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# TPC Benchmark™ H
# Full Disclosure Report

# Sun Microsystems Sun Fire™ V880 Server
# Using Sybase IQ 12.5

**Submitted for Review**
**Report Date: June 3 2003**

TPC Benchmark H Full Disclosure Report

First Printing

901 San Antonio Road, Palo Alto, California 94303 U.S.A.

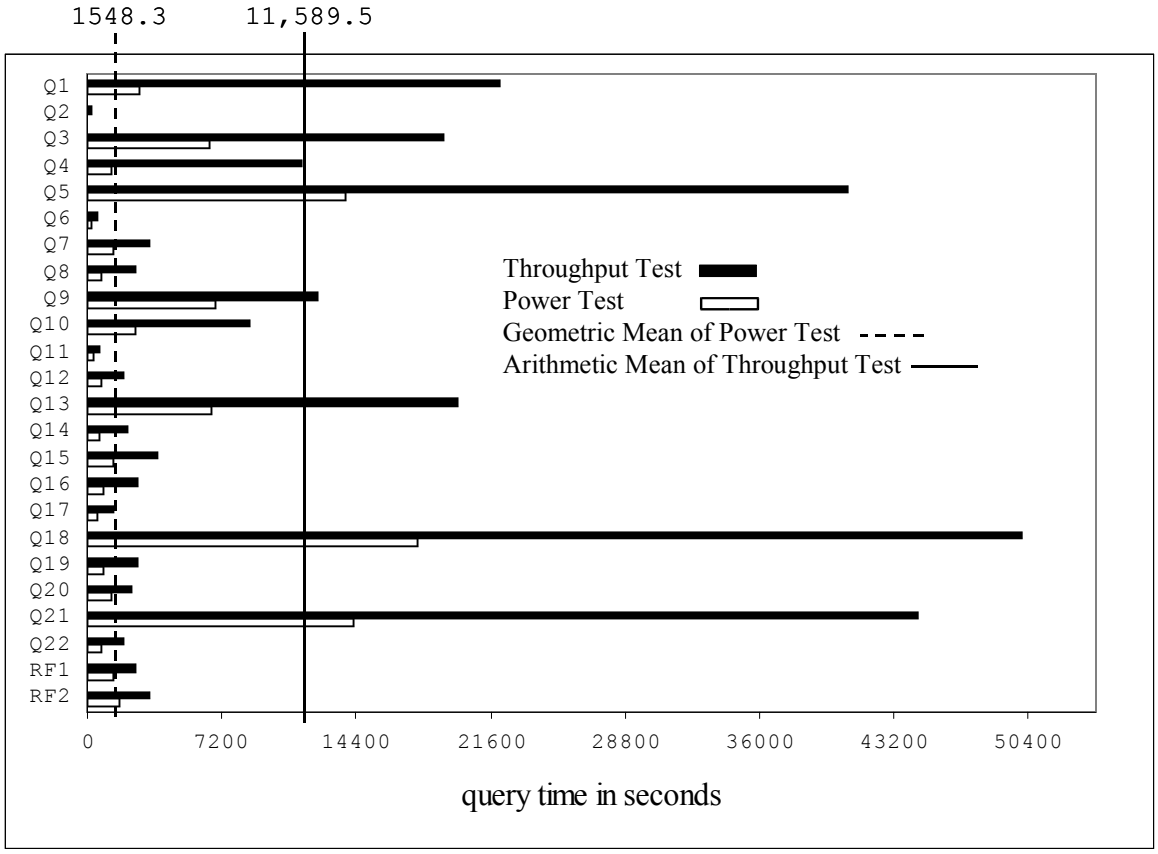
# Sun Fire™ V880 Server with Sybase IQ 12.5

**TPC-H Rev. 2.0**

**June 3 2003**

| Total System Cost | Composite Query per Hour Metric | Price/Performance |
|---|---|---|
| $232,206 | **2240.9** QphH@1000GB | **$104** $/QphH@1000GB |

| Database Size | Database Manager | Operating System | Other Software | Availability Date |
|---|---|---|---|---|
| 1000GB | Sybase IQ 12.5 | Solaris 9 | Solaris Volume Manager | June 3 2003 |




| Database Load Time = 22:24 | Load Includes Backup: N | Total Data Storage/Database Size=3.69 |
|---|---|---|
| RAID (Base tables): Y | RAID (Base tables and auxiliary data structures): Y | RAID (All): N |

System Configuration: Sun Fire™ V880 Server
Processors: 8 UltraSPARC™ III Cu 1050 MHz processors
Memory: 32GB memory
Disks: 6 internal disks (6x73.4 GB), 4 SE3310 (12x73.4GB)
Total Storage: 3,689.1 GB (in this calculation one GB is defined as 1024*1024*1024 bytes)

# Sun Fire™ V880 Server with Sybase IQ 12.5

**TPC-H Rev. 2.0**

**June 3 2003**

| Description | Part Number | Source | Unit Price | Qty | Ext. Price | 3 Yr. maint. |
|---|---|---|---|---|---|---|
| **Server Hardware** | | | | | | |
| Sun Fire V880 (8*1050MHz, 32GB mem, 6*73GB disks priced (2*18GB + 4*36GB disks measured)) | A30-WTF8-323GRF | 1 | 109,995 | 1 | 109,995 | 11,088 |
| 2M-SCSI-Cable | X1138A | 3 | 95 | 8 | 760 | |
| Dual-Ultra-3-SCSI-HBA | X6758A | 3 | 800 | 4 | 3,200 | |
| Server Hardware discount | | 1 | | | -17,519 | -3,548 |
| *Server HardwareSubtotal* | | | | | 96,436 | 7,540 |
| **Storage** | | | | | | |
| SE3310-12x73GB-JBOD Disk Array 10k rpm | XTA3310R01A0R876 | 3 | 14,995 | 4 | 59,980 | |
| 73GB-10KRPM-Disk (10)% spares | XTA-3310-73GB-10K | 3 | 1,595 | 5 | 7,975 | |
| Storage discount | | 1 | | | -19,432 | |
| *Storage Subtotal* | | | | | 48,523 | |
| **Server Software** | | | | | | |
| Solaris 9 CD SPARC Edition | SOLZS-090C9A | 1 | 50 | 1 | 50 | |
| Solaris discount | | 1 | | | -23 | |
| Sybase IQ-M Single App Svr - 8 cpu's | 12841 | 2 | 60,000 | 1 | 60,000 | |
| Sybase IQ 3 Years Extended Support 24 x 7 | 98480 | 2 | | 1 | | 31,680 |
| Sybase discount (licence and support) | | 2 | | | -12,000 | |
| *Server Software Subtotal* | | | | | 48,028 | 31,680 |
| | | | **Total** | | 192,986 | 39,220 |
| Service for all Sun products is from Sun Microsystems, Inc. | | | **3 Yr. Cost** | | 232,206 | |
| Service for Sybase products is from Sybase Inc. | | | **QphH@1000GB** | | 2,240.90 | |
| | | | **$/QphH@1000GB** | | $104 | |

**Notes (Source):**

1. Sun Microsystems, Inc.
2. Sybase Inc.
3. Continental Resources, Inc.

Price Quotes in Appendix G

Audited by: Brad Askins, InfoSizing, Inc. (www.sizing.com)

**Sun Fire™ V880 Server with Sybase IQ 12.5**

**TPC-H Rev. 2.0**

**June 3 2003**

# Numerical Quantities

## Measurement Results:

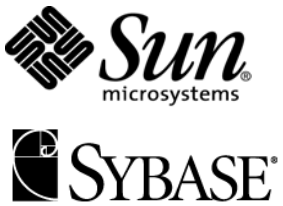
| | |
|---|---|
| Database Scale Factor | = 1000GB |
| Total Data Storage / Database Size | = 3.69 |
| Start of database load time | = 2003-05-10 09:41:00 |
| End of database load time | = 2003-05-11 08:04:47 |
| Database Load Time | = 22:24 |
| Query Streams for Throughput Test | = 7 |
| TPC-H Power | = 2325.1 |
| TPC-H Throughput | = 2159.7 |
| TPC-H Composite Query-per-Hour Rating (QphH@1000GB) | = 2240.9 |
| Total System Price Over 3 Years | = $232,206 |
| TPC-H Price/Performance Metric ($/QphH@1000GB) | = $104 |

## Measurement Intervals:

| | |
|---|---|
| Measurement Interval in Throughput Test (Ts) | = 256,698 seconds |

## Duration of Stream Execution:

| Stream ID | Seed | Start Date | Start Time | End Date | End Time | Duration |
|---|---|---|---|---|---|---|
| **Stream 00** | 511080447 | May 15, 2003 | 07:17:28 | May 16, 2003 | 06:33:07 | 23:15:39 |
| **Stream 01** | 511080448 | May 16, 2003 | 06:33:10 | May 19, 2003 | 05:51:28 | 71:18:18 |
| **Stream 02** | 511080449 | May 16, 2003 | 06:33:14 | May 19, 2003 | 05:05:55 | 70:32:41 |
| **Stream 03** | 511080450 | May 16, 2003 | 06:33:18 | May 19, 2003 | 05:32:37 | 70:59:19 |
| **Stream 04** | 511080451 | May 16, 2003 | 06:33:23 | May 19, 2003 | 05:39:32 | 71:06:09 |
| **Stream 05** | 511080452 | May 16, 2003 | 06:33:26 | May 19, 2003 | 04:48:59 | 70:15:33 |
| **Stream 06** | 511080453 | May 16, 2003 | 06:33:31 | May 19, 2003 | 05:17:11 | 70:43:40 |
| **Stream 07** | 511080454 | May 16, 2003 | 06:33:35 | May 19, 2003 | 05:25:05 | 70:51:30 |
| **Refresh** | | May 16, 2003 | 06:33:35 | May 19, 2003 | 02:45:20 | 68:11:45 |



# Sun Fire™ V880 Server with Sybase IQ 12.5

**TPC-H Rev. 2.0**

**June 3 2003**

## TPC-H Timing Intervals (in seconds)

| | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Q11 | Q12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stream 00** | 2,749.6 | 123.4 | 6,487.5 | 1,290.0 | 13,857.9 | 239.2 | 1,339.9 | 749.9 | 6,806.1 | 2,595.6 | 284.5 | 747.4 |
| **Stream 01** | 26,551.2 | 233.0 | 20,902.2 | 5,819.0 | 34,284.0 | 533.8 | 3,274.4 | 2,032.2 | 17,740.3 | 6,896.4 | 874.3 | 1,907.5 |
| **Stream 02** | 22,531.1 | 185.6 | 19,989.7 | 10,763.8 | 42,802.0 | 1,156.6 | 3,631.4 | 1,643.7 | 8,744.2 | 10,371.2 | 706.6 | 2,206.1 |
| **Stream 03** | 24,413.1 | 201.1 | 16,762.4 | 13,997.2 | 42,198.3 | 358.0 | 2,693.7 | 6,215.0 | 12,045.6 | 6,698.7 | 676.9 | 2,000.9 |
| **Stream 04** | 18,336.4 | 195.5 | 20,022.9 | 10,683.6 | 45,405.3 | 450.8 | 2,490.5 | 1,826.8 | 8,963.9 | 7,702.4 | 497.0 | 1,950.7 |
| **Stream 05** | 21,644.4 | 169.5 | 16,459.3 | 13,286.5 | 41,424.3 | 429.2 | 2,262.8 | 1,032.8 | 13,086.2 | 6,520.7 | 657.3 | 1,350.4 |
| **Stream 06** | 18,745.9 | 265.3 | 20,500.1 | 14,471.6 | 38,126.8 | 489.5 | 5,556.2 | 2,807.3 | 13,542.4 | 13,651.7 | 749.3 | 2,380.2 |
| **Stream 07** | 17,591.3 | 215.0 | 18,893.0 | 9,671.8 | 42,637.0 | 383.1 | 3,612.3 | 2,139.6 | 12,103.3 | 8,908.6 | 1,062.4 | 1,066.2 |
| **Minimum** | 17,591.3 | 169.5 | 16,459.3 | 5,819.0 | 34,284.0 | 358.0 | 2,262.8 | 1,032.8 | 8,744.2 | 6,520.7 | 497.0 | 1,066.2 |
| **Average** | 22,037.0 | 208.4 | 19,106.1 | 11,503.6 | 40,706.8 | 569.7 | 3,318.2 | 2,593.0 | 12,353.8 | 8,640.2 | 693.6 | 1,966.0 |
| **Maximum** | 26,551.2 | 265.3 | 20,902.2 | 14,471.6 | 45,405.3 | 1,156.6 | 5,556.2 | 6,215.0 | 17,740.3 | 13,651.7 | 1,062.4 | 2,380.2 |

| | Q13 | Q14 | Q15 | Q16 | Q17 | Q18 | Q19 | Q20 | Q21 | Q22 | RF1 | RF2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stream 00** | 6,687.9 | 594.5 | 1,406.3 | 805.9 | 529.8 | 17,727.1 | 813.0 | 1,277.6 | 14,241.8 | 715.1 | 1,364.3 | 1,661.6 |
| **Stream 01** | 17,037.3 | 1,629.3 | 4,491.0 | 3,646.9 | 1,035.9 | 54,946.6 | 1,994.6 | 2,053.3 | 46,678.3 | 2,130.1 | 4,812.7 | 3,111.4 |
| **Stream 02** | 20,739.6 | 3,751.2 | 2,734.5 | 3,621.1 | 3,308.0 | 45,978.8 | 2,799.2 | 1,983.6 | 42,213.7 | 2,092.4 | 2,190.9 | 3,101.9 |
| **Stream 03** | 19,189.3 | 1,227.5 | 3,633.5 | 2,053.3 | 811.9 | 48,314.1 | 3,390.3 | 2,903.3 | 44,335.2 | 1,430.7 | 2,450.5 | 3,397.2 |
| **Stream 04** | 25,027.5 | 1,686.0 | 3,864.9 | 1,644.2 | 967.5 | 50,837.7 | 3,085.0 | 2,617.1 | 46,471.6 | 1,236.3 | 2,287.0 | 2,976.5 |
| **Stream 05** | 18,518.3 | 1,079.5 | 4,480.5 | 2,948.6 | 785.8 | 54,236.9 | 2,131.1 | 2,152.0 | 46,594.4 | 1,677.9 | 2,064.7 | 3,587.7 |
| **Stream 06** | 18,234.3 | 3,438.7 | 3,013.1 | 2,174.6 | 1,328.1 | 45,823.2 | 2,867.6 | 2,686.3 | 40,673.0 | 3,082.3 | 1,924.4 | 3,766.7 |
| **Stream 07** | 16,675.9 | 1,235.9 | 2,080.5 | 1,608.5 | 1,593.2 | 59,060.2 | 2,065.9 | 5,360.9 | 45,935.4 | 1,184.4 | 2,302.4 | 3,428.4 |
| **Minimum** | 16,675.9 | 1,079.5 | 2,080.5 | 1,608.5 | 785.8 | 45,823.2 | 1,994.6 | 1,983.6 | 40,673.0 | 1,184.4 | 1,924.4 | 2,976.5 |
| **Average** | 19,791.1 | 2,135.3 | 3,702.9 | 2,681.5 | 1,372.9 | 50,022.9 | 2,711.3 | 2,399.3 | 44,494.4 | 1,941.6 | 2,621.7 | 3,323.6 |
| **Maximum** | 25,027.5 | 3,751.2 | 4,491.0 | 3,646.9 | 3,308.0 | 59,060.2 | 3,390.3 | 5,360.9 | 46,678.3 | 3,082.3 | 4,812.7 | 3,766.7 |

INFO SIZING

TPC TRANSACTION PROCESSING PERFORMANCE COUNCIL CERTIFIED AUDITOR

Benchmark Sponsors:


Brad Carlile
Director, Enterprise Benchmarking
Sun Microsystems, Inc.
8305 S. W. Creekside Place
Beaverton, OR 97008

Eric Miles
Sr. VP & General Manager
Sybase Business Intelligence
561 Virginia Road
Concord, MA 01742


June 2, 2003

I verified the TPC Benchmark™ H performance of the following configuration:

Platform: **Sun Fire V880 Server**
Database Manager: **Sybase IQ 12.5**
Operating System: **Solaris 9**

The results were:

| CPU (Speed) | Memory | Disks | **QphH@1000GB** |
|---|---|---|---|
| **Sun Fire 880** | | | |
| 8 x UltraSPARC III Cu (1050 MHz) | 32 GB Main | 54 x 73.4 GB | **2240.9** |

In my opinion, this performance result was produced in compliance with the TPC's requirements for the benchmark. The following verification items were given special attention:

- The database records were defined with the proper layout and size
- The database population was generated using DBGEN
- The database was properly scaled to 1000GB and populated accordingly
- The compliance of the database auxiliary data structures was verified
- The database load time was correctly measured and reported

- The required ACID properties were verified and met
- The query input variables were generated by QGEN
- The query text was produced using minor modifications
- The execution of the queries against the SF1 database produced compliant answers
- A compliant implementation specific layer was used to drive the tests
- The throughput tests involved 7 query streams
- The ratio between the longest and the shortest query was such that no query timing was adjusted
- The execution times for queries and refresh functions were correctly measured and reported
- The repeatability of the measured results was verified
- The required amount of database log was configured
- The system pricing was verified for major components and maintenance
- The major pages from the FDR were verified for accuracy

Additional Audit Notes:

The measured system included 2 18GB disks and 4 36.4GB disks that were substituted by 6 73.4GB disk drives in the priced configuration. Based on the specifications of these disks and on additional performance data collected on these disks, it is my opinion that this substitution does not have a material effect on the reported performance.

Respectfully Yours,

François Raab, President

Bradley J. Askins, Auditor

1373 North Franklin Street • Colorado Springs, CO 80903-2527 • Office: 719/473-7555 • Fax: 719/473-7554

# Table of Contents

# TPC Benchmark H Overview

The TPC BenchmarkTM H (TPC-H) is a Decision Support benchmark. It is a suite of business-oriented ad-hoc queries and concurrent modifications. The queries and the data populating the database have been chosen to have broad industry-wide relevance while maintaining a sufficient degree of ease of implementation. This benchmark illustrates Decision Support systems that:

- Examine large volumes of data
- Execute queries with a high degree of complexity
- Give answers to critical business questions

TPC-H evaluates the performance of various Decision Support systems by the execution of sets of queries against a standard database under controlled conditions. The TPC-H queries:

- Give answers to real-world business questions
- Simulate generated ad-hoc queries
- Are far more complex than most OLTP transactions
- Include a rich breadth of operators and selectivity constraints
- Generate intensive activity on the part of the database server component of the system under test
- Are executed against a database complying to specific population and scaling requirements
- Are implemented with constraints derived from staying closely synchronized with an on-line production database

# 1. General Items

## 1.1 Benchmark Sponsor

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

Sun Microsystems, Inc. and Sybase Inc. are the sponsors of this TPC-H benchmark.

## 1.2 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 parameters*
- *Configuration parameters and options for any other software component incorporated into the pricing structure*
- *Compiler optimization options*

Appendix A contains the Solaris and Sybase IQ parameters used in this benchmark.

## 1.3 Configuration Diagram

*Provide diagrams of both the measured and priced configurations, accompanied by a description of the differences.*

Sun Fire™ V880 Server, priced configured with:

- 8 UltraSPARC™ III Cu 1050 MHz processors
- 32 GB memory
- 4 PCI Dual Ultra-3 SCSI HBA
- 4 Sun StorEdge 3310 SCSI Array containing 12 x 73.4 GB disk drives
- 6 internal disk 4 x 73.4 GB disks
- 8 2 meter SCSI cables

The tested configuration had different internal disks than the priced configuration. The measured configuration had a total of 6 internal disks of which 2 were 18GB and 4 were 36GB. The priced configuration had 6 internal disks all of which were 73.4GB.

## Measured Configuration

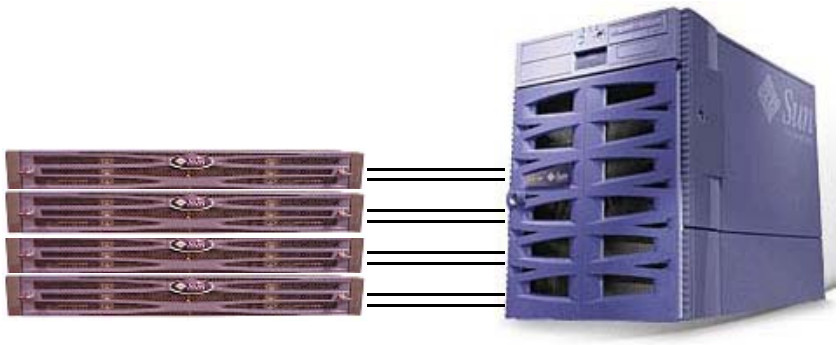
**Sun Fire V880 Server**

**8 x UltraSPARC™ III Cu 1050 Mhz**

**32 GB Memory**

**2 x 18 GB internal disks**

**4 x 36.4 GB internal disks**



**StorEdge™ 3310 SCSI Array**

**4 x (12 x 73.4GB disks)**

**IQ Main Database 1,440.0 GB RAID 1 (2 x = 2,880.0 GB)**

**IQ Temp Database 534.5 GB Non-RAID**

**See section 5.2 for detailed disk configuration information**

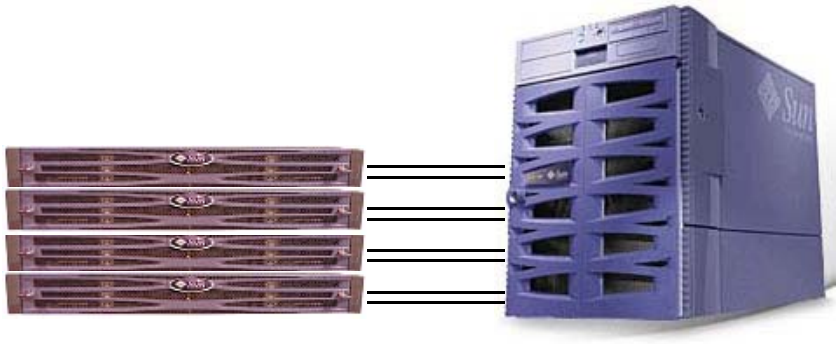
## Priced Configuration

**Sun Fire V880 Server**

**8 x UltraSPARC™ III Cu 1050 Mhz**

**32 GB Memory**

**6 x 73.4GB internal disks**



**StorEdge™ 3310 SCSI Array**

**4 x (12 x 73.4GB disks)**

# 2. Clause 1 Logical Database Design

## 2.1 Database Definition Statements

*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 the tables and indexes for the TPC-H database.

## 2.2 Physical Organization

*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.

## 2.3 Horizontal Partitioning

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

No horizontal partitioning was used.

## 2.4 Replication

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

No replication was used.

# 3. Clause 2 Queries and Refresh Functions

## 3.1 Query Language

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

SQL was the query language used to implement all queries.

## 3.2 Verifying Method for Random Number Generation

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

TPC supplied versions 1.3.0 of DBGEN and QGEN were used for this TPC-H benchmark.

## 3.3 Generating Values for Substitution Parameters

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

The supplied QGEN version 1.3.0 was used to generate the substitution parameters.

## 3.4 Query Text and Output Data from Qualification Database

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

Appendix C contains the query text and query output. The standard queries were used throughout with the following modifications:

- In Q1, Q4, Q5, Q6, Q10, Q12, Q14, Q15 and Q20, the "dateadd" function is used to perform date arithmetic.
- In Q7, Q8 and Q9, the "datepart" function is used to extract part of a date (e.g., "year").
- In Q2, Q3, Q10, Q18 and Q21, the "top" function is used to restrict the number of output rows.
- The semicolon (;) is used as a command delimiter.

## 3.5 Query Substitution Parameters and Seeds Used

*The query substitution parameters used for all performance tests must be disclosed in tabular format, along with the seeds used to generate these parameters.*

Appendix D contains the seed and query substitution parameters.

## 3.6 Query Isolation Level

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

The queries and transactions were run with isolation level 3 (repeatable read).

## 3.7 Source Code of Refresh Functions

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

Appendix B contains the source code for the refresh functions.

# 4. Clause 3 Database System Properties

## 4.1 ACID Properties

*The ACID (Atomicity, Consistency, Isolation and Durability) properties of transaction processing systems must be supported by the system under test during the timed portion of this benchmark. Since TPC-H is not a transaction processing benchmark, the ACID properties must be evaluated outside the timed portion of the test.*

Source code for the ACID test is included in Appendix B.

## 4.2 Atomicity

*The system under test must guarantee that transactions are atomic; the system will either perform all individual operations on the data, or will assure that no partially-completed operations leave any effects on the data.*

### 4.2.1 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 ORDERS, LINEITEM, and HISTORY tables*

1. The total price from the ORDERS table and the extended price from the LINEITEM table were retrieved for a randomly selected order key.
2. The ACID Transaction was performed using the order key from step 1.
3. The ACID Transaction committed.
4. The total price from the ORDERS table and the extended price from the LINEITEM table were retrieved for the same order key. It was verified that the appropriate rows had been changed.

### 4.2.2 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 ORDERS, LINEITEM, and HISTORY tables.*

1. The total price from the ORDERS 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 ORDERS table and the extended price from the LINEITEM table were retrieved for the same order key. It was verified that the appropriate rows had not been changed.

## 4.3 Consistency

*Consistency is the property of the application that requires any execution of transactions to take the database from one consistent state to another.*

### 4.3.1 Consistency Test

*Verify that ORDERS 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 ORDERS and LINEITEM.*

1. The consistency of the ORDERS and LINEITEM tables was verified based on a sample of order keys.
2. 100 ACID Transactions were submitted by each of seven execution streams.
3. The consistency of the ORDERS and LINEITEM tables was re-verified.

## 4.4 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 the proper order.*

### 4.4.1 Read-Write Conflict with Commit

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

1. An ACID Transaction was started for a randomly selected O_KEY, L_KEY, and DELTA. The ACID Transaction was suspended prior to COMMIT.
2. An ACID Query was started for the same O_KEY used in step 1.
3. The ACID Transaction was resumed and COMMITTED.
4. The ACID Query completed. It returned the data as committed by the ACID Transaction.

### 4.4.2 Read-Write Conflict with Rollback

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

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

### 4.4.3 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. T1 was suspended prior to COMMIT.
2. Another ACID Transaction, T2, was started using the same O_KEY and L_KEY and a randomly selected DELTA.
3. T2 waited.
4. T1 was allowed to COMMIT and T2 completed.

5. It was verified that T2.L_EXTENDEDPRICE = T1.L_EXTENDEDPRICE + (DELTA1*(T1.L_EXTENDEDPRICE/T1.L_QUANTITY))

### 4.4.4 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. T1 was suspended prior to ROLLBACK.
2. Another ACID Transaction, T2, was started using the same O_KEY and L_KEY and a randomly selected DELTA.
3. T2 waited.
4. T1 was allowed to ROLLBACK and T2 completed.
5. It was verified that T2.L_EXTENDEDPRICE = T1.L_EXTENDEDPRICE.

### 4.4.5 Concurrent Progress of Read and Write Transactions

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

1. An ACID Transaction, T1, was started for a randomly selected O_KEY, L_KEY, and DELTA. T1 was suspended prior to ROLLBACK.
2. Another Transaction, T2, was started which did the following:

   For random values of PS_PARTKEY and PS_SUPPKEY, all columns of the PARTSUPP table for which PS_PARTKEY and PS_SUPPKEY are equal, are returned.
3. T2 completed.
4. T1 was allowed to COMMIT.
5. It was verified that appropriate rows in ORDERS, LINEITEM and HISTORY tables were changed.

### 4.4.6 Read-Only Query Conflict with Update Transaction

*Demonstrate that 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.*

1. A Transaction, T1, executing Q1 against the qualification database, was started using a randomly selected DELTA.
2. An ACID Transaction T2, was started for a randomly selected O_KEY, L_KEY and DELTA.
3. T2 completed and appropriate rows in the ORDERS, LINEITEM and HISTORY tables had been changed.
4. Transaction T1 completed executing Q1.

## 4.5 Durability

*The SUT 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 3.5.3.*

### 4.5.1 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 disks containing TPC-H tables, indexes, catalog file and catalog log file were mirrored. During the durability test a disk containing tables and indexes and a database temp device was removed from its cabinet. The database server haulted when it could no longer access the unmirrored temp device. The disk was replaced and the IQ database restarted and brought back online through a normal database recovery.

### 4.5.2 System Crash

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

The system crash and memory failure tests were combined. Power to the server was turned off during the durability test. When power was restored, the system rebooted and the database was restarted. The durability success file and the HISTORY table were compared successfully.

### 4.5.3 Memory Failure

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

See section 4.5.2.

# 5. Clause 4 Scaling and Database Population

## 5.1 Ending Cardinality of Tables

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

| *Table* | *Rows* |
|---|---|
| *Lineitem* | *5,999,989,709* |
| *Orders* | *1,500,000,000* |
| *Partsupp* | *800,000,000* |
| *Part* | *200,000,000* |
| *Customer* | *150,000,000* |
| *Supplier* | *10,000,000* |
| *Nation* | *25* |
| *Region* | *5* |

## 5.2 Distribution of Tables and Logs Across Media

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

- All tables and indexes were mirrored across 24 volumes on the StorEdge 3310. Each volume was a RAID 1 device created using the Solaris Volume Manager.
- The Sybase IQ Temp dbspaces were configured using 52 raw partitions , 12 on each of the four StorEdge 3310 and 4 raw partitions on 4 of the internal drives. The temp space was not mirrored.

All Data and Indexes were striped across the twenty four RAID 1 volumes using Sybase IQ striping. Mirroring was performed by Solaris Volume Manager. The following two tables show the distribution of tables and logs across media.

The following table shows the file systems for the operating system and sybase software.

| Disk Size GB | Partition | Use |
|---|---|---|
| 18 | c1t0d0s0 | /root |
| 18 | c1t1d0s0 | /swap |
| | c1t1d0s6 | Solaris Volume Manager - metadb |
| | c1t1d0s7 | Solaris Volume Manager – metadb |

Each of the disks in the four StorEdge 3310 Arrays was split into two partitions using Solaris format, a larger partition for IQ Main Store and a small partition for IQ Temp Store. Each IQ Main Store device is constructed from two 60GB partitions on two disks using Solaris Volume Manager RAID 1. A smaller 8.3GB partition is created on each of the 48 disks in the StorEdge 3310 Arrays, these smaller un-mirrored raw partition are combined with 4 internal disks to form the IQ Temp Store. This table shows the devices used by the database server for data storage and temp space. The /sybase2 file system used to store the IQ

catalog file and catalog log resides on a small RAID 1 partition on the internal disks.

**Database Storage Summary:**

IQ Main Storage: 1,440.0 GB RAID 1 (2 x = 2,880.0 GB)

IQ Temp Storage: 534.5 GB

**Database Device Details:**

| Disk Size GB | Raw Partition Name | SVM Device Name | Mirror Primary Secondary | Symbolic Link | Database Usage | Database Device Size GB | RAID |
|---|---|---|---|---|---|---|---|
| 68.36 | c1t2d0s5 | d76 | P | | /sybase2 | 1.00 | RAID 1 |
| 68.36 | c1t3d0s5 | d77 | S | | /sybase2 | 0.00 | RAID 1 |
| 68.36 | c8t13d0s6 | d52 | P | M01 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c9t12d0s6 | d52 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c9t8d0s6 | d53 | P | M02 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c9t9d0s6 | d53 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c10t9d0s6 | d54 | P | M03 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c10t8d0s6 | d54 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c10t13d0s6 | d55 | P | M04 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c10t12d0s6 | d55 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c13t9d0s6 | d56 | P | M05 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c13t8d0s6 | d56 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c13t10d0s6 | d57 | P | M06 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c13t13d0s6 | d57 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c14t13d0s6 | d58 | P | M07 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c14t12d0s6 | d58 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c14t11d0s6 | d59 | P | M08 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c14t10d0s6 | d59 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c14t8d0s6 | d60 | P | M09 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c14t9d0s6 | d60 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c7t10d0s6 | d61 | P | M10 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c7t11d0s6 | d61 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c7t12d0s6 | d62 | P | M11 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c7t13d0s6 | d62 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c7t8d0s6 | d63 | P | M12 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c7t9d0s6 | d63 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c8t10d0s6 | d64 | P | M13 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c8t9d0s6 | d64 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c8t12d0s6 | d65 | P | M14 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c8t8d0s6 | d65 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c8t11d0s6 | d66 | P | M15 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c9t13d0s6 | d66 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c9t10d0s6 | d67 | P | M16 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c9t11d0s6 | d67 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c10t10d0s6 | d68 | P | M17 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c10t11d0s6 | d68 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c11t9d0s6 | d69 | P | M18 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c11t10d0s6 | d69 | S | | IQ Main | 0.00 | RAID 1 |

| Disk Size GB | Raw Partition Name | SVM Device Name | Mirror Primary Secondary | Symbolic Link | Database Usage | Database Device Size GB | RAID |
|---|---|---|---|---|---|---|---|
| 68.36 | c11t11d0s6 | d70 | P | M19 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c11t12d0s6 | d70 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c11t8d0s6 | d71 | P | M20 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c11t13d0s6 | d71 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c12t11d0s6 | d72 | P | M21 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c12t12d0s6 | d72 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c12t13d0s6 | d73 | P | M22 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c12t8d0s6 | d73 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c12t9d0s6 | d74 | P | M23 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c12t10d0s6 | d74 | S | | IQ Main | 0.00 | RAID 1 |
| 68.36 | c13t11d0s6 | d75 | P | M24 | IQ Main | 60.00 | RAID 1 |
| 68.36 | c13t12d0s6 | d75 | S | | IQ Main | 0.00 | RAID 1 |
| 33.9 | c1t2d0s6 | | | T01 | IQ Temp | 32.90 | None |
| 33.9 | c1t3d0s6 | | | T02 | IQ Temp | 32.90 | None |
| 33.9 | c1t4d0s6 | | | T03 | IQ Temp | 33.90 | None |
| 33.9 | c1t5d0s6 | | | T04 | IQ Temp | 33.90 | None |
| 68.36 | c7t12d0s7 | | | T05 | IQ Temp | 8.30 | None |
| 68.36 | c7t13d0s7 | | | T06 | IQ Temp | 8.30 | None |
| 68.36 | c8t8d0s7 | | | T07 | IQ Temp | 8.30 | None |
| 68.36 | c8t9d0s7 | | | T08 | IQ Temp | 8.30 | None |
| 68.36 | c8t10d0s7 | | | T09 | IQ Temp | 8.30 | None |
| 68.36 | c8t11d0s7 | | | T10 | IQ Temp | 8.30 | None |
| 68.36 | c8t12d0s7 | | | T11 | IQ Temp | 8.30 | None |
| 68.36 | c8t13d0s7 | | | T12 | IQ Temp | 8.31 | None |
| 68.36 | c9t8d0s7 | | | T13 | IQ Temp | 8.31 | None |
| 68.36 | c9t9d0s7 | | | T14 | IQ Temp | 8.31 | None |
| 68.36 | c9t10d0s7 | | | T15 | IQ Temp | 8.30 | None |
| 68.36 | c9t11d0s7 | | | T16 | IQ Temp | 8.30 | None |
| 68.36 | c9t12d0s7 | | | T17 | IQ Temp | 8.31 | None |
| 68.36 | c9t13d0s7 | | | T18 | IQ Temp | 8.30 | None |
| 68.36 | c10t8d0s7 | | | T19 | IQ Temp | 8.31 | None |
| 68.36 | c10t9d0s7 | | | T20 | IQ Temp | 8.31 | None |
| 68.36 | c10t10d0s7 | | | T21 | IQ Temp | 8.30 | None |
| 68.36 | c10t11d0s7 | | | T22 | IQ Temp | 8.30 | None |
| 68.36 | c10t12d0s7 | | | T23 | IQ Temp | 8.31 | None |
| 68.36 | c10t13d0s7 | | | T24 | IQ Temp | 8.31 | None |
| 68.36 | c11t8d0s7 | | | T25 | IQ Temp | 8.30 | None |
| 68.36 | c11t9d0s7 | | | T26 | IQ Temp | 8.30 | None |
| 68.36 | c11t10d0s7 | | | T27 | IQ Temp | 8.30 | None |
| 68.36 | c11t11d0s7 | | | T28 | IQ Temp | 8.30 | None |
| 68.36 | c11t12d0s7 | | | T29 | IQ Temp | 8.30 | None |
| 68.36 | c11t13d0s7 | | | T30 | IQ Temp | 8.30 | None |
| 68.36 | c12t8d0s7 | | | T31 | IQ Temp | 8.30 | None |
| 68.36 | c12t9d0s7 | | | T32 | IQ Temp | 8.30 | None |
| 68.36 | c12t10d0s7 | | | T33 | IQ Temp | 8.30 | None |
| 68.36 | c12t11d0s7 | | | T34 | IQ Temp | 8.30 | None |

| Disk Size GB | Raw Partition Name | SVM Device Name | Mirror Primary Secondary | Symbolic Link | Database Usage | Database Device Size GB | RAID |
|---|---|---|---|---|---|---|---|
| 68.36 | c12t12d0s7 | | | T35 | IQ Temp | 8.30 | None |
| 68.36 | c12t13d0s7 | | | T36 | IQ Temp | 8.30 | None |
| 68.36 | c13t8d0s7 | | | T37 | IQ Temp | 8.31 | None |
| 68.36 | c13t9d0s7 | | | T38 | IQ Temp | 8.31 | None |
| 68.36 | c13t10d0s7 | | | T39 | IQ Temp | 8.31 | None |
| 68.36 | c13t11d0s7 | | | T40 | IQ Temp | 8.30 | None |
| 68.36 | c13t12d0s7 | | | T41 | IQ Temp | 8.30 | None |
| 68.36 | c13t13d0s7 | | | T42 | IQ Temp | 8.31 | None |
| 68.36 | c14t8d0s7 | | | T43 | IQ Temp | 8.31 | None |
| 68.36 | c14t9d0s7 | | | T44 | IQ Temp | 8.31 | None |
| 68.36 | c14t10d0s7 | | | T45 | IQ Temp | 8.31 | None |
| 68.36 | c14t11d0s7 | | | T46 | IQ Temp | 8.31 | None |
| 68.36 | c14t12d0s7 | | | T47 | IQ Temp | 8.31 | None |
| 68.36 | c14t13d0s7 | | | T48 | IQ Temp | 8.31 | None |
| 68.36 | c7t8d0s7 | | | T49 | IQ Temp | 8.30 | None |
| 68.36 | c7t9d0s7 | | | T50 | IQ Temp | 8.30 | None |
| 68.36 | c7t10d0s7 | | | T51 | IQ Temp | 8.30 | None |
| 68.36 | c7t11d0s7 | | | T52 | IQ Temp | 8.30 | None |

Additional details can be found in the disk configuration section in Appendix B.

## 5.3 Database partition/replication mapping

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

Database partitioning/replication was not used.

## 5.4 RAID Feature

*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 must be disclosed for each device.*

RAID 1 was used for all base tables and auxiliary data structures. In addition, the Sybase IQ root .db file and log space were also protected by RAID 1.

## 5.5 Modifications to the DBGEN

*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 1.3.0 was used to generate the database population for this benchmark.

## 5.6 Database Load Time

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

The database load time was 22 hours 13 minutes.

## 5.7 Data Storage Ratio

*The data storage ratio must be disclosed. It is computed as the ratio between the total amount of priced disk space, and the chosen test database size as defined in Clause 4.1.3.*

The data storage ratio is computed from the following information:

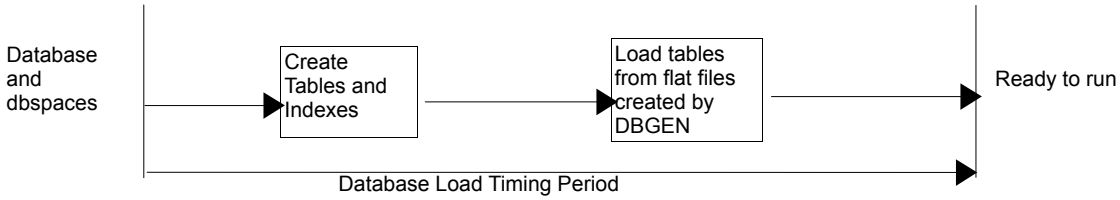
| Disk Type | # Of Disks | Space Per Disk* | Sub-Total Disk Space** |
|---|---|---|---|
| 3310 disk array | 48 | 73.4 GB | 3,278.9 GB |
| internal | 6 | 73.4 GB | 410.2 GB |
| | | **Total Space** | **3,689.1 GB** |
| | | **Data Storage Ratio** | **3.69** |

* *Disk manufacturer definition of one GB is 10^9 bytes*
***In this calculation one GB is defined as 2^30 bytes*

## 5.8 Database Load Mechanism Details and Illustration

*The details of the database load must be described, including a block diagram illustrating the overall process.*

The test database was loaded using flat files. All load scripts are included in Appendix B.




## 5.9 Qualification Database Configuration

*Any differences between the configuration of the qualification database and the test database must be disclosed.*

The qualification database used identical scripts to create and load the data with adjustments for the size difference.

# 6. Clause 5 Performance Metrics and Execution Rules

## 6.1 System Activity Between Load and Performance Tests

*Any system activity on the SUT that takes place between the conclusion of the load test and the beginning of the performance test must be fully disclosed.*

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

All scripts and queries used are included in Appendix F

## 6.2 Steps in the Power Test

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

The following steps were used to implement the power test:

1. RF1 Refresh Transaction
2. Stream 00 Execution
3. RF2 Refresh Transaction

## 6.3 Timing Intervals for Each Query and Refresh Functions

*The timing intervals for each query and for both refresh functions must be reported for the power test.*

The power test timing intervals are:

| | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Q11 | Q12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stream 00** | 2,749.6 | 123.4 | 6,487.5 | 1,290.0 | 13,857.9 | 239.2 | 1,339.9 | 749.9 | 6,806.1 | 2,595.6 | 284.5 | 747.4 |
| | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** | **Q21** | **Q22** | **RF1** | **RF2** |
| **Stream 00** | 6,687.9 | 594.5 | 1,406.3 | 805.9 | 529.8 | 17,727.1 | 813.0 | 1,277.6 | 14,241.8 | 715.1 | 1,364.3 | 1,661.6 |

## 6.4 Number of Streams for the Throughput Test

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

Seven streams were used for the throughput test.

## 6.5 Start and End Date/Times for Each Query Stream

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

The throughput test start time and finish time for each stream are contained in the Numerical Quantity Summary earlier in this document.

## 6.6 Total Elapsed Time of the Measurement Interval

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

The total elapsed time of the throughput test is contained in the Numerical Quantity Summary earlier in this document.

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

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

The start and finish times for each refresh function:

| Stream ID | Refresh Function | Start Date | Start Time | End Date | End Time |
|---|---|---|---|---|---|
| **Stream 01** | RF1 | May 16, 2003 | 06:33:35 | May 16, 2003 | 07:53:47 |
| **Stream 01** | RF2 | May 16, 2003 | 12:15:27 | May 16, 2003 | 13:07:19 |
| **Stream 02** | RF1 | May 16, 2003 | 17:28:59 | May 16, 2003 | 18:05:30 |
| **Stream 02** | RF2 | May 16, 2003 | 22:27:10 | May 16, 2003 | 23:18:52 |
| **Stream 03** | RF1 | May 17, 2003 | 03:40:32 | May 17, 2003 | 04:21:23 |
| **Stream 03** | RF2 | May 17, 2003 | 08:43:03 | May 17, 2003 | 09:39:41 |
| **Stream 04** | RF1 | May 17, 2003 | 14:01:21 | May 17, 2003 | 14:39:28 |
| **Stream 04** | RF2 | May 17, 2003 | 19:01:08 | May 17, 2003 | 19:50:45 |
| **Stream 05** | RF1 | May 18, 2003 | 00:12:25 | May 17, 2003 | 00:46:50 |
| **Stream 05** | RF2 | May 18, 2003 | 05:08:30 | May 18, 2003 | 06:08:17 |
| **Stream 06** | RF1 | May 18, 2003 | 10:29:58 | May 18, 2003 | 11:02:02 |
| **Stream 06** | RF2 | May 18, 2003 | 15:23:42 | May 18, 2003 | 16:26:29 |
| **Stream 07** | RF1 | May 18, 2003 | 20:48:09 | May 18, 2003 | 21:26:32 |
| **Stream 07** | RF2 | May 19, 2003 | 01:48:12 | May 19, 2003 | 02:45:20 |

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

*The timing intervals for each query of each stream and each refresh function must be reported for the throughput test.*

The timing intervals for each query and each refresh function for the throughput test are contained in the Numerical Quantity Summary earlier in this document.

## 6.9 Performance Metrics

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

The performance metrics, and the numbers on which they are based, are contained in the Numerical Quantity Summary earlier in this document.

## 6.10 The Performance Metric and Numerical Quantities from Both Runs

*The performance metric and numerical quantities from both runs must be disclosed.*

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

| Run ID | QppH@1000GB | QthH@1000GB | QphH@1000GB |
|---|---|---|---|
| Run 1 | 2324.2 | 2166.9 | 2244.2 |
| Run 2 | 2325.1 | 2159.7 | 2240.9 |
| % Difference | -0.04 | -0.33 | -0.15 |

## 6.11 System Activity Between Performance Tests

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

The database was not restarted after it was loaded or between the two runs.

# 7. Clause 6 SUT and Driver Implementation

## 7.1 Driver

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

The entire test is run by executing the do_test1000 script found in Appendix E, the scripts that do_test1000 executes can be found in Appendix B.

The Power Test and Throughput Test are performed by the do_test1000. The query streams are generated by a script called gen_streams.ksh which uses QGEN to generate the query stream files.

The Power Test is invoked within the do_test1000 script by executing the update_power.sql which runs the refresh functions and the stream0.sql which contains the power stream queries.

The Throughput Test is invoked within the do_test1000 script by executing the seven query stream scripts stream[1-7].sql files along with simultaneously executing the update_throughput.sql script. The refresh functions execute in parallel with the ad-hoc queries streams trickle feeding the refresh transactions.

## 7.2 Implementation-Specific Layer

*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.*

dbisqlc is a Sybase database utility that allows SQL to be executed against an Sybase IQ database. The dbisqlc utility is invoked from command-line mode on the SUT. dbisqlc reads an input file with the SQL commands and sends output to standard output. The dbisqlc utility uses information in the .odbc.ini file to connect to the database.

dbtest is a utility used internally at Sybase for testing , it facilitates access and manipulation of data in a Sybase IQ database. dbtest is invoked from command-line mode on the SUT, specifying access to the TPC-H database. It runs an input file containing either the QGEN generated SQL for the queries or SQL for the refresh functions. The dbtest utility uses information in the .odbc.ini file to connect to the database.

## 7.3 Profile-Directed Optimization

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

Profile-directed optimization was not used.

# 8. Clause 7 Pricing

## 8.1 Hardware and Software Used

*A detailed list of hardware and software used in the priced system must be reported. Each item must have 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.*

Refer to the Executive Summary.

## 8.2 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.*

The total 3-year price of the configuration is $232,206. For details of pricing, see the second page of the Executive Summary.

Discounts were taken from actual price quotes,available to any buyer with like conditions, provided by Sun Microsystems Inc., Continental Resources Inc.and Sybase Inc. The respective price quotes are included in Appendix G of this document.

## 8.3 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 reported availability date for the priced system must be the date at which all components are committed to be available.*

Hardware and Software components will be available June 3 2003.

# 9. Auditor's Information and Attestation Letter

*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.*

The auditor's attestation letter is included at the front of this report.

# Appendix A. Solaris 9 and Sybase IQ 12.5 Parameters

This Appendix contains Solaris kernel parameters and environment variables and Sybase IQ system parameters.

```
================================================
```

## Sybase IQ Server Configuration Parameters

```
================================================
```

## tpch.cfg

```
-n tpch1000
-c  32m
-gd all
-gl all
-gm 12
-gp 4096
-ti 4400
-tl 300
-iqmc 11200
-iqtc 16800
-iqmt 1000
-iqgovern 12
-iqpartition 4
```

```
================================================
```

## Sybase IQ Database Options

**(altered from default)**

```
================================================
```

## options.sql

```
================================================

SET OPTION PUBLIC.Allow_Nulls_By_Default='Off';
SET OPTION PUBLIC.Append_Load='On';
set option PUBLIC.Default_Like_Range_Selectivity = 5;
SET OPTION PUBLIC.Dml_Options10 = 'On';
SET OPTION PUBLIC.Flatten_Subqueries = 'On';
SET OPTION PUBLIC.Force_No_Scroll_Cursors='On';
SET OPTION PUBLIC.Garray_Fill_Factor_Percent=5;
SET OPTION PUBLIC.Hash_Thrashing_Percent=100;
SET OPTION PUBLIC.Load_Memory_Mb=0;
set option PUBLIC.Max_Hash_Rows = 12000000;
SET OPTION PUBLIC.Max_Hash_Rows=9000000;
SET OPTION PUBLIC.Max_Iq_Threads_Per_Connection=100;
SET OPTION PUBLIC.Minimize_Storage='On';
SET OPTION PUBLIC.Notify_Modulus=10000000;
SET OPTION PUBLIC.Prefetch_Threads_Percent=15;
SET OPTION PUBLIC.Query_Detail='On';
SET OPTION PUBLIC.Query_Plan_After_Run='On';
SET OPTION PUBLIC.Query_Plan_As_Html='On';
SET OPTION PUBLIC.Query_Plan='On';
SET OPTION PUBLIC.Query_Temp_Space_Limit=0;
SET OPTION PUBLIC.Row_Counts='On';
set option PUBLIC.Sort_Phase1_Helpers = 5;
SET OPTION PUBLIC.Sort_Phase1_Helpers=3;
SET OPTION PUBLIC.Sweeper_Threads_Percent=15;
SET OPTION PUBLIC.Wash_Area_Buffers_Percent = '60';
```

```
================================================
```

## Sybase IQ Environment Variables

```
================================================

SYBASE="/export/home/sybase"
export SYBASE
SYBASE_OCS="OCS-12_5"
export SYBASE_OCS
SYBASE_JRE="${SYBASE}/shared/jre-1_22"
export SYBASE_JRE
ASDIR="${SYBASE}/ASIQ-12_5"
export ASDIR
PATH="${ASDIR}/bin:${SYBASE}/${SYBASE_OCS}/bin:
${PATH}:/etc:."
export PATH
IQLIB="${ASDIR}/usrlib:${ASDIR}/lib:${SYBASE}
/${SYBASE_OCS}/lib"
LD_LIBRARY_PATH_64="${IQLIB}:$LD_LIBRARY_PATH_64"
export LD_LIBRARY_PATH_64
LD_LIBRARY_PATH="${IQLIB}:$LD_LIBRARY_PATH"
export LD_LIBRARY_PATH
unset IQLIB
LD_PRELOAD=mpss.so.1
export LD_PRELOAD
MPSSHEAP=512K
MPSSSTACK=64K
export MPSSHEAP
export MPSSSTACK
```

```
================================================
```

## .odbc.ini

```
================================================
[ODBC Data Sources]
tpch1000=ASIQ Driver
utility_db=ASIQ Driver

[tpch1000]
Driver=/export/home/sybase/asiq12/lib/dbodbc7_r.so.1
EngineName=tpch1000
CommLinks=tcpip{host=10.8.5.62;Port=2638}
DatabaseName=tpch1000
UserID=DBA
Password=SQL
DBG=yes
LOG=/export/home/sybase/tpch1000_odbc.log

[utility_db]
Driver=/export/home/sybase/asiq12/lib/dbodbc7_r.so.1
EngineName=tpch1000
CommLinks=tcpip{host=10.8.5.62;Port=2638}
DatabaseName=utility_db
UserID=DBA
Password=SQL
DBG=yes
LOG=/export/home/sybase/utility_db_odbc.log
```

## Solaris Parameters

**(altered from default)**

```
================================================
```

## /etc/system

```
================================================

set pt_cnt=1024
set npty=1024
set sadcnt=2048
set nautopush=1024
set dosynctodr=0
set tune_t_fsflushr=600
set autoup=36000000
```

# Appendix B. Programs and Scripts

==========

## check_query1.bash

==========

```
#!/bin/bash
#
# First remove the rf1.lock so that the Query Stream
will start
#
rm -f /export/home/sybase/run/scripts/rf1.lock
#
# Sleep while the rf2.lock file exists
# when the query stream completes it will remove the
rf2.lock
#
while [ -f /export/home/sybase/run/scripts/rf2.lock ]
do
 # Wait for the Query Steam to complete
 # check every 10 seconds
 # echo "Lock File Exists"
 sleep 10
done
# Return Control to the RF stream
```

==========

## create_database.sql

==========

```
CREATE DATABASE '/sybase2/tpch1000.db'
TRANSACTION LOG ON
COLLATION 'ISO_BINENG'
CASE RESPECT
PAGE SIZE 4096
BLANK PADDING ON
JAVA ON
JCONNECT ON
IQ PATH '/sybase2/M01'
IQ PAGE SIZE 524288
TEMPORARY PATH '/sybase2/T01';
```

==========

## create_dbspaces.sql

==========

```
create dbspace iq02 as '/sybase2/M02' iq store;
create dbspace iq03 as '/sybase2/M03' iq store;
create dbspace iq04 as '/sybase2/M04' iq store;
create dbspace iq05 as '/sybase2/M05' iq store;
create dbspace iq06 as '/sybase2/M06' iq store;
create dbspace iq07 as '/sybase2/M07' iq store;
create dbspace iq08 as '/sybase2/M08' iq store;
create dbspace iq09 as '/sybase2/M09' iq store;
create dbspace iq10 as '/sybase2/M10' iq store;
create dbspace iq11 as '/sybase2/M11' iq store;
create dbspace iq12 as '/sybase2/M12' iq store;
create dbspace iq13 as '/sybase2/M13' iq store;
create dbspace iq14 as '/sybase2/M14' iq store;
create dbspace iq15 as '/sybase2/M15' iq store;
create dbspace iq16 as '/sybase2/M16' iq store;
create dbspace iq17 as '/sybase2/M17' iq store;
create dbspace iq18 as '/sybase2/M18' iq store;
create dbspace iq19 as '/sybase2/M19' iq store;
create dbspace iq20 as '/sybase2/M20' iq store;
create dbspace iq21 as '/sybase2/M21' iq store;
create dbspace iq22 as '/sybase2/M22' iq store;
create dbspace iq23 as '/sybase2/M23' iq store;
create dbspace iq24 as '/sybase2/M24' iq store;

create dbspace iqtmp02 as '/sybase2/T02' iq temporary
store;
create dbspace iqtmp03 as '/sybase2/T03' iq temporary
store;
create dbspace iqtmp04 as '/sybase2/T04' iq temporary
store;
create dbspace iqtmp05 as '/sybase2/T05' iq temporary
store;
create dbspace iqtmp06 as '/sybase2/T06' iq temporary
store;
create dbspace iqtmp07 as '/sybase2/T07' iq temporary
store;
create dbspace iqtmp08 as '/sybase2/T08' iq temporary
store;
create dbspace iqtmp09 as '/sybase2/T09' iq temporary
store;
create dbspace iqtmp10 as '/sybase2/T10' iq temporary
store;
create dbspace iqtmp11 as '/sybase2/T11' iq temporary
store;
create dbspace iqtmp12 as '/sybase2/T12' iq temporary
store;
create dbspace iqtmp13 as '/sybase2/T13' iq temporary
store;
create dbspace iqtmp14 as '/sybase2/T14' iq temporary
store;
create dbspace iqtmp15 as '/sybase2/T15' iq temporary
store;
create dbspace iqtmp16 as '/sybase2/T16' iq temporary
store;
create dbspace iqtmp17 as '/sybase2/T17' iq temporary
store;
create dbspace iqtmp18 as '/sybase2/T18' iq temporary
store;
create dbspace iqtmp19 as '/sybase2/T19' iq temporary
store;
create dbspace iqtmp20 as '/sybase2/T20' iq temporary
store;
create dbspace iqtmp21 as '/sybase2/T21' iq temporary
store;
create dbspace iqtmp22 as '/sybase2/T22' iq temporary
store;
create dbspace iqtmp23 as '/sybase2/T23' iq temporary
store;
create dbspace iqtmp24 as '/sybase2/T24' iq temporary
store;
create dbspace iqtmp25 as '/sybase2/T25' iq temporary
store;
create dbspace iqtmp26 as '/sybase2/T26' iq temporary
store;
create dbspace iqtmp27 as '/sybase2/T27' iq temporary
store;
create dbspace iqtmp28 as '/sybase2/T28' iq temporary
store;
create dbspace iqtmp29 as '/sybase2/T29' iq temporary
store;
create dbspace iqtmp30 as '/sybase2/T30' iq temporary
store;
create dbspace iqtmp31 as '/sybase2/T31' iq temporary
store;
create dbspace iqtmp32 as '/sybase2/T32' iq temporary
store;
create dbspace iqtmp33 as '/sybase2/T33' iq temporary
store;
create dbspace iqtmp34 as '/sybase2/T34' iq temporary
store;
create dbspace iqtmp35 as '/sybase2/T35' iq temporary
store;
create dbspace iqtmp36 as '/sybase2/T36' iq temporary
```

```
store;
create dbspace iqtmp37 as '/sybase2/T37' iq temporary
store;
create dbspace iqtmp38 as '/sybase2/T38' iq temporary
store;
create dbspace iqtmp39 as '/sybase2/T39' iq temporary
store;
create dbspace iqtmp40 as '/sybase2/T40' iq temporary
store;
create dbspace iqtmp41 as '/sybase2/T41' iq temporary
store;
create dbspace iqtmp42 as '/sybase2/T42' iq temporary
store;
create dbspace iqtmp43 as '/sybase2/T43' iq temporary
store;
create dbspace iqtmp44 as '/sybase2/T44' iq temporary
store;
create dbspace iqtmp45 as '/sybase2/T45' iq temporary
store;
create dbspace iqtmp46 as '/sybase2/T46' iq temporary
store;
create dbspace iqtmp47 as '/sybase2/T47' iq temporary
store;
create dbspace iqtmp48 as '/sybase2/T48' iq temporary
store;
create dbspace iqtmp49 as '/sybase2/T49' iq temporary
store;
create dbspace iqtmp50 as '/sybase2/T50' iq temporary
store;
create dbspace iqtmp51 as '/sybase2/T51' iq temporary
store;
create dbspace iqtmp52 as '/sybase2/T52' iq temporary
store;
```

==========

## create_tables.sql

==========

```
CREATE TABLE region
  (
    r_regionkey            unsigned int,
    r_name                 char(25),
    r_comment              varchar(152),
    PRIMARY KEY (r_regionkey)
  );


CREATE TABLE nation
  (
    n_nationkey            unsigned int,
    n_name                 char(25),
    n_regionkey            unsigned int,
    n_comment              varchar(152),
    PRIMARY KEY (n_nationkey)
  );
CREATE HG INDEX n_regionkey_hg ON nation(n_regionkey)
;


CREATE TABLE supplier
  (
    s_suppkey              unsigned int,
    s_name                 char(25),
    s_address              varchar(40),
    s_nationkey            unsigned int,
    s_phone                char(15),
    s_acctbal              double precision,
    s_comment              varchar(101),
    PRIMARY KEY (s_suppkey)
  );
CREATE HG INDEX s_nationkey_hg ON
supplier(s_nationkey) ;


CREATE TABLE part
  (
    p_partkey              unsigned int,
    p_name                 varchar(55),
    p_mfgr                 char(25),
    p_brand                char(10),
    p_type                 varchar(25),
    p_size                 int,
    p_container            char(10),
    p_retailprice          double precision,
    p_comment              varchar(23),
    PRIMARY KEY(p_partkey)
  );


CREATE TABLE partsupp
  (
    ps_partkey             unsigned int,
    ps_suppkey             unsigned int,
    ps_availqty            integer,
    ps_supplycost          double precision,
    ps_comment             varchar(199),
    PRIMARY KEY (ps_partkey, ps_suppkey)
  );
CREATE HG INDEX ps_partkey_hg ON partsupp(ps_partkey)
;
CREATE HG INDEX ps_suppkey_hg ON partsupp(ps_suppkey)
;


CREATE TABLE customer
  (
    c_custkey              unsigned int,
    c_name                 varchar(25),
    c_address              varchar(40),
    c_nationkey            unsigned int,
    c_phone                char(15),
    c_acctbal              double precision,
    c_mktsegment           char(10),
    c_comment              varchar(117),
    PRIMARY KEY(c_custkey)
  );
CREATE HG INDEX c_nationkey_hg ON
customer(c_nationkey) ;


CREATE TABLE orders
  (
    o_orderkey             unsigned bigint,
    o_custkey              unsigned int,
    o_orderstatus          char(1),
    o_totalprice           double precision,
    o_orderdate            date,
    o_orderpriority        char(15),
    o_clerk                char(15),
    o_shippriority         int,
    o_comment              varchar(79),
    PRIMARY KEY (o_orderkey)
  );
CREATE HG INDEX o_custkey_hg ON orders(o_custkey) ;
CREATE DATE INDEX o_orderdate_date ON
orders(o_orderdate) ;


CREATE TABLE lineitem
  (
    l_orderkey             unsigned bigint,
    l_partkey              unsigned int,
    l_suppkey              unsigned int,
```

```
    l_linenumber           int,
    l_quantity             double precision,
    l_extendedprice        double precision,
    l_discount             double precision,
    l_tax                  double precision,
    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)
  );

CREATE HG INDEX l_partsupp_hg ON lineitem(l_partkey,
l_suppkey) ;
CREATE HG INDEX l_orderkey_hg ON lineitem(l_orderkey)
;
CREATE HG INDEX l_partkey_hg ON lineitem(l_partkey) ;
CREATE HG INDEX l_suppkey_hg ON lineitem(l_suppkey) ;
CREATE DATE INDEX l_shipdate_date ON
lineitem(l_shipdate) ;
CREATE DATE INDEX l_receiptdate_date ON
lineitem(l_receiptdate);
```

==========

## tpch_rf.sql

==========

```
create table refresh_control ( rf1_data_set int not
null, rf2_data_set int not null);
insert into refresh_control values (0,0);
commit;
CREATE PROCEDURE DBA.tpch_rf1 (IN c_directory
varchar(128),
                               IN c_stream varchar(3))
ON EXCEPTION RESUME
BEGIN
  DECLARE delim_asci integer;
  DECLARE c_data_set varchar(3);
  DECLARE i_data_set integer;
  DECLARE c_cmd long varchar;
  DECLARE outfilename varchar(128); -- Debug
  DECLARE outfilename2 varchar(128); -- Debug
  DECLARE c_lf varchar(2);
  DECLARE t_qstart timestamp;
  DECLARE t_qstop timestamp;
  DECLARE n_seconds numeric(12,5);
  DECLARE c_sqlstate CHAR(5);
  SET t_qstart = now(*);
  SET c_lf=char(10);
  SELECT rf1_data_set INTO i_data_set FROM
refresh_control;
  SET c_data_set=CAST(i_data_set+1 AS varchar(3));
  SET c_cmd='load table orders ( '+c_lf;
  SET c_cmd=c_cmd+' o_orderkey
'+char(39)+'|'+char(39)+', '+c_lf;
  SET c_cmd=c_cmd+' o_custkey
'+char(39)+'|'+char(39)+', '+c_lf;
  SET c_cmd=c_cmd+' o_orderstatus
'+char(39)+'|'+char(39)+', '+c_lf;
  SET c_cmd=c_cmd+' o_totalprice
'+char(39)+'|'+char(39)+', '+c_lf;
  SET c_cmd=c_cmd+' o_orderdate date('+char(39)+'YYYY-
MM-DD'+char(39)+'), filler(1), '+c_lf;
  SET c_cmd=c_cmd+' o_orderpriority
'+char(39)+'|'+char(39)+', '+c_lf;
  SET c_cmd=c_cmd+' o_clerk '+char(39)+'|'+char(39)+',
'+c_lf;
  SET c_cmd=c_cmd+' o_shippriority
'+char(39)+'|'+char(39)+','+c_lf;
  SET c_cmd=c_cmd+' o_comment
'+char(39)+'|'+char(39)+' ) '+c_lf;
  SET c_cmd=c_cmd+'from
'+char(39)+c_directory+'orders.tbl.u'+c_data_set+char(
39)+c_lf;
  SET c_cmd=c_cmd+'row delimited by
'+char(39)+'\\x0a'+char(39)+' quotes off escapes off
preview on;';
  EXECUTE IMMEDIATE c_cmd;
  SELECT SQLSTATE INTO c_sqlstate;
  IF c_sqlstate != '00000' THEN
    ROLLBACK;
    RAISERROR 23002 'RF1 failed at Step 1 with
SQLSTATE: ', c_sqlstate;
    RETURN(1);
  END IF;
  SET c_cmd='load table lineitem ( '+c_lf;
  SET c_cmd=c_cmd+' l_orderkey
'+char(39)+'|'+char(39)+', '+c_lf;
  SET c_cmd=c_cmd+' l_partkey
'+char(39)+'|'+char(39)+', '+c_lf;
  SET c_cmd=c_cmd+' l_suppkey
'+char(39)+'|'+char(39)+', '+c_lf;
  SET c_cmd=c_cmd+' l_linenumber
'+char(39)+'|'+char(39)+', '+c_lf;
  SET c_cmd=c_cmd+' l_quantity
'+char(39)+'|'+char(39)+', '+c_lf;
  SET c_cmd=c_cmd+' l_extendedprice
'+char(39)+'|'+char(39)+', '+c_lf;
  SET c_cmd=c_cmd+' l_discount
'+char(39)+'|'+char(39)+', '+c_lf;
  SET c_cmd=c_cmd+' l_tax '+char(39)+'|'+char(39)+',
'+c_lf;
  SET c_cmd=c_cmd+' l_returnflag
'+char(39)+'|'+char(39)+', '+c_lf;
  SET c_cmd=c_cmd+' l_linestatus
'+char(39)+'|'+char(39)+', '+c_lf;
  SET c_cmd=c_cmd+' l_shipdate date('+char(39)+'YYYY-
MM-DD'+char(39)+'), filler(1), '+c_lf;
  SET c_cmd=c_cmd+' l_commitdate
date('+char(39)+'YYYY-MM-DD'+char(39)+'), filler(1),
'+c_lf;
  SET c_cmd=c_cmd+' l_receiptdate
date('+char(39)+'YYYY-MM-DD'+char(39)+'), filler(1),
'+c_lf;
  SET c_cmd=c_cmd+' l_shipinstruct
'+char(39)+'|'+char(39)+', '+c_lf;
  SET c_cmd=c_cmd+' l_shipmode
'+char(39)+'|'+char(39)+', '+c_lf;
  SET c_cmd=c_cmd+' l_comment
'+char(39)+'|'+char(39)+' )'+c_lf;
  SET c_cmd=c_cmd+'from
'+char(39)+c_directory+'lineitem.tbl.u'+c_data_set+cha
r(39)+c_lf;
  SET c_cmd=c_cmd+'row delimited by
'+char(39)+'\\x0a'+char(39)+c_lf+'quotes off escapes
off preview on;';
  EXECUTE IMMEDIATE c_cmd;
  SELECT SQLSTATE INTO c_sqlstate;
  IF c_sqlstate != '00000' THEN
    rollback;
    RAISERROR 23002 'RF1 failed at Step 2 with
SQLSTATE: ', c_sqlstate;
    RETURN(1);
  END IF;
  UPDATE refresh_control SET
rf1_data_set=cast(c_data_set AS integer);
  COMMIT;
  SET t_qstop = now(*);
  SET n_seconds=cast(datediff(millisecond,t_qstart,
```

```
t_qstop) AS numeric(12,5))/1000;
  SET c_cmd='Stream updates Update
update_'+c_stream+'_RF1 LENGTH -- '+cast(n_seconds AS
varchar(20))+ ' seconds' ;
  SELECT c_cmd;
  RETURN(0);
END;
CREATE PROCEDURE DBA.tpch_rf2 (in c_directory
varchar(128),
                               in c_stream varchar(3))
ON exception resume
BEGIN
  DECLARE delim_asci integer;
  DECLARE c_data_set varchar(3);
  DECLARE i_data_set integer;
  DECLARE c_cmd long varchar;
  DECLARE outfilename varchar(128); -- Debug
  DECLARE c_lf varchar(2);
  DECLARE t_qstart timestamp;
  DECLARE t_qstop timestamp;
  DECLARE n_seconds numeric(18,5);
  DECLARE c_sqlstate CHAR(5);
  SET t_qstart = now(*);
  SET c_lf=char(10);
  SELECT rf2_data_set INTO i_data_set FROM
refresh_control;
  SET c_data_set=CAST(i_data_set+1 AS varchar(3));
  CREATE TABLE #delete_table ( d_orderkey UNSIGNED
BIGINT, PRIMARY KEY (d_orderkey) );
  SET c_cmd='load table #delete_table  (d_orderkey
'+char(39)+'\\x0a'+char(39)+') '+c_lf;
  SET c_cmd=c_cmd+'from
'+char(39)+c_directory+'delete.'+c_data_set+char(39)+c
_lf;
  SET c_cmd=c_cmd+'quotes off '+c_lf;
  SET c_cmd=c_cmd+'escapes off; '+c_lf;
  EXECUTE IMMEDIATE c_cmd;
  SELECT SQLSTATE INTO c_sqlstate;
  IF c_sqlstate != '00000' THEN
    ROLLBACK;
    SET c_cmd='RF2 failed at Step 1 with SQLSTATE:
'+c_sqlstate;
    RAISERROR 23002 c_cmd;
    RETURN(1);
  END IF;
  DELETE lineitem FROM lineitem, #delete_table WHERE
l_orderkey = d_orderkey;
  SELECT SQLSTATE INTO c_sqlstate;
  IF c_sqlstate != '00000' THEN
    ROLLBACK;
    SET c_cmd='RF2 failed at Step 2 with SQLSTATE:
'+c_sqlstate;
    RAISERROR 23002 c_cmd;
    RETURN(1);
  END IF;
  DELETE orders FROM orders, #delete_table WHERE
o_orderkey = d_orderkey;
  SELECT SQLSTATE INTO c_sqlstate;
  IF c_sqlstate != '00000' THEN
    ROLLBACK;
    SET c_cmd='RF2 failed at Step 3 with SQLSTATE:
'+c_sqlstate;
    RAISERROR 23002 c_cmd;
    RETURN(1);
  END IF;
  UPDATE refresh_control SET
rf2_data_set=CAST(c_data_set AS integer);
  COMMIT;
  DROP TABLE #delete_table;
  SET t_qstop = now(*);
  SET n_seconds=cast(datediff(millisecond,t_qstart,
t_qstop) as numeric(18,5))/1000;
  SET c_cmd='Stream updates Update
update_'+c_stream+'_RF2 LENGTH -- '+cast(n_seconds as
varchar(20))+ ' seconds' ;
  SELECT c_cmd;
  RETURN(0);
END;
```

==========

## load_region.sql

==========

```
LOAD TABLE REGION (
R_REGIONKEY                                 '|',
R_NAME                                      '|',
R_COMMENT                                   '|'
)
FROM '/sybase_stage1/region.tbl'
escapes off
quotes off
row delimited by '\x0a'
WITH CHECKPOINT ON;
commit;
```

==========

## load_nation.sql

==========

```
LOAD TABLE NATION (
N_NATIONKEY                                 '|',
N_NAME                                      '|',
N_REGIONKEY                                 '|',
N_COMMENT                                   '|'
)
FROM '/sybase_stage1/nation.tbl'
escapes off
quotes off
row delimited by '\x0a'
WITH CHECKPOINT ON;
commit;
```

==========

## load_customer.sql

==========

```
LOAD TABLE CUSTOMER (
C_CUSTKEY                                   '|',
C_NAME                                      '|',
C_ADDRESS                                   '|',
C_NATIONKEY                                 '|',
C_PHONE                                     '|',
C_ACCTBAL                                   '|',
C_MKTSEGMENT                                '|',
C_COMMENT                                   '|'
)
FROM '/sybase_stage1/customer.tbl.1',
     '/sybase_stage1/customer.tbl.2',
     '/sybase_stage1/customer.tbl.3',
     '/sybase_stage1/customer.tbl.4',
     '/sybase_stage1/customer.tbl.5',
     '/sybase_stage1/customer.tbl.6',
     '/sybase_stage1/customer.tbl.7',
     '/sybase_stage1/customer.tbl.8'
escapes off
quotes off
row delimited by '\x0a'
WITH CHECKPOINT ON;
commit;
```

==========

## load_part.sql

```
================================================

LOAD TABLE PART (
P_PARTKEY                                '|',
P_NAME                                   '|',
P_MFGR                                   '|',
P_BRAND                                  '|',
P_TYPE                                   '|',
P_SIZE                                   '|',
P_CONTAINER                              '|',
P_RETAILPRICE                            '|',
P_COMMENT                                '|'
)
FROM '/sybase_stage1/part.tbl.1',
     '/sybase_stage1/part.tbl.2',
     '/sybase_stage1/part.tbl.3',
     '/sybase_stage1/part.tbl.4',
     '/sybase_stage1/part.tbl.5',
     '/sybase_stage1/part.tbl.6',
     '/sybase_stage1/part.tbl.7',
     '/sybase_stage1/part.tbl.8'
escapes off
quotes off
row delimited by '\x0a'
WITH CHECKPOINT ON;
commit;

================================================
```

## load_supplier.sql

```
================================================

LOAD TABLE SUPPLIER (
S_SUPPKEY                                '|',
S_NAME                                   '|',
S_ADDRESS                                '|',
S_NATIONKEY                              '|',
S_PHONE                                  '|',
S_ACCTBAL                                '|',
S_COMMENT                                '|'
)
FROM '/sybase_stage1/supplier.tbl.1',
     '/sybase_stage1/supplier.tbl.2',
     '/sybase_stage1/supplier.tbl.3',
     '/sybase_stage1/supplier.tbl.4',
     '/sybase_stage1/supplier.tbl.5',
     '/sybase_stage1/supplier.tbl.6',
     '/sybase_stage1/supplier.tbl.7',
     '/sybase_stage1/supplier.tbl.8'
escapes off
quotes off
row delimited by '\x0a'
WITH CHECKPOINT ON;
commit;

================================================
```

## load_partsupp.sql

```
================================================

LOAD TABLE PARTSUPP (
PS_PARTKEY                               '|',
PS_SUPPKEY                               '|',
PS_AVAILQTY                              '|',
PS_SUPPLYCOST                            '|',
PS_COMMENT                               '|'
)
FROM '/sybase_stage2/partsupp.tbl.1',
     '/sybase_stage2/partsupp.tbl.2',
     '/sybase_stage2/partsupp.tbl.3',
     '/sybase_stage2/partsupp.tbl.4',
     '/sybase_stage3/partsupp.tbl.5',
     '/sybase_stage3/partsupp.tbl.6',
     '/sybase_stage3/partsupp.tbl.7',
     '/sybase_stage3/partsupp.tbl.8'
escapes off
quotes off
row delimited by '\x0a'
WITH CHECKPOINT ON;
commit;

================================================
```

## load_orders.sql

```
================================================

LOAD TABLE ORDERS (
O_ORDERKEY                               '|',
O_CUSTKEY                                '|',
O_ORDERSTATUS                            '|',
O_TOTALPRICE                             '|',
O_ORDERDATE                              '|',
O_ORDERPRIORITY                          '|',
O_CLERK                                  '|',
O_SHIPPRIORITY                           '|',
O_COMMENT                                '|'
)
FROM '/sybase_stage4/orders.tbl.1',
     '/sybase_stage4/orders.tbl.2',
     '/sybase_stage4/orders.tbl.3',
     '/sybase_stage4/orders.tbl.4',
     '/sybase_stage4/orders.tbl.5',
     '/sybase_stage4/orders.tbl.6',
     '/sybase_stage4/orders.tbl.7',
     '/sybase_stage4/orders.tbl.8',
     '/sybase_stage4/orders.tbl.9',
     '/sybase_stage4/orders.tbl.10',
     '/sybase_stage4/orders.tbl.11',
     '/sybase_stage4/orders.tbl.12',
     '/sybase_stage4/orders.tbl.13',
     '/sybase_stage4/orders.tbl.14',
     '/sybase_stage4/orders.tbl.15',
     '/sybase_stage4/orders.tbl.16',
     '/sybase_stage4/orders.tbl.17',
     '/sybase_stage4/orders.tbl.18',
     '/sybase_stage4/orders.tbl.19',
     '/sybase_stage4/orders.tbl.20',
     '/sybase_stage4/orders.tbl.21',
     '/sybase_stage4/orders.tbl.22',
     '/sybase_stage4/orders.tbl.23',
     '/sybase_stage4/orders.tbl.24',
     '/sybase_stage4/orders.tbl.25',
     '/sybase_stage4/orders.tbl.26',
     '/sybase_stage4/orders.tbl.27',
     '/sybase_stage4/orders.tbl.28',
     '/sybase_stage4/orders.tbl.29',
     '/sybase_stage4/orders.tbl.30',
     '/sybase_stage4/orders.tbl.31',
     '/sybase_stage4/orders.tbl.32',
     '/sybase_stage4/orders.tbl.33',
     '/sybase_stage4/orders.tbl.34',
     '/sybase_stage4/orders.tbl.35',
     '/sybase_stage4/orders.tbl.36',
     '/sybase_stage4/orders.tbl.37',
     '/sybase_stage4/orders.tbl.38',
     '/sybase_stage4/orders.tbl.39',
     '/sybase_stage4/orders.tbl.40',
     '/sybase_stage4/orders.tbl.41',
     '/sybase_stage4/orders.tbl.42',
     '/sybase_stage4/orders.tbl.43',
     '/sybase_stage4/orders.tbl.44',
     '/sybase_stage4/orders.tbl.45',
     '/sybase_stage4/orders.tbl.46',
```

```
     '/sybase_stage4/orders.tbl.47',
     '/sybase_stage4/orders.tbl.48',
     '/sybase_stage4/orders.tbl.49',
     '/sybase_stage4/orders.tbl.50',
     '/sybase_stage4/orders.tbl.51',
     '/sybase_stage4/orders.tbl.52',
     '/sybase_stage4/orders.tbl.53',
     '/sybase_stage4/orders.tbl.54',
     '/sybase_stage4/orders.tbl.55',
     '/sybase_stage4/orders.tbl.56',
     '/sybase_stage4/orders.tbl.57',
     '/sybase_stage4/orders.tbl.58',
     '/sybase_stage4/orders.tbl.59',
     '/sybase_stage4/orders.tbl.60'
escapes off
quotes off
row delimited by '\x0a'
WITH CHECKPOINT ON;
commit;
```

## load_lineitem.sql

```
LOAD TABLE 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                                 '|'
)
FROM '/sybase_stage1/lineitem.tbl.1',
     '/sybase_stage1/lineitem.tbl.2',
     '/sybase_stage1/lineitem.tbl.3',
     '/sybase_stage1/lineitem.tbl.4',
     '/sybase_stage1/lineitem.tbl.5',
     '/sybase_stage1/lineitem.tbl.6',
     '/sybase_stage1/lineitem.tbl.7',
     '/sybase_stage1/lineitem.tbl.8',
     '/sybase_stage1/lineitem.tbl.9',
     '/sybase_stage1/lineitem.tbl.10',
     '/sybase_stage1/lineitem.tbl.11',
     '/sybase_stage1/lineitem.tbl.12',
     '/sybase_stage1/lineitem.tbl.13',
     '/sybase_stage1/lineitem.tbl.14',
     '/sybase_stage1/lineitem.tbl.15',
     '/sybase_stage1/lineitem.tbl.16',
     '/sybase_stage1/lineitem.tbl.17',
     '/sybase_stage1/lineitem.tbl.18',
     '/sybase_stage1/lineitem.tbl.19',
     '/sybase_stage1/lineitem.tbl.20',
     '/sybase_stage2/lineitem.tbl.21',
     '/sybase_stage2/lineitem.tbl.22',
     '/sybase_stage2/lineitem.tbl.23',
     '/sybase_stage2/lineitem.tbl.24',
     '/sybase_stage2/lineitem.tbl.25',
     '/sybase_stage2/lineitem.tbl.26',
     '/sybase_stage2/lineitem.tbl.27',
     '/sybase_stage2/lineitem.tbl.28',
     '/sybase_stage2/lineitem.tbl.29',
     '/sybase_stage2/lineitem.tbl.30',
     '/sybase_stage2/lineitem.tbl.31',
     '/sybase_stage2/lineitem.tbl.32',
     '/sybase_stage2/lineitem.tbl.33',
     '/sybase_stage2/lineitem.tbl.34',
     '/sybase_stage2/lineitem.tbl.35',
     '/sybase_stage2/lineitem.tbl.36',
     '/sybase_stage2/lineitem.tbl.37',
     '/sybase_stage2/lineitem.tbl.38',
     '/sybase_stage2/lineitem.tbl.39',
     '/sybase_stage2/lineitem.tbl.40',
     '/sybase_stage3/lineitem.tbl.41',
     '/sybase_stage3/lineitem.tbl.42',
     '/sybase_stage3/lineitem.tbl.43',
     '/sybase_stage3/lineitem.tbl.44',
     '/sybase_stage3/lineitem.tbl.45',
     '/sybase_stage3/lineitem.tbl.46',
     '/sybase_stage3/lineitem.tbl.47',
     '/sybase_stage3/lineitem.tbl.48',
     '/sybase_stage3/lineitem.tbl.49',
     '/sybase_stage3/lineitem.tbl.50',
     '/sybase_stage3/lineitem.tbl.51',
     '/sybase_stage3/lineitem.tbl.52',
     '/sybase_stage3/lineitem.tbl.53',
     '/sybase_stage3/lineitem.tbl.54',
     '/sybase_stage3/lineitem.tbl.55',
     '/sybase_stage3/lineitem.tbl.56',
     '/sybase_stage3/lineitem.tbl.57',
     '/sybase_stage3/lineitem.tbl.58',
     '/sybase_stage3/lineitem.tbl.59',
     '/sybase_stage3/lineitem.tbl.60'
escapes off
quotes off
row delimited by '\x0a'
WITH CHECKPOINT ON;
commit;
checkpoint;
commit;
```

## update_power.sql

```
create variable qstart timestamp;
create variable qstop timestamp;
create variable c_sqlstate CHAR(5);
create variable c_path varchar(128);
set c_path='/sybase_stage1/';
set qstart=now(*);
select 'Stream 0 RF1 START -- ', qstart ;
call tpch_rf1 (c_path,'0');
set qstop=now(*);
select 'Stream 0 Update RF1 LENGTH -- ',
cast(datediff(millisecond,qstart,qstop) as
numeric)/1000, ' seconds';
select 'Stream 0 RF1 FINISH -- ', qstop ;
-- Sleep Until the query stream completes
set qstart = now(*);
select 'Stream 0 RF WAITING -- ', qstart;
xp_cmdshell('/export/home/sybase/run/scripts/check_que
ry1.bash');
set qstart = now(*);
select 'Stream 0 RF CONTINUING -- ', qstart;
set qstart = now(*);
select 'Stream 0 RF2 START -- ', qstart ;
call tpch_rf2 (c_path,'0');
set qstop=now(*);
select 'Stream 0 Update RF2 LENGTH -- ',
cast(datediff(millisecond,qstart,qstop) as
numeric)/1000, ' seconds';
select 'Stream 0 RF2 FINISH -- ', qstop ;
```

## update_throughput.sql

```
create variable qstart timestamp;
create variable qstop timestamp;
create variable c_sqlstate CHAR(5);
create variable c_path varchar(128);
set qstart = now(*);
set c_path='/sybase_stage1/';
select 'Stream updates START -- ', qstart ;
select @@servername, db_name();
call tpch_rf1 (c_path,'1');
commit;
xp_cmdshell('sleep 15700'); -- sleep 15700 seconds
commit;
call tpch_rf2 (c_path,'1');
commit;
xp_cmdshell('sleep 15700'); -- sleep 15700 seconds
commit;
call tpch_rf1 (c_path,'2');
commit;
xp_cmdshell('sleep 15700'); -- sleep 15700 seconds
commit;
call tpch_rf2 (c_path,'2');
commit;
xp_cmdshell('sleep 15700'); -- sleep 15700 seconds
commit;
call tpch_rf1 (c_path,'3');
commit;
xp_cmdshell('sleep 15700'); -- sleep 15700 seconds
commit;
call tpch_rf2 (c_path,'3');
commit;
xp_cmdshell('sleep 15700'); -- sleep 15700 seconds
commit;
call tpch_rf1 (c_path,'4');
commit;
xp_cmdshell('sleep 15700'); -- sleep 15700 seconds
commit;
call tpch_rf2 (c_path,'4');
commit;
xp_cmdshell('sleep 15700'); -- sleep 15700 seconds
commit;
call tpch_rf1 (c_path,'5');
commit;
xp_cmdshell('sleep 15700'); -- sleep 15700 seconds
commit;
call tpch_rf2 (c_path,'5');
commit;
xp_cmdshell('sleep 15700'); -- sleep 15700 seconds
commit;
call tpch_rf1 (c_path,'6');
commit;
xp_cmdshell('sleep 15700'); -- sleep 15700 seconds
commit;
call tpch_rf2 (c_path,'6');
commit;
xp_cmdshell('sleep 15700'); -- sleep 15700 seconds
commit;
call tpch_rf1 (c_path,'7');
commit;
xp_cmdshell('sleep 15700'); -- sleep 15700 seconds
commit;
call tpch_rf2 (c_path,'7');
commit;
set qstop = now(*);
select 'Stream updates STOP -- ', qstop ;
```

## gen_streams.ksh

```
#!/bin/ksh
PATH=/export/home/sybase/ASIQ-12_5/bin:
/export/home/sybase/OCS-12_5/bin:/usr/openwin/bin:
/bin:.:/usr/dist/pkgs/forte_dev/SUNWspro/bin:
/usr/ccs/bin:/usr/dt/bin:/usr/dist/pkgs/devpro,
v4.0/5.x-sparc/bin:/usr/dist/local/exe:/usr/dist/exe:
/usr/ucb:/usr/sbin:
/net/josie/export/home18/rgostan/bin:
/export/home/sybase/run/scripts:/etc:.:
/export/home/sybase/run/tpch/appendix/dbgen
export PATH
export DSS_PATH=/export/home/sybase/run/scripts;
export
DSS_CONFIG=/export/home/sybase/run/tpch/appendix/dbgen
;
export DSS_DIST=dists.dss;
export
DSS_QUERY=/export/home/sybase/run/tpch/appendix/templa
tes/queries;
#export
DSS_QUERY=/export/home/sybase/run/tpch/appendix/templa
tes/queries.debug;
let seed=$1;
qgen -c -p 0 -i $DSS_QUERY/init.sql -t
$DSS_QUERY/complete.sql -r $seed -s 1000 1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 >
stream0.sql
let seed=seed+1;
qgen -c -p 1 -i $DSS_QUERY/init.sql -t
$DSS_QUERY/complete.sql -r $seed -s 1000 1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 >
stream1.sql
let seed=seed+1;
qgen -c -p 2 -i $DSS_QUERY/init.sql -t
$DSS_QUERY/complete.sql -r $seed -s 1000 1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 >
stream2.sql
let seed=seed+1;
qgen -c -p 3 -i $DSS_QUERY/init.sql -t
$DSS_QUERY/complete.sql -r $seed -s 1000 1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 >
stream3.sql
let seed=seed+1;
qgen -c -p 4 -i $DSS_QUERY/init.sql -t
$DSS_QUERY/complete.sql -r $seed -s 1000 1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 >
stream4.sql
let seed=seed+1;
qgen -c -p 5 -i $DSS_QUERY/init.sql -t
$DSS_QUERY/complete.sql -r $seed -s 1000 1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 >
stream5.sql
let seed=seed+1;
qgen -c -p 6 -i $DSS_QUERY/init.sql -t
$DSS_QUERY/complete.sql -r $seed -s 1000 1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 >
stream6.sql
let seed=seed+1;
qgen -c -p 7 -i $DSS_QUERY/init.sql -t
$DSS_QUERY/complete.sql -r $seed -s 1000 1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 >
stream7.sql
let seed=seed+1;
qgen -c -p 8 -i $DSS_QUERY/init.sql -t
$DSS_QUERY/complete.sql -r $seed -s 1000 1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 >
stream8.sql
let seed=seed+1;
```

```
qgen -c -p 9 -i $DSS_QUERY/init.sql -t
$DSS_QUERY/complete.sql -r $seed -s 1000 1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 >
stream9.sql
echo $seed
```

==========

## ACID Test Execution Code

==========

==========

## atomicity test

==========

```
dbtest acid_atomic_main.tst > acid_atomic_main.out
```

==========

## consistency test

==========

```
dbtest acid_consistency_main.tst >
acid_consistency_main.out
```

==========

## isolation tests

==========

```
dbtest acid_isolation_main1.tst >
acid_isolation_main1.out
dbtest acid_isolation_main2.tst >
acid_isolation_main2.out
dbtest acid_isolation_main3.tst >
acid_isolation_main3.out
dbtest acid_isolation_main4.tst >
acid_isolation_main4.out
dbtest acid_isolation_main5.tst >
acid_isolation_main5.out
dbtest acid_isolation_main6.tst >
acid_isolation_main6.out
```

==========

## durability test

==========

```
dbtest acid_durability_main.tst >
acid_durability_main.out
```

==========

## ACID Test Source Code

==========

==========

## acid_atomic_main.tst

==========

```
stringconnect "dsn=tpch;"

execute {select now(*)} into times
print 'Atomicity test start = ', times
print ' '

include 'acid_functions.tst'
commit

%
% Atomicity test with rollback
%
print ' '
print 'Starting atomicity test with rollback'
print ' '

run test 'acid_atomic_setup.tst'

stringconnect "dsn=tpch;"
let counter=0

LOOP {
open cur2 {select ordr, line, delta from aa_whattodo
where seqnum=^}
       substitute counter
print 'counter = ',counter
fetch cur2 into ordr, line, delta
if ROWSTATUS != FOUND then { BREAK LOOP } endif
print 'Acid transaction for: o_key-',ordr,'  l_key-',
line,'  delta-',delta

execute {select o_totalprice, l_quantity,
l_extendedprice
       from orders, lineitem
       where o_orderkey = l_orderkey and o_orderkey
=^ and l_linenumber = ^}
       substitute ordr, line
       into o_total, l_quan, l_price
print  'o_totalprice = ',o_total,'   l_quantity = ',
l_quan,
       '       l_extendedprice = ',l_price

execute {call acid_transaction(^, ^,  ^, rprice,
quantity,
                               tax, disc, extprice,
ototal)
       } substitute ordr, line, delta
close cur2
let counter = counter+1

rollback
execute {select now(*)} into times
print 'rollback : ', times

execute {select o_totalprice, l_quantity,
l_extendedprice
       from orders, lineitem
       where o_orderkey = l_orderkey and o_orderkey
=^ and l_linenumber = ^}
       substitute ordr, line
       into o_total, l_quan, l_price
print  'o_totalprice = ',o_total,'   l_quantity = ',
l_quan,
       '       l_extendedprice = ',l_price
print ' '

} ENDLOOP

commit

%
% Atomicity test with commit
%
stringconnect "dsn=tpch;"
print ' '
print 'Starting atomicity test with commit '
print ' '
run test 'acid_atomic_setup.tst'

stringconnect "dsn=tpch;"

open cur1 {select ordr, line, delta from aa_whattodo}
LOOP {
fetch cur1 into ordr, line, delta
if ROWSTATUS != FOUND then { BREAK LOOP } endif
print 'Acid transaction for: o_key-',ordr,'  l_key-',
```

```
line,'  delta-',delta
execute {select o_totalprice, l_quantity,
l_extendedprice
       from orders, lineitem
       where o_orderkey = l_orderkey and o_orderkey
=^ and l_linenumber = ^}
       substitute ordr, line
       into o_total, l_quan, l_price
print   'o_totalprice = ',o_total,'   l_quantity = ',
l_quan,
       '       l_extendedprice = ',l_price

execute {call acid_transaction(^, ^,  ^, rprice,
quantity,
                              tax, disc, extprice,
ototal)
       } substitute ordr, line, delta
commit
execute {select now(*)} into times
print 'commit : ', times

execute {select o_totalprice, l_quantity,
l_extendedprice
       from orders, lineitem
       where o_orderkey = l_orderkey and o_orderkey
=^ and l_linenumber = ^}
       substitute ordr, line
       into o_total, l_quan, l_price
print   'o_totalprice = ',o_total,'   l_quantity = ',
l_quan,
       '       l_extendedprice = ',l_price
print ' '

} ENDLOOP

close cur1
commit

execute {select now(*)} into times
print 'Atomicity test end = ', times

End Test
```

==========

## acid_atomic_setup.tst

==========

```
Description    "Creates aa_whattodo table"

stringconnect "dsn=tpch;"

% Drop Table if found

allow error -141
execute { commit }
execute { drop table aa_whattodo }
allow no error

execute {
create table aa_whattodo (
                seqnum       int      not null,
                ordr         int        not null,
                line         int        null,
                delta        int         null)
}

print 'aa_whattodo CREATED!!'
execute {select now(*)} into times
print 'time = ', times

fetch {select count(*) from aa_whattodo } into ROWS
assert ROWS = 0

print 'Number of rows before load: ',ROWS

LOOP ({let counter = 0}; {counter < 5}; {let counter =
counter + 1})
{
       execute {call generate_acid_values()}
              into orderkey, linenumber,delta
       execute {insert into aa_whattodo values ( ^ ,
^ , ^ , ^ ) }
              substitute counter, orderkey,
linenumber, delta
 print  counter, ' ',orderkey, ' ',linenumber,' ',
delta
}
ENDLOOP

commit

fetch {select count(*) from aa_whattodo } into ROWS
assert ROWS = 5

print 'Number of rows after load: ',ROWS

disconnect

End Test
```

==========

## acid_consistency_main.tst

==========

```
stringconnect "dsn=tpch;"

execute {select now(*)} into times
print 'Consistency test start = ', times
print ' '

include 'acid_functions.tst'

run test 'acid_consistency_setup.tst'

execute {select now(*)} into times
print 'Consistency test time = ', times
print ' '

run test '-o' 'acid_consistency_q1.ot'
'acid_consistency_query.tst'
disconnect

start test '-o' 'acid_consist_user1.ot' 'stream=1'
'acid_consistency_txn.tst'
sleep 1000
start test '-o' 'acid_consist_user2.ot' 'stream=2'
'acid_consistency_txn.tst'
sleep 1000
start test '-o' 'acid_consist_user3.ot' 'stream=3'
'acid_consistency_txn.tst'
sleep 1000
start test '-o' 'acid_consist_user4.ot' 'stream=4'
'acid_consistency_txn.tst'
sleep 1000
start test '-o' 'acid_consist_user5.ot' 'stream=5'
'acid_consistency_txn.tst'
sleep 1000
start test '-o' 'acid_consist_user6.ot' 'stream=6'
'acid_consistency_txn.tst'
sleep 1000
start test '-o' 'acid_consist_user7.ot' 'stream=7'
'acid_consistency_txn.tst'
```

```
sleep 1000
start test '-o' 'acid_consist_user8.ot' 'stream=8'
'acid_consistency_txn.tst'
sleep 1000
start test '-o' 'acid_consist_user9.ot' 'stream=9'
'acid_consistency_txn.tst'

synchronize 10
% let the log flush...
sleep 10000

stringconnect "dsn=tpch;"
run test '-o' 'acid_consistency_q2.ot'
'acid_consistency_query.tst'

execute {select now(*)} into times
print 'Consistency test end = ', times
print ' '

End Test
```

==========

## acid_consistency_query.tst

==========

```
stringconnect "dsn=tpch;"

open cur1 {select stream, seqnum, ordr, line, delta
from acid_table
               where seqnum > 10 order by seqnum}
print ' '

let n=1
LOOP {
   fetch cur1 into str, seq, ord, lin, delta

   fetch {select round(cast(o_totalprice as
numeric(26,16)),2)
               from orders where o_orderkey=^ }
        substitute ord into o_price

   if ROWSTATUS != FOUND then { BREAK LOOP } endif
   if n > 25 then { BREAK LOOP } endif

   fetch { call acid_single_query (^) } substitute ord
into l_total

   fetch {select cast(^ as numeric(12,2)) } substitute
o_price into o_price
   fetch {select cast(^ as numeric(12,2)) } substitute
l_total into l_total

   print 'orderkey = ', ord, '       o_totalprice =
', o_price,
        '       acid query = ' , l_total

   ASSERT (o_price = l_total)
       then { print 'Did not compare correctly' }
ENDASSERT
   let n=n+1
 } ENDLOOP

disconnect

END Test
```

==========

## acid_consistency_setup.tst

==========

```
stringconnect "dsn=tpch;"

% Drop Table if found
allow error -141
execute { drop table acid_table }
allow no error

execute {
create table acid_table (
               stream  int    not null,
                seqnum  int   not null,
                ordr    int   not null,
                line    int   null,
                delta   int   null)
}

execute {checkpoint}

print 'acid_table CREATED!!'

fetch {select count(*) from acid_table } into ROWS
assert ROWS = 0
print 'Number of rows before load: ',ROWS
commit

LOOP ({let i = 1}; {i <= 9}; { let i = i + 1})
{
  LOOP ({let j = 1}; {j <= 100}; {let j = j + 1})
    {
        execute { call generate_acid_values()} into
ordr, line, delta
        execute { insert into acid_table values (^,^,
^,^,^) }
               substitute i,j,ordr,line,delta
    } endloop
  print (j-1)*i
} endloop

commit

fetch {select count(*) from acid_table } into ROWS
assert ROWS = 900
print 'Number of rows after load: ',ROWS

End Test
```

==========

## acid_consistency_txn.tst

==========

```
stringconnect "dsn=tpch;"

execute {select now(*)} into times
print 'Consistancy test start = ', times
print ' '

LOOP ({let i = 1}; {i <= 100}; { let i = i + 1})
{
 fetch {select ordr, line, delta from acid_table
               where stream=^ and seqnum=^ }
       substitute stream, i
 if ROWSTATUS != FOUND then { print 'not enough rows'
               BREAK LOOP }
 endif

 print 'Acid Trenasaction ',i,
       ':  o_key-', ordr , '  l_key-', line , '
delta-' ,delta

 execute {call acid_transaction( ^, ^,  ^, rprice,
quantity,
                                tax, disc, extprice,
```

```
ototal)
 } substitute ordr, line, delta
 commit
 print 'committed'
 sleep 1000

}
ENDLOOP

synchronize 10

End Test
```

==========

## acid_durability_main.tst

==========

```
stringconnect "dsn=tpch;"

execute {select now(*)} into times
print 'Durability test start = ', times
print ' '

include 'acid_functions.tst'
run test 'acid_durability_setup.tst'

execute {select now(*)} into times
print 'Durability test time = ', times
print ' '

run test  '-o' 'acid_durability_q1.ot'
'acid_durability_query.tst'

start test '-o' 'acid_dura_user1.ot' 'stream=1'
'acid_durability_txn.tst'
sleep 1000
start test '-o' 'acid_dura_user2.ot' 'stream=2'
'acid_durability_txn.tst'
sleep 1000
start test '-o' 'acid_dura_user3.ot' 'stream=3'
'acid_durability_txn.tst'
sleep 1000
start test '-o' 'acid_dura_user4.ot' 'stream=4'
'acid_durability_txn.tst'
sleep 1000
start test '-o' 'acid_dura_user5.ot' 'stream=5'
'acid_durability_txn.tst'
sleep 1000
start test '-o' 'acid_dura_user6.ot' 'stream=6'
'acid_durability_txn.tst'
sleep 1000
start test '-o' 'acid_dura_user7.ot' 'stream=7'
'acid_durability_txn.tst'
sleep 1000
start test '-o' 'acid_dura_user8.ot' 'stream=8'
'acid_durability_txn.tst'
sleep 1000
start test '-o' 'acid_dura_user9.ot' 'stream=9'
'acid_durability_txn.tst'

synchronize 10

execute {select now(*)} into times
print 'Durability test time = ', times
print ' '


run test  '-o' 'acid_durability_q2.ot'
'acid_durability_query.tst'

execute {select now(*)} into times
print 'Durability test end = ', times
print ' '

End Test
```

==========

## acid_durability_query.tst

==========

```
stringconnect "dsn=tpch;"

open cur1 {select stream, seqnum, ordr, line, delta
from acid_table
               where seqnum > 5 order by seqnum}
print ' '

let n=1
LOOP {
   fetch cur1 into str, seq, ord, lin, delta

   fetch {select round(cast(o_totalprice as
numeric(26,16)),2)
               from orders where o_orderkey=^ }
        substitute ord into o_price

   if ROWSTATUS != FOUND then { BREAK LOOP } endif
   if n > 50 then { BREAK LOOP } endif

   fetch { call acid_single_query (^) } substitute ord
into l_total

   fetch {select cast(^ as numeric(12,2)) } substitute
o_price into o_price
   fetch {select cast(^ as numeric(12,2)) } substitute
l_total into l_total

   print 'orderkey = ', ord, '       o_totalprice =
', o_price,
        '       acid query = ' , l_total

   ASSERT (o_price = l_total)
        then { print 'Did not compare correctly' }
ENDASSERT
   let n=n+1

 } ENDLOOP

disconnect

END Test
```

==========

## acid_durability_setup.tst

==========

```
stringconnect "dsn=tpch;"

% Drop Table if found
allow error -141
execute { drop table acid_table }
allow no error

execute {
create table acid_table (
               stream  int    not null,
                seqnum  int   not null,
                ordr    int   not null,
                line    int   null,
                delta   int   null)
}
```

```
execute {checkpoint}

print 'acid_table CREATED!!'

fetch {select count(*) from acid_table } into ROWS
assert ROWS = 0
print 'Number of rows before load: ',ROWS
commit

LOOP ({let i = 1}; {i <= 9}; { let i = i + 1})
{
  LOOP ({let j = 1}; {j <= 200}; { let j = j + 1})
    {
       execute { call generate_acid_values()} into
ordr, line, delta
       execute { insert into acid_table values (^,^,
^,^,^) }
              substitute i,j,ordr,line,delta
    } endloop
  print (j-1)*i
} endloop

commit
execute {checkpoint}

fetch {select count(*) from acid_table } into ROWS

print 'Number of rows after load: ',ROWS

End Test
```

==========

## acid_durability_txn.tst

==========

```
stringconnect "dsn=tpch;"

execute {select now(*)} into times
print 'Durability test start = ', times
print ' '
print 'stream  trans.  o_key   l_key   p_key   s_key
delta   date_t '

LOOP ({let i = 1}; {i <= 200}; { let i = i + 1})
{
 fetch {select ordr, line, delta from acid_table
       where stream=^ and seqnum=^ }
       substitute stream, i

 if ROWSTATUS != FOUND then { print 'not enough rows'
BREAK LOOP }
 endif

 execute {select l_partkey, l_suppkey from lineitem
               where l_orderkey=^ and l_linenumber=^}
       substitute ordr, line
       into p_key, s_key

 execute {call acid_transaction( ^, ^,  ^)
        } substitute ordr, line, delta
       into  rprice, quantity, tax, disc, extprice,
ototal

 assert SQLCODE=0 then { DIE } endassert
 commit

 execute {select now(*)} into times
 print  stream,'       ',
       'txn ',i, '     ',
        ordr,  '       ',
        line,  '       ',
        p_key, '       ',
        s_key, '       ',
        delta, '       ',
        times, '       '

 sleep 1000
}
ENDLOOP

synchronize 10

End Test
```

==========

## acid_functions.tst

==========

```
print 'creating the sleep procedure'

allow error -265
execute { DROP PROCEDURE dbo.sleep}
allow no error

execute{ create procedure dbo.sleep(in sleep_time
integer default null)
begin
  declare command varchar(255);
  select 'xp_cmdshell ''sleep '+str(sleep_time)+''''
into command;
  execute immediate command
end;
}

print 'creating the Acid Transaction'

allow error -265
execute { DROP PROCEDURE acid_transaction }
allow no error

execute{ CREATE PROCEDURE acid_transaction(
               IN  o_key      INT,
               IN  l_key      INT,
               IN  delta      INT,
               OUT rprice     Numeric(18,8),
               OUT quantity   INT,
               OUT tax        Numeric(18,8),
               OUT disc       Numeric(18,8),
               OUT extprice   Numeric(18,8),
               OUT ototal     Numeric(18,8)
               )
ON EXCEPTION RESUME
BEGIN
 DECLARE pkey           INT ;
 DECLARE skey           INT ;
 DECLARE cost           NUMERIC(18,8) ;
 DECLARE new_extprice   NUMERIC(18,8) ;
 DECLARE new_ototal     NUMERIC(18,8) ;
 DECLARE new_quantity   INT ;
 DECLARE c_sqlstate     char(5);
 LOOP1: LOOP
    COMMIT;
    SELECT o_totalprice
      INTO ototal
      FROM orders
     WHERE o_orderkey = o_key ;
    SELECT l_quantity,
           l_extendedprice,
           l_partkey,
           l_suppkey,
           l_tax,
           l_discount
```

```
      INTO quantity,
           extprice,
           pkey,
           skey,
           tax,
           disc
      FROM lineitem
     WHERE l_orderkey   = o_key
       AND l_linenumber = l_key;
    -- CLEAN UP IMPRECICE NUMBERS
    SET ototal = ototal -
"TRUNCATE"("truncate"(extprice*(1-disc),2)*(1+tax),2);
    SET rprice = "TRUNCATE"((extprice  / quantity),2);
    SET cost = "TRUNCATE"((rprice * delta),2);
    SET new_extprice = extprice + cost;
    SET new_ototal = "TRUNCATE"(new_extprice * (1.0 -
disc),2);
    SET new_ototal = "TRUNCATE"(new_ototal * (1.0 +
tax),2);
    SET new_ototal = ototal + new_ototal ;
    SET new_quantity = quantity + delta ;
    --
    -- Update LineItem
    --
    UPDATE lineitem
       SET l_quantity      = new_quantity,
           l_extendedprice = new_extprice
     WHERE l_orderkey=o_key
       AND l_linenumber=l_key;
    SELECT SQLSTATE INTO c_sqlstate;
    IF c_sqlstate = '00000' THEN
        --
        -- Update Orders
        --
        UPDATE orders
           SET o_totalprice = new_ototal
         WHERE o_orderkey = o_key;
        SELECT SQLSTATE INTO c_sqlstate;
        IF c_sqlstate = '00000'  THEN
            INSERT INTO history VALUES ( pkey, skey,
o_key, l_key, delta, now(*)) ;
            SELECT SQLSTATE INTO c_sqlstate;
            IF c_sqlstate = '00000'  THEN
                LEAVE LOOP1;
            END IF;
        END IF;
    END IF;
 END LOOP LOOP1;
 RETURN(0);
END;
}

print 'Acid transaction created'
print ' '

print 'Creating Acid query'

allow error -265
execute { DROP PROCEDURE acid_single_query }
allow no error

execute{
CREATE PROCEDURE acid_single_query( IN o_key INT, OUT
o_total NUMERIC(26,16) )
BEGIN
    SELECT o_total =
        sum ("truncate" ("truncate"(
                         round(cast(l_extendedprice as
numeric(26,16)),2) *
                         (1 - round(cast(l_discount as
numeric(26,16)),2)),2)
                    * (1 + round(cast(l_tax as
numeric(26,16)),2)) , 2))
        FROM lineitem WHERE l_orderkey = o_key;
 END
}

print 'Acid query created'
print ' '

print 'Creating Generate_acid_values function'

allow error -265
execute { DROP PROCEDURE generate_acid_values }
allow no error

execute{
create procedure generate_acid_values(
out orderkey   int,
out linenumber int,
out delta      int)

BEGIN

 declare seed         bigint;
 declare rand_dbl     double precision;
 declare rand_int     int;
 declare out_key      int;

 declare times cursor for select datediff(millisecond,
convert(char(10),getdate(), 116),now(*));
 declare random1 cursor for select rand(seed);
 declare random cursor for select rand();
 declare get_order cursor for
        select o_orderkey from orders where o_orderkey
= rand_int;
 declare get_linenumber cursor for
        select max(l_linenumber) from lineitem
        where l_orderkey = orderkey;

 open times;
 fetch next times into seed;
 open random1;
 fetch next random1 into rand_dbl;

 set out_key = 0;
 loop1:
 while out_key = 0 LOOP
        open random;
        open get_order;

        fetch next random into rand_dbl;
        set rand_int = rand_dbl * 6001215 +1;
        fetch next get_order into out_key;

        close random;
        close get_order;
 end loop loop1;

 set orderkey = out_key;

 open get_linenumber;
 fetch next get_linenumber into linenumber;
 close get_linenumber;

 open random;
 fetch next random into rand_dbl;
 set delta = rand_dbl * 100 + 1;
 close random;

END
}
commit
execute {checkpoint}
```

```
print 'Generate_acid_values function created'
print ' '

print 'Creating Generate_Ps_Values function'

allow error -265
execute { DROP PROCEDURE generate_ps_values }
allow no error

execute{
create procedure generate_ps_values(
out partkey    int,
out suppkey    int)

BEGIN

 declare seed          bigint;
 declare rand_dbl      double precision;
 declare rand_int      int;
 declare out_key       int;
 declare counter       int;

 declare times cursor for select datediff(millisecond,
convert(char(10),getdate(), 116),now(*));
 declare random1 cursor for select rand(seed);
 declare random cursor for select rand();
 declare get_supp cursor for
        select ps_suppkey from partsupp
        where ps_suppkey = rand_int;
 declare get_part cursor for
        select ps_partkey from partsupp
        where ps_suppkey = suppkey;

 open times;
 fetch next times into seed;
 open random1;
 fetch next random1 into rand_dbl;
 close random1;

 set out_key = 0;
 while out_key = 0 LOOP
        open random;
        open get_supp ;

        fetch next random into rand_dbl;
        set rand_int = rand_dbl * 10000 +1;
        fetch next get_supp into out_key;

        close random;
        close get_supp ;
 end loop;
 set suppkey = out_key;

 set out_key = 0;
 set counter  = 0;
 open random;
 open get_part;
 fetch next random into rand_dbl;
 set rand_int = rand_dbl * 10 +1;

 loop1:
 while counter < rand_int LOOP
        set counter = counter+1;
        fetch next get_part into out_key;
 end loop loop1;

 set partkey = out_key;
 close random;
 close get_part;

END
}

commit
execute {checkpoint}
print 'Generate_Ps_Values function created'
print ' '

print 'Creating history table'

allow error -141
execute { drop table history }
allow no error

execute {
create table history (
   h_p_key    unsigned INT NOT NULL ,
   h_s_key    unsigned INT NOT NULL ,
   h_o_key    unsigned INT NOT NULL ,
   h_l_key    INT NOT NULL,
   h_delta    INT NOT NULL,
   h_date_t   TIMESTAMP NOT NULL)
}

commit
execute {checkpoint}
print 'history table created'
print ' '
```

==========

## acid_isolation_main1.tst

==========

```
stringconnect "dsn=tpch;"

execute {select now(*)} into times
print ' '
print ' '
print 'Isolation test 1'
print 'start = ', times
print ' '

include 'acid_functions.tst'
include 'acid_isolation_setup.tst'

start test  'acid_isolation_test1.tst'
start test  'acid_isolation_test1_query.tst'

End Test
```

==========

## acid_isolation_main2.tst

==========

```
stringconnect "dsn=tpch;"

execute {select now(*)} into times
print ' '
print ' '
print 'Isolation test 2'
print 'start = ', times
print ' '


include 'acid_functions.tst'
include 'acid_isolation_setup.tst'

start test  'acid_isolation_test2.tst'
start test  'acid_isolation_test2_query.tst'

End Test
```

==========

## acid_isolation_main3.tst

```
stringconnect "dsn=tpch;"

execute {select now(*)} into times
print ' '
print ' '
print 'Isolation test 3'
print 'start = ', times
print ' '
print 'Isolation test start = ', times

include "acid_functions.tst"
include 'acid_isolation_setup.tst'

start test  'acid_isolation_test3_transaction1.tst'
start test  'acid_isolation_test3_transaction2.tst'

End Test
```

## acid_isolation_main4.tst

```
stringconnect "dsn=tpch;"

execute {select now(*)} into times
print ' '
print ' '
print 'Isolation test 4'
print 'start = ', times
print ' '
print 'Isolation test start = ', times

include 'acid_functions.tst'
include 'acid_isolation_setup.tst'

start test  'acid_isolation_test4_transaction1.tst'
start test  'acid_isolation_test4_transaction2.tst'

End Test
```

## acid_isolation_main5.tst

```
stringconnect "dsn=tpch;"

execute {select now(*)} into times
print ' '
print ' '
print 'Isolation test 5'
print 'start = ', times
print ' '

include 'acid_functions.tst'
include 'acid_isolation_setup.tst'

start test 'acid_isolation_test5_transaction1.tst'
start test 'acid_isolation_test5_query.tst'

End Test
```

## acid_isolation_main6.tst

```
stringconnect "dsn=tpch;"

execute {select now(*)} into times
print ' '
print ' '
print 'Isolation test 6'
print 'start = ', times
print ' '

include 'acid_functions.tst'
include 'acid_isolation_setup.tst'

start test '-u' 'acid_isolation_test6_query.tst'
start test  'acid_isolation_test6_transaction1.tst'

End Test
```

## acid_isolation_setup.tst

```
stringconnect "dsn=tpch;"

% Drop Table if found

allow error -141
execute { commit }
execute { drop table acid_isolation_table }
allow no error

execute {
create table acid_isolation_table (
                ordr         int    not null,
                line         int    null,
                delta        int    null)
}

execute {checkpoint}

print 'acid_isolation_table CREATED!!'
execute {select now(*)} into times
print 'time = ', times

fetch {select count(*) from acid_isolation_table }
into ROWS
assert ROWS = 0

print 'Number of rows before load: ',ROWS

execute {call generate_acid_values()} into orderkey,
linenumber,delta
execute {insert into acid_isolation_table values ( ^ ,
^ , ^ ) }
                substitute orderkey, linenumber, delta
print  orderkey, ' ',linenumber,' ', delta

commit

fetch {select count(*) from acid_isolation_table }
into ROWS
assert ROWS = 1

print 'Number of rows after load: ',ROWS

disconnect

End Test
```

## acid_isolation_test1.tst

```
stringconnect "dsn=tpch;"
```

```
execute {select ordr, line, delta from
acid_isolation_table}
        into ordr, line, delta

 print 'The following are the data input values for
the ACID Transaction.'
 print '(user 1) o_key-',ordr, '  l_key-', line, '
delta-',delta

 execute {call acid_transaction( ^, ^,  ^,
       rprice, quantity, tax, disc, extprice, ototal)
       } substitute ordr, line, delta

execute {select now(*)} into times
print 'User 1 waiting to commit = ', times
print ' '
synchronize 2
sleep 10000
execute {select now(*)} into times
print 'User 1 about to commit = ', times
commit

execute { select round(cast(o_totalprice as
numeric(18,2)),2)
       from orders where o_orderkey = ^}
       substitute ordr into o_total
print 'User 1 new values: '
print 'user 1 ordr= ', ordr
print 'user 1 o_total= ', o_total
print ' '

End Test
```

## acid_isolation_test1_query.tst

```
stringconnect "dsn=tpch;"

 synchronize 2
 print ' '
 execute {select now(*)} into times
 print 'User 2 start query = ', times

 execute {select ordr from acid_isolation_table}
        into ordr

 print 'user 2 ordr = ', ordr
 fetch { call acid_single_query (^) } substitute ordr
into o_total
 print 'user 2 o_total=' , o_total
 print ' '

execute {select now(*)} into times
print 'User 2 completed query = ', times

disconnect

END Test
```

## acid_isolation_test2.tst

```
stringconnect "dsn=tpch;"

execute {select ordr, line, delta from
acid_isolation_table}
        into ordr, line, delta

 print 'The following are the data input values for
the ACID Transaction.'
 print '(user 1) o_key-',ordr, '  l_key-', line, '
delta-',delta

 execute {call acid_transaction( ^, ^,  ^,
       rprice, quantity, tax, disc, extprice, ototal)
       } substitute ordr, line, delta

execute {select now(*)} into times
print 'User 1 waiting to roll back = ', times
print ' '
synchronize 2
sleep 10000
execute {select now(*)} into times
print 'User 1 about to roll back = ', times
rollback

execute { select round(cast(o_totalprice as
numeric(18,2)),2)
       from orders where o_orderkey = ^}
       substitute ordr into o_total
print 'User 1 new values: '
print 'user 1 ordr= ', ordr
print 'user 1 o_total= ', o_total
print ' '

End Test
```

## acid_isolation_test2_query.tst

```
stringconnect "dsn=tpch;"

 synchronize 2
 print ' '
 execute {select now(*)} into times
 print 'User 2 start query = ', times

 execute {select ordr from acid_isolation_table}
        into ordr

 print 'user 2 ordr = ', ordr
 fetch { call acid_single_query (^) } substitute ordr
into o_total
 print 'user 2 o_total=' , o_total
 print ' '

execute {select now(*)} into times
print 'User 2 completed query = ', times

disconnect

END Test
```

## acid_isolation_test3_transaction1.tst

```
stringconnect "dsn=tpch;"

execute {select now(*)} into times
print 'Isolation test 3 test start = ', times
print ' '

 execute {select ordr, line, delta from
acid_isolation_table}
        into ordr, line, delta

 print 'User 1 --  The input data values for User 1
```

```
Acid Transaction.'
 print 'User 1 -- o_key = ',ordr
 print 'User 1 -- l_key = ',line
 print 'User 1 -- delta1 = ',delta

 print ' '
 execute {select now(*)} into times
 print 'User 1 -- Starting the Acid Transaction: ',
times

 execute {call acid_transaction( ^, ^,  ^ )}
       substitute ordr, line, delta
       into rprice, quantity, tax, disc, extprice,
ototal

 print ' '
 execute {select now(*)} into times
 print 'User 1 -- Acid Transaction complete: ', times
 print '30 second timer started'
SYNCHRONIZE 2
 sleep 30000

 print ' '
 execute {select now(*)} into times
 print 'User 1 -- starting commit: ', times

 commit
 print ' '
 execute {select now(*)} into times
 print 'User 1 -- transaction commit complete: ',
times

 print ' '
 print 'USER 1 -- original extendedprice = ', extprice
 print 'USER 1 -- original quantity = ', quantity

 fetch { select cast(^ as numeric(18,6))
             + (cast(^ as numeric(18,6))*(cast (^ as
numeric(18,6))
             /cast (^ as numeric(18,6)))) }
       substitute extprice, delta, extprice, quantity
       into result1
 % make it format nicely...
 execute { select cast(^ as numeric(18,2)) }
substitute result1 into result2

 print ' '
 print 'User 1 -- result1 = '
 print '    txn1_extendedprice + (delta1 *
(txn1_extendedprice/txn1_quantity))'
 print 'User 1 -- result1= ', result2
 print ' '

 disconnect
 End Test
```

==========

## acid_isolation_test3_transaction2.tst

==========

```
stringconnect "dsn=tpch;"

execute {select ordr, line, delta from
acid_isolation_table}
       into ordr, line, delta
% generate a new set of values; we only use delta2
execute { call generate_acid_values()} into ordr2,
line2, delta2

 print ' '
 print 'User 2 - The input data values for the Acid
Transaction.'
 print 'User 2 -- o_key = ',ordr
 print 'User 2 -- l_key= ',line
 print 'User 2 -- delta2 = ',delta2

SYNCHRONIZE 2
sleep 5000

 print ' '
 execute {select now(*)} into times
 print 'User 2 -- Starting the Acid Transaction: ',
times

execute {call acid_transaction( ^, ^,  ^ ) }
       substitute ordr, line, delta2
       into rprice, quantity, tax, disc, extprice,
ototal
execute {select round(cast(^ as numeric(20,6)),2) }
       substitute extprice into extprice2

sleep 5000
print ' '
execute {select now(*)} into times
print 'User 2 -- About to commit: ', times
commit

execute {select now(*)} into times
print 'User 2 -- transaction commit complete: ', times

print ' '

print 'USER 2 -- original extendedprice = ', extprice2
print 'USER 2 -- original quantity = ', quantity
print ' '

End Test
```

==========

## acid_isolation_test4_transaction1.tst

==========

```
stringconnect "dsn=tpch;"

execute {select now(*)} into times
print 'Isolation test 3 test start = ', times
print ' '

 execute {select ordr, line, delta from
acid_isolation_table}
       into ordr, line, delta

 print 'User 1 --  The input data values for User 1
Acid Transaction.'
 print 'User 1 -- o_key = ',ordr
 print 'User 1 -- l_key = ',line
 print 'User 1 -- delta1 = ',delta

 print ' '
 execute {select now(*)} into times
 print 'User 1 -- Starting the Acid Transaction: ',
times

 execute {call acid_transaction( ^, ^,  ^ )}
       substitute ordr, line, delta
       into rprice, quantity, tax, disc, extprice,
ototal

 print ' '
 execute {select now(*)} into times
 print 'User 1 -- Acid Transaction complete: ', times
 print '30 second timer started'
```

```
SYNCHRONIZE 2
 sleep 30000

 print ' '
 execute {select now(*)} into times
 print 'User 1 -- starting rollback: ', times

 rollback
 print ' '
 execute {select now(*)} into times
 print 'User 1 -- transaction rollback complete: ',
times

 execute {select round(cast(^ as numeric(20,6)),2) }
        substitute extprice into extprice2
 print ' '
 print 'USER 1 -- original extendedprice = ',
extprice2
 print 'USER 1 -- original quantity = ', quantity
 print ' '

 disconnect
 End Test
```

==========

## acid_isolation_test4_transaction2.tst

==========

```
stringconnect "dsn=tpch;"

execute {select ordr, line, delta from
acid_isolation_table}
        into ordr, line, delta
% generate a new set of values; we only use delta2
execute { call generate_acid_values()} into ordr2,
line2, delta2

 print ' '
 print 'User 2 - The input data values for the Acid
Transaction.'
 print 'User 2 -- o_key = ',ordr
 print 'User 2 -- l_key= ',line
 print 'User 2 -- delta2 = ',delta2

SYNCHRONIZE 2
sleep 5000

 print ' '
 execute {select now(*)} into times
 print 'User 2 -- Starting the Acid Transaction: ',
times

execute {call acid_transaction( ^, ^,  ^ ) }
        substitute ordr, line, delta2
        into rprice, quantity, tax, disc, extprice,
ototal
execute {select round(cast(^ as numeric(20,6)),2) }
        substitute extprice into extprice2

sleep 5000
print ' '
execute {select now(*)} into times
print 'User 2 -- About to commit: ', times
commit

execute {select now(*)} into times
print 'User 2 -- transaction commit complete: ', times
print ' '
print 'USER 2 -- original extendedprice = ', extprice2
print 'USER 2 -- original quantity = ', quantity
print ' '

End Test
```

==========

## acid_isolation_test5_query.tst

==========

```
stringconnect "dsn=tpch;"

synchronize 2

execute { call generate_ps_values() } into ps_ptky,
ps_spky
print ' '
print 'user 2 ps_partkey = ', ps_ptky
print 'user 2 ps_suppkey = ', ps_spky
print ' '

execute {select now(*)} into times
print 'User 2 beginning query = ', times
execute {select * from partsupp where ps_partkey=^ and
ps_suppkey=^}
        substitute ps_ptky, ps_spky
        into ps_ptky, ps_spky, ps_aly, ps_spct, ps_ct

print ' '
print 'User2 gets all columns of the PARTSUPP table '
print ' for selected ps_partkey and ps_suppkey doing a
query.'
print ' '
print 'ps_partkey = ', ps_ptky, '     ps_suppkey = ',
ps_spky
print 'ps_availqty = ', ps_aly, '     ps_supplycost =
',ps_spct
print 'ps_comment = ', ps_ct
execute {select now(*)} into times
print 'User 2 query complete = ', times
print ' '

execute {select now(*)} into times
print 'User 2 about to commit = ', times
commit
execute {select now(*)} into times
print 'User 2 transaction commit complete = ', times

print ' '

End Test
```

==========

## acid_isolation_test5_transaction1.tst

==========

```
stringconnect "dsn=tpch;"

execute {select ordr, line, delta from
acid_isolation_table}
        into ordr, line, delta

 print ' '
 print 'The following are the input values for the
users1 ACID Transaction.'
 print 'o_key = ',ordr,'      l_key = ',line,'
delta = ',delta
 print ''
execute {select now(*)} into times
print 'User 1 isolation test time = ', times
print ' '
print ' '
execute {select o_totalprice from orders where
o_orderkey=^ }
```

```
       substitute ordr into o_tprice
execute {select l_extendedprice, l_quantity,l_partkey,
l_suppkey
       from lineitem
       where l_orderkey=^ and l_linenumber=^}
       substitute ordr, line
       into l_price, l_quant, l_ptky, l_spky
print 'User 1 o_totalprice = ', o_tprice
print 'User 1 l_extendedprice = ', l_price,'
l_quantity = ', l_quant
print 'User 1 l_partkey       = ', l_ptky,'  l_suppkey
= ', l_spky
print ' '

execute {select now(*)} into times
print 'User 1 starting acid transaction = ', times

execute {call acid_transaction( ^, ^,  ^, rprice,
quantity, tax, disc,
       extprice, ototal) } substitute ordr, line,
delta

execute {select now(*)} into times
print 'User 1 waiting to commit = ', times
print ' '
synchronize 2
sleep 10000
execute {select now(*)} into times
print 'User 1 about to commit = ', times
commit
execute {select now(*)} into times
print 'User 1 transaction commit complete = ', times

execute {select o_totalprice from orders where
o_orderkey=^ }
       substitute ordr into o_tprice
execute {select l_extendedprice, l_quantity
       from lineitem where l_orderkey=^ and
l_linenumber=^}
       substitute ordr, line
       into l_price, l_quant
print 'User 1 o_totalprice = ', o_tprice
print 'User 1 l_extendedprice = ', l_price,'
l_quantity = ', l_quant
print 'User 1 l_partkey       = ', l_ptky,'  l_suppkey
= ', l_spky

print ' '
execute {select * from history where h_o_key=^
       and h_date_t=(select max(h_date_t) from
history where h_o_key=^)}
       substitute ordr, ordr
       into hpk, hsk, hok, hlk, hda, hdt

print 'User 1 history entry:'
print '  h_p_key = ', hpk
print '  h_s_key = ', hsk
print '  h_o_key = ', hok
print '  h_l_key = ', hlk
print '  h_delta = ', hda
print '  h_date_t = ', hdt

execute {select now(*)} into times
print 'User 1 isolation test time = ', times
print ''

End Test
```

==========

## acid_isolation_test6_query.tst

==========

```
stringconnect "dsn=tpch;"

print 'User1 Query: '
print ' '
print 'User1 starts its query (Q1) here.'
execute {select now(*)} into qstart
print 'Start time for User1 Q1 =', qstart
print ' '
compare fetchall {select
       l_returnflag,
       l_linestatus,
       sum(l_quantity) as sum_qty,
       sum(l_extendedprice) as sum_base_price,
       sum(l_extendedprice * (1 - l_discount)) as
sum_disc_price,
       sum(l_extendedprice * (1 - l_discount) * (1 +
l_tax)) as sum_charge,
       avg(l_quantity) as avg_qty,
       avg(l_extendedprice) as avg_price,
       avg(l_discount) as avg_disc,
       count(*) as count_order
from   lineitem
where  l_shipdate <= dateadd(day, -1, '1998-12-01')
group by l_returnflag,l_linestatus
order by l_returnflag,l_linestatus
 } in 'queryresult'

execute {select now(*)} into qstop
print 'Stop time for User1 Q1 =', qstop
print ' '

End Test
```

==========

## acid_isolation_test6_transaction1.tst

==========

```
stringconnect "dsn=tpch;"

execute {select ordr, line, delta from
acid_isolation_table}
       into ordr, line, delta

 execute {select now(*)} into qstart2
 print 'User2 acid Transaction = ', qstart2
 print 'o_key = ',ordr, '     l_key = ',line, '
delta = ',delta
 print ' '
execute {select o_totalprice from orders where
o_orderkey=^ }
       substitute ordr into o_tprice
execute {select l_extendedprice, l_quantity,l_partkey,
l_suppkey
       from lineitem where l_orderkey=^ and
l_linenumber=^}
       substitute ordr, line
       into l_price, l_quant, l_ptky, l_spky
print 'User 2 o_totalprice = ', o_tprice
print 'User 2 l_extendedprice = ', l_price,'
l_quantity = ', l_quant
print 'User 2 l_partkey       = ', l_ptky,'
l_suppkey = ', l_spky
print ' '

execute {select now(*)} into qstart2
print 'Start Time for User2 Transaction = ', qstart2
print ' '
execute {call acid_transaction( ^, ^,  ^, rprice,
quantity,
                               tax, disc, extprice,
```

```
ototal) }
        substitute ordr, line, delta

execute {select now(*)} into qstop2
print 'User 2 about to commit = ', qstop2
commit
execute {select now(*)} into qstop2
print 'User 2 transaction commit complete = ', qstop2
print ' '

execute {select o_totalprice from orders where
o_orderkey=^ }
        substitute ordr
        into o_tprice
execute {select l_extendedprice, l_quantity
        from lineitem where l_orderkey=^ and
l_linenumber=^}
        substitute ordr, line
        into l_price, l_quant
print 'User 2 o_totalprice = ', o_tprice
print 'User 2 l_extendedprice = ', l_price,'
l_quantity = ', l_quant
print 'User 2 l_partkey       = ', l_ptky,'
l_suppkey = ', l_spky
print ' '

print ' '
execute {select * from history
        where h_o_key=^
        and h_date_t=(select max(h_date_t) from
history where h_o_key=^)}
        substitute ordr, ordr
        into hpk, hsk, hok, hlk, hda, hdt

print 'User 2 history entry:'
print '  h_p_key = ', hpk
print '  h_s_key = ', hsk
print '  h_o_key = ', hok
print '  h_l_key = ', hlk
print '  h_delta = ', hda
print '  h_date_t = ', hdt

print ' '
execute {select now(*)} into times
print 'User 2 completed = ', times

End Test
```

==========

## Disk Configuration Details

==========

### Solaris Volume Manager Configuration

```
# Create the state database:
metadb -a -f c1t1d0s6
metadb -a -f c1t1d0s7

# Initialize 3310 Devices:
metainit d4 1 1 c8t13d0s6
metainit d5 1 1 c9t12d0s6
metainit d6 1 1 c9t8d0s6
metainit d7 1 1 c9t9d0s6
metainit d8 1 1 c10t9d0s6
metainit d9 1 1 c10t8d0s6
metainit d10 1 1 c10t13d0s6
metainit d11 1 1 c10t12d0s6
metainit d12 1 1 c13t9d0s6
metainit d13 1 1 c13t8d0s6
metainit d14 1 1 c13t10d0s6
metainit d15 1 1 c13t13d0s6
metainit d16 1 1 c14t13d0s6
metainit d17 1 1 c14t12d0s6
metainit d18 1 1 c14t11d0s6
metainit d19 1 1 c14t10d0s6
metainit d20 1 1 c14t8d0s6
metainit d21 1 1 c14t9d0s6
metainit d22 1 1 c7t10d0s6
metainit d23 1 1 c7t11d0s6
metainit d24 1 1 c7t12d0s6
metainit d25 1 1 c7t13d0s6
metainit d26 1 1 c7t8d0s6
metainit d27 1 1 c7t9d0s6
metainit d28 1 1 c8t10d0s6
metainit d29 1 1 c8t9d0s6
metainit d30 1 1 c8t12d0s6
metainit d31 1 1 c8t8d0s6
metainit d32 1 1 c8t11d0s6
metainit d33 1 1 c9t13d0s6
metainit d34 1 1 c9t10d0s6
metainit d35 1 1 c9t11d0s6
metainit d36 1 1 c10t10d0s6
metainit d37 1 1 c10t11d0s6
metainit d38 1 1 c11t9d0s6
metainit d39 1 1 c11t10d0s6
metainit d40 1 1 c11t11d0s6
metainit d41 1 1 c11t12d0s6
metainit d42 1 1 c11t8d0s6
metainit d43 1 1 c11t13d0s6
metainit d44 1 1 c12t11d0s6
metainit d45 1 1 c12t12d0s6
metainit d46 1 1 c12t13d0s6
metainit d47 1 1 c12t8d0s6
metainit d48 1 1 c12t9d0s6
metainit d49 1 1 c12t10d0s6
metainit d50 1 1 c13t11d0s6
metainit d51 1 1 c13t12d0s6

# Create the mirrors:

metainit d52 -m d4
metattach d52 d5
metainit d53 -m d6
metattach d53 d7
metainit d54 -m d8
metattach d54 d9
metainit d55 -m d10
metattach d55 d11
metainit d56 -m d12
metattach d56 d13
metainit d57 -m d14
metattach d57 d15
metainit d58 -m d16
metattach d58 d17
metainit d59 -m d18
metattach d59 d19
metainit d60 -m d20
metattach d60 d21
metainit d61 -m d22
metattach d61 d23
metainit d62 -m d24
metattach d62 d25
metainit d63 -m d26
metattach d63 d27
metainit d64 -m d28
metattach d64 d29
metainit d65 -m d30
metattach d65 d31
metainit d66 -m d32
metattach d66 d33
metainit d67 -m d34
metattach d67 d35
metainit d68 -m d36
```

```
metattach d68 d37
metainit d69 -m d38
metattach d69 d39
metainit d70 -m d40
metattach d70 d41
metainit d71 -m d42
metattach d71 d43
metainit d72 -m d44
metattach d72 d45
metainit d73 -m d46
metattach d73 d47
metainit d74 -m d48
metattach d74 d49
metainit d75 -m d50
metattach d75 d51

# Create a RAID 1 volume for the /sybase2 file system

metainit d76 1 1 c1t2d0s5
metainit d77 1 1 c1t3d0s5
metattach d78 d76
metainit d78 -m d77
```

## Database Device Links

```
# Create the symbolic links:
ln -s /dev/md/rdsk/d52 ./M01
ln -s /dev/md/rdsk/d53 ./M02
ln -s /dev/md/rdsk/d54 ./M03
ln -s /dev/md/rdsk/d55 ./M04
ln -s /dev/md/rdsk/d56 ./M05
ln -s /dev/md/rdsk/d57 ./M06
ln -s /dev/md/rdsk/d58 ./M07
ln -s /dev/md/rdsk/d59 ./M08
ln -s /dev/md/rdsk/d60 ./M09
ln -s /dev/md/rdsk/d61 ./M10
ln -s /dev/md/rdsk/d62 ./M11
ln -s /dev/md/rdsk/d63 ./M12
ln -s /dev/md/rdsk/d64 ./M13
ln -s /dev/md/rdsk/d65 ./M14
ln -s /dev/md/rdsk/d66 ./M15
ln -s /dev/md/rdsk/d67 ./M16
ln -s /dev/md/rdsk/d68 ./M17
ln -s /dev/md/rdsk/d69 ./M18
ln -s /dev/md/rdsk/d70 ./M19
ln -s /dev/md/rdsk/d71 ./M20
ln -s /dev/md/rdsk/d72 ./M21
ln -s /dev/md/rdsk/d73 ./M22
ln -s /dev/md/rdsk/d74 ./M23
ln -s /dev/md/rdsk/d75 ./M24

ln -s /dev/rdsk/c1t2d0s6 T01
ln -s /dev/rdsk/c1t3d0s6 T02
ln -s /dev/rdsk/c1t4d0s6 T03
ln -s /dev/rdsk/c1t5d0s6 T04
ln -s /dev/rdsk/c7t12d0s7 T05
ln -s /dev/rdsk/c7t13d0s7 T06
ln -s /dev/rdsk/c8t8d0s7 T07
ln -s /dev/rdsk/c8t9d0s7 T08
ln -s /dev/rdsk/c8t10d0s7 T09
ln -s /dev/rdsk/c8t11d0s7 T10
ln -s /dev/rdsk/c8t12d0s7 T11
ln -s /dev/rdsk/c8t13d0s7 T12
ln -s /dev/rdsk/c9t8d0s7 T13
ln -s /dev/rdsk/c9t9d0s7 T14
ln -s /dev/rdsk/c9t10d0s7 T15
ln -s /dev/rdsk/c9t11d0s7 T16
ln -s /dev/rdsk/c9t12d0s7 T17
ln -s /dev/rdsk/c9t13d0s7 T18
ln -s /dev/rdsk/c10t8d0s7 T19
ln -s /dev/rdsk/c10t9d0s7 T20
ln -s /dev/rdsk/c10t10d0s7 T21
ln -s /dev/rdsk/c10t11d0s7 T22
ln -s /dev/rdsk/c10t12d0s7 T23
ln -s /dev/rdsk/c10t13d0s7 T24
ln -s /dev/rdsk/c11t8d0s7 T25
ln -s /dev/rdsk/c11t9d0s7 T26
ln -s /dev/rdsk/c11t10d0s7 T27
ln -s /dev/rdsk/c11t11d0s7 T28
ln -s /dev/rdsk/c11t12d0s7 T29
ln -s /dev/rdsk/c11t13d0s7 T30
ln -s /dev/rdsk/c12t8d0s7 T31
ln -s /dev/rdsk/c12t9d0s7 T32
ln -s /dev/rdsk/c12t10d0s7 T33
ln -s /dev/rdsk/c12t11d0s7 T34
ln -s /dev/rdsk/c12t12d0s7 T35
ln -s /dev/rdsk/c12t13d0s7 T36
ln -s /dev/rdsk/c13t8d0s7 T37
ln -s /dev/rdsk/c13t9d0s7 T38
ln -s /dev/rdsk/c13t10d0s7 T39
ln -s /dev/rdsk/c13t11d0s7 T40
ln -s /dev/rdsk/c13t12d0s7 T41
ln -s /dev/rdsk/c13t13d0s7 T42
ln -s /dev/rdsk/c14t8d0s7 T43
ln -s /dev/rdsk/c14t9d0s7 T44
ln -s /dev/rdsk/c14t10d0s7 T45
ln -s /dev/rdsk/c14t11d0s7 T46
ln -s /dev/rdsk/c14t12d0s7 T47
ln -s /dev/rdsk/c14t13d0s7 T48
ln -s /dev/rdsk/c7t8d0s7 T49
ln -s /dev/rdsk/c7t9d0s7 T50
ln -s /dev/rdsk/c7t10d0s7 T51
ln -s /dev/rdsk/c7t11d0s7 T52
```

==========

**entries from /etc/vfstab**

==========

```
# Root File System

/dev/dsk/c1t0d0s0       /dev/rdsk/c1t0d0s0      /
ufs     1       no      -

# Four File Systems for Load Files Generated by dbgen

/dev/md/dsk/d0  /dev/md/rdsk/d0 /sybase_stage1  ufs
1       yes     largefiles
/dev/md/dsk/d1  /dev/md/rdsk/d1 /sybase_stage2  ufs
1       yes     largefiles
/dev/md/dsk/d2  /dev/md/rdsk/d2 /sybase_stage3  ufs
1       yes     largefiles
/dev/md/dsk/d3  /dev/md/rdsk/d3 /sybase_stage4  ufs
1       yes     largefiles

# RAID 1 File System for .db .log and db device links

/dev/md/dsk/d78 /dev/md/rdsk/d78        /sybase2
ufs     1       yes     -

# Swap Space Configuration

swap    -       /tmp    tmpfs   -       yes     -
```

# Appendix C. Query Text and Query Output

```
==================================================
qualification query 1
==================================================

% select
% l_returnflag,
% l_linestatus,
% sum(l_quantity) as sum_qty,
% sum(l_extendedprice) as sum_base_price,
% sum(l_extendedprice * (1 - l_discount)) as
sum_disc_price,
% sum(l_extendedprice * (1 - l_discount) * (1 +
l_tax)) as sum_charge,
% avg(l_quantity) as avg_qty,
% avg(l_extendedprice) as avg_price,
% avg(l_discount) as avg_disc,
% count(*) as count_order
% from
% lineitem
% where
% l_shipdate <= dateadd(day,-90,'1998-12-01')
% group by
% l_returnflag,
% l_linestatus
% order by
% l_returnflag,
% l_linestatus;
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.32000 seconds - current
time 16:40:13
'A','F',
37734107,56586554400.7292032,53758257134.8694563,55909
065222.8284717,25.5220058532573342,38273.1297346211374
,.0499852958383577168,1478493
'N','F',
991417,1487504710.38000107,1413082168.05409968,1469649
223.19436967,25.5164719205229819,38284.4677608483374,
.0500934266742134809,38854
'N','O',
74476040,111701729697.737336,106118230307.607383,11036
7043872.495174,25.5022267695849895,38249.117988907361,
.049996586053555131,2920374
'R','F',
37719753,56568041380.8983326,53741292684.6045375,55889
619119.8339581,25.5057936126907617,38250.8546260985255
,.0500094058300870121,1478870
% total of 4 rows written

==================================================
qualification query 2
==================================================

% select top 100
% s_acctbal,
% s_name,
% n_name,
% p_partkey,
% p_mfgr,
% s_address,
% s_phone,
% s_comment
% from
% part,
% supplier,
% partsupp,
% nation,
% region
% where
% p_partkey = ps_partkey
% and s_suppkey = ps_suppkey
% and p_size = 15
% and p_type like 'BRASS'
% and s_nationkey = n_nationkey
% and n_regionkey = r_regionkey
% and r_name = 'EUROPE'
% and ps_supplycost = (
% select
% min(ps_supplycost)
% from
% partsupp,
% supplier,
% nation,
% region
% where
% p_partkey = ps_partkey
% and s_suppkey = ps_suppkey
% and s_nationkey = n_nationkey
% and n_regionkey = r_regionkey
% and r_name = 'EUROPE'
% )
% order by
% s_acctbal desc,
% n_name,
% s_name,
% p_partkey;
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.76000 seconds - current
time 16:40:25
9938.53,'Supplier#000005359       ','UNITED KINGDOM
',185358,'Manufacturer#4           ','QKuHYh,
vZGiwu2FWEJoLDx04','33-429-790-6131','blithely silent
pinto beans are furiously. slyly final deposits acros'
9937.84,'Supplier#000005969       ','ROMANIA
',108438,'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,'Manufacturer#4           ','B3rqp0xbSEim4Mpy2RH
J','33-320-228-2957','blithely special packages are.
stealthily express deposits across the closely final
instructi'
9923.77000000000119,'Supplier#000002324       ',
'GERMANY                  ',29821,'Manufacturer#4
','y3OD9UywSTOk','17-779-299-1839','quickly express
packages breach quiet pinto beans. requ'
9871.22,'Supplier#000006373       ','GERMANY
',43868,'Manufacturer#5           ','J8fcXWsTqM',
'17-813-485-8637','never silent deposits integrate
furiously blit'
9870.78,'Supplier#000001286       ','GERMANY
',81285,'Manufacturer#2           ','YKA,
E2fjiVd7eUrzp2Ef8j1QxGo2DFnosaTEH','17-516-924-4574',
'final theodolites cajole slyly special,'
9870.78,'Supplier#000001286       ','GERMANY
',181285,'Manufacturer#4           ','YKA,
E2fjiVd7eUrzp2Ef8j1QxGo2DFnosaTEH','17-516-924-4574',
'final theodolites cajole slyly special,'
9852.52000000000119,'Supplier#000008973       ',
'RUSSIA                   ',18972,'Manufacturer#2
','t5L67YdBYYH6o,Vz24jpDyQ9','32-188-594-7038',
'quickly regular instructions wake-- carefully unusual
```

```
braids into the expres'
9847.83,'Supplier#000008097       ','RUSSIA
',130557,'Manufacturer#2           ',
'xMe97bpE69NzdwLoX','32-375-640-3593','slyly regular
dependencies sleep slyly furiously express dep'
9847.57,'Supplier#000006345       ','FRANCE
',86344,'Manufacturer#1           ',
'VSt3rzk3qG698u6ld8HhOByvrTcSTSvQlDQDag',
'16-886-766-7945','silent pinto beans should have to
snooze carefully along the final reques'
% total of 100 rows written
```

## qualification query 3

```
% select top 10
% l_orderkey,
% sum(l_extendedprice * (1 - l_discount)) as revenue,
% o_orderdate,
% o_shippriority
% from
% customer,
% orders,
% lineitem
% where
% c_mktsegment = 'BUILDING'
% and c_custkey = o_custkey
% and l_orderkey = o_orderkey
% and o_orderdate < '1995-03-15'
% and l_shipdate > '1995-03-15'
% group by
% l_orderkey,
% o_orderdate,
% o_shippriority
% order by
% revenue desc,
% o_orderdate;
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.36000 seconds - current
time 16:40:27
2456423,406181.011100000024,'1995-03-05',0
3459808,405838.698899999917,'1995-03-04',0
492164,390324.061,'1995-02-19',0
1188320,384537.935899999976,'1995-03-09',0
2435712,378673.055799999952,'1995-02-26',0
4878020,378376.795200000048,'1995-03-12',0
5521732,375153.9215,'1995-03-13',0
2628192,373133.309399999976,'1995-02-22',0
993600,371407.45949999994,'1995-03-05',0
2300070,367371.145200000107,'1995-03-13',0
% total of 10 rows written
```

## qualification query 4

```
% select
% o_orderpriority,
% count(*) as order_count
% from
% orders
% where
% o_orderdate >= '1993-07-01'
% and o_orderdate < dateadd(month,3,'1993-07-01')
% and exists (
% select
% *
% from
% lineitem
% where
% l_orderkey = o_orderkey
% and l_commitdate < l_receiptdate
% )
% group by
% o_orderpriority
% order by
% o_orderpriority;
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.25000 seconds - current
time 16:40:31
'1-URGENT       ',10594
'2-HIGH         ',10476
'3-MEDIUM       ',10410
'4-NOT SPECIFIED',10556
'5-LOW          ',10487
% total of 5 rows written
```

## qualification query 5

```
% select
% n_name,
% sum(l_extendedprice * (1 - l_discount)) as revenue
% from
% customer,
% orders,
% lineitem,
% supplier,
% nation,
% region
% where
% c_custkey = o_custkey
% and l_orderkey = o_orderkey
% and l_suppkey = s_suppkey
% and c_nationkey = s_nationkey
% and s_nationkey = n_nationkey
% and n_regionkey = r_regionkey
% and r_name = 'ASIA'
% and o_orderdate >= '1994-01-01'
% and o_orderdate < dateadd(year,1,'1994-01-01')
% group by
% n_name
% order by
% revenue desc;
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.65000 seconds - current
time 16:40:36
'INDONESIA                ',55502041.1696999431
'VIETNAM                  ',55295086.9966999531
'CHINA                    ',53724494.2565999746
'INDIA                    ',52035512.000200057
'JAPAN                    ',45410175.6954000235
% total of 5 rows written
```

## qualification query 6

```
% select
% sum(l_extendedprice * l_discount) as revenue
% from
% lineitem
% where
% l_shipdate >= '1994-01-01'
% and l_shipdate < dateadd(year,1,'1994-01-01')
% and l_discount between .06 - 0.01 and .06 + 0.01
% and l_quantity < 24;
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.15000 seconds - current
time 16:40:41
123141078.228299007
% total of 1 rows written
```

## qualification query 7

```
% select
% supp_nation,
% cust_nation,
% l_year,
% sum(volume) as revenue
% from
% (
% select
% n1.n_name as supp_nation,
% n2.n_name as cust_nation,
% datepart(year, l_shipdate) as l_year,
% l_extendedprice * (1 - l_discount) as volume
% from
% supplier,
% lineitem,
% orders,
% customer,
% nation n1,
% nation n2
% where
% s_suppkey = l_suppkey
% and o_orderkey = l_orderkey
% and c_custkey = o_custkey
% and s_nationkey = n1.n_nationkey
% and c_nationkey = n2.n_nationkey
% and (
% (n1.n_name = 'FRANCE' and n2.n_name = 'GERMANY')
% or (n1.n_name = 'GERMANY' and n2.n_name = 'FRANCE')
% )
% and l_shipdate between '1995-01-01' and '1996-12-31'
% ) as shipping
% group by
% supp_nation,
% cust_nation,
% l_year
% order by
% supp_nation,
% cust_nation,
% l_year;
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.67000 seconds - current
time 16:40:43
'FRANCE                    ','GERMANY
',1995,54639732.7335999489
'FRANCE                    ','GERMANY
',1996,54633083.3075999737
'GERMANY                   ','FRANCE
',1995,52531746.6696999669
'GERMANY                   ','FRANCE
',1996,52520549.0223998487
% total of 4 rows written
```

## qualification query 8

```
% select
% o_year,
% sum(case
% when nation = 'BRAZIL' then volume
% else 0
% end) / sum(volume) as mkt_share
% from
% (
% select
% datepart(year, o_orderdate) as o_year,
% l_extendedprice * (1 - l_discount) as volume,
% n2.n_name as nation
% from
% part,
% supplier,
% lineitem,
% orders,
% customer,
% nation n1,
% nation n2,
% region
% where
% p_partkey = l_partkey
% and s_suppkey = l_suppkey
% and l_orderkey = o_orderkey
% and o_custkey = c_custkey
% and c_nationkey = n1.n_nationkey
% and n1.n_regionkey = r_regionkey
% and r_name = 'AMERICA'
% and s_nationkey = n2.n_nationkey
% and o_orderdate between '1995-01-01' and
'1996-12-31'
% and p_type = 'ECONOMY ANODIZED STEEL'
% ) as all_nations
% group by
% o_year
% order by
% o_year;
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.86000 seconds - current
time 16:40:47
1995,.0344358904066548347
1996,.041485521293530345
% total of 2 rows written
```

## qualification query 9

```
% select
% nation,
% o_year,
% sum(amount) as sum_profit
% from
% (
```

```
% select
% n_name as nation,
% datepart(year, o_orderdate) as o_year,
% l_extendedprice * (1 - l_discount) - ps_supplycost *
l_quantity as
%     amount
% from
% part,
% supplier,
% lineitem,
% partsupp,
% orders,
% nation
% where
% s_suppkey = l_suppkey
% and ps_suppkey = l_suppkey
% and ps_partkey = l_partkey
% and p_partkey = l_partkey
% and o_orderkey = l_orderkey
% and s_nationkey = n_nationkey
% and p_name like 'green'
% ) as profit
% group by
% nation,
% o_year
% order by
% nation,
% o_year desc;
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.69000 seconds - current
time 16:40:48
'ALGERIA                  ',1998,31342867.2345000029
'ALGERIA                  ',1997,57138193.0233001232
'ALGERIA                  ',1996,56140140.1330001235
'ALGERIA                  ',1995,53051469.6533999741
'ALGERIA                  ',1994,53867582.128600049
'ALGERIA                  ',1993,54942718.132400012
'ALGERIA                  ',1992,54628034.7126999021
'ARGENTINA                ',1998,30211185.708099997
'ARGENTINA                ',1997,50805741.75230003
'ARGENTINA                ',1996,51923746.5754999459
% total of 175 rows written
```

==========

## qualification query 10

==========

```
% select top 20
% c_custkey,
% c_name,
% sum(l_extendedprice * (1 - l_discount)) as revenue,
% c_acctbal,
% n_name,
% c_address,
% c_phone,
% c_comment
% from
% customer,
% orders,
% lineitem,
% nation
% where
% c_custkey = o_custkey
% and l_orderkey = o_orderkey
% and o_orderdate >= '1993-10-01'
% and o_orderdate < dateadd(month,3,'1993-10-01')
% and l_returnflag = 'R'
% and c_nationkey = n_nationkey
% group by
% c_custkey,
% c_name,
% c_acctbal,
% c_phone,
% n_name,
% c_address,
% c_comment
% order by
% revenue desc;
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.50000 seconds - current
time 16:40:55
57040,'Customer#000057040',734235.2455,632.87,'JAPAN
','Eioyzjf4pp','22-895-641-3466','requests sleep
blithely about the furiously i'
143347,'Customer#000143347',
721002.694799999952,2557.4700000000003,'EGYPT
','1aReFYv,Kw4','14-742-935-3718','fluffily bold
excuses haggle finally after the u'
60838,'Customer#000060838',
679127.307700000048,2454.77,'BRAZIL
','64EaJ5vMAHWJlBOxJklpNc2RJiWE','12-913-494-9813',
'furiously even pinto beans integrate under the
ruthless foxes; ironic, even dolphins across the slyl'
101998,'Customer#000101998',
637029.566699999809,3790.89,'UNITED KINGDOM
','01c9CILnNtfOQYmZj','33-593-865-6378','accounts doze
blithely! enticing, final deposits sleep blithely
special accounts. slyly express accounts pla'
125341,'Customer#000125341',
633508.086,4983.51000000000006,'GERMANY
','S29ODD6bceU8QSuuEJznkNaK','17-582-695-5962',
'quickly express requests wake quickly blithely'
25501,'Customer#000025501',
620269.784899999976,7725.04,'ETHIOPIA
','  W556MXuoiaYCCZamJI,Rn0B4ACUGdkQ8DZ',
'15-874-808-6793','quickly special requests sleep
evenly among the special deposits. special deposi'
115831,'Customer#000115831',
596423.867200000167,5098.1,'FRANCE
','rFeBbEEyk dl ne7zV5fDrmiq1oK09wV7pxqCgIc',
'16-715-386-3788','carefully bold excuses sleep
alongside of the thinly idle'
84223,'Customer#000084223',594998.023899999976,528.65,
'UNITED KINGDOM           ','nAVZCs6BaWap rrM27N
2qBnzc5WBauxbA','33-442-824-8191','pending, final
ideas haggle final requests. unusual, regular
asymptotes affix according to the even foxes.'
54289,'Customer#000054289',
585603.391799999952,5583.02,'IRAN
','vXCxoCsU0Bad5JQI ,oobkZ','20-834-292-4707','express
requests sublate blithely regular requests. regular,
even ideas solve.'
39922,'Customer#000039922',
584878.113399999976,7321.10999999999881,'GERMANY
','Zgy4s50l2GKN4pLDPBU8m342gIw6R','17-147-757-8036',
'even pinto beans haggle. slyly bold accounts inte'
6226,'Customer#000006226',576783.760599999905,2230.09,
'UNITED KINGDOM           ','8gPu8,
NPGkfyQQ0hcIYUGPIBWc,ybP5g,','33-657-701-3391',
'quickly final requests against the regular
instructions wake blithely final instructions. pa'
922,'Customer#000000922',576767.533299999833,3869.25,
'GERMANY                  ',
'Az9RFaut7NkPnc5zSD2PwHgVwr4jRzq','17-945-916-9648',
'boldly final requests cajole blith'
```

```
147946,'Customer#000147946',
576455.132,2030.1300000000003,'ALGERIA
','iANyZHjqhyy7Ajah0pTrYyhJ','10-886-956-3143',
'furiously even accounts are blithely above the
furiousl'
115640,'Customer#000115640',
569341.193299999952,6436.1,'ARGENTINA
','Vtgfia9qI 7EpHgecU1X','11-411-543-4901','final
instructions are slyly according to the'
73606,'Customer#000073606',
568656.857799999952,1785.67,'JAPAN
','xuR0Tro5yChDfOCrjkd2ol','22-437-653-6966',
'furiously bold orbits about the furiously busy
requests wake across the furiously quiet theodolites.
d'
110246,'Customer#000110246',
566842.981499999881,7763.35,'VIETNAM
','7KzflgX MDOq7sOkI','31-943-426-9837','dolphins
sleep blithely among the slyly final'
142549,'Customer#000142549',
563537.236799999952,5085.9899999999994,'INDONESIA
','ChqEoK43OysjdHbtKCp6dKqjNyvvi9','19-955-562-2398',
'regular, unusual dependencies boost slyly; ironic
attainments nag fluffily into the unusual packages?'
146149,'Customer#000146149',557254.9865,1791.55,
'ROMANIA                  ','s87fvzFQpU',
'29-744-164-6487','silent, unusual requests detect
quickly slyly regul'
52528,'Customer#000052528',556397.350899999976,551.79,
'ARGENTINA                ','NFztyTOR10UOJ',
'11-208-192-3205','unusual requests detect. slyly
dogged theodolites use slyly. deposit'
23431,'Customer#000023431',
554269.536000000119,3381.86,'ROMANIA
','HgiV0phqhaIa9aydNoIlb','29-915-458-2654',
'instructions nag quickly. furiously bold accounts
cajol'
% total of 20 rows written
```

==========

## qualification query 11

==========

```
% 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;
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.49000 seconds - current
time 16:41:01
129760,17538456.8599999994
166726,16503353.9199999988
191287,16474801.9699999988
161758,16101755.5399999976
34452,15983844.7200000018
139035,15907078.3400000006
9403,15451755.6199999988
154358,15212937.8799999982
38823,15064802.8599999994
85606,15053957.150000003
% total of 1048 rows written
```

==========

## qualification query 12

==========

```
% select
% l_shipmode,
% sum(case
% when o_orderpriority = '1-URGENT'
% or o_orderpriority = '2-HIGH'
% then 1
% else 0
% end) as high_line_count,
% sum(case
% when o_orderpriority <> '1-URGENT'
% and o_orderpriority <> '2-HIGH'
% then 1
% else 0
% end) as low_line_count
% from
% orders,
% lineitem
% where
% o_orderkey = l_orderkey
% and l_shipmode in ('MAIL', 'SHIP')
% and l_commitdate < l_receiptdate
% and l_shipdate < l_commitdate
% and l_receiptdate >= '1994-01-01'
% and l_receiptdate < dateadd(year,1,'1994-01-01')
% group by
% l_shipmode
% order by
% l_shipmode;
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.26000 seconds - current
time 16:41:03
'MAIL      ',6202,9324
'SHIP      ',6200,9262
% total of 2 rows written
```

==========

## qualification query 13

==========

```
% select
% c_count,
% count(*) as custdist
% from
% (
% select
```

```
% c_custkey,
% count(o_orderkey)
% from
% customer left outer join orders on
% c_custkey = o_custkey
% and o_comment not like 'specialrequests'
% group by
% c_custkey
% ) as c_orders (c_custkey, c_count)
% group by
% c_count
% order by
% custdist desc,
% c_count desc;
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.17000 seconds - current
time 16:41:06
0,50004
9,6641
10,6566
11,6058
8,5949
12,5553
13,4989
19,4748
7,4707
18,4625
% total of 42 rows written
```

==========

## qualification query 14

==========

```
% select
% 100.00 * sum(case
% when p_type like 'PROMO'
% then l_extendedprice * (1 - l_discount)
% else 0
% end) / sum(l_extendedprice * (1 - l_discount)) as
promo_revenue
% from
% lineitem,
% part
% where
% l_partkey = p_partkey
% and l_shipdate >= '1995-09-01'
% and l_shipdate < dateadd(month,1,'1995-09-01');
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.24000 seconds - current
time 16:41:19
16.3807786263955563
% total of 1 rows written
```

==========

## qualification query 15

==========

```
 Executing command:
% create view revenue0 (supplier_no, total_revenue) as
% select
% l_suppkey,
% sum(l_extendedprice * (1 - l_discount))
% from
% lineitem
% where
% l_shipdate >= '1996-01-01'
% and l_shipdate < dateadd(month,3,'1996-01-01')
% group by
% l_suppkey;
% execution time 0.81000 seconds - current time 16:41:
21

 Executing command:
%
% select
% s_suppkey,
% s_name,
% s_address,
% s_phone,
% total_revenue
% from
% supplier,
% revenue0
% where
% s_suppkey = supplier_no
% and total_revenue = (
% select
% max(total_revenue)
% from
% revenue0
% )
% order by
% s_suppkey;
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.27000 seconds - current
time 16:41:21
8449,'Supplier#000008449       ','Wp34zim9qYFbVctdW',
'20-469-856-8873',1772627.20870000005
% total of 1 rows written
```

==========

## qualification query 16

==========

```
% 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 'CustomerComplaints'
% )
% group by
% p_brand,
% p_type,
% p_size
% order by
```

```
% supplier_cnt desc,
% p_brand,
% p_type,
% p_size;
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.27000 seconds - current
time 16:41:22
'Brand#41  ','MEDIUM BRUSHED TIN',3,28
'Brand#54  ','STANDARD BRUSHED COPPER',14,27
'Brand#11  ','STANDARD BRUSHED TIN',23,24
'Brand#11  ','STANDARD BURNISHED BRASS',36,24
'Brand#15  ','MEDIUM ANODIZED NICKEL',3,24
'Brand#15  ','SMALL ANODIZED BRASS',45,24
'Brand#15  ','SMALL BURNISHED NICKEL',19,24
'Brand#21  ','MEDIUM ANODIZED COPPER',3,24
'Brand#22  ','SMALL BRUSHED NICKEL',3,24
'Brand#22  ','SMALL BURNISHED BRASS',19,24

% total of 18314 rows written
```

==========

## qualification query 17

==========

```
% 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
% );
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.22000 seconds - current
time 16:41:28
348406.054285713732
% total of 1 rows written
```

==========

## qualification query 18

==========

```
% select top 100
% c_name,
% c_custkey,
% o_orderkey,
% o_orderdate,
% o_totalprice,
% sum(l_quantity)
% from
% customer,
% orders,
% lineitem
% where
% o_orderkey in (
% select
% l_orderkey
% from
% lineitem
% group by
% l_orderkey having
% sum(l_quantity) > 300
% )
% and c_custkey = o_custkey
% and o_orderkey = l_orderkey
% group by
% c_name,
% c_custkey,
% o_orderkey,
% o_orderdate,
% o_totalprice
% order by
% o_totalprice desc,
% o_orderdate;
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.34000 seconds - current
time 16:41:29
'Customer#000128120',128120,4722021,'1994-04-07',
544089.089999999881,323
'Customer#000144617',144617,3043270,'1997-02-12',
530604.43999999994,317
'Customer#000013940',13940,2232932,'1997-04-13',
522720.61,304
'Customer#000066790',66790,2199712,'1996-09-30',
515531.82,327
'Customer#000046435',46435,4745607,'1997-07-03',
508047.99,309
'Customer#000015272',15272,3883783,'1993-07-28',
500241.33,302
'Customer#000146608',146608,3342468,'1994-06-12',
499794.58,303
'Customer#000096103',96103,5984582,'1992-03-16',
494398.78999999994,312
'Customer#000024341',24341,1474818,'1992-11-15',
491348.26,302
'Customer#000137446',137446,5489475,'1997-05-23',
487763.25,311
% total of 57 rows written
```

==========

## qualification query 19

==========

```
% 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'
% );
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.35000 seconds - current
time 16:41:46
3083843.05780000031
% total of 1 rows written
```

==========

## qualification query 20

==========

```
% select
% s_name,
% s_address
% from
% supplier,
% nation
% where
% s_suppkey in (
% select
% ps_suppkey
% from
% partsupp
% where
% ps_partkey in (
% select
% p_partkey
% from
% part
% where
% p_name like 'forest'
% )
% and ps_availqty > (
% select
% 0.5 * sum(l_quantity)
% from
% lineitem
% where
% l_partkey = ps_partkey
% and l_suppkey = ps_suppkey
% and l_shipdate >= '1994-01-01'
% and l_shipdate < dateadd(year,1,'1994-01-01')
% )
% )
% and s_nationkey = n_nationkey
% and n_name = 'CANADA'
% order by
% s_name;
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.37000 seconds - current
time 16:41:51
'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'
% total of 204 rows written
```

==========

## qualification query 21

==========

```
% select top 100
% s_name,
% count(*) as numwait
% from
% supplier,
% lineitem l1,
% orders,
% nation
% where
% s_suppkey = l1.l_suppkey
% and o_orderkey = l1.l_orderkey
% and o_orderstatus = 'F'
% and l1.l_receiptdate > l1.l_commitdate
% and exists (
% select
% *
% from
% lineitem l2
% where
% l2.l_orderkey = l1.l_orderkey
% and l2.l_suppkey <> l1.l_suppkey
% )
% and not exists (
% select
% *
% from
% lineitem l3
% where
% l3.l_orderkey = l1.l_orderkey
% and l3.l_suppkey <> l1.l_suppkey
% and l3.l_receiptdate > l3.l_commitdate
% )
% and s_nationkey = n_nationkey
% and n_name = 'SAUDI ARABIA'
% group by
% s_name
% order by
% numwait desc,
% s_name;
```

```
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.54000 seconds - current
time 16:41:53
'Supplier#000002829       ',20
'Supplier#000005808       ',18
'Supplier#000000262       ',17
'Supplier#000000496       ',17
'Supplier#000002160       ',17
'Supplier#000002301       ',17
'Supplier#000002540       ',17
'Supplier#000003063       ',17
'Supplier#000005178       ',17
'Supplier#000008331       ',17
% total of 100 rows written
```

==========

## qualification query 22

==========

```
% select
% cntrycode,
% count(*) as numcust,
% sum(c_acctbal) as totacctbal
% from
% (
% select
% substring(c_phone,1,2) as cntrycode,
% c_acctbal
% from
% customer
% where
% substring(c_phone,1,2) in
% ('13', '31', '23', '29', '30', '18', '17')
% and c_acctbal > (
% select
% avg(c_acctbal)
% from
% customer
% where
% c_acctbal > 0.00
% and substring(c_phone,1,2) in
% ('13', '31', '23', '29', '30', '18', '17')
% )
% and not exists (
% select
% *
% from
% orders
% where
% o_custkey = c_custkey
% )
% ) as custsale
% group by
% cntrycode
% order by
% cntrycode;
% Estimated 1 rows in query (I/O estimate 1010)
% PLAN> vt_1 (seq)
%
%
% 1 record(s) selected -- actual I/O 0
% select time including I/O 0.18000 seconds - current
time 16:42:07
'13',888,6737713.98999999881
'17',861,6460573.72
'18',964,7236687.40000001431
'23',892,6701457.95000000954
'29',948,7158866.62999999642
'30',909,6808436.13000000119
'31',922,6806670.17999998569
% total of 7 rows written
```

# Appendix D. Seed and Query Substitution Parameters

This Appendix contains Seed values and substitution parameters for each stream

## Seed Values

```
stream0 511080447
stream1 511080448
stream2 511080449
stream3 511080450
stream4 511080451
stream5 511080452
stream6 511080453
stream7 511080454
```

## Query Parameters

```
==================================================
stream0: 511080447
==================================================

1       94
2       42      NICKEL  MIDDLE EAST
3       FURNITURE       1995-03-27
4       1997-02-01
5       MIDDLE EAST     1995-01-01
6       1995-01-01      0.09    25
7       UNITED KINGDOM CHINA
8       CHINA   ASIA    STANDARD BURNISHED COPPER
9       bisque
10      1993-06-01
11      MOROCCO         0.0000001000
12      TRUCK   MAIL    1994-01-01
13      unusual         requests
14      1994-10-01
15      1995-11-01
16      Brand#23        SMALL ANODIZED 40       23
42      27      1       5       10      21
17      Brand#31        JUMBO BOX
18      312
19      Brand#43        Brand#55        Brand#44        2
        15      26
20      lace    1997-01-01      RUSSIA
21      SAUDI ARABIA
22      15      26      11      27      21      23
        22

==================================================
stream1: 511080448
==================================================

1       102
2       29      COPPER  AMERICA
3       MACHINERY       1995-03-12
4       1994-11-01
5       AFRICA  1995-01-01
6       1995-01-01      0.07    24
7       MOROCCO         IRAN
8       IRAN    MIDDLE EAST     PROMO BRUSHED COPPER
9       yellow
10      1994-03-01
11      CANADA  0.0000001000
12      RAIL    FOB     1994-01-01
13      unusual         requests
14      1995-01-01
15      1993-08-01
16      Brand#53        LARGE BURNISHED         35
19      26      12      39      28      36      9
17      Brand#33        JUMBO JAR
18      314
19      Brand#45        Brand#33        Brand#33        8
        16      22
20      slate   1995-01-01      JAPAN
21      JAPAN
22      25      32      10      17      11      15
        26

==================================================
stream2: 511080449
==================================================

1       110
2       17      STEEL   MIDDLE EAST
3       BUILDING        1995-03-29
4       1997-06-01
5       AMERICA         1995-01-01
6       1995-01-01      0.04    24
7       GERMANY         BRAZIL
8       BRAZIL  AMERICA         PROMO POLISHED TIN
9       thistle
10      1994-12-01
11      MOZAMBIQUE      0.0000001000
12      AIR     FOB     1995-01-01
13      express         requests
14      1995-04-01
15      1996-03-01
16      Brand#33        PROMO POLISHED 39       14
10      16      3       24      12      31
17      Brand#35        JUMBO CAN
18      315
19      Brand#42        Brand#11        Brand#32        3
        17      29
20      drab    1993-01-01      BRAZIL
21      EGYPT
22      12      11      30      15      26      31
        18

==================================================
stream3: 511080450
==================================================

1       118
2       5       BRASS   ASIA
3       MACHINERY       1995-03-14
4       1995-03-01
5       ASIA    1996-01-01
6       1996-01-01      0.09    25
7       UNITED STATES   ROMANIA
8       ROMANIA         EUROPE  PROMO BURNISHED TIN
9       slate
10      1993-10-01
11      EGYPT   0.0000001000
12      REG AIR         FOB     1995-01-01
13      express         requests
14      1995-07-01
15      1993-12-01
16      Brand#23        SMALL BRUSHED   42      15      8
        34      43      27      3       10
17      Brand#32        WRAP BOX
18      313
19      Brand#54        Brand#54        Brand#31        8
        18      25
```

```
20      peru    1997-01-01      MOZAMBIQUE
21      RUSSIA
22      21      20      11      31      28      18
        15
```

==========

## stream4: 511080451

==========

```
1       65
2       43      NICKEL  MIDDLE EAST
3       BUILDING        1995-03-31
4       1997-10-01
5       EUROPE  1996-01-01
6       1996-01-01      0.07    24
7       MOZAMBIQUE      IRAQ
8       IRAQ    MIDDLE EAST     ECONOMY BRUSHED TIN
9       saddle
10      1994-07-01
11      PERU    0.0000001000
12      FOB     TRUCK   1996-01-01
13      express         accounts
14      1995-10-01
15      1996-06-01
16      Brand#53        ECONOMY BURNISHED       26
21      29      22      37      6       15      43
17      Brand#34        WRAP JAR
18      314
19      Brand#51        Brand#32        Brand#21        3
        19      21
20      brown   1995-01-01      FRANCE
21      KENYA
22      19      28      16      17      15      31
        13
```

==========

## stream5: 511080452

==========

```
1       73
2       31      COPPER  ASIA
3       HOUSEHOLD       1995-03-16
4       1995-07-01
5       MIDDLE EAST     1996-01-01
6       1996-01-01      0.04    24
7       INDIA   CANADA
8       CANADA  AMERICA         ECONOMY PLATED TIN
9       puff
10      1993-04-01
11      ETHIOPIA        0.0000001000
12      MAIL    SHIP    1996-01-01
13      express         accounts
14      1996-02-01
15      1994-03-01
16      Brand#33        STANDARD PLATED         38
12      20      30      4       5       42      6
17      Brand#31        WRAP CAN
18      312
19      Brand#53        Brand#25        Brand#25        9
        20      29
20      maroon  1994-01-01      VIETNAM
21      FRANCE
22      31      20      21      30      33      27
        15
```

==========

## stream6: 511080453

==========

```
1       81
2       18      STEEL   AFRICA
3       AUTOMOBILE      1995-03-02
4       1993-04-01
5       AFRICA  1996-01-01
6       1996-01-01      0.02    25
7       ALGERIA         SAUDI ARABIA
8       SAUDI ARABIA    MIDDLE EAST     ECONOMY ANODIZED
TIN
9       papaya
10      1994-01-01
11      CHINA   0.0000001000
12      TRUCK   SHIP    1996-01-01
13      express         accounts
14      1996-05-01
15      1996-10-01
16      Brand#23        MEDIUM BRUSHED 49       8
12      22      31      36      18      48
17      Brand#33        SM BOX
18      313
19      Brand#15        Brand#53        Brand#24        4
        10      25
20      turquoise       1997-01-01      IRAN
21      UNITED KINGDOM
22      22      15      27      18      11      21
        28
```

==========

## stream7: 511080454

==========

```
1       89
2       6       BRASS   ASIA
3       HOUSEHOLD       1995-03-18
4       1995-11-01
5       AMERICA         1997-01-01
6       1997-01-01      0.07    24
7       PERU    JAPAN
8       JAPAN   ASIA    LARGE POLISHED NICKEL
9       navajo
10      1994-10-01
11      FRANCE  0.0000001000
12      RAIL    SHIP    1996-01-01
13      express         accounts
14      1996-08-01
15      1994-07-01
16      Brand#53        PROMO ANODIZED 22       4
27      30      43      26      9       21
17      Brand#35        SM JAR
18      315
19      Brand#12        Brand#41        Brand#13        9
        11      21
20      green   1996-01-01      ALGERIA
21      MOROCCO
22      10      26      24      20      11      21
        31
```

# Appendix E. Implementation-Specific Layer/Driver Code

```
================================================
```

## do_test1000

```
================================================

#!/bin/bash
echo Startup IQ: `date`
start_asiq @utility.cfg
echo IQ started: `date`
echo "  "
echo  Creating Database: `date`
echo "  "
dbisqlc -c "DSN=utility_db" -q create_database.sql
echo  Database Created: `date`
echo "  "

echo Shutting down IQ: `date`
dbstop -y -c "DSN=utility_db"
echo IQ shutdown: `date`
echo "  "

echo Sleeping  10 Seconds
echo "  "
sleep 10


echo Restart IQ with TPCH database: `date`
start_asiq @tpch.cfg /sybase2/tpch1000.db
echo IQ restarted: `date`
echo "  "
echo Adding dbspaces
dbisqlc -c "DSN=tpch1000" -q create_dbspaces.sql
echo Set Database Options `date`

dbisqlc -c "DSN=tpch1000" -q options.sql

echo "  "

echo Shutting down IQ: `date`
dbstop -y -c "DSN=tpch1000"
echo Sleeping  10 Seconds
echo "  "
sleep 10
echo Restart IQ with TPCH database: `date`
start_asiq @tpch.cfg /sybase2/tpch1000.db
echo IQ restarted: `date`
echo "  "
echo Create Tables `date`

dbisqlc -c "DSN=tpch1000" -q create_tables_noRI.sql
dbisqlc -c "DSN=tpch1000" -q tpch_rf.sql

echo "  "
echo Dump the IQ Configuration `date`

dbisqlc -c "DSN=tpch1000" -q check_options.sql
#
# Initialize the refresh_set file
#
echo "  "
echo Starting Load  `now_iq_format.bash` | tee
start_load.out
dbisqlc -c "DSN=tpch1000" -q load_lineitem.sql >
load_lineitem.out &
loadlpid=$!
echo "   Lineitem is load started `date` "
sleep 42000
dbisqlc -c "DSN=tpch1000" -q load_region.sql
echo "   Region loaded `date` "
dbisqlc -c "DSN=tpch1000" -q load_nation.sql
echo "   Nation loaded `date` "
dbisqlc -c "DSN=tpch1000" -q load_customer.sql
echo "   Customer loaded `date` "
dbisqlc -c "DSN=tpch1000" -q load_part.sql
echo "   Part loaded `date` "
dbisqlc -c "DSN=tpch1000" -q load_supplier.sql
echo "   Supplier loaded `date` "
dbisqlc -c "DSN=tpch1000" -q load_partsupp.sql
echo "   Partsupp loaded `date` "
dbisqlc -c "DSN=tpch1000" -q load_orders.sql
loadopid=$!
echo "   Orders loaded `date` "
wait $loadopid
wait $loadlpid
seed=`date '+%m%d%H%M%S'`;
echo Load Finished  `now_iq_format.bash` | tee
end_load.out
#
# Generate the Query Streams using the seed based on
database load completion
#
echo $seed;
./gen_streams.ksh $seed
echo "  "
echo "Run the Audit Script   `date` "
echo "  "
#
# After the load Completes run the Audit SQL
#
dbisqlc -c "DSN=tpch1000" -q dbtables-syb.sql >
rdbtablest.out
dbisqlc -c "DSN=tpch1000" -q dew_cat1.sql >
dew_cat1_start.out
dbisqlc -c "DSN=tpch1000" -q dew_cat2.sql >
dew_cat2_start.out
dbisqlc -c "DSN=tpch1000" -q dew_cat3.sql >
dew_cat3_start.out
echo "  "
echo "Start the Power Test   `date` "
echo "  "
#
# Touch the lock files so that the RF will pause after
RF1 and wait for the query stream to complete
#
touch /export/home/sybase/run/scripts/rf1.lock
touch /export/home/sybase/run/scripts/rf2.lock
#
# Start the RF Stream in the Background
#
dbisqlc -c "DSN=tpch1000" -q update_power.sql >
update_power.out &
rfspid=$!
#
# Wait for RF1 to Complete before Starting the Query
Stream
#
# the rf1.lock file will be removed after RF1
completes
# RF will then wait for rf2.lock to be removed before
continuing
#
while [ -f /export/home/sybase/run/scripts/rf1.lock ]
do
 # Sleep while Trigger file exists
 # echo "Waiting until trigger file is removed"
 sleep 10
done
#
# Continue RF1 has completed and RF2 is waiting on the
```

```
Query Stream to Complete
#
echo "  "
echo "Start Query Stream 0 `date` "
echo "  "
#
# Start the Query Stream
#
dbisqlc -c "DSN=tpch1000" -q stream0.sql > stream0.out
#
# Remove the lock file so that the RF will continue
with RF2
#
rm -f /export/home/sybase/run/scripts/rf2.lock
#
# Now wait for the RF stream 0 to complete
#
wait $rfspid

echo End Power `date`
echo "  "
echo Start Throughput `date`
echo "  "
echo "  "
echo Run Query Streams
dbisqlc -c "DSN=tpch1000" -q stream1.sql > stream1.out
&
qspid1=$!
sleep 4
dbisqlc -c "DSN=tpch1000" -q stream2.sql > stream2.out
&
qspid2=$!
sleep 4
dbisqlc -c "DSN=tpch1000" -q stream3.sql > stream3.out
&
qspid3=$!
sleep 4
dbisqlc -c "DSN=tpch1000" -q stream4.sql > stream4.out
&
qspid4=$!
sleep 4
dbisqlc -c "DSN=tpch1000" -q stream5.sql > stream5.out
&
qspid5=$!
sleep 4
dbisqlc -c "DSN=tpch1000" -q stream6.sql > stream6.out
&
qspid6=$!
sleep 4
dbisqlc -c "DSN=tpch1000" -q stream7.sql > stream7.out
&
qspid7=$!
echo Run refresh
echo "  "
dbisqlc -c "DSN=tpch1000" -q update_throughput.sql >
update_throughput.out &
qspid0=$!
sleep 4
wait $qspid0
wait $qspid1
wait $qspid2
wait $qspid3
wait $qspid4
wait $qspid5
wait $qspid6
wait $qspid7
mv stream0.out m1s00q.out
mv update_power.out m1s00rf.out
mv stream1.out m1s01q.out
mv stream2.out m1s02q.out
mv stream3.out m1s03q.out
mv stream4.out m1s04q.out
mv stream5.out m1s05q.out
mv stream6.out m1s06q.out
mv stream7.out m1s07q.out
mv update_throughput.out m1s01rf.out
echo "  "
echo "Start the Power Test   `date` "
echo "  "
#
# Touch the lock files so that the RF will pause after
RF1 and wait for the query stream to complete
#
touch /export/home/sybase/run/scripts/rf1.lock
touch /export/home/sybase/run/scripts/rf2.lock
#
# Start the RF Stream in the Background
#
dbisqlc -c "DSN=tpch1000" -q update_power.sql >
update_power.out &
rfspid=$!
#
# Wait for RF1 to Complete before Starting the Query
Stream
#
# the rf1.lock file will be removed after RF1
completes
# RF will then wait for rf2.lock to be removed before
continuing
#
while [ -f /export/home/sybase/run/scripts/rf1.lock ]
do
 # Sleep while Trigger file exists
 # echo "Waiting until trigger file is removed"
 sleep 10
done
#
# Continue RF1 has completed and RF2 is waiting on the
Query Stream to Complete
#
echo "  "
echo "Start Query Stream 0 `date` "
echo "  "
#
# Start the Query Stream
#
dbisqlc -c "DSN=tpch1000" -q stream0.sql > stream0.out
#
# Remove the lock file so that the RF will continue
with RF2
#
rm -f /export/home/sybase/run/scripts/rf2.lock
#
# Now wait for the RF stream 0 to complete
#
wait $rfspid

echo End Power `date`
echo "  "
echo Start Throughput `date`
echo "  "
echo "  "
echo Run Query Streams
dbisqlc -c "DSN=tpch1000" -q stream1.sql > stream1.out
&
qspid1=$!
sleep 4
dbisqlc -c "DSN=tpch1000" -q stream2.sql > stream2.out
&
qspid2=$!
sleep 4
dbisqlc -c "DSN=tpch1000" -q stream3.sql > stream3.out
&
qspid3=$!
```

```
sleep 4
dbisqlc -c "DSN=tpch1000" -q stream4.sql > stream4.out
&
qspid4=$!
sleep 4
dbisqlc -c "DSN=tpch1000" -q stream5.sql > stream5.out
&
qspid5=$!
sleep 4
dbisqlc -c "DSN=tpch1000" -q stream6.sql > stream6.out
&
qspid6=$!
sleep 4
dbisqlc -c "DSN=tpch1000" -q stream7.sql > stream7.out
&
qspid7=$!
echo Run refresh
echo "  "
dbisqlc -c "DSN=tpch1000" -q update_throughput.sql >
update_throughput.out &
qspid0=$!
sleep 4
wait $qspid0
wait $qspid1
wait $qspid2
wait $qspid3
wait $qspid4
wait $qspid5
wait $qspid6
wait $qspid7
mv stream0.out m2s00q.out
mv update_power.out m2s00rf.out
mv stream1.out m2s01q.out
mv stream2.out m2s02q.out
mv stream3.out m2s03q.out
mv stream4.out m2s04q.out
mv stream5.out m2s05q.out
mv stream6.out m2s06q.out
mv stream7.out m2s07q.out
mv update_throughput.out m2s01rf.out
```

# Appendix F. Misc database scripts

The dbtables-syb.sql script was run to validate the correctness of the database after the database load. Three other scripts were used to extract basic information about tables and indexes from the database dew_cat1.sql, dew_cat2.sql, dew_cat3.sql.

## Auditor Scripts

```
================================================
```

### dbtables-syb.sql

```
================================================

-- ================================================
--  FILENAME
--       DBTABLES.SQL
--  DESCRIPTION
--       CHECK ROW COUNT AND ROW STRUCTURE/CONTENT FOR
EACH TABLE
--       IN THE TPC-H DATABASE.
--
-- ================================================
--
-- GET TIMESTAMP
SELECT 'START TIME', CONVERT(CHAR(30), GETDATE(),
120);
go
-- ================================================
--           TABLE: LINEITEM
-- ================================================
SELECT COUNT(*) FROM LINEITEM;
go
SELECT * FROM LINEITEM
WHERE L_ORDERKEY IN
      ( 4, 26598,  148577,  387431, 56704, 517442,
600000)
      AND L_LINENUMBER = 1
ORDER BY L_ORDERKEY;
go
-- ================================================
--           TABLE: ORDERS
-- ================================================
-- GET TIMESTAMP
SELECT 'TIME', CONVERT(CHAR(30), GETDATE(), 120);
go
SELECT COUNT(*) FROM ORDERS;
go
SELECT * FROM ORDERS
WHERE O_ORDERKEY IN ( 7, 44065, 287590, 411111,
483876, 599942 )
ORDER BY O_ORDERKEY;
go
-- ================================================
--           TABLE: PART
-- ================================================
-- GET TIMESTAMP
SELECT 'TIME', CONVERT(CHAR(30), GETDATE(), 120);
go
SELECT COUNT(*) FROM PART;
go
SELECT * FROM PART
WHERE P_PARTKEY IN (1,984,8743,9028,13876,17899,20000)
ORDER BY P_PARTKEY;
go
-- ================================================
--           TABLE: PARTSUPP
-- ================================================
-- GET TIMESTAMP
SELECT 'TIME', CONVERT(CHAR(30), GETDATE(), 120);
go
SELECT COUNT(*) FROM PARTSUPP;
go
SELECT* FROM PARTSUPP
   WHERE PS_PARTKEY = 3398
   AND PS_SUPPKEY = (SELECT MIN(PS_SUPPKEY)
      FROM PARTSUPP WHERE PS_PARTKEY = 3398);
go
SELECT* FROM PARTSUPP
   WHERE PS_PARTKEY =15873
   AND PS_SUPPKEY = (SELECT MIN(PS_SUPPKEY)
      FROM PARTSUPP WHERE PS_PARTKEY = 15873);
go
SELECT* FROM PARTSUPP
   WHERE PS_PARTKEY = 11394
   AND PS_SUPPKEY = (SELECT MIN(PS_SUPPKEY)
      FROM PARTSUPP WHERE PS_PARTKEY = 11394);
go
SELECT* FROM PARTSUPP
   WHERE PS_PARTKEY = 6743
   AND PS_SUPPKEY = (SELECT MIN(PS_SUPPKEY)
      FROM PARTSUPP WHERE PS_PARTKEY = 6743);
go
SELECT* FROM PARTSUPP
   WHERE PS_PARTKEY = 19763
   AND PS_SUPPKEY = (SELECT MIN(PS_SUPPKEY)
      FROM PARTSUPP WHERE PS_PARTKEY =19763);
go
-- ================================================
--           TABLE: SUPPLIER
-- ================================================
-- GET TIMESTAMP
SELECT 'TIME', CONVERT(CHAR(30), GETDATE(), 120);
go
SELECT COUNT(*) FROM SUPPLIER;
go
SELECT * FROM SUPPLIER
WHERE  S_SUPPKEY IN (83,265,492,784,901,1000)
ORDER BY S_SUPPKEY;
go
-- ================================================
--           TABLE: CUSTOMER
-- ================================================
-- GET TIMESTAMP
SELECT 'TIME', CONVERT(CHAR(30), GETDATE(), 120);
go
SELECT COUNT(*) FROM CUSTOMER;
go
SELECT * FROM CUSTOMER
WHERE  C_CUSTKEY IN (832,2653,4924,7845,92016,108070)
ORDER BY C_CUSTKEY;
go
-- ================================================
--           TABLE: NATION & REGION
-- ================================================
-- GET TIMESTAMP
SELECT 'TIME', CONVERT(CHAR(30), GETDATE(), 120);
go
SELECT * FROM REGION;
go
SELECT COUNT(*) FROM NATION;
go
SELECT * FROM NATION
WHERE N_NATIONKEY IN (3,10,14,20)
ORDER BY N_NATIONKEY;
go
-- ================================================
--           CHECK KEY VALUES
-- ================================================
-- GET TIMESTAMP
```

```
SELECT 'TIME', CONVERT(CHAR(30), GETDATE(), 120);
go
if exists (select name from sysobjects where
name='MINMAX')
  drop table MINMAX
go
CREATE TABLE MINMAX
(TNAME CHAR(15),
KEYMIN INTEGER,
KEYMAX INTEGER);
go
INSERT INTO MINMAX
SELECT 'LINEITEM_ORD',MIN(L_ORDERKEY),MAX(L_ORDERKEY)
FROM LINEITEM;
go
INSERT INTO MINMAX
SELECT 'LINEITEM_NBR',MIN(L_LINENUMBER),
MAX(L_LINENUMBER)
FROM LINEITEM;
go
INSERT INTO MINMAX
SELECT 'ORDERS',MIN(O_ORDERKEY),MAX(O_ORDERKEY)
FROM ORDERS;
go
INSERT INTO MINMAX
SELECT 'CUSTOMER',MIN(C_CUSTKEY),MAX(C_CUSTKEY)
FROM CUSTOMER;
go
INSERT INTO MINMAX
SELECT 'PART',MIN(P_PARTKEY),MAX(P_PARTKEY)
FROM PART;
go
INSERT INTO MINMAX
SELECT 'SUPPLIER',MIN(S_SUPPKEY),MAX(S_SUPPKEY)
FROM SUPPLIER;
go
INSERT INTO MINMAX
SELECT 'PARTSUPP_PART',MIN(PS_PARTKEY),MAX(PS_PARTKEY)
FROM PARTSUPP;
go
INSERT INTO MINMAX
SELECT 'PARTSUPP_SUPP',MIN(PS_SUPPKEY),MAX(PS_SUPPKEY)
FROM PARTSUPP;
go
INSERT INTO MINMAX
SELECT 'NATION',MIN(N_NATIONKEY),MAX(N_NATIONKEY)
FROM NATION;
go
INSERT INTO MINMAX
SELECT 'REGION',MIN(R_REGIONKEY),MAX(R_REGIONKEY)
FROM REGION;
go
SELECT * FROM MINMAX;
go
if exists (select name from sysobjects where
name='MINMAX')
  drop table MINMAX
go
SELECT 'END TIME', CONVERT(CHAR(30), GETDATE(), 120);
go
```

==========

## dew_cat1.sql

==========

```
SELECT  st.table_name,
                st.table_type,
                su.user_name,
                st.server_type
          from SYS.SYSTABLE st, SYS.SYSUSERPERMS su
          where creator = user_id
order by 4,1,3;
```

==========

## dew_cat2.sql

==========

```
 select T.table_name    ,
        T.table_type    ,
        C.column_name   ,
        C.column_id
 From   SYS.SYSTABLE T,
        SYS.SYSCOLUMN C,
        SYS.SYSDOMAIN D,
        SYS.SYSUSERPERMS SU
 where T.creator = SU.user_id
   and T.table_id = C.table_id
   and C.domain_id = D.domain_id
order by 1,2;
```

==========

## dew_cat3.sql

==========

```
SELECT  index_name,T.table_name  ,
        column_name   ,
        index_type
 from   SYS.SYSTABLE T,
        SYS.SYSCOLUMN C,
        SYS.SYSINDEX I,
        SYS.SYSUSERPERMS UP,
        SYS.SYSFILE F,
        SYS.SYSIXCOL IC
 where T.table_id = C.table_id
   and C.table_id = I.table_id
   and T.file_id = F.file_id
   and I.table_id = IC.table_id
   AND I.index_id = IC.index_id
   AND IC.column_id = C.column_id
   and T.creator = UP.user_id;
```

## Appendix G. Pricing information

For Sybase pricing please contact:

Deborah Harrington
978-287-1535
dharring@sybase.com

For Sun pricing please contact:

Guido Ficco
781-442-0069
guido.ficco@sun.com

**Company**
**Contact**
**Phone**
**Fax**
**Address**

**CBSS#**

**Quotation for Software and Support**
**8 cpu Server**

**SYBASE Sales Rep:** Hollie Nash
**Phone:** 972-687-6412
**Fax:** 972-687-6409

| | Catalogue Number | Product Description | License Type | Machine | P/S | List Price Per Unit | Quantity | Discount % ** | Net Unit Price | Net Extended Price | Net Extended Support Fees |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Standard | | | |
| 1 | 12841 | Sybase IQ-M Single App Svr - 8 cpu's | SR | Sun | P | $ 60,000 | 1 | 20% | $48,000 | $48,000 | $31,680 |
| 2 | 98480 | Extended support/24 x 7 | | | | | 1 | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |
| 11 | | | | | | | | | | | |
| 12 | | | | | | | | | | | |
| | | | | | | Sub-total | | | | $ 48,000.00 | $ 31,680.00 |

** - Excludes royalty based products

***Quote Date:***
***Valid thru:***

Total $ 79,680.00 License + 3 Year maintenance

Payment terms : Net 30 Days



**5400 LBJ Freeway, Suite 1500, Dallas, TX 75240**

# Sales Quotation

Quote Number: T-US-387515-A

Quote Date: 5/28/03

Customer : ALAN GOLDMAN
SUN MICROSYSTEMS INC
1 NETWORK DR
BURLINGTON MA 01803-0903
Tel / Fax 7814423560 /

Sun Holli Babb
Sun Microsystems, Inc.
1 Network Dr
Burlington MA 0180301803
Tel / Fax : 800-786-0404/781-442-0864

We are pleased to quote as follows:

| Validity Period | Credit Terms | Shipping Terms |
|---|---|---|
| 48 Days | NET 3O FRM INV DATE | Origin |

| Item | