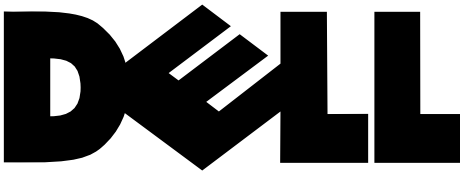
TPC Benchmark ™ H
Full Disclosure Report
DELL PowerEdge 6800/800FSB
Using
Red Hat Enterprise Linux AS Version 3.0
And
Oracle Database 10g Release 2 Enterprise Edition with RAC



First Edition

Submitted for Review

April 24, 2006

Dell Computer Corp PowerEdge 6800 Server with Red Hat Enterprise Linux AS version 3.0 and Oracle Database 10g Release 2 Enterprise Edition with RAC

First Printing April 2006

Printed in U.S.A.

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Abstract

This report documents the methodology and results of the TPC Benchmark H test conducted on a cluster of 2 PowerEdge 6800 Servers using Oracle database 10g Release 2 in conformance with the requirements of the TPC-H Benchmark Specification. The operating system used for the benchmark was Red Hat Enterprise Linux Advanced Server 3.0.

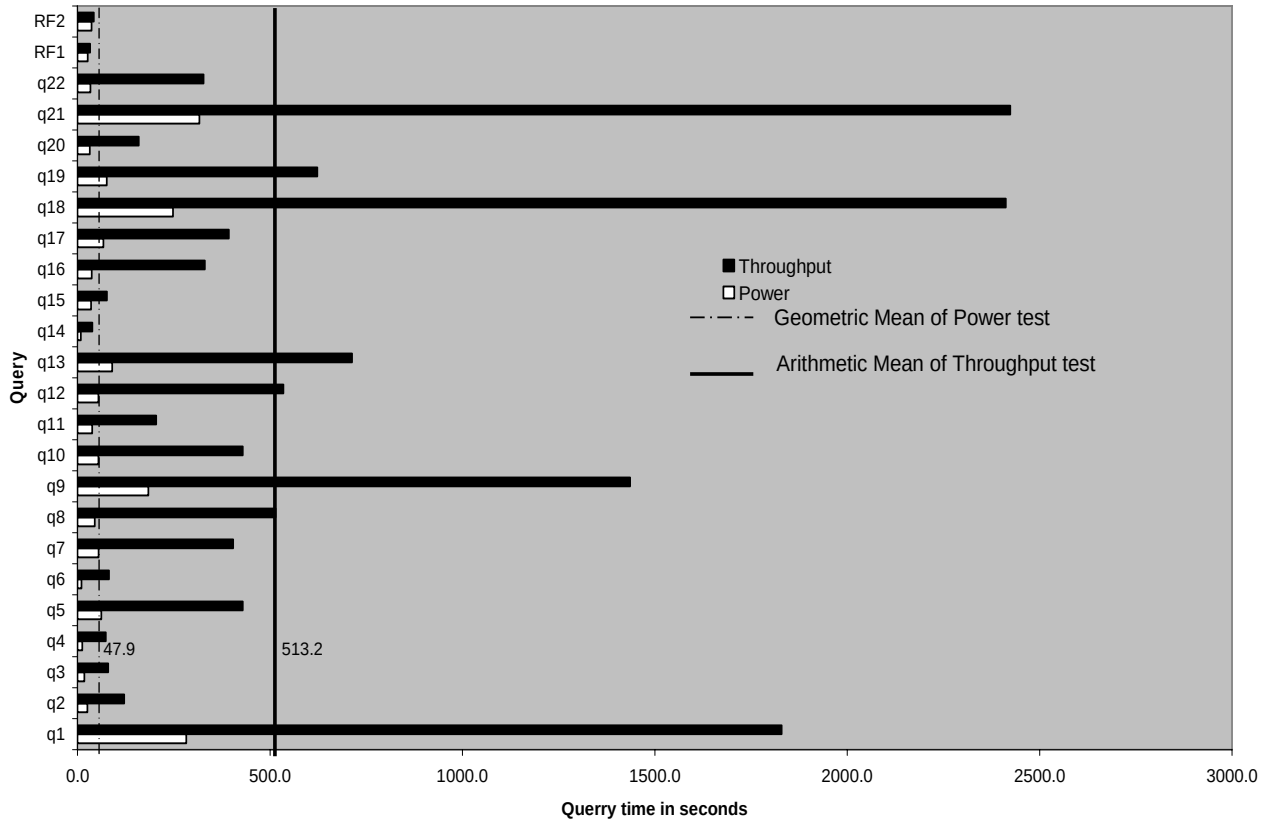
Hardware	Software	Total System Cost
2xDell PowerEdge 6800 with Quad Dual-Core 3.0GHz Intel Xeon MP Dell PowerVault 22XS Storage Enclosures	**Oracle Database 10g Release 2 Enterprise Edition Red Hat Enterprise Linux AS version 3.0**	**USD $460,004**

TPC-H Power@300GB	TPC-H Throughput@300GB	QphH@300GB	$/QphH@300GB
22,547.0	**15,811.0**	**18,881.0**	**USD $24.37**

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

In order to verify compliance to the TPC-H benchmark specification, Lorna Livingtree, Performance Metrics, Inc., audited the benchmark configuration, environment and methodology used to produce and validate the test results, and the pricing model used to calculate the price/performance.

DELL	**DELL PowerEdge 6800/800FSB with Oracle Database 10g R2**	**TPC-H Revision 2.3.0** **Report Date: April 24, 2006**
Total System Cost **USD $460,004**	**TPC-H Composite Query per Hour** **18,881.0 QphH@300GB**	**Price/Performance** **USD $24.37/QphH@300GB**
Database Size **300GB**	**Database Manager** Oracle Database 10g Release 2 Enterprise Edition with Oracle Real Application Clusters and Partitioning	**Operating System** Red Hat Enterprise Linux Advanced Server v3.0
Other Software		**Availability Date** **April 24, 2006**



Database Load Time 1:55:48	**Total Disk/Database Size** 24.16	**Load Includes Backup** N
RAID (Base tables only) : N	**RAID (Base tables and auxiliary data structures) :** N	**RAID (Everything) :** Y

System Configuration : 2 nodes
Processors/Cores/Threads (per node) : 4/8/16 3.0GHz/2x2MB L3 Intel Xeon MP
Memory: (per node) : 16GB RAM
Disk Drives: 214 Drives; 105 – 36GB 15k, FC HDD ; 105 - 73GB 15K, FC HDD ; 4 – 36GB 15K SCSI, OS

"Database Size includes only raw data (e.g., no temp, index, redundant storage space, etc.)."

Dell	PowerEdge 6800/800FSB	TPC-H EXECUTIVE SUMMARY PAGE 2 OF 2
	Client/Server	Report Date: 24-Apr-06

Description	Part Number	Third Party Brand	Third Party Pricing	Unit Price	Qty	Extended Price	3 yr. Maint. Price
Server Hardware							
Dell PowerEdge 6800 / 800FSB	222-0684		1	18,882	2	37,764	600
Includes :							
Intel Xeon MP 3.0GHz / 2x2MB L3 - 4 processors	311-5643		1	0	2	-	-
16 GB,DDR2, 8 x 2048MB DIMMS	311-4658		1	0	2	-	-
36 GB U320M SCSI 15K RPM Hard Drive	340-1897		1	0	4	-	-
Dell 15" Monitor	320-4599		1	0	2	-	-
Crossover cable	43-425		3	2	3	5	-
QLA2342 2GB OPT HBA	221-1293		1	1,490	6	8,940	0
QLA2462 4GB OPT HBA	222-0423		1	1,339	8	10,712	0
					Subtotal	57,421	600
PowerVault Disk Subsystem							
CX300 DPE 2Gbps, 15x73GB, 15K	221-6878, etc.		1	22,387	7	156,709	32,393
DAE2 Enclosure,15x36GB 15K FC-2, 5M FC2 Cables	221-0894		1	17,636	7	123,452	13,181
42U Rack	220-4492		1	964	2	1,928	-
					Subtotal	282,089	45,574
Server Software							
Oracle Database 10g Release 2, Enter. Ed.,Named User Plus, 3yrs			2	10,000	8**	80,000	
Partitioning, Named User Plus, 3yrs			2	2,500	8**	20,000	
Oracle Real Application Clusters, Named User Plus, 3yrs			2	5,000	8**	40,000	
Oracle Database Server Support Package for 3yrs, per server			2	4,000	3		12,000
Oracle Mandatory E-Business Discount			2			($22,800)	0
Red Hat Enterprise Linux Advanced Server, 3yrs SUB NFI	420-4250		1	2,699	2	5,398	0
					Subtotal	122,598	12,000
					****** Other Discounts**	(60,278)	-
					Total	**401,830**	**58,174**

Notes: * Maint. included in PowerVault 220S disk pod or PV650F/630F fibre channel disk pod

** Oracle Pricing Contact: MaryBeth Pierantoni, mary.beth.pierantoni@oracle.com,916-315-5081

8 = 16*0.50. Explanation: For purposes of counting the number of processors which require licensing, an Intel multicore chip with "n" cores shall be determined by multiplying "n" cores by a factor of 0.50.

*** Pricing: 1 - Dell 2 - Oracle 3 - Computer Network Associates

**** 15.4% Discount based upon total system cost as purchased by a regular customer on Dell hardware and services. Pricing may be verified by calling 1-800-BUY-DELL referencing quote numbers 288117585 as complex quotes.

Audited by Lorna Livingtree, Performance Metrics Inc.

Three-Year Cost of Ownership: USD	**$460,004**
QphH Rating:	**18881.00**
USD $ / QphH:	**24.37**

DELL	**DELL PowerEdge 6800/800FSB w/ Oracle 10g R2 / RHEL v3.0**	**TPC-H Revision 2.3.0** **Report Date: April 24, 2006**

Numerical Quantities Summary

Measurement Results:

Database Scale Factor	300
Total Data Storage/Database Size	24.16
Start of Database Load	04/11/2006 10:33:13
End of Database Load	04/11/2006 12:29:01
Database Load Time	1:55:48
Query Streams for Throughput Test	8
TPC-H Power	22,547.0
TPC-H Throughput	15,811.0
TPC-H Composite Query-per-Hour Metric (QphH@300GB)	18,881.0
Total System Price Over 3 Years	$460,004
TPC-H Price Performance Metric ($/QphH@300GB)	USD $24.37

Measurement Interval:

Measurement Interval in Throughput Test (Ts) = 12,022.0 seconds

Duration of stream execution:

	Seed	Start Date/Time	End Date/Time	Duration
Stream00	411122901	04/11/2006 16:26:16	04/11/2006 16:56:01	0:29:45
Stream01	411122902	04/11/2006 16:56:39	04/11/2006 20:04:23	3:07:44
Stream02	411122903	04/11/2006 16:56:39	04/11/2006 20:01:47	3:05:08
Stream03	411122904	04/11/2006 16:56:39	04/11/2006 20:07:33	3:10:54
Stream04	411122905	04/11/2006 16:56:39	04/11/2006 20:02:35	3:05:56
Stream05	411122906	04/11/2006 16:56:39	04/11/2006 20:02:51	3:06:12
Stream06	411122907	04/11/2006 16:56:39	04/11/2006 20:04:06	3:07:27
Stream07	411122908	04/11/2006 16:56:39	04/11/2006 20:07:54	3:11:15
Stream08	411122909	04/11/2006 16:56:39	04/11/2006 19:58:26	3:01:47
Refresh00		04/11/2006 16:25:49 04/11/2006 16:56:01	04/11/2006 16:26:16 04/11/2006 16:56:38	0:00:27 0:00:37
Refresh01		04/11/2006 20:07:54	04/11/2006 20:08:58	0:01:04
Refresh02		04/11/2006 20:08:58	04/11/2006 20:10:06	0:01:08
Refresh03		04/11/2006 20:10:06	04/11/2006 20:11:08	0:01:02
Refresh04		04/11/2006 20:11:08	04/11/2006 20:12:15	0:01:07
Refresh05		04/11/2006 20:12:15	04/11/2006 20:13:24	0:01:09
Refresh06		04/11/2006 20:13:24	04/11/2006 20:14:32	0:01:08
Refresh07		04/11/2006 20:14:32	04/11/2006 20:15:47	0:01:15
Refresh08		04/11/2006 20:15:47	04/11/2006 20:17:01	0:01:14

Numerical Quantities Summary

Timing Intervals in Seconds:

Query	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Stream00	282.8	25.7	17.4	12.5	61.7	10.3	55.0	44.6
Stream01	1512.8	69.6	80.1	33.4	339.5	41.4	277.4	211.9
Stream02	1434.3	121.5	49.9	62.0	412.3	25.6	336.2	295.5
Stream03	1673.1	62.3	32.7	73.4	429.3	63.1	314.9	514.5
Stream04	1663.7	69.7	42.0	68.6	312.3	41.7	328.9	191.0
Stream05	1826.3	108.8	61.4	51.1	383.8	81.8	404.3	197.2
Stream06	1729.6	90.1	40.2	56.5	388.2	53.7	342.7	258.0
Stream07	1829.7	71.0	56.8	58.2	322.7	13.1	322.0	214.8
Stream08	1502.5	66.3	58.8	59.3	329.6	50.9	266.9	182.9
Min Qi	1434.3	62.3	32.7	33.4	312.3	13.1	266.9	182.9
Max Qi	1829.7	121.5	80.1	73.4	429.3	81.8	404.3	514.5
Avg Qi	1646.5	82.4	52.7	57.8	364.7	46.4	324.1	258.2
Query	**Q9**	**Q10**	**Q11**	**Q12**	**Q13**	**Q14**	**Q15**	**Q16**
Stream00	184.2	54.7	37.8	54.4	90.2	8.5	35.0	37.0
Stream01	1275.2	372.3	146.8	330.2	666.7	38.7	75.1	291.9
Stream02	1246.2	429.7	175.7	285.6	570.9	29.6	63.4	272.0
Stream03	1268.3	327.5	132.0	130.3	713.1	20.4	59.0	159.4
Stream04	1220.0	362.0	197.1	422.0	627.9	35.7	76.6	330.9
Stream05	1196.1	338.1	204.6	331.7	570.1	35.0	55.4	256.1
Stream06	1351.8	127.1	180.1	534.9	527.1	17.3	34.8	300.5
Stream07	1436.0	245.6	153.7	183.5	644.6	18.1	32.2	65.4
Stream08	1302.0	380.9	125.9	400.3	559.1	34.7	68.2	309.8
Min Qi	1196.1	127.1	125.9	130.3	527.1	17.3	32.2	65.4
Max Qi	1436.0	429.7	204.6	534.9	713.1	38.7	76.6	330.9
Avg Qi	1286.9	322.9	164.5	327.3	609.9	28.7	58.1	248.2
Query	**Q17**	**Q18**	**Q19**	**Q20**	**Q21**	**Q22**	**RF1**	**RF2**
Stream00	67.7	248.3	75.9	31.7	316.7	33.7	26.8	36.5
Stream01	263.4	2019.3	465.4	143.4	2282.2	327.2	24.5	39.8
Stream02	319.6	1986.9	471.6	154.6	2131.2	233.8	27.0	40.5
Stream03	321.8	1980.6	396.7	139.7	2423.7	217.9	25.7	36.6
Stream04	148.9	2073.3	514.1	93.1	2128.3	208.1	28.0	38.5
Stream05	374.8	1789.2	449.4	131.9	2083.1	241.0	28.0	40.9
Stream06	339.4	1898.2	444.0	152.5	2110.2	270.0	30.8	37.2
Stream07	393.1	2411.8	189.9	158.9	2421.5	232.2	32.9	42.3
Stream08	157.7	2004.3	623.2	135.2	2046.1	241.8	32.0	41.6
Min Qi	148.9	1789.2	189.9	93.1	2046.1	208.1	24.5	36.6
Max Qi	393.1	2411.8	623.2	158.9	2423.7	327.2	32.9	42.3
Avg Qi	289.8	2020.5	444.3	138.7	2203.3	246.5	28.6	39.7

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General Items

Test Sponsor

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

DELL is the sponsor of this TPC Benchmark™ H result.

Parameter Settings

Settings must be provided for all customer-tunable parameters and options that have been changed from the defaults found in actual products, including but 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 parameter*
- *Configuration parameters and options for any other software in the pricing structure*
- *Compiler optimization options*

Providing a full list of all parameters and options can satisfy this requirement, as long as all those that have been modified from their default values have been clearly identified and these parameters and options are only set once.

***Comment** 1: In the event that some parameters and options are set multiple times, it must be easily discernible by an interested reader when the parameter or option was modified and what new value it received each time.*

***Comment** 2: This requirement can be satisfied by providing a full list of all parameters and options, as long as all those that have been modified from their default values have been clearly identified and these parameters and options are only set once.*

Details of system and database configurations and parameters are provided in Appendix A.

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 in 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), 2x DELL PowerEdge 6800/800FSB Servers, depicted in the next diagram consists of:

- 8 - 3.0GHz Intel ® Xeon MP Processors, each with 2x2MB of L3 cache.
- 32GB RAM.
- 8 – Qlogic 2462 PCIe HBAs.
- 6 - Qlogic 2342 PCI-X HBAs.
- 7x CX300 DPE 2Gbs
- 7x DAE enclosures
- 105 – 73GB,15k FC2
- 105 – 36GB, 15K FC2

Per *Clause 7.1.1:*

Specifically excluded from the priced system calculation are:

• End-user communication devices and related cables, connectors, and concentrators;

• Equipment and tools used exclusively in the production of the full disclosure report;

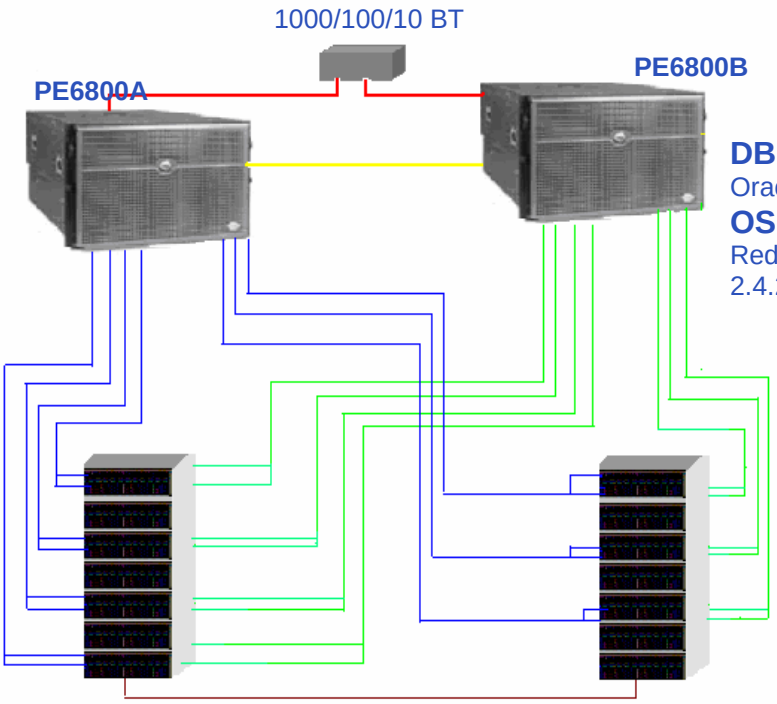
• Equipment and tools used exclusively for the execution of the DBGEN or QGEN (see Clause 2.1.4 and Clause 4.2.1) programs.

Measured and Priced Configuration

The measured and priced configurations are the same.

PE6800A
800 Mhz FSB
4xIntel Xeon MP 3.0GHz/2x2MB-L3
16 GB DDR
4xQLE2462 FC HBA
3x QLA2342 FC HBA
2x36GB, U320, 15K SCSI

PE6800B
800 Mhz FSB
4xIntel Xeon MP 3.0GHz/2x2MB-L3
16 GB DDR
4xQLE2462 FC HBA
3x QLA2342 FC HBA
2x36GB, U320, 15K SCSI



DBMS
Oracle 10g R2 w/ RAC
OS
Red Hat Linux AS 3.0 w/
2.4.21-37.ELsmp kernel

DBMS
Oracle 10g R2 w/ RAC
OS
Red Hat Linux AS 3.0 w/
2.4.21-37.ELsmp kernel

4x CX300 DPE w/
15x73GB,15k,FC
4x DAE encl. w/
15x36GB,15k,FC

3x CX300 DPE w/
15x73GB,15k,FC
3x DAE encl. w/
15x36GB,15k,FC

Clause 1: Logical Database Design

Table Definitions

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

Appendix B contains the scripts that create and analyze the tables and indexes for the TPC-H database.

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.

No record clustering or index clustering was used for this benchmark. Column ordering was reordered in tables. Refer to the table create statements in Appendix B for further details.

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 used for all base and index tables except NATION and REGION. The details of this partitioning can be understood by examining the syntax of the table and index definition statements in Appendix B. Similar partitioning was used in the qualification database.

Replication

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

Replication was not used for this benchmark.

Clause 2: Queries and Update Functions

Query Language

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

SQL was the query language used to implement all queries.

Random Number Generation

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

Version 2.3.0 of DBGEN and version 2.3.0 of QGEN were used to generate the random numbers for this TPC-H benchmark.

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.

QGEN version 2.3.0 was used to generate the substitution parameters.

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 D contains the query text and query output. The minor query modifications used in this implementation include the following:
Variant A of query 15 was used for this benchmark.

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 E contains the seed and query substitution parameters.

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 3 (repeatable read).

Refresh Function Source Code

The details of how the refresh functions were implemented must be disclosed (including source code of any non-commercial program used).

The source code for the refresh functions is included in Appendix F.

Clause 3: Database System Properties

Atomicity

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.

Atomicity of Completed Transaction

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.

1. The total prices 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 was 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.

Appendix C contains source code for ACID transactions.

Aborted Transaction

Perform the ACID transaction for a randomly selected set of input data, substituting 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.

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, and verified to not have changed.

Consistency

A consistent state for the TPC-H database is defined to exist when:

> *O_TOTALPRICE = SUM (trunc (trunc (L_EXTENDEDPRICE *(1 - L_DISCOUNT), 2) * (1+L_TAX), 2)) for each ORDERS and LINEITEM defined by (O_ORDERKEY = L_ORDERKEY)*

Consistency Test

Verify that ORDER and LINEITEM tables are initially consistent, submit the prescribed number of ACID Transactions with randomly selected input parameters, and re-verify the consistency of the ORDER and LINEITEM tables.

1. The consistency of the ORDER and LINEITEM tables was verified based on a sample of O_ORDERKEYs.
2. 100 ACID transactions were submitted from each of 8 execution streams.

3. The consistency of the ORDER and LINEITEM tables was verified a second time with the same O_ORDERKEYs.

Isolation

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.

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.

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

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.

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 completed and did not see the uncommitted changes made by the ACID transaction.
3. The ACID transaction was rolled back.

Write-Write Conflict with Commit

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

1. An ACID transaction, T1, was started for a randomly selected O_KEY, L_KEY, and DELTA. The ACID transaction was suspended prior to commit.
2. A second ACID transaction, T2, was started using the same O_KEY and L_KEY and a different randomly selected DELTA.
3. T2 waited.
4. T1 was allowed to commit and then T2 completed.
5. It was verified that T2.L_EXTENDPRICE was calculated correctly.

Write-Write Conflict with Rollback

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

1. An ACID transaction, T1, was started for a randomly selected O_KEY, L_KEY, and DELTA. The ACID transaction was suspended prior to rollback.
2. A second ACID transaction, T2, was started using the same O_KEY and L_KEY and a different randomly selected DELTA.

3. T2 waited.
4. T1 was allowed to rollback and then T2 completed.
5. It was verified that T2.L_EXTENDPRICE was calculated correctly.

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.

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.

Durability

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.

Failure of a Durable Medium

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

The database logs were stored on a RAID-10.

The tables for the database were stored on RAID-10 stripes.

During the test, one disk from the DELL_EMC DAE enclosure containing data and re-do log files was removed. As all data and re-do log files resided on RAID 10 volumes, the test continued uninterrupted.

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. The qualification database was brought up on both nodes.
2. Eight streams of ACID transactions were started.
3. While the streams of ACID transactions were running the system was powered off.
4. When power was restored the system rebooted and the database was restarted.
5. The database went through a recovery period.
6. The success file and the HISTORY table counts were compared, and they matched.

Memory Failure

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

The system crash test and the memory failure test were combined. See the previous section.

Appendix C contains source code for all transactions.

Clause 4: Scaling and Database Population

Initial Cardinality of Tables

The cardinality (e.g., 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.

Initial number of rows

Table	Occurrences
Orders	450,000,000
Lineitem	1,799,989,091
Customer	45,000,000
Part	60,000,000
Supplier	3,000,000
Partsupp	240,000,000
Nation	25
Region	5

Distribution of Tables and Logs Across Media

The distribution of tables and logs across all media must be explicitly described.

The Oracle 10g Database was stored on a shared-storage system composed of the following:

7 x DELL_EMC CX300 FC Storage Processors each with 15x73GB,15K FC disks
7 x DAE enclosure each with 36GB, 15k rpm, FC disk drives

14 logical volumes were configured each spanning 14 physical drives across both CX300 DPE and DAE enclosures in a RAID10 formation. Both nodes had 2 36GB, SCSI disks each for the operating system.
Each logical volume had 3 Linux partitions except for volume6 and volume14, which had 4 partitions. Each logical volume had an ext2 Linux file system for flat file storage and raw partitions for the database and temp files. Volume6 and Volume14 each had an extra raw partition for the Oracle Cluster Registry (OCR) and Voting disk respectively. The database raw partitions were configured into an Automatic Storage Management (ASM) disk group. Oracle ASM transparently managed the placement of the database and log data onto the shared-storage system.

A detailed description of distribution of database file groups and log can be found below.

Distribution of Storage

Red Hat Linux AS v3.0 Disk Administration			CX300 FC Configuration					
Volume **1 191941MB**			HBA # **0**		**Bart**			
Partition			Slot# **1**		Storage Processor A			
1	2	3		FC ID	Enc. 0	Enc. 1		
/dev/sdc1	**/dev/sdc2**	**/dev/sdc3**		1	**A0-1**	**A1-1**		
Raw1	**ff1**	**raw31**		2	**A0-2**	**A1-2**		
DB data	**Flat files**	**Temp files**		3	**A0-3**	**A1-3**		
117194143KB	**30282525KB**	**49070542KB**		4	**A0-4**	**A1-4**		
Raw FS	**ext2 FS**	**Raw FS**		5	**A0-5**	**A1-5**		
				6	**A0-6**	**A1-6**		
				7	**A0-7**	**A1-7**		
				8				
				9				
				10				
				11				
				12				
				13				
				14				

Red Hat Linux AS v3.0 Disk Administration			CX300 FC Configuration					
Volume **2 236472MB**			HBA # **0**		**Bart**			
Partition			Slot# **1**		Storage Processor B			
1	2	3		FC ID	Enc. 0	Enc. 1		
/dev/sdh1	**/dev/sdh2**	**/dev/sdh3**		1				
Raw2	**ff2**	**raw32**		2				
DB data	**Flat files**	**Temp files**		3				
117194143KB	**30282525KB**	**94671045KB**		4				
Raw FS	**ext2 FS**	**Raw FS**		5				
				6				
				7				
				8	**A0-8**	**A1-8**		
				9	**A0-9**	**A1-9**		
				10	**A0-10**	**A1-10**		
				11	**A0-11**	**A1-11**		
				12	**A0-12**	**A1-12**		
				13	**A0-13**	**A1-13**		
				14	**A0-14**	**A1-14**		

Red Hat Linux AS v3.0 Disk Administration	CX300 FC Configuration
Volume **3 191941MB**	HBA # **1** **Jonah**

Partition			Slot# **2**		Storage Processor A			
1	2	3		FC ID	Enc. 0	Enc. 1		
/dev/sdk1	**/dev/sdk2**	**/dev/sdk3**		1	**A0-1**	**A1-1**		
Raw3	**ff3**	**raw33**		2	**A0-2**	**A1-2**		
DB data	**Flat files**	**Temp Files**		3	**A0-3**	**A1-3**		
117194143KB	**30282525KB**	**49070542KB**		4	**A0-4**	**A1-4**		
Raw FS	**ext2 FS**	**Raw FS**		5	**A0-5**	**A1-5**		
				6	**A0-6**	**A1-6**		
				7	**A0-7**	**A1-7**		
				8				
				9				
				10				
				11				
				12				
				13				
				14				

Red Hat Linux AS v3.0 Disk Administration			CX300 FC Configuration					
Volume **4 236472MB**			HBA # **1** **Jonah**					
Partition			Slot# **2**		Storage Processor B			
1	2	3		FC ID	Enc. 0	Enc. 1		
/dev/sdp1	**/dev/sdp2**	**/dev/sdp3**		1				
Raw4	**ff4**	**raw34**		2				
DB data	**Flat Files**	**Temp file**		3				
117194143KB	**30282525KB**	**94671045KB**		4				
Raw FS	**Ext2 FS**	**Raw FS**		5				
				6				
				7				
				8	**A0-8**	**A1-8**		
				9	**A0-9**	**A1-9**		
				10	**A0-10**	**A1-10**		
				11	**A0-11**	**A1-11**		
				12	**A0-12**	**A1-12**		
				13	**A0-13**	**A1-13**		
				14	**A0-14**	**A1-14**		

Red Hat Linux AS v3.0 Disk Administration			CX300 FC Configuration					
Volume **5 191941MB**					HBA # **2**		**Barney**	
Partition			Slot# **3**		Storage Processor A			
1		2		FC ID	Enc. 0	Enc. 1		
/dev/sds1	**/dev/sds2**	**/dev/sds3**		1	**A0-1**	**A1-1**		
Raw5	**ff5**	**raw35**		2	**A0-2**	**A1-2**		
DB data	**Flat Files**	**Temp files**		3	**A0-3**	**A1-3**		
117194143KB	**30282525KB**	**49070542KB**		4	**A0-4**	**A1-4**		
Raw FS	**Ext2 FS**	**Raw FS**		5	**A0-5**	**A1-5**		
				6	**A0-6**	**A1-6**		
				7	**A0-7**	**A1-7**		
				8				
				9				
				10				
				11				
				12				
				13				
				14				

Red Hat Linux AS v3.0 Disk Administration				CX300 FC Configuration					
Volume **6 236472MB**						HBA # **2**	**Barney**		
Partition				Slot# **3**		Storage Processor B			
1	2	3	4		FC ID	Enc. 0	Enc. 1		
/dev/sdx1	**..dx2**	**/dev/sdx3**	**..sdx4**		1				
raw6	**Raw15**	**ff6**	**raw36**		2				
DB data	**OCR**	**Flat Files**	**Temp**		3				
117194143KB	**200MB**	**29573MB**	**90GB**		4				
Raw FS	**Raw FS**	**Ext2 FS**	**Raw FS**		5				
					6				
					7				
					8	**A0-8**	**A1-8**		
					9	**A0-9**	**A1-9**		
					10	**A0-10**	**A1-10**		
					11	**A0-11**	**A1-11**		
					12	**A0-12**	**A1-12**		
					13	**A0-13**	**A1-13**		
					14	**A0-14**	**A1-14**		

Red Hat Linux AS v3.0 Disk Administration			CX300 FC Configuration					
Volume **7 191941MB**			HBA # **3** **Homer**					
Partition			Slot# **4**	Storage Processor A				
1	2	3		FC ID	Enc. 0	Enc. 1		
/dev/sdaa1	**/dev/sdaa2**	**/dev/sdaa3**		1	**A0-1**	**A1-1**		
raw7	**ff7**	**raw37**		2	**A0-2**	**A1-2**		
DB data	**Flat Files**	**Temp files**		3	**A0-3**	**A1-3**		
117194143KB	**30282525KB**	**49070542KB**		4	**A0-4**	**A1-4**		
Raw FS	**Ext2 FS**	**Raw FS**		5	**A0-5**	**A1-5**		
				6	**A0-6**	**A1-6**		
				7	**A0-7**	**A1-7**		
				8				
				9				
				10				
				11				
				12				
				13				
				14				

Red Hat Linux AS v3.0 Disk Administration			CX300 FC Configuration					
Volume **8 236472MB**			HBA # **3** **Homer**					
Partition			Slot# **4**	Storage Processor B				
1	2	3		FC ID	Enc. 0	Enc. 1		
/dev/sdaf1	**/dev/sdaf2**	**/dev/sdaf3**		1				
raw8	**ff8**	**raw38**		2				
DB data	**Flat Files**	**Temp files**		3				
117194143KB	**30282525KB**	**94671045KB**		4				
Raw FS	**Ext2 FS**	**Raw FS**		5				
				6				
				7				
				8	**A0-8**	**A1-8**		
				9	**A0-9**	**A1-9**		
				10	**A0-10**	**A1-10**		
				11	**A0-11**	**A1-11**		
				12	**A0-12**	**A1-12**		
				13	**A0-13**	**A1-13**		
				14	**A0-14**	**A1-14**		

Red Hat Linux AS v3.0 Disk Administration			CX300 FC Configuration					
Volume **9 191941MB**			HBA # **4**			**Kuky**		
Partition			Slot# **5**		Storage Processor A			
1	2	3		FC ID	Enc. 0	Enc. 1		
/dev/sdai1	**/dev/sdai2**	**/dev/sdai3**		1	**A0-1**	**A1-1**		
Raw9	**ff9**	**raw39**		2	**A0-2**	**A1-2**		
DB data	**Flat Files**	**Temp files**		3	**A0-3**	**A1-3**		
117194143KB	**30282525KB**	**49070542KB**		4	**A0-4**	**A1-4**		
Raw FS	**Ext2 FS**	**Raw FS**		5	**A0-5**	**A1-5**		
				6	**A0-6**	**A1-6**		
				7	**A0-7**	**A1-7**		
				8				
				9				
				10				
				11				
				12				
				13				
				14				

Red Hat Linux AS v3.0 Disk Administration			CX300 FC Configuration					
Volume **10 236472MB**			HBA # **4**			**Kuky**		
Partition			Slot# **5**		Storage Processor B			
1	2	3		FC ID	Enc. 0	Enc. 1		
/dev/sdan1	**/dev/sdan2**	**/dev/sdan3**		1				
Raw10	**ff10**	**ff40**		2				
DB data	**Flat Files**	**Temp Files**		3				
117194143KB	**30282525KB**	**94671045KB**		4				
Raw FS	**Ext2 FS**	**Raw FS**		5				
				6				
				7				
				8	**A0-8**	**A1-8**		
				9	**A0-9**	**A1-9**		
				10	**A0-10**	**A1-10**		
				11	**A0-11**	**A1-11**		
				12	**A0-12**	**A1-12**		
				13	**A0-13**	**A1-13**		
				14	**A0-14**	**A1-14**		

Red Hat Linux AS v3.0 Disk Administration	CX300 FC Configuration

Volume **11 191941MB**			HBA # **5**					**Bob**
Partition			Slot# **6**		Storage Processor A			
1		2		FC ID	Enc. 0	Enc. 1		
/dev/sdaq1	**/dev/sdaq2**	**/dev/sdaq3**		1	**A0-1**	**A1-1**		
raw11	**ff11**	**/raw41**		2	**A0-2**	**A1-2**		
DB data	**Flat Files**	**Temp Files**		3	**A0-3**	**A1-3**		
117194143KB	**30282525KB**	**49070542KB**		4	**A0-4**	**A1-4**		
Raw FS	**Ext2 FS**	**Raw FS**		5	**A0-5**	**A1-5**		
				6	**A0-6**	**A1-6**		
				7	**A0-7**	**A1-7**		
				8				
				9				
				10				
				11				
				12				
				13				
				14				

Red Hat Linux AS v3.0 Disk Administration			CX300 FC Configuration					
Volume **12 236472MB**			HBA # **5**					**Bob**
Partition			Slot# **6**		Storage Processor B			
1		2		FC ID	Enc. 0	Enc. 1		
/dev/sdav1	**/dev/sdav2**	**/dev/sdav3**		1				
Raw12	**ff12**	**raw42**		2				
DB data	**Flat Files**	**Temp files**		3				
117194143KB	**30282525KB**	**94671045KB**		4				
Raw FS	**ext2 FS**	**Raw FS**		5				
				6				
				7				
				8	**A0-8**	**A1-8**		
				9	**A0-9**	**A1-9**		
				10	**A0-10**	**A1-10**		
				11	**A0-11**	**A1-11**		
				12	**A0-12**	**A1-12**		
				13	**A0-13**	**A1-13**		
				14	**A0-14**	**A1-14**		

Red Hat Linux AS v3.0 Disk Administration	CX300 FC Configuration	
Volume **13 191941MB**	HBA # **6**	**Itchy**

Partition			Slot# **7**		Storage Processor A			
1	2	3		FC ID	Enc. 0	Enc. 1		
/dev/sday1	**/dev/sday2**	**/dev/sday3**		1	**A0-1**	**A1-1**		
raw13	**ff13**	**raw43**		2	**A0-2**	**A1-2**		
DB data	**Flat Files**	**Temp files**		3	**A0-3**	**A1-3**		
117194143KB	**30282525KB**	**94671045KB**		4	**A0-4**	**A1-4**		
Raw FS	**Ext2 FS**	**Raw FS**		5	**A0-5**	**A1-5**		
				6	**A0-6**	**A1-6**		
				7	**A0-7**	**A1-7**		
				8				
				9				
				10				
				11				
				12				
				13				
				14				

Red Hat Linux AS v3.0 Disk Administration				CX300 FC Configuration				
Volume **14 236472MB**						HBA # **6**	**Itchy**	
Partition				Slot# **7**		Storage Processor B		
1	2	3	4		FC ID	Enc. 0	Enc. 1	
/dev/sdbd1	**…bd2**	**..bd3**	**..bd4**		1			
raw14	**Raw16**	**ff14**	**Raw44**		2			
DB data	**Vote dsk**	**Flat Files**	**Temp**		3			
117194143KB	**200MB**	**29573MB**	**90GB**		4			
Raw FS	**Raw FS**	**ext2 FS**	**Raw FS**		5			
					6			
					7			
					8	**A0-8**	**A1-8**	
					9	**A0-9**	**A1-9**	
					10	**A0-10**	**A1-10**	
					11	**A0-11**	**A1-11**	
					12	**A0-12**	**A1-12**	
					13	**A0-13**	**A1-13**	
					14	**A0-14**	**A1-14**	

Partitioning and Replication

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

The database was not replicated.

