&SUBS_Y3113103C&REV_A2\3&1EBE7528&0&98
PCI bus No SYSTEM 6.0.6001.18000
6/21/2006 (Standard system devices) machine.inf Not Available
ACPI\PNP\0A03\71
Not Available Not Available Not Available
Not Available Not Available Not Available
Not Available Not Available Not Available
ACPI\PNP\0C0F\1
PCI standard host CPU bridge No SYSTEM 6.0.6001.18000
6/21/2006 (Standard system devices) machine.inf Not Available
PCI\VEN_1022&DEV_1204&SUBS_Y30000000&REV_00\3&C04C483&0&EC

6/21/2006 (Standard system devices) machine.inf Not Available
PCI\VEN_1022&DEV_1204&SUBS_Y30000000&REV_00\3&C04C483&0&FC
PCI standard host CPU bridge No SYSTEM 6.0.6001.18000
6/21/2006 (Standard system devices) machine.inf Not Available
PCI\VEN_1022&DEV_1203&SUBS_Y30000000&REV_00\3&C04C483&0&FB
PCI standard host CPU bridge No SYSTEM 6.0.6001.18000
6/21/2006 (Standard system devices) machine.inf Not Available
PCI\VEN_1022&DEV_1202&SUBS_Y30000000&REV_00\3&C04C483&0&FA
PCI standard host CPU bridge No SYSTEM 6.0.6001.18000
6/21/2006 (Standard system devices) machine.inf Not Available
PCI\VEN_1022&DEV_1201&SUBS_Y30000000&REV_00\3&C04C483&0&F9
PCI standard host CPU bridge No SYSTEM 6.0.6001.18000
6/21/2006 (Standard system devices) machine.inf Not Available
PCI\VEN_1022&DEV_1200&SUBS_Y30000000&REV_00\3&C04C483&0&F8
PCI standard host CPU bridge No SYSTEM 6.0.6001.18000
6/21/2006 (Standard system devices) machine.inf Not Available
PCI\VEN_1022&DEV_1204&SUBS_Y30000000&REV_00\3&C04C483&0&F4
PCI standard host CPU bridge No SYSTEM 6.0.6001.18000
6/21/2006 (Standard system devices) machine.inf Not Available
PCI\VEN_1022&DEV_1203&SUBS_Y30000000&REV_00\3&C04C483&0&F3
PCI standard host CPU bridge No SYSTEM 6.0.6001.18000
6/21/2006 (Standard system devices) machine.inf Not Available
PCI\VEN_1022&DEV_1202&SUBS_Y30000000&REV_00\3&C04C483&0&F2
PCI standard host CPU bridge No SYSTEM 6.0.6001.18000
6/21/2006 (Standard system devices) machine.inf Not Available
PCI\VEN_1022&DEV_1201&SUBS_Y30000000&REV_00\3&C04C483&0&F1
PCI standard host CPU bridge No SYSTEM 6.0.6001.18000
6/21/2006 (Standard system devices) machine.inf Not Available
PCI\VEN_1022&DEV_1200&SUBS_Y30000000&REV_00\3&C04C483&0&F0
PCI standard host CPU bridge No SYSTEM 6.0.6001.18000
6/21/2006 (Standard system devices) machine.inf Not Available
PCI\VEN_1022&DEV_1204&SUBS_Y30000000&REV_00\3&C04C483&0&EC

HP Virtual LUN No SYSTEM
6.0.6001.18000 6/21/2006
Compaq scsidesv.inf Not Available
SCSI\OTHER&VEN_COMPAQ&PRO
D_SCSI_COMMUNICATE\5&721BD3
E&0&000000
Smart Array P800 ControllerYes
SCSIADAPTER 6.12.0.64
1/16/2008 Hewlett-Packard
Company oem4.inf Not Available
PCI\VEN_103C&DEV_3230&SUBS
YS_3223103C&REV_03\4&2EC1D6CF
&0&00A8
ServerWorks (Broadcom) HT-2100 HT-
PCI-E Bridge 2&4 No SYSTEM
6.0.6001.18000 6/21/2006
ServerWorks (RCC) machine.inf Not
Available
PCI\VEN_1166&DEV_0144&SUBS
YS_3115103C&REV_A2\3&C04C483&0
&A8
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not
Available
SCSI\DISK&VEN_HP&PROD_LOGI
CAL_VOLUME\5&33FE751F&0&00060
0
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not
Available
SCSI\DISK&VEN_HP&PROD_LOGI
CAL_VOLUME\5&33FE751F&0&00050
0
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not
Available
SCSI\DISK&VEN_HP&PROD_LOGI
CAL_VOLUME\5&33FE751F&0&00040
0
HP Virtual LUN No SYSTEM
6.0.6001.18000 6/21/2006
Compaq scsidesv.inf Not
Available
SCSI\OTHER&VEN_COMPAQ&PR
OD_SCSI_COMMUNICATE\5&33FE75
1F&0&000000
Smart Array P400 ControllerYes
SCSIADAPTER 6.12.0.64
1/16/2008 Hewlett-Packard
Company oem4.inf Not Available
PCI\VEN_103C&DEV_3230&SUBS
YS_3234103C&REV_03\4&322FE8E2&
0&00A0
ServerWorks (Broadcom) HT-2100 HT-
PCI-E Bridge 1&3 No SYSTEM
6.0.6001.18000 6/21/2006
ServerWorks (RCC) machine.inf Not
Available
PCI\VEN_1166&DEV_0142&SUBS
YS_3114103C&REV_A2\3&C04C483&0
&A0
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not
Available
SCSI\DISK&VEN_HP&PROD_LOGI
CAL_VOLUME\5&22B433C4&0&000F0
0
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not

Available
SCSI\DISK&VEN_HP&PROD_LOGI
CAL_VOLUME\5&22B433C4&0&000E0
0
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not
Available
SCSI\DISK&VEN_HP&PROD_LOGI
CAL_VOLUME\5&22B433C4&0&000D0
0
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not
Available
SCSI\DISK&VEN_HP&PROD_LOGI
CAL_VOLUME\5&22B433C4&0&000C0
0
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not
Available
SCSI\DISK&VEN_HP&PROD_LOGI
CAL_VOLUME\5&22B433C4&0&000B0
0
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not
Available
SCSI\DISK&VEN_HP&PROD_LOGI
CAL_VOLUME\5&22B433C4&0&000A0
0
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not
Available
SCSI\DISK&VEN_HP&PROD_LOGI
CAL_VOLUME\5&22B433C4&0&00090
0
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not
Available
SCSI\DISK&VEN_HP&PROD_LOGI
CAL_VOLUME\5&22B433C4&0&00080
0
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not
Available
SCSI\DISK&VEN_HP&PROD_LOGI
CAL_VOLUME\5&22B433C4&0&00070
0
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not
Available
SCSI\DISK&VEN_HP&PROD_LOGI
CAL_VOLUME\5&22B433C4&0&00060
0
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not
Available
SCSI\DISK&VEN_HP&PROD_LOGI
CAL_VOLUME\5&22B433C4&0&00050
0
Disk drive No DISKDRIVE
6.0.6001.18000 6/21/2006
(Standard disk drives) disk.inf Not
Available
SCSI\DISK&VEN_HP&PROD_LOGI
CAL_VOLUME\5&22B433C4&0&00040
0

HP Virtual LUN No SYSTEM
6.0.6001.18000 6/21/2006
Compaq scsidesv.inf Not
Available
SCSI\OTHER&VEN_COMPAQ&PR
OD_SCSI_COMMUNICATE\5&22B433
C4&0&000000
Smart Array P800 ControllerYes
SCSIADAPTER 6.12.0.64
1/16/2008 Hewlett-Packard
Company oem4.inf Not Available
PCI\VEN_103C&DEV_3230&SUBS
YS_3223103C&REV_03\4&359FAD9&0
&0098
ServerWorks (Broadcom) HT-2100 HT-
PCI-E Bridge 0 No SYSTEM
6.0.6001.18000 6/21/2006
ServerWorks (RCC) machine.inf Not
Available
PCI\VEN_1166&DEV_0140&SUBS
YS_3113103C&REV_A2\3&C04C483&0
&98
USB Root Hub No USB
6.0.6001.18000 6/21/2006
(Standard USB Host Controller)
usbport.inf Not Available
USB\ROOT_HUB20\4&2B0CDB6&0
Standard Enhanced PCI to USB Host
Controller No USB 6.0.6001.18000
6/21/2006 (Standard USB Host
Controller) usbport.inf Not Available
PCI\VEN_1166&DEV_0223&SUBS
YS_320D103C&REV_01\3&C04C483&
0&3A
Generic USB Hub No USB
6.0.6001.18000 6/21/2006
(Generic USB Hub) usb.inf Not
Available
USB\VID_04B4&PID_6560\5&3E7D
475&0&1
USB Root Hub No USB
6.0.6001.18000 6/21/2006
(Standard USB Host Controller)
usbport.inf Not Available
USB\ROOT_HUB\4&30992D62&0
Standard OpenHCD USB Host
Controller No USB 6.0.6001.18000
6/21/2006 (Standard USB Host
Controller) usbport.inf Not Available
PCI\VEN_1166&DEV_0223&SUBS
YS_320C103C&REV_01\3&C04C483&
0&39
USB Root Hub No USB
6.0.6001.18000 6/21/2006
(Standard USB Host Controller)
usbport.inf Not Available
USB\ROOT_HUB\4&7B81400&0
Standard OpenHCD USB Host
Controller No USB 6.0.6001.18000
6/21/2006 (Standard USB Host
Controller) usbport.inf Not Available
PCI\VEN_1166&DEV_0223&SUBS
YS_320C103C&REV_01\3&C04C483&
0&38
Communications Port No PORTS
6.0.6001.18000 6/21/2006
(Standard port types) msports.inf
Not Available ACPI\PNP0501\0
Extended IO Bus No SYSTEM
6.0.6001.18000 6/21/2006
(Standard system devices)
machine.inf Not Available
ACPI\PNP0A06\4&63ACF31&0
PS/2 Compatible MouseNo MOUSE
6.0.6001.18000 6/21/2006

Microsoft msmouse.inf Not Available	PCI\VEN_1166&DEV_0214&SUBS YS_320B103C&REV_00\3&C04C483&0&31	USB\VID_03F0&PID_1027&MI_01\6&174A8EC&0&0001
ACPI\PNP0F13\4&63ACF31&0	ServerWorks (Broadcom) HT-1000 HT-PCI-X Bridge 1 No SYSTEM	HID Keyboard Device No KEYBOARD 6.0.6001.18000
Standard PS/2 Keyboard No KEYBOARD 6.0.6001.18000	6.0.6001.18000 6/21/2006	6/21/2006 (Standard keyboards) keyboard.inf Not Available
6/21/2006 (Standard keyboards) keyboard.inf Not Available	ServerWorks (RCC) machine.inf Not Available	HID\VID_03F0&PID_1027&MI_00\7&2DCFE64&0&0000
ACPI\PNP0303\4&63ACF31&0	PCI\VEN_1166&DEV_0205&SUBS YS_02011166&REV_00\3&C04C483&0&30	USB Human Interface Device No HIDCLASS 6.0.6001.18000
Programmable interrupt controller No SYSTEM 6.0.6001.18000	6/21/2006 (Standard system devices) machine.inf Not Available	6/21/2006 (Standard system devices) input.inf Not Available
ACPI\PNP0000\4&63ACF31&0	Broadcom BCM5706C NetXtreme II GigE (NDIS VBD Client) No NET	USB\VID_03F0&PID_1027&MI_00\6&174A8EC&0&0000
System speakerNo SYSTEM 6.0.6001.18000	3.7.19.0 6/21/2006 Broadcom Corporation netbxnda.inf Not Available	USB Composite Device No USB 6.0.6001.18000 6/21/2006
(Standard system devices) machine.inf Not Available	B06BDRV\L2ND&PCI_164A14E4&SUBSYS_1709103C&REV_02\6&23BF5E65&0&20050204	(Standard USB Host Controller) usb.inf Not Available
ACPI\PNP0800\4&63ACF31&0	Broadcom BCM5706C NetXtreme II GigE No SYSTEM 3.7.20.0	USB\VID_03F0&PID_1027\5&1845D16A&0&1
Direct memory access controller No SYSTEM 6.0.6001.18000	6/21/2006 Broadcom Corporation netbvnda.inf Not Available	Generic USB Hub No USB 6.0.6001.18000 6/21/2006
6/21/2006 (Standard system devices) machine.inf Not Available	PCI\VEN_14E4&DEV_164A&SUBS YS_1709103C&REV_02\5&3609893E&0&206828	(Generic USB Hub) usb.inf Not Available
ACPI\PNP0200\4&63ACF31&0	Broadcom BCM5706C NetXtreme II GigE (NDIS VBD Client) No NET	USB\VID_03F0&PID_1327\5&1845D16A&0&2
High precision event timer No SYSTEM 6.0.6001.18000	3.7.19.0 6/21/2006 Broadcom Corporation netbxnda.inf Not Available	USB Root Hub No USB 6.0.6001.18000 6/21/2006
6/21/2006 (Standard system devices) machine.inf Not Available	B06BDRV\L2ND&PCI_164A14E4&SUBSYS_1709103C&REV_02\6&2FFF06&0&20050203	(Standard USB Host Controller) usbport.inf Not Available
ACPI\PNP0103\0	Broadcom BCM5706C NetXtreme II GigE No SYSTEM 3.7.20.0	USB\ROOT_HUB\4&1AAB332F&0
System timer No SYSTEM 6.0.6001.18000	6/21/2006 Broadcom Corporation netbvnda.inf Not Available	Standard Universal PCI to USB Host Controller No USB 6.0.6001.18000
6/21/2006 (Standard system devices) machine.inf Not Available	PCI\VEN_14E4&DEV_164A&SUBS YS_1709103C&REV_02\5&3609893E&0&186828	6/21/2006 (Standard USB Host Controller) usbport.inf Not Available
ACPI\PNP0100\4&63ACF31&0	ServerWorks (Broadcom) HT-1000 HT-PCI-X Bridge No SYSTEM	PCI\VEN_103C&DEV_3300&SUBS YS_3305103C&REV_00\3&C04C483&0&24
Microsoft Generic IPMI Compliant Device No SYSTEM 6.0.6001.18000	6.0.6001.18000 6/21/2006	HP iLO Management Channel Interface Driver Yes MULTIFUNCTION
6/21/2006 Microsoft ipmidrv.inf Not Available	ServerWorks (RCC) machine.inf Not Available	1.13.0.0 1/1/2008 Hewlett-Packard Company oem3.inf Not Available
ACPI\IPI0001\0	PCI\VEN_1166&DEV_0104&SUBS YS_3111103C&REV_C0\4&C527D2B&0&6828	PCI\VEN_0E11&DEV_B204&SUBS YS_3305103C&REV_03\3&C04C483&0&22
Motherboard resources No SYSTEM 6.0.6001.18000	6/21/2006 Broadcom Corporation netbvnda.inf Not Available	HP ProLiant iLO 2 Legacy Support Function Yes SYSTEM 1.7.0.0
6/21/2006 (Standard system devices) machine.inf Not Available	PCI\VEN_14E4&DEV_164A&SUBS YS_1709103C&REV_02\5&3609893E&0&186828	1/11/2008 Hewlett-Packard Company oem2.inf Not Available
ACPI\PNP0C02\78	ServerWorks (Broadcom) HT-1000 HT-PCI-X Bridge No SYSTEM	PCI\VEN_0E11&DEV_B203&SUBS YS_3305103C&REV_03\3&C04C483&0&20
ServerWorks (Broadcom) HT-1000 HT-PCI-X to ISA Bridge No SYSTEM	6.0.6001.18000 6/21/2006	Generic PnP Monitor No MONITOR 6.0.6001.18000
6.0.6001.18000 6/21/2006	ServerWorks (RCC) machine.inf Not Available	(Standard monitor types) monitor.inf Not Available
ServerWorks (RCC) machine.inf Not Available	PCI\VEN_1166&DEV_0036&SUBS YS_3110103C&REV_00\3&C04C483&0&28	DISPLAY\AVO0402\4&37029B4A&0&10000080&00&03
PCI\VEN_1166&DEV_0234&SUBS YS_02301166&REV_00\3&C04C483&0&32	ServerWorks (Broadcom) HT-1000 HT-PCI-X Bridge 0 No SYSTEM	Generic Non-PnP Monitor No MONITOR 6.0.6001.18000
6/21/2006 (Standard IDE ATA/ATAPI controllers) mshdc.inf Not Available	6.0.6001.18000 6/21/2006	6/21/2006 (Standard monitor types) monitor.inf Not Available
PCI\IDE\IDECHANNEL\4&148384D D&0&1	ServerWorks (RCC) machine.inf Not Available	DISPLAY\AVO0402\4&37029B4A&0&10000001&00&03
CD-ROM Drive No CDROM 6.0.6001.18000 6/21/2006	PCI\VEN_1166&DEV_0104&SUBS YS_3111103C&REV_C0\4&C527D2B&0&6828	ATI ES1000Yes DISPLAY 8.240.50.2000 10/25/2007 ATI Technologies Inc. oem1.inf Not Available
(Standard CD-ROM drives) cdrom.inf Not Available	ServerWorks (Broadcom) HT-1000 HT-PCI-X Bridge 0 No SYSTEM	PCI\VEN_1002&DEV_515E&SUBS YS_31FB103C&REV_02\3&C04C483&0&18
IDE\CDROMTSSTCORP_DVD-ROM_TS-L332A_____HG00____\5&2274845F&0&0.0.0	6.0.6001.18000 6/21/2006	PCI busNo SYSTEM 6.0.6001.18000
6/21/2006 (Standard IDE ATA/ATAPI controllers) mshdc.inf Not Available	ServerWorks (RCC) machine.inf Not Available	6/21/2006 (Standard system devices) input.inf Not Available
PCI\IDE\IDECHANNEL\4&148384D D&0&0	PCI\VEN_1166&DEV_0036&SUBS YS_3110103C&REV_00\3&C04C483&0&28	
Standard Dual Channel PCI IDE Controller No HDC 6.0.6001.18000	HP ProLiant iLO 2 Management Controller Driver Yes SYSTEM	
6/21/2006 (Standard IDE ATA/ATAPI controllers) mshdc.inf Not Available	1.7.0.0 1/11/2008 Hewlett-Packard Company oem2.inf Not Available	
ATA/ATAPI controllers) mshdc.inf Not Available	PCI\VEN_103C&DEV_3302&SUBS YS_3305103C&REV_00\3&C04C483&0&26	
PCI\IDE\IDECHANNEL\4&148384D D&0&0	HID-compliant mouse No MOUSE 6.0.6001.18000 6/21/2006	
Standard Dual Channel PCI IDE Controller No HDC 6.0.6001.18000	Microsoft msmouse.inf Not Available	
6/21/2006 (Standard IDE ATA/ATAPI controllers) mshdc.inf Not Available	HID\VID_03F0&PID_1027&MI_01\7&2B47AC2D&0&0000	
ATA/ATAPI controllers) mshdc.inf Not Available	USB Human Interface Device No HIDCLASS 6.0.6001.18000	
PCI\IDE\IDECHANNEL\4&148384D D&0&0	6/21/2006 (Standard system devices) input.inf Not Available	

devices) machine.inf Not Available	Processor No PROCESSOR	Not Available
ACPI\PNP0A03\70	6.0.6001.18000 6/21/2006	ACPI\AUTHENTICAMD_-
Processor No PROCESSOR	(Standard processor types) cpu.inf	_AMD64_FAMILY_16_MODEL_4\7
6.0.6001.18000 6/21/2006	Not Available	Processor No PROCESSOR
(Standard processor types) cpu.inf	ACPI\AUTHENTICAMD_-	6.0.6001.18000 6/21/2006
Not Available	_AMD64_FAMILY_16_MODEL_4\19	(Standard processor types) cpu.inf
ACPI\AUTHENTICAMD_-	Processor No PROCESSOR	Not Available
_AMD64_FAMILY_16_MODEL_4\31	6.0.6001.18000 6/21/2006	ACPI\AUTHENTICAMD_-
Processor No PROCESSOR	(Standard processor types) cpu.inf	_AMD64_FAMILY_16_MODEL_4\6
6.0.6001.18000 6/21/2006	Not Available	Processor No PROCESSOR
(Standard processor types) cpu.inf	ACPI\AUTHENTICAMD_-	6.0.6001.18000 6/21/2006
Not Available	_AMD64_FAMILY_16_MODEL_4\18	(Standard processor types) cpu.inf
ACPI\AUTHENTICAMD_-	Processor No PROCESSOR	Not Available
_AMD64_FAMILY_16_MODEL_4\30	6.0.6001.18000 6/21/2006	ACPI\AUTHENTICAMD_-
Processor No PROCESSOR	(Standard processor types) cpu.inf	_AMD64_FAMILY_16_MODEL_4\5
6.0.6001.18000 6/21/2006	Not Available	Processor No PROCESSOR
(Standard processor types) cpu.inf	ACPI\AUTHENTICAMD_-	6.0.6001.18000 6/21/2006
Not Available	_AMD64_FAMILY_16_MODEL_4\17	(Standard processor types) cpu.inf
ACPI\AUTHENTICAMD_-	Processor No PROCESSOR	Not Available
_AMD64_FAMILY_16_MODEL_4\29	6.0.6001.18000 6/21/2006	ACPI\AUTHENTICAMD_-
Processor No PROCESSOR	(Standard processor types) cpu.inf	_AMD64_FAMILY_16_MODEL_4\4
6.0.6001.18000 6/21/2006	Not Available	Processor No PROCESSOR
(Standard processor types) cpu.inf	ACPI\AUTHENTICAMD_-	6.0.6001.18000 6/21/2006
Not Available	_AMD64_FAMILY_16_MODEL_4\16	(Standard processor types) cpu.inf
ACPI\AUTHENTICAMD_-	Processor No PROCESSOR	Not Available
_AMD64_FAMILY_16_MODEL_4\28	6.0.6001.18000 6/21/2006	ACPI\AUTHENTICAMD_-
Processor No PROCESSOR	(Standard processor types) cpu.inf	_AMD64_FAMILY_16_MODEL_4\3
6.0.6001.18000 6/21/2006	Not Available	Processor No PROCESSOR
(Standard processor types) cpu.inf	ACPI\AUTHENTICAMD_-	6.0.6001.18000 6/21/2006
Not Available	_AMD64_FAMILY_16_MODEL_4\15	(Standard processor types) cpu.inf
ACPI\AUTHENTICAMD_-	Processor No PROCESSOR	Not Available
_AMD64_FAMILY_16_MODEL_4\27	6.0.6001.18000 6/21/2006	ACPI\AUTHENTICAMD_-
Processor No PROCESSOR	(Standard processor types) cpu.inf	_AMD64_FAMILY_16_MODEL_4\2
6.0.6001.18000 6/21/2006	Not Available	Processor No PROCESSOR
(Standard processor types) cpu.inf	ACPI\AUTHENTICAMD_-	6.0.6001.18000 6/21/2006
Not Available	_AMD64_FAMILY_16_MODEL_4\14	(Standard processor types) cpu.inf
ACPI\AUTHENTICAMD_-	Processor No PROCESSOR	Not Available
_AMD64_FAMILY_16_MODEL_4\26	6.0.6001.18000 6/21/2006	ACPI\AUTHENTICAMD_-
Processor No PROCESSOR	(Standard processor types) cpu.inf	_AMD64_FAMILY_16_MODEL_4\1
6.0.6001.18000 6/21/2006	Not Available	Processor No PROCESSOR
(Standard processor types) cpu.inf	ACPI\AUTHENTICAMD_-	6.0.6001.18000 6/21/2006
Not Available	_AMD64_FAMILY_16_MODEL_4\13	(Standard processor types) cpu.inf
ACPI\AUTHENTICAMD_-	Processor No PROCESSOR	Not Available
_AMD64_FAMILY_16_MODEL_4\25	6.0.6001.18000 6/21/2006	ACPI\AUTHENTICAMD_-
Processor No PROCESSOR	(Standard processor types) cpu.inf	_AMD64_FAMILY_16_MODEL_4\0
6.0.6001.18000 6/21/2006	Not Available	Microsoft ACPI-Compliant System No
(Standard processor types) cpu.inf	ACPI\AUTHENTICAMD_-	SYSTEM 6.0.6001.18000
Not Available	_AMD64_FAMILY_16_MODEL_4\12	6/21/2006 Microsoft acpi.inf Not
ACPI\AUTHENTICAMD_-	Processor No PROCESSOR	Available ACPI_HAL\PNP0C08\0
_AMD64_FAMILY_16_MODEL_4\24	6.0.6001.18000 6/21/2006	ACPI x64-based PC No COMPUTER
Processor No PROCESSOR	(Standard processor types) cpu.inf	6.0.6001.18000 6/21/2006
6.0.6001.18000 6/21/2006	Not Available	(Standard computers) hal.inf Not
(Standard processor types) cpu.inf	ACPI\AUTHENTICAMD_-	Available ROOT\ACPI_HAL\0000
Not Available	_AMD64_FAMILY_16_MODEL_4\11	Microsoft ISATAP Adapter No NET
ACPI\AUTHENTICAMD_-	Processor No PROCESSOR	6.0.6001.18000 6/21/2006
_AMD64_FAMILY_16_MODEL_4\23	6.0.6001.18000 6/21/2006	Microsoft nettun.inf Not
Processor No PROCESSOR	(Standard processor types) cpu.inf	Available ROOT*ISATAP\0001
6.0.6001.18000 6/21/2006	Not Available	Microsoft ISATAP Adapter No NET
(Standard processor types) cpu.inf	ACPI\AUTHENTICAMD_-	6.0.6001.18000 6/21/2006
Not Available	_AMD64_FAMILY_16_MODEL_4\10	Microsoft nettun.inf Not
ACPI\AUTHENTICAMD_-	Processor No PROCESSOR	Available ROOT*ISATAP\0000
_AMD64_FAMILY_16_MODEL_4\22	6.0.6001.18000 6/21/2006	Microsoft 6to4 Adapter No NET
Processor No PROCESSOR	(Standard processor types) cpu.inf	6.0.6001.18000 6/21/2006
6.0.6001.18000 6/21/2006	Not Available	Microsoft nettun.inf Not
(Standard processor types) cpu.inf	ACPI\AUTHENTICAMD_-	Available ROOT*6TO4MP\0000
Not Available	_AMD64_FAMILY_16_MODEL_4\9	Not Available Not Available Not
ACPI\AUTHENTICAMD_-	Processor No PROCESSOR	Available Not Available Not
_AMD64_FAMILY_16_MODEL_4\21	6.0.6001.18000 6/21/2006	Available Not Available Not
Processor No PROCESSOR	(Standard processor types) cpu.inf	Available Not Available
6.0.6001.18000 6/21/2006	Not Available	HTREEROOT\0
(Standard processor types) cpu.inf	ACPI\AUTHENTICAMD_-	
Not Available	_AMD64_FAMILY_16_MODEL_4\8	
ACPI\AUTHENTICAMD_-	Processor No PROCESSOR	
_AMD64_FAMILY_16_MODEL_4\20	6.0.6001.18000 6/21/2006	
Processor No PROCESSOR	(Standard processor types) cpu.inf	
6.0.6001.18000 6/21/2006		
(Standard processor types) cpu.inf		
Not Available		
ACPI\AUTHENTICAMD_-		
_AMD64_FAMILY_16_MODEL_4\20		

[Environment Variables]

Variable	Value	User Name
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```

ComSpec
  %SystemRoot%\system32\cmd.exe
  <SYSTEM>
FP_NO_HOST_CHECKNO <SYSTEM>
OS Windows_NT <SYSTEM>
Path
  %SystemRoot%\system32;%SystemRoot%;%SystemRoot%\System32\WindowsPowerShell\v1.0;E:\Program Files(x86)\Microsoft SQL Server\100\Tools\Binn\;E:\Program Files\Microsoft SQL Server\100\Tools\Binn\;E:\Program Files\Microsoft SQL Server\100\DTS\Binn\ <SYSTEM>
PATHEXT
  .COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC <SYSTEM>
PROCESSOR_ARCHITECTURE
  AMD64 <SYSTEM>
TEMP %SystemRoot%\TEMP
  <SYSTEM>
TMP %SystemRoot%\TEMP
  <SYSTEM>
USERNAME SYSTEM <SYSTEM>
windir %SystemRoot% <SYSTEM>
NUMBER_OF_PROCESSORS 32
  <SYSTEM>
PROCESSOR_LEVEL 16 <SYSTEM>
PROCESSOR_IDENTIFIERAMD64
  Family 16 Model 4 Stepping 2, AuthenticAMD <SYSTEM>
PROCESSOR_REVISION 0402
  <SYSTEM>
# SQL <SYSTEM>
TPCDS_SCALE_FACTOR_SIMPLE 100
  <SYSTEM>
TPCDS_AUTOMATION_ROOT
  G:\MikeFmstpcds.3.03 <SYSTEM>
TPCDS_OUTPUT_DIR_PREFIX
  g:\tpcdsRuns <SYSTEM>
TPCDS_NUM_DATABASE_FILES 32
  <SYSTEM>
TPCDS_NUM_BACKUP_DEVICES 32
  <SYSTEM>
TPCDS_NUM_THROUGHPUT_STREAMS 20
  <SYSTEM>
TPCDS_NUM_QUERIES 99
  <SYSTEM>
TPCDS_NUM_TOTAL_FF_STREAMS 32
  <SYSTEM>
TPCDS_NUM_TOTAL_FF_SetS 2
  <SYSTEM>
TPCDS_NUM_TOTAL_FF_FILES 32
  <SYSTEM>
#This controls<SYSTEM>
TPCDS_NUM_LOAD_STREAMS 32
  <SYSTEM>
TPCDS_FF_DRIVES 32 <SYSTEM>
TPCDS_DATA_DRIVES 32
  <SYSTEM>
TPCDS_LOG_DRIVES 1 <SYSTEM>
TPCDS_BACKUP_DRIVES 32
  <SYSTEM>
TPCDS_TEMPDB_DATA_DRIVES 32
  <SYSTEM>
TPCDS_TEMPDB_LOG_DRIVES 1
  <SYSTEM>
TPCDS_TEMPDEV_SIZE 7500MB
  <SYSTEM>
TPCDS_TEMPLOG_SIZE 20000MB
  <SYSTEM>
TPCDS_DATA_FG_FILE_SIZE 10000MB
  <SYSTEM>
TPCDS_LOAD_FG_FILE_SIZE 10000MB
  <SYSTEM>
TPCDS_LOG_FG_FILE_SIZE 1000MB
  <SYSTEM>
TPCDS_FILE_GROWTH_SIZE 100MB
  <SYSTEM>
TPCDS_SQL_SHELL sqlcmd -E -I -b -w 65535 -l 60 -y 0 <SYSTEM>
TPCDS_SCALE_FACTOR
  %TPCDS_SCALE_FACTOR_SIMPLE% <SYSTEM>
TPCDS_DATABASE
  tpcds%TPCDS_SCALE_FACTOR% <SYSTEM>
TPCDS_AUTOMATION_PATH
  %TPCDS_AUTOMATION_ROOT%\Automation <SYSTEM>
TPCDS_AUTOMATION_CMD_PATH
  %TPCDS_AUTOMATION_PATH%\cmd <SYSTEM>
TPCDS_AUTOMATION_CONFIG
  %TPCDS_AUTOMATION_PATH%\config <SYSTEM>
TPCDS_AUTOMATION_EXEC
  %TPCDS_AUTOMATION_PATH%\execs <SYSTEM>
TPCDS_AUTOMATION_VBS
  %TPCDS_AUTOMATION_PATH%\vbs <SYSTEM>
TPCDS_AUTOMATION_MAPS
  %TPCDS_AUTOMATION_PATH%\Maps <SYSTEM>
TPCDS_AUTOMATION_SQL
  %TPCDS_AUTOMATION_PATH%\SQL <SYSTEM>
TPCDS_AUTOMATION_GENERATOR_SCRIPT_PATH
  %TPCDS_AUTOMATION_PATH%\SQLScriptGenerators <SYSTEM>
TPCDS_POWER_QUERIES_PATH
  %TPCDS_AUTOMATION_PATH%\PowerQueries <SYSTEM>
TPCDS_MASTERLOG_NAME
  MasterLog.txt <SYSTEM>
TPCDS_CLONE_PATH
  %TPCDS_AUTOMATION_PATH%\Clones <SYSTEM>
TPCDS_LOGMAN_PERFCOUNTERS_FILE
  %TPCDS_AUTOMATION_CONFIG%\perfCountersTPCDS.ini <SYSTEM>
TPCDS_LOGMAN_SAMPLE_INTERVAL 3
  <SYSTEM>
TPCDS_LOGMAN_SAMPLE_FORMAT csv
  <SYSTEM>
TPCDS_EXEC_WINDOW_COLOR 9F
  <SYSTEM>
TPCDS_SQL_DIR
  %systemdrive%\Program Files\Microsoft SQL Server\MSSQL10.MSSQLSERVER\MS SQL <SYSTEM>
TPCDS_SQL_LOG_DIR
  %systemdrive%\Program Files\Microsoft SQL Server\MSSQL10.MSSQLSERVER\MS SQL <SYSTEM>
TPCDS_SQL_START_COMMAND_LINE -c -E -T 834
  <SYSTEM>
TEMP
  %USERPROFILE%\AppData\Local\Temp NT AUTHORITY\SYSTEM
TMP
  %USERPROFILE%\AppData\Local\Temp NT AUTHORITY\SYSTEM
TEMP
  %USERPROFILE%\AppData\Local\Temp NT AUTHORITY\LOCAL SERVICE
TMP
  %USERPROFILE%\AppData\Local\Temp NT AUTHORITY\NETWORK SERVICE
TMP
  %USERPROFILE%\AppData\Local\Temp NT AUTHORITY\NETWORK SERVICE
TMP
  %USERPROFILE%\AppData\Local\Temp OCTANE1\Administrator
TMP
  %USERPROFILE%\AppData\Local\Temp OCTANE1\Administrator
# SQL OCTANE1\Administrator
TPCDS_SCALE_FACTOR_SIMPLE 100
  OCTANE1\Administrator
TPCDS_AUTOMATION_ROOT
  G:\MikeFmstpcds.3.03
  OCTANE1\Administrator
TPCDS_OUTPUT_DIR_PREFIX
  g:\tpcdsRuns
  OCTANE1\Administrator
TPCDS_NUM_DATABASE_FILES 32
  OCTANE1\Administrator
TPCDS_NUM_BACKUP_DEVICES 32
  OCTANE1\Administrator
TPCDS_NUM_THROUGHPUT_STREAMS 20
  OCTANE1\Administrator
TPCDS_NUM_QUERIES 99
  OCTANE1\Administrator
TPCDS_NUM_TOTAL_FF_STREAMS 32
  OCTANE1\Administrator
TPCDS_NUM_TOTAL_FF_SetS 2
  OCTANE1\Administrator
TPCDS_NUM_TOTAL_FF_FILES 32
  OCTANE1\Administrator
#This controls
  OCTANE1\Administrator
TPCDS_NUM_LOAD_STREAMS 32
  OCTANE1\Administrator
TPCDS_FF_DRIVES 32
  OCTANE1\Administrator
TPCDS_DATA_DRIVES 32
  OCTANE1\Administrator
TPCDS_LOG_DRIVES 1
  OCTANE1\Administrator
TPCDS_BACKUP_DRIVES 32
  OCTANE1\Administrator
TPCDS_TEMPDB_DATA_DRIVES 32
  OCTANE1\Administrator
TPCDS_TEMPDB_LOG_DRIVES 1
  OCTANE1\Administrator
TPCDS_TEMPDEV_SIZE 7500MB
  OCTANE1\Administrator
TPCDS_TEMPLOG_SIZE 20000MB
  OCTANE1\Administrator
TPCDS_DATA_FG_FILE_SIZE 10000MB
  OCTANE1\Administrator
TPCDS_LOAD_FG_FILE_SIZE 10000MB
  OCTANE1\Administrator
TPCDS_LOG_FG_FILE_SIZE 1000MB
  OCTANE1\Administrator