Horizontal partitioning was used for base tables except NATION and REGION.

RAID Implementations

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 10 was used for all tables, indexes, temp files, logs and flat files.

DBGEN Version and Modifications

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

The supplied DBGEN Version 2.3.0 was used for database population. No modifications were made to DBGEN.

Database Load time

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

Database load time was 1hour 55 minutes 48 seconds.

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 1/100, rounded up.

Data Storage Ratio

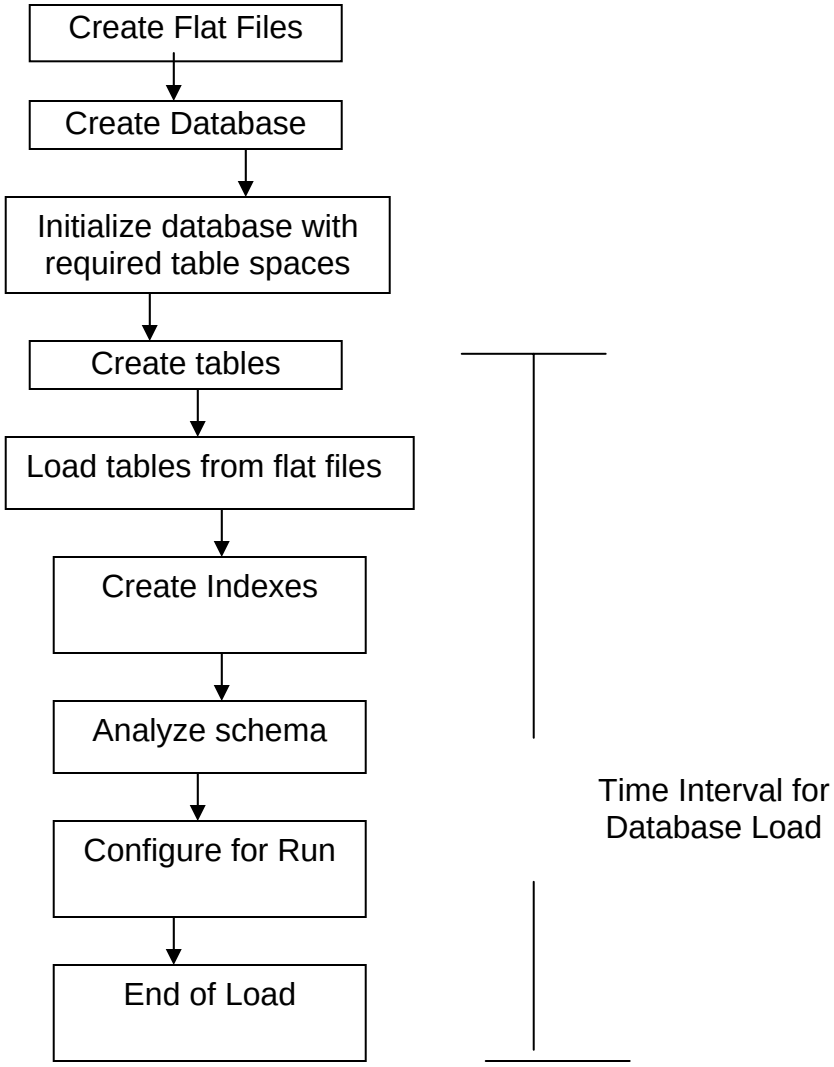
Disk Type	Number of Disks	Space per Disk	Subtotal Disk Space	Total Disk Storage	Data Storage Ratio
36GB 15k	105	33.87GB	3556.35GB		
36GB 15k	4	33.92GB	135.68GB		
73GB 15k	105	33.87GB	3556.35GB		
				7248.38GB	24.16

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.

DBGEN was used to create the flat files. The figure below describes the load procedure.

Database Load Process



Clause 5: Performance Metrics and Execution Rules

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. Database restart.
2. RF1 update transaction.
3. Stream 00 execution.
4. RF2 update transaction.

Timing Intervals

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

The power test timing intervals are disclosed in the Numerical Quantities Summary at the beginning of this document.

Number of Streams for the Throughput Test

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

Eight streams were used for the throughput test.

Start/Finish Time of Each Query Stream

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

The throughput test start time and finish time for each stream are disclosed in the Numerical Quantities Summary at the beginning of this document.

Total Elapsed Time

The total elapsed time of the measurement interval must be reported for the throughput test.

The total elapsed time of the throughput test was 12,022.0 seconds.

Start/Finish Time for Refresh Functions

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

The start and finish time for each refresh function in the update stream are disclosed in the Numerical Quantities Summary at the beginning of this document.

Timing Intervals for Each Query and Each Update

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 contained in the Numerical Quantities Summary disclosed earlier in this document.

Performance Metrics

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

The performance metrics, and the numbers, on which they are based, are contained in the Numerical Quantities section of the Executive Summary.

Reproducibility Method

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

Performance results from the first two executions of the TPC-H benchmark indicated the following percent differences for the metrics:

Percentage Differences in Benchmark Executions

Run	QppH@300GB	QthH@300GB	QphH@300GB
1	22,547.0	15,811.0	18,881.0
2	23,841.1	15,932.9	19,489.9
Percent Difference	5.7%	0.8%	3.2%

System Activity Between Run1 and Run2

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

Database was not re-started between Run1 and Run2.

Clause 6: SUT and Driver Implementation

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.

A single script performs all stream executions. QGEN is used to produce query text.
For each power-test run:

- RF1 refresh updates are submitted to the database
- QGEN-generated queries are submitted in the order defined by Clause 5.3.5.4
- RF2 refresh updates are submitted to the database

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.

A command script was used to control and track the execution of queries. Source file for qexec utility can be found in Appendix F. Qgen was used to generate the query streams, along with the appropriate substitution values.

Profile-Directed Optimization

If profile-directed optimization as described in Clause 5.2.9 is used, such use must be disclosed. In particular, the procedure and any scripts used to perform the optimization must be disclosed.

Profile-directed optimization was used.

Clause 7: Pricing

Hardware and Software Used in the Priced System

A detailed list of hardware and software used in the priced system must be reported. Each item must have vendor part number, description, and release/revision level, and either 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.

A detailed list of the hardware and software used in the priced system is included in the Executive Summary at the beginning of this document. The price quotes are located in Appendix G.

Total Three Year Price

The total 3-year price of the entire configuration must be reported including: hardware, software, and maintenance charges. Separate component pricing is recommended. The basis of all discounts used must be disclosed.

A detailed price sheet of all the hardware and software used in this configuration, including the 3-year maintenance cost, and total price, is included in the executive summary at the beginning of this document. This purchase qualifies for a 16% discount from Dell Computer Corporation. The price quotes are located in Appendix G.

Availability Date

The committed delivery date for general availability of products used in the price calculations must be reported. When the priced system includes products with different availability dates, the availability date reported on 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.

All Dell components are available at the time of publication.

Clause 8: Auditor-Related Items

Auditor's 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.

Lorna Livingtree of Performance Metrics audited this implementation of the TPC Benchmark H. Information regarding the audit process may be obtained from:

Performance Metrics, Inc.
P.O Box 984
Klamath, CA 95548
(Phone) (916) 985-1131
(Fax) (916) 985-1185
E-mail: lorna@perfmetrics.com

Requests for this TPC Benchmark H Full Disclosure Report should be sent to:
Transaction Processing Performance Council
Presidio of San Francisco
Building 572B (surface)
P.O Box 29920 (Mail)
San Francisco, CA 94129-0920 USA
Telephone: (415) 561-6272
Fax: (415) 561-6120
Info@tpc.org

April 18, 2006

Mr. Nicholas Wakou
Dell Computer Corporation
One Dell Way
Round Rock, TX 78682

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

Platform: DELL PowerEdge 6800 2 node cluster
Database Manager: Oracle Database 10g Enterprise Edition, Release 2
Operating System: Red Hat Enterprise Linux AS

CPU's	Memory	Total Disks	Qpph@ 300GB	QthH@ 300GB	QphH@ 300GB
8 Intel Xeon MP @ 3.0 Ghz	16 GB	109 @ 36 GB 105 @ 73 GB	**22,547.0**	**15,811.0**	**18,881.0**

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 version 2.3.0.
- The qualification database layout was identical to the tested database except for the number and size of the files.
- The query text was verified to use only compliant variants and minor modifications.
- The executable query text was generated by QGEN and submitted through Oracle's standard interactive interface. The version of QGEN was 2.3.0.
- The validation of the query text against the qualification database produced compliant results.
- The refresh functions were properly implemented and executed the correct number of inserts and deletes.
- The load timing was properly measured and reported.
- The execution times were correctly measured and reported.
- The performance metrics were correctly computed and reported.
- The repeatability of the measurement was verified.

- The ACID properties were tested and verified.
- Sufficient mirrored log space was present on the tested system.
- The system pricing was checked for major components, maintenance, price quotes and discounts.
- The executive summary pages of the FDR were verified for accuracy.

Auditor's Notes: None

Sincerely,

Lorna Livingtree
Auditor

Appendix A: Parameter settings

Appendix A

init_build.ora

```
cpu_count=8
db_cache_size = 1500m
aq_tm_processes              = 0
audit_trail                  = false
compatible                   = 10.1.0.2
control_files                = (+data/control_001,
+data/control_002)
db_block_checksum            = false
db_block_size                = 16384
db_file_multiblock_read_count   = 128
db_files                     = 500
db_name                      = 10i
db_writer_processes          = 4
dml_locks                    = 5000
global_names                 = false
instance_name                = pe68a
log_buffer                   = 4194304
log_checkpoints_to_alert     = true
max_dump_file_size           = unlimited
nls_date_format              = YYYY-MM-DD
open_cursors                 = 600
optimizer_mode               = CHOOSE
optimizer_features_enable    = 10.2.0.1.1
optimizer_index_cost_adj     = 450
parallel_adaptive_multi_user    = true
```

init_pe68a.0ra

```
instance_number              = 1
thread                       = 1
undo_management              = auto
undo_tablespace              = ts_undo1
cluster_database             = true
cluster_interconnects        = 192.1.2.170
ifile                        =
/home/oracle/10gR2/DB/dbs/init_build.ora
```

init_pe68b.ora

```
instance_number              = 2
thread                       = 2
undo_management              = auto
undo_tablespace              = ts_undo2
cluster_database             = true
cluster_interconnects        = 192.1.2.170
ifile                        =
/home/oracle/10gR2/DB/dbs/init_build.ora
```

init+ASM1.ora

```
########################################
# Miscellaneous
########################################
instance_type=asm

########################################
# Pools
########################################
shared_pool_size=120M
large_pool_size=12M

########################################
# Security and Auditing
########################################
remote_login_passwordfile=exclusive

asm_diskgroups=DATA,NEW_TEMP
#asm_diskgroups=DATA
+ASM2.instance_number=2
+ASM1.instance_number=1
instance_number = 1
processes = 500
```

init+ASM2.ora

```
################################################
############################
# Copyright (c) 1991, 2001, 2002 by Oracle Corporation
################################################
############################

########################################
# Cluster Database
########################################
cluster_database=true

########################################
# Diagnostics and Statistics
########################################
background_dump_dest=/home/oracle/10gR2/admin/+ASM/b
dump
core_dump_dest=/home/oracle/10gR2/admin/+ASM/cdump
user_dump_dest=/home/oracle/10gR2/admin/+ASM/udump

########################################
# Miscellaneous
########################################
instance_type=asm

########################################
# Pools
########################################
shared_pool_size=120M
large_pool_size=12M

########################################
# Security and Auditing
########################################
remote_login_passwordfile=exclusive
```

```
#asm_diskgroups=DATA,TEMP
asm_diskgroups=DATA,NEW_TEMP
#asm_diskgroups=DATA
+ASM2.instance_number=2
+ASM1.instance_number=1
instance_number = 2
processes = 500
```

.bashrc

```
# .bashrc
# User specific aliases and functions
# Source global definitions
if [ -f /etc/bashrc ]; then
        . /etc/bashrc
fi
export ORACLE_SID=pe68a
#export ORACLE_SID=1g_A
export ASM_SID=+ASM1
export ORACLE_BASE=/home/oracle/10gR2
export
PATH=.:$PATH:$HOME/bin:$O:$O/bin:$$O/rdbms/log:$FR
AME_PATH/bin
export
LD_LIBRARY_PATH=/usr/lib:$ORACLE_HOME/lib:
$ORACLE_HOME/rdbms/lib
export ORACLE_HOME=$ORACLE_BASE/DB
export O=$ORACLE_HOME
export ORA_CRS_HOME=$ORACLE_BASE/CRS
export  FRAME_PATH=$HOME/frame
export KIT_DIR=$HOME/kit
export
PATH=.:$PATH:$HOME/bin:$O:$O/bin:$$O/rdbms/log:$FR
AME_PATH/bin
export
LD_LIBRARY_PATH=/usr/lib:$ORACLE_HOME/lib:$OR
ACLE_HOME/rdbms/lib

export
PATH=$PATH:/mnt/sdb2/usr/bin:/mnt/sdb2/home/oracle/kit/
utils:/opt/intel/v
tune/bin
```

Appendix A

Appendix B: Database Build Scripts

Appendix B

build_dg_10gR2.sh

```
export ORACLE_SID=+ASM1
sqlplus /NOLOG <<!
connect /as sysdba
drop diskgroup DATA including contents;
CREATE DISKGROUP DATA External REDUNDANCY
DISK
'/dev/raw/raw1' SIZE 95378M ,
'/dev/raw/raw2' SIZE 95378M ,
'/dev/raw/raw3' SIZE 95378M ,
'/dev/raw/raw4' SIZE 95378M ,
'/dev/raw/raw5' SIZE 95378M ,
'/dev/raw/raw6' SIZE 95378M ,
'/dev/raw/raw7' SIZE 95378M ,
'/dev/raw/raw8' SIZE 95378M ,
'/dev/raw/raw9' SIZE 95378M ,
'/dev/raw/raw10' SIZE 95378M ,
'/dev/raw/raw11' SIZE 95378M ,
'/dev/raw/raw12' SIZE 95378M ,
'/dev/raw/raw13' SIZE 95378M ,
'/dev/raw/raw14' SIZE 95378M;

CREATE DISKGROUP new_temp External
REDUNDANCY
DISK
'/dev/raw/raw31' SIZE 15000M ,
'/dev/raw/raw32' SIZE 15000M ,
'/dev/raw/raw33' SIZE 15000M ,
'/dev/raw/raw34' SIZE 15000M ,
'/dev/raw/raw35' SIZE 15000M ,
'/dev/raw/raw36' SIZE 15000M ,
'/dev/raw/raw37' SIZE 15000M ,
'/dev/raw/raw38' SIZE 15000M ,
'/dev/raw/raw39' SIZE 15000M ,
'/dev/raw/raw40' SIZE 15000M ,
'/dev/raw/raw41' SIZE 15000M ,
'/dev/raw/raw42' SIZE 15000M ,
'/dev/raw/raw43' SIZE 15000M ,
'/dev/raw/raw44' SIZE 15000M ;



!
```

dbcre_10gR2.sh

```
#!/bin/ksh
echo "database creation"
date;

sqlplus  /NOLOG <<!
connect /as sysdba

startup pfile = /home/oracle/10gR2/DB/dbs/init_build.ora
nomount;
create database
  controlfile reuse
  logfile '+DATA'  size 4096m reuse,
        '+DATA'  size 4096m reuse
  datafile '+DATA'  size 1024m reuse
  sysaux datafile '+DATA' size 1024m reuse
  undo tablespace ts_undo1
    datafile '+DATA' size 8192m reuse
  default temporary tablespace ts_temp
    tempfile '+NEW_TEMP' size 14400m reuse
    extent management local uniform size 10m
  maxdatafiles 4000
  maxinstances 2;

create undo tablespace ts_undo2 datafile '+DATA' size 8192m
reuse;
alter database add logfile thread 2 '+DATA' size 4096m reuse,
                              '+DATA' size 4096m reuse;
alter database enable public thread 2;

set termout off
set echo off
spool /tmp/cat
@?/rdbms/admin/catalog.sql;
@?/rdbms/admin/catproc.sql;
@?/rdbms/admin/catclust.sql;
connect system/manager
@?/sqlplus/admin/pupbld.sql;
spool off
!
echo "end of database creation"
date
```

dapop_10gR2.sh

```
#!/bin/bash
sqlplus /NOLOG <<EOF
connect / as sysdba
drop user tpch cascade;
grant DBA
to tpch identified by tpch;
connect tpch/tpch;
drop directory ff1;
drop directory ff2;
drop directory ff3;
drop directory ff4;
drop directory ff5;
drop directory ff6;
drop directory ff7;
drop directory ff8;
drop directory ff9;
drop directory ff10;
drop directory ff11;
drop directory ff12;
drop directory ff13;
drop directory ff14;
create directory ff1 as '/ff1';
create directory ff2 as '/ff2';
create directory ff3 as '/ff3';
create directory ff4 as '/ff4';
create directory ff5 as '/ff5';
create directory ff6 as '/ff6';
create directory ff7 as '/ff7';
```

Appendix B

```
create directory ff8 as '/ff8';
create directory ff9 as '/ff9';
create directory ff10 as '/ff10';
create directory ff11 as '/ff11';
create directory ff12 as '/ff12';
create directory ff13 as '/ff13';
create directory ff14 as '/ff14';
create directory log_dir as
'/home/oracle/kit/schema/10.0/build/log';

drop table l_et;
create table l_et(
   l_orderkey          number ,
   l_partkey           number ,
   l_suppkey           number ,
   l_linenumber        number ,
   l_quantity          number ,
   l_extendedprice     number ,
   l_discount          number ,
   l_tax               number ,
   l_returnflag        char(1) ,
   l_linestatus        char(1) ,
   l_shipdate          date ,
   l_commitdate        date ,
   l_receiptdate       date ,
   l_shipinstruct      char(25) ,
   l_shipmode          char(10) ,
   l_comment           varchar(44)
)
organization external (
type ORACLE_LOADER
  default directory ff1
access parameters
(
            records delimited by newline
            nobadfile
            nologfile
            fields terminated by '|'
            missing field values are null
      )
      location (
ff1:'lineitem.tbl.1',
ff2:'lineitem.tbl.2',
ff3:'lineitem.tbl.3',
ff4:'lineitem.tbl.4',
ff5:'lineitem.tbl.5',
ff6:'lineitem.tbl.6',
ff7:'lineitem.tbl.7',
ff8:'lineitem.tbl.8',
ff9:'lineitem.tbl.9',
ff10:'lineitem.tbl.10',
ff11:'lineitem.tbl.11',
ff12:'lineitem.tbl.12',
ff13:'lineitem.tbl.13',
ff14:'lineitem.tbl.14'
))
parallel reject limit unlimited;

drop table o_et;
create table o_et(
   o_orderkey          number ,
   o_custkey           number ,
   o_orderstatus       char(1) ,
   o_totalprice        number ,
   o_orderdate         date ,
   o_orderpriority     char(15) ,
   o_clerk             char(15) ,
   o_shippriority      number ,
   o_comment           varchar(79)
)
organization external (
type ORACLE_LOADER
default directory ff1
access parameters
(
            records delimited by newline
            badfile log_dir:'o_et.bad'
            logfile log_dir:'o_et.log'
            fields terminated by '|'
            missing field values are null
      )
      location (
ff1:'orders.tbl.1',
ff2:'orders.tbl.2',
ff3:'orders.tbl.3',
ff4:'orders.tbl.4',
ff5:'orders.tbl.5',
ff6:'orders.tbl.6',
ff7:'orders.tbl.7',
  ff8:'orders.tbl.8',
ff9:'orders.tbl.9',
ff10:'orders.tbl.10',
ff11:'orders.tbl.11',
ff12:'orders.tbl.12',
ff13:'orders.tbl.13',
ff14:'orders.tbl.14'
))
parallel reject limit unlimited;

drop table ps_et;
create table ps_et(
   ps_partkey          number ,
   ps_suppkey          number ,
   ps_availqty         number ,
   ps_supplycost       number ,
   ps_comment          varchar(199)
)
organization external (
type ORACLE_LOADER
default directory ff1
access parameters
(
            records delimited by newline
            nobadfile
            nologfile
            fields terminated by '|'
            missing field values are null
      )
```

Appendix B

```
        location (
ff1:'partsupp.tbl.1',
ff2:'partsupp.tbl.2',
ff3:'partsupp.tbl.3',
ff4:'partsupp.tbl.4',
ff5:'partsupp.tbl.5',
ff6:'partsupp.tbl.6',
ff7:'partsupp.tbl.7',
ff8:'partsupp.tbl.8',
ff9:'partsupp.tbl.9',
ff10:'partsupp.tbl.10',
ff11:'partsupp.tbl.11',
ff12:'partsupp.tbl.12',
ff13:'partsupp.tbl.13',
ff13:'partsupp.tbl.14'
))
parallel reject limit unlimited;

drop table p_et;
create table p_et(
   p_partkey          number ,
   p_name             varchar(55) ,
   p_mfgr             char(25) ,
   p_brand            char(10) ,
   p_type             varchar(25) ,
   p_size             number ,
   p_container        char(10) ,
   p_retailprice      number ,
   p_comment          varchar(23)
  )
organization external (
type ORACLE_LOADER
default directory ff1
access parameters
(
            records delimited by newline
            nobadfile
            nologfile
            fields terminated by '|'
            missing field values are null
       )
       location (
ff1:'part.tbl.1',
ff2:'part.tbl.2',
ff3:'part.tbl.3',
ff4:'part.tbl.4',
ff5:'part.tbl.5',
ff6:'part.tbl.6',
ff7:'part.tbl.7',
ff8:'part.tbl.8',
ff9:'part.tbl.9',
ff10:'part.tbl.10',
ff11:'part.tbl.11',
ff12:'part.tbl.12',
ff13:'part.tbl.13',
ff14:'part.tbl.14'
))
parallel reject limit unlimited;
```

```
drop table c_et;
create table c_et(
   c_custkey          number ,
   c_name             varchar(25) ,
   c_address          varchar(40) ,
   c_nationkey        number ,
   c_phone            char(15) ,
   c_acctbal          number ,
   c_mktsegment       char(10) ,
   c_comment          varchar(117)
)
organization external (
type ORACLE_LOADER
default directory ff1
access parameters
(
            records delimited by newline
            nobadfile
            nologfile
            fields terminated by '|'
            missing field values are null
       )
       location (
ff1:'customer.tbl.1',
ff2:'customer.tbl.2',
ff3:'customer.tbl.3',
ff4:'customer.tbl.4',
  ff5:'customer.tbl.5',
ff6:'customer.tbl.6',
ff7:'customer.tbl.7',
ff8:'customer.tbl.8',
ff9:'customer.tbl.9',
ff10:'customer.tbl.10',
ff11:'customer.tbl.11',
ff12:'customer.tbl.12',
ff13:'customer.tbl.13',
ff14:'customer.tbl.14'
))
parallel reject limit unlimited;

drop table s_et;
create table s_et(
   s_suppkey          number ,
   s_name             char(25) ,
   s_address          varchar(40) ,
   s_nationkey        number ,
   s_phone            char(15) ,
   s_acctbal          number ,
   s_comment          varchar(101)
)
organization external (
type ORACLE_LOADER
default directory ff1
access parameters
(
            records delimited by newline
            nobadfile
            nologfile
            fields terminated by '|'
```

```
            missing field values are null
        )
        location (
ff1:'supplier.tbl.1',
ff2:'supplier.tbl.2',
ff3:'supplier.tbl.3',
ff4:'supplier.tbl.4',
ff5:'supplier.tbl.5',
ff6:'supplier.tbl.6',
ff7:'supplier.tbl.7',
ff8:'supplier.tbl.8',
ff9:'supplier.tbl.9',
ff10:'supplier.tbl.10',
ff11:'supplier.tbl.11',
ff12:'supplier.tbl.12',
ff13:'supplier.tbl.13',
ff14:'supplier.tbl.14'
        ))
parallel reject limit unlimited;

drop table n_et;
create table n_et(
    n_nationkey          number ,
    n_name               char(25) ,
    n_regionkey          number ,
    n_comment            varchar(152)
    )
organization external (
type ORACLE_LOADER
default directory ff1
access parameters
(
            records delimited by newline
            nobadfile
            nologfile
            fields terminated by '|'
            missing field values are null
        )
        location (
ff14:'nation.tbl'
))
reject limit unlimited;

drop table r_et;
create table r_et(
    r_regionkey          number ,
    r_name               char(25) ,
    r_comment            varchar(152)
)
organization external (
type ORACLE_LOADER
default directory ff1
access parameters
(
            records delimited by newline
            nobadfile
            nologfile
            fields terminated by '|'
            missing field values are null
        )
        location (
ff14:'region.tbl'
))
reject limit unlimited;

alter user tpch default tablespace ts_data1;
alter user tpch temporary tablespace ts_temp;

set timing on
set echo on
rem drop table orders;
create table orders(
    o_orderdate          ,
    o_orderkey           NOT NULL,
    o_custkey            NOT NULL,
    o_orderpriority      ,
    o_shippriority       ,
    o_clerk              ,
    o_orderstatus        ,
    o_totalprice         ,
    o_comment
)
pctfree 2
pctused 98
 initrans 10
storage (initial 16m freelist groups 2 freelists 99)
compress
parallel
nologging
partition by range (o_orderdate)
subpartition by hash(o_custkey)
subpartitions 32
(
partition ord1 values less than (to_date('1992-01-01','YYYY-
MM-DD')),
partition ord2 values less than (to_date('1992-02-01','YYYY-
MM-DD')),
partition ord3 values less than (to_date('1992-03-01','YYYY-
MM-DD')),
partition ord4 values less than (to_date('1992-04-01','YYYY-
MM-DD')),
partition ord5 values less than (to_date('1992-05-01','YYYY-
MM-DD')),
partition ord6 values less than (to_date('1992-06-01','YYYY-
MM-DD')),
partition ord7 values less than (to_date('1992-07-01','YYYY-
MM-DD')),
partition ord8 values less than (to_date('1992-08-01','YYYY-
MM-DD')),
partition ord9 values less than (to_date('1992-09-01','YYYY-
MM-DD')),
partition ord10 values less than (to_date('1992-10-01','YYYY-
MM-DD')),
partition ord11 values less than (to_date('1992-11-01','YYYY-
MM-DD')),
partition ord12 values less than (to_date('1992-12-01','YYYY-
MM-DD')),
```


Appendix B

```
partition ord13 values less than (to_date('1993-01-01','YYYY-MM-DD')),
partition ord14 values less than (to_date('1993-02-01','YYYY-MM-DD')),
partition ord15 values less than (to_date('1993-03-01','YYYY-MM-DD')),
partition ord16 values less than (to_date('1993-04-01','YYYY-MM-DD')),
partition ord17 values less than (to_date('1993-05-01','YYYY-MM-DD')),
partition ord18 values less than (to_date('1993-06-01','YYYY-MM-DD')),
partition ord19 values less than (to_date('1993-07-01','YYYY-MM-DD')),
partition ord20 values less than (to_date('1993-08-01','YYYY-MM-DD')),
partition ord21 values less than (to_date('1993-09-01','YYYY-MM-DD')),
partition ord22 values less than (to_date('1993-10-01','YYYY-MM-DD')),
partition ord23 values less than (to_date('1993-11-01','YYYY-MM-DD')),
partition ord24 values less than (to_date('1993-12-01','YYYY-MM-DD')),
partition ord25 values less than (to_date('1994-01-01','YYYY-MM-DD')),
partition ord26 values less than (to_date('1994-02-01','YYYY-MM-DD')),
partition ord27 values less than (to_date('1994-03-01','YYYY-MM-DD')),
partition ord28 values less than (to_date('1994-04-01','YYYY-MM-DD')),
partition ord29 values less than (to_date('1994-05-01','YYYY-MM-DD')),
partition ord30 values less than (to_date('1994-06-01','YYYY-MM-DD')),
partition ord31 values less than (to_date('1994-07-01','YYYY-MM-DD')),
partition ord32 values less than (to_date('1994-08-01','YYYY-MM-DD')),
partition ord33 values less than (to_date('1994-09-01','YYYY-MM-DD')),
partition ord34 values less than (to_date('1994-10-01','YYYY-MM-DD')),
partition ord35 values less than (to_date('1994-11-01','YYYY-MM-DD')),
partition ord36 values less than (to_date('1994-12-01','YYYY-MM-DD')),
partition ord37 values less than (to_date('1995-01-01','YYYY-MM-DD')),
partition ord38 values less than (to_date('1995-02-01','YYYY-MM-DD')),
partition ord39 values less than (to_date('1995-03-01','YYYY-MM-DD')),
partition ord40 values less than (to_date('1995-04-01','YYYY-MM-DD')),
partition ord41 values less than (to_date('1995-05-01','YYYY-MM-DD')),
partition ord42 values less than (to_date('1995-06-01','YYYY-MM-DD')),
partition ord43 values less than (to_date('1995-07-01','YYYY-MM-DD')),
partition ord44 values less than (to_date('1995-08-01','YYYY-MM-DD')),
partition ord45 values less than (to_date('1995-09-01','YYYY-MM-DD')),
partition ord46 values less than (to_date('1995-10-01','YYYY-MM-DD')),
partition ord47 values less than (to_date('1995-11-01','YYYY-MM-DD')),
partition ord48 values less than (to_date('1995-12-01','YYYY-MM-DD')),
partition ord49 values less than (to_date('1996-01-01','YYYY-MM-DD')),
  partition ord50 values less than (to_date('1996-02-01','YYYY-MM-DD')),
partition ord51 values less than (to_date('1996-03-01','YYYY-MM-DD')),
partition ord52 values less than (to_date('1996-04-01','YYYY-MM-DD')),
partition ord53 values less than (to_date('1996-05-01','YYYY-MM-DD')),
partition ord54 values less than (to_date('1996-06-01','YYYY-MM-DD')),
partition ord55 values less than (to_date('1996-07-01','YYYY-MM-DD')),
partition ord56 values less than (to_date('1996-08-01','YYYY-MM-DD')),
partition ord57 values less than (to_date('1996-09-01','YYYY-MM-DD')),
partition ord58 values less than (to_date('1996-10-01','YYYY-MM-DD')),
partition ord59 values less than (to_date('1996-11-01','YYYY-MM-DD')),
partition ord60 values less than (to_date('1996-12-01','YYYY-MM-DD')),
partition ord61 values less than (to_date('1997-01-01','YYYY-MM-DD')),
partition ord62 values less than (to_date('1997-02-01','YYYY-MM-DD')),
partition ord63 values less than (to_date('1997-03-01','YYYY-MM-DD')),
partition ord64 values less than (to_date('1997-04-01','YYYY-MM-DD')),
partition ord65 values less than (to_date('1997-05-01','YYYY-MM-DD')),
partition ord66 values less than (to_date('1997-06-01','YYYY-MM-DD')),
partition ord67 values less than (to_date('1997-07-01','YYYY-MM-DD')),
partition ord68 values less than (to_date('1997-08-01','YYYY-MM-DD')),
partition ord69 values less than (to_date('1997-09-01','YYYY-MM-DD')),
partition ord70 values less than (to_date('1997-10-01','YYYY-MM-DD')),
```

```
partition ord71 values less than (to_date('1997-11-01','YYYY-
MM-DD')),
partition ord72 values less than (to_date('1997-12-01','YYYY-
MM-DD')),
partition ord73 values less than (to_date('1998-01-01','YYYY-
MM-DD')),
partition ord74 values less than (to_date('1998-02-01','YYYY-
MM-DD')),
partition ord75 values less than (to_date('1998-03-01','YYYY-
MM-DD')),
partition ord76 values less than (to_date('1998-04-01','YYYY-
MM-DD')),
partition ord77 values less than (to_date('1998-05-01','YYYY-
MM-DD')),
partition ord78 values less than (to_date('1998-06-01','YYYY-
MM-DD')),
partition ord79 values less than (to_date('1998-07-01','YYYY-
MM-DD')),
partition ord80 values less than (to_date('1998-08-01','YYYY-
MM-DD')),
partition ord81 values less than (to_date('1998-09-01','YYYY-
MM-DD')),
partition ord82 values less than (to_date('1998-10-01','YYYY-
MM-DD')),
partition ord83 values less than (to_date('1998-11-01','YYYY-
MM-DD')),
partition ord84 values less than (MAXVALUE))
as select
   o_orderdate         ,
   o_orderkey          ,
   o_custkey           ,
   o_orderpriority     ,
   o_shippriority      ,
   o_clerk             ,
   o_orderstatus       ,
   o_totalprice        ,
   o_comment
from o_et ;

rem drop table partsupp;
create table partsupp(
   ps_partkey          NOT NULL,
   ps_suppkey          NOT NULL,
   ps_supplycost       NOT NULL,
   ps_availqty         ,
   ps_comment
)
partition by hash(ps_partkey)
partitions 32
storage (initial 100m freelist groups 2 freelists 99)
  compress
parallel
nologging
as select
   ps_partkey          ,
   ps_suppkey          ,
   ps_supplycost       ,
   ps_availqty         ,
   ps_comment
from ps_et;

rem drop table customer;
create table customer(
   c_custkey           NOT NULL,
   c_mktsegment        ,
   c_nationkey         ,
   c_name              ,
   c_address           ,
   c_phone             ,
   c_acctbal           ,
   c_comment
)
pctfree 0
pctused 99
storage (initial 100m freelist groups 2 freelists 99)
compress
parallel
nologging
partition by hash (c_custkey)
partitions 32
as select
   c_custkey           ,
   c_mktsegment        ,
   c_nationkey         ,
   c_name              ,
   c_address           ,
   c_phone             ,
   c_acctbal           ,
   c_comment
from c_et;

rem drop table part;
create table part(
   p_partkey           NOT NULL,
   p_type              ,
   p_size              ,
   p_brand             ,
   p_name              ,
   p_container         ,
   p_mfgr              ,
   p_retailprice       ,
   p_comment
)
pctfree 0
pctused 99
storage (initial 66m  freelist groups 2 freelists 99)
compress
parallel
 nologging
partition by hash (p_partkey)
partitions 32
as select
   p_partkey           ,
   p_type              ,
   p_size              ,
   p_brand             ,
   p_name              ,
   p_container         ,
```

```
   p_mfgr          ,
   p_retailprice   ,
   p_comment
from p_et;

rem drop table supplier;
create table supplier(
   s_suppkey       NOT NULL,
   s_nationkey     ,
   s_comment       ,
   s_name          ,
   s_address       ,
   s_phone         ,
   s_acctbal
)
pctfree 0
pctused 99
storage (initial 16m freelist groups 2 freelists 99)
compress
parallel
nologging
partition by hash (s_suppkey)
partitions 32
as select
   s_suppkey       ,
   s_nationkey     ,
   s_comment       ,
   s_name          ,
   s_address       ,
   s_phone         ,
   s_acctbal
from s_et;

rem drop table nation;
create table nation(
   n_nationkey     NOT NULL,
   n_name          ,
   n_regionkey     ,
   n_comment       )
as select * from n_et;

rem drop table region;
create table region(
   r_regionkey     ,
   r_name          ,
   r_comment       )
as select * from r_et;

rem drop table lineitem;
create table lineitem(
   l_shipdate      ,
   l_orderkey      NOT NULL,
   l_discount      NOT NULL,
   l_extendedprice NOT NULL,
   l_suppkey       NOT NULL,
   l_quantity      NOT NULL,
   l_returnflag    ,
   l_partkey       NOT NULL,
   l_linestatus    ,
   l_tax           NOT NULL,
   l_commitdate    ,
   l_receiptdate   ,
   l_shipmode      ,
   l_linenumber    NOT NULL,
   l_shipinstruct  ,
   l_comment
)
pctfree 2
pctused 98
initrans 10
storage (initial 66m freelist groups 2 freelists 99)
compress
parallel
nologging
partition by range (l_shipdate)
subpartition by hash(l_partkey)
subpartitions 32
(
partition item1 values less than (to_date('1992-01-01','YYYY-
MM-DD')) ,
partition item2 values less than (to_date('1992-02-01','YYYY-
MM-DD')) ,
partition item3 values less than (to_date('1992-03-01','YYYY-
MM-DD')) ,
partition item4 values less than (to_date('1992-04-01','YYYY-
MM-DD')) ,
partition item5 values less than (to_date('1992-05-01','YYYY-
MM-DD')) ,
partition item6 values less than (to_date('1992-06-01','YYYY-
MM-DD')) ,
partition item7 values less than (to_date('1992-07-01','YYYY-
MM-DD')) ,
partition item8 values less than (to_date('1992-08-01','YYYY-
MM-DD')) ,
partition item9 values less than (to_date('1992-09-01','YYYY-
MM-DD')) ,
partition item10 values less than (to_date('1992-10-
01','YYYY-MM-DD')) ,
partition item11 values less than (to_date('1992-11-
01','YYYY-MM-DD')) ,
partition item12 values less than (to_date('1992-12-
01','YYYY-MM-DD')) ,
partition item13 values less than (to_date('1993-01-
01','YYYY-MM-DD')) ,
partition item14 values less than (to_date('1993-02-
01','YYYY-MM-DD')) ,
partition item15 values less than (to_date('1993-03-
01','YYYY-MM-DD')) ,
partition item16 values less than (to_date('1993-04-
01','YYYY-MM-DD')) ,
partition item17 values less than (to_date('1993-05-
01','YYYY-MM-DD')) ,
partition item18 values less than (to_date('1993-06-
01','YYYY-MM-DD')) ,
partition item19 values less than (to_date('1993-07-
01','YYYY-MM-DD')) ,
partition item20 values less than (to_date('1993-08-
01','YYYY-MM-DD')) ,
```

```
partition item21 values less than (to_date('1993-09-
01','YYYY-MM-DD')) ,
partition item22 values less than (to_date('1993-10-
01','YYYY-MM-DD')) ,
partition item23 values less than (to_date('1993-11-
01','YYYY-MM-DD')) ,
partition item24 values less than (to_date('1993-12-
01','YYYY-MM-DD')) ,
partition item25 values less than (to_date('1994-01-
01','YYYY-MM-DD')) ,
partition item26 values less than (to_date('1994-02-
01','YYYY-MM-DD')) ,
partition item27 values less than (to_date('1994-03-
01','YYYY-MM-DD')) ,
 partition item28 values less than (to_date('1994-04-
01','YYYY-MM-DD')) ,
partition item29 values less than (to_date('1994-05-
01','YYYY-MM-DD')) ,
partition item30 values less than (to_date('1994-06-
01','YYYY-MM-DD')) ,
partition item31 values less than (to_date('1994-07-
01','YYYY-MM-DD')) ,
partition item32 values less than (to_date('1994-08-
01','YYYY-MM-DD')) ,
partition item33 values less than (to_date('1994-09-
01','YYYY-MM-DD')) ,
partition item34 values less than (to_date('1994-10-
01','YYYY-MM-DD')) ,
partition item35 values less than (to_date('1994-11-
01','YYYY-MM-DD')) ,
partition item36 values less than (to_date('1994-12-
01','YYYY-MM-DD')) ,
partition item37 values less than (to_date('1995-01-
01','YYYY-MM-DD')) ,
partition item38 values less than (to_date('1995-02-
01','YYYY-MM-DD')) ,
partition item39 values less than (to_date('1995-03-
01','YYYY-MM-DD')) ,
partition item40 values less than (to_date('1995-04-
01','YYYY-MM-DD')) ,
partition item41 values less than (to_date('1995-05-
01','YYYY-MM-DD')) ,
partition item42 values less than (to_date('1995-06-
01','YYYY-MM-DD')) ,
partition item43 values less than (to_date('1995-07-
01','YYYY-MM-DD')) ,
partition item44 values less than (to_date('1995-08-
01','YYYY-MM-DD')) ,
partition item45 values less than (to_date('1995-09-
01','YYYY-MM-DD')) ,
partition item46 values less than (to_date('1995-10-
01','YYYY-MM-DD')) ,
partition item47 values less than (to_date('1995-11-
01','YYYY-MM-DD')) ,
partition item48 values less than (to_date('1995-12-
01','YYYY-MM-DD')) ,
partition item49 values less than (to_date('1996-01-
01','YYYY-MM-DD')) ,
partition item50 values less than (to_date('1996-02-
01','YYYY-MM-DD')) ,
partition item51 values less than (to_date('1996-03-
01','YYYY-MM-DD')) ,
partition item52 values less than (to_date('1996-04-
01','YYYY-MM-DD')) ,
partition item53 values less than (to_date('1996-05-
01','YYYY-MM-DD')) ,
partition item54 values less than (to_date('1996-06-
01','YYYY-MM-DD')) ,
partition item55 values less than (to_date('1996-07-
01','YYYY-MM-DD')) ,
partition item56 values less than (to_date('1996-08-
01','YYYY-MM-DD')) ,
partition item57 values less than (to_date('1996-09-
01','YYYY-MM-DD')) ,
partition item58 values less than (to_date('1996-10-
01','YYYY-MM-DD')) ,
partition item59 values less than (to_date('1996-11-
01','YYYY-MM-DD')) ,
partition item60 values less than (to_date('1996-12-
01','YYYY-MM-DD')) ,
partition item61 values less than (to_date('1997-01-
01','YYYY-MM-DD')) ,
partition item62 values less than (to_date('1997-02-
01','YYYY-MM-DD')) ,
partition item63 values less than (to_date('1997-03-
01','YYYY-MM-DD')) ,
partition item64 values less than (to_date('1997-04-
01','YYYY-MM-DD')) ,
partition item65 values less than (to_date('1997-05-
01','YYYY-MM-DD')) ,
partition item66 values less than (to_date('1997-06-
01','YYYY-MM-DD')) ,
partition item67 values less than (to_date('1997-07-
01','YYYY-MM-DD')) ,
partition item68 values less than (to_date('1997-08-
01','YYYY-MM-DD')) ,
partition item69 values less than (to_date('1997-09-
01','YYYY-MM-DD')) ,
partition item70 values less than (to_date('1997-10-
01','YYYY-MM-DD')) ,
partition item71 values less than (to_date('1997-11-
01','YYYY-MM-DD')) ,
partition item72 values less than (to_date('1997-12-
01','YYYY-MM-DD')) ,
partition item73 values less than (to_date('1998-01-
01','YYYY-MM-DD')) ,
partition item74 values less than (to_date('1998-02-
01','YYYY-MM-DD')) ,
partition item75 values less than (to_date('1998-03-
01','YYYY-MM-DD')) ,
partition item76 values less than (to_date('1998-04-
01','YYYY-MM-DD')) ,
partition item77 values less than (to_date('1998-05-
01','YYYY-MM-DD')) ,
partition item78 values less than (to_date('1998-06-
01','YYYY-MM-DD')) ,
```



```
partition item79 values less than (to_date('1998-07-
01','YYYY-MM-DD')) ,
partition item80 values less than (to_date('1998-08-
01','YYYY-MM-DD')) ,
partition item81 values less than (to_date('1998-09-
01','YYYY-MM-DD')) ,
partition item82 values less than (to_date('1998-10-
01','YYYY-MM-DD')) ,
partition item83 values less than (to_date('1998-11-
01','YYYY-MM-DD')) ,
partition item84 values less than (MAXVALUE))
as select
     l_shipdate          ,
    l_orderkey          ,
    l_discount          ,
    l_extendedprice     ,
    l_suppkey           ,
    l_quantity          ,
    l_returnflag        ,
    l_partkey           ,
    l_linestatus        ,
    l_tax               ,
    l_commitdate        ,
    l_receiptdate       ,
    l_shipmode          ,
    l_linenumber        ,
    l_shipinstruct      ,
    l_comment
from l_et ;

drop table l_et;
drop table o_et;
drop table ps_et;
drop table p_et;
drop table c_et;
drop table s_et;
drop table n_et;
drop table r_et;



rem drop index i_l_orderkey;
create index i_l_orderkey
on lineitem (l_orderkey) global partition by hash (l_orderkey)
partitions 32
pctfree 2
initrans 10
storage (initial 66m freelist groups 2 freelists 99)
parallel
compute statistics
nologging;
alter index i_l_orderkey allocate extent (size 66m);
alter index i_l_orderkey allocate extent (size 66m);
alter index i_l_orderkey allocate extent (size 66m);
alter index i_l_orderkey allocate extent (size 66m);



rem drop index i_o_orderkey;
create unique index i_o_orderkey
on orders (o_orderkey) global partition by hash (o_orderkey)
partitions 32
pctfree 2
initrans 10
storage (initial 16m freelist groups 2 freelists 99 )
parallel
compute statistics
nologging;
alter index i_o_orderkey allocate extent (size 16m);
alter index i_o_orderkey allocate extent (size 16m);
alter index i_o_orderkey allocate extent (size 16m);
alter index i_o_orderkey allocate extent (size 16m);
  rem drop index i_c_custkey;
create unique index i_c_custkey
on customer (c_custkey)  global partition by hash (c_custkey)
partitions 32
pctfree 2
initrans 10
storage (initial 10m freelist groups 2 freelists 99)
parallel
compute statistics
nologging;

create unique index i_ps_partkey_suppkey
on partsupp (ps_partkey,ps_suppkey)  global partition by hash
(ps_partkey)
partitions 32
pctfree 2
initrans 10
storage (initial 10m freelist groups 2 freelists 99)
parallel
compute statistics
nologging;

execute dbms_stats.gather_schema_stats('TPCH' ,
estimate_percent => 1, degree =>
 32 , granularity => 'GLOBAL' );
connect / as sysdba
execute dbms_stats.gather_system_stats;
exec
dbms_scheduler.disable('AUTO_TASKS_JOB_CLASS');
alter system switch logfile;
```

addts.sh

```
sqlplus /NOLOG<<!
connect / as sysdba;
alter tablespace $1 add datafile '$2' size $3 reuse;
!
```

addtts.sh

```
sqlplus /NOLOG<<!
connect / as sysdba;
alter tablespace $1 add tempfile '$2' size $3 reuse;
!
```

tscre_10gR2.sh

```
#!/bin/ksh
echo "START: tablespace creation"
date;
```

Appendix B

```
sqlplus  /NOLOG <<!
connect /as sysdba
drop tablespace ts_data1 including contents;

create tablespace ts_data1
nologging
datafile '+DATA' size 30720m reuse
extent management dictionary default storage (initial 100m
next 10m maxextents u
nlimited pctincrease 0);

!

i=1
while [ $i -lt 16 ]
do
      i=`expr $i + 1`
      addts.sh  ts_data1 +DATA 30720m &
done

i=1
while [ $i -lt 14 ]
do
      i=`expr $i + 1`
      addtts.sh  ts_temp +NEW_TEMP 14000m &
done


wait;



echo "END: tablespace  creation"
date;
```

Appendix C: ACID Scripts

Appendix C

a_query.sql

```
Rem
Rem $Header: a_query.sql 06-aug-99.10:51:10 mpoess Exp $
Rem
Rem a_query.sql
Rem
Rem  Copyright (c) Oracle Corporation 1999. All Rights
Reserved.
Rem
Rem    NAME
Rem      a_query.sql - <one-line expansion of the name>
Rem
rem  DESCRIPTION
Rem       Performs ACID Query for TPC-D benchmark.
Rem       Asks user to input values for o_key
Rem       The range of okey is 1 to 600000
Rem
==========================================
====================
Rem
Rem Usage:   sqlplus tpcd/tpcd @a_query <o_key>
Rem
Rem
Rem    MODIFIED   (MM/DD/YY)
Rem    mpoess      08/06/99 - Creation
Rem    mpoess      08/06/99 - Created
Rem

set serverout on;

select
'BEFORE ACID QUERY' as STAGE,
substr(TO_CHAR(sysdate,'YYYY-MM-DD
HH:MI:SS'),1,20) as CURRENT_TIME
from dual;

select SUM(trunc(trunc(l_extendedprice * (1-l_discount),2) *
(1+l_tax),2)) AS RESULT
from lineitem
where l_orderkey = &&1;

select
'AFTER ACID QUERY' as STAGE,
substr(TO_CHAR(sysdate,'YYYY-MM-DD
HH:MI:SS'),1,20) as CURRENT_TIME
from dual;

exit;
```

a_query2.sql

```
Rem
Rem $Header: aquery2.sql 07-aug-99.23:54:47 mpoess Exp $
Rem
Rem aquery2.sql
Rem
Rem  Copyright (c) Oracle Corporation 1999. All Rights
Reserved.
Rem
Rem    NAME
Rem      aquery2.sql - <one-line expansion of the name>
Rem
Rem  DESCRIPTION
Rem       Performs query on PARTSUPP for TPC-D
benchmark
Rem       Isolation Test 5.
Rem       Asks user to input values for ps_partkey and
ps_suppkey
Rem       The range for ps_partkey is 1 to 20000
Rem       The range for ps_suppkey is 1 to 1000
Rem       A valid combination is 46 and 47
Rem  Usage:   sqlplus tpcd/tpcd @a_query2 <ps_partkey>
<ps_suppkey>
Rem
Rem    MODIFIED   (MM/DD/YY)
Rem    mpoess      08/07/99 - Creation
Rem    mpoess      08/07/99 - Created
Rem
rem  DESCRIPTION
rem       Performs query on PARTSUPP for TPC-D
benchmark
rem       Isolation Test 5.
rem       Asks user to input values for ps_partkey and
ps_suppkey
rem       The range for ps_partkey is 1 to 20000
rem       The range for ps_suppkey is 1 to 1000
rem       A valid combination is 46 and 47

set serverout on;

select
'BEFORE PARTSUPP QUERY' as STAGE,
substr(TO_CHAR(sysdate,'YYYY-MM-DD
HH:MI:SS'),1,20) as CURRENT_TIME
from dual;

select *
from partsupp
where ps_partkey = &&1
and ps_suppkey = &&2;

select
'AFTER PARTSUPP QUERY' as STAGE,
substr(TO_CHAR(sysdate,'YYYY-MM-DD
HH:MI:SS'),1,20) as CURRENT_TIME
from dual;

exit;
```

atom.sh

```
#!/bin/ksh
#
# $Header: atom.sh 08-aug-99.13:48:02 mpoess Exp $
#
# atom.sh
```

Appendix C

```
#
#  Copyright (c) Oracle Corporation 1999. All Rights
Reserved.
#
#    NAME
#      atom.sh - <one-line expansion of the name>
#
#  DESCRIPTION
#      Performs atomicity tests.
#      Usage: atom.sh [-n iter] [-p prog] [-u usr/pswd] -h
#
#      Options: See usage below
#
#    NOTES
#      <other useful comments, qualifications, etc.>
#
#    MODIFIED   (MM/DD/YY)
#    mpoess      08/08/99 - Creation
#    mpoess      08/08/99 - Creation
#

. $KIT_DIR/env

OH=$ORACLE_HOME
# ACID_DIR=$TPCD_KIT_DIR/audit set in env
OUT_DIR=$ACID_OUT
DURA_DIR=$ACID_DIR/dura

usage() {

   echo ""
   echo "Usage: $0 [-n iter] [-p prog] [-u usr/pswd] -h"
   echo ""
   echo "-n iter     : number of iterations, default is 100"
   echo "-p prog     : program to run, default is atranspl.ott"
   echo "-u usr/pswd : user/password combo for database
access, default is tpcd/tpcd"
   echo "-h          : print this usage summary"
   exit 1;
}

ITER=3
SF=1
PROG=$KIT_DIR/utils/atranspl
OUT=${OUT_DIR}/atom
USER=${DATABASE_USER}

set -- `getopt "n:p:u:h" "$@"` || usage

while :
do
   case "$1" in
   -n) shift; ITER=$1;;
   -p) shift; PROG=$1;;
   -u) shift; USER=$1;;
   -h) usage; exit 0;;
   --) break;;
   esac
   shift
done

echo "Starting Atomicity Test at `date`..."
echo ""
echo "Performing $ITER ACID transactions with COMMIT"
echo ""

$KIT_DIR/utils/randkey $ITER $SF u$USER | $PROG 1 1 1
0 u$USER > ${OUT}c 2>&1

echo "ACID transactions with COMMIT ended. Output in
${OUT}c"
echo ""
echo "Performing $ITER ACID transactions with
ROLLBACK"
echo ""

$KIT_DIR/utils/randkey $ITER $SF u$USER | $PROG 1 1 0
0 u$USER > ${OUT}r 2>&1

echo "ACID transactions with ROLLBACK ended. Output in
${OUT}r"
echo ""
echo "Ending Atomicity Test at `date`..."
```

atranspl.c

```
/* Copyright (c) 2001, 2002, Oracle Corporation.  All rights
reserved.  */

/*

   NAME
     atranspl.c - <one-line expansion of the name>

   DESCRIPTION
     TPC-HR benchmark ACID transaction driver, OCI version
8

   NOTES
     <other useful comments, qualifications, etc.>

   MODIFIED   (MM/DD/YY)
   mpoess      10/23/02 - mpoess_update_from_visa
   mpoess      10/17/01 - add parameter in ACIDinit
   mpoess      02/22/01 - enlarge timing array
   mpoess      01/04/01 - Creation

*/

#include <stdio.h>
#include <stdlib.h>
#include <sys/types.h>
#include <sys/stat.h>
#include <fcntl.h>

#include "atranspl.h"

/* Declare error handling functions */
```

```
double gettime();
void sql_error();
void usage();
void ACIDinit();
void ACIDexit();
int atoi();
void srand48();
long lrand48();

/* declarations for ORDERS */

int o_key = 0;
double o_tprice = 0.0;
double o_newtprice = 0.0;

/* declarations for LINEITEM */

int l_key = 0;
int l_pkey = 0;
int l_skey = 0;

int l_quan = 0;
int l_newquan = 0;
double l_eprice = 0.0;
double l_neweprice = 0.0;
double l_disc = 0.0;
double l_tax = 0.0;

sb2 l_npricei;

/* other declarations */

int delta = 0;
double rprice;
double cost;

int proc_no = 1;          /* process number, global              */
int num_streams = 1;      /* number of transaction streams
*/
int trig = 0;             /* Trigger Time                        */
int slp = 0;              /* Sleep Time                          */

int logfile;              /* fdes for logfile for durability (optional)
*/
int outfile = 1;          /* output file (optional)              */
#ifdef LINUX
  FILE *infile;     /* input file (optional)               */
#else
  FILE *infile = stdin;     /* input file (optional)               */
                    /* in the format of <o_key> <delta>    */
#endif
char lname[UNAME_LEN];    /* username/passwd combo
*/
char *passwd;             /* pointer to password                 */

char buf[WRITE_BUF_LEN];  /* buffer to write
*/
unsigned flag = (unsigned) 0;       /* flag to store all sorts of
options  */

#define INFILE  0x01u
#define OUTFILE 0x02u
#define LOGFILE 0x04u
#define COMMIT  0x08u
#define DELTA   0x10u

double tr_end = 0.0;      /* transaction end time                */
double tr_start = 0.0;    /* transaction start time              */

int num_iter = 0;         /* number of iterations                */

time_t curr_time;         /* Current Time                        */

/* OCI handles */

OCIEnv *tpcenv = NULL;
OCIServer *tpcsrv = NULL;
OCIError *errhp = NULL;
OCISvcCtx *tpcsvc = NULL;
OCISession *tpcusr = NULL;
OCIStmt *curi = NULL;
OCIStmt *curr = NULL;
OCIStmt *cure1 = NULL;
OCIStmt *cure2 = NULL;

/* OCI bind handles */

#ifdef NOLKEY
OCIBind *l_keyi_bp = NULL;
OCIBind *o_keyi_bp = NULL;
#endif /* NOLKEY */

OCIBind *l_key_bp = NULL;
OCIBind *o_key_bp = NULL;
OCIBind *delta_bp = NULL;
OCIBind *l_pkey_bp = NULL;
OCIBind *l_skey_bp = NULL;
OCIBind *l_quan_bp = NULL;
OCIBind *l_newquan_bp = NULL;
OCIBind *l_tax_bp = NULL;
OCIBind *l_disc_bp = NULL;
OCIBind *l_eprice_bp = NULL;
OCIBind *l_neweprice_bp = NULL;
OCIBind *o_tprice_bp = NULL;
OCIBind *o_newtprice_bp = NULL;
OCIBind *rprice_bp = NULL;
OCIBind *cost_bp = NULL;

OCIBind *l_neweprice1_bp = NULL;
OCIBind *l_newquan1_bp = NULL;
OCIBind *o_key1_bp = NULL;
OCIBind *l_key1_bp = NULL;

OCIBind *o_newtprice2_bp = NULL;
OCIBind *o_key2_bp = NULL;
```

```
sword status = OCI_SUCCESS;  /* OCI return value */

char sqlstmt[1024];

/* usage: prints the usage of the program */

void usage()
{

  fprintf (stderr,"\nUsage: atrans.o[st]t <proc_no>
<num_streams> <commit> <delta>\n[i<pathname for input>]
[o<pathname for output>] [d<pathname for durability file>]
[u<uid/passwd>] \n\n");

  fprintf(stderr,"    proc_no      :the process number within this
ACID\n");
  fprintf(stderr,"    num_streams  :the total number of ACID
transaction streams\n");
  fprintf(stderr,"    commit       :1 to commit transaction, abort
otherwise\n\n");
  fprintf(stderr,"    delta        :1 to generate new random delta,
otherwise obtain delta from input\n\n");
  fprintf(stderr,"    OPTIONAL PARAMETERS:\n");
  fprintf(stderr,"    i<pathname for input>      :full path name
for input file - default is stdin\n");
  fprintf(stderr,"    o<pathname for output>     :full path name
for output file - default is stdout\n");
  fprintf(stderr,"    d<pathname for durability> :full path name
for durability success file - must specify for durability test\n");
  fprintf(stderr,"    u<uid/passwd>
:Username/Password string - default is tcpd/tpcd\n");
  fprintf(stderr,"    t<trigger>                 :Trigger Time - sleep
<trigger> seconds before start\n\n");
  fprintf(stderr,"    s<sleep>                   :Sleep Time - sleep
<sleep> seconds before commit or rollback\n\n");
  exit(-1);

}


void ACIDexit() {

  OCILogoff(tpcsvc,errhp);
  OCIhfree(tpcenv,OCI_HTYPE_STMT);
  OCIhfree(tpcsvc,OCI_HTYPE_SVCCTX);
  OCIhfree(tpcsrv,OCI_HTYPE_SERVER);
  OCIhfree(tpcusr,OCI_HTYPE_SESSION);

}



/* type: 0 if environment handle is passed, 1 if error handle is
passwd */

void sql_error(errhp,status,type)
    OCIError *errhp;
    sword status;
    sword type;
{
  char msg[2048];
  ub4 errcode;
  ub4 msglen;
  int i,j;

  switch(status) {
  case OCI_SUCCESS_WITH_INFO:
    fprintf(stderr, "Error: Statement returned with info.\n");
    if (type)
      (void) OCIErrorGet(errhp,1,NULL,(sb4*) &errcode,
(text*) msg,
                    2048, OCI_HTYPE_ERROR);
    else
      (void) OCIErrorGet(errhp,1,NULL,(sb4*) &errcode,
(text*) msg,
                    2048, OCI_HTYPE_ENV);
    fprintf(stderr,"%s\n",msg);
    break;
  case OCI_ERROR:
    fprintf(stderr, "Error: OCI call error.\n");
    if (type)
      (void) OCIErrorGet(errhp,1,NULL, (sb4 *) &errcode,
(text*) msg,
                    2048,OCI_HTYPE_ERROR);
    else
      (void) OCIErrorGet(errhp,1,NULL, (sb4 *) &errcode,
(text*) msg,
                    2048,OCI_HTYPE_ENV);
    fprintf(stderr,"%s\n",msg);
    break;
  case OCI_INVALID_HANDLE:
    fprintf(stderr, "Error: Invalid Handle.\n");
    if (type)
      (void) OCIErrorGet(errhp,1,NULL, (sb4 *) &errcode,
(text*) msg,
                    2048,OCI_HTYPE_ERROR);
    else
      (void) OCIErrorGet(errhp,1,NULL, (sb4 *) &errcode,
(text*) msg,
                    2048,OCI_HTYPE_ENV);
    fprintf(stderr,"%s\n",msg);
    break;
  }
  /* Rollback just in case */

  (void) OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);

  fprintf(stderr, "Exiting Oracle...\n");
  fflush(stderr);

  ACIDexit();

  exit(1);
}

#ifdef LINUX
int main(argc,argv)
#else
```

Appendix C

```
void main(argc,argv)
#endif
    int argc;
    char *argv[];
{

  int i;
  char line[64];
  ub4 errcode;
  char msg[2048];
  int need_commit = 0;

  /* Initialize some variables */
#ifdef LINUX
  infile=fopen("/dev/stdin","r");
#endif
  strcpy((char *) lname, "tpcd/tpcd");

  if ((argc > 10) || (argc < 5)) {
   usage();
  }

  /* argv[1] -- Process Number */

  proc_no = atoi(argv[1]);

  /* argv[2] -- Number of Streams */

  num_streams = atoi(argv[2]);

  /* argv[3] -- Commit? */

  if (atoi(argv[3]) == 1)
   BIS(flag, COMMIT);

  /* argv[4] -- Delta? */

  if (atoi(argv[4]) == 1)
   BIS(flag, DELTA);

  /* Process  optional parameters */

  argc -= 4;
  argv += 4;

  while(--argc) {
   ++argv;
   switch(argv[0][0]) {
   case 'u':
     strncpy((char *) lname, ++(argv[0]), UNAME_LEN);
     if (strchr((char *) lname, '/') == NULL) {
       fprintf(stderr, "Login name must be in the format of
userid/passwd\n");
       usage();
       exit(-1);
     }
     break;
   case 'i':
     if ((infile = fopen(++(argv[0]), "r")) == NULL) {
       fprintf(stderr,"Cannot open input file %s\n", argv[0]);
       fprintf(stderr,"%s\n",strerror(errno));
       exit(-1);
     }
     BIS(flag, INFILE);
     break;
   case 'o':
     if ((outfile = open(++(argv[0]), (O_RDWR | O_SYNC |
O_CREAT), S_IRWXU)) == -1) {
       fprintf(stderr,"Cannot open output file %s\n", argv[0]);
       fprintf(stderr,"%s\n",strerror(errno));
       exit(-1);
     }
     BIS(flag, OUTFILE);
     break;
   case 'd':
     if ((logfile = open(++(argv[0]), (O_RDWR | O_SYNC |
O_CREAT), S_IRWXU)) == -1) {
       fprintf(stderr,"Cannot open durability success file %s\n",
argv[0]);
       fprintf(stderr,"%s\n",strerror(errno));
       exit(-1);
     }
     BIS(flag, LOGFILE);
     break;
   case 'b':
     num_iter = atoi(++(argv[0]));
     break;
   case 't':
     trig = atoi(++(argv[0]));
     break;
   case 's':
     slp = atoi(++(argv[0]));
     break;
   default:
     fprintf(stderr, "Unknown argument %s\n", argv[0]);
     usage();
     break;
   }
  }

  FPRTF(outfile,"-----------------------------------------------\n");

  /* Initialize the cursors etc. */

  (void) ACIDinit();

  /* sleep for some time (triggering) */

  sleep(trig);

  /* start doing the ACID transactions */

  tr_start = gettime();

  /* The number of iteration we will run depends on the
number of */
  /* input lines                                    */
```

Appendix C

```
  while (fgets(line, 64, infile) != NULL) {

#ifdef NOLKEY
   sscanf(line, "%d %d\n", &o_key, &delta);

   /* Obtain l_key from l_key query */

   OCIsexec(tpcsvc,curi,errhp,1);

   /* l_key is the highest l_linenumber available.  We need to
pick */
   /* at random a number between 1..l_key.                    */

   l_key = (int) ((lrand48() % l_key) + 1);
#else
   sscanf(line, "%d %d %d\n", &o_key, &l_key, &delta);
#endif /* NOLKEY */

   /* Generate delta if necessary */

   if (BIT(flag, DELTA))
     delta = (int) (floor((drand48() * 100)) + 1);

   /* Now, we are ready to run the ACID transaction. */

   curr_time = time(NULL);

   FPRTF2(outfile, "Starting ACID transaction %d at %s...\n",
(++num_iter),
          ctime(&curr_time));

   FPRTF1(outfile, "o_key: %d\n", (int) o_key);
   FPRTF1(outfile, "l_key: %d\n", (int) l_key);
   FPRTF1(outfile, "delta: %d\n", (int) delta);

   OCIsexec(tpcsvc,curr,errhp,1);

   curr_time = time(NULL);

   if (!BIT(flag, LOGFILE)) {
   FPRTF1(outfile, "BEFORE COMMIT/ROLLBACK
TRANSACTION at %s\n", ctime(&curr_time));
   FPRTF1(outfile, "l_extendedprice: %.2f\n", l_eprice);
   FPRTF1(outfile, "l_quantity:      %d\n", (int) l_quan);
   FPRTF1(outfile, "o_totalprice:    %.2f\n\n", o_tprice);
   }

   FPRTF1(outfile, "Sleep %d seconds before
COMMIT/ROLLBACK...\n\n", slp);
   sleep(slp);

   /* Shall we commit? */

   if (BIT(flag, COMMIT)) {
     need_commit = 1;
     while (need_commit) {

if((status=OCITransCommit(tpcsvc,errhp,OCI_DEFAULT))
!= OCI_SUCCESS) {
                OCIrol(tpcsvc,errhp);
                OCIsexec(tpcsvc,curr,errhp,1);
              } else {
                need_commit = 0;
                curr_time = time(NULL);
                FPRTF2(outfile, "ACID Transaction iteration %d
COMMITED at %s\n",
                  num_iter, ctime(&curr_time));
              }
            }
           } else {
            OCIrol(tpcsvc,errhp);
            curr_time = time(NULL);
            FPRTF2(outfile, "ACID Transaction iteration %d
ROLLBACK at %s\n",
                num_iter, ctime(&curr_time));
           }

   /* Report all results to outfile and if necessary, to success
file. */

   /* Report initial and new values for o_totalprice,
l_extendedprice, */
   /* l_quantity.                                             */

   /*
   curr_time = time(NULL);
   FPRTF1(outfile, "Transaction Completed at %s\n",
ctime(&curr_time));
   */

   /* Get the values in LINEITEM and ORDERS after the
transaction */

   if (BIT(flag, LOGFILE)) {
     FPRTF1(logfile, "p_key:      %d\n", (int) l_pkey);
     FPRTF1(logfile, "s_key:      %d\n", (int) l_skey);
     FPRTF1(logfile, "o_key:      %d\n", (int) o_key);
     FPRTF1(logfile, "l_key:      %d\n", (int) l_key);
     FPRTF1(logfile, "delta:      %d\n", (int) delta);
     FPRTF1(logfile, "Transaction Completed at %s\n",
ctime(&curr_time));
     FPRTF(logfile, "-----------------------------------------------
\n");
   } else {

     OCIsexec(tpcsvc,cure1,errhp,1);
     OCIsexec(tpcsvc,cure2,errhp,1);

     FPRTF(outfile, "AFTER TRANSACTION:\n");
     FPRTF1(outfile, "l_extendedprice: %.2lf\n", l_neweprice);
     FPRTF1(outfile, "l_quantity:      %d\n", (int) l_newquan);
     FPRTF1(outfile, "o_totalprice:    %.2lf\n\n", o_newtprice);
     FPRTF1(outfile, "l_tax:           %.2lf\n", l_tax);
     FPRTF1(outfile, "l_discount:      %.2lf\n", l_disc);
     FPRTF1(outfile, "rprice:          %.2lf\n", rprice);
     FPRTF1(outfile, "cost:            %.2lf\n", cost);
     FPRTF(outfile, "-----------------------------------------------
-\n");
```

```
    }
  }

  tr_end = gettime();

  if (!BIT(flag,LOGFILE)) {
    FPRTF1(outfile, "Start Time: %.2f\n", tr_start);
    FPRTF1(outfile, "End Time: %.2f\n", tr_end);
    FPRTF1(outfile, "Elapsed Time: %.2f\n", (tr_end -
tr_start));
    FPRTF1(outfile, "Transaction Count: %d\n", num_iter);
    FPRTF1(outfile, "Transaction Rate: %.2f\n",
num_iter/(tr_end - tr_start));
  } else {
    FPRTF1(logfile, "Start Time: %.2f\n", tr_start);
    FPRTF1(logfile, "End Time: %.2f\n", tr_end);
    FPRTF1(logfile, "Elapsed Time: %.2f\n", (tr_end -
tr_start));
    FPRTF1(logfile, "Transaction Count: %d\n", num_iter);
  }

  /*  Disconnect from ORACLE. */

  if (BIT(flag, INFILE))
    fclose(infile);
  if (BIT(flag, OUTFILE))
    close(outfile);
  if (BIT(flag, LOGFILE))
    close(logfile);

  ACIDexit();

  exit(0);
}


void ACIDinit()
{

  /* run random seed */

  srand48(getpid());

  /* Connect to ORACLE.  Program will call sql_error()
     if an error occurs in connecting to the default database. */

  (void) OCIInitialize(OCI_DEFAULT,(dvoid *)0,0,0,0);
  if((status=OCIEnvInit((OCIEnv
**)&tpcenv,OCI_DEFAULT,0,(dvoid **)0)) !=
     OCI_SUCCESS)
    sql_error(tpcenv, status, 0);

  OCIhalloc(tpcenv,&errhp,OCI_HTYPE_ERROR);
  OCIhalloc(tpcenv,&curi,OCI_HTYPE_STMT);
  OCIhalloc(tpcenv,&curr,OCI_HTYPE_STMT);
  OCIhalloc(tpcenv,&cure1,OCI_HTYPE_STMT);
  OCIhalloc(tpcenv,&cure2,OCI_HTYPE_STMT);
  OCIhalloc(tpcenv,&tpcsvc,OCI_HTYPE_SVCCTX);
  OCIhalloc(tpcenv,&tpcsrv,OCI_HTYPE_SERVER);
  OCIhalloc(tpcenv,&tpcusr,OCI_HTYPE_SESSION);

  /* Disables auto commit */
/*
  if (ocof(&tpclda)) {
    sql_error(&tpclda, &tpclda);
    ologof(&tpclda);
    exit(-1);
  }
*/

  /* get username and password */

  passwd = strchr(lname, '/');
  *passwd = '\0';
  passwd++;

  if ((status = OCIServerAttach(tpcsrv,errhp,(text
*)0,0,OCI_DEFAULT)) != OCI_SUCCESS)
    sql_error(errhp,status,1);


OCIaset(tpcsvc,OCI_HTYPE_SVCCTX,tpcsrv,0,OCI_ATTR
_SERVER,errhp);

OCIaset(tpcusr,OCI_HTYPE_SESSION,lname,strlen(lname),
OCI_ATTR_USERNAME,
        errhp);

OCIaset(tpcusr,OCI_HTYPE_SESSION,passwd,strlen(passw
d),OCI_ATTR_PASSWORD,
        errhp);

  if ((status = OCISessionBegin(tpcsvc, errhp, tpcusr,
OCI_CRED_RDBMS,
                        OCI_DEFAULT)) != OCI_SUCCESS)
    sql_error(errhp,status,1);


OCIaset(tpcsvc,OCI_HTYPE_SVCCTX,tpcusr,0,OCI_ATTR
_SESSION,errhp);

  /* Enable session parallel dml */

  sprintf((char *) sqlstmt, PDMLTXT);
  OCIStmtPrepare(curi,errhp,(text *)sqlstmt,strlen((char
*)sqlstmt),
              OCI_NTV_SYNTAX,OCI_DEFAULT);
  OCIsexec(tpcsvc,curi,errhp,1);

  /* Enable session parallel ddl */

  /*sprintf((char *) sqlstmt, PDDLTXT);
  OCIStmtPrepare(curi,errhp,(text *)sqlstmt,strlen((char
*)sqlstmt),
              OCI_NTV_SYNTAX,OCI_DEFAULT);
  OCIsexec(tpcsvc,curi,errhp,1);*/
```


Appendix C

```
  /* Make session serializable */

  sprintf ((char *) sqlstmt, ISOTXT);
  OCIStmtPrepare(curi,errhp,(text *)sqlstmt,strlen((char
*)sqlstmt),
            OCI_NTV_SYNTAX,OCI_DEFAULT);
  OCIsexec(tpcsvc,curi,errhp,1);

  /* Set optimizer_index_cost_adj = 25 */

  sprintf ((char *) sqlstmt, OICATXT);
  OCIStmtPrepare(curi,errhp,(text *)sqlstmt,strlen((char
*)sqlstmt),
            OCI_NTV_SYNTAX,OCI_DEFAULT);
  OCIsexec(tpcsvc,curi,errhp,1);

  curr_time = time(NULL);
  printf("\nConnected to ORACLE as user: %s at %s\n\n",
lname, ctime(&curr_time));


#ifdef NOLKEY
  /* Open and Parse cursor for query to choose determine
l_key. */
  /* Binds l_key to :l_key.                              */

  sprintf((char *) sqlstmt,SQLTXT1);
  OCIStmtPrepare(curi,errhp,sqlstmt,strlen((char
*)sqlstmt),OCI_NTV_SYNTAX,OCI_DEFAULT);



OCIbbname(curi,&l_keyi_bp,errhp,":l_key",ADR(l_key),SIZ(
l_key),SQLT_INT);

OCIbbname(curi,&o_keyi_bp,errhp,":o_key",ADR(o_key),SI
Z(o_key),SQLT_INT);

#endif /* NOLKEY */

  /* Open and Parse cursor for the ACID transaction.          */

  sprintf((char *) sqlstmt,SQLTXT2);
  OCIStmtPrepare(curr,errhp,(text *)sqlstmt,strlen((char
*)sqlstmt),
            OCI_NTV_SYNTAX,OCI_DEFAULT);

  /* bind variables */


OCIbbname(curr,l_key_bp,errhp,":l_key",ADR(l_key),SIZ(l_
key),SQLT_INT);

OCIbbname(curr,o_key_bp,errhp,":o_key",ADR(o_key),SIZ(
o_key),SQLT_INT);

OCIbbname(curr,delta_bp,errhp,":delta",ADR(delta),SIZ(delt
a),SQLT_INT);

OCIbbname(curr,l_pkey_bp,errhp,":l_pkey",ADR(l_pkey),SI
Z(l_pkey),SQLT_INT);

OCIbbname(curr,l_skey_bp,errhp,":l_skey",ADR(l_skey),SIZ
(l_skey),SQLT_INT);

OCIbbname(curr,l_quan_bp,errhp,":l_quan",ADR(l_quan),SI
Z(l_quan),SQLT_INT);

OCIbbname(curr,l_newquan_bp,errhp,":l_newquan",ADR(l_n
ewquan),
        SIZ(l_newquan),SQLT_INT);

OCIbbname(curr,l_tax_bp,errhp,":l_tax",ADR(l_tax),SIZ(l_ta
x),SQLT_FLT);

OCIbbname(curr,l_disc_bp,errhp,":l_disc",ADR(l_disc),SIZ(l
_disc),SQLT_FLT);

OCIbbname(curr,l_eprice_bp,errhp,":l_eprice",ADR(l_eprice)
,SIZ(l_eprice),
        SQLT_FLT);

OCIbbname(curr,l_neweprice_bp,errhp,":l_neweprice",ADR(l
_neweprice),
        SIZ(l_neweprice),SQLT_FLT);


OCIbbname(curr,o_tprice_bp,errhp,":o_tprice",ADR(o_tprice
),SIZ(o_tprice),
        SQLT_FLT);

OCIbbname(curr,o_newtprice_bp,errhp,":o_newtprice",ADR(
o_newtprice),
        SIZ(o_newtprice), SQLT_FLT);

OCIbbname(curr,rprice_bp,errhp,":rprice",ADR(rprice),SIZ(r
price), SQLT_FLT);
  OCIbbname(curr,cost_bp,errhp,":cost",ADR(cost),SIZ(cost),
SQLT_FLT);

  /* Open & Parse cursor for end values query */

  sprintf((char *) sqlstmt,SQLTXT3);
  OCIStmtPrepare(cure1,errhp,(text *)sqlstmt,strlen((char
*)sqlstmt),
            OCI_NTV_SYNTAX,OCI_DEFAULT);

  sprintf((char *) sqlstmt,SQLTXT4);
  OCIStmtPrepare(cure2,errhp,(text *)sqlstmt,strlen((char
*)sqlstmt),
            OCI_NTV_SYNTAX,OCI_DEFAULT);

  /* bind variables */


OCIbbname(cure1,l_neweprice1_bp,errhp,":l_neweprice",AD
R(l_neweprice),
```

```
        SIZ(l_neweprice),SQLT_FLT);

OCIbbname(cure1,l_newquan1_bp,errhp,":l_newquan",ADR(
l_newquan),
        SIZ(l_newquan),SQLT_INT);

OCIbbname(cure1,o_key1_bp,errhp,":o_key",ADR(o_key),SI
Z(o_key),SQLT_INT);

OCIbbname(cure1,l_key1_bp,errhp,":l_key",ADR(l_key),SIZ
(l_key),SQLT_INT);


OCIbbname(cure2,o_newtprice2_bp,errhp,":o_newtprice",AD
R(o_newtprice),
        SIZ(o_newtprice),SQLT_FLT);

OCIbbname(cure2,o_key2_bp,errhp,":o_key",ADR(o_key),SI
Z(o_key),SQLT_INT);

}
```

atranspl.h

```
/* Copyright (c) 2001, 2002, Oracle Corporation.  All rights
reserved.  */

/*
  NAME
    atranspl.h - <one-line expansion of the name>

  DESCRIPTION

  MODIFIED   (MM/DD/YY)
  mpoess     10/23/02 - mpoess_update_from_visa
  mpoess     10/17/01 - add TXT parameter
  mpoess     04/09/01 - add hint to find max linenumber
  mpoess     01/04/01 - Creation

*/
#ifndef ATRANSPL_H

#define ATRANSPL_H

#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <sys/param.h>
#include <sys/types.h>
#include <time.h>
#include <errno.h>
#include <math.h>

#include <oratypes.h>
#ifndef OCIDFN
#include <ocidfn.h>
#endif /* OCIDFN */

#ifndef OCI_ORACLE
#include <oci.h>
#endif /* OCI_ORACLE */

/*
#ifdef __STDC__
#include <ociapr.h>
#else
#include <ocikpr.h>
#endif */ /* __STDC__ */

extern int errno;

#ifndef NULL
#define NULL 0
#endif

#ifndef NULLP
# define NULLP (void *)NULL
#endif /* NULLP */

#ifndef DISCARD
# define DISCARD (void)
#endif

#ifndef sword
# define sword int
#endif

#ifndef ub1
#define ub1 unsigned char
#endif

#define UNAME_LEN 64
#define WRITE_BUF_LEN 1024

#define NA            -1      /* ANSI SQL NULL */
#define VER7           2
#define NOT_SERIALIZABLE  8177  /* ORA-08177:
transaction not serializable */
#define WRITE_BUF_LEN 1024

#define ADR(object) ((ub1 *)&(object))
#define SIZ(object) ((sword)sizeof(object))
#define BIS(flg,mask) (unsigned) (flg |= (unsigned) mask)
#define BIT(flg,mask) (unsigned) ((unsigned) flg &
(unsigned) mask)

#define FPRTF(fd,s) \
{sprintf(buf,s); write(fd, buf, strlen(s));}
#define FPRTF1(fd,s,p) \
{sprintf(buf,s,p); write(fd, buf, strlen(buf));}
#define FPRTF2(fd,s,p1,p2) \
{sprintf(buf,s,p1,p2); write(fd, buf, strlen(buf));}

#define OCIhalloc(envh,hndl,htyp) \
   if((status=OCIHandleAlloc((dvoid *)envh,(dvoid
**)hndl,htyp,0,(dvoid **)0))!=OCI_SUCCESS) \
      sql_error(envh,status,0); \
   else \
```

```
    DISCARD 0

#define OCIhfree(hndl,htyp) \
   if((status=OCIHandleFree((dvoid *)hndl,htyp)) ==
OCI_SUCCESS) \
     fprintf(stderr, "Error freeing handle of type %d\n", htyp)

#define OCIaget(hndl,htyp,attp,size,atyp,errh) \
   if((status=OCIAttrGet((dvoid *)hndl,htyp,(dvoid
*)attp,(dvoid *)size,atyp,errh)) != OCI_SUCCESS) \
     sql_error(errh,status,1); \
   else \
     DISCARD 0

#define OCIaset(hndl,htyp,attp,size,atyp,errh) \
   if((status=OCIAttrSet((dvoid *)hndl,htyp,(dvoid
*)attp,size,atyp,errh)) != OCI_SUCCESS) \
     sql_error(errh,status,1); \
   else \
     DISCARD 0

#define OCIsexec(svch,stmh,errh,iter) \

if((status=OCIStmtExecute(svch,stmh,errh,iter,0,NULL,NUL
L,OCI_DEFAULT)) != OCI_SUCCESS) \
     sql_error(errh,status,1); \
   else \
     DISCARD 0

#define
OCIbbname(stmh,bindp,errh,sqlvar,progv,progvl,ftype) \
   if((status=OCIBindByName(stmh,&bindp,errh,(text
*)sqlvar,strlen(sqlvar), \
           progv,progvl,ftype,0,0,0,0,0,OCI_DEFAULT)) !=
OCI_SUCCESS) \
     sql_error(errh,status,1); \
   else \
     DISCARD 0

#define
OCIbbnamei(stmh,bindp,errh,sqlvar,progv,progvl,ftype,indp)
\
   if((status=OCIHandleAlloc((dvoid *)stmh,(dvoid
**)&bindp,OCI_HTYPE_BIND, \
                    0,(dvoid **)0))!=OCI_SUCCESS) \
     sql_error(stmh,status,0); \
   if((status=OCIBindByName(stmh,&bindp,errh,(text
*)sqlvar,strlen(sqlvar), \
           progv,progvl,ftype,indp,0,0,0,0,OCI_DEFAULT))
!= OCI_SUCCESS) \
     sql_error(errh,status,1); \
   else \
     DISCARD 0

#define OCIcom(svcp,errh) \
    if((status=OCITransCommit(svcp,errh,OCI_DEFAULT))
!= OCI_SUCCESS) \
      sql_error(errh,status,1); \
    else \
      DISCARD 0

#define OCIrol(svcp,errh) \
    if((status=OCITransRollback(svcp,errh,OCI_DEFAULT))
!= OCI_SUCCESS) \
      sql_error(errh,status,1); \
    else \
      DISCARD 0

#define ISOTXT "alter session set isolation_level =
serializable"
#define PDMLTXT "alter session force parallel dml parallel
(degree 2)"
#define PDDLTXT "alter session force parallel ddl parallel
(degree 2)"
#define OICATXT "alter session set
optimizer_index_cost_adj=25"

#define SQLTXT1 "BEGIN SELECT /*+
index(lineitem,i_l_orderkey) */ MAX(l_linenumber) INTO
:l_key FROM lineitem \
WHERE l_orderkey = :o_key; END;"

#define SQLTXT2 "BEGIN d_atrans.doatrans(:l_key, :o_key,
:delta, :l_pkey, \
:l_skey, :l_quan, :l_newquan, :l_tax, :l_disc, :l_eprice,
:l_neweprice, \
:o_tprice, :o_newtprice, :rprice, :cost); END;"

#define SQLTXT3 "BEGIN SELECT l_extendedprice,
l_quantity \
INTO :l_neweprice, :l_newquan \
FROM lineitem \
WHERE l_orderkey = :o_key \
AND l_linenumber = :l_key; END;"

#define SQLTXT4 "BEGIN SELECT o_totalprice INTO
:o_newtprice \
FROM orders \
WHERE o_orderkey = :o_key; END;"

#define SQLTXT5 "BEGIN SELECT l_extendedprice,
l_quantity \
INTO :l_eprice, :l_quan \
FROM lineitem \
WHERE l_orderkey = :o_key \
AND l_linenumber = :l_key; END;"

#define SQLTXT6 "BEGIN SELECT o_totalprice INTO
:o_tprice \
FROM orders \
WHERE o_orderkey = :o_key; END;"

#endif /* ATRANSPL_H */
```

ckpt.sh

```
#!/bin/ksh
#
# $Header: ckpt.sh 08-aug-99.17:32:22 mpoess Exp $
```

Appendix C

```
#
# ckpt.sh
#
#  Copyright (c) Oracle Corporation 1999. All Rights
Reserved.
#
#   NAME
#     ckpt.sh - <one-line expansion of the name>
#
#   DESCRIPTION
#     <short description of component this file
declares/defines>
#
#   NOTES
#     <other useful comments, qualifications, etc.>
#
#   MODIFIED   (MM/DD/YY)
#   mpoess      08/08/99 - Creation
#   mpoess      08/08/99 - Creation
#
. $KIT_DIR/env
sqlplus -s /NOLOG << !

       connect / as sysdba;
       alter system switch logfile;
       alter system switch logfile;
       exit;
!
```

consist.sh

```
#!/bin/ksh
#
# $Header: consist.sh 08-aug-99.14:20:51 mpoess Exp $
#
# consist.sh
#
#  Copyright (c) Oracle Corporation 1999. All Rights
Reserved.
#
#   NAME
#     consist.sh - <one-line expansion of the name>
#
#  DESCRIPTION
#     Performs consistency tests.
#     Usage: consist.sh [-n iter] [-s number of stream] [-p prog]
#                       [-u usr/pswd] -h
#
#     Options: See usage below
#
#   NOTES
#     <other useful comments, qualifications, etc.>
#
#   MODIFIED   (MM/DD/YY)
#   mpoess      08/08/99 - Creation
#   mpoess      08/08/99 - Creation
#

. $KIT_DIR/env
OH=$ORACLE_HOME
# ACID_DIR=$TPCD_KIT_DIR/audit set in env
OUT_DIR=$ACID_OUT

KEY=$OUT_DIR/key$$_
OUTFILE=${OUT_DIR}/consrte
CON1=${OUT_DIR}/conb
CON2=${OUT_DIR}/cona
CHK=${OUT_DIR}/consckpt

/bin/rm -rf ${KEY}* $CON1 $CON2 $OUTFILE $CHK

trap "/bin/rm -rf ${KEY}*; exit 1" 1 2 3 15

STREAM=${NUM_STREAMS}
let STREAM="$STREAM + 1" # add one for the update
stream
ITER=100
PROG=atranspl
USER=${DATABASE_USER}
CK=10

usage() {

  echo ""
  echo "Usage: $0 [-n iter] [-s number of stream] [-p prog] [-u
usr/pswd] -h"
  echo ""
  echo "-n iter            : number of iterations, default is 100"
  echo "-s number of stream : number of streams, default is 2"
  echo "-p prog            : program to run, default is
atranspl.ott"
  echo "-u usr/pswd        : user/password for database access,
default is tpcd/tpcd"
  echo "-t chkpt           : time after the start of ACID
transaction to perform the checkpoint"
  echo "                     default is 10 seconds"
  echo "-h                 : print this usage summary"
  exit 1;
}

set -- `getopt "n:p:u:s:h" "$@"` || usage

while :
do
  case "$1" in
  -s) shift; STREAM=$1;;
  -n) shift; ITER=$1;;
  -p) shift; PROG=$1;;
  -u) shift; USER=$1;;
  -t) shift; CK=$1;;
  -h) usage; exit 0;;
  --) break;;
  esac
  shift
done


if [ $ITER -lt 100 ]
```

```
then
echo "Error: Must at least run 100 iterations!"
echo "Exiting..."
exit 1
fi

if [ $STREAM -lt 2 ]
then
echo "Error: Must at least run 2 streams!"
echo "Exiting..."
exit 1
fi

echo "Starting Consistency Test at `date`..."
echo ""
echo "Generate some keys first"
echo ""

i=0

while [ $i -lt $STREAM ]
do
  echo randkey $ITER 1 u$USER
  randkey $ITER 1 u$USER > ${KEY}$i
  i=`expr $i + 1`
done

echo "Check consistency before Submitting Transactions
`date`"
echo "Check consistency before Submitting Transactions
`date`" >> $CON1

echo "Obtain 10 keys from the each key file to check
consistency"

i=0
while [ $i -lt $STREAM ]
do
KEYS=`head -10 ${KEY}${i} | awk '{printf "%d ", $1}'`
echo "The 10 Keys for file $i are: $KEYS"
#for j in `head -10 ${KEY}${i} | awk '{printf "%d ", $1}'`
for j in $KEYS
do
   sqlplus $USER @consist $j >> $CON1
   echo "------------------------------" >> $CON1
done
   i=`expr $i + 1`
done

echo ""
echo "Starting ACID transactions at `date`"
echo ""

i=0

while [ $i -lt $STREAM ]
do
   $PROG $i $STREAM 1 0 u${USER} i${KEY}${i}
o${OUTFILE}${i} s1 &
   i=`expr $i + 1`
done

echo "Schedule a Checkpoint"
echo "Checkpoint scheduled at $CK seconds after `date`"

(sleep $CK; $ACID_DIR/ckpt.sh) &

wait

echo ""
echo "Ending ACID transactions at `date`"
echo ""

echo "Completed $STREAM transaction streams with $ITER
iterations each"
echo ""

echo "Check consistency after Submitting Transactions
`date`"
echo "Check consistency after Submitting Transactions
`date`" >> $CON2

cat
${ORACLE_HOME}/rdbms/log/alert_${ORACLE_SID}.log
>> $CHK

i=0
while [ $i -lt $STREAM ]
do
KEYS=`head -10 ${KEY}$i | awk '{printf "%d ", $1}'`
#for j in `head -10 ${KEY}$i | awk '{printf "%d ", $1}'`
echo "The keys to check for consistency after the test from file
$i are:"
echo "$KEYS"
for j in $KEYS
do
   sqlplus $USER @consist $j >> $CON2
   echo "------------------------------" >> $CON2
done
   i=`expr $i + 1`
done
```

consist.sql

```
Rem
Rem $Header: consist.sql 08-aug-99.16:59:17 mpoess Exp $
Rem
Rem consist.sql
Rem
Rem  Copyright (c) Oracle Corporation 1999. All Rights
Reserved.
Rem
Rem    NAME
Rem      consist.sql - <one-line expansion of the name>
Rem
Rem  DESCRIPTION
Rem       Verifies the consistency of TPC-D database using the
Rem       consistency condition.
Rem
```

Appendix C

```
Rem Usage:   sqlplus tpcd/tpcd @consist
Rem
Rem NOTE
Rem REQUIRES PACKAGES prvtotpt and dbmsotpt
rem
Rem    MODIFIED   (MM/DD/YY)
Rem    mpoess      08/08/99 - Creation
Rem    mpoess      08/08/99 - Created
Rem

set verify off
rem set termout on
rem set echo on



REM
REM Get today's date.
REM

select
substr(TO_CHAR(sysdate,'YYYY-MM-DD
HH:MI:SS'),1,20) as CURRENT_TIME
from dual;

set serverout on;

DECLARE
          o_okey         number;
          o_tprice number;
          l_tprice  number;
          diff                  number;
BEGIN
   select o_totalprice
          into o_tprice
          from orders
          where o_orderkey = &&1;



   select sum(trunc((trunc((l_extendedprice * (1-l_discount)),
2)
        * (1+l_tax)), 2))
          into l_tprice
          from lineitem
          where l_orderkey = &&1;

   diff := l_tprice - o_tprice;

   dbms_output.put_line('O_TOTALPRICE: ' ||
TO_CHAR(trunc(o_tprice,2)));
   dbms_output.put_line('L_TOTALPRICE: ' ||
TO_CHAR(trunc(l_tprice,2)));
   dbms_output.put_line('Difference:   ' ||
TO_CHAR(trunc(diff,2)));

END;
.
/
spool off
exit
```

dura.sh

```
#!/bin/ksh
#
# $Header: dura.sh 08-aug-99.15:21:38 mpoess Exp $
#
# dura.sh
#
#  Copyright (c) Oracle Corporation 1999. All Rights
Reserved.
#
#    NAME
#      dura.sh - <one-line expansion of the name>
#
#    DESCRIPTION
#      <short description of component this file
declares/defines>
#
#    NOTES
#      <other useful comments, qualifications, etc.>
#
#    MODIFIED   (MM/DD/YY)
#    mpoess      08/08/99 - Creation
#    mpoess      08/08/99 - Creation
#

. $KIT_DIR/env

# Create history table

# Count number of entries in the history table

SERVER="ultraperf2"

echo "------------------------------------------------"
echo "Capturing Process information before durability tests
`date`"
rsh $SERVER -n -l spyda  ps -ef; date
echo "------------------------------------------------"

echo "------------------------------------------------"
echo "Starting the durability tests `date`"
run_acid.sh &
echo "------------------------------------------------"

sleep 1200

echo "------------------------------------------------"
echo "Collecting user information. `date`"
./cnt_user.sh pswong spyda ultraperf2 > dura/duraucnt 2>&1
echo "------------------------------------------------"

echo "------------------------------------------------"
echo "Capturing Process information while running
Transactions `date`"
rsh $SERVER -n -l spyda  ps -ef; date
echo "------------------------------------------------"
```

Appendix C

```
echo "------------------------------------------------"
echo "Capturing disk information on Server: Ultraperf2
`date`"
rsh $SERVER -n -l spyda  vxprint -ht ; date
echo "------------------------------------------------"

echo "------------------------------------------------"
echo "Detaching mirror on data disk. `date`"
rsh $SERVER -n -l root  "vxplex -v ordr23 det ordr23-01"
echo "------------------------------------------------"

echo "------------------------------------------------"
echo "Capturing Disk information information on Server:
Ultraperf2 `date`"
rsh $SERVER -n -l spyda  vxprint -ht ; date
echo "------------------------------------------------"

sleep 120

echo "------------------------------------------------"
echo "Capturing Process information after breaking data
mirror. `date`"
rsh $SERVER -n -l spyda  ps -ef; date
echo "------------------------------------------------"



echo "------------------------------------------------"
echo "Detaching mirror on log2 disk. `date`"
rsh $SERVER -n -l root "vxplex -v log2 det log2-01"
echo "------------------------------------------------"

echo "------------------------------------------------"
echo "Capturing Disk information information on Server:
Ultraperf2 `date`"
rsh $SERVER -n -l spyda  vxprint -ht ; date
echo "------------------------------------------------"

sleep 120

echo "------------------------------------------------"
echo "Capturing Process information after detaching log
mirror. `date`"
rsh $SERVER -n -l spyda  ps -ef; date
echo "------------------------------------------------"

# Power Off
```

end_acid.sh

```
#!/bin/ksh
#
# $Header: end_acid.sh 08-aug-99.17:06:20 mpoess Exp $
#
# end_acid.sh
#
#  Copyright (c) Oracle Corporation 1999. All Rights
Reserved.
#
#    NAME
#      end_acid.sh - <one-line expansion of the name>
#
#  DESCRIPTION
#      end_cons.sh <pid of the durability run>
#      Options: See usage below
#
#    NOTES
#      <other useful comments, qualifications, etc.>
#
#    MODIFIED   (MM/DD/YY)
#    mpoess      08/08/99 - Creation
#    mpoess      08/08/99 - Creation
#

. $KIT_DIR/env

OH=$ORACLE_HOME
# ACID_DIR=$OH/tpcd/audit set in env
OUT_DIR=$ACID_OUT/
DURA_DIR=$ACID_OUT/dura
RUN_ID_FILE=$ACID_DIR/run_id

SHELL_PID=`cat ${DURA_DIR}/shellpid`
ITER=100
STEM=${NUM_STREAMS}
let STEM="$STEM + 1" # add one for the update stream
PROG=${ACID_DIR}/atranspl.ott
IN=${ACID_DIR}/acid_in
DURA=${DURA_DIR}/drate
OUT=${DURA_DIR}/drate
DSMPL=${DURA_DIR}/durasmpl
KEY=${DURA_DIR}/key${SHELL_PID}_
USER=tpch/tpch
TRIG=1
HCNT=duracnta

# get history count

sqlplus $USER @cnt_hist > $DURA_DIR/$HCNT 2>&1

# perform the consistency

i=0
while [ $i -lt $STEM ]
do
  for j in `head -10 ${KEY}${i} | awk '{printf "%d ",$1}'`
  do
    sqlplus tpch/tpch @consist $j >> $DURA_DIR/duraconsa
  done
  i=`expr $i + 1`
done

i=0
while [ $i -lt $STEM ]
do
sample.sh $DURA${i} > ${DSMPL}${i} 2>&1
i=`expr $i + 1`
done
```

Appendix C

gettime.c

```
#ifdef RCSID
static char *RCSid =
  "$Header: gettime.c 15-jul-99.14:27:44 mpoess Exp $ ";
#endif /* RCSID */

/* Copyright (c) Oracle Corporation 1999. All Rights
Reserved. */

/*

  NAME
    gettime.c

  DESCRIPTION
    get wall clock time.
    get cpu time.

  FUNCTIONS
    get wall clock time.
    get cpu time.

  NOTES
    Both routines return time in seconds as a double.
  MODIFIED   (MM/DD/YY)
  mpoess      07/15/99 - Creation
  mpoess      07/15/99 - Creation

*/


/*
**  Options:
**     TIME_W_TIMES:      implement gettime() with times().
**     TIME_W_GETTIME:    implement gettime() with
gettimeofday().
**     CPU_W_TIMES:       implement getcpu()  with times().
**     CPU_W_GETRU:       implement getcpu()  with
getrusage().
**     GETRU_STATS:       collect getrusage statistics
**     GET_P_STATS:       collect get_process_stats statistics
*/

#define SUN_OS5

#if defined(SUN_OS5)
#define TIME_W_GETTIME
#define CPU_W_TIMES
#undef GETRU_STATS
#undef CPU_W_GETRU
#endif /* SUN_OS5 */

#if defined(sequent) || defined(SEQ_PSX)
# define GET_P_STATS
#endif /* sequent */

#if defined(aix) || defined(AIXRIOS)
# define TIME_W_GETTIME
# define CPU_W_TIMES
# define GETRU_STATS
#endif /* AIXRIOS */

#if defined(a_osf) || defined(A_OSF)
# define TIME_W_GETTIME
# define CPU_W_GETRU
# define GETRU_STATS
#endif /* AIXRIOS */

#if defined(HPUX) || defined(XENIX_386) ||
defined(SYSV_386) || defined(ATT_3B)
# define TIME_W_TIMES
# define CPU_W_TIMES
#endif /* HPUX || XENIX_386 || SYSV_386 */

#if !defined(TIME_W_GETTIME) &&
!defined(TIME_W_TIMES)
# define TIME_W_TIMES
#endif

#if !defined(CPU_W_GETRU) &&
!defined(CPU_W_TIMES)
# define CPU_W_TIMES
#endif

#ifdef GET_P_STATS
# ifdef GETRU_STATS
#  undef GETRU_STATS
# endif
#endif

#if defined(TIME_W_GETTIME) ||
defined(CPU_W_GETRU) || defined(GETRU_STATS)
# include <sys/time.h>
#endif /* TIME_W_GETTIME || CPU_W_GETRU ||
GETRU_STATS */

#if defined(CPU_W_GETRU) || defined(GETRU_STATS)
# include <sys/resource.h>
#endif /* CPU_W_GETRU || GETRU_STATS */

#if defined(TIME_W_TIMES) || defined (CPU_W_TIMES)
# include <sys/types.h>
# include <sys/times.h>
# include <sys/param.h>  /* most systems define HZ here */
#endif /* TIME_W_TIMES or CPU_W_TIMES */

#ifdef GET_P_STATS
# include <sys/types.h>
# include <sys/procstats.h>
#endif /* GET_P_STATS */

# include <stdio.h>

#ifdef GETRU_STATS
struct rusage selfru;
struct rusage kidsru;
```

```
#endif /* GETRU_STATS */

#ifdef GET_P_STATS
struct process_stats selfru;
struct process_stats kidsru;
#endif /* GET_P_STATS */



double gettime ()

{

#ifdef TIME_W_GETTIME
  struct timeval tv;

  (void) gettimeofday (&tv, (struct timezone *) 0);
  return ((double) tv.tv_sec + (1.0e-6 * (double) tv.tv_usec));
#endif /* TIME_W_GETTIME */

#ifdef TIME_W_TIMES
  struct tms buf;

  return ((double) times (&buf) / HZ);
#endif /* TIME_W_TIMES */

}



double getcpu ()

{

#ifdef CPU_W_TIMES
  struct tms buf;

  (void) times (&buf);
  return (((double) buf.tms_utime + (double) buf.tms_stime) /
HZ);
#endif /* CPU_W_TIMES */

#ifdef CPU_W_GETRU
  struct rusage ru;
  double usecs;

  (void) getrusage (0, &ru);
  usecs = 1.0e-6 * (double) (ru.ru_utime.tv_usec +
ru.ru_stime.tv_usec);
  return ((double) (ru.ru_utime.tv_sec + ru.ru_stime.tv_sec) +
usecs);
#endif /* CPU_W_GETRU */

}



getru (fp, kids, config, runname, proc_no)
FILE *fp;
int kids;
char *config;
char *runname;
int proc_no;

{

#ifdef GETRU_STATS
  struct rusage ru;

  fprintf (fp, "%-10.10s %-10.10s %10d %10d ",
config,runname, proc_no, kids);
  getrusage (kids ? RUSAGE_CHILDREN :
RUSAGE_SELF, &ru);
  print_ru (fp, &ru);
  fprintf (fp, "\n");
#endif /* GETRU_STATS */

#ifdef GET_P_STATS
  timeval_t tv;
  struct process_stats ru;

  fprintf (fp, "%-10.10s %-10.10s %10d %10d ",
config,runname, proc_no, kids);
  if (kids)
    get_process_stats (&tv, PS_SELF, (struct process_stats *)
0, &ru);
  else
    get_process_stats (&tv, PS_SELF, &ru, (struct
process_stats *) 0);
  print_ru (fp, &ru);
  fprintf (fp, "\n");
#endif /* GET_P_STATS */

}



getru1 (kids)

int kids;

{

#ifdef GETRU_STATS
  if (kids) {
    memset (&kidsru, 0, sizeof (kidsru));
    getrusage (RUSAGE_CHILDREN, &kidsru);
  }
  else {
    memset (&selfru, 0, sizeof (selfru));
    getrusage (RUSAGE_SELF, &selfru);
  }
#endif /* GETRU_STATS */

#ifdef GET_P_STATS
  timeval_t tv;
```

```
  if (kids) {
    memset (&kidsru, 0, sizeof (kidsru));
    get_process_stats (&tv, PS_SELF, (struct process_stats *)
0, &kidsru);
  }
  else {
    memset (&selfru, 0, sizeof (selfru));
    get_process_stats (&tv, PS_SELF, &selfru, (struct
process_stats *) 0);
  }
#endif /* GET_P_STATS */

}



getru2 (fp, kids, config, runname, proc_no)

FILE *fp;
int kids;
char *config;
char *runname;
int proc_no;

{

#ifdef GETRU_STATS
  struct rusage ru;

  fprintf (fp, "%-10.10s %-10.10s %10d %10d ", config,
runname, proc_no, kids);
  getrusage (kids ? RUSAGE_CHILDREN :
RUSAGE_SELF, &ru);
  if (kids)
    diffru (&ru, &kidsru);
  else
    diffru (&ru, &selfru);
  print_ru (fp, &ru);
  fprintf (fp, "\n");
#endif /* GETRU_STATS */

#ifdef GET_P_STATS
  timeval_t tv;
  struct process_stats ru;

  fprintf (fp, "%-10.10s %-10.10s %10d %10d ", config,
runname, proc_no, kids);
  if (kids)
    get_process_stats (&tv, PS_SELF, (struct process_stats *)
0, &ru);
  else
    get_process_stats (&tv, PS_SELF, &ru, (struct
process_stats *) 0);
  if (kids)
    diffru (&ru, &kidsru);
  else
    diffru (&ru, &selfru);
  print_ru (fp, &ru);
  fprintf (fp, "\n");
#endif /* GET_P_STATS */

}



#ifdef GETRU_STATS

print_ru (fp, ru)

FILE *fp;
struct rusage *ru;

{

  fprintf (fp, "%10ld ", ru->ru_utime.tv_sec * 1000 +
           (ru->ru_utime.tv_usec/1000));
  fprintf (fp, "%10ld ", ru->ru_stime.tv_sec * 1000 +
           (ru->ru_stime.tv_usec/1000));
  fprintf (fp, "%10ld ", ru->ru_maxrss);
  fprintf (fp, "%10ld ", ru->ru_majflt);
  fprintf (fp, "%10ld ", ru->ru_minflt);
  fprintf (fp, "%10ld ", 0);
  fprintf (fp, "%10ld ", 0);
  fprintf (fp, "%10ld ", 0);
  fprintf (fp, "%10ld ", ru->ru_nswap);
  fprintf (fp, "%10ld ", 0);
  fprintf (fp, "%10ld ", ru->ru_nvcsw);
  fprintf (fp, "%10ld ", ru->ru_nivcsw);
  fprintf (fp, "%10ld ", ru->ru_nsignals);
  fprintf (fp, "%10ld ", 0);
  fprintf (fp, "%10ld ", 0);
  fprintf (fp, "%10ld ", ru->ru_inblock);
  fprintf (fp, "%10ld ", ru->ru_oublock);
  fprintf (fp, "%10ld ", 0);
  fprintf (fp, "%10ld",  0);

}



diffru (ru2, ru)

struct rusage *ru2;
struct rusage *ru;

{

  ru2->ru_utime.tv_sec -= ru->ru_utime.tv_sec;
  ru2->ru_utime.tv_usec -= ru->ru_utime.tv_usec;
  ru2->ru_stime.tv_sec -= ru->ru_stime.tv_sec;
  ru2->ru_stime.tv_usec -= ru->ru_stime.tv_usec;
  ru2->ru_maxrss -= ru->ru_maxrss;
  ru2->ru_ixrss -= ru->ru_ixrss;
  ru2->ru_idrss -= ru->ru_idrss;
  ru2->ru_minflt -= ru->ru_minflt;
  ru2->ru_majflt -= ru->ru_majflt;
  ru2->ru_nswap -= ru->ru_nswap;
  ru2->ru_inblock -= ru->ru_inblock;
```


Appendix C

```
  ru2->ru_oublock -= ru->ru_oublock;
  ru2->ru_msgsnd -= ru->ru_msgsnd;
  ru2->ru_msgrcv -= ru->ru_msgrcv;
  ru2->ru_nsignals -= ru->ru_nsignals;
  ru2->ru_nvcsw -= ru->ru_nvcsw;
  ru2->ru_nivcsw -= ru->ru_nivcsw;

}

#endif /* GETRU_STATS */



#ifdef GET_P_STATS

print_ru (fp, ps)

FILE *fp;
struct process_stats *ps;

{

  fprintf (fp, "%lu ", ps->ps_utime.tv_sec * 1000 +
                  (ps->ps_utime.tv_usec/1000));
  fprintf (fp, "%lu ", ps->ps_stime.tv_sec * 1000 +
                   (ps->ps_stime.tv_usec/1000));
  fprintf (fp, "%lu ", ps->ps_maxrss);
  fprintf (fp, "%lu ", ps->ps_pagein);
  fprintf (fp, "%lu ", ps->ps_reclaim);
  fprintf (fp, "%lu ", ps->ps_zerofill);
  fprintf (fp, "%lu ", ps->ps_pffincr);
  fprintf (fp, "%lu ", ps->ps_pffdecr);
  fprintf (fp, "%lu ", ps->ps_swap);
  fprintf (fp, "%lu ", ps->ps_syscall);
  fprintf (fp, "%lu ", ps->ps_volcsw);
  fprintf (fp, "%lu ", ps->ps_involcsw);
  fprintf (fp, "%lu ", ps->ps_signal);
  fprintf (fp, "%lu ", ps->ps_lread);
  fprintf (fp, "%lu ", ps->ps_lwrite);
  fprintf (fp, "%lu ", ps->ps_bread);
  fprintf (fp, "%lu ", ps->ps_bwrite);
  fprintf (fp, "%lu ", ps->ps_phread);
  fprintf (fp, "%lu",  ps->ps_phwrite);

}



diffru (ru2, ru)

struct process_stats *ru2;
struct process_stats *ru;

{

  ru2->ps_utime.tv_sec -= ru->ps_utime.tv_sec;
  ru2->ps_utime.tv_usec -= ru->ps_utime.tv_usec;
  ru2->ps_stime.tv_sec -= ru->ps_stime.tv_sec;
  ru2->ps_stime.tv_usec -= ru->ps_stime.tv_usec;
  ru2->ps_maxrss -= ru->ps_maxrss;
  ru2->ps_pagein -= ru->ps_pagein;
  ru2->ps_reclaim -= ru->ps_reclaim;
  ru2->ps_zerofill -= ru->ps_zerofill;
  ru2->ps_pffincr -= ru->ps_pffincr;
  ru2->ps_pffdecr -= ru->ps_pffdecr;
  ru2->ps_swap -= ru->ps_swap;
  ru2->ps_syscall -= ru->ps_syscall;
  ru2->ps_volcsw -= ru->ps_volcsw;
  ru2->ps_involcsw -= ru->ps_involcsw;
  ru2->ps_signal -= ru->ps_signal;
  ru2->ps_lread -= ru->ps_lread;
  ru2->ps_lwrite -= ru->ps_lwrite;
  ru2->ps_bread -= ru->ps_bread;
  ru2->ps_bwrite -= ru->ps_bwrite;
  ru2->ps_phread -= ru->ps_phread;
  ru2->ps_phwrite -= ru->ps_phwrite;

}

#endif /* GET_P_STATS */
```

gtime.c

```
/* Copyright (c) 2001, 2002, Oracle Corporation.  All rights
reserved.  */

/*

  NAME
    gtime.c - <one-line expansion of the name>

  DESCRIPTION
    <short description of facility this file declares/defines>

  EXPORT FUNCTION(S)
    <external functions defined for use outside package - one-
line descriptions>

  INTERNAL FUNCTION(S)
    <other external functions defined - one-line descriptions>

  STATIC FUNCTION(S)
    <static functions defined - one-line descriptions>

  NOTES
    <other useful comments, qualifications, etc.>

  MODIFIED   (MM/DD/YY)
  mpoess      10/23/02 - mpoess_update_from_visa
  mpoess      08/29/01 - Creation

*/
#include<stdio.h>
#include<stdlib.h>

# include <sys/time.h>

main ()
{
```

```
  struct timeval tv;

      (void) gettimeofday (&tv, (struct timezone *) 0);

  printf ("%.2f\n", ((double) tv.tv_sec + (1.0e-6 * (double)
tv.tv_usec)) ) ;

}

/* end of file gtime.c */
```

iso1.sh

```
#!/bin/ksh
#
# $Header: iso1.sh 29-jul-98.17:00:11 akarasik Exp $
#
# iso1.sh
#
#  Copyright (c) Oracle Corporation 1998. All Rights
Reserved.
#
#    NAME
#      iso1.sh
#
#  DESCRIPTION
#       Usage: iso1.sh [-u user/password] [-n remote_node] -h
#       Options: See usage below
#  NOTES
#            For a cross node isolation test, assume the local node
is
#            one of the participating nodes.  The other node can
be
#            specified by the -n option.
#       You need to set the environment variable
TPCD_KIT_DIR
#
#    MODIFIED   (MM/DD/YY)
#    mpoess      12/16/98 - update to version 8.1.6
#    mpoess      09/25/98 - update audit
#    akarasik    07/29/98 -
#    akarasik    07/29/98 - Creation
#

. $KIT_DIR/env

# May need to change the following:
RSH=ssh

OH=$ORACLE_HOME
#ACID_DIR=$KIT_DIR/acid is set in env
OUT_DIR=$ACID_OUT

TXN1FILE=$OUT_DIR/txn1$$.out
TXN2FILE=$OUT_DIR/txn2$$.out
KEYFILE=$OUT_DIR/key$$.out
ISOFILE=$OUT_DIR/iso1
USER=$DATABASE_USER
PROG=atranspl


/bin/rm -rf $TXN1FILE $TXN2FILE $KEYFILE

trap "/bin/rm -rf $TXN1FILE $TXN2FILE $KEYFILE; exit
1" 1 2 3 15

usage() {

  echo ""
  echo "Usage: $0 [-u user/passwd] [-n remote_node] -h"
  echo ""
  exit 1;
}

set -- `getopt "u:n:h" "$@"` || usage

while :
do
  case "$1" in
  -u) shift; USER=$1;;
  -n) shift; HOST="$1";;
  -h) usage; exit 0;;
  --) break;;
  esac
  shift;
done


de=`direxists.sh $ACID_OUT c` # I am not using $de
afterward, but I want to avoid the output of direxists

# generate key files

randkey 1 0.1 u"$USER" > $KEYFILE

OKEY=`cat $KEYFILE | awk '{print $1}'`
echo "o_key is "$OKEY

# before the ACID transaction, let's run a ACID query to
record the
# initial state of lineitem

echo "Running ACID query BEFORE the start of Isolation
Test 1" >> $TXN2FILE
echo "`date`" >> $TXN2FILE
echo "" >> $TXN2FILE
sqlplus $USER @$ACID_DIR/isolation/a_query $OKEY >>
$TXN2FILE
echo "" >> $TXN2FILE
echo "------------------------------------------------" >>
$TXN2FILE

sleep 1

# start ACID transaction, Sleep for 60 second before
COMMIT
```

Appendix C

```
$PROG 1 1 1 0 i$KEYFILE u$USER s60 b0 >> $TXN1FILE
&

# let's sleep 10 seconds before starting ACID query

sleep 15

# start ACID query with the same OKEY

echo "Running ACID query 15 seconds AFTER the start of
ACID Transaction" \
>> $TXN2FILE
echo "`date`" >> $TXN2FILE
if [ "$HOST" != "" ]
then
echo "Starting ACID query on node $HOST" >> $TXN2FILE
${RSH} -n ${HOST}  sqlplus $USER
@$ACID_DIR/isolation/a_query $OKEY >> $TXN2FILE
else
sqlplus $USER @$ACID_DIR/isolation/a_query $OKEY >>
$TXN2FILE
fi

echo "------------------------------------------------" >>
$TXN2FILE
wait
echo "------------------------------------------------" >>
$TXN1FILE

cat $TXN1FILE $TXN2FILE >> $ISOFILE

/bin/rm -rf $TXN1FILE $TXN2FILE $KEYFILE
```

iso2.sh

```
#!/bin/ksh
#
# $Header: iso2.sh 04-aug-99.09:19:54 mpoess Exp $
#
# iso2.sh
#
#  Copyright (c) Oracle Corporation 1999. All Rights
Reserved.
#
#   NAME
#     iso2.sh - <one-line expansion of the name>
#
#   DESCRIPTION
#     Usage: iso2.sh [-u user/password] [-n remote_node] -h
#     Options: See usage below
#   NOTES
#      For a cross node isolation test, assume the local node is
#      one of the participating nodes.  The other node can be
#      specified by the -n option.
#      You need to set the environment variable
TPCD_KIT_DIR
#
#   MODIFIED   (MM/DD/YY)
#   mpoess      08/04/99 - Creation
#   mpoess      08/04/99 - Creation
#
#
#
==========================================
=====================+
# May need to change the following:

. $KIT_DIR/env

RSH=ssh

OH=$ORACLE_HOME
# ACID_DIR=$TPCD_KIT_DIR/audit is set in env
OUT_DIR=$ACID_OUT

DURA_DIR=$ACID_DIR/dura

TXN1FILE=$OUT_DIR/txn1$$.out
TXN2FILE=$OUT_DIR/txn2$$.out
KEYFILE=$OUT_DIR/key$$.out
ISOFILE=$OUT_DIR/iso2

USER=$DATABASE_USER
PROG=atranspl

/bin/rm -rf $TXN1FILE $TXN2FILE $KEYFILE

trap "/bin/rm -rf $TXN1FILE $TXN2FILE $KEYFILE; exit
1" 1 2 3 15

usage() {

  echo ""
  echo "Usage: $0 [-u user/passwd] [-n remote_node] -h"
  echo ""
  exit 1;
}

set -- `getopt "u:n:h" "$@"` || usage

while :
do
  case "$1" in
  -u) shift; USER=$1;;
  -n) shift; HOST="$1";;
  -h) usage; exit 0;;
  --) break;;
  esac
  shift;
done



# generate key files

randkey 1 0.1 u"$USER" > $KEYFILE

OKEY=`cat $KEYFILE | awk '{print $1}'`
echo "o_key is "$OKEY
```

Appendix C

```
# before the ACID transaction, let's run a ACID query to
record the
# initial state of lineitem

echo "Running ACID query BEFORE the start of Isolation
Test 1" >> $TXN2FILE
echo "`date`" >> $TXN2FILE
echo "" >> $TXN2FILE
sqlplus "$USER" @$ACID_DIR/isolation/a_query $OKEY
>> $TXN2FILE
echo "" >> $TXN2FILE
echo "------------------------------------------------" >>
$TXN2FILE

sleep 1

# start ACID transaction, Sleep for 30 second before
ROLLBACK

$PROG 1 1 0 0 i$KEYFILE u$USER s30 >> $TXN1FILE &

# let's sleep 15 seconds before starting ACID query

sleep 15

# start ACID query with the same OKEY

echo "Running ACID query 15 seconds AFTER the start of
ACID transaction" \
>> $TXN2FILE
echo "`date`" >> $TXN2FILE
if [ "$HOST" != "" ]
then
echo "Starting ACID query on node $HOST" >> $TXN2FILE
${RSH} -n ${HOST}  sqlplus "$USER"
@$ACID_DIR/isolation/a_query $OKEY >> $TXN2FILE
else
sqlplus $USER @$ACID_DIR/isolation/a_query $OKEY >>
$TXN2FILE
fi

echo "------------------------------------------------" >>
$TXN2FILE
wait
echo "------------------------------------------------" >>
$TXN1FILE

cat $TXN1FILE $TXN2FILE >> $ISOFILE

/bin/rm -rf $TXN1FILE $TXN2FILE $KEYFILE
```

iso3.sh

```
#!/bin/ksh
#
# $Header: iso3.sh 04-aug-99.09:20:35 mpoess Exp $
#
# iso3.sh
#
#  Copyright (c) Oracle Corporation 1999. All Rights
Reserved.
#
#    NAME
#      iso3.sh - <one-line expansion of the name>
#
#  DESCRIPTION
#      Usage: iso3.sh [-u user/password] [-n remote_node] -h
#      Options: See usage below
#  NOTES
#       For a cross node isolation test, assume the local node is
#       one of the participating nodes.  The other node can be
#       specified by the -n option.
#           We need to make sure the remote node has access to
the
#           file system on the local node.  Otherwise, we need to
rcp
#           the keyfile to the remote system.
#       You need to set the environment variable
TPCD_KIT_DIR
#
#    MODIFIED   (MM/DD/YY)
#    mpoess      08/04/99 - Creation
#    mpoess      08/04/99 - Creation
#

. $KIT_DIR/env

# May need to change the following:
RSH=ssh

OH=$ORACLE_HOME
#ACID_DIR=$TPCD_KIT_DIR/audit is set in env
OUT_DIR=$ACID_OUT

DURA_DIR=$ACID_DIR/dura

TXN1FILE=$OUT_DIR/txn1$$.out
TXN2FILE=$OUT_DIR/txn2$$.out
KEYFILE=$OUT_DIR/key$$.out
ISOFILE=$OUT_DIR/iso3

USER=$DATABASE_USER
PROG=atranspl

/bin/rm -rf $TXN1FILE $TXN2FILE $KEYFILE

trap "/bin/rm -rf $TXN1FILE $TXN2FILE $KEYFILE; exit
1" 1 2 3 15

usage() {

  echo ""
  echo "Usage: $0 [-u user/passwd] [-n remote_node] -h"
  echo ""
  exit 1;
}

set -- `getopt "u:n:h" "$@"` || usage
```

Appendix C

```
while :
do
  case "$1" in
  -u) shift; USER=$1;;
  -n) shift; HOST="$1";;
  -h) usage; exit 0;;
  --) break;;
  esac
  shift
done



# generate key files

randkey 1 0.1 u"$USER" > $KEYFILE
scp $KEYFILE ${HOST}:$KEYFILE

sleep 1

# start ACID transaction, Sleep for 30 second before
COMMIT

$PROG 1 2 1 0 i$KEYFILE u$USER s30 b0 >> $TXN1FILE
&

# let's sleep 15 seconds before starting second ACID
transaction

sleep 15

# start another ACID transaction with the same LKEY and
OKEY
# but different DELTA

# Do not sleep before COMMIT so that we can see TXN2 has
waited.

if [ "$HOST" != "" ]
then
echo "Starting TXN2 on node $HOST" >> $TXN2FILE
${RSH} -n ${HOST} $PROG 2 2 1 1 i$KEYFILE u$USER
s1 b1 >> $TXN2FILE &
else
$PROG 2 2 1 1 i$KEYFILE u$USER s1 b1 >> $TXN2FILE
&
fi

wait
echo "------------------------------------------------" >>
$TXN2FILE
echo "------------------------------------------------" >>
$TXN1FILE

cat $TXN1FILE $TXN2FILE >> $ISOFILE

/bin/rm -rf $TXN1FILE $TXN2FILE $KEYFILE
```

iso4.sh

```
#!/bin/ksh
#
# $Header: iso4.sh 04-aug-99.09:21:12 mpoess Exp $
#
# iso4.sh
#
#  Copyright (c) Oracle Corporation 1999. All Rights
Reserved.
#
#    NAME
#      iso4.sh - <one-line expansion of the name>
#
#  DESCRIPTION
#      Usage: iso4.sh [-u user/password] [-n remote_node] -h
#      Options: See usage below
#  NOTES
#       For a cross node isolation test, assume the local node is
#       one of the participating nodes.  The other node can be
#       specified by the -n option.
#       We need to make sure the remote node has access to the
#       file system on the local node.  Otherwise, we need to rcp
#       the keyfile to the remote system.
#       You need to set the environment variable
TPCD_KIT_DIR
#
#    MODIFIED   (MM/DD/YY)
#    mpoess      08/04/99 - Creation
#    mpoess      08/04/99 - Creation
#

. $KIT_DIR/env

# May need to change the following:
RSH=ssh

OH=$ORACLE_HOME
# ACID_DIR=$TPCD_KIT_DIR/audit is set in env
OUT_DIR=$ACID_OUT

DURA_DIR=$ACID_DIR/dura

TXN1FILE=$OUT_DIR/txn1$$.out
TXN2FILE=$OUT_DIR/txn2$$.out
KEYFILE=$OUT_DIR/key$$.out
ISOFILE=$OUT_DIR/iso4

USER=$DATABASE_USER
PROG=atranspl

/bin/rm -rf $TXN1FILE $TXN2FILE $KEYFILE

trap "/bin/rm -rf $TXN1FILE $TXN2FILE $KEYFILE; exit
1" 1 2 3 15

usage() {

  echo ""
  echo "Usage: $0 [-u user/passwd] [-n remote_node] -h"
  echo ""
```

```
  exit 1;
}

set -- `getopt "u:n:h" "$@"` || usage

while :
do
  case "$1" in
  -u) shift; USER=$1;;
  -n) shift; HOST="$1";;
  -h) usage; exit 0;;
  --) break;;
  esac
  shift
done


# generate key files

randkey 1 0.1 u"$USER" > $KEYFILE
scp $KEYFILE ${HOST}:$KEYFILE

sleep 1

# start ACID transaction, Sleep for 30 second before
ROLLBACK

$PROG 1 2 0 0 i$KEYFILE u$USER s30 b0 >> $TXN1FILE
&

# let's sleep 15 seconds before starting second ACID
transaction

sleep 15

# start another ACID transaction with the same LKEY and
OKEY
# but different DELTA

# Do not sleep before COMMIT so that we can see TXN2 has
waited.

if [ "$HOST" != "" ]
then
echo "Starting TXN2 on node $HOST" >> $TXN2FILE
${RSH} -n ${HOST} $PROG 2 2 1 1 i$KEYFILE u$USER
s1 b1 >> $TXN2FILE &
else
$PROG 2 2 1 1 i$KEYFILE u$USER s1 b1 >> $TXN2FILE
&
fi

wait
echo "------------------------------------------------" >>
$TXN2FILE
echo "------------------------------------------------" >>
$TXN1FILE

cat $TXN1FILE $TXN2FILE >> $ISOFILE

/bin/rm -rf $TXN1FILE $TXN2FILE $KEYFILE
```

iso5.sh

```
#!/bin/ksh
#
# $Header: iso5.sh 04-aug-99.09:21:45 mpoess Exp $
#
# iso5.sh
#
#  Copyright (c) Oracle Corporation 1999. All Rights
Reserved.
#
#    NAME
#      iso5.sh - <one-line expansion of the name>
#
#  DESCRIPTION
#      Usage: iso5.sh [-u user/password] [-n remote_node] -h
#      Options: See usage below
#  NOTES
#       For a cross node isolation test, assume the local node is
#       one of the participating nodes.  The other node can be
#       specified by the -n option.
#       You need to set the environment variable
TPCD_KIT_DIR
#
#    MODIFIED   (MM/DD/YY)
#    mpoess      08/04/99 - Creation
#    mpoess      08/04/99 - Creation
#

. $KIT_DIR/env

# May need to change the following:
RSH=ssh

OH=$ORACLE_HOME
# ACID_DIR=$TPCD_KIT_DIR/audit is set in env
OUT_DIR=$ACID_OUT
DURA_DIR=$ACID_DIR/dura

TXN1FILE=$OUT_DIR/txn1$$.out
TXN2FILE=$OUT_DIR/txn2$$.out
KEYFILE=$OUT_DIR/key$$.out
ISOFILE=$OUT_DIR/iso5

USER=$DATABASE_USER
PROG=atranspl

/bin/rm -rf $TXN1FILE $TXN2FILE $KEYFILE

trap "/bin/rm -rf $TXN1FILE $TXN2FILE $KEYFILE; exit
1" 1 2 3 15

usage() {

  echo ""
  echo "Usage: $0 [-u user/passwd] [-n remote_node] -h"
  echo ""
```

```
  exit 1;
}

set -- `getopt "u:n:h" "$@"` || usage

while :
do
  case "$1" in
  -u) shift; USER=$1;;
  -n) shift; HOST="$1";;
  -h) usage; exit 0;;
  --) break;;
  esac
  shift;
done


# generate key files

randkey 1 0.1 u"$USER" > $KEYFILE
scp $KEYFILE ${HOST}:$KEYFILE

OKEY=`cat $KEYFILE | awk '{print $1}'`
echo "o_key is "$OKEY

# before the ACID transaction, let's run a ACID query to
record the
# initial state of lineitem

echo "Running ACID query BEFORE the start of Isolation
Test 5" >> $TXN1FILE
echo "`date`" >> $TXN1FILE
echo "" >> $TXN1FILE
sqlplus $USER @$ACID_DIR/isolation/a_query $OKEY >>
$TXN1FILE
echo "" >> $TXN1FILE
echo "-------------------------------------------------" >>
$TXN1FILE

sleep 1

# start ACID transaction, Sleep for 60 second before
COMMIT

$PROG 1 1 1 0 i$KEYFILE u$USER s60 >> $TXN1FILE &

# let's sleep 5 seconds before starting PARTSUPP query

sleep 5

# First generate PS_PARTKEY and PS_SUPPKEY

PSKEY=`randpsup 1`

echo "Running PARTSUPP query 5 seconds AFTER the start
of ACID Transaction" \
>> $TXN2FILE
echo "`date`" >> $TXN2FILE
echo "PS_PARTKEY and PS_SUPPKEY are: $PSKEY" >>
$TXN2FILE

if [ "$HOST" != "" ]
then
echo "Starting PARTSUPP query on node $HOST" >>
$TXN2FILE
${RSH} -n ${HOST} sqlplus $USER
@$ACID_DIR/isolation/a_query2 ${PSKEY} >>
$TXN2FILE &
else
sqlplus $USER @$ACID_DIR/isolation/a_query2 ${PSKEY}
>> $TXN2FILE &
fi

wait

echo "-------------------------------------------------" >>
$TXN2FILE
echo "-------------------------------------------------" >>
$TXN1FILE

cat $TXN1FILE $TXN2FILE >> $ISOFILE

/bin/rm -rf $TXN1FILE $TXN2FILE $KEYFILE
```

iso6.sh

```
#!/bin/ksh
#
# $Header: iso6.sh 04-aug-99.09:22:12 mpoess Exp $
#
# iso6.sh
#
#  Copyright (c) Oracle Corporation 1999. All Rights
Reserved.
#
#    NAME
#      iso6.sh - <one-line expansion of the name>
#
#  DESCRIPTION
#      Usage: iso6.sh [-u user/password] [-n remote_node] -h
#      Options: See usage below
#  NOTES
#       For a cross node isolation test, assume the local node is
#       one of the participating nodes.  The other node can be
#       specified by the -n option.
#       We need to make sure the remote node has access to the
#       file system on the local node.  Otherwise, we need to rcp
#       the keyfile to the remote system.
#       You need to set the environment variable
TPCD_KIT_DIR
#
#    MODIFIED   (MM/DD/YY)
#    mpoess      08/04/99 - Creation
#    mpoess      08/04/99 - Creation
#

. $KIT_DIR/env
```

Appendix C

```
# May need to change the following:
RSH=ssh

OH=/private/tpcd
# ACID_DIR=$TPCD_KIT_DIR/audit is set in env
OUT_DIR=$ACID_OUT

DURA_DIR=$ACID_DIR/dura

TXN1FILE=$OUT_DIR/txn1$$.out
TXN2FILE=$OUT_DIR/txn2$$.out
TXN3FILE=$OUT_DIR/txn3$$.out
KEYFILE=$OUT_DIR/key$$.out
ISOFILE=$OUT_DIR/iso6

USER=$DATABASE_USER
PROG=atranspl

/bin/rm -rf $TXN1FILE $TXN2FILE $TXN3FILE
$KEYFILE

trap "/bin/rm -rf $TXN1FILE $TXN2FILE $TXN3FILE
$KEYFILE; exit 1" 1 2 3 15

usage() {

  echo ""
  echo "Usage: $0 [-u user/passwd] [-n remote_node] -h"
  echo ""
  exit 1;
}

set -- `getopt "u:n:h" "$@"` || usage

while :
do
  case "$1" in
  -u) shift; USER=$1;;
  -n) shift; HOST="$1";;
  -h) usage; exit 0;;
  --) break;;
  esac
  shift;
done


# generate key files

randkey 1 0.1 u"$USER" > $KEYFILE
scp $KEYFILE ${HOST}:$KEYFILE

OKEY=`cat $KEYFILE | awk '{print $1}'`
echo "o_key is "$OKEY

# before the any transaction, let's run a ACID query to record
the
# initial state of lineitem
echo "Running ACID query BEFORE the start of Isolation
Test 6" >> $TXN2FILE
echo "`date`" >> $TXN2FILE
echo "" >> $TXN2FILE
sqlplus $USER @$ACID_DIR/isolation/a_query $OKEY >>
$TXN2FILE
echo "" >> $TXN2FILE
echo "-----------------------------------------------" >>
$TXN2FILE

sleep 1

# start Query 1, use 0 as the delta

echo "Running Query 17b at `date`" >> $TXN1FILE
sqlplus $USER @q1 >> $TXN1FILE &

# sleep 2 seconds before starting ACID transaction

sleep 2

# start ACID transaction, COMMIT after one second

echo "Starting AICD transaction at `date`" >> $TXN2FILE

if [ "$HOST" != "" ]
then
echo "Starting ACID transaction on node $HOST" >>
$TXN2FILE
${RSH} -n ${HOST} $PROG 1 1 1 0 i$KEYFILE u$USER
s1 >> $TXN2FILE &
else
$PROG 1 1 1 0 i$KEYFILE u$USER s1 >> $TXN2FILE &
fi

# start Query 17

sleep 2

echo "Running 2nd Query 17b at `date`" >> $TXN3FILE
sqlplus $USER @q1 >> $TXN3FILE &
# wait for everyone to finish

wait

echo "-----------------------------------------------" >>
$TXN3FILE
echo "-----------------------------------------------" >>
$TXN2FILE
echo "-----------------------------------------------" >>
$TXN1FILE

cat $TXN1FILE $TXN2FILE $TXN3FILE >> $ISOFILE

/bin/rm -rf $TXN1FILE $TXN2FILE $TXN3FILE
$KEYFILE
```

randkey.c

Appendix C

```
/* Copyright (c) 2001, 2002, Oracle Corporation.  All rights
reserved.  */

/*

  NAME
    randkey.c - <one-line expansion of the name>

  DESCRIPTION
    Generate random keys for ACID transactions:
    O_ORDERKEY unique random (1..SF*150000*4) and
only
    first 8 keys out of every 32 are populated.
      and
    L_ORDERKEY based on Clause 3.1.6.2
    DELTA random (1..100)
*/

#include <stdio.h>
#include <stdlib.h>
#include <math.h>
#include "atranspl.h"

#define ORDERCNT 150000.0

/* MK_SPARSE adopted from dss.h */

#define  MK_SPARSE(key, seq) \
       (((((key>>3)<<2)|(seq & 0x0003))<<3)|(key & 0x0007))

void sql_error();
void usage();
void ACIDinit();
long atol();
void srand48();
long lrand48();

/* Not really used here, but retained it for future purposes. */

typedef struct aciddef {
  long okey;
  long lkey;
  int delta;
} adef;

long l_key = 0;
long o_key = 0;
char lname[UNAME_LEN];
char *passwd;

/* OCI handles */

OCIEnv *tpcenv;
OCIServer *tpcsrv;
OCIError *errhp;
OCISvcCtx *tpcsvc;
OCISession *tpcusr;
OCIStmt *curi;
OCIBind *l_key_bp;
OCIBind *o_key_bp;

sword status = OCI_SUCCESS;  /* OCI return value */

char sqlstmt[1024];


void ACIDexit() {
  OCILogoff(tpcsvc,errhp);
  OCIhfree(tpcenv,OCI_HTYPE_STMT);
  OCIhfree(tpcsvc,OCI_HTYPE_SVCCTX);
  OCIhfree(tpcsrv,OCI_HTYPE_SERVER);
  OCIhfree(tpcusr,OCI_HTYPE_SESSION);
}


/* type: 0 if environment handle is passed, 1 if error handle is
passwd */

void sql_error(errhp,status,type)
     OCIError *errhp;
     sword status;
     sword type;
{
  char msg[2048];
  sb4 errcode;
  ub4 msglen;
  int i,j;

  switch(status) {
  case OCI_SUCCESS_WITH_INFO:
    fprintf(stderr, "Error: Statement returned with info.\n");
    if (type)
      (void) OCIErrorGet(errhp,1,NULL,(sb4 *) &errcode,(text
*)msg,
                         2048,OCI_HTYPE_ERROR);
    else
      (void) OCIErrorGet(errhp,1,NULL,(sb4 *) &errcode,(text
*)msg,
                         2048,OCI_HTYPE_ENV);
    fprintf(stderr,"%s\n",msg);
    break;
  case OCI_ERROR:
    fprintf(stderr, "Error: OCI call error.\n");
    if (type)
      (void) OCIErrorGet(errhp,1,NULL,(sb4 *) &errcode,(text
*)msg,
                         2048,OCI_HTYPE_ERROR);
    else
      (void) OCIErrorGet(errhp,1,NULL,(sb4 *) &errcode,(text
*)msg,
                         2048,OCI_HTYPE_ENV);
    fprintf(stderr,"%s\n",msg);
    break;
  case OCI_INVALID_HANDLE:
    fprintf(stderr, "Error: Invalid Handle.\n");
    if (type)
```

Appendix C

```
    (void) OCIErrorGet(errhp,1,NULL,(sb4 *) &errcode,(text
*)msg,
                       2048,OCI_HTYPE_ERROR);
   else
    (void) OCIErrorGet(errhp,1,NULL,(sb4 *) &errcode,(text
*)msg,
                       2048,OCI_HTYPE_ENV);
   fprintf(stderr,"%s\n",msg);
   break;
  }
 /* Rollback just in case */

 (void) OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);

 fprintf(stderr, "Exiting Oracle...\n");
 fflush(stderr);

 ACIDexit();

 exit(1);
}


main(argc, argv)
    int argc;
    char **argv;
{

 long count;
 long i;
 double sf;        /* need to accomodate sf 0.1 */
 double random;
 double ordcnt;
 adef *res;

 if ((argc < 3) || (argc > 4)) {
  usage();
  exit(-1);
 }

 strcpy((char *) lname, "tpcd/tpcd");

 count = atol(argv[1]);
 sf = atof(argv[2]);

 argc -= 2;
 argv += 2;

 while (--argc) {
  ++argv;
  switch(argv[0][0]) {
  case 'u':
    strncpy((char *) lname, ++(argv[0]), UNAME_LEN);
    if (strchr((char *) lname, '/') == NULL) {
      usage();
      exit(-1);
    }
    break;
  default:
    fprintf(stderr, "Unknown argument %s\n", argv[0]);
    usage();
    break;
  }
 }

 ACIDinit();

 /* initialize array for random numbers */

 res = (adef *) malloc(count*sizeof(adef));
 ordcnt = (double) ORDERCNT * (double) sf;

 for (i=0; i<count; i++) {

   /* The algorithm:                                    */
   /* Assumes drand's output is 'unique', first get a number
within */
   /* the range of [0..sf*ORDERCNT) and then maps the
different     */
   /* ranges to generate the real output.                */

   random = floor(drand48() * (double) ordcnt) + 1;
   res[i].okey = o_key = (long) MK_SPARSE((long) random,
0);
   res[i].delta = (long) floor(drand48() * 100) + 1;

   /* Obtain l_key from l_key query */

   OCIsexec(tpcsvc,curi,errhp,1);

   /* l_key is the highest l_linenumber available.  We need to
pick */
   /* at random a number between 1..l_key.               */

   res[i].lkey = (lrand48() % l_key) + 1;

   printf("%ld %ld %d\n", res[i].okey, res[i].lkey, res[i].delta);
 }

 ACIDexit();
 free(res);

}


void usage() {

 fprintf(stderr, "Usage: randkey <number of random keys to
generate> <SF> u<user/password>\n");
 fprintf(stderr, "\n");
}

void ACIDinit()
{

 /* run random seed */

 srand48(getpid());
```

Appendix C

```
  /* Connect to ORACLE.  Program will call sql_error()
     if an error occurs in connecting to the default database. */

  (void) OCIInitialize(OCI_DEFAULT,(dvoid *)0,0,0,0);
  if((status=OCIEnvInit((OCIEnv
**)&tpcenv,OCI_DEFAULT,0,(dvoid **)0)) !=
     OCI_SUCCESS)
    sql_error(tpcenv, status, 0);

  OCIhalloc(tpcenv,&errhp,OCI_HTYPE_ERROR);
  OCIhalloc(tpcenv,&curi,OCI_HTYPE_STMT);
  OCIhalloc(tpcenv,&tpcsvc,OCI_HTYPE_SVCCTX);
  OCIhalloc(tpcenv,&tpcsrv,OCI_HTYPE_SERVER);
  OCIhalloc(tpcenv,&tpcusr,OCI_HTYPE_SESSION);

  /* get username and password */

  passwd = strchr(lname, '/');
  *passwd = '\0';
  passwd++;

  if ((status=OCIServerAttach(tpcsrv,errhp,(text
*)0,0,OCI_DEFAULT))!=OCI_SUCCESS)
    sql_error(errhp,status,1);


OCIaset(tpcsvc,OCI_HTYPE_SVCCTX,tpcsrv,0,OCI_ATTR
_SERVER,errhp);

OCIaset(tpcusr,OCI_HTYPE_SESSION,lname,strlen(lname),
OCI_ATTR_USERNAME,
        errhp);

OCIaset(tpcusr,OCI_HTYPE_SESSION,passwd,strlen(passw
d),OCI_ATTR_PASSWORD,
        errhp);

  if ((status = OCISessionBegin(tpcsvc, errhp, tpcusr,
OCI_CRED_RDBMS,
                        OCI_DEFAULT)) != OCI_SUCCESS)
    sql_error(errhp,status,1);


OCIaset(tpcsvc,OCI_HTYPE_SVCCTX,tpcusr,0,OCI_ATTR
_SESSION,errhp);

  /* Open and Parse cursor for query to choose determine
l_key. */
  /* Binds l_key to :l_key.                              */

  sprintf((char *) sqlstmt,SQLTXT1);
  OCIStmtPrepare(curi,errhp,(text *)sqlstmt,strlen((char
*)sqlstmt),
              OCI_NTV_SYNTAX,OCI_DEFAULT);


OCIbbname(curi,l_key_bp,errhp,":l_key",ADR(l_key),SIZ(l_
key),SQLT_INT);

OCIbbname(curi,o_key_bp,errhp,":o_key",ADR(o_key),SIZ(
o_key),SQLT_INT);
}
```

randpsup.c

```
/* Copyright (c) 2001, 2002, Oracle Corporation.  All rights
reserved.  */

/*

   NAME
     randpsup.c - <one-line expansion of the name>

   DESCRIPTION
     Generate random keys for ACID PARTSUPP transactions:
     (Clause 4.2.3)
     PS_PARTKEY random within [SF*200000]
       and
     PS_SUPPKEY = (PS_PARTKEY + (i * ((S/4) +
(int)(PS_PARTKEY - 1)
                /S))) % S + 1
     where i random within [0..3] and S = SF * 10000

MODIFIED
   mpoess      10/23/02 - mpoess_update_from_visa
   mpoess      01/04/01 - Creation

*/

#include <stdio.h>
#include <stdlib.h>
#include <math.h>

#define PS_PER_SF 200000.0
#define S_PER_SF 10000.0
#define SUPP_PER_PART 4

/* borrowed from build.c in the dbgen distribution */

#define PART_SUPP_BRIDGE(tgt, p, s) \
    { \
    long tot_scnt = (long) (S_PER_SF * sf); \
    tgt = (p + s *  (tot_scnt / SUPP_PER_PART +  \
       (long) ((p - 1) / tot_scnt))) % tot_scnt + 1; \
    }

void usage();
double atof();
void srand48();
long lrand48();


main(argc, argv)
     int argc;
     char **argv;
{

  double sf = 0.1;          /* scale factor      */
```

```
 long supp;              /* the i-th supplier */
 long pkey;              /* partkey           */
 long maxpkey;             /* highest partkey   */
 long ps_skey;            /* ps_suppkey        */

 if (argc < 2) {
   usage();
   exit(-1);
 }

 /* seed the random number generator */

 srand48(getpid());

 sf = atof(argv[1]);
 maxpkey = (long) (sf * PS_PER_SF);
 supp = lrand48() % 4;
 pkey = lrand48() % maxpkey + 1;

 PART_SUPP_BRIDGE(ps_skey, pkey, supp);

 fprintf(stdout, "%ld %ld", pkey, ps_skey);

 exit(0);
}


void usage()
{
 fprintf(stderr, "Usage: randpsup <SF>\n\n");
}
```

run_acid.sh

```
#!/bin/ksh
#
# $Header: run_acid.sh 08-aug-99.15:30:10 mpoess Exp $
#
# run_acid.sh
#
#  Copyright (c) Oracle Corporation 1999. All Rights
Reserved.
#
#   NAME
#     run_acid.sh - <one-line expansion of the name>
#
#  DESCRIPTION
#     Usage: run_acid.sh [-n iter] [-s stream] [-p prog] [-i
infile]
#                        [-o outfile] [-d durafile] [-u usr/pswd]
#                        [-t trigger] [-f scale factor] -h
#
#     Options: See usage below
#
#   MODIFIED   (MM/DD/YY)
#   mpoess      08/08/99 - Creation
#   mpoess      08/08/99 - Creation
#
. $KIT_DIR/env

OH=$ORACLE_HOME
ACID_DIR=$ACID_DIR
OUT_DIR=$ACID_OUT

usage() {

   echo ""
   echo "Usage: $0 [-n iter] [-s stream] [-p prog] [-i infile] [-o
outfile]"
   echo "          [-d durafile] [-u usr/pswd] -h"
   echo ""
   echo "-n iter     : number of iterations, default is 100"
   echo "-s stream   : number of streams, default is 2"
   echo "-p prog     : program to run, default is atranspl.ott"
   echo "-i infile   : input file prefix, suffix by process number
within a"
   echo "              stream and run ID, default is ./acid_in"
   echo "-o outfile  : output file prefix, similar to input file"
   echo "              default is ./out/acid_out"
   echo "-d durafile : durability file prefix, used for durability
tests"
   echo "              default is ./dura/acid_dura"
   echo "-u usr/pswd : user/password combo for database
access, default is tpch/tpch"
   echo "-t trigger  : trigger time between process starts, default
is 1 second"
   echo "-h          : print this usage summary"
   exit 1;
}

ITER=600
STEM=${NUM_STREAMS}
let STEM="$STEM + 1" # add one for the update stream
SF=1
PROG=atranspl
IN=${ACID_DIR}/acid_in
DURA_DIR=$ACID_OUT/dura
OUT=$DURA_DIR/drate
DURA=$DURA_DIR/dura
KEY=${DURA_DIR}/key$$_
echo "$$" > ${DURA_DIR}/shellpid
USER=tpch/tpch
TRIG=1
HCNT=duracntb

set -- `getopt "n:s:p:i:o:d:u:ht:f:" "$@"` || usage

# get all the options

while :
do
   case "$1" in
   -n) shift; ITER=$1;;
   -s) shift; STEM=$1;;
   -p) shift; PROG=$1;;
   -i) shift; IN=$1;;
   -o) shift; OUT=$1;;
```

```
  -d) shift; DURA=$1;;
  -u) shift; USER=$1;;
  -h) usage; exit 0;;
  -t) shift; TRIG=$1;;
  -f) shift; SF=$1;;
  --) break;;
  esac
  shift;
done



echo "Starting ACID run..."

i=0
T=`expr $STEM \* $TRIG + 6`

# Get history count before the run

sqlplus $USER @cnt_hist > $DURA_DIR/$HCNT 2>&1

while [ $i -lt $STEM ]
do
  randkey $ITER ${SF} u${USER} > ${KEY}${i} &
  i=`expr $i + 1`
done

wait
# perform the consistency

i=0
while [ $i -lt $STEM ]
do
  for j in `head -10 ${KEY}${i} | awk '{printf "%d ",$1}'`
  do
    sqlplus tpch/tpch @consist $j >> $DURA_DIR/duraconsb
  done
  i=`expr $i + 1`
done

echo "Starting Transaction Counting Program"
count_tx.sh $STEM 100 $DURA_DIR &

i=0
while [ $i -lt $STEM ]
do

  $PROG $i $STEM 1 0 i${KEY}${i} o${OUT}${i}
d${DURA}${i} u$USER s1 &
  T=`expr $T - $TRIG`
  i=`expr $i + 1`

done

wait

echo "ACID run completed"
```

sample.sh

```
#!/bin/ksh
#
# $Header: sample.sh 08-aug-99.17:10:00 mpoess Exp $
#
# sample.sh
#
#  Copyright (c) Oracle Corporation 1999. All Rights
Reserved.
#
#    NAME
#      sample.sh - <one-line expansion of the name>
#
#    DESCRIPTION
#      <short description of component this file
declares/defines>
#
#    NOTES
#      <other useful comments, qualifications, etc.>
#
#    MODIFIED   (MM/DD/YY)
#    mpoess      08/08/99 - Creation
#    mpoess      08/08/99 - Creation
#

# $1 durability output file

. $KIT_DIR/env

cat $1 | grep o_key | awk '{printf "%d \n", $2}' | head -106 >
/tmp/okey$$
cat $1 | grep l_key | awk '{printf "%d \n", $2}' | head -106 >
/tmp/lkey$$



paste /tmp/okey$$ /tmp/lkey$$ > /tmp/keys$$
tail -6 /tmp/keys$$ > /tmp/6keys$$

echo "Keys chosen are:"
cat /tmp/6keys$$

i=1
while [ $i -le 6 ]
do
j=`cat /tmp/6keys$$ | tail -${i} | head -1`
sqlplus tpch/tpch @sample $j
i=`expr $i + 1`
done
#/bin/rm -f /tmp/*key*
```

sample.sql

```
Rem
Rem $Header: sample.sql 08-aug-99.17:10:34 mpoess Exp $
Rem
Rem sample.sql
Rem
Rem  Copyright (c) Oracle Corporation 1999. All Rights
Reserved.
Rem
Rem    NAME
```

Appendix C

```
Rem      sample.sql - <one-line expansion of the name>
Rem
Rem    DESCRIPTION
Rem      <short description of component this file
declares/defines>
Rem
Rem    NOTES
Rem      <other useful comments, qualifications, etc.>
Rem
Rem    MODIFIED   (MM/DD/YY)
Rem    mpoess      08/08/99 - Creation
Rem    mpoess      08/08/99 - Created
Rem
alter session set nls_date_format = 'YYYY-MM-DD
HH:MI:SS';
select * from history where  h_o_key = &&1 and
h_l_key = &&2;
exit;
```

Appendix D: Query text and Output

Appendix E

1.log

Begin Execution at Tue Mar 28 16:20:59 2006

-- using default substitutions

```
select
l_returnflag,
l_linestatus,
sum(l_quantity) as sum_qty,
sum(l_extendedprice) as sum_base_price,
sum(l_extendedprice * (1 - l_discount)) as sum_disc_price,
sum(l_extendedprice * (1 - l_discount) * (1 + l_tax)) as
sum_charge,
avg(l_quantity) as avg_qty,
avg(l_extendedprice) as avg_price,
avg(l_discount) as avg_disc,
count(*) as count_order
from
lineitem
where
l_shipdate <= to_date ('1998-12-01','YYYY-MM-DD')  -  90
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          37734107.00          56586554400.73
53758257134.87        55909065222.83        25.52
38273.13              0.05                  1478493.00
N          F          991417.00            1487504710.38
1413082168.05         1469649223.19         25.52
38284.47              0.05                  38854.00
N          O          74476040.00          111701729697.74
106118230307.61       110367043872.50       25.50
38249.12              0.05                  2920374.00
R          F          37719753.00          56568041380.90
53741292684.60        55889619119.83        25.51
38250.85              0.05                  1478870.00
```

4 rows processed.
Query Processed in 6.66 seconds.

Ended Executing this Stream at Tue Mar 28 16:21:06 2006

Stream Started at 1143584459.50
Stream Ended at 1143584466.17
Stream Processed in 6.66 seconds

2.log

Begin Execution at Tue Mar 28 16:21:06 2006

-- using default substitutions

```
select * from (
select
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
)
where rownum <= 100
S_ACCTBAL            S_NAME                N_NAME
```

Appendix D

P_PARTKEY P_MFGR S_ADDRESS S_PHONE S_COMMENT

9938.53 Supplier#000005359 UNITED KINGDOM
185358.00 Manufacturer#4 QKuHYh,vZGiwu2FWEJoLDx04 33-429-790-6131
blithely silent pinto beans are furiously. slyly final deposits acros

9937.84 Supplier#000005969 ROMANIA
108438.00 Manufacturer#1 ANDENSOSmk,miq23Xfb5RWt6dvUcvt6Qa 29-520-692-3537
carefully slow deposits use furiously. slyly ironic platelets above the ironic

9936.22 Supplier#000005250 UNITED KINGDOM
249.00 Manufacturer#4 B3rqp0xbSEim4Mpy2RH J 33-320-228-2957
blithely special packages are. stealthily express deposits across the closely fi
nal instructi
9923.77 Supplier#000002324 GERMANY
29821.00 Manufacturer#4 y3OD9UywSTOk 17-779-299-1839
quickly express packages breach quiet pinto beans. requ

9871.22 Supplier#000006373 GERMANY
43868.00 Manufacturer#5 J8fcXWsTqM 17-813-485-8637
never silent deposits integrate furiously blit

.
.
.
.
7894.56 Supplier#000007981 GERMANY
85472.00 Manufacturer#4 NSJ96vMROAbeXP 17-963-404-3760
regular, even theodolites integrate carefully. bold, special theodolites are sly
ly fluffily iron
7887.08 Supplier#000009792 GERMANY
164759.00 Manufacturer#3 Y28ITVeYriT3kIGdV2K8fSZ V2UqT5H1Otz 17-988-938-4296
pending, ironic packages sleep among the carefully ironic accounts. quickly fina
l accounts
7871.50 Supplier#000007206 RUSSIA
104695.00 Manufacturer#1 3w fNCnrVmvJjE95sgWZzvW 32-432-452-7731
furiously dogged pinto beans cajole. bold, express notornis until the slyly pend
ing

7852.45 Supplier#000005864 RUSSIA
8363.00 Manufacturer#4 WCNfBPZeSXh3h,c 32-454-883-3821
blithely regular deposits

7850.66 Supplier#000001518 UNITED KINGDOM
86501.00 Manufacturer#1 ONda3YJiHKJOC 33-730-383-3892
furiously final accounts wake carefully idle requests. even dolphins wake acc

7843.52 Supplier#000006683 FRANCE
11680.00 Manufacturer#4 2Z0JGkiv01Y00oCFwUGfviIbhzCdy 16-464-517-8943
carefully bold accounts doub

100 rows processed.
Query Processed in 0.69 seconds.

Ended Executing this Stream at Tue Mar 28 16:21:06 2006

Stream Started at 1143584466.27
Stream Ended at 1143584466.96
Stream Processed in 0.69 seconds

3.log

Begin Execution at Tue Mar 28 16:21:07 2006

-- using default substitutions

```
select * from (
select
l_orderkey,
sum(l_extendedprice * (1 - l_discount)) as revenue,
o_orderdate,
o_shippriority
from
customer,
orders,
lineitem
where
c_mktsegment = 'BUILDING'
and c_custkey = o_custkey
and l_orderkey = o_orderkey
and o_orderdate < to_date( '1995-03-15', 'YYYY-MM-DD')
and l_shipdate > to_date( '1995-03-15', 'YYYY-MM-DD')
group by
l_orderkey,
o_orderdate,
```

```
o_shippriority
order by
revenue desc,
o_orderdate)
where rownum <= 10

L_ORDERKEY          REVENUE
O_ORDERDATE O_SHIPPRIORITY

2456423.00          406181.01           1995-03-05  0.00

3459808.00          405838.70           1995-03-04  0.00

492164.00           390324.06           1995-02-19  0.00

1188320.00          384537.94           1995-03-09  0.00

2435712.00          378673.06           1995-02-26  0.00

4878020.00          378376.80           1995-03-12  0.00

5521732.00          375153.92           1995-03-13  0.00

2628192.00          373133.31           1995-02-22  0.00

993600.00           371407.46           1995-03-05  0.00

2300070.00          367371.15           1995-03-13  0.00



10 rows processed.
Query Processed in 3.43 seconds.


Ended Executing this Stream at Tue Mar 28 16:21:10 2006


Stream Started at 1143584467.05
Stream Ended at 1143584470.49
Stream Processed in 3.43 seconds
```

4.log

```
Begin Execution at Tue Mar 28 16:21:10 2006



-- using default substitutions


select
o_orderpriority,
count(*) as order_count
from
orders
where
o_orderdate >= to_date( '1993-07-01',  'YYYY-MM-DD')
and o_orderdate < add_months(to_date( '1993-07-01',
'YYYY-MM-DD'),3)
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        10594.00
2-HIGH          10476.00
3-MEDIUM        10410.00
4-NOT SPECIFIED 10556.00
5-LOW           10487.00


5 rows processed.
Query Processed in 2.72 seconds.


Ended Executing this Stream at Tue Mar 28 16:21:13 2006


Stream Started at 1143584470.58
Stream Ended at 1143584473.30
Stream Processed in 2.72 seconds


SQL statements processed: 1
```

5.log

```
Begin Execution at Tue Mar 28 16:21:13 2006



-- using default substitutions


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 >= to_date( '1994-01-01',  'YYYY-MM-DD')
and o_orderdate < add_months(to_date( '1994-01-01',
'YYYY-MM-DD'),  12)
group by
n_name
order by
revenue desc
```

```
N_NAME                REVENUE
INDONESIA              55502041.17
VIETNAM               55295087.00
CHINA                 53724494.26
INDIA                 52035512.00
JAPAN                  45410175.70
```

5 rows processed.
Query Processed in 3.34 seconds.

Ended Executing this Stream at Tue Mar 28 16:21:16 2006

Stream Started at 1143584473.39
Stream Ended at 1143584476.73
Stream Processed in 3.34 seconds

6.log

Begin Execution at Tue Mar 28 16:21:16 2006

-- using default substitutions

```
select
sum(l_extendedprice * l_discount) as revenue
from
lineitem
where
l_shipdate >= to_date( '1994-01-01',  'YYYY-MM-DD')
and l_shipdate < add_months(to_date( '1994-01-01',  'YYYY-
MM-DD'),  12)
and l_discount between .06 - 0.01 and .06 + 0.01
and l_quantity < 24
```

```
REVENUE
123141078.23
```

1 row processed.
Query Processed in 0.56 seconds.

Ended Executing this Stream at Tue Mar 28 16:21:17 2006

Stream Started at 1143584476.82
Stream Ended at 1143584477.38
Stream Processed in 0.56 seconds

SQL statements processed: 1

7.log

Begin Execution at Tue Mar 28 16:21:17 2006

-- using default substitutions

```
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,
                to_number (to_char (l_shipdate,'yyyy')) 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 to_date( '1995-01-01', 'YYYY-MM-
DD') and to_date( '1996-1
2-31', 'YYYY-MM-DD')
) 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              1995.00
54639732.73
FRANCE               GERMANY              1996.00
54633083.31
GERMANY              FRANCE               1995.00
52531746.67
GERMANY              FRANCE               1996.00
52520549.02
4 rows processed.
Query Processed in 3.12 seconds.


Ended Executing this Stream at Tue Mar 28 16:21:20 2006


Stream Started at 1143584477.47
Stream Ended at 1143584480.60
Stream Processed in 3.12 seconds
```

8.log

```
Begin Execution at Tue Mar 28 16:21:20 2006


-- using default substitutions


select
o_year,
sum(case when nation='BRAZIL' then volume else 0 end )/
sum(volume)
as mkt_share
from
(
select
to_number (to_char (o_orderdate, 'yyyy')) 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 to_date ('1995-01-01', 'YYYY-MM-
DD') and to_date ('1996-
12-31', 'YYYY-MM-DD')
and p_type = 'ECONOMY ANODIZED STEEL'
) all_nations
group by
o_year
order by
o_year

O_YEAR          MKT_SHARE
1995.00         0.03
1996.00         0.04


2 rows processed.
Query Processed in 3.02 seconds.


Ended Executing this Stream at Tue Mar 28 16:21:23 2006


Stream Started at 1143584480.69
Stream Ended at 1143584483.71
Stream Processed in 3.02 seconds
```

9.log

```
Begin Execution at Tue Mar 28 16:21:23 2006


-- using default substitutions


select
nation,
o_year,
sum(amount) as sum_profit
from
(
select
n_name as nation,
to_number (to_char (o_orderdate, 'yyyy')) 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%'
) profit
group by
nation,
o_year
order by
nation,
o_year desc
```

NATION	O_YEAR	SUM_PROFIT
ALGERIA	1998.00	31342867.23
ALGERIA	1997.00	57138193.02
ALGERIA	1996.00	56140140.13
ALGERIA	1995.00	53051469.65
ALGERIA	1994.00	53867582.13
ALGERIA	1993.00	54942718.13
ALGERIA	1992.00	54628034.71
ARGENTINA	1998.00	30211185.71
ARGENTINA	1997.00	50805741.75
ARGENTINA	1996.00	51923746.58
ARGENTINA	1995.00	49298625.77
ARGENTINA	1994.00	50835610.11
ARGENTINA	1993.00	51646079.18
ARGENTINA	1992.00	50410314.99
BRAZIL	1998.00	27217924.38
BRAZIL	1997.00	48378669.20
BRAZIL	1996.00	50482870.36
.		
.		
.		
UNITED STATES	1998.00	25126238.95
UNITED STATES	1997.00	50077306.42
UNITED STATES	1996.00	48048649.47
UNITED STATES	1995.00	48809032.42
UNITED STATES	1994.00	49296747.18
UNITED STATES	1993.00	48029946.80
UNITED STATES	1992.00	48671944.50
VIETNAM	1998.00	30442736.06
VIETNAM	1997.00	50309179.79
VIETNAM	1996.00	50488161.41
VIETNAM	1995.00	49658284.61
VIETNAM	1994.00	50596057.26
VIETNAM	1993.00	50953919.15
VIETNAM	1992.00	49613838.32

175 rows processed.
Query Processed in 5.23 seconds.

Ended Executing this Stream at Tue Mar 28 16:21:29 2006

Stream Started at 1143584483.80
Stream Ended at 1143584489.03
Stream Processed in 5.23 seconds

10.log

Begin Execution at Tue Mar 28 16:21:29 2006

-- using default substitutions

```
select  *  from  (
select
c_custkey,
c_name,
sum(l_extendedprice * (1 - l_discount)) as revenue,
c_acctbal,
n_name,
c_address,
c_phone,
c_comment
from
customer,
orders,
lineitem,
nation
where
c_custkey = o_custkey
and l_orderkey = o_orderkey
and o_orderdate >= to_date ('1993-10-01',  'YYYY-MM-DD')
and o_orderdate < add_months(  to_date( '1993-10-01',
'YYYY-MM-DD'),  3)
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)
where rownum <= 20
```

C_CUSTKEY	C_NAME	REVENUE
C_ACCTBAL	N_NAME	
C_ADDRESS	C_PHONE	
C_COMMENT		
57040.00	Customer#000057040	734235.25
632.87	JAPAN	
Eioyzjf4pp	22-895-641-3466	
requests sleep blithely about the furiously i		

143347.00 Customer#000143347 721002.69
2557.47 EGYPT
1aReFYv,Kw4 14-742-935-3718
fluffily bold excuses haggle finally after the u
.
.
.
52528.00 Customer#000052528 556397.35
551.79 ARGENTINA
NFztyTOR10UOJ 11-208-192-3205
unusual requests detect. slyly dogged theodolites use slyly.
deposit

23431.00 Customer#000023431 554269.54
3381.86 ROMANIA
HgiV0phqhaIa9aydNoIlb 29-915-458-2654
instructions nag quickly. furiously bold accounts cajol

20 rows processed.
Query Processed in 3.31 seconds.

Ended Executing this Stream at Tue Mar 28 16:21:32 2006

Stream Started at 1143584489.12
Stream Ended at 1143584492.44
Stream Processed in 3.31 seconds

11.log

Begin Execution at Tue Mar 28 16:21:32 2006

-- using default substitutions

```
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
129760.00	17538456.86
166726.00	16503353.92
191287.00	16474801.97
161758.00	16101755.54
34452.00	15983844.72
139035.00	15907078.34
9403.00	15451755.62
154358.00	15212937.88
38823.00	15064802.86
85606.00	15053957.15
33354.00	14408297.40
154747.00	14407580.68
82865.00	14235489.78
76094.00	14094247.04
222.00	13937777.74
121271.00	13908336.00
55221.00	13716120.47
22819.00	13666434.28
76281.00	13646853.68
85298.00	13581154.93
85158.00	13554904.00
139684.00	13535538.72
.	
.	
.	
77207.00	7897752.72
96712.00	7897575.27
10157.00	7897046.25
171154.00	7896814.50
79373.00	7896186.00
113808.00	7893353.88
27901.00	7892952.00
128820.00	7892882.72
25891.00	7890511.20
122819.00	7888881.02
154731.00	7888301.33
101674.00	7879324.60
51968.00	7879102.21
72073.00	7877736.11
5182.00	7874521.73

1048 rows processed.
Query Processed in 1.20 seconds.

Ended Executing this Stream at Tue Mar 28 16:21:33 2006

Appendix D

Stream Started at 1143584492.53
Stream Ended at 1143584493.73
Stream Processed in 1.20 seconds

12.log

Begin Execution at Tue Mar 28 16:21:33 2006

-- using default substitutions

```
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 >= to_date( '1994-01-01',  'YYYY-MM-
DD')
and l_receiptdate < add_months(to_date ('1994-01-01',
'YYYY-MM-DD'),  12)
group by
      l_shipmode
order by
      l_shipmode
```

L_SHIPMODE HIGH_LINE_COUNT
LOW_LINE_COUNT
MAIL 6202.00 9324.00
SHIP 6200.00 9262.00

2 rows processed.
Query Processed in 2.46 seconds.

Ended Executing this Stream at Tue Mar 28 16:21:36 2006

Stream Started at 1143584493.83
Stream Ended at 1143584496.29
Stream Processed in 2.46 seconds

13.log

Begin Execution at Tue Mar 28 16:21:36 2006

-- using default substitutions

```
select
c_count,
count(*) as custdist
from
(
select
c_custkey,
count(o_orderkey)  as  c_count
from
customer, orders where
c_custkey = o_custkey(+)
and o_comment(+) not like '%special%requests%'
group by
c_custkey
) c_orders
group by
c_count
order by
custdist desc,
c_count desc
```

C_COUNT	CUSTDIST
0.00	50004.00
9.00	6641.00
10.00	6566.00
11.00	6058.00
8.00	5949.00
12.00	5553.00
13.00	4989.00
19.00	4748.00
7.00	4707.00
18.00	4625.00
15.00	4552.00
17.00	4530.00
14.00	4484.00
20.00	4461.00
16.00	4323.00
21.00	4217.00
22.00	3730.00
6.00	3334.00
23.00	3129.00
24.00	2622.00
25.00	2079.00

```
5.00            1972.00
26.00           1593.00
27.00           1185.00
4.00            1033.00
28.00           869.00
29.00           559.00
3.00            398.00
30.00           373.00
31.00           235.00
2.00            144.00
32.00           128.00
33.00           71.00
34.00           48.00
35.00           33.00
1.00            23.00
36.00           17.00
37.00           7.00
40.00           4.00
38.00           4.00
39.00           2.00
41.00           1.00


42 rows processed.
Query Processed in 3.09 seconds.


Ended Executing this Stream at Tue Mar 28 16:21:39 2006


Stream Started at 1143584496.38
Stream Ended at 1143584499.47
Stream Processed in 3.09 seconds
```

14.log

```
Begin Execution at Tue Mar 28 16:21:39 2006



-- using default substitutions


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 >= date '1995-09-01'
      and l_shipdate < date '1995-09-01' + interval '1' month

PROMO_REVENUE
16.38

1 row processed.
Query Processed in 0.53 seconds.


Ended Executing this Stream at Tue Mar 28 16:21:40 2006


Stream Started at 1143584499.56
Stream Ended at 1143584500.09
Stream Processed in 0.53 seconds
```

15.log

```
Begin Execution at Tue Mar 28 16:21:40 2006



-- using default substitutions


with   revenue
as (select
l_suppkey supplier_no,
sum(l_extendedprice * (1 - l_discount)) total_revenue
from
lineitem
where
            l_shipdate >= date '1996-01-01'
            and l_shipdate < date '1996-01-01' + interval '3'
month
group by
l_suppkey)
select
s_suppkey,
s_name,
s_address,
s_phone,
total_revenue
from
supplier,
revenue
where
s_suppkey = supplier_no
and total_revenue = (
select
max(total_revenue)
from
revenue  )
order by
s_suppkey

S_SUPPKEY           S_NAME
S_ADDRESS                       S_PHONE
TOTAL_REVENUE
8449.00             Supplier#000008449
```

Wp34zim9qYFbVctdW 20-469-856-8873
1772627.21

1 row processed.
Query Processed in 17.28 seconds.

Ended Executing this Stream at Tue Mar 28 16:21:57 2006

Stream Started at 1143584500.18
Stream Ended at 1143584517.46
Stream Processed in 17.28 seconds

16.log
Begin Execution at Tue Mar 28 16:21:57 2006

-- using default substitutions

```
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 3.00 28.00
Brand#54 STANDARD BRUSHED COPPER 14.00 27.00
Brand#11 STANDARD BRUSHED TIN 23.00 24.00
Brand#11 STANDARD BURNISHED BRASS 36.00 24.00
Brand#15 MEDIUM ANODIZED NICKEL 3.00 24.00
Brand#15 SMALL ANODIZED BRASS 45.00 24.00
Brand#15 SMALL BURNISHED NICKEL 19.00 24.00
Brand#21 MEDIUM ANODIZED COPPER 3.00 24.00
Brand#22 SMALL BRUSHED NICKEL 3.00 24.00
.
.
.
Brand#15 LARGE PLATED NICKEL 45.00 3.00
Brand#15 LARGE POLISHED NICKEL 9.00 3.00
Brand#21 PROMO BURNISHED STEEL 45.00 3.00
Brand#22 STANDARD PLATED STEEL 23.00 3.00
Brand#25 LARGE PLATED STEEL 19.00 3.00
Brand#32 STANDARD ANODIZED COPPER 23.00 3.00
Brand#33 SMALL ANODIZED BRASS 9.00 3.00
Brand#35 MEDIUM ANODIZED TIN 19.00 3.00
Brand#51 SMALL PLATED BRASS 23.00 3.00
Brand#52 MEDIUM BRUSHED BRASS 45.00 3.00
Brand#53 MEDIUM BRUSHED TIN 45.00 3.00

Brand#54 ECONOMY POLISHED BRASS 9.00
3.00

Brand#55 PROMO PLATED BRASS 19.00
3.00

Brand#55 STANDARD PLATED TIN 49.00
3.00

18314 rows processed.
Query Processed in 0.82 seconds.

Ended Executing this Stream at Tue Mar 28 16:21:58 2006

Stream Started at 1143584517.55
Stream Ended at 1143584518.37
Stream Processed in 0.82 seconds

17.log
Begin Execution at Tue Mar 28 16:21:58 2006

-- using default substitutions

```
select
sum(l_extendedprice) / 7.0 as avg_yearly
from
lineitem ,
part
where
p_partkey = l_partkey
and p_brand = 'Brand#23'
and p_container = 'MED BOX'
and l_quantity < (
select
0.2 * avg(l_quantity)
from
lineitem
where
l_partkey = p_partkey
)
```

AVG_YEARLY
348406.05

1 row processed.
Query Processed in 2.56 seconds.

Ended Executing this Stream at Tue Mar 28 16:22:01 2006

Stream Started at 1143584518.77
Stream Ended at 1143584521.33
Stream Processed in 2.56 seconds

18.log
Begin Execution at Tue Mar 28 16:22:01 2006

-- using default substitutions

```
select * from (
select
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
)
where rownum <= 100
```

C_NAME C_CUSTKEY O_ORDERKEY
O_ORDERD
ATE
O_TOTALPRICE SUM(L_QUANTITY)
Customer#000128120 128120.00 4722021.00
1994-04-
07
544089.09 323.00
Customer#000144617 144617.00 3043270.00
1997-02-

```
12
530604.44          317.00
Customer#000013940        13940.00          2232932.00
1997-04-
13
522720.61          304.00
Customer#000066790        66790.00          2199712.00
1996-09-
30
```

19.log

```
Begin Execution at Tue Mar 28 16:22:06 2006



-- using default substitutions


select
sum(l_extendedprice* (1 - l_discount)) as revenue
from
lineitem,
part
where
(
p_partkey = l_partkey
and p_brand = 'Brand#12'
and p_container in ('SM CASE', 'SM BOX', 'SM PACK', 'SM
PKG')
and l_quantity >= 1 and l_quantity <= 1 + 10
and p_size between 1 and 5
and l_shipmode in ('AIR', 'AIR REG')
and l_shipinstruct = 'DELIVER IN PERSON'
)
or
(
p_partkey = l_partkey
and p_brand = 'Brand#23'
and p_container in ('MED BAG', 'MED BOX', 'MED PKG',
'MED PACK')
and l_quantity >= 10 and l_quantity <= 10 + 10
and p_size between 1 and 10
and l_shipmode in ('AIR', 'AIR REG')
and l_shipinstruct = 'DELIVER IN PERSON'
)
or
(
p_partkey = l_partkey
and p_brand = 'Brand#34'
and p_container in ('LG CASE', 'LG BOX', 'LG PACK', 'LG
PKG')
and l_quantity >= 20 and l_quantity <= 20 + 10
and p_size between 1 and 15
and l_shipmode in ('AIR', 'AIR REG')
and l_shipinstruct = 'DELIVER IN PERSON'
)

REVENUE
3083843.06


1 row processed.
Query Processed in 3.09 seconds.


Ended Executing this Stream at Tue Mar 28 16:22:09 2006


Stream Started at 1143584526.57
Stream Ended at 1143584529.66
Stream Processed in 3.09 seconds
```

20.log

```
Begin Execution at Tue Mar 28 16:22:09 2006


-- using default substitutions


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 >= to_date ('1994-01-01', 'YYYY-MM-DD')
and l_shipdate < add_months( to_date ('1994-01-01', 'YYYY-
MM-DD'), 12)
)
)
and s_nationkey = n_nationkey
and n_name = 'CANADA'
order by
```

Appendix E

s_name

S_NAME S_ADDRESS
Supplier#000000020 iybAE,RmTymrZVYaFZva2SH,j
Supplier#000000091
YV45D7TkfdQanOOZ7q9QxkyGUapU1oOWU6q3
Supplier#000000197
YC2Acon6kjY3zj3Fbxs2k4Vdf7X0cd2F
Supplier#000000226 83qOdU2EYRdPQAQhEtn GRZEd
Supplier#000000285 Br7e1nnt1yxrw6ImgpJ7YdhFDjuBf
Supplier#000000378 FfbhyCxWvcPrO8ltp9
Supplier#000000402
i9Sw4DoyMhzhKXCH9By,AYSgmD
Supplier#000000530 0qwCMwobKY
OcmLyfRXlagA8ukENJv,
Supplier#000000688 D
fw5ocppmZpYBBIPI718hCihLDZ5KhKX
Supplier#000000710 f19YPvOyb
QoYwjKC,oPycpGfieBAcwKJo
Supplier#000000736
l6i2nMwVuovfKnuVgaSGK2rDy65DlAFLegiL7
Supplier#000000761
zlSLelQUj2XrvTTFnv7WAcYZGvvMTx882d4
.
.
.
Supplier#000009278 RqYTzgxj93CLX 0mcYfCENOefD
Supplier#000009327 uoqMdf7e7Gj9dbQ53
Supplier#000009430 igRqmneFt
Supplier#000009567 r4Wfx4c3xsEAjcGj71HHZByornl
D9vrztXlv4
Supplier#000009601 51m637bO,Rw5DnHWFUvLacRx9
Supplier#000009709
rRnCbHYgDgl9PZYnyWKVYSUW0vKg
Supplier#000009753 wLhVEcRmd7PkJF4FBnGK7Z
Supplier#000009796 z,y4Idmr15DOvPUqYG
Supplier#000009799 4wNjXGa4OKWl
Supplier#000009811 E3iuyq7UnZxU7oPZIe2Gu6
Supplier#000009812
APFRMy3lCbgFga53n5t9DxzFPQPgnjrGt32
Supplier#000009862 rJzweWeN58
Supplier#000009868 ROjGgx5gvtkmnUUoeyy7v
Supplier#000009869
ucLqxzrpBTRMewGSM29t0rNTM30g1Tu3Xgg3mKag
Supplier#000009899 7XdpAHrzr1t,UQFZE
Supplier#000009974
7wJ,J5DKcxSU4Kp1cQLpbcAvB5AsvKT

204 rows processed.
Query Processed in 1.14 seconds.

Ended Executing this Stream at Tue Mar 28 16:22:10 2006

Stream Started at 1143584529.75
Stream Ended at 1143584530.89
Stream Processed in 1.14 seconds

21.log

Begin Execution at Tue Mar 28 16:22:10 2006

-- using default substitutions

```
select * from (
select
s_name,
count(*)  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)
where rownum <= 100
```

S_NAME NUMWAIT
Supplier#000002829 20.00
Supplier#000005808 18.00
Supplier#000000262 17.00
Supplier#000000496 17.00
Supplier#000002160 17.00
Supplier#000002301 17.00
Supplier#000002540 17.00

Supplier#000003063 17.00
.
.
.
Supplier#000007417 13.00
Supplier#000007497 13.00
Supplier#000007602 13.00
Supplier#000008134 13.00
Supplier#000008234 13.00
Supplier#000009435 13.00
Supplier#000009436 13.00
Supplier#000009564 13.00
Supplier#000009896 13.00
Supplier#000000379 12.00
Supplier#000000673 12.00
Supplier#000000762 12.00
Supplier#000000811 12.00
Supplier#000000821 12.00
Supplier#000001337 12.00
Supplier#000001916 12.00
Supplier#000001925 12.00
Supplier#000002039 12.00
Supplier#000002357 12.00
Supplier#000002483 12.00

100 rows processed.
Query Processed in 8.67 seconds.

Ended Executing this Stream at Tue Mar 28 16:22:19 2006

Stream Started at 1143584530.98
Stream Ended at 1143584539.66
Stream Processed in 8.67 seconds

22.log

Begin Execution at Tue Mar 28 16:22:19 2006-- using default substitutions
Select cntrycode, count(*) as numcust, sum(c_acctbal) as totacctbal from(selectsubstr(c_phone, 1, 2) as cntrycode,c_acctbal from customer where substr(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 substr(c_phone, 1, 2) in ('13', '31', '23', '29', '30', '18', '17')) and not exists (select * from orders where o_custkey = c_custkey)) custsale group by cntrycode order by cntrycode

CNTRYCODE	NUMCUST	TOTACCTBAL
13	888.00	6737713.99
17	861.00	6460573.72
18	964.00	7236687.40
23	892.00	6701457.95
29	948.00	7158866.63
30	909.00	6808436.13
31	922.00	6806670.18

7 rows processed.

Query Processed in 2.28 seconds.

Ended Executing this Stream at Tue Mar 28 16:22:22 2006

Stream Started at 1143584539.75

Stream Ended at 1143584542.03

Stream Processed in 2.28 seconds

Appendix D

Appendix E: Seed and Input Parameters

Appendix E

Seed

0411122901

Stream 0

14 1995-07-01
2 4 BRASS AMERICA
9 tan
20 turquoise 1997-01-01 ALGERIA
6 1993-01-01 0.08 24
17 Brand#44 MED DRUM
18 314
8 ALGERIA AFRICA PROMO PLATED STEEL
21 SAUDI ARABIA
13 pending requests
3 HOUSEHOLD 1995-03-07
22 10 17 28 27 13 19 23
16 Brand#44 LARGE POLISHED 30 41 27
48 46
43 33 10
4 1994-01-01
11 PERU 0.0000003333
15 1993-10-01
1 63
10 1994-05-01
19 Brand#35 Brand#51 Brand#54 7 17
28
5 MIDDLE EAST 1993-01-01
7 ROMANIA ALGERIA
12 FOB RAIL 1995-01-01

Stream 1

21 JORDAN
3 BUILDING 1995-03-23
18 312
5 AFRICA 1993-01-01
11 ETHIOPIA 0.0000003333
7 IRAQ PERU
6 1993-01-01 0.05 25
20 green 1995-01-01 MOROCCO
17 Brand#41 JUMBO BAG
12 TRUCK RAIL 1995-01-01
16 Brand#34 STANDARD ANODIZED 34 9
35 32
7 25 29 16
15 1996-05-01
13 pending accounts
10 1993-02-01
2 42 TIN EUROPE
8 PERU AMERICA PROMO ANODIZED STEEL
14 1995-10-01
19 Brand#42 Brand#34 Brand#54 2 18
24
9 sky
22 13 17 31 26 29 21 11
1 71
4 1996-08-01

Stream 2

6 1994-01-01 0.06 25
17 Brand#22 SM BAG
14 1996-02-01
16 Brand#12 MEDIUM BURNISHED 3 1
22 12
10 2 49 50
19 Brand#11 Brand#22 Brand#14 9 20
23
10 1995-01-01
9 moccasin
2 28 BRASS AFRICA
15 1995-02-01
8 SAUDI ARABIA MIDDLE EAST LARGE PLATED STEEL
5 AMERICA 1994-01-01
22 15 14 26 12 22 18 31
12 RAIL MAIL 1995-01-01
7 KENYA SAUDI ARABIA
13 pending accounts
18 313
1 66
4 1993-08-01
20 beige 1994-01-01 ETHIOPIA
3 FURNITURE 1995-03-04
11 EGYPT 0.0000003333
21 GERMANY

Stream 3

8 ARGENTINA AMERICA ECONOMY BURNISHED COPPER
5 ASIA 1994-01-01
4 1996-12-01
6 1994-01-01 0.08 24
17 Brand#44 JUMBO DRUM
7 SAUDI ARABIA ARGENTINA
1 87
18 315
22 29 28 17 16 33 24 14
14 1996-05-01
9 powder
10 1994-08-01
15 1996-08-01
11 FRANCE 0.0000003333
20 cornsilk 1997-01-01 ROMANIA
2 17 STEEL MIDDLE EAST
21 RUSSIA
19 Brand#41 Brand#54 Brand#42 3 20
28
13 pending accounts
16 Brand#44 ECONOMY POLISHED 40 10
22 1

Appendix E

4 15 13 48
12 AIR TRUCK 1996-01-01
3 AUTOMOBILE 1995-03-25

Stream 4

5 EUROPE 1994-01-01
21 KENYA
14 1996-08-01
19 Brand#54 Brand#32 Brand#41 8 10
24
15 1994-05-01
17 Brand#41 WRAP BAG
12 REG AIR TRUCK 1996-01-01
6 1994-01-01 0.06 25
4 1994-09-01
9 pale
8 CHINA ASIA LARGE BRUSHED COPPER
16 Brand#34 STANDARD BRUSHED 44 33
6 10
32 26 18 11
11 ROMANIA 0.0000003333
2 5 BRASS AMERICA
10 1993-06-01
18 312
1 95
13 unusual accounts
7 JAPAN CHINA
22 19 16 26 17 15 12 10
3 HOUSEHOLD 1995-03-11
20 navy 1995-01-01 INDONESIA

Stream 5

21 FRANCE
15 1996-11-01
4 1997-04-01
6 1994-01-01 0.03 24
7 EGYPT IRAN
16 Brand#14 LARGE BURNISHED 18 30 14
35 29
26 10 34
19 Brand#51 Brand#25 Brand#35 3 11
20
18 314
14 1996-11-01
22 20 15 25 13 17 18 22
11 GERMANY 0.0000003333
13 unusual deposits
3 AUTOMOBILE 1995-03-27
1 103
2 43 NICKEL MIDDLE EAST
5 MIDDLE EAST 1994-01-01
8 IRAN MIDDLE EAST LARGE PLATED COPPER
20 azure 1994-01-01 UNITED STATES
12 SHIP TRUCK 1996-01-01
17 Brand#43 WRAP PKG
10 1994-03-01
9 moccasin

Stream 6

10 1994-12-01
3 FURNITURE 1995-03-13
15 1994-08-01
13 unusual deposits
6 1994-01-01 0.08 24
8 BRAZIL AMERICA LARGE ANODIZED COPPER
9 maroon
7 VIETNAM BRAZIL
4 1995-01-01
11 SAUDI ARABIA 0.0000003333
22 24 22 10 18 11 17 32
18 315
12 MAIL FOB 1994-01-01
1 111
5 AFRICA 1994-01-01
16 Brand#54 PROMO PLATED 39 23 48
29 25
18 15 7
2 31 COPPER AMERICA
14 1997-02-01
19 Brand#53 Brand#53 Brand#35 9 12
27
20 lavender 1997-01-01 KENYA
17 Brand#45 WRAP DRUM
21 UNITED KINGDOM

Stream 7

18 313
8 ROMANIA EUROPE MEDIUM POLISHED COPPER
20 slate 1996-01-01 CANADA
21 MOZAMBIQUE
2 19 STEEL MIDDLE EAST
4 1997-08-01
22 24 22 11 18 10 19 16
17 Brand#42 SM BAG
1 119
11 INDIA 0.0000003333
9 lawn
19 Brand#15 Brand#41 Brand#34 4 13
24
3 MACHINERY 1995-03-29
13 unusual deposits
5 ASIA 1995-01-01
7 JORDAN ROMANIA
10 1993-09-01
16 Brand#34 SMALL BRUSHED 4 21 42
26 1
34 18 17
6 1995-01-01 0.06 25
14 1997-05-01
15 1997-03-01
12 TRUCK MAIL 1997-01-01

Stream 8

19 Brand#12 Brand#24 Brand#23 9 14
20
1 66

Appendix E

15 1994-12-01
17 Brand#44 SM PKG
5 EUROPE 1995-01-01
8 IRAQ MIDDLE EAST MEDIUM PLATED TIN
9 hot
12 RAIL MAIL 1997-01-01
14 1997-09-01
7 ETHIOPIA IRAQ
4 1995-04-01
3 FURNITURE 1995-03-15
20 firebrick 1994-01-01 CHINA
16 Brand#14 ECONOMY ANODIZED 7 42
17 8
18 27 44 34
6 1995-01-01 0.03 24
22 15 27 23 31 30 14 10
10 1994-06-01
13 unusual deposits
2 6 BRASS ASIA
21 INDIA
18 314
11 VIETNAM 0.0000003333

Appendix F: Benchmark Scripts

Appendix F

dbtables.sql

```
set echo on
set numwidth 25
spool rdbtablest
SELECT COUNT(*) FROM LINEITEM;

SELECT * FROM LINEITEM
WHERE L_ORDERKEY IN
 ( 4, 26598,  148577,  387431, 56704, 517442, 600000)
AND L_LINENUMBER = 1
ORDER BY L_ORDERKEY;

SELECT * FROM REGION;

SELECT COUNT(*) FROM NATION;

SELECT * FROM NATION
WHERE N_NATIONKEY IN (3,10,14,20)
ORDER BY N_NATIONKEY;
SELECT COUNT(*) FROM ORDERS;
SELECT * FROM ORDERS
WHERE O_ORDERKEY IN ( 7, 44065, 287590, 411111,
483876, 599942 )
ORDER BY O_ORDERKEY;

SELECT COUNT(*) FROM PART;

SELECT * FROM PART
WHERE P_PARTKEY IN
(1,984,8743,9028,13876,17899,20000)
ORDER BY P_PARTKEY;

SELECT COUNT(*) FROM PARTSUPP;

SELECT* FROM PARTSUPP
  WHERE PS_PARTKEY = 3398
  AND PS_SUPPKEY = (SELECT MIN(PS_SUPPKEY)
    FROM PARTSUPP WHERE PS_PARTKEY = 3398);

SELECT* FROM PARTSUPP
  WHERE PS_PARTKEY =15873
  AND PS_SUPPKEY = (SELECT MIN(PS_SUPPKEY)
    FROM PARTSUPP WHERE PS_PARTKEY = 15873);

SELECT* FROM PARTSUPP
  WHERE PS_PARTKEY = 11394
  AND PS_SUPPKEY = (SELECT MIN(PS_SUPPKEY)
    FROM PARTSUPP WHERE PS_PARTKEY = 11394);

SELECT* FROM PARTSUPP
  WHERE PS_PARTKEY = 6743
  AND PS_SUPPKEY = (SELECT MIN(PS_SUPPKEY)
    FROM PARTSUPP WHERE PS_PARTKEY = 6743);

SELECT* FROM PARTSUPP
  WHERE PS_PARTKEY = 19763
  AND PS_SUPPKEY = (SELECT MIN(PS_SUPPKEY)
                    FROM PARTSUPP WHERE PS_PARTKEY =19763);


SELECT COUNT(*) FROM SUPPLIER;

SELECT * FROM SUPPLIER
WHERE  S_SUPPKEY IN (83,265,492,784,901,1000)
ORDER BY S_SUPPKEY;

SELECT COUNT(*) FROM CUSTOMER;

DROP TABLE MINMAX;

CREATE TABLE MINMAX
(TNAME CHAR(15),
KEYMIN INTEGER,
KEYMAX INTEGER);

INSERT INTO MINMAX
SELECT
'LINEITEM_ORD',MIN(L_ORDERKEY),MAX(L_ORDER
KEY)
FROM LINEITEM ;

INSERT INTO MINMAX
SELECT
'LINEITEM_NBR',MIN(L_LINENUMBER),MAX(L_LINE
NUMBER)
FROM LINEITEM;

INSERT INTO MINMAX
SELECT
'ORDERTBL',MIN(O_ORDERKEY),MAX(O_ORDERKEY)
FROM ORDERS;

INSERT INTO MINMAX
SELECT
'CUSTOMER',MIN(C_CUSTKEY),MAX(C_CUSTKEY)
FROM CUSTOMER;

INSERT INTO MINMAX
SELECT 'PART',MIN(P_PARTKEY),MAX(P_PARTKEY)
FROM PART;

INSERT INTO MINMAX
SELECT
'SUPPLIER',MIN(S_SUPPKEY),MAX(S_SUPPKEY)
FROM SUPPLIER;

INSERT INTO MINMAX
SELECT
'PARTSUPP_PART',MIN(PS_PARTKEY),MAX(PS_PART
KEY)
FROM PARTSUPP;

INSERT INTO MINMAX
```

Appendix F

```
SELECT
'PARTSUPP_SUPP',MIN(PS_SUPPKEY),MAX(PS_SUPPK
EY)
FROM PARTSUPP ;

INSERT INTO MINMAX
SELECT
'NATION',MIN(N_NATIONKEY),MAX(N_NATIONKEY)
FROM NATION;

INSERT INTO MINMAX
SELECT
'REGION',MIN(R_REGIONKEY),MAX(R_REGIONKEY)
FROM REGION;

SELECT * FROM MINMAX;
spool off
exit;
```

dbinsert.sql

```
rem
rem
================================================
======================+
rem  FILENAME
rem      inserts.sql
rem  DESCRIPTION
rem      Inserts duplicate rows with new key numbers and
rem      inserts rows with values beyond the TPC-D values.
rem
rem
================================================
======================
rem
rem Usage:   sqlplus tpcc/tpcc @insert
rem


set pagesize 100
set termout on
set echo on
set timing on
spool rdbinsert


rem
================================================
======================
rem Duplicates
rem
================================================
======================

REM get timestamp
select to_char (sysdate, 'HH24:MI:SS') timestamp from dual;


drop table temp_part;
create table temp_part as
  select * from part
        where p_partkey = 1;
update temp_part
        set p_partkey = 2147483647;
insert into part
        (select * from temp_part);
select * from part
        where p_partkey = 2147483647
        or p_partkey = 1;
delete from part
        where p_partkey = 2147483647;
drop table temp_part;
commit;

drop table temp_supplier;
create table temp_supplier as
  select * from supplier
        where s_suppkey = 1;
update temp_supplier
        set s_suppkey = 2147483647;
insert into supplier
        (select * from temp_supplier);
select * from supplier
        where s_suppkey = 2147483647
        or s_suppkey = 1;
delete from supplier
        where s_suppkey = 2147483647;
drop table temp_supplier;
commit;

drop table temp_partsupp;
create table temp_partsupp as
  select * from partsupp
        where ps_partkey = 1
        and ps_suppkey = 2;
update temp_partsupp
        set ps_partkey = 2147483647,
            ps_suppkey = 2147483647;
insert into partsupp
        (select * from temp_partsupp);
select * from partsupp
        where (ps_partkey = 2147483647
        and    ps_suppkey = 2147483647)
        or    (ps_partkey = 1
        and    ps_suppkey = 2);
delete from partsupp
        where ps_partkey = 2147483647
        and   ps_suppkey = 2147483647;
drop table temp_partsupp;
commit;


drop table temp_customer;
create table temp_customer as
```

Appendix F

```
  select * from customer
          where c_custkey = 1;
update temp_customer
          set c_custkey = 2147483647;
insert into customer
          (select * from temp_customer);
select * from customer
          where c_custkey = 2147483647
          or c_custkey = 1;
delete from customer
          where c_custkey = 2147483647;
drop table temp_customer;
commit;

drop table temp_orders;
create table temp_orders as
  select * from orders
          where o_orderkey = (select min(o_orderkey) from
orders);
update temp_orders
          set o_orderkey = 2147483647;
insert into orders
          (select * from temp_orders);
select * from orders
          where o_orderkey = 2147483647
          or o_orderkey = (select min(o_orderkey) from
orders);
delete from orders
          where o_orderkey = 2147483647;
drop table temp_orders;
commit;

drop table temp_lineitem;
create table temp_lineitem as
  select * from lineitem
          where l_orderkey = (select min(o_orderkey) from
orders)
          and   l_linenumber = 1;
update temp_lineitem
          set l_orderkey = 2147483647,
             l_partkey  = 2147483647,
             l_suppkey  = 2147483647,
             l_linenumber = -2147483646;
insert into lineitem
          (select * from temp_lineitem);
select * from lineitem
          where (l_orderkey = 2147483647
          and    l_partkey  = 2147483647
          and    l_suppkey  = 2147483647
          and    l_linenumber = -2147483646)
          or          (l_orderkey = (select min(o_orderkey) from
orders)
          and    l_linenumber = 1);
delete from lineitem
          where l_orderkey = 2147483647
          and   l_partkey  = 2147483647
          and   l_suppkey  = 2147483647
          and   l_linenumber = -2147483646;
drop table temp_lineitem;
commit;

drop table temp_nation;
create table temp_nation as
  select * from nation
          where n_nationkey = 1;
update temp_nation
          set n_nationkey = 2147483647;
insert into nation
          (select * from temp_nation);
select * from nation
          where n_nationkey = 2147483647
          or n_nationkey = 1;
delete from nation
          where n_nationkey = 2147483647;
drop table temp_nation;
commit;


drop table temp_region;
create table temp_region as
  select * from region
          where r_regionkey = 1;
update temp_region
          set r_regionkey = 2147483647;
insert into region
          (select * from temp_region);
select * from region
          where r_regionkey = 2147483647
          or r_regionkey = 1;
delete from region
          where r_regionkey = 2147483647;
drop table temp_region;
commit;

rem
========================================
====================
rem Duplicates finished starting inserts for domain range
rem
========================================
====================

REM get timestamp
select to_char (sysdate, 'HH24:MI:SS') timestamp from dual;


insert into supplier
          (s_suppkey, s_name, s_address, s_nationkey,
s_phone,
          s_acctbal, s_comment)
          values
          (2147483647, 'NAME text .....25E',
          'Address varchar .....30.....40E',
          2147483647,'This is phone E', 123456789012,
          'Supplier comment field is 101 long no E');
select * from supplier
          where s_suppkey = 2147483647;
delete from supplier D
```

```
        where s_suppkey = 2147483647;
rem
================================================
======================
insert into part
        (p_partkey, p_name, p_mfgr, p_brand, p_type,
        p_size, p_container, p_retailprice, p_comment)
        values
        (2147483647, 'Pname text .....2.....3.....4....5E',
        'Pmfgr text.....2....5E','Pbrand 10E',
        'Ptype varchar.....2....5E', 2147483646,
        'PcontainrE', 123456789012,
        'Part comment field  23E');
select * from part
        where p_partkey = 2147483647;
delete from part
        where p_partkey = 2147483647;
rem
================================================
======================
insert into partsupp
        (ps_partkey, ps_suppkey, ps_availqty, ps_supplycost,
        ps_comment)
        values
        (2147483647, 2147483647, -2147483646,
123456789012,
        'PS comment field is 199 long no E');
select * from partsupp
        where ps_partkey = 2147483647
        and   ps_suppkey = 2147483647;
delete from partsupp
        where ps_partkey = 2147483647
        and   ps_suppkey = 2147483647;
rem
================================================
======================
insert into customer
        (c_custkey, c_name, c_address, c_nationkey,
        c_phone, c_acctbal, c_mktsegment, c_comment)
        values
        (2147483647, 'Customer Name goes to 25E',
        'Customer Address goes here..3.....4E',
        2147483647, 'This is phone E', 123456789012,
        'ZMark segE', 'Customer comments fiels is 117 long
no E');
select * from customer
        where c_custkey = 2147483647;
delete from customer
        where c_custkey = 2147483647;
rem
================================================
======================
insert into orders
        (o_orderkey, o_custkey, o_orderstatus, o_totalprice,
        o_orderdate, o_orderpriority, o_clerk, o_shippriority,
        o_comment)
        values
        (2147483647, 2147483647, 'X', 123456789012,
        TO_DATE('2005-12-30','YYYY-MM-DD'),
        'Order Priorty5E', 'Fixed text  15E', -2147483646,
        'Order comments field is 79 no E');
select * from orders
        where o_orderkey = 2147483647
        and  o_custkey = 2147483647;
delete from orders
        where o_orderkey = 2147483647
        and  o_custkey = 2147483647;
rem
================================================
======================
insert into lineitem
        (l_orderkey, l_partkey, l_suppkey, l_linenumber,
        l_quantity, l_extendedprice, l_discount, l_tax,
        l_returnflag, l_linestatus, l_shipdate, l_commitdate,
        l_receiptdate, l_shipinstruct, l_shipmode,
l_comment)
        values
        (2147483647,
        2147483647,
        2147483647,
        -2147483646,
        -123456789012,
        -123456789012,
        -123456789012,
        -123456789012,
        'Q',
        'R',
        TO_DATE('2005-12-30','YYYY-MM-DD'),
        TO_DATE('2005-12-30','YYYY-MM-DD'),
        TO_DATE('2005-12-30','YYYY-MM-DD'),
        'Ship by camel .....5E',
        'Ship ASAPE',
        'Is this really what you wanted? 44 long....E');
select * from lineitem
        where l_orderkey = 2147483647
        and l_partkey = 2147483647
        and l_suppkey = 2147483647
        and l_linenumber = -2147483646;
delete from lineitem
        where l_orderkey = 2147483647
        and l_partkey = 2147483647
        and l_suppkey = 2147483647
        and l_linenumber = -2147483646;
rem
================================================
======================
insert into nation
        (n_nationkey, n_name, n_regionkey, n_comment)
        values
        (2147483647,
        'Ze Republic d MakebelievE',
        2147483647,
        'A nation comment for field size 152 no E');
select * from nation
        where n_nationkey = 2147483647
        and n_regionkey = 2147483647;
delete from nation
        where n_nationkey = 2147483647
```

```
        and n_regionkey = 2147483647;
rem
================================================
======================
insert into region
        (r_regionkey, r_name, r_comment)
        values
        (2147483647,
        'Ze ends of the earth....E',
        'A reasonable comment would go herE');
select * from region
        where r_regionkey = 2147483647;
delete from region
        where r_regionkey = 2147483647;
rem
================================================
======================

REM get timestamp
select to_char (sysdate, 'HH24:MI:SS') timestamp from dual;
rem
================================================
======================
rem Done
rem
================================================
======================
spool off;
exit;
```

gen_seed.sh

```
#!/bin/ksh

SEED_FILE=$1

#Generate the seed
echo "Setting the random number seed"
PSEED=`date +%m:%d:%H:%M:%S | sed -e 's/://g'`
echo "Using ${PSEED} as seed0"
echo ${PSEED} >  $SEED_FILE
echo "Done setting the random number seed"
```

runTPCHall.load

```
#!/bin/ksh
. $KIT_DIR/env

ECHO=echo

sqlplus=$ORACLE_HOME/bin/sqlplus
GTIME=${KIT_DIR}/utils/gtime

RUN_ID_FILE=${KIT_DIR}/audit/r_id
if [ ! -f $RUN_ID_FILE ]
then
  echo "0" > $RUN_ID_FILE
fi

RUN_ID=`cat $RUN_ID_FILE`
RUN_ID=`expr $RUN_ID + 1`
echo $RUN_ID > $RUN_ID_FILE

OUT_DIR=${KIT_DIR}/audit/tests/${RUN_ID}
if [ ! -d $OUT_DIR ]
then
  mkdir $OUT_DIR
fi

SCRIPT_LOG_FILE=${OUT_DIR}/main.out
RDB_TABLES=${OUT_DIR}/rdbtablest
FIRST_TEN=${OUT_DIR}/firstten
LD1DBCRE=${OUT_DIR}/Ld1dbcre
LD2SCTSO=${OUT_DIR}/Ld2sctso
LD3DAPOP=${OUT_DIR}/Ld3dapop

2shut
2asmshut
#
echo Start TPC-H Benchmark SEQUENCE NUMBER:
$RUN_ID > $SCRIPT_LOG_FILE
echo >> $SCRIPT_LOG_FILE
echo "Starting a new Oracle log file:
$ORACLE_HOME/rdbms/log/alert_${ORACLE_SID}
.log" >> $SCRIPT_LOG_FILE
echo >> $SCRIPT_LOG_FILE
##
mv
$ORACLE_HOME/rdbms/log/alert_${ORACLE_SID}.log
$ORACLE_HOME/rdbms/log/alert_$
{ORACLE_SID}.log.preAudit.$RUN_ID
touch
$ORACLE_HOME/rdbms/log/alert_${ORACLE_SID}.log
##
echo "Start: load database `date`" >> $SCRIPT_LOG_FILE
asmstart
dbcre_10gR2.sh >> $LD1DBCRE
tscre_10gR2.sh >>  $LD2SCTSO
tshut
asmshut
2asmstart
2start
STIME=`$GTIME`
echo "Start: timed load portion `date`" >>
$SCRIPT_LOG_FILE
dapop_10gR2.sh >> $LD3DAPOP
$KIT_DIR/audit/gen_seed.sh $KIT_DIR/audit/seed
echo Generated seed: `cat $KIT_DIR/audit/seed` >>
$SCRIPT_LOG_FILE
echo "End: timed load portion `date`" >>
$SCRIPT_LOG_FILE
```



```
2shut >> $SCRIPT_LOG_FILE
2asmshut >> $SCRIPT_LOG_FILE
exit
```

runTPCHall.afterload

```
#!/bin/ksh
. $KIT_DIR/env

ECHO=echo

sqlplus=$ORACLE_HOME/bin/sqlplus
GTIME=${KIT_DIR}/utils/gtime

RUN_ID_FILE=${KIT_DIR}/audit/r_id

if [ ! -f $RUN_ID_FILE ]
then
  echo "0" > $RUN_ID_FILE
fi

RUN_ID=`cat $RUN_ID_FILE`
#RUN_ID=`expr $RUN_ID + 1`
echo $RUN_ID > $RUN_ID_FILE

OUT_DIR=${KIT_DIR}/audit/tests/${RUN_ID}
if [ ! -d $OUT_DIR ]
then
  mkdir $OUT_DIR
fi

SCRIPT_LOG_FILE=${OUT_DIR}/main.out
RDB_TABLES=${OUT_DIR}/rdbtablest
FIRST_TEN=${OUT_DIR}/firstten
LD1DBCRE=${OUT_DIR}/Ld1dbcre
LD2SCTSO=${OUT_DIR}/Ld2sctso
LD3DAPOP=${OUT_DIR}/Ld3dapop

2asmstart >> $SCRIPT_LOG_FILE
2start  >> $SCRIPT_LOG_FILE
ckpnt.sh


echo "Start: dbtables.sql and count.sql" >>
$SCRIPT_LOG_FILE
$sqlplus ${DATABASE_USER} @$KIT_DIR/audit/dbtables
> ${RDB_TABLES} 2>&1
$sqlplus ${DATABASE_USER} @$KIT_DIR/audit/firstten
> ${FIRST_TEN} 2>&1
echo "End: dbtables.sql and count.sql `date`" >>
$SCRIPT_LOG_FILE

runTPCHpt ${SCALE_FACTOR} 1 ${RUN_ID}
runTPCHpt ${SCALE_FACTOR} 2 ${RUN_ID}


cp $ORACLE_HOME/rdbms/log/alert_${ORACLE_SID}.log
$OUT_DIR
echo "End TPC-H Benchmark SEQUENCE NUMBER:
$RUN_ID `date`" >> $SCRIPT_LOG_FILE
```

runTPCHpt.sh

```
#!/bin/ksh
. $KIT_DIR/env
#ECHO=/bin/echo
SCRIPT_DIR=${KIT_DIR}/scripts
SQL_DIR=${KIT_DIR}/sql
UPD_DIR=${KIT_DIR}/update
SRC_DIR=${KIT_DIR}/utils
QRY_DIR=${KIT_DIR}/queries # this is the location of the
query template file
QGEN_DIR=${KIT_DIR}/dbgen
QGEN=${QGEN_DIR}/qgen
QEXEC=${SRC_DIR}

DSS_QUERY=${KIT_DIR}/queries
export DSS_QUERY

UPD_SQL=${UPD_DIR}/sql
UPD_SPT=${UPD_DIR}/scripts
UPD_SRC=${UPD_DIR}/source
UPD_DAT=${UPD_DIR}/data

TPCD_BIN=${KIT_DIR}/audit/bin

GTIME=${SRC_DIR}/gtime
SEED_FILE=${KIT_DIR}/audit/seed

DF=/dev/null
HID=1
INTERVAL=60
COUNT=1200

# The defaults

QPROG=${QEXEC}/qexec

usage () {

echo " "
echo "Usage: $0 [-p <program for query stream>] [-u1
<program for UF1>]"
echo "         [-u2 <program for UF2>] [-o] [-s] [-h] [-u
<user/password>]"
echo "         <scale factor> <run_number>"
echo ""
echo "scale factor     : The scale factor of the run."
echo "update ||ism     : The parallelism to use for the UFs."
echo ""
echo "-p <program>     : Program for Query Stream."
echo "                   Default is $QPROG."
echo "-u1 <program>    : Program for UF1."
echo "                   Default is $U1PROG."
echo "-u2 <program>    : Program for UF2."
echo "                   Default is $U2PROG."
echo "-o               : Collect Oracle statistics."
```

```
echo "-s              : Collect System statistics."
echo "-u <user/passwd> : User/Password. Default is
tpch/tpch."
echo "-h              : Displays this message."
}
set -- `getopt "p:u1:u2:osu:h" "$@"` || usage

while :
do
  case "$1" in
  -u1) shift; U1PROG=$1;;
  -u2) shift; U2PROG=$1;;
  -p) shift; QPROG=$1;;
  -o) OSTAT=1;;
  -s) SSTAT=1;;
  -h) usage; exit 0;;
  --) shift; break;;
  esac
  shift;
done


if [ "$#" -ne "3" ]
then
 usage
 exit 1
fi

SF=$1
PARA=$2
RUN_ID=$3

OUT_DIR=${KIT_DIR}/audit/tests/${RUN_ID}
if [ ! -d $OUT_DIR ]
then
      mkdir $OUT_DIR
fi

TPCD_LOG=${OUT_DIR}
TPCD_RPT=${OUT_DIR}
OUT=${OUT_DIR}

let UF_SET="($PARA-1)*($NUM_STREAMS+1)+1"
START_SET=1
let STOP_SET=$NUM_STREAMS
let START_SET_UPDATE="($PARA-
1)*($NUM_STREAMS+1)+2"
let
STOP_SET_UPDATE="$START_SET_UPDATE+$NUM_S
TREAMS-1"

TPCD_LOG_FILE=${TPCD_LOG}/m${PARA}s0
TPCD_RPT_FILE=${TPCD_RPT}/m${PARA}s0inter
QRY_FILE=${TPCD_RPT}/qtemp.${PARA}s0
QUERY_PARAMETER=${TPCD_LOG}/qp${PARA}.0
SCRIPT_LOG_FILE=${TPCD_LOG}/m${PARA}timing
UF1_LOG=${TPCD_LOG}/m${PARA}s0rf1
UF2_LOG=${TPCD_LOG}/m${PARA}s0rf2
STREAM_COUNT_LOG=${TPCD_LOG}/m${PARA}tstrcn
t

echo "TPC-H Test - RUN:${PARA}
SEQUENCE:${RUN_ID} `date`" > $SCRIPT_LOG_FILE
echo "TPC-H Test - RUN:${PARA}
SEQUENCE:${RUN_ID} `date`" > $TPCD_RPT_FILE
echo "Generates query template file with seed: `cat
$SEED_FILE` for stream 0" >>
 $SCRIPT_LOG_FILE
echo >> $SCRIPT_LOG_FILE

${QGEN} -c -r `cat $SEED_FILE` -p 0 -s ${SF} -l
$QUERY_PARAMETER > ${QRY_FILE}
START=`$GTIME`
echo "Start Power Test - RUN:${PARA}
SEQUENCE:${RUN_ID} Execution Starts $START,
 `date`" >>  $SCRIPT_LOG_FILE
echo "" >> $SCRIPT_LOG_FILE

# Execute UF1

SDATE=`date`
UF1_START=`$GTIME`
echo "Start UF1  $UF1_START, `date`" >>
$SCRIPT_LOG_FILE

${ECHO} ${UPD_SPT}/runuf1.sh ${UF_SET} >>
$UF1_LOG 2>&1
# Execute Query Stream

UF1_END=`${GTIME}`
E1DATE=`date`

UF1_TIME=`echo $UF1_END - $UF1_START | bc`
echo UF1: Execution Time: $UF1_TIME >>
${TPCD_RPT_FILE}
echo Start Time: $UF1_START, $SDATE >>
${TPCD_RPT_FILE}
echo End Time: $UF1_END, $E1DATE >>
${TPCD_RPT_FILE}
echo "" >> ${TPCD_RPT_FILE}

echo "End UF1 $UF1_END, ${E1DATE}" >>
$SCRIPT_LOG_FILE
echo UF1: Execution Time: $UF1_TIME >>
$SCRIPT_LOG_FILE
echo >> $SCRIPT_LOG_FILE

echo "Start Query Part `$GTIME`, `date` " >>
$SCRIPT_LOG_FILE

${QPROG} ${DATABASE_USER} q${QRY_FILE}
l${TPCD_LOG_FILE} r${TPCD_RPT_FILE}  > $D
F  2>&1

# Execute UF2

UF2_START=`${GTIME}`
```

Appendix F

```
E2DATE=`date`

echo "End Query Part `$GTIME`, ${E2DATE}" >>
$SCRIPT_LOG_FILE
echo "" >> $SCRIPT_LOG_FILE

echo "Start UF2  $UF2_START, `date`" >>
$SCRIPT_LOG_FILE
${ECHO} ${UPD_SPT}/runuf2.sh ${UF_SET} >>
$UF2_LOG 2>&1
UF2_END=`${GTIME}`
END=`${GTIME}`
EDATE=`date`

UF2_TIME=`echo $UF2_END - $UF2_START | bc`
echo UF2: Execution Time: $UF2_TIME >>
${TPCD_RPT_FILE}
echo Start Time: $UF2_START, $E2DATE >>
${TPCD_RPT_FILE}
echo End Time: $UF2_END, $EDATE >>
${TPCD_RPT_FILE}
echo "End UF2 $UF2_END, $EDATE" >>
$SCRIPT_LOG_FILE
echo UF2: Execution Time: $UF2_TIME >>
$SCRIPT_LOG_FILE
echo >>  $SCRIPT_LOG_FILE
echo "End TPC-H Power Test - RUN:${PARA}
SEQUENCE:${RUN_ID}, $END, $EDATE" >> $S
CRIPT_LOG_FILE
MEA_INT=`echo $END - $START | bc`
echo "Elapsed Time for TPC-H Power Test - RUN:${PARA}
SEQUENCE:${RUN_ID} is $MEA
_INT" >> $SCRIPT_LOG_FILE
echo >> $SCRIPT_LOG_FILE
${KIT_DIR}/audit/abridge.pl ${TPCD_LOG_FILE}

i=$START_SET
PSEED=`cat $SEED_FILE`
while [ $i -le $STOP_SET ]; do

TPCD_LOG_FILE=${TPCD_LOG}/mt${RUN_ID}_${i}.log
  TPCD_RPT_FILE=${TPCD_RPT}/mt${RUN_ID}_${i}.rpt

QUERY_PARAMETER=${TPCD_LOG}/qp${PARA}.${i}
  QRY_FILE=${TPCD_RPT}/qtemp.${PARA}s${i}

  PSEED=`expr $PSEED + 1`
  ${QGEN} -c -r ${PSEED} -p ${i} -s ${SF} -l
$QUERY_PARAMETER > ${QRY_FILE}

  i=`expr $i + 1`
done
TH_START_D=`date`
TH_START_T=`${GTIME}`
echo >> $SCRIPT_LOG_FILE

rm -f /tmp/th_pipe1
mknod /tmp/th_pipe1 p
rm -f /tmp/th_pipe2
mknod /tmp/th_pipe2 p
i=$START_SET

echo "Start Throughput Test - RUN:${PARA}
SEQUENCE:${RUN_ID} $TH_START_T, $TH_ST
ART_D"  >> $SCRIPT_LOG_FILE

# starts a script to count the streams during the throughtput
run
(scnt.sh $PARA $RUN_ID > $STREAM_COUNT_LOG &)

while [ $i -le $STOP_SET ]; do
  M_SDATE=`date`
  M_STIME=`${GTIME}`
      TPCD_LOG_FILE=${TPCD_LOG}/m${PARA}s${i}

TPCD_RPT_FILE=${TPCD_RPT}/m${PARA}s${i}inter
  echo "Start Query Stream $i $M_STIME, ${M_SDATE}"
>> $SCRIPT_LOG_FILE
      QRY_FILE=${TPCD_RPT}/qtemp.${PARA}s${i}
 ${QPROG} ${DATABASE_USER} q${QRY_FILE}
l${TPCD_LOG_FILE} r${TPCD_RPT_FILE} | gr
ep -v "Connected to ORACLE" >> $SCRIPT_LOG_FILE &
  i=`expr $i + 1`
done
(${KIT_DIR}/audit/runTPCHus $RUN_ID
$START_SET_UPDATE $STOP_SET_UPDATE ${SF}
$PA
RA >> $SCRIPT_LOG_FILE 2>&1 &)

wait
THQ_END_T=`$GTIME`
THQ_END_D=`date`
echo End all Query Streams $THQ_END_T, $THQ_END_D
>> $SCRIPT_LOG_FILE
print > /tmp/th_pipe1
read < /tmp/th_pipe2

TH_END_D=`date`
TH_END_T=`$GTIME`
echo End Update Stream ${TH_END_T}, ${TH_END_D}
>> $SCRIPT_LOG_FILE
echo >> $SCRIPT_LOG_FILE
echo "End Throughput Test ${TH_END_T},
${TH_END_D}" >> $SCRIPT_LOG_FILE

i=$START_SET
while [ $i -le $STOP_SET ]; do
      TPCD_LOG_FILE=${TPCD_LOG}/m${PARA}s${i}
  ${KIT_DIR}/audit/abridge.pl ${TPCD_LOG_FILE}
      i=`expr $i + 1`
done
PIDS=`ps -fu oracle | grep scnt.sh | grep -v grep | awk '{print
$2}'`
kill -9 $PIDS
#calculate the metric
#analyze_streams.pl -f p -n $RUN_ID >
${TPCD_RPT}/tpch_metric.${RUN_ID}.${HID}.r
pt
```

Appendix F

runuf1.sh

```
#!/bin/ksh
#
# $Header: runuf1.sh 25-oct-2001.15:56:04 mpoess Exp $
#
# runuf1.sh
#
# Copyright (c) 1999, 2001, Oracle Corporation.  All rights
reserved.
#
#    NAME
#      runuf1.sh - <one-line expansion of the name>
#
# DESCRIPTION
#    runuf1.sh -l [<path name for reports>] -u [<uid/passwd>]
#              -p [<program>] <run_id> <scale factor> <pair
number>
#              <parallelism>
# USAGE
#    To execute UF1.
#
#    NOTES
#      <other useful comments, qualifications, etc.>
#
#    MODIFIED   (MM/DD/YY)
#    mpoess      10/25/01 - change default directory for update
sets
#    mpoess      10/17/01 - add support for external tables
#    mpoess      08/15/99 - Creation
#    mpoess      08/15/99 - Creation
#
#
. $KIT_DIR/env
O=${ORACLE_HOME}
UPDATE_DIR=${KIT_DIR}/update
SCRIPT_DIR=${UPDATE_DIR}/scripts
UTILS_DIR=${KIT_DIR}/utils
LOG_DIR=${UPDATE_DIR}/log
GTIME=${UTILS_DIR}/gtime
SF=${SCALE_FACTOR}
PAR_HINT=16

LOGPATH=.
PASSWD=${DATABASE_USER}

if [ $# -lt 1 ];
then
  echo runuf1.sh setnum
  exit 1
fi
SETNUM=$1
i=1
PID=""

# perform the update function 1

START=`$GTIME`
# first create the temp tables

sqlplus /NOLOG << !
connect $PASSWD;
set timing on
set serveroutput on
set echo on
drop directory data_dir;
create directory data_dir as '/ff14/updates';

drop table temp_l_et;
create table temp_l_et(
   l_orderkey          number ,
   l_partkey           number ,
   l_suppkey           number ,
   l_linenumber        number ,
   l_quantity          number ,
   l_extendedprice     number ,
   l_discount          number ,
   l_tax               number ,
   l_returnflag        char(1) ,
   l_linestatus        char(1) ,
   l_shipdate          date ,
   l_commitdate        date ,
   l_receiptdate       date ,
   l_shipinstruct      char(25) ,
   l_shipmode          char(10) ,
   l_comment           varchar(44)
)
organization external (
type ORACLE_LOADER
default directory data_dir
access parameters
(
            records delimited by newline
            nobadfile
            nologfile
            fields terminated by '|'
            missing field values are null
      )
      location (
      'lineitem.tbl.u${SETNUM}'
))
reject limit unlimited parallel ${PAR_HINT};

drop table temp_o_et;
create table temp_o_et(
   o_orderkey          number ,
   o_custkey           number ,
   o_orderstatus       char(1) ,
   o_totalprice        number ,
   o_orderdate         date ,
   o_orderpriority     char(15) ,
   o_clerk             char(15) ,
   o_shippriority      number ,
   o_comment           varchar(79)
)
organization external (
type ORACLE_LOADER
```

Appendix F

```
default directory data_dir
access parameters
(
        records delimited by newline
        nobadfile
        nologfile
        fields terminated by '|'
        missing field values are null
    )
    location (
    'orders.tbl.u${SETNUM}'
))
reject limit unlimited parallel ${PAR_HINT};


alter session force parallel dml parallel (degree
${PAR_HINT});
alter session set isolation_level = serializable;
alter session set optimizer_index_cost_adj = 25;

insert into orders(
select
o_orderdate         ,
o_orderkey          ,
o_custkey           ,
o_orderpriority     ,
o_shippriority      ,
o_clerk             ,
o_orderstatus       ,
o_totalprice        ,
o_comment
from temp_o_et);

insert into lineitem(
  select
    l_shipdate          ,
    l_orderkey          ,
    l_discount          ,
    l_extendedprice     ,
    l_suppkey           ,
    l_quantity          ,
    l_returnflag        ,
    l_partkey           ,
    l_linestatus        ,
    l_tax               ,
    l_commitdate        ,
    l_receiptdate       ,
    l_shipmode          ,
    l_linenumber        ,
    l_shipinstruct      ,
    l_comment
from temp_l_et);

commit;
drop table temp_l_et;
drop table temp_o_et;

exit;
!
```

```
END=`$GTIME`

# Done

echo ""
echo "Update Function 1 Set $SETNUM done!"
echo "Elapsed Time is `echo $END - $START | bc`"
echo ""
```

runuf2.sh

```
#!/bin/ksh
#
# $Header: runuf2.sh 25-oct-2001.15:56:05 mpoess Exp $
#
# runuf2.sh
#
# Copyright (c) 1999, 2001, Oracle Corporation.  All rights
reserved.
#
#    NAME
#      runuf2.sh - <one-line expansion of the name>
#
# DESCRIPTION
#    runuf2.sh [-u <uid/passwd to login>] [-p <program>]
<run_id>
#             <scale factor> <pair number> <parallelism>
# USAGE
#    To execute UF2.
#
#    NOTES
#      <other useful comments, qualifications, etc.>
#
#    MODIFIED   (MM/DD/YY)
#    mpoess      10/25/01 - change default directory for update
sets
#    mpoess      10/17/01 - add support for external tables
#    mpoess      08/15/99 - Creation
#    mpoess      08/15/99 - Creation
#
. $KIT_DIR/env
UPDATE_DIR=${KIT_DIR}/update
SCRIPT_DIR=${UPDATE_DIR}/scripts
UTILS_DIR=${KIT_DIR}/utils
GTIME=${UTILS_DIR}/gtime
LOG_DIR=${UPDATE_DIR}/log
PAR_HINT=32
SF=${SCALE_FACTOR}
PASSWD=${DATABASE_USER}

if [ $# -lt 1 ]
then
  usage
  exit 1
fi

SETNUM=$1

i=1
```

```
PID=""

START=`$GTIME`
# first create the temp tables

sqlplus /NOLOG << !

connect $PASSWD;
set timing  on
set serveroutput on
set echo on
drop directory data_dir;
create directory data_dir as '/ff14/updates';
drop table temp_okey_et;
drop table temp_okey;

create table temp_okey_et(
   t_orderkey          number
)
organization external (
type ORACLE_LOADER
default directory data_dir
access parameters
(
            records delimited by newline
            nobadfile
            nologfile
            fields terminated by '|'
            missing field values are null
      )
      location (
      'delete.${SETNUM}'))
reject limit unlimited;

alter table temp_okey_et parallel ${PAR_HINT};

create table temp_okey parallel ${PAR_HINT} nologging as
select * from temp_okey
_et;

create unique index i_temp_okey on temp_okey (t_orderkey)
parallel ${PAR_HINT}
nologging compute statistics;

analyze table temp_okey estimate statistics sample 2 percent;


alter session  force parallel dml parallel ${PAR_HINT};
alter session set isolation_level=serializable;
alter session set optimizer_index_cost_adj = 25;

delete from (select /*+ use_nl(o) */ o.rowid from orders o,
temp_okey t where o.
o_orderkey = t.t_orderkey order by 1);

delete from (select /*+ use_nl(l) */ l.rowid from lineitem
l,temp_okey t where l
.l_orderkey = t.t_orderkey order by 1);
commit;
drop table temp_okey;
drop table temp_okey_et;
exit;
!

END=`$GTIME`

# Done

echo ""
echo "Update Function 2 Set $SETNUM done!"
echo "Elapsed Time is `echo $END - $START | bc`"
```

qexecpl.c

```
#ifdef RCSID
static char *RCSid =
  "$Header: qexecpl.c 17-oct-2001.09:29:47 mpoess Exp $ ";
#endif /* RCSID */

/* Copyright (c) 1999, 2001, Oracle Corporation.  All rights
reserved.  */

/*

  NAME
    qexecpl.c - <one-line expansion of the name>

  DESCRIPTION
    SQL Execution Engine, Oracle v8,  OCI version

  PRIVATE FUNCTION(S)
    <list of static functions defined in .c file - with one-line
descriptions>

  MODIFIED   (MM/DD/YY)
    mpoess    10/17/01 - add serialization level in SQLinit
    mpoess    02/22/01 - add linux changes
    mpoess    08/05/99 - make compile
    mpoess    11/13/98 - fix pddl statement
    pswong    02/19/97 - migrating to version 8
    pswong    04/02/96 - more polishing
    pswong    03/25/96 - polish up
    pswong    03/06/96 - created

*/

#include <stdio.h>
#include <string.h>
#include <setjmp.h>
#include <sys/param.h>
#include <errno.h>
#include <math.h>
#include <string.h>
#include <sys/types.h>
#include <time.h>
#include <stdlib.h>

#include "qexecpl.h"
```

Appendix F

```
/* Function Prototypes */

extern double gettime();

/* function prototypes from gen.c */

int get_statement();

/* Declare error handling functions */

void sql_error();

/* Other prototypes */

int define_output_variables();
void process_select_list();
void usage();
void SQLinit();
void SQLexec();
void SQLexit();
void *memalloc();
void print_header();
void print_rows();
int OFEN();
void remove_newline();

char logname[UNAME_LEN];  /* username/passwd combo */
char *passwd;

double tr_start = 0.0;    /* query start time                */
double tr_end = 0.0;      /* query end time                  */

double s_tr_start = 0.0;  /* statement start time            */
double s_tr_end = 0.0;    /* statement end time              */

/* For our purpose of timing, we will treat comments as
delimiters */
/* for queries.   Thus, we will collect query timings whenever
we  */
/* encounter a comment (of course not for the first comment
in a   */
/* file).                                                    */

int end_flag = 0;         /* flag to indicate that we have reached
*/
                          /* the end of a query              */

int stmt_cnt = 0;         /* Number of statements processed.
*/
int qry_cnt = 0;          /* Number of query processed.      */

double product = 1.0;     /* cumulative product of query times
*/
int rows_ret = 0;         /* the number of rows fetched      */
int num_sel_list = 0;     /* the number of select list item  */

long num_to_fetch = -1;   /* Number of rows to fetch. -1
means fetch all */

sltype slist[MAX_SEL_LIST];  /* Array for describing Select
List        */
dltype *dlist[MAX_SEL_LIST]; /* Array of ptrs for Defining
Select List   */

char stmt[SQL_LEN];       /* The SQL statement or comment
line.  */
char qn[4];               /* Number of the query being executed
*/
char qnp[4];              /* Number of the previous query
executed  */
char cmnt[5000];          /* Buffer to save the comment.
*/
#ifdef LINUX
FILE *qtemp;      /* fd for query template           */
FILE *logfile;   /* log and report files            */
FILE *rep;
#else
FILE *qtemp = stdin;      /* fd for query template           */
FILE *logfile = stdout;   /* log and report files            */
FILE *rep = stdout;
#endif
void *defbuf;             /* Buffer pointer for ODEFIN       */
int deflen = 0;           /* Size of data type for ODEFIN    */
int deftype = 1;          /* Oracle type number for ODEFIN
*/

int pfmem = PFMEMSIZE;    /* Memory to prefetch rows
*/

time_t tim;               /* To get wall clock time          */

/* OCI handles */

OCIEnv *tpcenv = NULL;
OCIServer *tpcsrv = NULL;
OCIError *errhp = NULL;
OCISvcCtx *tpcsvc = NULL;
OCISession *tpcusr = NULL;
OCIStmt *curq = NULL;
OCIStmt *cur_dml = NULL;
OCIStmt *cur_ddl = NULL;
OCIParam *tpcpar = NULL;

sword status = OCI_SUCCESS;  /* OCI return value */

/* usage: prints the usage of the program */

void usage() {

  fprintf(stderr,"\nUsage: qexec username/password [q<path
name for query template file>]\n");
  fprintf(stderr,"               [l<path name for log>] [r<path
name for reports>]\n\n");
  fprintf(stderr,"Options:\n");
  fprintf(stderr,"q<path for query>         : full path name for the
query template file.\n");
  fprintf(stderr,"                          (default is stdin)\n");
```

```
  fprintf(stderr,"l<path name for log>      : full path name for
log files\n");
  fprintf(stderr,"                          (default is stdout)\n");
  fprintf(stderr,"r<path name for reports>  : full path name for
reports\n");
  fprintf(stderr,"                          (default is stdout)\n");
  exit(-1);
}



/* type: 0 if environment handle is passed, 1 if error handle is
passwd */

void sql_error(errhp,status,type)
    OCIError *errhp;
    sword status;
    sword type;
{
  char msg[2048];
  ub4 errcode;
  ub4 msglen;
  int i,j;

  switch(status) {
  case OCI_SUCCESS_WITH_INFO:
    fprintf(stderr, "Error: Statement returned with info.\n");
    if (type)
      (void)
OCIErrorGet(errhp,1,NULL,(sb4*)&errcode,(text*)msg,
                              2048,OCI_HTYPE_ERROR);
    else
      (void)
OCIErrorGet(errhp,1,NULL,(sb4*)&errcode,(text*)msg,
                              2048,OCI_HTYPE_ENV);
    fprintf(stderr,"%s\n",msg);
    break;
  case OCI_ERROR:
    fprintf(stderr, "Error: OCI call error.\n");
    if (type)
      (void)
OCIErrorGet(errhp,1,NULL,(sb4*)&errcode,(text*)msg,
                              2048,OCI_HTYPE_ERROR);
    else
      (void)
OCIErrorGet(errhp,1,NULL,(sb4*)&errcode,(text*)msg,
                              2048,OCI_HTYPE_ENV);
    fprintf(stderr,"%s\n",msg);
    break;
  case OCI_INVALID_HANDLE:
    fprintf(stderr, "Error: Invalid Handle.\n");
    if (type)
      (void)
OCIErrorGet(errhp,1,NULL,(sb4*)&errcode,(text*)msg,
                              2048,OCI_HTYPE_ERROR);
    else
      (void)
OCIErrorGet(errhp,1,NULL,(sb4*)&errcode,(text*)msg,
                              2048,OCI_HTYPE_ENV);
    fprintf(stderr,"%s\n",msg);
    break;
  }

  /* Rollback just in case */

  (void) OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);

  fprintf(stderr, "Exiting Oracle...\n");
  fflush(stderr);

  SQLexit();

  exit(1);
}

#ifdef LINUX
int main(argc,argv)
#else
void main(argc,argv)
#endif
    int argc;
    char *argv[];
{

  int i,pos,pos2;
  int retcode;      /* Return code for get_statement */
#ifdef LINUX
  logfile=fopen("/dev/stdout","w");
  qtemp=fopen("/dev/stdin","rw");
  rep=fopen("/dev/stdout","w");
#endif
  /* Initialize some variables */

  if ((argc > 5) || (argc < 2)) {
    usage();
  }

  /* argv[1] -- User and Password for Database */

  strcpy(logname, argv[1]);

  /* Process  optional parameters */

  argc -= 1;
  argv += 1;

  while(--argc) {
    ++argv;
    switch(argv[0][0]) {
    case 'q':
      if ((qtemp = fopen(++(argv[0]),"r")) == NULL) {
            fprintf(stderr,"Unable to open file '%s'\n", argv[0]);
            fprintf(stderr,"%s: %s\n", argv[0], strerror(errno));
            exit(-1);
      }
      break;
    case 'r':
      if ((rep = fopen(++(argv[0]),"a")) == NULL) {
```

Appendix F

```
            fprintf(stderr,"Unable to open file '%s'\n", argv[0]);
            fprintf(stderr,"%s: %s\n", argv[0], strerror(errno));
            exit(-1);
      }
      break;
    case 'l':
      if ((logfile = fopen(++(argv[0]),"a")) == NULL) {
            fprintf(stderr,"Unable to open file '%s'\n", argv[0]);
            fprintf(stderr,"%s: %s\n", argv[0], strerror(errno));
            exit(-1);
      }
      break;
    default:
      fprintf(stderr,"Invalid Option: %c\n", argv[0][0]);
      usage();
      break;
    }
  }

  /* Do some initialization and establish connection with the
database */

  SQLinit();

  /* May want to add some triggering mechanism here */

  time(&tim);
  fprintf(logfile, "Begin Execution at %s\n\n", ctime(&tim));
  fprintf(rep, "Begin Executing this Stream at %s\n\n",
ctime(&tim));
  /* Get the next statement and start processing it */

  while ((retcode = get_statement()) > 0) {

    switch (retcode) {

      /* If this is a comment, skips it */
    case COMMENT:
      /*if (end_flag) {
            end_flag = 0;  */    /* reset query end flag */
            /* save the comment so that we can print it out later
on  */
            /* strcpy(cmnt, stmt);
            break;
      } */
      if (stmt[3]== '@') {
        pos=4;
        strcpy(qnp,qn);
        while (stmt[pos] != ')') {
          pos++;
        }
        pos2=0;
        pos++;
        while (stmt[pos] != '.') {
          /*printf ("qn %d %c \n",pos2,stmt[pos]);*/
          qn[pos2]=stmt[pos];
          pos2++;
          pos++;
        }
        qn[pos2] = 0;
        /* printf("found a new query: %s\n",qn); */
      }
      /* save the comment so that we can print it out later on  */
      strcat(cmnt, stmt);
      break;

      /* if this is a set_row_fetch command */
    case SET_FETCHROW:
      fprintf(logfile,"Setting the number of rows to fetch to:
%ld\n\n",
              num_to_fetch);
      break;

      /* if this is a SQL statement */
    case SQL_STMT:

      /* Executes the query */
      SQLexec();

      stmt_cnt++;
      qry_cnt++;
      fflush(rep);
      fflush(logfile);
      /*
      fprintf(logfile,"\nStatement Started at %.2f\n", s_tr_start);
      fprintf(logfile,"Statement Ended at %.2f\n", s_tr_end);

      fprintf(logfile,"Statement Processed in %.2f seconds.\n",
              (s_tr_end - s_tr_start));
      fprintf(rep, "Query %s: Execution Time: %.2f started %.2f
ended %.2f\n",
              qn,(s_tr_end - s_tr_start)s_tr_start,s_tr_end);
      fflush(rep);
      fflush(logfile);*/
      break;

      /* Should never reach here */
    default:
      fprintf(stderr, "Invalid statement type!!\n");
      SQLexit();
      break;
    }
  }

  /* Get Timing for the last query */

  tr_end = gettime();

  fprintf(logfile,"Query Processed in %.2f
seconds.\n\n",(tr_end - s_tr_start));

  /* print comments for this query that we have saved */

  /* fprintf(logfile, "%s\n", cmnt); */

  /* fprintf(rep, "Query %s : Execution time %.2f\n",
qn,(tr_end - s_tr_start));*/
```

```
  fprintf(rep, "Query %s: Execution Time: %.2f started %.2f
ended %.2f\n",
                qn,(tr_end - s_tr_start),s_tr_start,tr_end);

  time(&tim);
  fprintf(logfile,"\nEnded Executing this Stream at %s\n",
ctime(&tim));
  fprintf(logfile,"\nStream Started at %.2f\n", tr_start);
  fprintf(logfile,"Stream Ended at %.2f\n", tr_end);
  fprintf(logfile,"Stream Processed in %.2f
seconds\n\n",(tr_end - tr_start));

  fprintf(rep,"\nEnded Executing this Stream at %s\n",
ctime(&tim));
  fprintf(rep,"\nStream Started at %.2f\n", tr_start);
  fprintf(rep,"Stream Ended at %.2f\n", tr_end);
  fprintf(rep,"Stream Processed in %.2f seconds\n\n",
              (tr_end - tr_start));

  fprintf(logfile, "\nSQL statements processed: %d\n",
stmt_cnt);
  /*fprintf(logfile, "Queries processed: %d\n", qry_cnt);*/

  fflush(rep);
  fflush(logfile);

  /* Close the query template file */

  fclose(qtemp);

  /*  Disconnect from ORACLE. */

  SQLexit();
  exit(0);
}


/* SQLinit(): Perform initialization tasks.                    */
/*          Logs on to Oracle, opens some files and open a
cursor for */
/*          later use.                                         */

void SQLinit() {

  int i;

  /* preallocate MAX_PREALLOC members of the dlist array
*/
  /* initializes others to NULL so that we can determine who
to free later */

  for (i=0; i<MAX_SEL_LIST; i++) {
    if (i < MAX_PREALLOC) {
      dlist[i] = (dltype *) memalloc (sizeof(dltype));
      dlist[i]->defhdl = NULL;
/*      OCIhalloc(curq,&(dlist[i]-
>defhdl),OCI_HTYPE_DEFINE); */
    }
    else
      dlist[i] = NULL;
  }

  /* Connect to ORACLE.  Program will call sql_error()
*/
  /* if an error occurs in connecting to the default database. */

  (void) OCIInitialize(OCI_DEFAULT,(dvoid *)0,0,0,0);

  if((status=OCIEnvInit((OCIEnv
**)&tpcenv,OCI_DEFAULT,0,(dvoid **)0)) !=
     OCI_SUCCESS)
    sql_error(tpcenv, status, 0);

  OCIhalloc(tpcenv,&errhp,OCI_HTYPE_ERROR);
  OCIhalloc(tpcenv,&curq,OCI_HTYPE_STMT);
  OCIhalloc(tpcenv,&cur_dml,OCI_HTYPE_STMT);
  OCIhalloc(tpcenv,&cur_ddl,OCI_HTYPE_STMT);
  OCIhalloc(tpcenv,&tpcsvc,OCI_HTYPE_SVCCTX);
  OCIhalloc(tpcenv,&tpcsrv,OCI_HTYPE_SERVER);
  OCIhalloc(tpcenv,&tpcusr,OCI_HTYPE_SESSION);

  /* get username and password */

  passwd = strchr(logname, '/');
  *passwd = '\0';
  passwd++;

  if ((status = OCIServerAttach(tpcsrv,errhp,(text
*)0,0,OCI_DEFAULT)) != OCI_SUCCESS)
    sql_error(errhp,status,1);


OCIaset(tpcsvc,OCI_HTYPE_SVCCTX,tpcsrv,0,OCI_ATTR
_SERVER,errhp);

OCIaset(tpcusr,OCI_HTYPE_SESSION,logname,strlen(logna
me),OCI_ATTR_USERNAME,
              errhp);

OCIaset(tpcusr,OCI_HTYPE_SESSION,passwd,strlen(passw
d),OCI_ATTR_PASSWORD,
              errhp);

  if ((status = OCISessionBegin(tpcsvc, errhp, tpcusr,
OCI_CRED_RDBMS,
                                OCI_DEFAULT)) !=
OCI_SUCCESS)
    sql_error(errhp,status,1);


OCIaset(tpcsvc,OCI_HTYPE_SVCCTX,tpcusr,0,OCI_ATTR
_SESSION,errhp);

/*
  if ((status=OCILogon((OCIEnv *)tpcenv,(OCIError
*)errhp,(OCISvcCtx *)tpcsvc,
                       (text *)logname, strlen(logname), (text
*)passwd,
```

```
                    strlen(passwd), (text *) 0, 0)) !=
OCI_SUCCESS)
   sql_error(errhp, status, 1);
*/
  printf("\nConnected to ORACLE as user: %s\n\n", logname);

}



/* SQLexec()  Executes the SQL statement.
*/
/*          Parse the SQL statement.                         */
/*          If DDL or DML statements, execute right away.
*/
/*          Else describe and define select list outputs,          */
/*              execute and fetch results.                   */

void SQLexec()
{
  int i;
  ub2 stmttyp = OCI_STMT_SELECT;     /* default is a
SELECT statement */

  /* Clause 5.3.6.2: QI(i,s) is the time between the first
character */
  /*              of this query text is submitted and the first   */
  /*              character of the next query text is submitted.  */

  if (qry_cnt) {
    time(&tim);
    s_tr_end = gettime();
    fprintf(logfile,"Query Processed in %.2f seconds.\n\n",
     (s_tr_end - s_tr_start));

    /* print comments for this query that we have saved */

    /* fprintf(logfile, "%s\n", cmnt); */

    /*fprintf(rep, "Query %s : Execution time %.2f\n",
qnp,(s_tr_end - s_tr_start));*/
    fprintf(rep, "Query %s: Execution Time: %.2f started %.2f
ended %.2f\n",
                qnp,(s_tr_end - s_tr_start),s_tr_start,s_tr_end);

    /* Let's fflush stuff so that we can see what's going on */

    /* Fix for Q15 */
    fflush(logfile);
    fflush(rep);

    strcpy(qnp,qn);

    fflush(logfile);
    fflush(rep);
  }
  else
    tr_start = gettime();
  s_tr_start = gettime();

  /* prepare the statement */

  if ((status = OCIStmtPrepare(curq, errhp, (text*) stmt, (ub4)
strlen(stmt),
                                  OCI_NTV_SYNTAX,
OCI_DEFAULT)) != OCI_SUCCESS)
    sql_error(errhp,status,1);

  /* Prints the query text and comment to the logfile */

  fprintf(logfile, "\n%s\n", cmnt);
  cmnt[0]=0;
  fprintf(logfile, "\n%s\n", stmt);

  /* if this is a DDL or DML statement, execute it right away
*/
  /* only worries about SELECT statements right now, cannot
*/
  /* execute a stored PL/SQL procedure in thie version       */


OCIaget(curq,OCI_HTYPE_STMT,&stmttyp,NULL,OCI_AT
TR_STMT_TYPE,errhp);

  if (stmttyp != OCI_STMT_SELECT) {
    OCIsexec(tpcsvc,curq,errhp,1);
    return;
  }

  /* otherwise, this is a select statement */
  /* Describe and define output variables  */

  /* first let's execute it to get the select-list definition */

  OCIaset(curq, OCI_HTYPE_STMT, &pfmem, 0,
OCI_ATTR_PREFETCH_MEMORY, errhp);

  OCIsexec(tpcsvc,curq,errhp,0);

  num_sel_list = define_output_variables();

  /* Executes the query and fetches the rows */

  (void) process_select_list(num_sel_list);

  /* Need to get the number of rows fetched first   */
  /* since the following statments will screw it up */


OCIaget(curq,OCI_HTYPE_STMT,&rows_ret,NULL,OCI_A
TTR_ROW_COUNT,errhp);

  /* To control memory usage, let's free up the extra dlist
entries */
  /* that we have allocated.                                 */
```

```
  i=MAX_PREALLOC;
  while(dlist[i] != NULL) {
    free(dlist[i]);
    dlist[i++] = NULL;
  }

  /* reset set_fetchrows */

  num_to_fetch = -1;

}


void SQLexit() {

  int i;

  OCILogoff(tpcsvc,errhp);
  OCIhfree(tpcenv,OCI_HTYPE_STMT);
  OCIhfree(tpcsvc,OCI_HTYPE_SVCCTX);
  OCIhfree(tpcsrv,OCI_HTYPE_SERVER);
  OCIhfree(tpcusr,OCI_HTYPE_SESSION);

  /* free all memory */

  for (i=0; i<MAX_SEL_LIST; i++) {
    if (dlist[i] != NULL) {
      free(dlist[i]);
    }
  }

  /* Flush all output */

  fflush(rep);
  fflush(logfile);

}


/* define_output_variables(): Describe and define select-list
items for */
/*                    a query statement.                    */
/*                    Returns the number of select-list items   */
/*                    for this query.                       */

int define_output_variables()
{

  int i;
  int retflag = 0;

  for (i=0; i<MAX_SEL_LIST; i++) {

    slist[i].buflen = MAX_COLNAME_SIZE;

    if (OCIParamGet(curq, OCI_HTYPE_STMT, errhp, (dvoid
**) &tpcpar,
                                POS(i)) != OCI_SUCCESS)
      break;

    /* dsize and nullok fields of dlist not used */

    OCIaget(tpcpar, OCI_DTYPE_PARAM, &(slist[i].dbsize),
            NULL, OCI_ATTR_DATA_SIZE, errhp);
    OCIaget(tpcpar, OCI_DTYPE_PARAM, &(slist[i].dbtype),
            NULL, OCI_ATTR_DATA_TYPE, errhp);
    OCIaget(tpcpar, OCI_DTYPE_PARAM, &(slist[i].buf),
            &(slist[i].buflen), OCI_ATTR_NAME, errhp);
    OCIaget(tpcpar, OCI_DTYPE_PARAM,
&(slist[i].precision),
            NULL, OCI_ATTR_PRECISION, errhp);
    OCIaget(tpcpar, OCI_DTYPE_PARAM, &(slist[i].scale),
            NULL, OCI_ATTR_SCALE, errhp);

    /* For formatting purpose, remove trailing blanks in select-
list name. */

/*
    if (slist[i].buflen < MAX_COLNAME_SIZE)
      (slist[i].buf)[slist[i].buflen] = '\0';
*/
    /* Well, we need to allocate for entries for dlist */

    if (i >= MAX_PREALLOC) {
      dlist[i] = (dltype *) memalloc(sizeof(dltype));
      dlist[i]->defhdl = NULL;
    }

    /* Let's check the sizes and types for this select list item */

    switch (slist[i].dbtype) {

    case OCI_TYPECODE_NUMBER:

      /* The odescr will not give a good estimate to the scale if
*/
      /* no scale was given in the Oracle table definition.      */

#ifdef HAVE_SCALE
      if (slist[i].scale != 0) {
          defbuf = (double *) dlist[i]->fbuf;
          deflen = FLT;
          deftype = OCI_TYPECODE_DOUBLE;
          slist[i].dbtype = OCI_TYPECODE_DOUBLE;
      } else {
          defbuf = (int *) dlist[i]->ibuf;
          deflen = INT;
          deftype = OCI_TYPECODE_INTEGER;
          slist[i].dbtype = OCI_TYPECODE_INTEGER;
      }
#else
      defbuf = (double *) dlist[i]->fbuf;
      deflen = FLT;
      deftype = OCI_TYPECODE_FLOAT;
      slist[i].dbtype = OCI_TYPECODE_FLOAT;
#endif /* HAVE_SCALE */
```



```
     break;

   default:

     /* default is character string */

     defbuf = (char **) dlist[i]->sbuf;
     deflen = MAX_STR_LEN;
     deftype = SQLT_STR;
/*     deftype = OCI_TYPECODE_CHAR; */
     break;
   }

   /* Define the column */

   if ((status=OCIDefineByPos(curq,&(dlist[i]-
>defhdl),errhp,POS(i),
                              defbuf,deflen,deftype,NULL,
                              dlist[i]-
>rlen,NULL,OCI_DEFAULT))!=OCI_SUCCESS)
     sql_error(errhp,status,1);
  }
  return i;
}


/* process_select_list(): Fetch rows from a query.              */

void process_select_list(num)
    int num;       /* number of select list items */
{

  int i,j;
  int ntf;
  int num_so_far;
  sword stats = OCI_SUCCESS;

  /* Print the headers for the query execution result */

  print_header(num);

  /* See if we need to limit the rows to fetch */

  ntf = (num_to_fetch >= 0) ? num_to_fetch : MAX_ARRAY;

  /* Fetch the rows and print them out */

  if ((ntf > MAX_ARRAY) || (num_to_fetch == -1)) {

   stats = OCIStmtFetch(curq, errhp, MAX_ARRAY,
OCI_FETCH_NEXT, OCI_DEFAULT);


OCIaget(curq,OCI_HTYPE_STMT,&rows_ret,NULL,OCI_A
TTR_ROW_COUNT,errhp);

   print_rows(num,rows_ret);

   /* To avoid 1022 from OFEN */
     /* More rows to fetch...   */

   if (stats != OCI_NO_DATA) {
    if (num_to_fetch == -1) {
          while ((stats =
OCIStmtFetch(curq,errhp,MAX_ARRAY,OCI_FETCH_NEX
T,
                                        OCI_DEFAULT)) ==
OCI_SUCCESS) {

OCIaget(curq,OCI_HTYPE_STMT,&num_so_far,NULL,
                          OCI_ATTR_ROW_COUNT,errhp);
           print_rows(num,(num_so_far-rows_ret));
           rows_ret = num_so_far;
          }
          /* Print the final rows */
          OCIaget(curq,OCI_HTYPE_STMT,&num_so_far,N
ULL,
                       OCI_ATTR_ROW_COUNT,errhp);
          print_rows(num,(num_so_far-rows_ret));
          rows_ret = num_so_far;
     } else {
          ntf -= MAX_ARRAY;

          while ((stats = OCIStmtFetch(curq,errhp,
                                        ((ntf>MAX_ARRAY)
? MAX_ARRAY:ntf),
                                        OCI_FETCH_NEXT,
OCI_DEFAULT)) ==
                OCI_SUCCESS) {
            ntf -= MAX_ARRAY;

OCIaget(curq,OCI_HTYPE_STMT,&num_so_far,NULL,
                          OCI_ATTR_ROW_COUNT,errhp);
           print_rows(num,(num_so_far-rows_ret));
           rows_ret = num_so_far;
           if (ntf <= 0) break;
          }
          OCIaget(curq,OCI_HTYPE_STMT,&num_so_far,N
ULL,
                       OCI_ATTR_ROW_COUNT,errhp);
          print_rows(num,(num_so_far-rows_ret));
          rows_ret = num_so_far;
     }
    }
  } else {
    OCIStmtFetch(curq, errhp, ntf, OCI_FETCH_NEXT,
OCI_DEFAULT);

OCIaget(curq,OCI_HTYPE_STMT,&rows_ret,NULL,OCI_A
TTR_ROW_COUNT,errhp);
    print_rows(num,rows_ret);
  }

  fprintf(logfile,"\n\n%d %s processed.\n", rows_ret,
          rows_ret == 1 ? "row" : "rows");

}
```

Appendix F

```
int get_statement()
{

  char line[128];
  char *pos, *str;

  /* Reset statement buffer */

  stmt[0] = '\0';

  while (fgets(line, 127, qtemp) != NULL) {

    /* skip blank lines */
    if (line[0] == '\n')
      continue;

    /* remove blanks */

    str = line;

    while (*str == ' ') str++;

    /* Let's get the line together first */

    strcat(stmt, str);

    /* if this is a comment line */
    if ((str[0] == '-') && (str[1] == '-'))
      return COMMENT;

    /* see if this is a set_fetchrows line */
    if (strncmp(str, "set_fetchrows", 13) == 0) {
      pos = strchr(str, ';');
      *pos = '\0';
      pos = strchr(str, '=');
      num_to_fetch = atol(++pos);
      return SET_FETCHROW;
    }

    /* if this is the end of the current statement */
    if ((pos = strchr(stmt, ';')) != NULL) {
      *pos = '\0';
      return SQL_STMT;
    }
  }
  return END_OF_FILE;
}


/* memalloc(): Allocates memory, exit program if we have a
problem. */

void *memalloc(size)
     int size;
{

  void *tmp;

  if ((tmp = (void *) malloc(size)) == NULL) {
    fprintf(stderr, "Error in malloc\n");
    SQLexit();
    return NULL;       /* should never reach here */
  } else {
    return tmp;
  }
}



void print_header(nsel)
     int nsel;          /* Number of select list items */
{

  int i, diff;
  char colname[MAX_COLNAME_SIZE];
  int len = 0;          /* Running column length */
  int cwid = 0;

  fprintf(logfile, "\n");

  for (i=0; i<nsel; i++) {

    /* extract the column name */

    strncpy((char *)colname, (char *)slist[i].buf, slist[i].buflen);
    colname[slist[i].buflen] = '\0';

    /* format the output a little */

    cwid = MAX(slist[i].dbsize, slist[i].buflen);

    /* do a little bit of formatting */

    if (cwid > 80) {
      fprintf(logfile,"\n");
      len = 0;
    } else if ((len += cwid) > 80) {
      fprintf(logfile,"\n");
      len = cwid;
    }
#ifdef FORMAT1
    if ((slist[i].dbtype == INT_TYPE) || (slist[i].dbtype ==
FLT_TYPE))
      fprintf(logfile, "%*s ", cwid, slist[i].buf);
    else  /* string type */
      fprintf(logfile, "%*s ", -cwid, slist[i].buf);
#else
      fprintf(logfile, "%*s ", -cwid, colname);
#endif /* FORMAT1 */
  }

  fprintf(logfile,"\n");
}



void print_rows(ncol, nrow)
     int ncol;
```

```
    int nrow;
{

  int i,j;
  int len;
  int diff;
  int cwid;

  for (i=0;i<nrow;i++) {

    len = 0;

    for (j=0;j<ncol;j++) {

      cwid = MAX(slist[j].dbsize, slist[j].buflen);

      /* do a little bit of formatting */

      if (cwid > 80) {
            fprintf(logfile,"\n");
            len = 0;
      } else if ((len += cwid) > 80) {
            fprintf(logfile,"\n");
            len = cwid;
      }

      switch(slist[j].dbtype) {
      case INT_TYPE:
#ifdef HAVE_SCALE
            fprintf(logfile, "%*ld|", cwid,          (dlist[j]-
>ibuf)[i]);
            break;
#endif /* HAVE_SCALE */
      case FLT_TYPE:
#ifdef FORMAT1
            fprintf(logfile,"%*.2f ", cwid, (dlist[j]->fbuf)[i]);
#else
            fprintf(logfile,"%*.2f ", -cwid, (dlist[j]->fbuf)[i]);
#endif /* FORMAT1 */
            break;
      default:
            fprintf(logfile, "%*s ", -(cwid), (dlist[j]->sbuf)[i]);
            break;
      }
    }
    fprintf(logfile, "\n");
  }
}


/* remove_newline(): Remove newline character from str. */

void remove_newline(str)
    char *str;
{

  char *p;

  while ((p = strchr(str,'\n')) != NULL)
      *p = ' ';
}
```

qexecpl.h

```
/*
 * $Header: qexecpl.h 13-nov-2001.17:52:35 mpoess Exp $
 */

/* Copyright (c) 1999, 2001, Oracle Corporation.  All rights
reserved.  */

/* NOTE:  See 'header_template.doc' in the 'doc' dve under the
'forms'
     directory for the header file template that includes
instructions.
*/

/*
   NAME
     qexecpl.h

   DESCRIPTION
     SQL statement execution front-end header file.

   PUBLIC FUNCTION(S)
     <list of external functions declared/defined - with one-line
descriptions>

   PRIVATE FUNCTION(S)
     <list of static functions defined in .c file - with one-line
descriptions>

   EXAMPLES
   NOTES
     <other useful comments, qualifications, etc.>

   MODIFIED   (MM/DD/YY)
   mpoess      11/13/01 - change DOP to 84 for DML and DDL
   mpoess      02/22/01 - add linux changes
   mpoess      08/05/99 - make compile
   mpoess      07/15/99 - Creation
   mpoess      07/15/99 - Creation

*/

/*
# ifndef S_ORACLE
#  include <s.h>
# endif
*/
#ifndef QSTREAMPL_H

#define QSTREAMPL_H

#include <stdio.h>
#include <string.h>
#include <sys/param.h>
#include <sys/types.h>
#include <time.h>
```

Appendix F

```
#include <errno.h>
#include <math.h>

#include <oratypes.h>

#include <oratypes.h>

#ifndef OCIDFN
#include <ocidfn.h>
#endif /* OCIDFN */

#ifndef OCI_ORACLE
#include <oci.h>
#endif /* OCI_ORACLE */
/*
#ifdef __STDC__
#include <ociapr.h>
#else
#include <ocikpr.h>
#endif *//* __STDC__ */

/* some basic definitions */
#define UNAME_LEN 64
#define MAX_FILE_PATH_LEN 128

#ifndef TRUE
#define TRUE 1
#endif /* TRUE */

#ifndef FALSE
#define FALSE 1
#endif /* FALSE */
#ifndef LINUX
#define MAX(x,y) ((x >= y) ? x : y)
#define MIN(x,y) ((x <= y) ? x : y)
#endif
/* defines and typedefs for parsing */

#define CRT_TBL  1
#define INS_STMT 3
#define SEL_STMT 4
#define UPD_STMT 5
#define DRP_VIEW 7
#define DRP_TBL  8
#define DEL_STMT 9
#define CRT_VIEW 10
/* defines and typedefs for query description */

#define MAX_COLNAME_SIZE 32   /* Maximum length of
Column name  */
#define MAX_SEL_LIST 16       /* Maximum items on a
select list */

#define END_OF_LIST 1007      /* Error code when we reach
the end of the */
                      /* select list.                    */

/* types for describe */
#define CHAR_TYPE 1
#define NUM_TYPE  2
#define INT_TYPE  3
#define FLT_TYPE  4
#define STR_TYPE  5
#define DATE_TYPE 12

#define NUMWIDTH 16          /* Width of the numeric fields
*/

#define POS(i) (i+1)         /* The position is 1...n instead  */
#define IND(i) (i-1)         /* of 0..n-1 as in an array.      */

typedef struct des
{
  ub2 dbsize;
  ub4 buflen;
/*  sb2 dsize;  */
  sb4 scale;
/*  sb2 nullok; */
  OCITypeCode dbtype;
/*  text buf[MAX_COLNAME_SIZE]; */
  text *buf;
  ub1 precision;
} sltype;


/* defines and typedefs for query select list definition */

#define MAX_ARRAY 50       /* Maximum array size for
array fetch */
#define PFMEMSIZE 65536    /* Memory size of prefetch
buffer     */

#define MAX_STR_LEN 256    /* Maximum size for string
variables          */
#define MAX_PREALLOC 8     /* Maximum number of
preallocated select list */
                   /* definitions.                    */

#define INT sizeof(long)
#define STR sizeof(char)
#define FLT sizeof(double)
#define FLTP (double *)
#define INTP (long *)
#define STRP (char **)

typedef struct def
{
  long ibuf[MAX_ARRAY];
  double fbuf[MAX_ARRAY];
  char sbuf[MAX_ARRAY][MAX_STR_LEN];
  ub2 rlen[MAX_ARRAY];        /* return length     */
  OCIDefine *defhdl;
} dltype;

extern int errno;

#define SQL_LEN 2048
```

Appendix F

```
#ifndef NULL
#define NULL 0
#endif

#ifndef NULLP
# define NULLP (void *)NULL
#endif /* NULLP */
#ifndef DISCARD
# define DISCARD (void)
#endif

#ifndef sword
# define sword int
#endif

#ifndef ub1
#define ub1 unsigned char
#endif

#define NA              -1      /* ANSI SQL NULL */
#define VER7             2
#define NOT_SERIALIZABLE  8177  /* ORA-08177:
transaction not serializable */

#define ADR(object) ((ub1 *)&(object))
#define SIZ(object) ((sword)sizeof(object))
#define SID(sid) ((sid == -1) ? 0 : sid)

/* For get_statement */

#define END_OF_FILE –1
#define COMMENT 1
#define SQL_STMT   2
#define SET_FETCHROW 3



#define OCIhalloc(envh,hndl,htyp) \
   if((status=OCIHandleAlloc((dvoid *)envh,(dvoid
**)hndl,htyp,0,(dvoid **)0))!
=OCI_SUCCESS) \
      sql_error(envh,status,0); \
   else \
      DISCARD 0

#define OCIhfree(hndl,htyp) \
   if((status=OCIHandleFree((dvoid *)hndl,htyp)) ==
OCI_SUCCESS) \
      fprintf(stderr, "Error freeing handle of type %d\n", htyp)

#define OCIaget(hndl,htyp,attp,size,atyp,errh) \
   if((status=OCIAttrGet((dvoid *)hndl,htyp,(dvoid
*)attp,(dvoid *)size,atyp,er
rh)) != OCI_SUCCESS) \
      sql_error(errh,status,1); \
   else \
      DISCARD 0

#define OCIaset(hndl,htyp,attp,size,atyp,errh) \
   if((status=OCIAttrSet((dvoid *)hndl,htyp,(dvoid
*)attp,size,atyp,errh)) != O
CI_SUCCESS) \
      sql_error(errh,status,1); \
   else \
      DISCARD 0

#define OCIsexec(svch,stmh,errh,iter) \

if((status=OCIStmtExecute(svch,stmh,errh,iter,0,NULL,NUL
L,OCI_DEFAULT)) != O
CI_SUCCESS) \
      sql_error(errh,status,1); \
   else \
      DISCARD 0


#define ISOTXT "alter session set isolation_level =
serializable"
#define PDMLTXT "alter session force parallel dml parallel
(degree 84)"
#define PDDLTXT "alter session force parallel ddl parallel
(degree 84)"

#endif /* QSTREAMPL_H */
```

2asmshut

```
#!/bin/ksh
. $FRAME_PATH/env
export ORACLE_SID=$ASM_SID
if [ "$1" = "abort" ]; then
for i in $SECONDARY_NODES
do
ssh $i -n $KIT_DIR/rasmshuta
done
sqlplus << !
connect / as sysdba
shutdown abort
exit
!
else
for i in $SECONDARY_NODES
do
ssh $i -n $KIT_DIR/rasmshut
done
sqlplus << !
connect / as sysdba
shutdown immediate
exit
!
fi
```

2asmstart

```
#!/bin/ksh

. $FRAME_PATH/env
export ORACLE_SID=$ASM_SID
sqlplus /NOLOG << EOF
```

```
!date
set timing on
connect / as sysdba
startup pfile=$ORACLE_HOME/dbs/init${ASM_SID}.ora
!date
exit
EOF

for i in $SECONDARY_NODES
do
ssh $i -n $KIT_DIR/rasmstart
done
```

2shut

```
#!/bin/ksh
. $FRAME_PATH/env

if [ "$1" = "abort" ]; then
for i in $SECONDARY_NODES
do
ssh $i -n /mnt/sdb2/home/oracle/frame/bin/tshut
done
sqlplus << !
connect / as sysdba
shutdown abort
exit
!
else
for i in $SECONDARY_NODES
do
ssh $i -n /mnt/sdb2/home/oracle/frame/bin/tshut abort
done
sqlplus << !
connect / as sysdba
shutdown immediate
exit
!
fi
```

2start

```
#!/bin/ksh

. $FRAME_PATH/env

tstart

for i in $SECONDARY_NODES
do
ssh $i -n /mnt/sdb2/home/oracle/frame/bin/tstart
done
```

tshut

```
#!/bin/ksh
#
# $Header: tshut.sh 08-aug-99.18:06:22 mpoess Exp $
#
# tshut.sh
#
#  Copyright (c) Oracle Corporation 1999. All Rights
Reserved.
#
#   NAME
#     tshut.sh
#
#   DESCRIPTION
#     shuts down a database
#
#   NOTES
#     <other useful comments, qualifications, etc.>
#
#   MODIFIED   (MM/DD/YY)
#   mpoess      08/08/99 - Creation
#   mpoess      08/08/99 - Creation
#
#!/bin/ksh

if [ "$1" = "abort" ]; then
sqlplus /NOLOG<< !
connect / as sysdba
shutdown abort
exit
!
else
sqlplus /NOLOG<< !
connect / as sysdba
shutdown
exit
!
fi
```

tstart

```
#!/bin/ksh
#
# $Header: tstart.sh 08-aug-99.18:05:50 mpoess Exp $
#
# tstart.sh
#
#  Copyright (c) Oracle Corporation 1999. All Rights
Reserved.
#
#   NAME
#     tstart.sh
#
#   DESCRIPTION
#     starts a database with a specific init.ora or uses the
default.
#
#   NOTES
#     <other useful comments, qualifications, etc.>
#
#   MODIFIED   (MM/DD/YY)
#   mpoess      08/08/99 - Creation
#   mpoess      08/08/99 - Creation
#
#!/bin/ksh

DIR=`pwd`
```

Appendix F

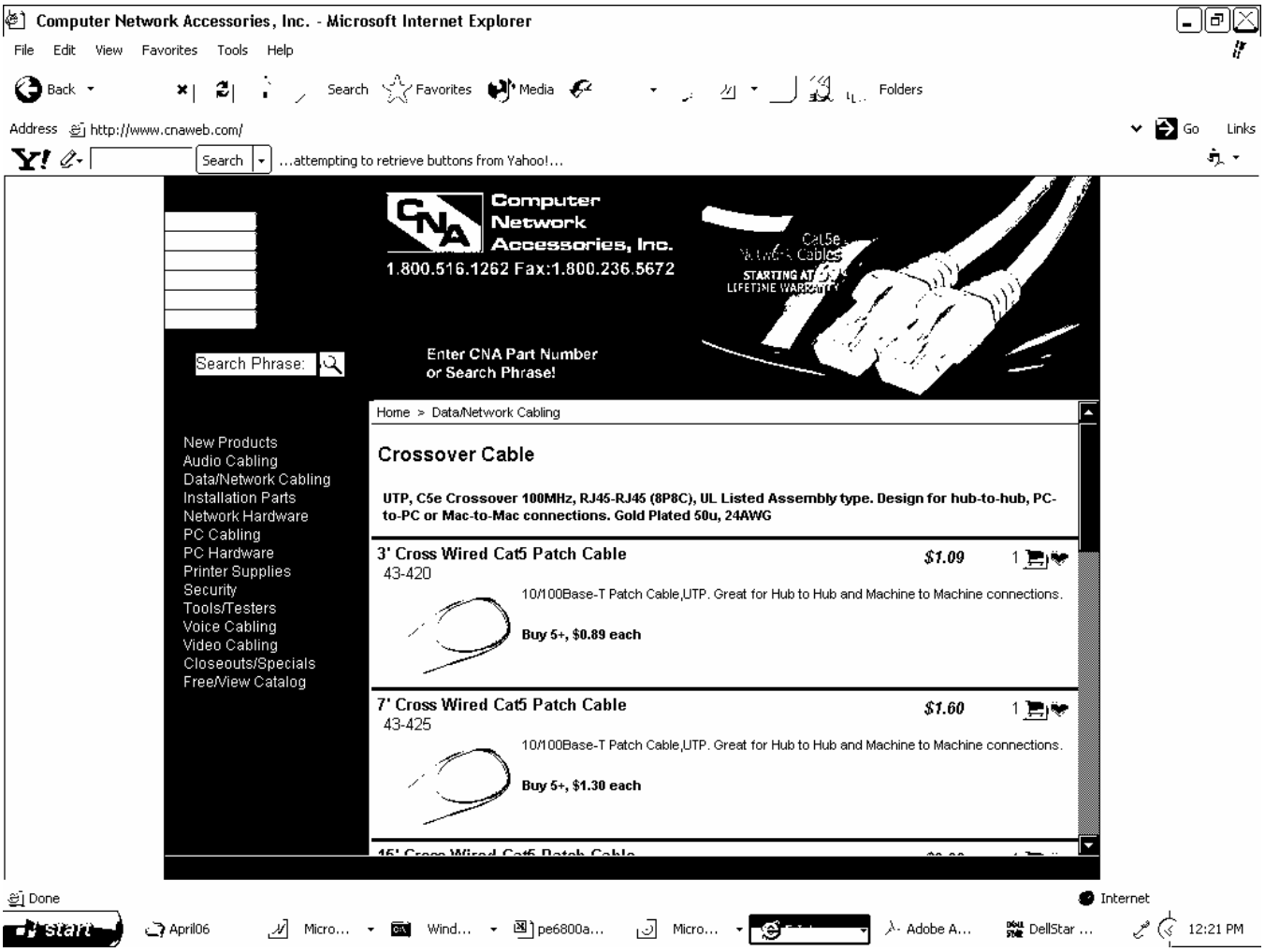
```
cd $ORACLE_HOME/dbs

if [ "$1" != "" ]; then
  PFILE="pfile=$ORACLE_HOME/dbs/$1.ora"
else

PFILE="pfile=$ORACLE_HOME/dbs/init_$ORACLE_SID.o
ra"
fi
```

Appendix G: Price Quotations

Appendix G



Appendix G

Product	Price	Quantity	Extended Price
Oracle Database 10g Enterprise Edition Release 2, Named User Plus for 3 years	10,000	8*	80,000
Oracle Real Application Clusters	5,000	8*	40,000
Partitioning	2,500	8*	20,000
Database Server Support Package	4,000	3	12,000
Oracle Mandatory E-Business Discount			<22,800>
TOTAL			129,200

Oracle Pricing Contact: MaryBeth Pierantoni, mary.beth.pierantoni@oracle.com, 916-315-5081
** 8 = 16 * 0.50. Explanation: For the purposes of counting the number of processors which require licensing, an Intel multicore chip with "n" cores shall be determined by multiplying "n" cores by a factor of 0.50.