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TPCDS_FILE_GROWTH_SIZE 100MB
 OCTANE1\Administrator
 TPCDS_SQL_SHELL sqlcmd -E -I -b -w 65535 -l 60 -y 0
 OCTANE1\Administrator
 TPCDS_SCALE_FACTOR
 %TPCDS_SCALE_FACTOR_SIMP
 LE%g OCTANE1\Administrator
 TPCDS_DATABASE
 tpcds%TPCDS_SCALE_FACTOR%
 OCTANE1\Administrator
 TPCDS_AUTOMATION_PATH
 %TPCDS_AUTOMATION_ROOT%\Automation
 OCTANE1\Administrator
 TPCDS_AUTOMATION_CMD_PATH
 %TPCDS_AUTOMATION_PATH%\cmd
 OCTANE1\Administrator
 TPCDS_AUTOMATION_CONFIG
 %TPCDS_AUTOMATION_PATH%\config
 OCTANE1\Administrator
 TPCDS_AUTOMATION_EXEC
 %TPCDS_AUTOMATION_PATH%\execs
 OCTANE1\Administrator
 TPCDS_AUTOMATION_VBS
 %TPCDS_AUTOMATION_PATH%\vbs
 OCTANE1\Administrator
 TPCDS_AUTOMATION_MAPS
 %TPCDS_AUTOMATION_PATH%\Maps
 OCTANE1\Administrator
 TPCDS_AUTOMATION_SQL
 %TPCDS_AUTOMATION_PATH%\SQL
 OCTANE1\Administrator
 TPCDS_AUTOMATION_GENERATOR_SCRIPT_PATH
 %TPCDS_AUTOMATION_PATH%\SQLScriptGenerators
 OCTANE1\Administrator
 TPCDS_POWER_QUERIES_PATH
 %TPCDS_AUTOMATION_PATH%\PowerQueries
 OCTANE1\Administrator
 TPCDS_MASTERLOG_NAME
 MasterLog.txt
 OCTANE1\Administrator
 TPCDS_CLONE_PATH
 %TPCDS_AUTOMATION_PATH%\Clones
 OCTANE1\Administrator
 TPCDS_LOGMAN_PERFCOUNTERS_FILE
 %TPCDS_AUTOMATION_CONFIG%\perfCountersTPCDS.ini
 OCTANE1\Administrator
 TPCDS_LOGMAN_SAMPLE_INTERVAL 3
 OCTANE1\Administrator
 TPCDS_LOGMAN_SAMPLE_FORMAT csv
 OCTANE1\Administrator
 TPCDS_EXEC_WINDOW_COLOR 9F
 OCTANE1\Administrator
 TPCDS_SQL_DIR
 %systemdrive%\Program Files\Microsoft SQL Server\MSSQL10.MSSQLSERVER\MSSQL
 OCTANE1\Administrator
 TPCDS_SQL_LOG_DIR
 %systemdrive%\Program Files\Microsoft SQL Server\MSSQL10.MSSQLSERVER\MSSQL
 OCTANE1\Administrator
 TPCDS_SQL_START_COMMAND_LINE
 -c -E -T 834
 OCTANE1\Administrator

Can't Collect Information

[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
system	idle process	Not Available	0	0	Not Available	Not Available	Not Available	Not Available	Not Available
Available	Not Available	4	8	Not Available	Not Available	11/10/2008	2:42 PM	Not Available	Not Available
smss.exe	Not Available	61611	200	1380	11/10/2008	2:42 PM	Not Available	Not Available	Not Available
Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
csrss.exe	e:\windows\system32\csrss.exe	684	13	2001380	11/10/2008	2:43 PM	6.0.6001.18000	7.50 KB (7,680 bytes)	1/18/2008 9:59 PM
wininit.exe	e:\windows\system32\wininit.exe	72413	2001380	11/10/2008	2:43 PM	6.0.6001.18000	121.00 KB (123,904 bytes)	1/18/2008 10:17 PM	
csrss.exe	e:\windows\system32\csrss.exe	744	13	2001380	11/10/2008	2:43 PM	6.0.6001.18000	7.50 KB (7,680 bytes)	1/18/2008 9:59 PM
services.exe	e:\windows\system32\services.exe	7769	2001380	11/10/2008	2:43 PM	6.0.6001.18000	375.50 KB (384,512 bytes)	1/18/2008 10:03 PM	
lsass.exe	e:\windows\system32\lsass.exe	788	9	2001380	11/10/2008	2:43 PM	6.0.6001.18000	11.00 KB (11,264 bytes)	1/18/2008 10:16 PM
lsm.exe	e:\windows\system32\lsm.exe	7968	2001380	11/10/2008	2:43 PM	6.0.6001.18000	258.50 KB (264,704 bytes)	1/18/2008 10:43 PM	
svchost.exe	e:\windows\system32\svchost.exe	9528	2001380	11/10/2008	2:43 PM	6.0.6001.18000	27.00 KB (27,648 bytes)	1/18/2008 10:02 PM	
svchost.exe	e:\windows\system32\svchost.exe	1012	8	2001380	11/10/2008	2:43 PM	6.0.6001.18000	27.00 KB (27,648 bytes)	1/18/2008 10:02 PM
svchost.exe	e:\windows\system32\svchost.exe	5328	2001380	11/10/2008	2:43 PM	6.0.6001.18000	27.00 KB (27,648 bytes)	1/18/2008 10:02 PM	
svchost.exe	e:\windows\system32\svchost.exe	6248	2001380	11/10/2008	2:43 PM	6.0.6001.18000	27.00 KB (27,648 bytes)	1/18/2008 10:02 PM	

svchost.exe
 e:\windows\system32\svchost.exe
 6528 2001380 11/10/2008
 2:43 PM 6.0.6001.18000 27.00 KB (27,648 bytes) 1/18/2008 10:02 PM
 slsvc.exe
 e:\windows\system32\slsvc.exe 692
 8 2001380 11/10/2008 2:43 PM
 6.0.6001.18000 2.06 MB (2,161,664 bytes) 1/18/2008 11:33 PM
 svchost.exe
 e:\windows\system32\svchost.exe
 7928 2001380 11/10/2008
 2:43 PM 6.0.6001.18000 27.00 KB (27,648 bytes) 1/18/2008 10:02 PM
 svchost.exe
 e:\windows\system32\svchost.exe
 1060 8 2001380 11/10/2008
 2:43 PM 6.0.6001.18000 27.00 KB (27,648 bytes) 1/18/2008 10:02 PM
 winlogon.exe
 e:\windows\system32\winlogon.exe
 1108 13 2001380 11/10/2008
 2:43 PM 6.0.6001.18000 396.50 KB (406,016 bytes) 1/18/2008 10:18 PM
 svchost.exe
 e:\windows\system32\svchost.exe
 1144 8 2001380 11/10/2008
 2:43 PM 6.0.6001.18000 27.00 KB (27,648 bytes) 1/18/2008 10:02 PM
 logonui.exe
 e:\windows\system32\logonui.exe
 1280 13 2001380 11/10/2008
 2:43 PM 6.0.6001.18000 20.50 KB (20,992 bytes) 1/18/2008 10:17 PM
 svchost.exe
 e:\windows\system32\svchost.exe
 1408 8 2001380 11/10/2008
 2:43 PM 6.0.6001.18000 27.00 KB (27,648 bytes) 1/18/2008 10:02 PM
 svchost.exe
 e:\windows\system32\svchost.exe
 1436 8 2001380 11/10/2008
 2:43 PM 6.0.6001.18000 27.00 KB (27,648 bytes) 1/18/2008 10:02 PM
 sqlwriter.exe e:\program files\microsoft sql server\90\shared\sqlwriter.exe 1536
 8 2001380 11/10/2008 2:43 PM
 2007.100.1600.22 154.02 KB (157,720 bytes) 7/10/2008 5:31 AM
 csrss.exe
 e:\windows\system32\csrss.exe
 2208 13 2001380 11/10/2008
 2:43 PM 6.0.6001.18000 7.50 KB (7,680 bytes) 1/18/2008 9:59 PM
 winlogon.exe
 e:\windows\system32\winlogon.exe
 2232 13 2001380 11/10/2008
 2:43 PM 6.0.6001.18000 396.50 KB (406,016 bytes) 1/18/2008 10:18 PM
 taskeng.exe
 e:\windows\system32\taskeng.exe
 2412 8 2001380 11/10/2008
 2:44 PM 6.0.6001.18000 259.00 KB (265,216 bytes) 1/18/2008 10:13 PM
 rdclip.exe
 e:\windows\system32\rdclip.exe
 2464 8 2001380 11/10/2008
 2:44 PM 6.0.6001.18000 187.00 KB (191,488 bytes) 1/19/2008 5:51 AM
 dwm.exe
 e:\windows\system32\dwm.exe
 2532 8 2001380 11/10/2008

[Print Jobs]

2:44 PM 6.0.6001.18000 96.50 KB
 (98,816 bytes) 1/18/2008 10:10 PM
 explorer.exe e:\windows\explorer.exe
 2592 8 200 1380 11/10/2008
 2:44 PM 6.0.6001.18000 2.94 MB
 (3,080,704 bytes) 1/18/2008 10:22
 PM
 taskeng.exe
 e:\windows\system32\taskeng.exe
 2972 6 200 1380 11/10/2008
 2:44 PM 6.0.6001.18000 259.00 KB
 (265,216 bytes) 1/18/2008 10:13 PM
 sqlservr.exe e:\program files\microsoft
 sql
 server\mssql10.mssqlserver\mssql\binn\
 sqlservr.exe3052 8 200 1380
 11/10/2008 2:44 PM
 2007.100.1600.22 55.14 MB
 (57,820,696 bytes) 7/10/2008 5:31 AM
 msdtc.exe
 e:\windows\system32\msdtc.exe
 2336 8 200 1380 11/10/2008
 2:45 PM 2001.12.6931.18000
 104.00 KB (106,496 bytes)
 1/18/2008 10:27 PM
 msinfo32.exe
 e:\windows\system32\msinfo32.exe
 3372 8 200 1380 11/11/2008
 9:51 AM 6.0.6001.18000 477.50 KB
 (488,960 bytes) 1/18/2008 10:03 PM
 wmiprvse.exe
 e:\windows\system32\wbem\wmiprv
 se.exe 3312 8 200 1380
 11/11/2008 9:51 AM
 6.0.6001.18000 340.50 KB (348,672
 bytes) 1/18/2008 10:13 PM
 wmiprvse.exe
 e:\windows\system32\wbem\wmiprv
 se.exe 3768 200 1380 11/11/2008
 10:04 AM 6.0.6001.18000 340.50 KB
 (348,672 bytes) 1/18/2008 10:13 PM

[Loaded Modules]

Name	Version	Size	File Date
Manufacturer Path			
csrss	6.0.6001.18000	7.50 KB (7,680 bytes)	1/18/2008 9:59 PM
Microsoft Corporation			
e:\windows\system32\csrss.exe			
ntdll	6.0.6001.18000	1.49 MB (1,559,696 bytes)	1/19/2008 1:50 AM
Microsoft Corporation			
e:\windows\system32\ntdll.dll			
csrssrv	6.0.6001.18000	83.50 KB (85,504 bytes)	1/18/2008 9:59 PM
Microsoft Corporation			
e:\windows\system32\csrssrv.dll			
basesrv	6.0.6001.18000	78.50 KB (80,384 bytes)	1/18/2008 9:59 PM
Microsoft Corporation			
e:\windows\system32\basesrv.dll			
winsrv	6.0.6001.18000	439.50 KB (450,048 bytes)	1/18/2008 10:08 PM
Microsoft Corporation			
e:\windows\system32\winsrv.dll			
user32	6.0.6001.18000	801.00 KB (820,224 bytes)	1/18/2008 10:08 PM
Microsoft Corporation			
e:\windows\system32\user32.dll			
kernel32	6.0.6001.18000	1.16 MB (1,213,952 bytes)	1/18/2008 10:01 PM
Microsoft Corporation			
e:\windows\system32\kernel32.dll			

gdi32 6.0.6001.18023 379.00 KB
 (388,096 bytes) 10/6/2008 11:11 AM
 Microsoft Corporation
 e:\windows\system32\gdi32.dll
 advapi32 6.0.6001.18000 1.01 MB
 (1,062,400 bytes) 1/18/2008 11:13
 PM Microsoft Corporation
 e:\windows\system32\advapi32.dll
 rpcrt4 6.0.6001.18000 1.22 MB
 (1,281,024 bytes) 1/18/2008 10:28
 PM Microsoft Corporation
 e:\windows\system32\rpcrt4.dll
 lpk 6.0.6001.18000 32.00 KB (32,768
 bytes) 1/18/2008 10:08 PM
 Microsoft Corporation
 e:\windows\system32\lpk.dll
 usp10 1.626.6001.18000 607.50 KB
 (622,080 bytes) 1/18/2008 10:08 PM
 Microsoft Corporation
 e:\windows\system32\usp10.dll
 msvcrt 7.0.6001.18000 606.50 KB
 (621,056 bytes) 1/18/2008 9:52 PM
 Microsoft Corporation
 e:\windows\system32\msvcrt.dll
 sxs 6.0.6001.18000 560.50 KB (573,952
 bytes) 1/18/2008 10:00 PM
 Microsoft Corporation
 e:\windows\system32\sxs.dll
 wininit 6.0.6001.18000 121.00 KB
 (123,904 bytes) 1/18/2008 10:17 PM
 Microsoft Corporation
 e:\windows\system32\wininit.exe
 userenv6.0.6001.18000 134.00 KB
 (137,216 bytes) 1/18/2008 10:16 PM
 Microsoft Corporation
 e:\windows\system32\userenv.dll
 secur326.0.6001.18000 92.00 KB
 (94,208 bytes) 1/18/2008 10:16 PM
 Microsoft Corporation
 e:\windows\system32\secur32.dll
 imm32 6.0.6001.18000 160.00 KB
 (163,840 bytes) 1/18/2008 10:07 PM
 Microsoft Corporation
 e:\windows\system32\imm32.dll
 msctf 6.0.6001.18000 1,016.00 KB
 (1,040,384 bytes) 1/18/2008 10:09
 PM Microsoft Corporation
 e:\windows\system32\msctf.dll
 apphelp6.0.6001.18000 195.50 KB
 (200,192 bytes) 1/18/2008 9:52 PM
 Microsoft Corporation
 e:\windows\system32\apphelp.dll
 ws2_32 6.0.6001.18000 259.00 KB
 (265,216 bytes) 1/18/2008 10:38 PM
 Microsoft Corporation
 e:\windows\system32\ws2_32.dll
 nsi 6.0.6001.18000 11.00 KB (11,264
 bytes) 1/18/2008 10:36 PM
 Microsoft Corporation
 e:\windows\system32\nsi.dll
 mswsock 6.0.6001.18000 297.00 KB
 (304,128 bytes) 1/18/2008 10:38 PM
 Microsoft Corporation
 e:\windows\system32\mswsock.dll
 wshtcpip 6.0.6001.18000 12.50 KB
 (12,800 bytes) 1/18/2008 10:36 PM
 Microsoft Corporation
 e:\windows\system32\wshtcpip.dll
 wship6 6.0.6001.18000 11.00 KB
 (11,264 bytes) 1/18/2008 10:36 PM
 Microsoft Corporation
 e:\windows\system32\wship6.dll
 credssp6.0.6001.18000 18.00 KB
 (18,432 bytes) 1/18/2008 10:16 PM

Microsoft Corporation
 e:\windows\system32\credssp.dll
 crypt32 6.0.6001.18000 1.20 MB
 (1,254,400 bytes) 1/18/2008 10:15
 PM Microsoft Corporation
 e:\windows\system32\crypt32.dll
 msasn16.0.6001.18000 79.00 KB
 (80,896 bytes) 1/18/2008 10:57 PM
 Microsoft Corporation
 e:\windows\system32\msasn1.dll
 schannel 6.0.6001.18000 326.50 KB
 (334,336 bytes) 1/18/2008 10:16 PM
 Microsoft Corporation
 e:\windows\system32\schannel.dll
 netapi32 6.0.6001.18000 633.50 KB
 (648,704 bytes) 1/18/2008 10:19 PM
 Microsoft Corporation
 e:\windows\system32\netapi32.dll
 psapi 6.0.6001.18000 16.50 KB
 (16,896 bytes) 1/18/2008 10:40 PM
 Microsoft Corporation
 e:\windows\system32\psapi.dll
 services 6.0.6001.18000 375.50 KB
 (384,512 bytes) 1/18/2008 10:03 PM
 Microsoft Corporation
 e:\windows\system32\services.exe
 scesrv 6.0.6001.18000 390.00 KB
 (399,360 bytes) 1/18/2008 10:15 PM
 Microsoft Corporation
 e:\windows\system32\scesrv.dll
 authz 6.0.6001.18000 139.50 KB
 (142,848 bytes) 1/18/2008 10:16 PM
 Microsoft Corporation
 e:\windows\system32\authz.dll
 ncobjapi 6.0.6001.18000 68.50 KB
 (70,144 bytes) 1/18/2008 10:13 PM
 Microsoft Corporation
 e:\windows\system32\ncobjapi.dll
 ntmarta 6.0.6001.18000 155.50 KB
 (159,232 bytes) 1/18/2008 10:16 PM
 Microsoft Corporation
 e:\windows\system32\ntmarta.dll
 wldap32 6.0.6001.18000 321.00 KB
 (328,704 bytes) 1/18/2008 10:20 PM
 Microsoft Corporation
 e:\windows\system32\wldap32.dll
 samlib 6.0.6001.18000 97.00 KB
 (99,328 bytes) 1/18/2008 10:19 PM
 Microsoft Corporation
 e:\windows\system32\samlib.dll
 ole32 6.0.6001.18000 1.83 MB
 (1,923,072 bytes) 1/18/2008 10:30
 PM Microsoft Corporation
 e:\windows\system32\ole32.dll
 lsass 6.0.6001.18000 11.00 KB
 (11,264 bytes) 1/18/2008 10:16 PM
 Microsoft Corporation
 e:\windows\system32\lsass.exe
 lsasrv 6.0.6001.18000 1.61 MB
 (1,692,160 bytes) 1/18/2008 11:21
 PM Microsoft Corporation
 e:\windows\system32\lsasrv.dll
 samsrv 6.0.6001.18000 651.00 KB
 (666,624 bytes) 1/18/2008 10:19 PM
 Microsoft Corporation
 e:\windows\system32\samsrv.dll
 cryptdll 6.0.6001.18000 63.50 KB
 (65,024 bytes) 1/18/2008 10:15 PM
 Microsoft Corporation
 e:\windows\system32\cryptdll.dll
 dnsapi 6.0.6001.18000 214.50 KB
 (219,648 bytes) 1/18/2008 10:20 PM
 Microsoft Corporation
 e:\windows\system32\dnsapi.dll

ntdsapi 6.0.6001.18000 143.00 KB (146,432 bytes) 1/18/2008 10:20 PM Microsoft Corporation e:\windows\system32\ntdsapi.dll	Microsoft Corporation e:\windows\system32\wdigest.dll	svchost 6.0.6001.18000 27.00 KB (27,648 bytes) 1/18/2008 10:02 PM Microsoft Corporation e:\windows\system32\svchost.exe
feclient 6.0.6001.18000 67.00 KB (68,608 bytes) 1/18/2008 10:18 PM Microsoft Corporation e:\windows\system32\feclient.dll	rsaenh 6.0.6001.18000 283.05 KB (289,848 bytes) 1/18/2008 10:18 PM Microsoft Corporation e:\windows\system32\rsaenh.dll	umpnpgmgr 6.0.6001.18000 304.50 KB (311,808 bytes) 1/18/2008 9:59 PM Microsoft Corporation e:\windows\system32\umpnpgmgr.dll
mpr 6.0.6001.18000 83.50 KB (85,504 bytes) 1/18/2008 10:38 PM Microsoft Corporation e:\windows\system32\mpr.dll	tspkg 6.0.6001.18000 77.00 KB (78,848 bytes) 1/18/2008 10:16 PM Microsoft Corporation e:\windows\system32\tspkg.dll	powrprof 6.0.6001.18000 118.50 KB (121,344 bytes) 1/18/2008 10:23 PM Microsoft Corporation e:\windows\system32\powrprof.dll
slc 6.0.6001.18000 146.50 KB (150,016 bytes) 1/18/2008 11:32 PM Microsoft Corporation e:\windows\system32\slc.dll	gpapi 6.0.6001.18000 82.50 KB (84,480 bytes) 1/18/2008 10:20 PM Microsoft Corporation e:\windows\system32\gpapi.dll	rpcss 6.0.6001.18000 697.00 KB (713,728 bytes) 1/18/2008 10:27 PM Microsoft Corporation e:\windows\system32\rpcss.dll
sysntfy 6.0.6000.16386 21.00 KB (21,504 bytes) 1/18/2008 10:17 PM Microsoft Corporation e:\windows\system32\sysntfy.dll	setupapi 6.0.6001.18000 1.83 MB (1,921,536 bytes) 1/18/2008 10:00 PM Microsoft Corporation e:\windows\system32\setupapi.dll	FirewallAPI 6.0.6001.18000 685.00 KB (701,440 bytes) 1/18/2008 10:35 PM Microsoft Corporation e:\windows\system32\firewallapi.dll
wevtapi 6.0.6001.18000 384.50 KB (393,728 bytes) 1/18/2008 10:12 PM Microsoft Corporation e:\windows\system32\wevtapi.dll	oleaut32 6.0.6001.18000 828.00 KB (847,872 bytes) 1/18/2008 10:27 PM Microsoft Corporation e:\windows\system32\oleaut32.dll	version 6.0.6001.18000 26.50 KB (27,136 bytes) 1/18/2008 10:24 PM Microsoft Corporation e:\windows\system32\version.dll
iphlpapi 6.0.6001.18000 124.00 KB (126,976 bytes) 1/18/2008 10:36 PM Microsoft Corporation e:\windows\system32\iphlpapi.dll	scecli 6.0.6001.18000 230.00 KB (235,520 bytes) 1/18/2008 10:15 PM Microsoft Corporation e:\windows\system32\scecli.dll	wtsapi32 6.0.6001.18000 30.50 KB (31,232 bytes) 1/18/2008 10:42 PM Microsoft Corporation e:\windows\system32\wtsapi32.dll
dhcpcsvc 6.0.6001.18000 262.00 KB (268,288 bytes) 1/18/2008 10:35 PM Microsoft Corporation e:\windows\system32\dhcpcsvc.dll	rassfm 6.0.6001.18000 25.50 KB (26,112 bytes) 1/19/2008 5:51 AM Microsoft Corporation e:\windows\system32\rassfm.dll	cabinet 6.0.6001.18000 91.00 KB (93,184 bytes) 1/18/2008 10:23 PM Microsoft Corporation e:\windows\system32\cabinet.dll
winnsi 6.0.6001.18000 21.50 KB (22,016 bytes) 1/18/2008 10:36 PM Microsoft Corporation e:\windows\system32\winnsi.dll	dssenh 6.0.6001.18000 197.55 KB (202,296 bytes) 1/18/2008 10:18 PM Microsoft Corporation e:\windows\system32\dssenh.dll	wevtvsc 6.0.6001.18000 1.42 MB (1,486,336 bytes) 1/18/2008 10:13 PM Microsoft Corporation e:\windows\system32\wevtvsc.dll
dhcpcsvc6 6.0.6001.18000 155.00 KB (158,720 bytes) 1/18/2008 10:35 PM Microsoft Corporation e:\windows\system32\dhcpcsvc6.dll	winsta 6.0.6001.18000 200.50 KB (205,312 bytes) 1/18/2008 10:43 PM Microsoft Corporation e:\windows\system32\winsta.dll	lmhsvc 6.0.6001.18000 23.50 KB (24,064 bytes) 1/18/2008 10:36 PM Microsoft Corporation e:\windows\system32\lmhsvc.dll
cngaudit 6.0.6000.16386 14.50 KB (14,848 bytes) 1/18/2008 10:15 PM Microsoft Corporation e:\windows\system32\cngaudit.dll	cryptnet 6.0.6001.18000 127.00 KB (130,048 bytes) 1/18/2008 10:15 PM Microsoft Corporation e:\windows\system32\cryptnet.dll	gpsvc 6.0.6001.18000 701.50 KB (718,336 bytes) 1/18/2008 10:20 PM Microsoft Corporation e:\windows\system32\gpsvc.dll
ncrypt 6.0.6001.18000 247.50 KB (253,440 bytes) 1/18/2008 10:15 PM Microsoft Corporation e:\windows\system32\ncrypt.dll	sensapi 6.0.6001.18000 12.50 KB (12,800 bytes) 1/18/2008 10:27 PM Microsoft Corporation e:\windows\system32\sensapi.dll	nlaapi 6.0.6001.18000 60.00 KB (61,440 bytes) 1/18/2008 10:36 PM Microsoft Corporation e:\windows\system32\nlaapi.dll
bcrypt 6.0.6001.18000 299.50 KB (306,688 bytes) 1/18/2008 10:15 PM Microsoft Corporation e:\windows\system32\bcrypt.dll	shlwapi 6.0.6001.18000 443.50 KB (454,144 bytes) 1/18/2008 10:21 PM Microsoft Corporation e:\windows\system32\shlwapi.dll	wbemprox 6.0.6001.18000 42.50 KB (43,520 bytes) 1/18/2008 10:12 PM Microsoft Corporation e:\windows\system32\wbem\wbemprox.dll
msprivs 6.0.6000.16386 2.00 KB (2,048 bytes) 1/18/2008 10:16 PM Microsoft Corporation e:\windows\system32\msprivs.dll	comctl32 6.10.6001.18000 1.95 MB (2,049,024 bytes) 1/19/2008 1:51 AM Microsoft Corporation e:\windows\winsxs\amd64_microsoft-.windows.common-controls_6595b64144ccf1df_6.0.6001.18000_none_152e7382f3bd50c6\comctl32.dll	wbemcomn 6.0.6001.18000 516.00 KB (528,384 bytes) 1/18/2008 10:13 PM Microsoft Corporation e:\windows\system32\wbemcomn.dll
kerberos 6.0.6001.18000 639.50 KB (654,848 bytes) 1/18/2008 10:17 PM Microsoft Corporation e:\windows\system32\kerberos.dll	ism 6.0.6001.18000 258.50 KB (264,704 bytes) 1/18/2008 10:43 PM Microsoft Corporation e:\windows\system32\ism.exe	wbemsv 6.0.6001.18000 121.00 KB (123,904 bytes) 1/18/2008 10:12 PM Microsoft Corporation e:\windows\system32\wbem\wbemsv.dll
msv1_06 6.0.6001.18000 259.50 KB (265,728 bytes) 1/18/2008 10:16 PM Microsoft Corporation e:\windows\system32\msv1_0.dll	wmsgapi 6.0.6000.16386 14.00 KB (14,336 bytes) 1/18/2008 10:17 PM Microsoft Corporation e:\windows\system32\wmsgapi.dll	fastprox 6.0.6001.18000 869.50 KB (890,368 bytes) 1/18/2008 10:13 PM Microsoft Corporation e:\windows\system32\wbem\fastprox.dll
netlogon 6.0.6001.18000 700.00 KB (716,800 bytes) 1/18/2008 10:19 PM Microsoft Corporation e:\windows\system32\netlogon.dll	clbcatq 2001.12.6931.18000 597.00 KB (611,328 bytes) 1/18/2008 10:28 PM Microsoft Corporation e:\windows\system32\clbcatq.dll	profsvc 6.0.6001.18000 174.50 KB (178,688 bytes) 1/18/2008 10:16 PM Microsoft Corporation e:\windows\system32\profsvc.dll
winbrand 6.0.6001.18000 851.00 KB (871,424 bytes) 1/18/2008 10:02 PM Microsoft Corporation e:\windows\system32\winbrand.dll	lsiproxy 6.0.6001.18000 43.50 KB (44,544 bytes) 1/18/2008 10:42 PM Microsoft Corporation e:\windows\system32\lsiproxy.dll	atl 3.5.2284.0 85.50 KB (87,552 bytes) 1/18/2008 11:09 PM Microsoft Corporation e:\windows\system32\atl.dll
wdigest 6.0.6001.18000 193.00 KB (197,632 bytes) 1/18/2008 10:16 PM		

sens 6.0.6001.18000 60.50 KB
(61,952 bytes) 1/18/2008 10:27 PM
Microsoft Corporation
e:\windows\system32\sens.dll

schedsv 6.0.6001.18000 824.00 KB
(843,776 bytes) 1/18/2008 10:13 PM
Microsoft Corporation
e:\windows\system32\schedsv.dll

ktmw32 6.0.6001.18000 14.50 KB
(14,848 bytes) 1/18/2008 9:52 PM
Microsoft Corporation
e:\windows\system32\ktmw32.dll

taskcomp 6.0.6001.18000 400.00 KB
(409,600 bytes) 1/18/2008 10:13 PM
Microsoft Corporation
e:\windows\system32\taskcomp.dll

seclogon 6.0.6001.18000 28.00 KB
(28,672 bytes) 1/18/2008 10:18 PM
Microsoft Corporation
e:\windows\system32\seclogon.dll

wmisvc 6.0.6001.18000 216.50 KB
(221,696 bytes) 1/18/2008 10:13 PM
Microsoft Corporation
e:\windows\system32\wbem\wmisvc.dll

srsv 6.0.6001.18000 172.50 KB
(176,640 bytes) 1/18/2008 10:18 PM
Microsoft Corporation
e:\windows\system32\srsv.dll

iphlpvc 6.0.6001.18000 218.00 KB
(223,232 bytes) 1/18/2008 10:36 PM
Microsoft Corporation
e:\windows\system32\iphlpvc.dll

fwpuclnt 6.0.6001.18000 761.50 KB
(779,776 bytes) 1/18/2008 10:36 PM
Microsoft Corporation
e:\windows\system32\fwpuclnt.dll

rtutils 6.0.6001.18000 49.50 KB
(50,688 bytes) 1/18/2008 10:37 PM
Microsoft Corporation
e:\windows\system32\rtutils.dll

sqmapi 6.0.6001.18000 172.00 KB
(176,128 bytes) 1/18/2008 10:11 PM
Microsoft Corporation
e:\windows\system32\sqmapi.dll

sscore 6.0.6000.16386 12.00 KB
(12,288 bytes) 1/18/2008 10:18 PM
Microsoft Corporation
e:\windows\system32\sscore.dll

clusapi 6.0.6001.18000 237.50 KB
(243,200 bytes) 1/18/2008 10:05 PM
Microsoft Corporation
e:\windows\system32\clusapi.dll

activeds 6.0.6001.18000 259.50 KB
(265,728 bytes) 1/18/2008 10:19 PM
Microsoft Corporation
e:\windows\system32\activeds.dll

adsl dpc 6.0.6001.18000 224.00 KB
(229,376 bytes) 1/18/2008 10:19 PM
Microsoft Corporation
e:\windows\system32\adsl dpc.dll

credui 6.0.6001.18000 186.50 KB
(190,976 bytes) 1/18/2008 10:18 PM
Microsoft Corporation
e:\windows\system32\credui.dll

shell32 6.0.6001.18062 12.30 MB
(12,897,280 bytes) 10/6/2008 11:12 AM
Microsoft Corporation
e:\windows\system32\shell32.dll

resutils 6.0.6001.18000 76.00 KB
(77,824 bytes) 1/18/2008 10:04 PM
Microsoft Corporation
e:\windows\system32\resutils.dll

wintrust 6.0.6001.18000 213.00 KB
(218,112 bytes) 1/18/2008 10:15 PM

Microsoft Corporation
e:\windows\system32\wintrust.dll

imagehlp 6.0.6001.18000 72.50 KB
(74,240 bytes) 1/18/2008 10:40 PM
Microsoft Corporation
e:\windows\system32\imagehlp.dll

vssapi 6.0.6001.18000 1.43 MB
(1,494,528 bytes) 1/18/2008 10:30 PM
Microsoft Corporation
e:\windows\system32\vssapi.dll

vsstrace 6.0.6001.18000 90.00 KB
(92,160 bytes) 1/18/2008 10:29 PM
Microsoft Corporation
e:\windows\system32\vsstrace.dll

xmllite 1.2.1009.0 176.00 KB (180,224 bytes) 1/18/2008 11:13 PM
Microsoft Corporation
e:\windows\system32\xmllite.dll

propsys 6.0.6001.18000 895.50 KB
(916,992 bytes) 1/18/2008 10:21 PM
Microsoft Corporation
e:\windows\system32\propsys.dll

wbemcore 6.0.6001.18000 1.12 MB
(1,171,456 bytes) 1/18/2008 10:14 PM
Microsoft Corporation
e:\windows\system32\wbem\wbemcore.dll

esscli 6.0.6001.18000 418.00 KB
(428,032 bytes) 1/18/2008 10:12 PM
Microsoft Corporation
e:\windows\system32\wbem\esscli.dll

wmiutils 6.0.6001.18000 128.50 KB
(131,584 bytes) 1/18/2008 10:12 PM
Microsoft Corporation
e:\windows\system32\wbem\wmiutils.dll

repdrvfs 6.0.6001.18000 372.50 KB
(381,440 bytes) 1/18/2008 10:13 PM
Microsoft Corporation
e:\windows\system32\wbem\repdrvfs.dll

wmiprvse 6.0.6001.18000 671.50 KB
(687,616 bytes) 1/18/2008 10:13 PM
Microsoft Corporation
e:\windows\system32\wbem\wmiprvse.dll

wbemess 6.0.6001.18000 501.00 KB
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Microsoft Corporation
e:\windows\system32\wbem\wbemess.dll

winnr 6.0.6001.18000 27.00 KB
(27,648 bytes) 1/18/2008 10:19 PM
Microsoft Corporation
e:\windows\system32\winnr.dll

napinsp 6.0.6001.18000 61.50 KB
(62,976 bytes) 1/18/2008 10:37 PM
Microsoft Corporation
e:\windows\system32\napinsp.dll

ncprov 6.0.6001.18000 77.50 KB
(79,360 bytes) 1/18/2008 10:13 PM
Microsoft Corporation
e:\windows\system32\wbem\ncprov.dll

sessenv 6.0.6001.18000 73.00 KB
(74,752 bytes) 1/18/2008 10:43 PM
Microsoft Corporation
e:\windows\system32\sessenv.dll

TSChannel 6.0.6000.16386 18.50 KB
(18,944 bytes) 1/18/2008 10:12 PM
Microsoft Corporation
e:\windows\system32\tchannel.dll

rasadhlp 6.0.6001.18000 13.00 KB
(13,312 bytes) 1/18/2008 10:37 PM

Microsoft Corporation
e:\windows\system32\rasadhlp.dll

winhttp 6.0.6001.18000 429.50 KB
(439,808 bytes) 1/18/2008 10:26 PM
Microsoft Corporation
e:\windows\system32\winhttp.dll

qmgr 7.0.6001.18000 1.03 MB
(1,082,368 bytes) 1/18/2008 10:12 PM
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e:\windows\system32\qmgr.dll

shfolder 6.0.6001.18000 10.00 KB
(10,240 bytes) 1/18/2008 10:22 PM
Microsoft Corporation
e:\windows\system32\shfolder.dll

bitsperf 7.0.6000.16386 22.50 KB
(23,040 bytes) 1/18/2008 10:11 PM
Microsoft Corporation
e:\windows\system32\bitsperf.dll

bitsigd 7.0.6001.18000 45.50 KB
(46,592 bytes) 1/18/2008 10:11 PM
Microsoft Corporation
e:\windows\system32\bitsigd.dll

wuaueng 7.2.6001.784 2.19 MB
(2,291,912 bytes) 10/6/2008 11:10 AM
Microsoft Corporation
e:\windows\system32\wuaueng.dll

esent 6.0.6001.18000 2.41 MB
(2,522,624 bytes) 1/18/2008 10:17 PM
Microsoft Corporation
e:\windows\system32\esent.dll

winspool 6.0.6001.18000 333.50 KB
(341,504 bytes) 1/18/2008 11:11 PM
Microsoft Corporation
e:\windows\system32\winspool.drv

mssmsh 6.0.6001.18000 45.50 KB
(46,592 bytes) 1/18/2008 10:05 PM
Microsoft Corporation
e:\windows\system32\mssmsh.dll

rasapi32 6.0.6001.18000 329.50 KB
(337,408 bytes) 1/18/2008 10:37 PM
Microsoft Corporation
e:\windows\system32\rasapi32.dll

rasman 6.0.6001.18000 90.50 KB
(92,672 bytes) 1/18/2008 10:37 PM
Microsoft Corporation
e:\windows\system32\rasman.dll

tapi32 6.0.6000.16386 238.00 KB
(243,712 bytes) 1/18/2008 11:13 PM
Microsoft Corporation
e:\windows\system32\tapi32.dll

winmm 6.0.6001.18000 207.00 KB
(211,968 bytes) 1/18/2008 10:44 PM
Microsoft Corporation
e:\windows\system32\winmm.dll

oleacc 4.2.5406.0 300.50 KB (307,712 bytes) 1/18/2008 10:08 PM
Microsoft Corporation
e:\windows\system32\oleacc.dll

slsvc 6.0.6001.18000 2.06 MB
(2,161,664 bytes) 1/18/2008 11:33 PM
Microsoft Corporation
e:\windows\system32\slsvc.exe

es 2001.12.6931.18057 353.50 KB
(361,984 bytes) 10/6/2008 11:12 AM
Microsoft Corporation
e:\windows\system32\es.dll

nsisvc 6.0.6001.18000 24.00 KB
(24,576 bytes) 1/18/2008 10:36 PM
Microsoft Corporation
e:\windows\system32\nsisvc.dll

wkssvc 6.0.6001.18000 198.00 KB
(202,752 bytes) 1/18/2008 10:18 PM
Microsoft Corporation
e:\windows\system32\wkssvc.dll

netprofm 6.0.6001.18000 297.00 KB (304,128 bytes) 1/18/2008 10:38 PM Microsoft Corporation e:\windows\system32\netprofm.dll

npmproxy 6.0.6000.16386 31.50 KB (32,256 bytes) 1/18/2008 10:38 PM Microsoft Corporation e:\windows\system32\npmproxy.dll

uxsms 6.0.6001.18000 32.00 KB (32,768 bytes) 1/18/2008 10:10 PM Microsoft Corporation e:\windows\system32\uxsms.dll

trkwks 6.0.6001.18000 114.50 KB (117,248 bytes) 1/18/2008 10:27 PM Microsoft Corporation e:\windows\system32\trkwks.dll

umrdp 6.0.6001.18000 247.00 KB (252,928 bytes) 1/19/2008 5:52 AM Microsoft Corporation e:\windows\system32\umrdp.dll

umb 6.0.6001.18000 58.50 KB (59,904 bytes) 1/18/2008 10:06 PM Microsoft Corporation e:\windows\system32\umb.dll

wdi 6.0.6001.18000 80.00 KB (81,920 bytes) 1/18/2008 10:03 PM Microsoft Corporation e:\windows\system32\wdi.dll

radardt 6.0.6000.16386 77.50 KB (79,360 bytes) 1/19/2008 5:52 AM Microsoft Corporation e:\windows\system32\radardt.dll

netman 6.0.6001.18000 340.00 KB (348,160 bytes) 1/18/2008 10:35 PM Microsoft Corporation e:\windows\system32\netman.dll

netshell 6.0.6001.18000 3.19 MB (3,341,312 bytes) 1/18/2008 10:35 PM Microsoft Corporation e:\windows\system32\netshell.dll

rasdlg 6.0.6001.18000 890.00 KB (911,360 bytes) 1/18/2008 10:37 PM Microsoft Corporation e:\windows\system32\rasdlg.dll

mprapi 6.0.6001.18000 126.50 KB (129,536 bytes) 1/18/2008 10:37 PM Microsoft Corporation e:\windows\system32\mprapi.dll

hnetcfg 6.0.6001.18000 423.50 KB (433,664 bytes) 1/18/2008 10:35 PM Microsoft Corporation e:\windows\system32\hnetcfg.dll

netcfgx 6.0.6001.18000 492.00 KB (503,808 bytes) 1/18/2008 10:35 PM Microsoft Corporation e:\windows\system32\netcfgx.dll

winlogon 6.0.6001.18000 396.50 KB (406,016 bytes) 1/18/2008 10:18 PM Microsoft Corporation e:\windows\system32\winlogon.exe

shsvcs 6.0.6001.18000 294.50 KB (301,568 bytes) 1/18/2008 10:21 PM Microsoft Corporation e:\windows\system32\shsvcs.dll

dnrsrldr 6.0.6001.18000 115.00 KB (117,760 bytes) 1/18/2008 10:20 PM Microsoft Corporation e:\windows\system32\dnrsrldr.dll

nlasvc 6.0.6001.18000 201.50 KB (206,336 bytes) 1/18/2008 10:36 PM Microsoft Corporation e:\windows\system32\nlasvc.dll

ncsi 6.0.6001.18000 106.50 KB (109,056 bytes) 1/18/2008 10:35 PM Microsoft Corporation e:\windows\system32\ncsi.dll

cfgmgr32 6.0.6001.18000 17.50 KB (17,920 bytes) 1/18/2008 9:59 PM Microsoft Corporation e:\windows\system32\cfgmgr32.dll

ssdpapi 6.0.6000.16386 49.00 KB (50,176 bytes) 1/18/2008 10:38 PM Microsoft Corporation e:\windows\system32\ssdpapi.dll

termsrv 6.0.6001.18000 534.00 KB (546,816 bytes) 1/18/2008 10:43 PM Microsoft Corporation e:\windows\system32\termsrv.dll

icaapi 6.0.6000.16386 20.00 KB (20,480 bytes) 1/18/2008 10:42 PM Microsoft Corporation e:\windows\system32\icaapi.dll

regapi 6.0.6001.18000 87.00 KB (89,088 bytes) 1/18/2008 10:42 PM Microsoft Corporation e:\windows\system32\regapi.dll

rdpwsx 6.0.6001.18000 115.00 KB (117,760 bytes) 1/18/2008 10:42 PM Microsoft Corporation e:\windows\system32\rdpwsx.dll

mstlsapi 6.0.6001.18000 135.00 KB (138,240 bytes) 1/18/2008 10:42 PM Microsoft Corporation e:\windows\system32\mstlsapi.dll

msdtckrm 2001.12.6931.18000 386.00 KB (395,264 bytes) 1/18/2008 10:27 PM Microsoft Corporation e:\windows\system32\msdtckrm.dll

wsmsvc 6.0.6001.18000 1.04 MB (1,091,072 bytes) 1/18/2008 10:14 PM Microsoft Corporation e:\windows\system32\wsmsvc.dll

wsmprov 6.0.6001.18000 71.50 KB (73,216 bytes) 1/18/2008 10:13 PM Microsoft Corporation e:\windows\system32\wsmprov.dll

winrmgr 6.0.6001.18000 294.00 KB (301,056 bytes) 1/18/2008 10:14 PM Microsoft Corporation e:\windows\system32\winrmgr.dll

httpapi 6.0.6001.18000 32.50 KB (33,280 bytes) 1/18/2008 10:35 PM Microsoft Corporation e:\windows\system32\httpapi.dll

wsmres 6.0.6001.18000 13.00 KB (13,312 bytes) 1/18/2008 10:13 PM Microsoft Corporation e:\windows\system32\wsmres.dll

wevtfd 6.0.6001.18000 104.50 KB (107,008 bytes) 1/18/2008 10:12 PM Microsoft Corporation e:\windows\system32\wevtfd.dll

logonui 6.0.6001.18000 20.50 KB (20,992 bytes) 1/18/2008 10:17 PM Microsoft Corporation e:\windows\system32\logonui.exe

authui 6.0.6001.18000 2.17 MB (2,271,744 bytes) 1/18/2008 10:25 PM Microsoft Corporation e:\windows\system32\authui.dll

msimg32 6.0.6001.18000 8.00 KB (8,192 bytes) 1/18/2008 10:07 PM Microsoft Corporation e:\windows\system32\msimg32.dll

uxtheme 6.0.6001.18000 310.00 KB (317,440 bytes) 1/18/2008 10:21 PM Microsoft Corporation e:\windows\system32\uxtheme.dll

gdiplus 5.2.6001.18065 2.09 MB (2,190,848 bytes) 10/6/2008 11:12 AM Microsoft Corporation e:\windows\winsxs\amd64_microsoft.windows.gdiplus_6595b64144ccf1df_1.0.6001.18065_none_56cd8757b545091c\gdiplus.dll

duser 6.0.6001.18000 244.50 KB (250,368 bytes) 1/18/2008 10:09 PM Microsoft Corporation e:\windows\system32\duser.dll

SmartcardCredentialProvider 6.0.6001.18000 157.00 KB (160,768 bytes) 1/18/2008 10:15 PM Microsoft Corporation e:\windows\system32\smartcardcredentialprovider.dll

shgina 6.0.6001.18000 82.50 KB (84,480 bytes) 1/18/2008 10:22 PM Microsoft Corporation e:\windows\system32\shgina.dll

raslap 6.0.6001.18000 380.50 KB (389,632 bytes) 1/18/2008 10:37 PM Microsoft Corporation e:\windows\system32\raslap.dll

winscard 6.0.6001.18000 186.00 KB (190,464 bytes) 1/18/2008 10:15 PM Microsoft Corporation e:\windows\system32\winscard.dll

shacct 6.0.6001.18000 96.00 KB (98,304 bytes) 1/18/2008 10:22 PM Microsoft Corporation e:\windows\system32\shacct.dll

hid 6.0.6001.18000 28.50 KB (29,184 bytes) 1/18/2008 10:33 PM Microsoft Corporation e:\windows\system32\hid.dll

dps 6.0.6001.18000 136.00 KB (139,264 bytes) 1/18/2008 10:03 PM Microsoft Corporation e:\windows\system32\dps.dll

taskschd 6.0.6001.18000 640.50 KB (655,872 bytes) 1/18/2008 10:13 PM Microsoft Corporation e:\windows\system32\taskschd.dll

regsvc 6.0.6001.18000 201.50 KB (206,336 bytes) 1/18/2008 10:03 PM Microsoft Corporation e:\windows\system32\regsvc.dll

sqlwriter 2007.100.1600.22 154.02 KB (157,720 bytes) 7/10/2008 5:31 AM Microsoft Corporation e:\program files\microsoft sql server\90\shared\sqlwriter.exe

msvcr80 8.0.50727.3053 787.00 KB (805,888 bytes) 10/4/2008 9:26 PM Microsoft Corporation e:\windows\winsxs\amd64_microsoft.vc80.crt_1fc8b3b9a1e18e3b_8.0.50727.3053_none_88e044e32fae7230\msvcr80.dll

sqlwvss 2007.100.1600.22 384.02 KB (393,240 bytes) 7/10/2008 5:31 AM Microsoft Corporation e:\program files\microsoft sql server\90\shared\sqlwvss.dll

msvcp80 8.0.50727.3053 1.02 MB (1,071,616 bytes) 10/4/2008 9:26 PM Microsoft Corporation e:\windows\winsxs\amd64_microsoft.vc80.crt_1fc8b3b9a1e18e3b_8.0.50727.3053_none_88e044e32fae7230\msvcp80.dll

taskeng 6.0.6001.18000 259.00 KB (265,216 bytes) 1/18/2008 10:13 PM

Microsoft Corporation
e:\windows\system32\taskeng.exe
dmsjob 6.0.6001.18000 43.00 KB
(44,032 bytes) 1/18/2008 10:18 PM
Microsoft Corporation
e:\windows\system32\dmsjob.dll
MsCtfMonitor 6.0.6000.16386 25.50
KB (26,112 bytes) 1/18/2008 10:08
PM Microsoft Corporation
e:\windows\system32\msctfmonit.
dll
msutb 6.0.6001.18000 222.50 KB
(227,840 bytes) 1/18/2008 10:08 PM
Microsoft Corporation
e:\windows\system32\msutb.dll
dwmapi 6.0.6001.18000 38.50 KB
(39,424 bytes) 1/18/2008 10:10 PM
Microsoft Corporation
e:\windows\system32\dwmapi.dll
PlaySndSrv 6.0.6000.16386 74.50 KB
(76,288 bytes) 1/18/2008 10:43 PM
Microsoft Corporation
e:\windows\system32\playsndsrv.dll
pautoenr 6.0.6000.16386 46.00 KB
(47,104 bytes) 1/18/2008 10:18 PM
Microsoft Corporation
e:\windows\system32\pautoenr.dll
certcli 6.0.6001.18000 434.00 KB
(444,416 bytes) 1/18/2008 10:16 PM
Microsoft Corporation
e:\windows\system32\certcli.dll
CertEnroll 6.0.6001.18000 1.58 MB
(1,658,368 bytes) 1/18/2008 10:19
PM Microsoft Corporation
e:\windows\system32\certenroll.dll
wininet 7.0.6001.18099 989.50 KB
(1,013,248 bytes) 10/6/2008 11:12
AM Microsoft Corporation
e:\windows\system32\wininet.dll
normaliz 6.0.6000.16386 3.00 KB
(3,072 bytes) 1/18/2008 9:59 PM
Microsoft Corporation
e:\windows\system32\normaliz.dll
iertutil 7.0.6001.18000 366.00 KB
(374,784 bytes) 1/18/2008 10:25 PM
Microsoft Corporation
e:\windows\system32\iertutil.dll
mmdevapi 6.0.6001.18000 197.50 KB
(202,240 bytes) 1/18/2008 10:44 PM
Microsoft Corporation
e:\windows\system32\mmdevapi.dll
qagent 6.0.6001.18000 245.00 KB
(250,880 bytes) 1/18/2008 10:35 PM
Microsoft Corporation
e:\windows\system32\qagent.dll
qutil 6.0.6001.18000 97.00 KB
(99,328 bytes) 1/18/2008 10:34 PM
Microsoft Corporation
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rdpclip 6.0.6001.18000 187.00 KB
(191,488 bytes) 1/19/2008 5:51 AM
Microsoft Corporation
e:\windows\system32\rdpclip.exe
urlmon 7.0.6001.18099 1.35 MB
(1,418,240 bytes) 10/6/2008 11:12
AM Microsoft Corporation
e:\windows\system32\urlmon.dll
dwm 6.0.6001.18000 96.50 KB
(98,816 bytes) 1/18/2008 10:10 PM
Microsoft Corporation
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dwmredir 6.0.6001.18000 100.00 KB
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Microsoft Corporation
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slwga 6.0.6001.18000 14.00 KB
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Microsoft Corporation
e:\windows\system32\slwga.dll
milcore 6.0.6001.18000 2.45 MB
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explorer 6.0.6001.18000 2.94 MB
(3,080,704 bytes) 1/18/2008 10:22
PM Microsoft Corporation
e:\windows\explorer.exe
shdocvw 6.0.6001.18000 1.14 MB
(1,195,008 bytes) 1/18/2008 10:22
PM Microsoft Corporation
e:\windows\system32\shdocvw.dll
browseui 6.0.6001.18000 1.58 MB
(1,654,784 bytes) 1/18/2008 10:22
PM Microsoft Corporation
e:\windows\system32\browseui.dll
WindowsCodecs 6.0.6001.18000
821.50 KB (841,216 bytes)
1/18/2008 10:11 PM Microsoft
Corporation
e:\windows\system32\windowscode
cs.dll
iconcodecservice 6.0.6000.16386
12.50 KB (12,800 bytes) 1/19/2008
5:51 AM Microsoft Corporation
e:\windows\system32\iconcodecserv
ice.dll
timedate 6.0.6001.18000 860.50 KB
(881,152 bytes) 1/18/2008 10:23 PM
Microsoft Corporation
e:\windows\system32\timedate.cpl
ieframe 7.0.6001.18099 6.68 MB
(7,003,648 bytes) 10/6/2008 11:12
AM Microsoft Corporation
e:\windows\system32\ieframe.dll
networkexplorer 6.0.6001.18000 2.14
MB (2,247,168 bytes) 1/18/2008
10:35 PM Microsoft Corporation
e:\windows\system32\networkexplor
er.dll
cscapi 6.0.6001.18000 38.00 KB
(38,912 bytes) 1/18/2008 9:55 PM
Microsoft Corporation
e:\windows\system32\cscapi.dll
ExplorerFrame 6.0.6001.18000 39.00
KB (39,936 bytes) 1/18/2008 10:21
PM Microsoft Corporation
e:\windows\system32\explorerframe
.dll
stobject 6.0.6001.18000 731.00 KB
(748,544 bytes) 1/18/2008 10:23 PM
Microsoft Corporation
e:\windows\system32\stobject.dll
batmeter 6.0.6001.18000 727.50 KB
(744,960 bytes) 1/18/2008 10:23 PM
Microsoft Corporation
e:\windows\system32\batmeter.dll
SndVolSSO 6.0.6000.16386 173.50 KB
(177,664 bytes) 1/18/2008 10:44 PM
Microsoft Corporation
e:\windows\system32\sndvolss0.dll
pnidui 6.0.6001.18000 1.93 MB
(2,024,960 bytes) 1/18/2008 10:35
PM Microsoft Corporation
e:\windows\system32\pnidui.dll
wlanutil 6.0.6000.16386 10.00 KB
(10,240 bytes) 1/18/2008 10:34 PM
Microsoft Corporation
e:\windows\system32\wlanutil.dll
cscui 6.0.6001.18000 656.50 KB
(672,256 bytes) 1/19/2008 5:51 AM

Microsoft Corporation
e:\windows\system32\cscui.dll
csd.dll 6.0.6001.18000 28.00 KB
(28,672 bytes) 1/18/2008 9:55 PM
Microsoft Corporation
e:\windows\system32\csd.dll
srchadmin 6.0.6001.18000 292.00 KB
(299,008 bytes) 1/18/2008 10:23 PM
Microsoft Corporation
e:\windows\system32\srchadmin.dll
webcheck 7.0.6001.18000 284.00 KB
(290,816 bytes) 1/18/2008 10:26 PM
Microsoft Corporation
e:\windows\system32\webcheck.dll
imapi2 6.0.6001.18000 396.00 KB
(405,504 bytes) 1/18/2008 10:29 PM
Microsoft Corporation
e:\windows\system32\imapi2.dll
bthprops 6.0.6001.18000 993.50 KB
(1,017,344 bytes) 1/18/2008 10:23
PM Microsoft Corporation
e:\windows\system32\bthprops.cpl
actxprxy 6.0.6001.18000 979.00 KB
(1,002,496 bytes) 1/18/2008 11:13
PM Microsoft Corporation
e:\windows\system32\actxprxy.dll
ntshrui 6.0.6001.18000 347.00 KB
(355,328 bytes) 1/18/2008 10:24 PM
Microsoft Corporation
e:\windows\system32\ntshrui.dll
mlang 6.0.6001.18000 232.50 KB
(238,080 bytes) 1/18/2008 10:22 PM
Microsoft Corporation
e:\windows\system32\mlang.dll
sqlservr 2007.100.1600.22 55.14 MB
(57,820,696 bytes) 7/10/2008 5:31 AM
Microsoft Corporation e:\program
files\microsoft sql
server\mssql10.mssqlserver\mssql\binn\
sqlservr.exe
sqlos 2007.100.1600.22 18.02 KB
(18,456 bytes) 7/10/2008 5:31 AM
Microsoft Corporation e:\program
files\microsoft sql
server\mssql10.mssqlserver\mssql\binn\
sqlos.dll
pdh 6.0.6001.18000 301.50 KB (308,736
bytes) 1/18/2008 10:03 PM
Microsoft Corporation
e:\windows\system32\pdh.dll
opens60 2007.100.1600.22 23.52
KB (24,088 bytes) 7/10/2008 4:46 AM
Microsoft Corporation e:\program
files\microsoft sql
server\mssql10.mssqlserver\mssql\binn\
opens60.dll
batchparser 2007.100.1600.22 170.52
KB (174,616 bytes) 7/10/2008 4:38 AM
Microsoft Corporation e:\program
files\microsoft sql
server\mssql10.mssqlserver\mssql\binn\
batchparser.dll
instapi10 2007.100.1600.22 42.52
KB (43,544 bytes) 7/10/2008 4:39 AM
Microsoft Corporation e:\program
files\microsoft sql
server\100\shared\instapi10.dll
sqllevn70 2007.100.1600.22 1.99
MB (2,090,008 bytes) 7/10/2008 4:58
AM Microsoft Corporation e:\program
files\microsoft sql
server\mssql10.mssqlserver\mssql\binn\
resources\1033\sqllevn70.rll
mscoree 2.0.50727.3053 397.00 KB
(406,528 bytes) 10/4/2008 9:26 PM

00805fc79235} Normal LocalSystem 0	Normal NT Authority\LocalService 0	localservicenonetwork Normal NT Authority\LocalService 0
Cryptographic Services CryptSvc Stopped Manual Share Process e:\windows\system32\svchost.exe -k	Group Policy Client gpsvc Running Auto Own Process e:\windows\system32\svchost.exe -k	Distributed Transaction Coordinator MSDTCRunning Auto Own Process e:\windows\system32\msdtc.exe Normal NT
networkservice Normal NT Authority\NetworkService 0	gpsvcgroup Normal LocalSystem 0	AUTHORITY\NetworkService 0
Offline Files CscService Stopped Disabled Share Process e:\windows\system32\svchost.exe -k	Human Interface Device Access hidserv Stopped Manual Share Process e:\windows\system32\svchost.exe -k	Microsoft iSCSI Initiator Service MSiSCSI Stopped Manual Share Process e:\windows\system32\svchost.exe -k
localsystemnetworkrestricted Normal LocalSystem 0	Health Key and Certificate Management hkmsvc Stopped Manual Share Process e:\windows\system32\svchost.exe -k	netsvcs Normal LocalSystem 0
DCOM Server Process Launcher DcomLaunch Running Auto Share Process e:\windows\system32\svchost.exe -k	Windows CardSpace idsvc Stopped Manual Share Process "e:\windows\microsoft.net\framework k64\v3.0\windows communication foundation\infocard.exe" Normal LocalSystem 0	Windows Installer msiserver Stopped Manual Own Process e:\windows\system32\msiexec /v Normal LocalSystem 0
dcomlaunchNormal LocalSystem 0	IKE and AuthIP IPsec Keying Modules IKEEXT Stopped Manual Share Process e:\windows\system32\svchost.exe -k	SQL Server (MSSQLSERVER) MSSQLSERVER Stopped Manual Own Process "e:\program files\microsoft sql server\mssql10.mssqlserver\mssql\binn\ sqlservr.exe" -smssqlserver Normal LocalSystem 0
DHCP Client Dhcp Running Auto Share Process e:\windows\system32\svchost.exe -k	netsvcs Normal LocalSystem 0	SQL Active Directory Helper Service MSSQLServerADHelper100 Stopped Disabled Own Process "e:\program files\microsoft sql server\100\shared\sqladhlp.exe" Normal NT
localservicenetworkrestricted Normal NT Authority\LocalService 0	PnP-X IP Bus Enumerator IPBusEnum Stopped Disabled Share Process e:\windows\system32\svchost.exe -k	AUTHORITY\NETWORK SERVICE 0
DNS Client Dnscache Running Auto Share Process e:\windows\system32\svchost.exe -k	IP Helper iphlpsvc Running Auto Share Process e:\windows\system32\svchost.exe -k	Network Access Protection Agent napagent Stopped Manual Share Process e:\windows\system32\svchost.exe -k
networkservice Normal NT AUTHORITY\NetworkService 0	netsvcs Normal LocalSystem 0	networkservice Normal NT
Wired AutoConfig dot3svc Stopped Manual Share Process e:\windows\system32\svchost.exe -k	CNG Key Isolation KeyIso Stopped Manual Share Process e:\windows\system32\lsass.exe Normal LocalSystem 0	AUTHORITY\NetworkService 0
localsystemnetworkrestricted Normal localSystem0	KtmRm for Distributed Transaction Coordinator KtmRm Running Auto Share Process e:\windows\system32\svchost.exe -k	Netlogon Netlogon Stopped Manual Share Process e:\windows\system32\lsass.exe Normal LocalSystem 0
Diagnostic Policy Service DPS Running Auto Share Process e:\windows\system32\svchost.exe -k	Server LanmanServer Running Auto Share Process e:\windows\system32\svchost.exe -k	Network Connections Netman Running Manual Share Process e:\windows\system32\svchost.exe -k
localservicenonetwork Normal NT AUTHORITY\LocalService 0	netsvcs Normal LocalSystem 0	localsystemnetworkrestricted Normal LocalSystem 0
Extensible Authentication Protocol EapHost Stopped Manual Share Process e:\windows\system32\svchost.exe -k	Workstation LanmanWorkstation Running Auto Share Process e:\windows\system32\svchost.exe -k	Network List Service netprofm Running Auto Share Process e:\windows\system32\svchost.exe -k
networkservice Normal LocalSystem0	Link-Layer Topology Discovery Mapper lltdsvc Stopped Manual Share Process e:\windows\system32\svchost.exe -k	localservice Normal NT
Windows Event Log EventLog Running Auto Share Process e:\windows\system32\svchost.exe -k	LocalSystem 0	AUTHORITY\LocalService 0
localservicenetworkrestricted Normal NT AUTHORITY\LocalService 0	TCP/IP NetBIOS Helper lmhosts Running Auto Share Process e:\windows\system32\svchost.exe -k	Net.Tcp Port Sharing Service NetTcpPortSharing Stopped Disabled Share Process "e:\windows\microsoft.net\framework k64\v3.0\windows communication foundation\smssvchost.exe" Normal NT AUTHORITY\LocalService 0
COM+ Event System EventSystem Running Auto Share Process e:\windows\system32\svchost.exe -k	LocalSystem 0	Network Location Awareness NlaSvc Running Auto Share Process e:\windows\system32\svchost.exe -k
localservice Normal NT AUTHORITY\LocalService 0	Multimedia Class Scheduler MMCSS Stopped Manual Share Process e:\windows\system32\svchost.exe -k	networkservice Normal NT
Microsoft Fibre Channel Platform Registration Service FCRegSvc Stopped Manual Share Process e:\windows\system32\svchost.exe -k	netsvcs Normal LocalSystem 0	AUTHORITY\NetworkService 0
localservicenetworkrestricted Normal NT AUTHORITY\LocalService 0	Workstation LanmanWorkstation Running Auto Share Process e:\windows\system32\svchost.exe -k	Network Store Interface Service nsi Running Auto Share Process e:\windows\system32\svchost.exe -k
Function Discovery Provider Host fdpHost Stopped Manual Share Process e:\windows\system32\svchost.exe -k	Link-Layer Topology Discovery Mapper lltdsvc Stopped Manual Share Process e:\windows\system32\svchost.exe -k	localservice Normal NT
localservice Normal NT AUTHORITY\LocalService 0	LocalSystem 0	Authority\LocalService 0
Function Discovery Resource Publication FDResPub Stopped Manual Share Process e:\windows\system32\svchost.exe -k	Windows Firewall MpsSvc Stopped Manual Share Process e:\windows\system32\svchost.exe -k	Performance Counter DLL Host PerfHost Stopped Manual Own Process e:\windows\syswow64\perfhst.exe Normal NT
localservice Normal NT AUTHORITY\LocalService 0	Windows Presentation Foundation Font Cache 3.0.0.0 FontCache3.0.0.0 Stopped Manual Own Process e:\windows\microsoft.net\framework 64\v3.0\wpf\presentationfontcache.exe	AUTHORITY\LocalService 0

```

Performance Logs & Alerts pla
  Stopped Manual Share Process
  e:\windows\system32\svchost.exe -k
localsericenetwork Normal NT
AUTHORITY\LocalService 0
Plug and Play PlugPlay Running
  Auto Share Process
  e:\windows\system32\svchost.exe -k
dcomlaunchNormal LocalSystem 0
IPsec Policy Agent PolicyAgent
  Stopped Manual Share Process
  e:\windows\system32\svchost.exe -k
networkservicenetworkrestrictedNormal
  NT Authority\NetworkService 0
User Profile Service ProfSvcRunning
  Auto Share Process
  e:\windows\system32\svchost.exe -k
netsvcs Normal LocalSystem 0
Protected Storage ProtectedStorage
  Stopped Manual Share Process
  e:\windows\system32\lsass.exe
  Normal LocalSystem 0
Remote Access Auto Connection
Manager RasAuto Stopped
  Manual Share Process
  e:\windows\system32\svchost.exe -k
netsvcs Normal localSystem0
Remote Access Connection Manager
  RasMan Stopped Manual
  Share Process
  e:\windows\system32\svchost.exe -k
netsvcs Normal localSystem0
Routing and Remote Access
  RemoteAccess Stopped
  Disabled Share Process
  e:\windows\system32\svchost.exe -k
netsvcs Normal localSystem0
Remote Registry RemoteRegistry
  Running Auto Share Process
  e:\windows\system32\svchost.exe -k
regsvc Normal NT
AUTHORITY\LocalService 0
Remote Procedure Call (RPC) Locator
  RpcLocator Stopped Manual
  Own Process
  e:\windows\system32\locator.exe
  Normal NT
AUTHORITY\NetworkService 0
Remote Procedure Call (RPC) RpcSs
  Running Auto Share Process
  e:\windows\system32\svchost.exe -k
rpcss Normal NT
AUTHORITY\NetworkService 0
Resultant Set of Policy Provider
  RSoPProv Stopped Manual
  Share Process
  e:\windows\system32\rsopprov.exe
  Normal LocalSystem 0
Special Administration Console Helper
  sacsvr Stopped Manual Share
  Process
  e:\windows\system32\svchost.exe -k
netsvcs Normal LocalSystem 0
Security Accounts Manager SamSs
  Running Auto Share Process
  e:\windows\system32\lsass.exe
  Normal LocalSystem 0
Smart Card SCardSvr Stopped
  Manual Share Process
  e:\windows\system32\svchost.exe -k
localserviceNormal NT
AUTHORITY\LocalService 0
Task Scheduler Schedule Running
  Auto Share Process
  e:\windows\system32\svchost.exe -k
netsvcs Normal LocalSystem 0
Smart Card Removal Policy
  SCPolicySvc Stopped Manual
  Share Process
  e:\windows\system32\svchost.exe -k
netsvcs Normal LocalSystem 0
Secondary Logon seclogon
  Running Auto Share Process
  e:\windows\system32\svchost.exe -k
netsvcs Normal LocalSystem 0
System Event Notification Service
  SENS Running Auto Share
  Process
  e:\windows\system32\svchost.exe -k
netsvcs Normal LocalSystem 0
Terminal Services Configuration
  SessionEnvRunning Manual
  Share Process
  e:\windows\system32\svchost.exe -k
netsvcs Normal localSystem0
Internet Connection Sharing (ICS)
  SharedAccess Stopped
  Disabled Share Process
  e:\windows\system32\svchost.exe -k
netsvcs Normal LocalSystem 0
Shell Hardware Detection
  ShellHWDetection Stopped
  Disabled Share Process
  e:\windows\system32\svchost.exe -k
netsvcs Ignore LocalSystem 0
Software Licensing slsvc Running
  Auto Own Process
  e:\windows\system32\slsvc.exe
  Normal NT
AUTHORITY\NetworkService 0
SL UI Notification Service SLUINotify
  Stopped Manual Share Process
  e:\windows\system32\svchost.exe -k
localserviceNormal NT
AUTHORITY\LocalService 0
SNMP Trap SNMPTRAP Stopped
  Manual Own Process
  e:\windows\system32\snmptrap.exe
  Normal NT
AUTHORITY\LocalService 0
Print Spooler Spooler Stopped
  Manual Own Process
  e:\windows\system32\spoolsv.exe
  Normal LocalSystem 0
SQL Server Browser SQLBrowser
  Stopped Disabled Own
  Process "e:\program files
  (x86)\microsoft sql
  server\90\shared\sqlbrowser.exe"
  Normal NT AUTHORITY\LOCAL
  SERVICE 0
SQL Server Agent (MSSQLSERVER)
  SQLSERVERAGENT Stopped
  Manual Own Process "e:\program
  files\microsoft sql
  server\mssql10.mssqlserver\mssql\binn\
  sqlagent.exe" -i mssqlserverNormal
  LocalSystem 0
SQL Server VSS Writer SQLWriter
  Running Auto Own Process
  "e:\program files\microsoft sql
  server\90\shared\sqlwriter.exe" Normal
  LocalSystem 0
SSDP Discovery SSDPSRV
  Stopped Disabled Share
  Process
  e:\windows\system32\svchost.exe -k
localserviceNormal NT
AUTHORITY\LocalService 0
Secure Socket Tunneling Protocol
  Service SstpSvc Stopped Manual
  Share Process
  e:\windows\system32\svchost.exe -k
localserviceNormal NT
Authority\LocalService 0
Microsoft Software Shadow Copy
  Provider swprv Stopped Manual
  Own Process
  e:\windows\system32\svchost.exe -k
swprv Normal LocalSystem 0
HP ProLiant System Shutdown Service
  sysdown Stopped Manual
  Own Process
  e:\windows\system32\sysdown.exe
  Normal LocalSystem 0
Superfetch SysMain Stopped
  Disabled Share Process
  e:\windows\system32\svchost.exe -k
localsystemnetworkrestricted Ignore
  LocalSystem 0
Telephony TapiSrv Stopped Manual
  Own Process
  e:\windows\system32\svchost.exe -k
tapisrv Normal NT
AUTHORITY\NetworkService 0
TPM Base Services TBS Stopped
  Auto Share Process
  e:\windows\system32\svchost.exe -k
localserviceNormal NT
AUTHORITY\LocalService 0
Terminal Services TermService
  Running Auto Share Process
  e:\windows\system32\svchost.exe -k
networkservice Normal NT
Authority\NetworkService 0
Themes Themes Stopped
  Disabled Share Process
  e:\windows\system32\svchost.exe -k
netsvcs Normal LocalSystem 0
Thread Ordering Server
  THREADORDER Stopped
  Manual Share Process
  e:\windows\system32\svchost.exe -k
localserviceNormal NT
AUTHORITY\LocalService 0
Distributed Link Tracking Client TrkWks
  Running Auto Share Process
  e:\windows\system32\svchost.exe -k
localsystemnetworkrestricted Normal
  LocalSystem 0
Windows Modules Installer
  TrustedInstaller Stopped Manual
  Own Process
  e:\windows\servicing\trustedinstaller
  .exe Normal localSystem0
Interactive Services Detection
  UI0Detect Stopped Manual
  Own Process
  e:\windows\system32\ui0detect.exe
  Normal LocalSystem 0
Terminal Services UserMode Port
  Redirector UmRdpService Running
  Manual Share Process
  e:\windows\system32\svchost.exe -k
localsystemnetworkrestricted Normal
  localSystem0
UPnP Device Host upnphost
  Stopped Disabled Share
  Process
  e:\windows\system32\svchost.exe -k
localserviceNormal NT
AUTHORITY\LocalService 0
Desktop Window Manager Session
  Manager UxSms Running Auto

```


Menu\Programs\Startup
OCTANE1\Administrator
Start Menu\Programs\WattsUp USB
OCTANE1\Administrator:Start
Menu\Programs\WattsUp USB
OCTANE1\Administrator

[Startup Programs]
Program Command User Name
Location
[OLE Registration]

Object Local Server
WordPad Document
"%programfiles%\windows
nt\accessories\wordpad.exe"
Package Not Available

SQL Server

Engine Version: Microsoft SQL Server 2008 (RTM) - 10.0.1600.22 (X64)

SQL install: The installation followed the default options. For the sort order Latin1_General_binary was chosen. Mixed mode authentication was used.

SQL Startup parameters:

- 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
- T2301 Trace flag to enable more accurate query run-time behavior modeling in the SQL Server query optimizer typically only needed for large data set decision support processing.
- T834 On systems with 8GB or more, this trace flag causes the buffer pool to use large pages. These are allocated at startup and are kept throughout the lifetime of the process. This trace flag can only be set on 64-bit installations of SQL Server.

The following parameters were changed from their default values:

name	minimum	maximum	config_value	run_value
affinity mask	-2147483648	2147483648	-1	-1
allow updates	0	1	1	1
lightweight pooling	0	1	1	1
max worker threads	128	32767	2048	2048
max server memory (MB)	16	2147483647	248000	248000
min server memory (MB)	0	2147483647	240000	240000
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 = 'tpch300g') drop database tpch300g

CREATE DATABASE tpch300g ON PRIMARY

(NAME = tpch300g_root,
FILENAME = "G:\TPCH\tpch300g.mdf",
SIZE = 100MB,
FILEGROWTH = 10MB),

FILEGROUP STAGING_FG

(NAME = tpch300g_stage1, FILENAME = 'G:\mnt\ntfs\1\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage2, FILENAME = 'G:\mnt\ntfs\2\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage3, FILENAME = 'G:\mnt\ntfs\3\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage4, FILENAME = 'G:\mnt\ntfs\4\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage5, FILENAME = 'G:\mnt\ntfs\5\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage6, FILENAME = 'G:\mnt\ntfs\6\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage7, FILENAME = 'G:\mnt\ntfs\7\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage8, FILENAME = 'G:\mnt\ntfs\8\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage9, FILENAME = 'G:\mnt\ntfs\9\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage10, FILENAME = 'G:\mnt\ntfs\10\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage11, FILENAME = 'G:\mnt\ntfs\11\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage12, FILENAME = 'G:\mnt\ntfs\12\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage13, FILENAME = 'G:\mnt\ntfs\13\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage14, FILENAME = 'G:\mnt\ntfs\14\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage15, FILENAME = 'G:\mnt\ntfs\15\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage16, FILENAME = 'G:\mnt\ntfs\16\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage17, FILENAME = 'G:\mnt\ntfs\17\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage18, FILENAME = 'G:\mnt\ntfs\18\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage19, FILENAME = 'G:\mnt\ntfs\19\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage20, FILENAME = 'G:\mnt\ntfs\20\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage21, FILENAME = 'G:\mnt\ntfs\21\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage22, FILENAME = 'G:\mnt\ntfs\22\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage23, FILENAME = 'G:\mnt\ntfs\23\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage24, FILENAME = 'G:\mnt\ntfs\24\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage25, FILENAME = 'G:\mnt\ntfs\25\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage26, FILENAME = 'G:\mnt\ntfs\26\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage27, FILENAME = 'G:\mnt\ntfs\27\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage28, FILENAME = 'G:\mnt\ntfs\28\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage29, FILENAME = 'G:\mnt\ntfs\29\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage30, FILENAME = 'G:\mnt\ntfs\30\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage31, FILENAME = 'G:\mnt\ntfs\31\load\stage.mdf', SIZE = 10GB),
(NAME = tpch300g_stage32, FILENAME = 'G:\mnt\ntfs\32\load\stage.mdf', SIZE = 10GB),

FILEGROUP LINEITEM_FG

(NAME = tpch300g_li1, FILENAME = 'G:\mnt\li\1\', SIZE = 12GB), (NAME = tpch300g_li2, FILENAME = 'G:\mnt\li\2\', SIZE = 12GB),
(NAME = tpch300g_li3, FILENAME = 'G:\mnt\li\3\', SIZE = 12GB), (NAME = tpch300g_li4, FILENAME = 'G:\mnt\li\4\', SIZE = 12GB),
(NAME = tpch300g_li5, FILENAME = 'G:\mnt\li\5\', SIZE = 12GB), (NAME = tpch300g_li6, FILENAME = 'G:\mnt\li\6\', SIZE = 12GB),
(NAME = tpch300g_li7, FILENAME = 'G:\mnt\li\7\', SIZE = 12GB), (NAME = tpch300g_li8, FILENAME = 'G:\mnt\li\8\', SIZE = 12GB),
(NAME = tpch300g_li9, FILENAME = 'G:\mnt\li\9\', SIZE = 12GB), (NAME = tpch300g_li10, FILENAME = 'G:\mnt\li\10\', SIZE = 12GB),
(NAME = tpch300g_li11, FILENAME = 'G:\mnt\li\11\', SIZE = 12GB), (NAME = tpch300g_li12, FILENAME = 'G:\mnt\li\12\', SIZE = 12GB),
(NAME = tpch300g_li13, FILENAME = 'G:\mnt\li\13\', SIZE = 12GB), (NAME = tpch300g_li14, FILENAME = 'G:\mnt\li\14\', SIZE = 12GB),
(NAME = tpch300g_li15, FILENAME = 'G:\mnt\li\15\', SIZE = 12GB), (NAME = tpch300g_li16, FILENAME = 'G:\mnt\li\16\', SIZE = 12GB),
(NAME = tpch300g_li17, FILENAME = 'G:\mnt\li\17\', SIZE = 12GB), (NAME = tpch300g_li18, FILENAME = 'G:\mnt\li\18\', SIZE = 12GB),
(NAME = tpch300g_li19, FILENAME = 'G:\mnt\li\19\', SIZE = 12GB), (NAME = tpch300g_li20, FILENAME = 'G:\mnt\li\20\', SIZE = 12GB),
(NAME = tpch300g_li21, FILENAME = 'G:\mnt\li\21\', SIZE = 12GB), (NAME = tpch300g_li22, FILENAME = 'G:\mnt\li\22\', SIZE = 12GB),
(NAME = tpch300g_li23, FILENAME = 'G:\mnt\li\23\', SIZE = 12GB), (NAME = tpch300g_li24, FILENAME = 'G:\mnt\li\24\', SIZE = 12GB),
(NAME = tpch300g_li25, FILENAME = 'G:\mnt\li\25\', SIZE = 12GB), (NAME = tpch300g_li26, FILENAME = 'G:\mnt\li\26\', SIZE = 12GB),
(NAME = tpch300g_li27, FILENAME = 'G:\mnt\li\27\', SIZE = 12GB), (NAME = tpch300g_li28, FILENAME = 'G:\mnt\li\28\', SIZE = 12GB),
(NAME = tpch300g_li29, FILENAME = 'G:\mnt\li\29\', SIZE = 12GB), (NAME = tpch300g_li30, FILENAME = 'G:\mnt\li\30\', SIZE = 12GB),
(NAME = tpch300g_li31, FILENAME = 'G:\mnt\li\31\', SIZE = 12GB), (NAME = tpch300g_li32, FILENAME = 'G:\mnt\li\32\', SIZE = 12GB),

FILEGROUP GENERAL_FG

(NAME = tpch300g_gen1, FILENAME = 'G:\mnt\gen\1\', SIZE = 5GB), (NAME = tpch300g_gen2, FILENAME = 'G:\mnt\gen\2\', SIZE = 5GB),
(NAME = tpch300g_gen3, FILENAME = 'G:\mnt\gen\3\', SIZE = 5GB), (NAME = tpch300g_gen4, FILENAME = 'G:\mnt\gen\4\', SIZE = 5GB),
(NAME = tpch300g_gen5, FILENAME = 'G:\mnt\gen\5\', SIZE = 5GB), (NAME = tpch300g_gen6, FILENAME = 'G:\mnt\gen\6\', SIZE = 5GB),
(NAME = tpch300g_gen7, FILENAME = 'G:\mnt\gen\7\', SIZE = 5GB), (NAME = tpch300g_gen8, FILENAME = 'G:\mnt\gen\8\', SIZE = 5GB),
(NAME = tpch300g_gen9, FILENAME = 'G:\mnt\gen\9\', SIZE = 5GB), (NAME = tpch300g_gen10, FILENAME = 'G:\mnt\gen\10\', SIZE = 5GB),

```
(NAME = tpch300g_gen11, FILENAME = 'G:\mnt\gen\11',SIZE =5GB),(NAME = tpch300g_gen12, FILENAME = 'G:\mnt\gen\12',SIZE=5GB),
(NAME = tpch300g_gen13, FILENAME = 'G:\mnt\gen\13',SIZE =5GB),(NAME = tpch300g_gen14, FILENAME = 'G:\mnt\gen\14',SIZE=5GB),
(NAME = tpch300g_gen15, FILENAME = 'G:\mnt\gen\15',SIZE =5GB),(NAME = tpch300g_gen16, FILENAME = 'G:\mnt\gen\16',SIZE =5GB),
(NAME = tpch300g_gen17, FILENAME = 'G:\mnt\gen\17',SIZE =5GB),(NAME = tpch300g_gen18, FILENAME = 'G:\mnt\gen\18',SIZE =5GB),
(NAME = tpch300g_gen19, FILENAME = 'G:\mnt\gen\19',SIZE =5GB),(NAME = tpch300g_gen20, FILENAME = 'G:\mnt\gen\20',SIZE =5GB),
(NAME = tpch300g_gen21, FILENAME = 'G:\mnt\gen\21',SIZE =5GB),(NAME = tpch300g_gen22, FILENAME = 'G:\mnt\gen\22',SIZE =5GB),
(NAME = tpch300g_gen23, FILENAME = 'G:\mnt\gen\23',SIZE =5GB),(NAME = tpch300g_gen24, FILENAME = 'G:\mnt\gen\24',SIZE =5GB),
(NAME = tpch300g_gen25, FILENAME = 'G:\mnt\gen\25',SIZE =5GB),(NAME = tpch300g_gen26, FILENAME = 'G:\mnt\gen\26',SIZE =5GB),
(NAME = tpch300g_gen27, FILENAME = 'G:\mnt\gen\27',SIZE =5GB),(NAME = tpch300g_gen28, FILENAME = 'G:\mnt\gen\28',SIZE =5GB),
(NAME = tpch300g_gen29, FILENAME = 'G:\mnt\gen\29',SIZE =5GB),(NAME = tpch300g_gen30, FILENAME = 'G:\mnt\gen\30',SIZE =5GB),
(NAME = tpch300g_gen31, FILENAME = 'G:\mnt\gen\31',SIZE =5GB),(NAME = tpch300g_gen32, FILENAME = 'G:\mnt\gen\32',SIZE =5GB)
```

LOG ON

```
(NAME = tpch300g_log1, FILENAME = "L:\", SIZE = 40GB)
```

Create Base Tables

```
create table LINEITEM
```

```
(L_ORDERKEY int 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 date not null,
 L_COMMITDATE date not null,
 L_RECEIPTDATE date not null,
 L_SHIPINSTRUCT char(25) not null,
 L_SHIPMODE char(10) not null,
 L_COMMENT varchar(44) not null)
```

```
on STAGING_FG
```

```
with (DATA_COMPRESSION = PAGE);
```

```
create table ORDERS
```

```
(O_ORDERKEY int not null,
 O_CUSTKEY int not null,
 O_ORDERSTATUS char(1) not null,
 O_TOTALPRICE float not null,
 O_ORDERDATE date 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 STAGING_FG
```

```
with (DATA_COMPRESSION = PAGE);
```

```
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 STAGING_FG
```

```
with (DATA_COMPRESSION = PAGE);
```

```
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 STAGING_FG
```

```
with (DATA_COMPRESSION = PAGE);
```

```
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 STAGING_FG
```

```
with (DATA_COMPRESSION = PAGE);
```

```
create table PARTSUPP
```

```
(PS_PARTKEY int not null,
 PS_SUPPKEY int not null,
 PS_AVAILQTY int not null,
 PS_SUPPLYCOST float not null,
 PS_COMMENT varchar(199) not null)
```

```
on STAGING_FG
```

```
with (DATA_COMPRESSION = PAGE);
```

```
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 STAGING_FG
```

```
with (DATA_COMPRESSION = PAGE);
```

```
create table REGION
```

```
(R_REGIONKEY int not null,
 R_NAME char(25) not null,
 R_COMMENT varchar(152) not null)
```

```
on STAGING_FG
```

```
with (DATA_COMPRESSION = PAGE);
```


Indexes

```
create clustered index L_SHIPDATE_CLUIDX
on LINEITEM(L_SHIPDATE)
with (FILLFACTOR=95, SORT_IN_TEMPDB = ON, MAXDOP = 1)
on LINEITEM_FG
```

```
create clustered index O_ORDERDATE_CLUIDX
on ORDERS(O_ORDERDATE)
with (FILLFACTOR=95, SORT_IN_TEMPDB = ON, MAXDOP = 1)
on GENERAL_FG
```

```
create index L_ORDERKEY_IDX
on LINEITEM(L_ORDERKEY)
with (FILLFACTOR=95, SORT_IN_TEMPDB = ON,
DATA_COMPRESSION = PAGE)
on LINEITEM_FG
```

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

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

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

```
create index S_NATIONKEY_IDX
on SUPPLIER(S_NATIONKEY)
with (fillfactor=100, SORT_IN_TEMPDB = ON,
DATA_COMPRESSION = PAGE)
on GENERAL_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)
```

Primary Keys

```
ALTER table NATION ADD constraint PK_N_NATIONKEY primary key (N_NATIONKEY) ON GENERAL_FG
ALTER table REGION ADD constraint PK_R_REGIONKEY primary key (R_REGIONKEY) ON GENERAL_FG
ALTER table SUPPLIER ADD constraint PK_S_SUPPKEY primary key (S_SUPPKEY) ON GENERAL_FG
ALTER table CUSTOMER ADD constraint PK_C_CUSTKEY primary key (C_CUSTKEY) ON GENERAL_FG
ALTER table ORDERS ADD constraint PK_O_ORDERKEY primary key (O_ORDERKEY) WITH (FILLFACTOR = 95) ON GENERAL_FG
ALTER table PARTSUPP ADD constraint PK_PS_PARTKEY_PS_SUPPKEY primary key (PS_PARTKEY, PS_SUPPKEY) ON
GENERAL_FG
ALTER table PART ADD constraint PK_P_PARTKEY primary key (P_PARTKEY) ON GENERAL_FG
```

Backup

```
backup database tpch300g to
DISK = 'G:\mnt\ntfs\1\backup\tpch300g.bak', DISK = 'G:\mnt\ntfs\2\backup\tpch300g.bak',
DISK = 'G:\mnt\ntfs\3\backup\tpch300g.bak', DISK = 'G:\mnt\ntfs\4\backup\tpch300g.bak',
DISK = 'G:\mnt\ntfs\5\backup\tpch300g.bak', DISK = 'G:\mnt\ntfs\6\backup\tpch300g.bak',
DISK = 'G:\mnt\ntfs\7\backup\tpch300g.bak', DISK = 'G:\mnt\ntfs\8\backup\tpch300g.bak',
DISK = 'G:\mnt\ntfs\9\backup\tpch300g.bak', DISK = 'G:\mnt\ntfs\10\backup\tpch300g.bak',
DISK = 'G:\mnt\ntfs\11\backup\tpch300g.bak', DISK = 'G:\mnt\ntfs\12\backup\tpch300g.bak',
DISK = 'G:\mnt\ntfs\13\backup\tpch300g.bak', DISK = 'G:\mnt\ntfs\14\backup\tpch300g.bak',
DISK = 'G:\mnt\ntfs\15\backup\tpch300g.bak', DISK = 'G:\mnt\ntfs\16\backup\tpch300g.bak',
DISK = 'G:\mnt\ntfs\17\backup\tpch300g.bak', DISK = 'G:\mnt\ntfs\18\backup\tpch300g.bak',
DISK = 'G:\mnt\ntfs\19\backup\tpch300g.bak', DISK = 'G:\mnt\ntfs\20\backup\tpch300g.bak',
DISK = 'G:\mnt\ntfs\21\backup\tpch300g.bak', DISK = 'G:\mnt\ntfs\22\backup\tpch300g.bak',
DISK = 'G:\mnt\ntfs\23\backup\tpch300g.bak', DISK = 'G:\mnt\ntfs\24\backup\tpch300g.bak',
DISK = 'G:\mnt\ntfs\25\backup\tpch300g.bak', DISK = 'G:\mnt\ntfs\26\backup\tpch300g.bak',
DISK = 'G:\mnt\ntfs\27\backup\tpch300g.bak', DISK = 'G:\mnt\ntfs\28\backup\tpch300g.bak',
DISK = 'G:\mnt\ntfs\29\backup\tpch300g.bak', DISK = 'G:\mnt\ntfs\30\backup\tpch300g.bak',
DISK = 'G:\mnt\ntfs\31\backup\tpch300g.bak', DISK = 'G:\mnt\ntfs\32\backup\tpch300g.bak'
with init, compression, maxtransfer size=1048576, BUFFERCOUNT=1000, stats = 1
```

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_EXTENDEDPRI
  AS SUM_BASE_PRICE, SUM(L_EXTENDEDPRI*(1-L_DISCOUNT)) AS SUM_DISC_PRICE,
  SUM(L_EXTENDEDPRI*(1-L_DISCOUNT)*(1+L_TAX)) AS SUM_CHARGE, AVG(L_QUANTITY) AS AVG_QTY,
  AVG(L_EXTENDEDPRI) 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	56586554400.729401	53758257134.869392	55909065222.827774
38273.129735	0.049985		1478493		25.522006
N	F	991417.000000	1487504710.379998	1413082168.054106	1469649223.194383
38284.467761	0.050093		38854		25.516472
N	O	74476040.000000	111701729697.741550	106118230307.607930	110367043872.496800
38249.117989	0.049997		2920374		25.502227
R	F	37719753.000000	56568041380.899246	53741292684.604187	55889619119.831680
38250.854626	0.050009		1478870		25.505794

(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	uriously regular requests hag				
9937.840000	Supplier#000005969	ROMANIA	108438	Manufacturer#1	
ANDENSOSmk,miq23Xfb5RWt6dvUcvt6Qa		29-520-692-3537	efully express instructions. regular requests against the slyly fin		
9936.220000	Supplier#000005250	UNITED KINGDOM	249	Manufacturer#4	B3rqp0xbSEim4Mpy2RH J
33-320-228-2957	etect about the furiously final accounts. slyly ironic pinto beans sleep inside the furiously				
9923.770000	Supplier#000002324	GERMANY	29821	Manufacturer#4	y3OD9UyWSTok
17-779-299-1839	ackages boost blithely. blithely regular deposits c				
.					
.					
.					
7850.660000	Supplier#000001518	UNITED KINGDOM	86501	Manufacturer#1	ONda3YJiHKJOC
33-730-383-3892	ifts haggle fluffily pending pai				
7843.520000	Supplier#000006683	FRANCE	11680	Manufacturer#4	2Z0JGkiv01Y00oCFwUGfvilbhzcDy
16-464-517-8943	express, final pinto beans x-ray slyly asymptotes. unusual, unusual				

(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_SHIPRIORITY
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_SHIPRIORITY
ORDER BY REVENUE DESC, O_ORDERDATE
```

L_ORDERKEY	REVENUE	O_ORDERDATE	O_SHIPRIORITY
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(YEAR, 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_EXTENDEDPRI*(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 C_PHONE	REVENUE C_COMMENT	C_ACCTBAL	N_NAME	C_ADDRESS
57040	Customer#000057040	734235.245500	632.870000	JAPAN	Eioyjf4pp 22-895-
641-3466	sits. slyly regular requests	sleep alongside of the regular inst			
143347	Customer#000143347	721002.694800	2557.470000	EGYPT	1aReFYv,Kw4 14-
742-935-3718	ggle carefully enticing requests.	final deposits use bold, bold pinto beans. ironic, idle re			
60838	Customer#000060838	679127.307700	2454.770000	BRAZIL	64EaJ5vMAHWJIBOxJklpNc2RJiWE
12-913-494-9813	need to boost against the slyly regular account				
23431	Customer#000023431	554269.536000	3381.860000	ROMANIA	HgiV0phqhala9aydNollb
29-915-458-2654	nusual, even instructions: furiously stealthy n				

(20 row(s) affected)

/* TPC_H Query 11 - Important Stock Identification */

```
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      50005
9      6641
10     6532
11     6014
8      5937
12     5639
13     5024
19     4793
7      4687.
```

```
.
41     2
39     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_EXTENDEDPRISE)/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_EXTENDEDPRISE * (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 GRZEEd
Supplier#000000285	Br7e1nnt1yxrw6lmgpJ7YdhFDjuBf
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	1y
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

Stream 0 Substitution Parameters Seed 1107052703	Stream 1 Substitution Parameters Seed 1107052704
1 115 2 17 NICKEL AMERICA 3 BUILDING 1995-03-08 4 1994-04-01 5 AFRICA 1995-01-01 6 1995-01-01 0.08 24 7 ROMANIA ETHIOPIA 8 ETHIOPIA AFRICA PROMO PLATED STEEL 9 thistle 10 1994-01-01 11 PERU 0.0001000000 12 TRUCK RAIL 1995-01-01 13 pendingaccounts 14 1995-11-01 15 1996-12-01 16 Brand#45 LARGE BURNISHED 46 4 3 24 23 16 26 42 17 Brand#53 JUMBO PACK 18 314 19 Brand#43 Brand#33 Brand#32 6 19 28 20 light 1995-01-01 IRAQ 21 KENYA 22 30 15 18 22 27 17 23	1 62 2 5 TIN EUROPE 3 HOUSEHOLD 1995-03-25 4 1996-11-01 5 AMERICA 1995-01-01 6 1995-01-01 0.05 25 7 IRAQ RUSSIA 8 RUSSIA EUROPE PROMO ANODIZED COPPER 9 slate 10 1994-10-01 11 EGYPT 0.0001000000 12 RAIL TRUCK 1996-01-01 13 pendingaccounts 14 1996-03-01 15 1994-08-01 16 Brand#35 PROMO PLATED 40 46 42 4 20 17 13 50 17 Brand#55 JUMBO DRUM 18 315 19 Brand#45 Brand#21 Brand#21 1 20 24 20 steel 1994-01-01 ARGENTINA 21 FRANCE 22 11 13 14 19 16 23 33

Stream 2 Substitution Parameters Seed 1107052705	Stream 3 Substitution Parameters Seed 1107052706
1 70 2 43 COPPER AMERICA 3 AUTOMOBILE 1995-03-10 4 1994-08-01 5 ASIA 1996-01-01 6 1996-01-01 0.03 25 7 CANADA KENYA 8 KENYA AFRICA ECONOMY POLISHED COPPER 9 saddle 10 1993-08-01 11 PERU 0.0001000000 12 AIR TRUCK 1996-01-01 13 pendingaccounts 14 1996-06-01 15 1997-03-01 16 Brand#15 SMALL BRUSHED 6 17 47 9 16 31 29 4 17 Brand#52 WRAP BAG 18 313 19 Brand#52 Brand#54 Brand#21 6 10 20 20 frosted 1997-01-01 MOZAMBIQUE 21 UNITED KINGDOM 22 12 15 26 29 17 14 34	1 78 2 31 BRASS MIDDLE EAST 3 HOUSEHOLD 1995-03-27 4 1997-03-01 5 EUROPE 1996-01-01 6 1996-01-01 0.08 24 7 SAUDI ARABIA FRANCE 8 FRANCE EUROPE ECONOMY BURNISHED COPPER 9 puff 10 1994-05-01 11 ETHIOPIA 0.0001000000 12 REG AIR TRUCK 1996-01-01 13 unusualaccounts 14 1996-09-01 15 1994-12-01 16 Brand#45 ECONOMY ANODIZED 11 20 32 13 39 44 23 9 17 Brand#54 WRAP PACK 18 314 19 Brand#54 Brand#42 Brand#25 1 11 27 20 purple 1996-01-01 FRANCE 21 MOROCCO 22 11 10 13 18 32 23 15

Stream 4 Substitution Parameters Seed 1107052707	Stream 5 Substitution Parameters Seed 1107052708
1 86 2 18 NICKEL AMERICA 3 AUTOMOBILE 1995-03-12 4 1994-11-01 5 MIDDLE EAST 1996-01-01 6 1996-01-01 0.05 25 7 JAPAN UNITED KINGDOM 8 UNITED KINGDOM EUROPE LARGE BRUSHED COPPER 9 papaya 10 1993-02-01 11 CHINA 0.0001000000 12 FOB TRUCK 1996-01-01 13 unusualdeposits 14 1996-12-01 15 1997-06-01 16 Brand#35 STANDARD PLATED 50 22 16 9 2 23 45 40 17 Brand#51 WRAP DRUM 18 312 19 Brand#51 Brand#25 Brand#14 7 12 24 20 chiffon 1994-01-01 SAUDI ARABIA 21 GERMANY 22 28 18 29 23 16 19 27	1 94 2 6 TIN MIDDLE EAST 3 FURNITURE 1995-03-29 4 1997-06-01 5 AFRICA 1996-01-01 6 1996-01-01 0.03 25 7 EGYPT MOROCCO 8 MOROCCO AFRICA LARGE PLATED COPPER 9 navajo 10 1993-11-01 11 FRANCE 0.0001000000 12 MAIL FOB 1995-01-01 13 unusualdeposits 14 1997-04-01 15 1995-03-01 16 Brand#15 MEDIUM POLISHED 34 9 50 40 23 28 37 24 17 Brand#53 SM BAG 18 313 19 Brand#13 Brand#53 Brand#13 2 13 20 20 mint 1997-01-01 IRAN 21 UNITED STATES 22 15 12 27 34 18 19 11

Stream 6 Substitution Parameters Seed 1107052709
1 102 2 44 COPPER ASIA 3 AUTOMOBILE 1995-03-14 4 1995-03-01 5 AMERICA 1997-01-01 6 1997-01-01 0.08 24 7 VIETNAM GERMANY 8 GERMANY EUROPE LARGE BURNISHED TIN 9 medium 10 1994-09-01 11 ROMANIA 0.0001000000 12 TRUCK MAIL 1997-01-01 13 unusualdeposits 14 1997-07-01 15 1997-10-01 16 Brand#45 PROMO ANODIZED 4 50 5 40 12 11 6 26 17 Brand#55 SM PACK 18 315 19 Brand#15 Brand#41 Brand#13 7 14 27 20 yellow 1996-01-01 ALGERIA 21 PERU 22 10 11 29 32 21 23 33

Appendix E: Refresh Function Source Code

RF1

```
IF EXISTS (SELECT name FROM sysobjects WHERE name = 'RF1')
    DROP PROCEDURE RF1
GO
--
-- Create a stored RefreshInsert 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 DATE
    DECLARE @enddate DATE
    DECLARE @edate DATE
    DECLARE @rangeStart INTEGER
    DECLARE @rangeSize INTEGER
    DECLARE @range INTEGER

    DECLARE @success 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)

    DECLARE @ErrorMessage NVARCHAR(4000)
    DECLARE @ErrorNumber INT
    DECLARE @ErrorSeverity INT
    DECLARE @ErrorState INT
    DECLARE @ErrorLine INT
    DECLARE @ErrorProcedure NVARCHAR(200)

    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,cast(min(O_ORDERDATE) as date)), @edate = max(O_ORDERDATE)
    FROM NEWORDERS'
    EXEC sp_executesql @stmt,N'@sdate date output, @edate date output',@startdate output, @enddate output

    -- SELECT 'CurrExec:'+cast(@current_execution as varchar(200)) +','+cast(scheduler_id as varchar(200)) as [sched] from
    sys.dm_exec_requests where session_id=@@spid

    IF (@total_executions > @parallel_executions)
    BEGIN
        SET @div = (@index-1)/@skip
        SET @mod = (@index-1) - @div * @skip

        --SET @rangeSize = datediff(day, @startdate, cast(@enddate as date))/@parallel_executions + 1
        SET @rangeSize = ((@div+1) * datediff(day, @startdate, cast(@enddate as date)))/@parallel_executions - (@div * datediff(day,
        @startdate, cast(@enddate as date)))/@parallel_executions

        SET @totRangeSize = @rangeSize
        SET @rangeSum = 0

        --SET @rangeStart = @div * @rangeSize
        SET @rangeStart = (@div * datediff(day, @startdate, cast(@enddate as date)))/@parallel_executions
```

```

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) -- last allocation
  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 = (@current_execution * datediff(day, @startdate, cast(@enddate as date)))/@total_executions - ((@current_execution-1) * datediff(day, @startdate, cast(@enddate as date)))/@total_executions
    SET @rangeStart = ((@current_execution-1) * datediff(day, @startdate, cast(@enddate as date)))/@total_executions
  end

SET @startdate = dateadd(day, @rangeStart, cast(@startdate as date))
IF (@index < @total_executions)
  SET @enddate = dateadd(day, @rangeSize, cast(@startdate as date))

SET @range = datediff(day, @startdate, cast(@enddate as date)) / @insert_sets

--
-- This handles the case when the max-min/insert_sets is less than 1
--
IF @range = 0
  SET @range = 1

--
-- Generate the two insert statements
--

SET @edate = dateadd(day, @range, cast(@startdate as date))
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)
option (loop join,MaxDop 1)'
SET @liSql = N'INSERT INTO LINEITEM (L_ORDERKEY,L_PARTKEY,L_SUPPKEY,L_LINENUMBER,L_QUANTITY,
  L_EXTENDEDPRI, 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_EXTENDEDPRI, 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)
option (loop join,MaxDop 1)'

--
-- Loop through the order keys inserting sets into the
-- ORDERS and LINEITEM tables
--
WHILE @startdate < @enddate
  BEGIN
    --
    -- Insert into ORDERS and LINEITEM tables
    --
    INSERT_TRANS:
    SET @success = 1
    BEGIN TRANSACTION

    BEGIN TRY

```

```

EXEC sp_executesql @orderSql, N'@startdate date, @edate date', @startdate, @edate
EXEC sp_executesql @liSql, N'@startdate date, @edate date', @startdate, @edate
END TRY
BEGIN CATCH
    SET @success = 0
    IF (error_number() = 1205) -- deadlock victim
        BEGIN
            PRINT 'Insert deadlock - restarting RF1'
            IF (@@trancount>0)
                ROLLBACK TRANSACTION
            END
        ELSE
            BEGIN -- not a deadlock
                PRINT ERROR_MESSAGE()
                SELECT @ErrorMessage = ERROR_MESSAGE(),
                    @ErrorSeverity = ERROR_SEVERITY(),
                    @ErrorState = ERROR_STATE(),
                    @ErrorLine = ERROR_LINE(),
                    @ErrorProcedure = ISNULL(ERROR_PROCEDURE(), '-');
                SELECT @ErrorMessage = N'Error %d, Level %d, State %d, Procedure %s, Line %d, ' +
                    'Message: '+ ERROR_MESSAGE();
                IF (@@trancount>0)
                    ROLLBACK TRANSACTION
                RAISERROR
                (
                    @ErrorMessage,
                    @ErrorSeverity,
                    1,
                    @ErrorNumber, -- parameter: original error number.
                    @ErrorSeverity, -- parameter: original error severity.
                    @ErrorState, -- parameter: original error state.
                    @ErrorProcedure, -- parameter: original error procedure name.
                    @ErrorLine -- parameter: original error line number.
                );
            END
        END CATCH

    IF (@success = 0) -- deadlock - redo the inserts
        GOTO INSERT_TRANS

    COMMIT TRANSACTION

    SET @startdate = @edate
    SET @edate = dateadd(day, @range, cast(@edate as date))

    IF (@edate > @enddate)
        SET @edate = @enddate

END
END
GO

```

RF2

```
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 DATE
    DECLARE @enddate DATE
    DECLARE @edate DATE
    DECLARE @rangeStart INTEGER
    DECLARE @rangeSize INTEGER
    DECLARE @range INTEGER

    declare @success 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)

    DECLARE @ErrorMessage NVARCHAR(4000)
    DECLARE @ErrorNumber INT
    DECLARE @ErrorSeverity INT
    DECLARE @ErrorState INT
    DECLARE @ErrorLine INT
    DECLARE @ErrorProcedure NVARCHAR(200)

    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,cast(min(O_ORDERDATE) as date)), @edate = max(O_ORDERDATE)
        FROM MOD_OLDORDERS'
    EXEC sp_executesql @sql,N'@sdate date output, @edate date output',@startdate output, @enddate output

    -- SELECT 'CurrExec:'+cast(@current_execution as varchar(200)) +','+cast(scheduler_id as varchar(200)) as [sched] from
    sys.dm_exec_requests where session_id=@@spid

    IF (@total_executions > @parallel_executions)
        BEGIN
            SET @div = (@index-1)/@skip
            SET @mod = (@index-1) - @div * @skip
            --SET @rangeSize = datediff(day, @startdate, cast(@enddate as date))/@parallel_executions + 1
            SET @rangeSize = ((@div+1) * datediff(day, @startdate, cast(@enddate as date)))/@parallel_executions - (@div * datediff(day,
            @startdate, cast(@enddate as date)))/@parallel_executions

            SET @totRangeSize = @rangeSize
            SET @rangeSum = 0

            --SET @rangeStart = @div * @rangeSize
            SET @rangeStart = (@div * datediff(day, @startdate, cast(@enddate as date)))/@parallel_executions

            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 = (@current_execution * datediff(day, @startdate, cast(@enddate as date)))/@total_executions - ((@current_execution-
1) * datediff(day, @startdate, cast(@enddate as date)))/@total_executions
    SET @rangeStart = ((@current_execution-1) * datediff(day, @startdate, cast(@enddate as date)))/@total_executions
END

SET @startdate = dateadd(day, @rangeStart, cast(@startdate as date))
IF (@index < @total_executions)
    SET @enddate = dateadd(day, @rangeSize, cast(@startdate as date))

SET @range = datediff(day, @startdate, cast(@enddate as date)) / @delete_sets

--
-- This handles the case when the max-min/delete_sets is less than 1
--
IF @range = 0
    SET @range = 1

--
-- Loop through the order keys deleting sets from orders
-- and lineitem tables
--
SET @edate = dateadd(day, @range, cast(@startdate as date))
SET @liSql = N'DELETE FROM LINEITEM WHERE L_ORDERKEY in
    (SELECT O_ORDERKEY FROM MOD_OLDORDERS
    WHERE O_ORDERDATE > @startdate AND O_ORDERDATE <= @edate)
    option (loop join,MaxDop 1)'
SET @orderSql = N'DELETE FROM ORDERS WHERE O_ORDERKEY in
    (SELECT O_ORDERKEY FROM MOD_OLDORDERS
    WHERE O_ORDERDATE > @startdate AND O_ORDERDATE <= @edate)
    option (loop join,MaxDop 1)'

WHILE @startdate < @enddate
BEGIN

    DELETE_TRANS:
    SET @success = 1
    BEGIN TRANSACTION

    BEGIN TRY
        EXEC sp_executesql @liSql, N'@startdate date, @edate date', @startdate, @edate
        EXEC sp_executesql @orderSql, N'@startdate date, @edate date', @startdate, @edate
    END TRY
    BEGIN CATCH
        SET @success = 0
        IF (error_number() = 1205) -- deadlock victim
            BEGIN
                PRINT 'Insert deadlock - restarting RF2'
                IF (@@trancount>0)
                    ROLLBACK TRANSACTION
            END
        ELSE
            BEGIN -- not a deadlock
                PRINT ERROR_MESSAGE()
                SELECT @ErrorNumber = ERROR_NUMBER(),
                    @ErrorSeverity = ERROR_SEVERITY(),
                    @ErrorState = ERROR_STATE(),
                    @ErrorLine = ERROR_LINE(),
                    @ErrorProcedure = ISNULL(ERROR_PROCEDURE(), '-');
                SELECT @ErrorMessage = N'Error %d, Level %d, State %d, Procedure %s, Line %d, ' +
                    'Message: '+ ERROR_MESSAGE();
                IF (@@trancount>0)
                    ROLLBACK TRANSACTION
            END
    END

```

```

RAISERROR
(
    @ErrorMessage,
    @ErrorSeverity,
    1,
    @ErrorNumber, -- parameter: original error number.
    @ErrorSeverity, -- parameter: original error severity.
    @ErrorState, -- parameter: original error state.
    @ErrorProcedure, -- parameter: original error procedure name.
    @ErrorLine -- parameter: original error line number.
);
END
END CATCH

IF (@success = 0) -- deadlock - redo the inserts
    GOTO DELETE_TRANS

COMMIT TRANSACTION

SET @startdate = @edate
SET @edate = dateadd(day, @range, cast(@edate as date))

IF (@edate > @enddate)
    SET @edate = @enddate

END
END

GO

```

RF1_Whole.CMD	RF2_Whole.CMD
<pre> setlocal set TPCH_NUM_LOAD_STREAMS=%1 set TPCH_NUM_LOAD_FILES=%2 set TPCH_NUM_EXEC_STREAMS=%3 set TPCH_NUM_EXEC_TOTAL=%4 set TPCH_EXEC_BATCH_SIZE=%5 set TPCH_FF_LOCN=%6 set TPCH_RF_STREAM_NUM=%7 set TPCH_RUN_NUM=%8 set TPCH_COMMENT_STR=%9 set TPCH_OUTPUT_DIR=%TPCH_OUTPUT_DIR_PREFIX%\%TPCH_R H_RUN_NUM% set TPCH_MASTERLOG_FILE=%TPCH_OUTPUT_DIR%\%TPCH_M ASTERLOG_NAME% if not exist %TPCH_OUTPUT_DIR% md %TPCH_OUTPUT_DIR% pushd %TPCH_OUTPUT_DIR% echo !DATE! !TIME! Start: Executing RF1 %TPCH_COMMENT_STR% >> %TPCH_MASTERLOG_FILE% %TPCH_SQL_SHELL% -d %TPCH_DATABASE% -i create_RF1_tables.sql >> create_RF1_tables.out set TPCH_SEMAPHORE_NAME=Load.%TPCH_RF_STREAM_NUM %.%TPCH_RUN_NUM% start %TPCH_AUTOMATION_CMD_PATH%WaitForSemaphore.cmd %TPCH_SEMAPHORE_NAME% %TPCH_NUM_LOAD_STREAMS% %TPCH_SEMAPHORE_NAME%_all set /A LOCAL_CURR_STREAM = 1 :outerLoopLoadRun start %TPCH_AUTOMATION_CMD_PATH%\execSQLFileListSemapho re.cmd %TPCH_SEMAPHORE_NAME% RF1_Load_List_%TPCH_RF_STREAM_NUM%.%LOCAL_CURR _STREAM%.txt %TPCH_RUN_NUM% no no no set /A LOCAL_CURR_STREAM = %LOCAL_CURR_STREAM% + 1 if %LOCAL_CURR_STREAM% LEQ %TPCH_NUM_LOAD_STREAMS% goto outerLoopLoadRun %TPCH_AUTOMATION_EXEC%\semaphore -wait %TPCH_SEMAPHORE_NAME%_all -count 1 %TPCH_SQL_SHELL% -d %TPCH_DATABASE% -i </pre>	<pre> setlocal set TPCH_NUM_LOAD_STREAMS=%1 set TPCH_NUM_LOAD_FILES=%2 set TPCH_NUM_EXEC_STREAMS=%3 set TPCH_NUM_EXEC_TOTAL=%4 set TPCH_EXEC_BATCH_SIZE=%5 set TPCH_FF_LOCN=%6 set TPCH_RF_STREAM_NUM=%7 set TPCH_RUN_NUM=%8 set TPCH_COMMENT_STR=%9 set TPCH_OUTPUT_DIR=%TPCH_OUTPUT_DIR_PREFIX%\%TPCH_RU N_NUM% set TPCH_MASTERLOG_FILE=%TPCH_OUTPUT_DIR%\%TPCH_MAST ERLOG_NAME% if not exist %TPCH_OUTPUT_DIR% md %TPCH_OUTPUT_DIR% pushd %TPCH_OUTPUT_DIR% echo !DATE! !TIME! Start: Executing RF2 %TPCH_COMMENT_STR% >> %TPCH_MASTERLOG_FILE% %TPCH_SQL_SHELL% -d %TPCH_DATABASE% -i create_RF2_tables.sql >> create_RF2_tables.out set TPCH_SEMAPHORE_NAME=Load.%TPCH_RF_STREAM_NUM%.%T PCH_RUN_NUM% start %TPCH_AUTOMATION_CMD_PATH%WaitForSemaphore.cmd %TPCH_SEMAPHORE_NAME% %TPCH_NUM_LOAD_STREAMS% %TPCH_SEMAPHORE_NAME%_all set /A LOCAL_CURR_STREAM = 1 :outerLoopLoadRun start %TPCH_AUTOMATION_CMD_PATH%\execSQLFileListSemaphore.c md %TPCH_SEMAPHORE_NAME% RF2_Load_List_%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_STR EAM%.txt %TPCH_RUN_NUM% no no no set /A LOCAL_CURR_STREAM = %LOCAL_CURR_STREAM% + 1 if %LOCAL_CURR_STREAM% LEQ %TPCH_NUM_LOAD_STREAMS% goto outerLoopLoadRun %TPCH_AUTOMATION_EXEC%\semaphore -wait %TPCH_SEMAPHORE_NAME%_all -count 1 create_RF2_indices.sql >> create_indices_RF2.out set TPCH_SEMAPHORE_NAME=Exec.%TPCH_RF_STREAM_NUM%.%T </pre>


```

create_RF1_indices.sql >> create_indices_RF1.out
set
TPCH_SEMAPHORE_NAME=Exec.%TPCH_RF_STREAM_NUM
%.%TPCH_RUN_NUM%
start
%TPCH_AUTOMATION_CMD_PATH%\WaitForSemaphore.cmd
%TPCH_SEMAPHORE_NAME%
%TPCH_NUM_EXEC_STREAMS%
%TPCH_SEMAPHORE_NAME%_all
set /A LOCAL_CURR_STREAM = 1
:outerLoopExecRun
start
%TPCH_AUTOMATION_CMD_PATH%\execSQLFileListSemapho
re.cmd %TPCH_SEMAPHORE_NAME%
RF1_Execute_List_%TPCH_RF_STREAM_NUM%.%LOCAL_CU
RR_STREAM%.txt %TPCH_RUN_NUM% no no no
set /A LOCAL_CURR_STREAM = %LOCAL_CURR_STREAM% +
1
if %LOCAL_CURR_STREAM% LEQ
%TPCH_NUM_EXEC_STREAMS% goto outerLoopExecRun
%TPCH_AUTOMATION_EXEC%\semaphore -wait
%TPCH_SEMAPHORE_NAME%_all -count 1
echo !DATE! !TIME! End : Executing RF1
%TPCH_COMMENT_STR% >> %TPCH_MASTERLOG_FILE%
%TPCH_SQL_SHELL% -d %TPCH_DATABASE% -i
%TPCH_AUTOMATION_SQL%\Dump_Row_Count.sql >>
Post_RF1_Row_Count.out
endlocal

PCH_RUN_NUM%
start %TPCH_AUTOMATION_CMD_PATH%\WaitForSemaphore.cmd
%TPCH_SEMAPHORE_NAME% %TPCH_NUM_EXEC_STREAMS%
%TPCH_SEMAPHORE_NAME%_all
set /A LOCAL_CURR_STREAM = 1
:outerLoopExecRun
start
%TPCH_AUTOMATION_CMD_PATH%\execSQLFileListSemaphore.c
md %TPCH_SEMAPHORE_NAME%
RF2_Execute_List_%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_S
TREAM%.txt %TPCH_RUN_NUM% no no no
set /A LOCAL_CURR_STREAM = %LOCAL_CURR_STREAM% + 1
if %LOCAL_CURR_STREAM% LEQ
%TPCH_NUM_EXEC_STREAMS% goto outerLoopExecRun
%TPCH_AUTOMATION_EXEC%\semaphore -wait
%TPCH_SEMAPHORE_NAME%_all -count 1
%TPCH_COMMENT_STR%_Exec >> %TPCH_MASTERLOG_FILE%
echo !DATE! !TIME! End : Executing RF2 %TPCH_COMMENT_STR%
>> %TPCH_MASTERLOG_FILE%
%TPCH_SQL_SHELL% -d %TPCH_DATABASE% -i
%TPCH_AUTOMATION_SQL%\Dump_Row_Count.sql >>
%TPCH_SQL_SHELL% -d %TPCH_DATABASE% -i
%TPCH_AUTOMATION_SQL%\Increment_Update_Set.sql >>
Increment_Update_Set.out
endlocal

```

Global Variables

```

TPCH_AUTOMATION_PATH "e:\rfs"
TPCH_AUTOMATION_CMD_PATH "%TPCH_AUTOMATION_PATH%\cmd"
TPCH_AUTOMATION_SQL "%TPCH_AUTOMATION_PATH%\sql"
TPCH_AUTOMATION_CONFIG "%TPCH_AUTOMATION_PATH%\config"
TPCH_AUTOMATION_EXEC "%TPCH_AUTOMATION_PATH%\execs"
TPCH_AUTOMATION_VBS "%TPCH_AUTOMATION_PATH%\vbs"
TPCH_MASTERLOG_NAME "MasterLog.txt"
TPCH_OUTPUT_DIR_PREFIX "e:\tpchRuns"
TPCH_EXEC_WINDOW_COLOR "9F"
TPCH_DATABASE "tpch300g"
TPCH_SCALE_FACTOR "300g"
TPCH_SCALE_FACTOR_SIMPLE "300"
TPCH_SQL_SHELL "sqlcmd -SSQLDUNE -Usa -P**** -b -w 65535 -l 60 -y 0

```

Create_RF1_Indices.sql

```

create clustered index NEWORDERS_CLUIDX on NEWORDERS (O_ORDERDATE) on GENERAL_FG
create clustered index NEWLINEITEM_CLUIDX on NEWLINEITEM (L_ORDERKEY) on GENERAL_FG

```

Create_RF1_Tables.sql

```

if exists (select name from sysobjects where name = 'NEWORDERS') drop table NEWORDERS
create table NEWORDERS (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

if exists (select name from sysobjects where name = 'NEWLINEITEM') drop table NEWLINEITEM
create table NEWLINEITEM (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,
    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 GENERAL_FG
```

Create_RF2_Indices.sql

```
create clustered index MOD_OLDORDERS_CLUIDX on MOD_OLDORDERS (O_ORDERDATE) on GENERAL_FG  
create index MOD_OLDORDERS_IDX on MOD_OLDORDERS (O_ORDERKEY) on GENERAL_FG
```

Create_RF2_Tables.sql

```
declare @segment integer  
declare @sql nchar(1000)  
if exists (select name from sysobjects where name = 'MOD_OLDORDERS') drop table MOD_OLDORDERS  
create table MOD_OLDORDERS (O_ORDERDATE datetime, O_ORDERKEY bigint)  
set @segment = 1  
while @segment <= $(totalSegments)  
begin  
set @sql = 'if exists (select name from sysobjects where name = "OLDORDERS_'  
+ RTRIM(CONVERT(varchar(30),@segment))+ "'")  
drop table OLDORDERS_' + RTRIM(CONVERT(varchar(30),@segment))  
exec sp_executesql @sql  
set @sql = 'create table OLDORDERS_' + RTRIM(CONVERT(varchar(30),@segment))  
+ '(O_ORDERKEY int)'  
exec sp_executesql @sql  
  
set @segment = @segment + 1  
end
```

Execute_RF1_tmpl.sql

```
EXEC RF1 $(currExec), $(batchSize), $(numParallelExecs), $(totalExecs)
```

Execute_RF2_tmpl.sql

```
EXEC RF2 $(currExec), $(batchSize), $(numParallelExecs), $(totalExecs)
```

Increment_Update_Set.sql

```
UPDATE TPCH_AUX_TABLE SET updateset=updateset+1
```

```
go  
select * from TPCH_AUX_TABLE  
go
```

Load_RF1_tmpl.sql

```
print 'RF1 Load'  
declare @sql nchar(1000)  
declare @set integer  
select @set = updateset from TPCH_AUX_TABLE  
set @sql = 'bulk insert NEWLINEITEM from "$(ffLoc)\Lineitem.tbl.u' + RTRIM(CONVERT(varchar(30),@set))+ '.$(partNo)" with  
(FieldTerminator = "|", RowTerminator = "\n",tablock)'  
exec sp_executesql @sql
```

```
set @sql = 'bulk insert NEWORDERS from "$(ffLoc)\Orders.tbl.u' + RTRIM(CONVERT(varchar(30), @set)) + '.$(partNo)" with  
(FieldTerminator = "|", RowTerminator = "\n",tablock)'  
exec sp_executesql @sql
```

Load_RF2_tmpl.sql

```
print 'RF2 Load'  
declare @set integer  
declare @sql nchar(1000)  
select @set = updateset from TPCH_AUX_TABLE  
set @sql = 'bulk insert OLDORDERS_$(partNo) from "$(ffLoc)\Delete.u' + RTRIM(CONVERT(varchar(30),@set)) + '.$(partNo)" with  
(RowTerminator = "|",tablock)'  
exec sp_executesql @sql
```

```
insert into MOD_OLDORDERS (O_ORDERDATE, O_ORDERKEY) (select B.O_ORDERDATE, B.O_ORDERKEY from  
OLDORDERS_$(partNo) A, ORDERS B where A.O_ORDERKEY = B.O_ORDERKEY)
```

Get_Row_Count.sql

```
select name, rowcnt from sysindexes where id = object_id('LINEITEM')  
select name, rowcnt from sysindexes where id = object_id('ORDERS')
```

Script calls

```
RF1_Whole 32 32 64 64 40 G:\mnt\ntfs 0 Run1 Run1_Power  
RF1_Whole 32 32 64 64 40 G:\mnt\ntfs 8 Run2 Run2_Power  
RF2_Whole 32 32 64 64 40 G:\mnt\ntfs 0 Run1 Run1_Power  
RF2_Whole 32 32 64 64 40 G:\mnt\ntfs 8 Run2 Run2_Power  
RFStreams_Run1 32 32 64 64 40 g:\mnt\ntfs 6 Run1  
RFStreams_Run2 32 32 64 64 40 g:\mnt\ntfs 14 Run2
```

execSQLFileList.cmd

```
echo on  
set TPCH_INPUT_LIST=%1
```

```

set TPCH_INPUT_LIST_DIR=%~dp1
set TPCH_INPUT_LIST_NAME=%~n1
set TPCH_RUN_NUM=%2
set TPCH_OUTPUT_DIR=%TPCH_OUTPUT_DIR_PREFIX%\%TPCH_RUN_NUM%
set TPCH_MASTERLOG_FILE=%TPCH_OUTPUT_DIR%\%TPCH_MASTERLOG_NAME%
set TPCH_COLLECT_SHOWPLAN=%3
set TPCH_COLLECT_PERFMON=%4
set TPCH_WRITE_TO_MASTER=%5
if not exist %TPCH_OUTPUT_DIR% md %TPCH_OUTPUT_DIR%
COLOR %TPCH_EXEC_WINDOW_COLOR%
for /F "tokens=1" %%i in (%TPCH_INPUT_LIST%) do (
    set TPCH_CURRENT_FILE_NAME=%%~nxi
    set TPCH_CURRENT_FILE=%TPCH_INPUT_LIST_DIR%\%%~nxi
    set TPCH_CURRENT_OUTPUT_FILE=%TPCH_OUTPUT_DIR%\%%~ni.out
    set TPCH_EXEC_FILE=!TPCH_CURRENT_FILE!
    if not exist !TPCH_CURRENT_FILE! goto :missingfile
    title %%~ni
    if /i '%TPCH_WRITE_TO_MASTER'=='yes' (
        echo !DATE! !TIME! Start: Executing !TPCH_CURRENT_FILE! >> %TPCH_MASTERLOG_FILE%
    )
    set ERRORLEVEL=0
    %TPCH_SQL_SHELL% -d %TPCH_DATABASE% -i !TPCH_EXEC_FILE! -o !TPCH_CURRENT_OUTPUT_FILE!
    echo %ERRORLEVEL%
    if not errorlevel 0 goto :errorexit
    if /i '%TPCH_WRITE_TO_MASTER'=='yes' (
        echo !DATE! !TIME! End : Executing !TPCH_CURRENT_FILE! >> %TPCH_MASTERLOG_FILE%
    )
)
)
goto finish
:errorexit
echo Program returned with error when executing %TPCH_CURRENT_FILE%
goto finish
:missingfile
echo File %TPCH_CURRENT_FILE% missing
goto finish
:finish
endlocal

```

execSQLFileListSemaphore

```

setlocal
set TPCH_SEMAPHORE_NAME=%1
shift
call %TPCH_AUTOMATION_CMD_PATH%\execSQLFileList %1 %2 %3 %4 %5 %6 %7 %8 %9
%TPCH_AUTOMATION_EXEC%\semaphore -release %TPCH_SEMAPHORE_NAME%
exit
endlocal

```

RFStreams_Run1.cmd

```

setlocal
set TPCH_NUM_LOAD_STREAMS=%1
set TPCH_NUM_LOAD_FILES=%2
set TPCH_NUM_EXEC_STREAMS=%3
set TPCH_NUM_EXEC_TOTAL=%4
set TPCH_EXEC_BATCH_SIZE=%5
set TPCH_FF_LOCN=%6
set TPCH_NUM_RF_STREAMS=%7
set TPCH_RUN_NUM=%8
set TPCH_OUTPUT_DIR=%TPCH_OUTPUT_DIR_PREFIX%\%TPCH_RUN_NUM%
set TPCH_MASTERLOG_FILE=%TPCH_OUTPUT_DIR%\%TPCH_MASTERLOG_NAME%
if not exist %TPCH_OUTPUT_DIR% md %TPCH_OUTPUT_DIR%
pushd %TPCH_OUTPUT_DIR%
set /A LOCAL_CURR_STREAM = 1
:outerRFLoop
call %TPCH_AUTOMATION_CMD_PATH%\RF1_Whole.cmd %TPCH_NUM_LOAD_STREAMS% %TPCH_NUM_LOAD_FILES%
%TPCH_NUM_EXEC_STREAMS% %TPCH_NUM_EXEC_TOTAL% %TPCH_EXEC_BATCH_SIZE% %TPCH_FF_LOCN%
%LOCAL_CURR_STREAM% %TPCH_RUN_NUM% Throughput_RF1_Stream%LOCAL_CURR_STREAM%
call %TPCH_AUTOMATION_CMD_PATH%\RF2_Whole.cmd %TPCH_NUM_LOAD_STREAMS% %TPCH_NUM_LOAD_FILES%
%TPCH_NUM_EXEC_STREAMS% %TPCH_NUM_EXEC_TOTAL% %TPCH_EXEC_BATCH_SIZE% %TPCH_FF_LOCN%
%LOCAL_CURR_STREAM% %TPCH_RUN_NUM% Throughput_RF2_Stream%LOCAL_CURR_STREAM%
set /A LOCAL_CURR_STREAM = %LOCAL_CURR_STREAM% + 1
if %LOCAL_CURR_STREAM% LEQ %TPCH_NUM_RF_STREAMS% goto outerRFLoop
endlocal

```

RFStreams_Run2

```

setlocal
set TPCH_NUM_LOAD_STREAMS=%1
set TPCH_NUM_LOAD_FILES=%2
set TPCH_NUM_EXEC_STREAMS=%3

```

```

set TPCH_NUM_EXEC_TOTAL=%4
set TPCH_EXEC_BATCH_SIZE=%5
set TPCH_FF_LOCN=%6
set TPCH_NUM_RF_STREAMS=%7
set TPCH_RUN_NUM=%8
set TPCH_OUTPUT_DIR=%TPCH_OUTPUT_DIR_PREFIX%%TPCH_RUN_NUM%
set TPCH_MASTERLOG_FILE=%TPCH_OUTPUT_DIR%\%TPCH_MASTERLOG_NAME%
if not exist %TPCH_OUTPUT_DIR% md %TPCH_OUTPUT_DIR%
pushd %TPCH_OUTPUT_DIR%
set /A LOCAL_CURR_STREAM = 9
:outerRFLoop
call %TPCH_AUTOMATION_CMD_PATH%\RF1_Whole.cmd %TPCH_NUM_LOAD_STREAMS% %TPCH_NUM_LOAD_FILES%
%TPCH_NUM_EXEC_STREAMS% %TPCH_NUM_EXEC_TOTAL% %TPCH_EXEC_BATCH_SIZE% %TPCH_FF_LOCN%
%LOCAL_CURR_STREAM% %TPCH_RUN_NUM% Throughput_RF1_Stream%LOCAL_CURR_STREAM%
call %TPCH_AUTOMATION_CMD_PATH%\RF2_Whole.cmd %TPCH_NUM_LOAD_STREAMS% %TPCH_NUM_LOAD_FILES%
%TPCH_NUM_EXEC_STREAMS% %TPCH_NUM_EXEC_TOTAL% %TPCH_EXEC_BATCH_SIZE% %TPCH_FF_LOCN%
%LOCAL_CURR_STREAM% %TPCH_RUN_NUM% Throughput_RF2_Stream%LOCAL_CURR_STREAM%
set /A LOCAL_CURR_STREAM = %LOCAL_CURR_STREAM% + 1
if %LOCAL_CURR_STREAM% LEQ %TPCH_NUM_RF_STREAMS% goto outerRFLoop
endlocal

```

WaitForSemaphore.cmd

```

setlocal
set TPCH_Group=%1
set waitcount=%2
set TPCH_Sentinel=%3
%TPCH_AUTOMATION_EXEC%\semaphore -wait %TPCH_Group% -count %waitcount%
%TPCH_AUTOMATION_EXEC%\semaphore -release %TPCH_Sentinel%
exit
endlocal

```

Call_Create_RFStreams.cmd

Create-RFStreams 64 64 64 128 40 g:\mnt\ntfs 15 Run1 7

Create-RF1_Whole

```

setlocal
set TPCH_NUM_LOAD_STREAMS=%1
set TPCH_NUM_LOAD_FILES=%2
set TPCH_NUM_EXEC_STREAMS=%3
set TPCH_NUM_EXEC_TOTAL=%4
set TPCH_EXEC_BATCH_SIZE=%5
set TPCH_FF_LOCN=%6
set TPCH_RF_STREAM_NUM=%7
set /a TPCH_UPDATESET=%TPCH_RF_STREAM_NUM% + 1
set TPCH_RUN_NUM=%8
set TPCH_COMMENT_STR=%9
set TPCH_FF_LOCN=%TPCH_FF_LOCN%\%TPCH_UPDATESET%\rf128
set TPCH_OUTPUT_DIR=%TPCH_OUTPUT_DIR_PREFIX%%TPCH_RUN_NUM%
set TPCH_MASTERLOG_FILE=%TPCH_OUTPUT_DIR%\%TPCH_MASTERLOG_NAME%
if not exist %TPCH_OUTPUT_DIR% md %TPCH_OUTPUT_DIR%
pushd %TPCH_OUTPUT_DIR%
if not exist Create_RF1_Tables.sql copy %TPCH_AUTOMATION_SQL%\RF_tmpl\Create_RF1_Tables.sql
if not exist Create_RF1_Indices.sql copy %TPCH_AUTOMATION_SQL%\RF_tmpl\Create_RF1_Indices.sql
set /A LOCAL_CURR_STREAM = 1
:outerLoopLoadCreate
set /A LOCAL_CURR_LOAD = %LOCAL_CURR_STREAM%
if exist (RF1_Load_List_%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_STREAM%.txt) del
RF1_Load_List_%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_STREAM%.txt
:innerLoopLoadCreate
echo :setvar ffLoc %TPCH_FF_LOCN% > load_RF1_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_LOAD%.sql
echo :setvar partNo %LOCAL_CURR_LOAD% >> load_RF1_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_LOAD%.sql
type %TPCH_AUTOMATION_SQL%\RF_tmpl\Load_RF1_tmpl.sql >>
load_RF1_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_LOAD%.sql
echo load_RF1_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_LOAD%.sql >>
RF1_Load_List_%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_STREAM%.txt
set /A LOCAL_CURR_LOAD = %LOCAL_CURR_LOAD% + %TPCH_NUM_LOAD_STREAMS%
if %LOCAL_CURR_LOAD% LEQ %TPCH_NUM_LOAD_FILES% goto innerLoopLoadCreate
set /A LOCAL_CURR_STREAM = %LOCAL_CURR_STREAM% + 1
if %LOCAL_CURR_STREAM% LEQ %TPCH_NUM_LOAD_STREAMS% goto outerLoopLoadCreate
set /A LOCAL_CURR_STREAM = 1
:outerLoopExecCreate
set /A LOCAL_CURR_EXEC = %LOCAL_CURR_STREAM%
if exist (RF1_Execute_List_%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_STREAM%.txt) del
RF1_Execute_List_%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_STREAM%.txt
:innerLoopExecCreate
echo :setvar currExec %LOCAL_CURR_EXEC% >
exec_RF1_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_EXEC%.sql
echo :setvar batchSize %TPCH_EXEC_BATCH_SIZE% >>

```

```

exec_RF1_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_EXEC%.sql
echo :setvar numParallelExecs %TPCH_NUM_EXEC_STREAMS% >>
exec_RF1_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_EXEC%.sql
echo :setvar totalExecs %TPCH_NUM_EXEC_TOTAL% >>
exec_RF1_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_EXEC%.sql
type %TPCH_AUTOMATION_SQL%\RF_temp\Execute_RF1_tmpl.sql>>
exec_RF1_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_EXEC%.sql
echo exec_RF1_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_EXEC%.sql >>
RF1_Execute_List_%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_STREAM%.txt
set /A LOCAL_CURR_EXEC = %LOCAL_CURR_EXEC% + %TPCH_NUM_EXEC_STREAMS%
if %LOCAL_CURR_EXEC% LEQ %TPCH_NUM_EXEC_TOTAL% goto innerLoopExecCreate
set /A LOCAL_CURR_STREAM = %LOCAL_CURR_STREAM% + 1
if %LOCAL_CURR_STREAM% LEQ %TPCH_NUM_EXEC_STREAMS% goto outerLoopExecCreate
endlocal

```

Create-RF2_Whole.cmd

```

setlocal
set TPCH_NUM_LOAD_STREAMS=%1
set TPCH_NUM_LOAD_FILES=%2
set TPCH_NUM_EXEC_STREAMS=%3
set TPCH_NUM_EXEC_TOTAL=%4
set TPCH_EXEC_BATCH_SIZE=%5
set TPCH_FF_LOCN=%6
set TPCH_RF_STREAM_NUM=%7
set /a TPCH_UPDATESET=%7+1
set TPCH_RUN_NUM=%8
set TPCH_COMMENT_STR=%9
set TPCH_FF_LOCN=%TPCH_FF_LOCN%\%TPCH_UPDATESET%\rf128
set TPCH_OUTPUT_DIR=%TPCH_OUTPUT_DIR_PREFIX%\%TPCH_RUN_NUM%
set TPCH_MASTERLOG_FILE=%TPCH_OUTPUT_DIR%\%TPCH_MASTERLOG_NAME%
if not exist %TPCH_OUTPUT_DIR% md %TPCH_OUTPUT_DIR%
pushd %TPCH_OUTPUT_DIR%
echo :setvar totalSegments %TPCH_NUM_LOAD_FILES% > Create_RF2_Tables.sql
type %TPCH_AUTOMATION_SQL%\RF_temp\Create_RF2_Tables.sql >> Create_RF2_Tables.sql
if not exist Increment_Update_Set.sql copy %TPCH_AUTOMATION_SQL%\RF_temp\Increment_Update_Set.sql
if not exist Create_RF2_Indices.sql copy %TPCH_AUTOMATION_SQL%\RF_temp\Create_RF2_Indices.sql
set /A LOCAL_CURR_STREAM = 1
:outerLoopLoadCreate
set /A LOCAL_CURR_LOAD = %LOCAL_CURR_STREAM%
if exist (RF2_Load_List_%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_STREAM%.txt) del
RF2_Load_List_%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_STREAM%.txt
echo :setvar ffLoc %TPCH_FF_LOCN% > load_RF2_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_LOAD%.sql
echo :setvar partNo %LOCAL_CURR_LOAD% >> load_RF2_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_LOAD%.sql
type %TPCH_AUTOMATION_SQL%\RF_temp\Load_RF2_tmpl.sql >>
load_RF2_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_LOAD%.sql
echo load_RF2_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_LOAD%.sql >>
RF2_Load_List_%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_STREAM%.txt
set /A LOCAL_CURR_LOAD = %LOCAL_CURR_LOAD% + %TPCH_NUM_LOAD_STREAMS%
if %LOCAL_CURR_LOAD% LEQ %TPCH_NUM_LOAD_FILES% goto innerLoopLoadCreate
set /A LOCAL_CURR_STREAM = %LOCAL_CURR_STREAM% + 1
if %LOCAL_CURR_STREAM% LEQ %TPCH_NUM_LOAD_STREAMS% goto outerLoopLoadCreate
set /A LOCAL_CURR_STREAM = 1
:outerLoopExecCreate
set /A LOCAL_CURR_EXEC = %LOCAL_CURR_STREAM%
if exist (RF2_Execute_List_%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_STREAM%.txt) del
RF2_Execute_List_%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_STREAM%.txt
:innerLoopExecCreate
echo :setvar currExec %LOCAL_CURR_EXEC% >
exec_RF2_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_EXEC%.sql
echo :setvar batchSize %TPCH_EXEC_BATCH_SIZE% >>
exec_RF2_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_EXEC%.sql
echo :setvar numParallelExecs %TPCH_NUM_EXEC_STREAMS% >>
exec_RF2_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_EXEC%.sql
echo :setvar totalExecs %TPCH_NUM_EXEC_TOTAL% >>
exec_RF2_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_EXEC%.sql
type %TPCH_AUTOMATION_SQL%\RF_temp\Execute_RF2_tmpl.sql>>
exec_RF2_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_EXEC%.sql
echo exec_RF2_input.%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_EXEC%.sql >>
RF2_Execute_List_%TPCH_RF_STREAM_NUM%.%LOCAL_CURR_STREAM%.txt
set /A LOCAL_CURR_EXEC = %LOCAL_CURR_EXEC% + %TPCH_NUM_EXEC_STREAMS%
if %LOCAL_CURR_EXEC% LEQ %TPCH_NUM_EXEC_TOTAL% goto innerLoopExecCreate
set /A LOCAL_CURR_STREAM = %LOCAL_CURR_STREAM% + 1
if %LOCAL_CURR_STREAM% LEQ %TPCH_NUM_EXEC_STREAMS% goto outerLoopExecCreate
endlocal

```

Create-RF_Streams.cmd

```

setlocal

```

```

set TPCH_NUM_LOAD_STREAMS=%1
set TPCH_NUM_LOAD_FILES=%2
set TPCH_NUM_EXEC_STREAMS=%3
set TPCH_NUM_EXEC_TOTAL=%4
set TPCH_EXEC_BATCH_SIZE=%5
set TPCH_FF_LOCN=%6
set TPCH_NUM_RF_STREAMS=%7
set TPCH_RUN_NUM=%8
set TPCH_SWITCH_TO_RUN2=%9
set TPCH_OUTPUT_DIR=%TPCH_OUTPUT_DIR_PREFIX%%TPCH_RUN_NUM%
set TPCH_MASTERLOG_FILE=%TPCH_OUTPUT_DIR%\%TPCH_MASTERLOG_NAME%
if not exist %TPCH_OUTPUT_DIR% md %TPCH_OUTPUT_DIR%
pushd %TPCH_OUTPUT_DIR%
set /A LOCAL_CURR_STREAM = 0
:outerRFLoop
if %LOCAL_CURR_STREAM% GTR %TPCH_SWITCH_TO_RUN2% set TPCH_RUN_NUM=Run2
call %TPCH_AUTOMATION_PATH%\CreateFiles\Create-RF1_Whole.cmd %TPCH_NUM_LOAD_STREAMS%
%TPCH_NUM_LOAD_FILES% %TPCH_NUM_EXEC_STREAMS% %TPCH_NUM_EXEC_TOTAL% %TPCH_EXEC_BATCH_SIZE%
%TPCH_FF_LOCN% %LOCAL_CURR_STREAM% %TPCH_RUN_NUM% Throughput_RF1_Stream%LOCAL_CURR_STREAM%
call %TPCH_AUTOMATION_PATH%\CreateFiles\Create-RF2_Whole.cmd %TPCH_NUM_LOAD_STREAMS%
%TPCH_NUM_LOAD_FILES% %TPCH_NUM_EXEC_STREAMS% %TPCH_NUM_EXEC_TOTAL% %TPCH_EXEC_BATCH_SIZE%
%TPCH_FF_LOCN% %LOCAL_CURR_STREAM% %TPCH_RUN_NUM% Throughput_RF2_Stream%LOCAL_CURR_STREAM%
set /A LOCAL_CURR_STREAM = %LOCAL_CURR_STREAM% + 1
if %LOCAL_CURR_STREAM% LEQ %TPCH_NUM_RF_STREAMS% goto outerRFLoop
endlocal

```

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(IngIndex).ConstraintId =
IngConstraintId Then
    QueryConstraintIndex = IngIndex
    Exit Function
End If

Next IngIndex

' 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
IngConstraintId As Long) _
    As cConstraint

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

Dim IngQueryElement As Long

IngQueryElement =
QueryConstraintIndex(IngConstraintId)

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

End Function

Public Sub LoadConstraints(ByVal
IngWorkspaceId 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( mstr
EmptyString, 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 IngStepId
As Long)

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

Dim IngIndex 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 IngIndex = mcarrConstraints.Count - 1 To 0
Step -1
If mcarrConstraints(IngIndex).GlobalStepId =
IngStepId Then

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

End If
Next IngIndex

End Sub

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

Dim IngDeleteElement As Long

```



```

    lngDeleteElement =
    QueryConstraintIndex(cOldConstraint.ConstraintId)

    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(IngParamToDelete As Long)

    Dim IngDeleteElement As Long

    IngDeleteElement =
    QueryIndex(IngParamToDelete)

    Call
    mcarrParameters.Unload(IngDeleteElement)

End Sub

Public Sub SaveParametersInWsp(ByVal IngWorkspace 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(IngWorkspace)

End Sub
Public Function GetParameterValue(ByVal IngWorkspace As Long, _
    ByVal strParamName As String) As cParameter

```

```

' Returns the value for the passed in workspace parameter

    Dim cParamRec As cParameter
    Dim IngIndex As Long

    On Error GoTo GetParameterValueErr

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

            Set GetParameterValue = cParamRec
            Exit For
        End If
    Next IngIndex

    If IngIndex > 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(IngParamToDelete As Long)

    ' Delete the passed in parameter

    Dim IngDeleteElement As Long

    IngDeleteElement =
    QueryIndex(IngParamToDelete)
    Call
    mcarrParameters.Delete(IngDeleteElement)

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

    Dim IngIndex As Long

    ' Find the matching parameter record in the array
    For IngIndex = 0 To mcarrParameters.Count - 1

```

```

        If mcarrParameters(IngIndex).ParameterId =
        IngParameterId And _
            mcarrParameters(IngIndex).IndOperation
        <> DeleteOp Then
            QueryIndex = IngIndex
            Exit Function
        End If
    Next IngIndex

    ' 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(IngParameterId As Long) _
    As cParameter

    Dim IngQueryElement As Long

    IngQueryElement = QueryIndex(IngParameterId)

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

End Function
Public Property Get ParameterCount() As Long

    ParameterCount = mcarrParameters.Count

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

    Set Item = mcarrParameters(IngIndex)

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 IngIndex As Long
    Dim cTempParam As cParameter

    On Error GoTo ValidateErr

    ' Check if the parameter name already exists in the workspace
    For IngIndex = 0 To mcarrParameters.Count - 1
        Set cTempParam = mcarrParameters(IngIndex)
        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(IngQueryElement)

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 IngStepId
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(IngStepId)

' 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 =
IngStepId And _

mcarrSteps(intIndex).ParentVersionNo =
strVersionNo And _

mcarrSteps(intIndex).IndOperation <>
DeleteOp Then

' Increase the array dimension and
add the step
' to it
ReDim Preserve
cSubSteps(IngStepCount)
Set cSubSteps(IngStepCount) =
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.
'
' 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_NAME
& " = [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
' Propagate 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(IConnNameId As Long)

```

```

Dim lngDeleteElement As Long

lngDeleteElement = QueryIndex(IConnNameId)

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(IConnNameId As Long)
' Delete the passed in parameter

Dim lngDeleteElement As Long

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

End Sub
Private Function QueryIndex(IConnNameId 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 =
IConnNameId 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(IConnNameId As Long) As
cConnDtl

Dim lngQueryElement As Long

lngQueryElement =
QueryIndex(IConnNameId)

' 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.ConnNameId <>
cConnToValidate.ConnNameId 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
        ' Propagate 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 interdependent
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, tsq_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], " & _
"tsq_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(IngConnId As Long)

    Dim IngDeleteElement As Long

    IngDeleteElement = QueryIndex(IngConnId)

    Call
mcarrConnections.Unload(IngDeleteElement)

End Sub

Public Sub SaveConnectionsInWsp(ByVal
IngWorkspace As Long)

    ' Call a procedure to save all connection
records for the workspace
    Call mcarrConnections.Save(IngWorkspace)

End Sub

```

```

Public Function GetConnection(ByVal
IngWorkspace As Long, _
ByVal strConnectionName As String) As
cConnection

    ' Returns the connection string for the passed in
connection name

    Dim IngIndex As Long

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

mcarrConnections(IngIndex).ConnectionName =
strConnectionName Then

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

    If IngIndex > 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(IngConnId As Long)

    ' Delete the passed in parameter

    Dim IngDeleteElement As Long

    IngDeleteElement = QueryIndex(IngConnId)
    Call
mcarrConnections.Delete(IngDeleteElement)

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

    Dim IngIndex As Long

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

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

    ' 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(IngConnId As
Long) As cConnection

    Dim IngQueryElement 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 mdbmsConstraintDB 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 =
mIngWorkspaceId
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(mIngConstraintId) & ", " &
Str(mIngStepId) & ", " & _
' mstrSQ & mstrVersionNo & mstrSQ & ",
" & Str(mintConstraintType) & ", " & _
' Str(mIngGlobalStepId) & ", " & 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 = mIngConstraintId

Case "[s_id]"
prmParam.Value = mIngStepId

Case "[ver_no]"
prmParam.Value = mstrVersionNo

Case "[cons_type]"
prmParam.Value =
mintConstraintType

Case "[g_step_id]"
prmParam.Value =
mIngGlobalStepId

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

```



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    mlngConstraintId = vdata
Else
    ' Propagate 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
    ' Propagate 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
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'
' 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(IParentStepId As
Long) As Boolean
' Returns False if there is any condition that
prevents sub-steps of the passed
' in instance from being executed
Dim IIndex As Long

ExecuteSubStep = True

For IIndex = 0 To Count() - 1
    If mcFailedSteps(IIndex).ContCriteria =
gintOnFailureCompleteSiblings And _
    IParentStepId <>
mcFailedSteps(IIndex).ParentStepId Then
        ExecuteSubStep = False
        Exit For
    End If

    If mcFailedSteps(IIndex).ContCriteria =
gintOnFailureAbortSiblings And _
    IParentStepId =
mcFailedSteps(IIndex).ParentStepId Then
        ExecuteSubStep = False
        Exit For
    End If

    If mcFailedSteps(IIndex).ContCriteria =
gintOnFailureSkipSiblings And _
    IParentStepId =
mcFailedSteps(IIndex).ParentStepId Then
        ExecuteSubStep = False
        Exit For
    End If

    If mcFailedSteps(IIndex).ContCriteria =
gintOnFailureAbort Then
        ExecuteSubStep = False
        Exit For
    End If

Next IIndex

End Function
Public Sub Add(ByVal objItem As cFailedStep)

mcFailedSteps.Add objItem

End Sub
Public Function Delete(ByVal IPosition As Long)
As cFailedStep

Set Delete = mcFailedSteps.Delete(IPosition)

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(IStepId As Long) As Boolean

    ' Returns True if a failure record already exists for the passed in step
    Dim IIndex As Long

    StepFailed = False

    For IIndex = 0 To Count() - 1
        If mcFailedSteps(IIndex).StepId = IStepId Then
            StepFailed = True
            Exit For
        End If
    Next IIndex

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, _
    bInContinue 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 Get
cStep_FailureDetails() 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	' carry out the specific validations for the type and	
Private Property Get cStep_StepLevel() As Integer	' call the generic validation routine	If StringEmpty(mcStep.StepText) And StringEmpty(mcStep.StepTextFile) Then ShowError errStepTextAndFileNull
cStep_StepLevel = mcStep.StepLevel	On Error GoTo cStep_ValidateErr	On Error GoTo 0
End Property	mstrSource = mstrModuleName & "cStep_Validate"	Err.Raise vbObjectError + errStepTextAndFileNull, _
Private Property Let cStep_StepText(ByVal RHS As String)	' Validations specific to global steps	mstrSource,
mcStep.StepText = RHS	' Check if the step text or a file name has been	LoadResString(errStepTextAndFileNull)
End Property	' specified	ElseIf Not StringEmpty(mcStep.StepText) And Not StringEmpty(mcStep.StepTextFile) Then ShowError errStepTextOrFile
Private Property Get cStep_StepText() As String	Call StepTextOrFileEntered	On Error GoTo 0
cStep_StepText = mcStep.StepText	' The step level must be zero for all globals	Err.Raise vbObjectError + errStepTextOrFile,
End Property	If mcStep.StepLevel <> 0 Then	- mstrSource,
Private Property Let cStep_StepTextFile(ByVal RHS As String)	ShowError errStepLevelZeroForGlobal	LoadResString(errStepTextOrFile)
mcStep.StepTextFile = RHS	On Error GoTo 0	End If
End Property	Err.Raise vbObjectError + errValidateFailed, _	End Sub
Private Property Get cStep_StepTextFile() As String	gstrSource, _	Private Property Let cStep_VersionNo(ByVal RHS As String)
cStep_StepTextFile = mcStep.StepTextFile	LoadResString(errValidateFailed)	mcStep.VersionNo = RHS
End Property	End If	End Property
Private Property Let cStep_StepType(RHS As gintStepType)	If mcStep.EnabledFlag Then	Private Property Get cStep_VersionNo() As String
mcStep.StepType = RHS	ShowError errEnabledFlagFalseForGlobal	cStep_VersionNo = mcStep.VersionNo
End Property	On Error GoTo 0	End Property
Private Property Get cStep_StepType() As gintStepType	Err.Raise vbObjectError + errValidateFailed, _	Private Property Let cStep_WorkspaceId(ByVal RHS As Long)
cStep_StepType = mcStep.StepType	gstrSource, _	mcStep.WorkspaceId = RHS
End Property	LoadResString(errValidateFailed)	End Property
Private Sub cStep_UnloadIterators()	End If	Private Property Get cStep_WorkspaceId() As Long
Call mcStep.UnloadIterators	If mcStep.DegreeParallelism > 0 Then	cStep_WorkspaceId = mcStep.WorkspaceId
End Sub	ShowError	End Property
Private Sub cStep_UpdateIterator(cItRecord As cIterator)	errDegParallelismNullForGlobal	VERSION 1.0 CLASS
Call mcStep.UpdateIterator(cItRecord)	On Error GoTo 0	BEGIN
End Sub	Err.Raise vbObjectError + errValidateFailed, _	MultiUse = -1 'True
Private Sub cStep_UpdateIteratorVersion()	gstrSource, _	END
Call mcStep.UpdateIteratorVersion	LoadResString(errValidateFailed)	Attribute VB_Name = "cInstance"
End Sub	End If	Attribute VB_GlobalNameSpace = False
Private Sub cStep_Validate()	mcStep.Validate	Attribute VB_Creatable = True
' The validate routines for each of the steps will	Exit Sub	Attribute VB_PredeclaredId = False
	cStep_ValidateErr:	Attribute VB_Exposed = False
	LogErrors Errors	' FILE: cInstance.cls
	mstrSource = mstrModuleName & "cStep_Validate"	' Microsoft TPC-H Kit Ver. 1.00
	On Error GoTo 0	' Copyright Microsoft, 1999
	Err.Raise vbObjectError + errValidateFailed, _	' All Rights Reserved
	mstrSource, _	' PURPOSE: Encapsulates the properties and methods of an instance.
	LoadResString(errValidateFailed)	' An instance is created when a step is executed for a
	End Sub	' particular iterator value (if applicable) at 'run' time.
	Private Sub StepTextOrFileEntered()	' Contains functions to determine if an instance is running,
	' Checks if either the step text or the name of the file containing	' complete, and so on.
	' the text has been entered	' Contact: Reshma Tharamal (reshmat@microsoft.com)
	' If both of them are null or both of them are not null,	
	' the global step is invalid and an error is raised	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 cRunCollt

' A collection of all the sub-steps for this
step
Private mcSubSteps As cSubSteps
Public Sub UpdateStartTime(IStepId 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 = IStepId 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 cRunCollt

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
cRunCollt)

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 IIndex As Long

InstanceAborted = False

For IIndex = 0 To Count() - 1
If mcInstances(IIndex).Step.StepID =
cSubStepRec.StepID And _
mcInstances(IIndex).Status =
gintAborted Then
InstanceAborted = True
Exit For
End If
Next IIndex

End Function

Public Function
CompletedInstanceExists(IParentInstance 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 =
IParentInstance 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 mddbIteratorDB 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 qry 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_tpy], " & _
" [it_val], [seq_no] )"

Set qry =
mddbIteratorDB.CreateQueryDef(gstrEmptyString,
strInsert)

' Call a procedure to execute the Querydef object
Call AssignParameters(qry, lngStepId, strVersion)

qry.Execute dbFailOnError
qry.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(qryExec 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 qryExec.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 mdbIteratorDB 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 =
mdbIteratorDB.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 =
mdbIteratorDB.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 mdbIteratorDB = vdata

End Property

Public Property Get NodeDB() As Database

    Set NodeDB = mdbIteratorDB

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 TypeError
    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

TypeError:
    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 mdbIteratorDB = RHS

End Property

Private Property Get cNode_NodeDB() As
DAO.Database

    Set cNode_NodeDB = mdbIteratorDB

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

```

<pre> 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 </pre>	<pre> 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 </pre>	<pre> 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) </pre>
--	---	---

```

' 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 mdbNodeDb 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 = mdbNodeDb

End Property

Public Property Set NodeDB(vdata As Database)

Set mdbNodeDb = 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 = mdbNodeDb

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-existent 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 = "mmddy"

'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 mstrConnectionDtIPrefix = "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(IngIdentifier 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$(Str$(IngIdentifier))

    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(IWspId As
Long, WspParameters As cArrParameters)
As String

    Dim sDir As String
    sDir = SubstituteParameters(_

```

```

    gstrEnvVarSeparator &
    PARAM_DEFAULT_DIR &
    gstrEnvVarSeparator, _
    IWspId,
    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
cRunCollt, _
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 cRunCollt =
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

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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 cRunCollt, _
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 character 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(lngWorkspaceId, _
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_STRIN
G)
    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:    ConnectionCommon.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 mdbStepMaster 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

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```

' 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 =
mIngWorkspaceId

        Case "[p_id]"
            prmParam.Value =
mIngParameterId

        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 =
mIngWorkspaceId
' qyExec.Parameters("p_id").Value =
mIngParameterId
' 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)

    mIngPosition = RHS

End Property

Public Property Get Position() As Long

    Position = mIngPosition

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 =
mIngWorkspaceId
    cCloneParam.ParameterId =
mIngParameterId
    cCloneParam.ParameterName =
mstrParameterName
    cCloneParam.ParameterValue =
mstrParameterValue
    cCloneParam.Description = mstrDescription
    cCloneParam.ParameterType =
mintParameterType
    cCloneParam.IndOperation = mintOperation
    cCloneParam.Position = mIngPosition

    ' 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
        ' Propagate 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 =
mdbStepMaster.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) & " )"
    ' mdbStepMaster.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 =
mdbStepMaster.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 =
mdbStepMaster.CreateQueryDef(gstrEmptyString,
strUpdate)

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

```

```

    qy.Close

    ' mdbaStepMaster.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 =
    mdbaStepMaster
    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 mdbaStepMaster = Nothing
    Set mFieldValue = Nothing
End Sub
VERSION 1.0 CLASS
BEGIN
    MultiUse = -1 'True
END
Attribute VB_Name = "cRunCollt"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE: cRunCollt.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 =
"cRunCollt."
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: cRunCollt.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

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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

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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

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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

```



```

    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(IngIndex As
Long)
' Frees an instance of a cExecuteSM
object depending on the index
On Error GoTo FreeExecStepErr

Select Case IngIndex + 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 IIndex 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 IIndex = mcFailures.Count - 1 To 0
Step -1

        Set cFailureRec = mcFailures(IIndex)

        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 IIndex

' 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 IIndex = mcFailures.Count - 1 To 0
Step -1
            If mcFailures(IIndex).ContCriteria =
gintOnFailureAsk Then
                mblnAsk = False
                Set cFailureRec =
mcFailures.Delete(IIndex)

                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.Instan
ceId)

                        Call
RunPendingSiblings(cNextInst,
cFailureRec.EndTime)

                End Select
            End If
        Next IIndex
    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 IIndex 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 IIndex = mcInstances.Count - 1 To 0 Step -1

        If mcInstances(IIndex).Step.StepId =
cFailureRec.StepId Then
            Set cParentInstance =
mcInstances.QueryInstance(mcInstances(IIndex).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(IIndex)
        End If
    Next IIndex

    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(IngIndex + 1) & " has completed."

Call mcTermSteps.Delete
Call FreeExecStep(IngIndex)

' Call a procedure to add the freed up
object to the list
Call AddFreeProcess(IngIndex)

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(IngIndex)

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.DegreeParallelism, _
cExecStep.WorkspaceId,
WspParameters:=mcParameters)

If
mcNavSteps.HasChild(StepKey:=cNewInstance.Key) Then
Set nodChild =
mcNavSteps.ChildStep(StepKey:=cNewInstance.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.StepId)
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 cRunCollt
' 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 cRunCollt
Dim cRunIt As cRunItNode
Dim cStepIt As cIterator
Dim cParentInst As cInstance
Dim cSubStepRec As cSubStep
Dim cSubStepDtIs As cStep
Dim lngSubStepId As Long
Dim lngIndex As Long

```

```

On Error GoTo DetermineIteratorsErr

Set cRunIts = New cRunCollt

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.ParentInstanceId)

' 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 cSubStepDtIs =
mcRunSteps.QueryStep(lngSubStepId)

' And determine the next iteration value
for the
' substep in this instance
Set cStepIt =
cSubStepRec.NewIteration(cSubStepDtIs)

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 =
cSubStepDtIs.IteratorName
cRunIt.Value =
SubstituteParameters(cStepIt.Value,
cSubStepDtIs.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.ParentInstanceId)
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(IngStepId
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(IngStepId)
        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(IngRunningProcess 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) =
IngRunningProcess Then
        mcFreeSteps.Delete
    Position:=mcFreeSteps.Count - 1
    Else
        ' Ask the class to find the element and
delete it
        mcFreeSteps.Delete
    Item:=IngRunningProcess
    End If

End Sub
Private Sub
AddFreeProcess(IngTerminatedProcess 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(IngIndex)
        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
' decrement 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
' decrement the number of running steps
on it's
' manager
Set cParentInstance =
mcInstances.QueryInstance(cTermInstance.Par
entInstanceId)

' 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.ParenI
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.St
epId)
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(mstrCurBranchR
oot, 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.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 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
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Case 90
Set cExecStep90 = New cRunStep
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Case 91
Set cExecStep91 = New cRunStep
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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" &
(IngIndex + 1) & "!"

If Not InitExecStep Is Nothing Then
InitExecStep.Index = IngIndex

' Remove this element from the
collection of free objects
Call RemoveFreeProcess(IngIndex)
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(IIndex)
'      If IIndex = 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 IIndex
'      Case mintStepComplete
'      For IIndex = StepDtls.Count - 1 To
0 Step -1
'          sLabel = StepDtls(IIndex)
'          If IIndex = 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 IIndex
'          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 WspPostExecute() As
Variant
'      WspPostExecute = mcvntWspPostCons
End Property
Public Property Let
WspPostExecute(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

```


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(cStepRecord 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(cStepRecord 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(cStepReco  
rd 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(cStepRecord 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, EndTime:=dtmEndTime, ElapsedTime:=lElapsed)

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

```

```

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)

End Sub

```

```

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

```

```

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)

```

```

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, _

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    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)

End Sub

```

```

    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, _

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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(cStepReco
rd 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, _

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(cStepReco
rd 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(cStepReco
rd 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)

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```

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)

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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)

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Call
TimeUpdateForProcess(cStepRecord,
IngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep61_ProcessStart(cStepRecord As
cStep, _
strCommand As String, dtmStartTime
As Currency, IngInstanceId As Long)

Call
TimeUpdateForProcess(cStepRecord,
IngInstanceId, 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,
IngInstanceId As Long, lElapsed As Long)

Call
TimeUpdateForProcess(cStepRecord,
IngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep62_ProcessStart(cStepRecord As
cStep, _
strCommand As String, dtmStartTime
As Currency, IngInstanceId As Long)

Call
TimeUpdateForProcess(cStepRecord,
IngInstanceId, StartTime:=dtmStartTime,
Command:=strCommand)

End Sub

Private Sub
cExecStep62_StepComplete(cStepRecord
As cStep, _
dtmEndTime As Currency, InstanceId
As Long, Status As InstanceStatus)

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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, IngInstanceId
As Long, lElapsed As Long)

Call TimeUpdateForProcess(cStepRecord,
IngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep63_ProcessStart(cStepRecord As
cStep, _
strCommand As String, dtmStartTime As
Currency, IngInstanceId As Long)

Call TimeUpdateForProcess(cStepRecord,
IngInstanceId, 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, IngInstanceId
As Long, lElapsed As Long)

Call TimeUpdateForProcess(cStepRecord,
IngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

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End Sub

Private Sub
cExecStep64_ProcessStart(cStepRecord As cStep, _
strCommand As String, dtmStartTime As
Currency, IngInstanceId As Long)

Call TimeUpdateForProcess(cStepRecord,
IngInstanceId, 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, IngInstanceId As
Long, lElapsed As Long)

Call TimeUpdateForProcess(cStepRecord,
IngInstanceId, EndTime:=dtmEndTime,
ElapsedTime:=lElapsed)

End Sub

Private Sub
cExecStep65_ProcessStart(cStepRecord As cStep, _
strCommand As String, dtmStartTime As
Currency, IngInstanceId As Long)

Call TimeUpdateForProcess(cStepRecord,
IngInstanceId, 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)

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End Sub

Private Sub
cExecStep66_ProcessComplete(cStepRecord As cStep, _
    dtmEndTime As Currency, lngInstanceId As Long, lElapsed As Long)

    Call
    TimeUpdateForProcess(cStepRecord, lngInstanceId, dtmEndTime, lElapsed)

End Sub

Private Sub
cExecStep66_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As Currency, lngInstanceId As Long)

    Call
    TimeUpdateForProcess(cStepRecord, lngInstanceId, 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, InstanceId As Long, Status As InstanceStatus)

    Call
    TimeUpdateForProcess(cStepRecord, lngInstanceId, dtmEndTime, lElapsed)

End Sub

Private Sub
cExecStep67_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As Currency, lngInstanceId As Long)

    Call
    TimeUpdateForProcess(cStepRecord, lngInstanceId, dtmStartTime, Command:=strCommand)

End Sub

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lngInstanceId, 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, dtmEndTime, lElapsed)

End Sub

Private Sub
cExecStep68_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord, lngInstanceId, 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

```

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Private Sub
cExecStep69_ProcessComplete(cStepRecord As cStep, _
    dtmEndTime As Currency, lngInstanceId As Long, lElapsed As Long)

    Call TimeUpdateForProcess(cStepRecord, lngInstanceId, dtmEndTime, lElapsed)

End Sub

Private Sub
cExecStep69_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord, lngInstanceId, 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, dtmEndTime, lElapsed)

End Sub

Private Sub
cExecStep70_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord, lngInstanceId, 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)

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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

```

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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

```

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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)

```

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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, _

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    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, lngInstance
Id 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

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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

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    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, _

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(cStepReco
rd 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(cStepReco
rd 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)

```

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

```

```

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 cRunCollt
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(), mInngInstanceId)
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(), mInngInstanceId, 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(), mInglInstanceId,
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, _

```

```

IngWorkspace 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, IngWorkspace,
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

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 mdbLoadDb 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, slts 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, sltValue 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 = mdbLoadDb.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(IngInstanceId) _
    & ", " & Str(IParentInstanceId) _
    & ", " &
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,
IngInstanceId 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:=IngInstanceId,
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 = mIngRunId
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 = mIngRunId

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 = mIngWorkspaceId

Case "[r_id]"
    prmParam.Value = mIngRunId

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, sltValue As
String)

```

```

On Error GoTo ProcessStartProcessingErr

' Insert the run detail into the database
Call InsertRunDetail(cStepRecord,
strCommand, dtmStartTime, lngInstanceId, _
lParentInstanceId, sltValue)

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, sltValue 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, sltValue)
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 qry As QueryDef

On Error GoTo UpdateRunHeaderErr

strUpdate = "update run_header " & _
" set end_time = [e_date] " & _
" where run_id = [r_id] "

Set qry = mdbLoadDb.CreateQueryDef( _
gstrEmptyString, strUpdate)

' Call a procedure to execute the Querydef object
Call AssignParameters(qry,
EndTime:=dtmEndTime)

qry.Execute dbFailOnError
qry.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
kpaceId, 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 = mdbLoadDb

End Property
Public Property Set LoadDb(vdata As
Database)

    Set mdbLoadDb = 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 = mdbLoadDb
    Set mcRunParams.ParamDatabase =
mdbLoadDb
    Set mcRunConstraints.ConstraintDB =
mdbLoadDb
    Set mcRunConnections.ConnDb =
mdbLoadDb
    Set mcRunConnDtls.ConnDb =
mdbLoadDb

    ' 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 mdbLoadDb = 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, sltValue As
String)

RaiseEvent ProcessStart(cStepRecord,
strCommand, dtmStartTime, lngInstanceId)
Call ProcessStartProcessing(cStepRecord,
strCommand, dtmStartTime, lngInstanceId,
_
lParentInstanceId, sltValue)

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, slts As String,
sltValue As String)

RaiseEvent StepStart(cStepRecord,
dtmStartTime, lngInstanceId, sPath, slts)
'bugmessage "Step: " &
cStepRecord.StepLabel & " has started."

Call StepStartProcessing(cStepRecord,
dtmStartTime, lngInstanceId,
lParentInstanceId, sltValue)

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 mreIdentifiers As Recordset
Private mdbDatabase 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 =
mdbDatabase.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 mreIdentifiers =
mdbDatabase.OpenRecordset(strSql,
dbOpenForwardOnly)

If mreIdentifiers.RecordCount = 0 Then
CreateIdRecord
Set mreIdentifiers =
mdbDatabase.OpenRecordset(strSql,
dbOpenForwardOnly)
End If

BugAssert mreIdentifiers.RecordCount <> 0

End Sub

Public Property Set IdDatabase(vdata As Database)

Set mdbDatabase = 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 mreIdentifiers.Fields.Count
- 1

If
LCASE(Trim(mreIdentifiers.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

mIngIdentifier =
mrecIdentifiers.Fields(mstrIdentifierColumn
).Value

Identifier = mIngIdentifier

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 mIngCount 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 mIngStepId As Long
Private mstrVersionNo As String
Private mstrStepLabel As String
Private mstrStepTextFile As String
Private mstrStepText As String
Private mstrStartDir As String
Private mIngWorkspaceId As Integer
Private mIngParentStepId 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 mIngPosition As Long
Private mstrIteratorName As String
Private mcIterators As cNodeCollections
Private mblsNewVersion 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 = mdbDatabase

' Clone all the iterators for the step
For lngIndex = 0 To mclIterators.Count - 1
    Set cItRec = mclIterators(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 mdfsDatabase = vdata
    Set mclIterators.NodeDB = vdata
End Property
Public Property Get NodeDB() As Database

    Set NodeDB = mdfsDatabase
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
        mblnNewVersion = 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 =
mdfsDatabase.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(mstrStepTextFile)
        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 =
mIngWorkspaceId
Case "[s_id]"
prmParam.Value = mIngStepId
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 =
mIngParentStepId
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 =
mdbDatabase.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(mstrStepTextFile)
strUpdate = strUpdate & ", step_text = " &
mFieldValue.MakeStringFieldValid(mstrStepText)
strUpdate = strUpdate & ", start_directory = " &
mFieldValue.MakeStringFieldValid(mstrStartDir)

strUpdate = strUpdate & ", workspace_id = " &
Str(mIngWorkspaceId) & _
", parent_step_id = " & Str(mIngParentStepId)
& _
", 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(mstrFailureDetails) & _
    ", continuation_criteria = " &
Str(mintContinuationCriteria) & _
    ", global_flag = " &
Str(mblnGlobalFlag) & _
    ", archived_flag = " &
Str(mblnArchivedFlag) & _
    ", output_file_name = " &
mFieldValue.MakeStringFieldValid(mstrOutputFile) & _
    ", error_file_name = " &
mFieldValue.MakeStringFieldValid(mstrErrorFile) & _
    ", iterator_name = " &
mFieldValue.MakeStringFieldValid(mstrIteratorName)

'    ", log_file_name = " &
mFieldValue.MakeStringFieldValid(mstrLogFile) & _

    strUpdate = strUpdate & " where step_id
= " & Str(mlngStepId) & _
    " and version_no = " &
mFieldValue.MakeStringFieldValid(mstrVersionNo)

    BugMessage strUpdate
mddbDatabase.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 mddbDatabase 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]"

```

```

' mddbDatabase.Execute strDelete,
dbFailOnError
Set qy =
mddbDatabase.CreateQueryDef(gstrEmptyString, 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

```

<pre> 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 </pre>	<pre> ' 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 </pre>	<pre> ' 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 = mdbDatabase 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, _ </pre>
---	---	--

```

    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 ITemp As Long

    HasChild = False
    StepId = GetStepId(StepKey, StepId)

```

```

    For ITemp = 0 To StepRecords.StepCount - 1
        If StepRecords(ITemp).StepType <> gintGlobalStep And
StepRecords(ITemp).ParentStepId = StepId Then
            HasChild = True
        Exit For
    End If
    Next ITemp

End Property
Public Property Get ChildStep(Optional ByVal StepKey As String, _
    Optional ByVal StepId As Long = 0) As cStep

    Dim ITemp As Long
    Dim cChildStep As cStep

    Set ChildStep = Nothing
    StepId = GetStepId(StepKey, StepId)

    For ITemp = 0 To StepRecords.StepCount - 1
        If StepRecords(ITemp).StepType <> gintGlobalStep And
StepRecords(ITemp).ParentStepId = StepId And _
StepRecords(ITemp).SequenceNo = gintMinSequenceNo Then
            Set ChildStep = StepRecords(ITemp)
        Exit For
    End If
    Next ITemp

End Property
Public Property Get NextStep(Optional ByVal StepKey As String, _
    Optional ByVal StepId As Long = 0) As cStep

    Dim ITemp As Long
    Dim cChildStep As cStep

    Set NextStep = Nothing
    StepId = GetStepId(StepKey, StepId)
    Set cChildStep =
StepRecords.QueryStep(StepId)

    For ITemp = 0 To StepRecords.StepCount - 1
        If StepRecords(ITemp).StepType <> gintGlobalStep And _
StepRecords(ITemp).ParentStepId = cChildStep.ParentStepId And _
StepRecords(ITemp).SequenceNo = cChildStep.SequenceNo + 1 Then
            Set NextStep = StepRecords(ITemp)
        Exit For
    End If
    Next ITemp

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
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 IWorkspace 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, IWorkspace,
WspParameters:=ColParameters)
                Case gintTo
                    mcLastIterator.RangeTo =
SubstituteParameters(cItRec.Value, IWorkspace,
WspParameters:=ColParameters)
                Case gintStep
                    mcLastIterator.RangeStep =
SubstituteParameters(cItRec.Value, IWorkspace,
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)

```

<pre> 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 </pre>	<pre> 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 </pre>	<pre> 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) </pre>
--	--	---

```

' 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 < (m lngCount - 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
m lngCount - 2
MoveDown lngIndex
Next lngIndex

End If

' Delete the last Node from the array
m lngCount = m lngCount - 1
If m lngCount > 0 Then
ReDim Preserve mcarrItems(0 To
m lngCount - 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 m lngCount - 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 < m lngCount
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 >= m lngCount Then
ReDim Preserve mcarrItems(Position)
m lngCount = 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 < m lngCount
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 < m lngCount - 1
Then
lngTemp = mcarrItems(Position)

mcarrItems(Position) = mcarrItems(Position +
1)
mcarrItems(Position + 1) = lngTemp
End If

End Sub

Public Function Count() As Long

Count = m lngCount

End Function

Private Sub Class_Initialize()

m lngCount = 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 m lngCount 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

```


<pre> 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 </pre>	<pre> 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, _ </pre>	<pre> 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 </pre>
---	---	---

```

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 mdbStepMaster 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 mdbStepMaster = 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 =
mdbStepMaster.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 =
mdbStepMaster.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
' Propagate 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
    ' Propagate 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 =
mdbStepMaster
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 ( " & _
    " values ( [w_id], [w_name],
[archived] ) "
    Set qy =
mdbStepMaster.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 ( " & _
    " values ( [w_id], [w_name],
' mFieldValue.MakeStringFieldValid(mstrWork
spaceName) & _
    " " & Str(mblnArchivedFlag) & _
    " ) "
' mdbStepMaster.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 =
mdbStepMaster.CreateQueryDef(gstrEmptyString,
strDelete)

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

    qy.Execute dbFailOnError
    qy.Close

    ' mdbStepMaster.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 =
mdbStepMaster.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)
'
' mdbcStepMaster.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 mdbcStepMaster = 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 gbldbOpen 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
BFLE 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 =
rUseServer

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 gbldbOpen = 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, 1,
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 UCCase(parameter_value)
like '*DRIVER*' " & _
    ' or UCCase(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 IId 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)
IId = 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(IId) & ", " & _
            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
    
```

```

IId = IId + 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(IId)
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 IId 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_STRIN
G & _
    ", " &
FLD_CONN_DTL_CONNECTION_TYPE
& ")" & _
    " values ( [w_id], [c_id], [c_name],
[c_str], [c_type] )"
    Set qy = dbFile.CreateQueryDef("", sBuf)

    Ild = 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 = Ild
            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

```

```

        Ild = Ild + 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(Ild)
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_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

    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_FILTER
R = "Text Files (*.txt)*.txt"
Const mstr_FILE_OUTPUT_FILTER =
"Output Files (*.*)*.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 =
ShowFileDialog( _

mstr_FILE_STEP_TEXT_FILTER &
mstr_FILE_ALL_FILTER, _
s_DLG_TITLE_OPEN, _

mlng_FILE_STEP_TEXT_FLAGS, _
strDefaultFile)

Case gintOutputCompareFile
strFileName =
ShowFileDialog( _

mstr_FILE_OUTPUT_COMPARE_FILTER
R & mstr_FILE_ALL_FILTER, _
s_DLG_TITLE_OPEN, _

mlng_FILE_OUTPUT_COMPARE_FLAG
S, _
strDefaultFile)

Case gintOutputFile
strFileName =
ShowFileDialog( _

```

```

mstr_FILE_OUTPUT_FILTER &
mstr_FILE_ALL_FILTER, _
s_DLG_TITLE_OPEN, _
mlng_FILE_OUTPUT_FLAGS, _
strDefaultFile)

Case gintLogFile
strFileName = ShowFileDialog( _
mstr_FILE_LOG_FILTER &
mstr_FILE_ALL_FILTER, _
s_DLG_TITLE_OPEN, _
mlng_FILE_LOG_FLAGS, _
strDefaultFile)

Case gintErrorFile
strFileName = ShowFileDialog( _
mstr_FILE_ERROR_FILTER &
mstr_FILE_ALL_FILTER, _
s_DLG_TITLE_OPEN, _
mlng_FILE_ERROR_FLAGS, _
strDefaultFile)

Case gintDBFile
strFileName = ShowFileDialog( _
mstr_FILE_DB_FILTER &
mstr_FILE_ALL_FILTER, _
s_DLG_TITLE_OPEN, _
mlng_FILE_DB_FLAGS, _
strDefaultFile)

Case gintDBFileNew
strFileName = ShowFileDialog( _
mstr_FILE_DB_FILTER &
mstr_FILE_ALL_FILTER, _
s_DLG_TITLE_NEW, _
mlng_FILE_DB_NEW_FLAGS, _
strDefaultFile)

Case gintImportFile
strFileName = ShowFileDialog( _
mstr_FILE_DB_FILTER &
mstr_FILE_ALL_FILTER, _
s_DLG_TITLE_IMPORT, _
mlng_FILE_DB_FLAGS, _
strDefaultFile)

Case gintExportFile
strFileName = ShowFileDialog( _
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 = ShowFileDialog( _
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_DbIclick()

  ' 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 qryIt As DAO.QueryDef
  Dim strSQL 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
  strSQL = "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
  strSQL = strSQL & " order by sequence_no "

  Set qryIt =
dbsAttTool.CreateQueryDef(gstrEmptyString,
strSQL)
  rstStepsInWsp.MoveFirst

  While Not rstStepsInWsp.EOF

    qryIt.Parameters("s_id").Value =
rstStepsInWsp!step_id
    qryIt.Parameters("ver_no").Value =
rstStepsInWsp!version_no

    Set recIterators =
qryIt.OpenRecordset(dbOpenSnapshot)

    Call LoadIteratorsArray(cStepsCol,
recIterators)

    recIterators.Close

```

```

rstStepsInWsp.MoveNext
Wend

qryIt.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 qryIt 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
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 = lngMaxFileIndex 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 IIndex As Long

If Not mOpenFiles Is Nothing Then
For IIndex = mOpenFiles.Count - 1 To
0
CloseFileSM
(mOpenFiles(IIndex).FileName)
Next IIndex
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 giMinId As Long = 1
Public Const giInvalidId 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 cRunCollt
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.IteratorName) 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: 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 qryCons 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 qryCons =
mcarrConstraints.NodeDB.CreateQueryDef(gstrEm
ptyString, strSql)
    qryCons.Parameters("archived").Value = False

    rstStepsInWsp.MoveFirst

    While Not rstStepsInWsp.EOF

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

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

        Set recConstraints =
qryCons.OpenRecordset(dbOpenSnapshot)

        Call
LoadRecordsetInConstraintArray(recConstraints)
        recConstraints.Close

        rstStepsInWsp.MoveNext
    Wend

    qryCons.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.ConstraintId)
    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(IWspId As
Long, IRunId 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(IWspId,
PARAM_RUN_ID)
cParamRec.ParameterValue =
CStr(IRunId)
Call Modify(cParamRec)

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

Call SaveParametersInWsp(IWspId)

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(IngParamToDelete As
Long)

Dim IngDeleteElement As Long

IngDeleteElement =
QueryIndex(IngParamToDelete)

Call
mcarrParameters.Unload(IngDeleteElement)

End Sub

Public Sub SaveParametersInWsp(ByVal
IngWorkspace 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(IngWorkspace)

End Sub

Public Function GetParameterValue(ByVal
IngWorkspace As Long, _
ByVal strParamName As String) As
cParameter

' Returns the value for the passed in
workspace parameter

Dim cParamRec As cParameter
Dim IngIndex As Long

On Error GoTo GetParameterValueErr

' Find all parameters in the array with a
matching workspace id
For IngIndex = 0 To mcarrParameters.Count
- 1

Set cParamRec =
mcarrParameters(IngIndex)
If cParamRec.WorkspaceId =
IngWorkspace And _
cParamRec.ParameterName =
strParamName Then

Set GetParameterValue = cParamRec
Exit For

End If
Next IngIndex

If IngIndex > 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(IngParamToDelete As Long)
' Delete the passed in parameter

Dim IngDeleteElement As Long

IngDeleteElement =
QueryIndex(IngParamToDelete)
Call mcarrParameters.Delete(IngDeleteElement)

End Sub

Private Function QueryIndex(IngParameterId As
Long) As Long

Dim IngIndex As Long

' Find the matching parameter record in the array
For IngIndex = 0 To mcarrParameters.Count - 1
If mcarrParameters(IngIndex).ParameterId =
IngParameterId And _
mcarrParameters(IngIndex).IndOperation

<> DeleteOp Then
QueryIndex = IngIndex
Exit Function
End If
Next IngIndex

' 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(IngParameterId
As Long) _
As cParameter

Dim IngQueryElement As Long

IngQueryElement = QueryIndex(IngParameterId)

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

End Function

Public Property Get ParameterCount() As Long

ParameterCount = mcarrParameters.Count

End Property

Public Property Get Item(IngIndex As Long) As
cParameter

Attribute Item.VB_UserMemId = 0

Set Item = mcarrParameters(IngIndex)

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
rights reserved.
'
' 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_NAME
& " = [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
        ' Propagate 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_STRIN
    G & " = [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(ICConnNameId As Long)
' Delete the passed in parameter

Dim lngDeleteElement As Long

lngDeleteElement =
QueryIndex(ICConnNameId)
Call
mcarrConnDtls.Delete(lngDeleteElement)
End Sub
Private Function QueryIndex(ICConnNameId
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 =
ICConnNameId 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(ICConnNameId As Long) As
cConnDtl

Dim lngQueryElement As Long

lngQueryElement =
QueryIndex(ICConnNameId)

' 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 TsqBatchSeparator 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
        ' Propagate 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, tsq_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], " & _
        "tsq_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(IngConnId As Long)
' Delete the passed in parameter

Dim lngDeleteElement As Long

lngDeleteElement =
QueryIndex(IngConnId)
Call
mcarrConnections.Delete(IngDeleteElement
)

End Sub
Private Function QueryIndex(IngConnId 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(IngConnId As Long) As cConnection

Dim lngQueryElement As Long

lngQueryElement =
QueryIndex(IngConnId)

' 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 mdbConstraintDB 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 =
mdbContext
    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 mdbConstraintDB 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 qry 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
    ' 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 qry =
mdbConstraintDB.CreateQueryDef(gstrEmptyString, strUpdate)

    ' Call a procedure to assign the parameter
    values to the
    ' querydef object

```

```

" where constraint_id = [cons_id] " & _
" and step_id = [s_id] " & _
" and version_no = [ver_no] "

Set qry =
mdbConstraintDB.CreateQueryDef(gstrEmptyString, strDelete)

Call AssignParameters(qry)
qry.Execute dbFailOnError

qry.Close

' strDelete = "Delete from step_constraints " & _
' " where constraint_id = " &
Str(mlngConstraintId) & _
' " and step_id = " & Str(mlngStepId) &
_
' " and version_no = " & mstrSQ &
mstrVersionNo & mstrSQ
'

' BugMessage strDelete
' mdbConstraintDB.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 qry 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 qry =
mdbConstraintDB.CreateQueryDef(gstrEmptyString, strUpdate)

    ' Call a procedure to assign the parameter
    values to the
    ' querydef object

```

```

Call AssignParameters(qry)
qry.Execute dbFailOnError

qry.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
' mdbConstraintDB.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 mdbConstraintDB = vdata

End Property

Public Property Get NodeDB() As Database

    Set NodeDB = mdbConstraintDB

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
        ' Propagate 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
        ' Propagate 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(IParentStepId As
Long) As Boolean
    ' Returns False if there is any condition that
prevents sub-steps of the passed
' in instance from being executed
    Dim IIndex As Long

    ExecuteSubStep = True

```



```

For IIndex = 0 To Count() - 1
    If mcFailedSteps(IIndex).ContCriteria = gintOnFailureCompleteSiblings And _
        IParentStepId <>
        mcFailedSteps(IIndex).ParentStepId Then
            ExecuteSubStep = False
            Exit For
        End If

    If mcFailedSteps(IIndex).ContCriteria = gintOnFailureAbortSiblings And _
        IParentStepId =
        mcFailedSteps(IIndex).ParentStepId Then
            ExecuteSubStep = False
            Exit For
        End If

    If mcFailedSteps(IIndex).ContCriteria = gintOnFailureSkipSiblings And _
        IParentStepId =
        mcFailedSteps(IIndex).ParentStepId Then
            ExecuteSubStep = False
            Exit For
        End If

    If mcFailedSteps(IIndex).ContCriteria = gintOnFailureAbort Then
        ExecuteSubStep = False
        Exit For
    End If

Next IIndex

End Function
Public Sub Add(ByVal objItem As cFailedStep)

    mcFailedSteps.Add objItem

End Sub
Public Function Delete(ByVal IPosition As Long) As cFailedStep

    Set Delete =
    mcFailedSteps.Delete(IPosition)

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(IStepId As Long) As Boolean

    ' Returns True if a failure record already exists for the passed in step
    Dim IIndex As Long

    StepFailed = False

```

```

For IIndex = 0 To Count() - 1
    If mcFailedSteps(IIndex).StepId = IStepId
    Then
        StepFailed = True
        Exit For
    End If
Next IIndex

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
Attribute VB_ExtKey =
' 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 mdbNodeDb 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 mdbNodeDb = vdata

End Property

Public Property Get NodeDB() As Database

```

```

Set NodeDB = mdbNodeDb

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_ExtKey =
"SavedWithClassBuilder", "Yes"
Attribute VB_ExtKey = "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 cRunCollt

```

```

' 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(mInngStepId 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 =
mInngStepId 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 cRunCollt

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
cRunCollt)

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(IParentInstance 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 =
IParentInstance 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
            End 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 mdbIteratorDB 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, _

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```

    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 qry 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 =
mdbContext.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 mdbIteratorDB 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 =
mdbIteratorDB.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 =
mdbIteratorDB.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 mdbIteratorDB = vdata

End Property

Public Property Get NodeDB() As Database

    Set NodeDB = mdbIteratorDB

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 mdbIteratorDB = RHS
End Property
Private Property Get cNode_NodeDB() As
DAO.Database
    Set cNode_NodeDB = mdbIteratorDB
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

    gstrSource, _
    LoadResString(errValidateFailed)
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 = "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(IngDeletePosition As Long)
    ' Unloads the passed in object from the array

    On Error GoTo UnloadErr

    If IngDeletePosition < (mLngNodeCount - 1) Then

        ' Set the Node at the position being deleted to
        ' the last Node in the Node array
        Set mcarrNodes(IngDeletePosition) = mcarrNodes(mLngNodeCount - 1)

    mcarrNodes(IngDeletePosition).Position = IngDeletePosition
    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(IngDeletePosition 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(IngDeletePosition)

    If cDeleteObj.IndOperation = InsertOp Then
        ' If we are deleting a record that has just been inserted,
        ' blow it away
        Call Unload(IngDeletePosition)
    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-existent 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 = mdbNodeDb

    ' 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 = "mmdddy"

' 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(IngWorkspaceIdentifier 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, IngWorkspaceIdentifier)

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$(lDay, gsDtFormat) &
gsBlank & _
Format$(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(IngIdentifier 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$(Str$(IngIdentifier))

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(IWspId As
Long, WspParameters As cArrParameters) As
String

    Dim sDir As String
    sDir = SubstituteParameters(_
        gstrEnvVarSeparator &
PARAM_DEFAULT_DIR &
gstrEnvVarSeparator, _
        IWspId,
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
cRunCollt, _
    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 cRunCollt =
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 cRunCollt, _
    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 character 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(IngWor
kpaceId, _
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: ConnectionCommon.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 mdbStepMaster 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]"

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```

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 = mdbStepMaster
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 mdbStepMaster = vdata

End Property
Public Property Get NodeDB() As Database

Set NodeDB = mdbStepMaster

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 =
mdbStepMaster.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 mdbStepMaster 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
        ' Propagate 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 =
mdbStepMaster.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) & " )"
    ' mdbStepMaster.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 = lngParameterId

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 = lngWorkspaceId

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 = "cRunCollt"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = True
Attribute VB_PredeclaredId = False
Attribute VB_Exposed = False
' FILE: cRunCollt.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 =
"cRunCollt."
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: cRunCollt.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 RunConnDtIs As cConnDtIs
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 msAbortDtIs 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

```



```

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

```



```

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 IIndex 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 IIndex = mcFailures.Count - 1 To 0 Step
-1

Set cFailureRec = mcFailures(IIndex)

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 IIndex

' 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 IIndex = mcFailures.Count - 1 To 0 Step -1
If mcFailures(IIndex).ContCriteria =
gintOnFailureAsk Then
mblnAsk = False
Set cFailureRec =
mcFailures.Delete(IIndex)

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 IIndex
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 IIndex 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 IIndex = mcInstances.Count - 1 To 0 Step -1

If mcInstances(IIndex).Step.StepId =
cFailureRec.StepId Then
Set cParentInstance =
mcInstances.QueryInstance(mcInstances(IIndex).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(IIndex)
    End If
    Next IIndex

    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(msAbortDtIs) Then
            ' Initialize the abort message
            msAbortDtIs = "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(msAbortDtIs) 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,
msAbortDtIs, "Run Aborted", _
                            MB_APPLMODAL + MB_OK
+ MB_ICONEXCLAMATION)
                    #Else
                        Call
ShowMessageBox(frmRunning.hWnd,
msAbortDtIs, "Run Aborted", _
                            MB_APPLMODAL + MB_OK
+ MB_ICONEXCLAMATION)
                    #End If
                    ' MsgBox msAbortDtIs, 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 cSubStepDtIs 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 cSubStepDtIs =
mcRunSteps.QueryStep(lngSubStepId)
    If cSubStepDtIs.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(cSubStepDtIs,
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
llemism, _
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 cRunCollt
' 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 cRunCollt
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 cRunCollt

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(IngConsCount)
        cColConstraints(IngConsCount) =
vntTempCons
        IngConsCount = IngConsCount +
1
    End If
End If

Set cTempInst = cParentInst

Loop While Not cTempInst Is Nothing

If IngConsCount > 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(IngStepId
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(IngStepId)
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(IngRunningProcess 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) =
IngRunningProcess Then
mcFreeSteps.Delete
Position:=mcFreeSteps.Count - 1
Else
' Ask the class to find the element and delete it
mcFreeSteps.Delete Item:=IngRunningProcess
End If

End Sub
Private Sub AddFreeProcess(IngTerminatedProcess
As Long)
' Adds the passed in element to the collection of
' free objects

mcFreeSteps.Add IngTerminatedProcess

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 <>
gIngNumConcurrentProcesses 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(IngIndex)
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(strCurBranchRo
ot 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
        ' decrement 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
decrement the number of running steps on it's
manager
    Set cParentInstance =
mcInstances.QueryInstance(cTermInstance.ParentI
nstanceId)

    ' 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
step
    ' 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.St
epId)

```

```

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, cSubStepDtIs)
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.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
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
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Case 53
Set cExecStep53 = New cRunStep
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Case 54
Set cExecStep54 = New cRunStep
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Set cExecStep56 = New cRunStep
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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
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Case 78
Set cExecStep78 = New cRunStep
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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
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Case 86
Set cExecStep86 = New cRunStep
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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" &
(IngIndex + 1) & "!"

If Not InitExecStep Is Nothing Then
InitExecStep.Index = IngIndex

'Remove this element from the collection
of free objects
Call RemoveFreeProcess(IngIndex)
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
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 IIndex 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 =
GetInstanceDefaultDir(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 IIndex = 0 To
mcParameters.ParameterCount - 1
    If
mcParameters(IIndex).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(IIndex).ParameterName &
gstrSQ & vbTab & vbTab & gstrSQ &
mcParameters(IIndex).ParameterValue &
gstrSQ
        End If
    Next IIndex

' Write all connection properties to the
log
For IIndex = 0 To
RunConnections.Count - 1
    Set cTempConn =
RunConnections(IIndex)
    If IIndex = 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 IIndex

    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 IIndex = StepDtls.Count - 1 To 0 Step -1
            sLabel = StepDtls(IIndex)
            If IIndex = StepDtls.Count - 1 Then
                mcWspLog.WriteLine
JulianDateToString(dtStamp) & " Start Step: " &
vbTab & sLabel
            Else
                mcWspLog.WriteLine vbTab & vbTab
& vbTab & vbTab & sLabel
            End If
        Next IIndex

    Case mintStepComplete
        For IIndex = StepDtls.Count - 1 To 0 Step -1
            sLabel = StepDtls(IIndex)
            If IIndex = StepDtls.Count - 1 Then
                mcWspLog.WriteLine
JulianDateToString(dtStamp) & " Comp. Step: " &
vbTab & sLabel
            Else
                mcWspLog.WriteLine vbTab & vbTab
& vbTab & vbTab & sLabel
            End If
        Next IIndex

    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 IIndex 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 IIndex = 0 To
mcParameters.ParameterCount - 1
' If
mcParameters(IIndex).ParameterType <>
gintParameterApplication Then
' If Not bHdr Then
' mcWspLog.WriteLine
Format(Now, FMT_WSP_LOG_DATE) &
" Parameters: " & vbTab & gstrSQ &
mcParameters(IIndex).ParameterName &
gstrSQ & vbTab & vbTab & gstrSQ &
mcParameters(IIndex).ParameterValue &
gstrSQ
' bHdr = True
' Else
' mcWspLog.WriteLine
vbTab & vbTab & vbTab & vbTab &
gstrSQ &
mcParameters(IIndex).ParameterName &
gstrSQ & vbTab & vbTab & gstrSQ &
mcParameters(IIndex).ParameterValue &
gstrSQ
' End If
' End If
' Next IIndex
'
' 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 IIndex = StepDtls.Count - 1 To
0 Step -1
' sLabel = StepDtls(IIndex)
' If IIndex = 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 IIndex
'
' Case mintStepComplete
' For IIndex = StepDtls.Count - 1 To
0 Step -1
' sLabel = StepDtls(IIndex)
' If IIndex = 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 IIndex
'
' 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, lngInstanceId As Long, Status As InstanceStatus)

Call StepTerminated(cStepRecord, dtmEndTime, cExecStep1.Index, lngInstanceId, Status)

End Sub

Private Sub

cExecStep1_StepStart(cStepRecord As cStep, _
dtmStartTime As Currency, lngInstanceId As Long)

Call
TimeStartUpdateForStep(cStepRecord, lngInstanceId, dtmStartTime)

End Sub

Private Sub

cExecStep9_ProcessComplete(cStepRecord As cStep, _
dtmEndTime As Currency, lngInstanceId As Long, lElapsed As Long)

Call
TimeUpdateForProcess(cStepRecord, lngInstanceId, 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, dtmStartTime, Command:=strCommand)

End Sub

Private Sub

cExecStep9_StepComplete(cStepRecord As cStep, _
dtmEndTime As Currency, lngInstanceId As Long, Status As InstanceStatus)

Call StepTerminated(cStepRecord, dtmEndTime, cExecStep9.Index, lngInstanceId, Status)

End Sub

Private Sub

cExecStep9_StepStart(cStepRecord As cStep, _
dtmStartTime As Currency, lngInstanceId As Long)

Call TimeStartUpdateForStep(cStepRecord, lngInstanceId, dtmStartTime)

End Sub

Private Sub

cExecStep10_ProcessComplete(cStepRecord As cStep, _
dtmEndTime As Currency, lngInstanceId As Long, lElapsed As Long)

Call TimeUpdateForProcess(cStepRecord, lngInstanceId, 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, dtmStartTime, Command:=strCommand)

End Sub

Private Sub

cExecStep10_StepComplete(cStepRecord As cStep, _
dtmEndTime As Currency, lngInstanceId As Long, Status As InstanceStatus)

Call StepTerminated(cStepRecord, dtmEndTime, cExecStep10.Index, lngInstanceId, Status)

End Sub

Private Sub

cExecStep10_StepStart(cStepRecord As cStep, _
dtmStartTime As Currency, lngInstanceId As Long)

Call TimeStartUpdateForStep(cStepRecord, lngInstanceId, dtmStartTime)

End Sub

Private Sub

cExecStep11_ProcessComplete(cStepRecord As cStep, _
dtmEndTime As Currency, lngInstanceId As Long, lElapsed As Long)

Call TimeUpdateForProcess(cStepRecord, lngInstanceId, 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, dtmStartTime, Command:=strCommand)

End Sub

Private Sub

cExecStep11_StepComplete(cStepRecord As cStep, _
dtmEndTime As Currency, lngInstanceId As Long, Status As InstanceStatus)

Call StepTerminated(cStepRecord, dtmEndTime, cExecStep11.Index, lngInstanceId, Status)

End Sub

Private Sub cExecStep11_StepStart(cStepRecord As cStep, _

dtmStartTime As Currency, lngInstanceId As Long)

Call TimeStartUpdateForStep(cStepRecord, lngInstanceId, dtmStartTime)

End Sub

Private Sub

cExecStep12_ProcessComplete(cStepRecord As cStep, _
dtmEndTime As Currency, lngInstanceId As Long, lElapsed As Long)

Call TimeUpdateForProcess(cStepRecord, lngInstanceId, 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, dtmStartTime, Command:=strCommand)

End Sub

Private Sub

cExecStep12_StepComplete(cStepRecord As cStep, _
dtmEndTime As Currency, lngInstanceId As Long, Status As InstanceStatus)

Call StepTerminated(cStepRecord, dtmEndTime, cExecStep12.Index, lngInstanceId, 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_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)

```

<pre> 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 </pre>	<pre> 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 </pre>	<pre> 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) </pre>
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```

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)

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```

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

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```

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, dtmEndTime:=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(cStepRecord
As cStep, _
dtmEndTime As Currency,
lngInstanceId As Long, lElapsed As Long)

Call
TimeUpdateForProcess(cStepRecord,
lngInstanceId, dtmEndTime:=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, dtmEndTime:=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, dtmEndTime:=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, dtmEndTime:=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

```

```

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, _

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    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

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```

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

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    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, _

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    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

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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)

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    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, _

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    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

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    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

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    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,
_

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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(cStepRecord 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)


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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)

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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)

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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)

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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)

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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)

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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)

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End Sub

Private Sub
cExecStep70_ProcessComplete(cStepRecord As cStep, _
    dtmEndTime As Currency, lngInstanceId As Long, lElapsed As Long)

    Call
    TimeUpdateForProcess(cStepRecord, lngInstanceId, dtmEndTime, lElapsed)

End Sub

Private Sub
cExecStep70_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As Currency, lngInstanceId As Long)

    Call
    TimeUpdateForProcess(cStepRecord, lngInstanceId, 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(cStepRecord As cStep, _
    dtmEndTime As Currency, lngInstanceId As Long, lElapsed As Long)

    Call
    TimeUpdateForProcess(cStepRecord, lngInstanceId, dtmEndTime, lElapsed)

End Sub

Private Sub
cExecStep71_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As Currency, lngInstanceId As Long)

    Call
    TimeUpdateForProcess(cStepRecord, lngInstanceId, dtmStartTime, Command:=strCommand)

End Sub

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lngInstanceId, 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, dtmEndTime, lElapsed)

End Sub

Private Sub
cExecStep72_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord, lngInstanceId, 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

```

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Private Sub
cExecStep73_ProcessComplete(cStepRecord As cStep, _
    dtmEndTime As Currency, lngInstanceId As Long, lElapsed As Long)

    Call TimeUpdateForProcess(cStepRecord, lngInstanceId, dtmEndTime, lElapsed)

End Sub

Private Sub
cExecStep73_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord, lngInstanceId, 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, dtmEndTime, lElapsed)

End Sub

Private Sub
cExecStep74_ProcessStart(cStepRecord As cStep, _
    strCommand As String, dtmStartTime As Currency, lngInstanceId As Long)

    Call TimeUpdateForProcess(cStepRecord, lngInstanceId, 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

```

```

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)

```

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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, _

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    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)

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    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, _

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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, _

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)

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 cRunCollt
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
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 Execute.Step 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$(GetShortName(SubstituteParameters(
-
mcExecStep.StartDir,
mcExecStep.WorkspaceId, mcIterators,
WspParameters:=WspParameters)))
'Dummy connection object
Set cConn = New cConnection
Set cRunConnDtl = New cConnDtl
Else
' Find the connection string value and
substitute parameter values in it
Set cRunConnDtl =
WspConnDtls.GetConnectionDtl(mcExecSt
ep.WorkspaceId, mcExecStep.StartDir)
Set cConn =
WspConnections.GetConnection(mcExecSt
p.WorkspaceId,
cRunConnDtl.ConnectionString)
sStartDir =
Trim$(SubstituteParameters(cConn.Connec
tionValue, _
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 cRunCollt)

    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 mdbLoadDb 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, slts 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, sltValue As String)
    ' Inserts a new run detail record into the database

    Dim strInsert As String
    Dim qry 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 = mdbLoadDb.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 & " ) "

    mdbLoadDb.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 = mdbLoadDb.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 = mdbLoadDb.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 = mdbLoadDb.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 =
mngWorkspaceld

    Case "[r_id]"
      prmParam.Value = mngRunId

    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, sltValue As
String)

  On Error GoTo ProcessStartProcessingErr

  ' Insert the run detail into the database
  Call InsertRunDetail(cStepRecord,
strCommand, dtmStartTime, lngInstanceId, _
  lParentInstanceId, sltValue)

  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, sltValue 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, sltValue)
  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 = mdbLoadDb.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)
mIngWorkspaceId = vdata
End Property
Public Property Get WorkspaceId() As Long
WorkspaceId = mIngWorkspaceId
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"
mIngRunId = cRunSeq.Identifier
Set cRunSeq = Nothing

Call
mcRunParams.InitBuiltInsForRun(mIngWor
kpaceId, mIngRunId)

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 = mIngWorkspaceId
mcRun.RootKey =
LabelStep(mIngWorkspaceId)
mcRun.RunId = mIngRunId
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 = mdbLoadDb

End Property
Public Property Set LoadDb(vdata As
Database)

Set mdbLoadDb = 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 = mdbLoadDb
Set mcRunParams.ParamDatabase =
mdbLoadDb
Set mcRunConstraints.ConstraintDB =
mdbLoadDb
Set mcRunConnections.ConnDb =
mdbLoadDb
Set mcRunConnDtls.ConnDb =
mdbLoadDb

' Read all the step and parameter data for the
workspace
Call
ReadWorkspaceData(mIngWorkspaceId,
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( _
mIngWorkspaceId, _
gintPreStep, _
blnSort:=True, _
blnGlobalConstraintsOnly:=True)
mcvntWspPostCons =
mcRunConstraints.ConstraintsForWsp( _
mIngWorkspaceId, _
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 mdbLoadDb = 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, lngRunId)
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 lngIdentifier As Long
Private mstrIdentifierColumn As String

```

```

Private mrecIdentifiers As Recordset
Private mdbDatabase 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 strSql As String
Dim pId As DAO.Parameter
Dim qyId As DAO.QueryDef

strSql = "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 =
mdbDatabase.CreateQueryDef(gstrEmptyString,
strSql)
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 =
mdbDatabase.OpenRecordset(strSql,
dbOpenForwardOnly)

If mrecIdentifiers.RecordCount = 0 Then
CreateIdRecord
Set mrecIdentifiers =
mdbDatabase.OpenRecordset(strSql,
dbOpenForwardOnly)
End If

BugAssert mrecIdentifiers.RecordCount <> 0

End Sub

Public Property Set IdDatabase(vdata As Database)

Set mdbDatabase = 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"
    mdbDatabase.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 Integer
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 mdbDatabase As Database
Private mintStepType As Integer
Private mintOperation As Operation
Private mlngPosition As Long
Private mstrIteratorName As String
Private mclIterators As cNodeCollections
Private mblsNewVersion 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 interdependent
    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 = mdbmsDatabase

    ' 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
        mblsNewVersion = 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(mInlgWorkspaceId)
& ", " & Str(mInlgStepId) & _
", " &
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(mstrStepTextFile)
strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrStepText)
strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrStartDir)

strInsert = strInsert & ", " &
Str(mlngParentStepId) & _
", " &
mFieldValue.MakeStringFieldValid(mstrParentVersionNo) & _
", " & Str(mintSequenceNo) & _
", " & Str(mblnEnabledFlag) & ", " &
Str(mintStepLevel)

strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrDegreeParallelism)
strInsert = strInsert & ", " &
Str(mintExecutionMechanism)

strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrFailureDetails) & _
", " & Str(mintContinuationCriteria) & _
", " & Str(mblnGlobalFlag) & _
", " & Str(mblnArchivedFlag)

strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrOutputFile)
strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrLogFile)
strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrErrorFile)
strInsert = strInsert & ", " &
mFieldValue.MakeStringFieldValid(mstrIteratorName)

strInsert = strInsert & ") "

BugMessage strInsert
mdbContext.Database.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 =
mdbContext.Database.CreateQueryDef(gstrEmptyString, 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(mstrVersionNo)

BugMessage sUpdate
mdbContext.Database.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(mIngStepId,
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 =
mIngWorkspaceId
            Case "[s_id]"
                prmParam.Value = mIngStepId
            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 =
mIngParentStepId
            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 =
mdbDatabase.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(mstrStepTextFile)
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(mstrParentVersionNo) & _
" , sequence_no = " &
Str(mintSequenceNo) & _
" , step_level = " & Str(mintStepLevel)
& _
" , enabled_flag = " &
Str(mblnEnabledFlag) & _
" , degree_parallelism = " &
mFieldValue.MakeStringFieldValid(mstrDegreeParallelism) & _
" , execution_mechanism = " &
Str(mintExecutionMechanism) & _
" , failure_details = " &
mFieldValue.MakeStringFieldValid(mstrFailureDetails) & _
" , continuation_criteria = " &
Str(mintContinuationCriteria) & _
" , global_flag = " &
Str(mblnGlobalFlag) & _
" , archived_flag = " &
Str(mblnArchivedFlag) & _
" , output_file_name = " &
mFieldValue.MakeStringFieldValid(mstrOutputFile) & _
" , error_file_name = " &
mFieldValue.MakeStringFieldValid(mstrErrorFile) & _
" , iterator_name = " &
mFieldValue.MakeStringFieldValid(mstrIteratorName)

' " , log_file_name = " &
mFieldValue.MakeStringFieldValid(mstrLogFile) & _

strUpdate = strUpdate & " where step_id
= " & Str(mlngStepId) & _
" and version_no = " &
mFieldValue.MakeStringFieldValid(mstrVersionNo)

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(gstrEmptyString, 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 IWorkspace 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, IWorkspace,
WspParameters:=ColParameters)
Case gintTo
mcLastIterator.RangeTo =
SubstituteParameters(cItRec.Value, IWorkspace,
WspParameters:=ColParameters)
Case gintStep
mcLastIterator.RangeStep =
SubstituteParameters(cItRec.Value, IWorkspace,
WspParameters:=ColParameters)
Case Else
On Error GoTo 0
Err.Raise vbObjectError +
errTypeInvalid, mstrModuleName, _
LoadResString(errTypeInvalid)
End Select
Next lngIndex

```


<pre> 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 </pre>	<pre> 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 </pre>	<pre> 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() </pre>
--	--	--

```

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

```

```

mInGCount = mInGCount + 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 < (mInGCount - 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
mInGCount - 2
            MoveDown lngIndex
        Next lngIndex

    End If

    ' Delete the last Node from the array
mInGCount = mInGCount - 1
    If mInGCount > 0 Then
        ReDim Preserve mcarrItems(0 To
mInGCount - 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 mInGCount - 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 < mInGCount
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 >= mInGCount Then
            ReDim Preserve mcarrItems(Position)
            mInGCount = 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 < mInGCount 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 < mInGCount - 1
Then
        lngTemp = mcarrItems(Position)

        mcarrItems(Position) = mcarrItems(Position +
1)
        mcarrItems(Position + 1) = lngTemp
    End If

End Sub
Public Function Count() As Long

    Count = mInGCount

End Function

Private Sub Class_Initialize()

    mInGCount = 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 mdbStepMaster 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 mdbStepMaster = 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 =
mdbStepMaster.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 =
mdbStepMaster.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
    ' Propagate 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
    ' Propagate 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(gstrEmptyString, 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 =
mdbStepMaster.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)
'
' mdbStepMaster.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 mdbStepMaster = 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 =
"\\SMDData" & 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"

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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"

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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) & ", " & _

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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_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

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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

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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)

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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)

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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 " & _

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    " 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

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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 Ild 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)
    Ild = 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(Ild) & ", " & _
                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) & ", " & _

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                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

                Ild = Ild + 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(Ild)
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 Ild As Long
    Dim cTempStr As New cStringSM

    On Error GoTo Upgrade243to25Err

    sBuf = "Release " & gsVersion25 & " onwards,
new 'Connections' must be created for all " & _

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"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_STRIN
G & _
", " &
FLD_CONN_DTL_CONNECTION_TYPE
& " ) " & _
" values ( [w_id], [c_id], [c_name],
[c_str], [c_type] ) "
Set qy = dbFile.CreateQueryDef("", sBuf)

IId = glMinId

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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 = IId
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)
ConnTypeDynamic
qy.Parameters("c_type").Value =

qy.Execute dbFailOnError

IId = IId + 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(IId)
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 &
"]& "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
(reshmata@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

```

```

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 = &H8000
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 gFileType
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_FILTER
= "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

```

```

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
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
#End 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))
#End If
Dim dtStart As Date
Dim qtyIt 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 qtyIt =
dbsAttTool.CreateQueryDef(gstrEmptyString, sSql)
rstStepsInWsp.MoveFirst
While Not rstStepsInWsp.EOF
    qtyIt.Parameters("s_id").Value =
rstStepsInWsp!step_id
    qtyIt.Parameters("ver_no").Value =
rstStepsInWsp!version_no
    Set recIterators =
qtyIt.OpenRecordset(dbOpenSnapshot)
    Call LoadIteratorsArray(cStepsCol,
recIterators)
    recIterators.Close
    rstStepsInWsp.MoveNext
Wend
qtyIt.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 qtyIt 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 =
mInjMaxFileIndex 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 IIndex As Long

    If Not mOpenFiles Is Nothing Then
        For IIndex = mOpenFiles.Count - 1 To 0
            CloseFileSM
(mOpenFiles(IIndex).FileName)
        Next IIndex
    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 gMinId As Long = 1
Public Const gInvalidId 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 cRunCollt
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

' 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
errStepModifyFileFailed
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
errUnableToProcessListViewDbClick = 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(gintOnFailureCompleteSibli
ngs) = "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.tblConstraintCommand
s)
#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 uElapsed
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

```

```

Public Const STATUS_TIMEOUT
As Long = &H102
Public Const STATUS_PENDING
As Long = &H103

Public Const WAIT_FAILED As
Long = &HFFFFFFF
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
lpstrFileName As String
nMaxFileName 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

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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
"sftime.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 ShowFileDialog(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 ShowFileDialogErr

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
ShowFileDialog = Left$(opfile.lpstrFile,
Instr(opfile.lpstrFile, vbNullChar) - 1)
Else
ShowFileDialog = strOldFile
End If

Exit Function

ShowFileDialogErr:
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
End 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 iRetVal 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
iRetVal = GetShortPathName(sLongFile,
sShortPathName, iLen)
If iRetVal = 0 Then
    Call LogSystemError
End If
GetShortName = IIf(iRetVal = 0, sLongFile,
Left(sShortPathName, iRetVal))
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

```

```

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 =
gInvalidId, _
    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 <> gInvalidId 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 <> gInvalidId 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.ItemData
a(frmWorkspaceOpen.lstWorkspaces.NewIndex) = _
    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(IngWorkspaceId
As Long, _
    rstWorkspaceParameters As Recordset, _
    qryWspParams 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 qryWspParams =
dbsAttTool.CreateQueryDef(gstrEmptyString,
strSql)
    qryWspParams.Parameters("w_id").Value =
IngWorkspaceId

' 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, tsq_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 qryConns =
dbsAttTool.CreateQueryDef(gstrEmptyString,
strSql)
    qryConns.Parameters("w_id").Value =
IngWorkspaceId

Set rstConns =
qryConns.OpenRecordset(dbOpenSnapshot)

Exit Sub

ReadWorkspaceParametersErr:

    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError +
errReadWorkspaceDataFailed, _
    mstrModuleName & "ReadWorkspaceParameters",
LoadResString(errReadWorkspaceDataFailed)

End Sub

```

```

Set rstWorkSpaceParameters =
qryWspParams.OpenRecordset(dbOpenSnapshot)

Exit Sub

ReadWorkspaceParametersErr:

    LogErrors Errors
    gstrSource = mstrModuleName &
"ReadWorkspaceParameters"
    On Error GoTo 0
    Err.Raise vbObjectError +
errReadWorkspaceDataFailed, _
    gstrSource, _

LoadResString(errReadWorkspaceDataFailed)

End Sub
Private Sub ReadConnections(IngWorkspaceId
As Long, rstConns As Recordset, _
    qryConns 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, tsq_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 qryConns =
dbsAttTool.CreateQueryDef(gstrEmptyString,
strSql)
    qryConns.Parameters("w_id").Value =
IngWorkspaceId

Set rstConns =
qryConns.OpenRecordset(dbOpenSnapshot)

Exit Sub

ReadWorkspaceParametersErr:

    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError +
errReadWorkspaceDataFailed, _
    mstrModuleName & "ReadConnections",
LoadResString(errReadWorkspaceDataFailed)

End Sub

```

```

End Sub
Private Sub ReadConnectionDtls(IngWorkspaceId
As Long, rstConns As Recordset, _
    qryConns 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 qryConns =
dbsAttTool.CreateQueryDef(gstrEmptyString,
strSql)
    qryConns.Parameters("w_id").Value =
IngWorkspaceId

Set rstConns =
qryConns.OpenRecordset(dbOpenSnapshot)

Exit Sub

ReadWorkspaceParametersErr:

    LogErrors Errors
    On Error GoTo 0
    Err.Raise vbObjectError +
errReadWorkspaceDataFailed, _
    mstrModuleName & "ReadConnectionDtls",
LoadResString(errReadWorkspaceDataFailed)

End Sub

Public Sub ReadWorkspaceData(IngWorkspaceId
As Long, _
    cStepsCol As cArrSteps, _
    cParamsCol As cArrParameters, _
    cConsCol As cArrConstraints, _
    cConns As cConnections, _
    cConnDetails As cConnDtls, _
    rstStepsInWsp As Recordset, _
    qryStepsInWsp As DAO.QueryDef, _
    rstParamsInWsp As Recordset, _
    qryParamsInWsp As DAO.QueryDef, _
    rstConns As Recordset, _
    qryConns As DAO.QueryDef, _
    rstConnDtls As Recordset, _
    qryConnDtls 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.

```



```

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

```

<pre> // 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); } </pre>	<pre> //////////////////////////////////// // 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__ </pre>
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<pre> #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 *); #ifdef __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); </pre>	<pre> 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; </pre>
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<pre> interface ISMLog { CONST_VTBL struct ISMLogVtbl __RPC_FAR *lpVtbl; }; #ifndef 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); </pre>	<pre> 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__ </pre>
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<pre> EXTERN_C const IID IID_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); </pre>	<pre> 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,lcid,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 */ </pre>
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<pre> 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 } </pre>	<pre> //////////////////////////////////// // 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*/ </pre>
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<pre> #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 */ </pre>	<pre> 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; </pre>
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<pre> 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,rgDisp 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); </pre>	<pre> 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__ */ #ifdef __LOGWRITERLib_LIBRARY_DEFINED__ #define __LOGWRITERLib_LIBRARY_DEFINED__ </pre>
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<pre> /* library LOGWRITERLib */ /* [helpstring][version][uuid] */ EXTERN_C const IID LIBID_LOGWRITERLib; #ifdef __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); </pre>	<pre> /* [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,lcid,rgDispId) \ GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rgDispId) #define _ISMLogEvents_Invoke(This,dispIdMember,riid,lcid,wFlags,pDispParams,pVarResult,pExcepInfo,puArgErr) \ (This->lpVtbl -> Invoke(This,dispIdMember,riid,lcid,wFlags,pDispParams,pVarResult,pExcepInfo,puArgErr)) #endif /* COBJMACROS */ #endif /* C style interface */ #endif /* __ISMLogEvents_DISPINTERFACE_DEFINED__ */ </pre>
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<pre> 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) #ifdef __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 #ifdef 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 </pre>	<pre> // 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 IDisposition; //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(); } } </pre>
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<pre> iActiveBuffer = 0; pCurrent = pBuffer[iActiveBuffer]; IDisposition = m_bAppend ? OPEN_ALWAYS : CREATE_ALWAYS; m_hTxnFile = CreateFile(LPCTSTR)szFile, GENERIC_WRITE, FILE_SHARE_READ, NULL, IDisposition, 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); } </pre>	<pre> 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; } </pre>
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<pre> 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 destructor (which does not return a value) //throw new CSystemErr(CSystemErr::eWriteFile, "CTxnLog::CloseTransactionLogFile"); } } </pre>	<pre> // 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 } </pre>
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<pre> STDMETHODIMP CSMLog::put_Append(BOOL newVal) { m_bAppend = newVal; return S_OK; } // FILE: SMEExecute.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 </pre>	<pre> 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 <atimpl.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_) </pre>
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<pre> // 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 *pLogFile; // 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; } </pre>	<pre> 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 IRowCount, long IQueryTmout, 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_IRowCount = IRowCount; m_IQueryTmout = IQueryTmout; m_szConnection = szConnection; } } </pre>
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<pre> 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[MAXBUFLLEN]; 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); </pre>	<pre> #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 </pre>
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<pre> TC_TIME CExecute::ExecuteShell() { STARTUPINFO 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(STARTUPINFO)); 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); } </pre>	<pre> 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 } } </pre>
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<pre> 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_UIINTEGER); 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) { </pre>	<pre> #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; } } </pre>
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<pre> 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; } </pre>	<pre> void CExecute::ReConnectDeadConnection(HDBC *phdbc) { SQLRETURN rc; SQLINTEGER uConnDead; // Connect to the server using the passed in connection string rc = SQLGetConnectAttr(*phdbc, SQL_ATTR_CONNECTION_DEAD, &uConnDead, SQL_IS_INTEGER, 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_szExecDtIs, 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; } </pre>
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<pre> 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) { SQLINTEGER 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_INTEGER); HandleODBCError(rc, SQL_HANDLE_STMT, m_hHandle, SMSQLSetStmtAttr); } return; } </pre>	<pre> 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 } </pre>
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<pre> 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, SMSQLError); } } 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 </pre>	<pre> // Determine the number of result set columns. rc = SQLNumResultCols(m_hHandle, &NumCols); HandleODBCError(rc, SQL_HANDLE_STMT, m_hHandle, SMSQLError); 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, SMSQLError); #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, SMSQLError); </pre>
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// 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_INTEGER);
SQLSetStmtAttr(m_hHandle,
SQL_ATTR_ROW_ARRAY_SIZE, &iRowArraySize,
SQL_IS_INTEGER);
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
}

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<pre> 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) </pre>	<pre> { 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, '\0', iColLen - j); *(s + iColLen) = '\0'; // Write the field to the output file _bstr_t temp(s); pOutput->WriteField((BSTR)temp); free(s); } return; } </pre>
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<pre> 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); </pre>	<pre> 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; } } </pre>
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<pre> /* 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 szErrMsg[SQL_MAX_MESSAGE_LENGTH+1]; // SQL Error Text string char szBuffer[SQL_SQLSTATE_SIZE+SQL_MAX_MESSAGE _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 </pre>	<pre> // call SQLGetDiagRec function with proper ODBC handles, repeatedly until // function returns SQL_NO_DATA. while (!m_bAbort && (nErrResult = SQLGetDiagRec(fHandleType, handle, sMsgNum++, szErrState, &dwErrCode, szErrMsg, SQL_MAX_MESSAGE_LENGTH-1, &wErrMsgLen)) != SQL_NO_DATA) { if (!SQL_SUCCEEDED(nErrResult)) break; if (m_pOutputFile && IsServerMessage(dwErrCode, szErrMsg)) { wsprintf(szBuffer, SM_SQLMSG_FORMAT, (LPSTR)szErrMsg); 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)szErrMsg)); temp = szBuffer; m_pOutputFile->WriteLine((BSTR) temp); } else if (m_pErrorFile && !IsODBCWarning(szErrState)) { wsprintf(szBuffer, SM_SQLERR_FORMAT, (LPSTR)szErrState, dwErrCode, (LPSTR)szErrMsg); 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; } </pre>
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<pre> /* FUNCTION: ODBCcleanup(HDBC *hdbc, HSTMT *hstmt) COMMENTS: Cleanup of all ODBC structures */ void CExecute::ODBCcleanup(HDBC *hdbc, HSTMT *hstmt) { SQLRETURN IReturn; #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 IReturn = 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 STDMETHODCALLTYPE CExecute::RaiseSystemError(void) { char s[MAXBUFLEN]; GetSystemError(s); return Error(s, 0, NULL, GUID_NULL); } </pre>	<pre> // 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; } STDMETHODCALLTYPE CExecute::get_StepStatus(InstanceStatus *pVal) { *pVal = m_StepStatus; return S_OK; } STDMETHODCALLTYPE CExecute::WriteError(BSTR szMsg) { if (m_pErrorFile) return(m_pErrorFile->WriteLine(szMsg)); return S_OK; } </pre>
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<pre>// 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 "ExecuteDIICP.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 MAXBUFLN 256 // display buffer size #define MAXLOGCMDLEN 256 // maximum characters in command that will be // printed to log #define MAXLOGCMDDBUF 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"</pre>	<pre>// 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 INativeError, UCHAR *szErr){ return((strstr((LPCTSTR)szErr, SM_MSG_SERVER) != NULL) ? (INativeError == 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)); } };</pre>
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<pre> 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; } </pre>	<pre> 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; } </pre>
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<pre> 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(IEExecute) COM_INTERFACE_ENTRY(ISupportErrorInfo) COM_INTERFACE_ENTRY(IDispatch) COM_INTERFACE_ENTRY(IConnectionPointContainer) COM_INTERFACE_ENTRY_IMPL(IConnectionPointContainer) END_COM_MAP() BEGIN_CONNECTION_POINT_MAP(CExecute) CONNECTION_POINT_ENTRY(DIID__IEExecuteEvents) END_CONNECTION_POINT_MAP() // ISupportsErrorInfo STDMETHOD(InterfaceSupportsErrorInfo)(REFIID riid); // IEExecute 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; </pre>	<pre> 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; SQLINTEGER m_lQueryTmout; _bstr_t m_ErrorFile, m_OutputFile; BOOL m_bAbort; </pre>
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<pre> 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((LPCTSTR)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(LPCTSTR szFile, LPCTSTR szFmt); void WriteToTpchLog(char *szMsg); #endif </pre>	<pre> #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 ExecuteDlls.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(); </pre>
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<pre> //////////////////////////////////// // DLL Entry Point extern "C" BOOL WINAPI DllMain(HINSTANCE hInstance, DWORD dwReason, LPVOID /*!pReserved*/) { 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); SQLINTEGER 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); } } </pre>	<pre> 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 szErrMsg[SQL_MAX_MESSAGE_LENGTH+1]; // SQL Error Text string char szBuffer[SQL_SQLSTATE_SIZE+SQL_MAX_MESSAGE _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, szErrMsg, SQL_MAX_MESSAGE_LENGTH-1, &wErrMsgLen)) != SQL_NO_DATA) { if (!SQL_SUCCEEDED(nErrResult)) break; wsprintf(szBuffer, SM_SQLERR_FORMAT, (LPSTR)szErrState, dwErrCode, (LPSTR)szErrMsg); MessageBox(NULL, szBuffer, szCaption, MB_OK); } } </pre>
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<pre> 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); } </pre>	<pre> //////////////////////////////////// // 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__ */ </pre>
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<pre> /* 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) *QueryInterface)(_IExecuteEvents __RPC_FAR * This, /* [in] */ REFIID riid, /* [iid_is][out] */ void __RPC_FAR * __RPC_FAR *ppvObject); </pre>	<pre> 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; }; #ifndef COBJMACROS #define _IExecuteEvents_QueryInterface(This,riid,ppvObject)\ (This->lpVtbl -> QueryInterface(This,riid,ppvObject)) #define _IExecuteEvents_AddRef(This)\ (This->lpVtbl -> AddRef(This)) </pre>
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<pre> #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, rgpszNames, cNames, lcid, rgDispId) \ (This)->lpVtbl -> GetIDsOfNames(This, riid, rgpszNames, 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; </pre>	<pre> 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 *rgpszNames, /* [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); </pre>
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<pre> /* [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 IRowCount, /* [in] */ long IQueryTmout, /* [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,ptinfo) \ (This)->lpVtbl -> GetTypeInfoCount(This,ptinfo) #define IExecute_GetTypeInfo(This,iTInfo,lcid,ppTInfo) \ (This)->lpVtbl -> GetTypeInfo(This,iTInfo,lcid,ppTInfo) </pre>	<pre> #define IExecute_GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rgDispId) \ (This)->lpVtbl -> GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rgDispId) #define IExecute_Invoke(This,dispIdMember,riid,lcid,wFlags,pDispParams,pVarResult,pExcepInfo,puArgErr) \ (This)->lpVtbl -> Invoke(This,dispIdMember,riid,lcid,wFlags,pDispParams,pVarResult,pExcepInfo,puArgErr) #define IExecute_DoExecute(This,szCommand,szExecutionDtls,ExecMethod,bNoCount, bNoExecute,bParseOnly,bQuotedIds,bAnsiNulls,bShowQP, bStatsTime,bStatsIO,IRowCount,IQueryTmout,szConnection)\ (This)->lpVtbl -> DoExecute(This,szCommand,szExecutionDtls,ExecMethod,bNoCount,bNoExecute,bParseOnly,bQuotedIds, bAnsiNulls,bShowQP,bStatsTime,bStatsIO,IRowCount,IQueryTmout,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 IRowCount, /* [in] */ long IQueryTmout, /* [in] */ BSTR szConnection); void __RPC_STUB IExecute_DoExecute_Stub(IRpcStubBuffer *This, IRpcChannelBuffer *_pRpcChannelBuffer, PRPC_MESSAGE _pRpcMessage, DWORD *_pdwStubPhase); </pre>
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<pre> /* [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][propget] */ 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][propget] */ 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 </pre>	<pre> // 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 CEExecute::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; } </pre>
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<pre> 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; } } </pre>	<pre> 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[MAXBUFLLEN]; 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 </pre>
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<pre>// 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 MAXLOGCMDDBUF characters from the command file and writes it to the log FILE *fpCmd; int iRead; char szBuf[MAXLOGCMDDBUF]; char szCmd[MAXLOGCMDLEN]; if (pfLogFile != NULL) { if ((fpCmd = fopen(szFile,</pre>	<pre>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); } }</pre>
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<pre> 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 </pre>	<pre> 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_INTEGER); 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 { </pre>
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<pre> 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); } </pre>	<pre> 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, SMSQLEAllocHandle); 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 } } </pre>
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<pre> 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; SQLINTEGER uConnDead; // Connect to the server using the passed in connection string rc = SQLGetConnectAttr(*phdbc, SQL_ATTR_CONNECTION_DEAD, &uConnDead, SQL_IS_INTEGER, 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 } } </pre>	<pre> 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_szExecDtIs, 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); } } </pre>
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<pre> 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) { SQLINTEGER 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_INTEGER); 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); } </pre>	<pre> 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; } </pre>
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<pre> 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)); SQLUIINTEGER iRowArraySize, iArrayElementSize; // SQLUIINTEGER 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); </pre>	<pre> 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); </pre>
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<pre> // 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)); </pre>	<pre> 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); </pre>
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<pre> } 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; } </pre>	<pre> 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; } } } } </pre>
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<pre> 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); </pre>	<pre> 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); </pre>
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<pre> 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_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 szErrMsg[SQL_MAX_MESSAGE_LENGTH+1]; // SQL Error Text string char szBuffer[SQL_SQLSTATE_SIZE+SQL_MAX_MESSAGE _LENGTH+MAXBUFLen+1] = ""; // formatted Error text Buffer </pre>	<pre> 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, szErrMsg, SQL_MAX_MESSAGE_LENGTH-1, &wErrMsgLen) != SQL_NO_DATA) { if (!SQL_SUCCEEDED(nErrResult)) break; if (m_pOutputFile && IsServerMessage(dwErrCode, szErrMsg)) { wsprintf(szBuffer, SM_SQLMSG_FORMAT, (LPSTR)szErrMsg); 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)szErrMsg)); temp = szBuffer; m_pOutputFile->WriteLine((BSTR) temp); } else if (m_pErrorFile && !IsODBCWarning(szErrState)) { wsprintf(szBuffer, SM_SQLERR_FORMAT, (LPSTR)szErrState, dwErrCode, (LPSTR)szErrMsg); temp = szBuffer; m_pErrorFile->WriteLine((BSTR) temp); } } } </pre>
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<pre> /* 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 IReturn; #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 IReturn = 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; } </pre>	<pre> // 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; } </pre>
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<pre>// 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 "ExecuteDIICP.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 MAXLOGCMDDBUF 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"</pre>	<pre>// 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(Len) ((Len) % ALIGNSIZE) ? \ ((Len) + ALIGNSIZE - ((Len) % ALIGNSIZE)) : (Len) #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 INativeError, UCHAR *szErr){ return((strstr(LPCTSTR)szErr, SM_MSG_SERVER) != NULL) ? (INativeError == 0) : FALSE; } inline BOOL IsODBCWarning(UCHAR *szSqlState){ return(strcmp(LPCTSTR)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));} };</pre>
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<pre> 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: HRESULT OnTaskStarted(UINT uMsg, WPARAM wParam, LPARAM lParam, BOOL& bHandled) { CURRENCY CStartTime = Get64BitTime(&m_tStartTime); Fire_Start(CStartTime); return 0; } </pre>	<pre> HRESULT 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; } </pre>
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<pre> 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(IConnectionPointContainer) COM_INTERFACE_ENTRY_IMPL(IConnectionPointContainer) 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; </pre>	<pre> 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; SQLINTEGER m_lQueryTmout; _bstr_t m_ErrorFile, m_OutputFile; BOOL m_bAbort; </pre>
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<pre> 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((LPCTSTR)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(LPCTSTR szFile, LPCTSTR szFmt); void WriteToTpchLog(char *szMsg); #endif </pre>	<pre> #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 </pre>
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<pre> void ShowODBCErrors(SWORD fHandleType, SQLHANDLE handle); void CloseOpenConnections(); //////////////////////////////////// // DLL Entry Point extern "C" BOOL WINAPI DllMain(HINSTANCE hInstance, DWORD dwReason, LPVOID /*IpReserved*/) { 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); </pre>	<pre> SQLINTEGER 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 szErrMsg[SQL_MAX_MESSAGE_LENGTH+1]; // SQL Error Text string char szBuffer[SQL_SQLSTATE_SIZE+SQL_MAX_MESSAGE _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, szErrMsg, SQL_MAX_MESSAGE_LENGTH-1, &wErrMsgLen)) != SQL_NO_DATA) { if (!SQL_SUCCEEDED(nErrResult)) break; wsprintf(szBuffer, SM_SQLERR_FORMAT, (LPSTR)szErrState, dwErrCode, (LPSTR)szErrMsg); MessageBox(NULL, szBuffer, szCaption, MB_OK); } } </pre>
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<pre> 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); } </pre>	<pre> // // 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*/ #ifdef __REQUIRED_RPCNDR_H_VERSION__ #define __REQUIRED_RPCNDR_H_VERSION__ 440 #endif #include "rpc.h" #include "rpcndr.h" #ifdef __ExecuteDll_h__ #define __ExecuteDll_h__ #ifdef __cplusplus extern "C"{ #endif /* Forward Declarations */ #ifdef __IExecuteEvents_FWD_DEFINED__ #define __IExecuteEvents_FWD_DEFINED__ typedef interface _IExecuteEvents _IExecuteEvents; #endif /* __IExecuteEvents_FWD_DEFINED__ */ #ifdef __IExecute_FWD_DEFINED__ #define __IExecute_FWD_DEFINED__ typedef interface IExecute IExecute; #endif /* __IExecute_FWD_DEFINED__ */ #ifdef __Execute_FWD_DEFINED__ #define __Execute_FWD_DEFINED__ #ifdef __cplusplus typedef class Execute Execute; #else typedef struct Execute Execute; #endif /* __cplusplus */ #endif /* __Execute_FWD_DEFINED__ */ #endif /* __Execute_FWD_DEFINED__ */ </pre>
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<pre> /* 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 { }; </pre>	<pre> #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; }; </pre>
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<pre> #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; </pre>	<pre> 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); </pre>
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<pre> /* [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; }; </pre>	<pre> #ifndef 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,rgDispId) \ (This)->lpVtbl -> GetIDsOfNames(This,riid,rgszNames,cNames,lcid,rgDispId) #define IExecute_Invoke(This,dispIdMember,riid,lcid,wFlags,pDispParams,pVarResult,pExcepInfo,puArgErr) \ (This)->lpVtbl -> Invoke(This,dispIdMember,riid,lcid,wFlags,pDispParams,pVarResult,pExcepInfo,puArgErr) #define IExecute_DoExecute(This,szCommand,szExecutionDtls,ExecMethod,bNoCount,bNoExecute, bParseOnly,bQuotedIds,bAnsiNulls,bShowQP,bStatsTime,bStatsIO,lRowCount,lQueryTmout,szConnection)\ (This)->lpVtbl -> DoExecute(This,szCommand,szExecutionDtls,ExecMethod,bNoCount,bNoExecute,bParseOnly, bQuotedIds,bAnsiNulls,bShowQP,bStatsTime,bStatsIO,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 */ </pre>
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<pre> /* [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 lQueryTimeout, /* [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); </pre>	<pre> 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) // #endifdef _EXECUTEDLLCP_H_ #define _EXECUTEDLLCP_H_ </pre>
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<pre> 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; } }; </pre>	<pre> #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_EXECUTE_SHELL 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; </pre>
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```

// 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 <atimpl.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
#ifdef _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 SMTTime.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: SMTTime.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)
//
// SMTTime.cpp : Implementation of DLL Exports.

// Note: Proxy/Stub Information
// To build a separate proxy/stub DLL,
// run nmake -f SMTTimeps.mk in the project directory.

#include "stdafx.h"
#include "resource.h"
#include <initguid.h>
#include "SMTTime.h"

#include "SMTTime_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 /*IpReserved*/)
{
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\SMTTime\SMTTime.idl:
Oicf (OptLev=i2), W1, Zp8, env=Win32, ms_ext, c_ext
error checks: allocation ref bounds_check enum stub_data
*/
//@@MIDL_FILE_HEADING( )

```

<pre> /* 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 __SMTTime_h__ #define __SMTTime_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: </pre>	<pre> 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); </pre>
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<pre> /* [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; }; #ifndef 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 */ </pre>	<pre> /* [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); </pre>
--	--

```

#endif /* __StepMasterTimeFunctions_MODULE_DEFINED__
*/

EXTERN_C const CLSID CLSID_SMTimer;

#ifdef __cplusplus

class DECLSPEC_UUID("27BAB71B-89E1-4A78-8854-
FDFBDC8037E")
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 SMTimer.rc
//
#define IDS_PROJNAME 100
#define IDR_SMTIMER 102

// Next default values for new objects
//
#ifdef APSTUDIO_INVOKED
#ifdef 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
#endif

// FILE: SMTimer.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)
// SMTimer.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 "SMTimer.h"

#include "SMTimer_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);
}

```

<pre> //////////////////////////////////// // 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\SMTTime\SMTTime.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 __SMTTime_h__ #define __SMTTime_h__ #ifdef __cplusplus extern "C"{ #endif </pre>	<pre> /* 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 </pre>
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<pre> *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); #ifndef COBJMACROS #define ISMTimer_QueryInterface(This,riid,ppvObject) \ (This)->lpVtbl -> QueryInterface(This,riid,ppvObject) #define ISMTimer_AddRef(This) \ (This)->lpVtbl -> AddRef(This) </pre>	<pre> #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); </pre>
--	---

```

/* [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-
FDFBDC8037E")
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
// Copyright Microsoft, 1999
// All Rights Reserved
//
// PURPOSE: Implementation of CSMTimer
// Contact: Reshma Tharamal (reshmat@microsoft.com)
//
// SMTimer.cpp : Implementation of CSMTimer
#include "stdafx.h"
#include "SMTTime.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;
}

```

<pre> 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; } </pre>	<pre> // 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 }; </pre>
---	--

<pre> // 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 // All Rights Reserved // // // 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_LINKCURRENCY __stdcall SMTTime_Get64BitTime(LPSYSTEMTIME lpInitTime); int JulianDay(int yr, int mm, int dd); void JulianToCalendar(int day, int* yr, int* mm, int* dd); #ifdef __cplusplus } #endif #endif </pre>	<pre> /// // 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); }; </pre>
--	---

```

#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 <atimpl.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__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
#ifdef _WIN32_WINNT
#define _WIN32_WINNT 0x0400
#endif
#define _ATL_APARTMENT_THREADED

#include <atbase.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 <atcom.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)

```

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"
);

```


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
November 11, 2008

HP
Mike Fitzner
One Microsoft Way
Redmond, WA 98052

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
810-07578	SQL Server 2008 Enterprise x64 Edition Server License with 25 CALs Discount Schedule: Open Program - Level C Unit Price reflects a 40% discount from the retail unit price of \$13,969.	\$8,318	1	\$8,318
359-01912	SQL Server 2008 Client License Client Access License Discount Schedule: Open Program - No Level Unit Price reflects a 4% discount from the retail unit price of \$163.	\$156	35	\$5,460
P72-03168	Windows Server 2008 Enterprise Edition (x64) Server License with 25 CALs Discount Schedule: Open Program - Level C Unit Price reflects a 42% discount from the retail unit price of \$3,999.	\$2,310	1	\$2,310
127-00012	Visual Studio Standard 2005 Full License No Discount Applied	\$250	1	\$250
N/A	Microsoft Problem Resolution Services Professional Support (1 Incident)	\$245	1	\$245

Windows Server 2008 and Windows Server 2003 are currently orderable through Microsoft's normal distribution channels. A list of Microsoft's resellers can be found at <http://www.microsoft.com/products/info/render.aspx?view=22&type=mpn&content=22/licensing>

SQL Server 2008 will be orderable and available by August 30, 2008.

Defect support is included in the purchase price. Additional support is available from Microsoft PSS on an incident by incident basis at \$245 per call.

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: PHmifi080110110000001637.

Please include this Reference ID in any correspondence regarding this price quote.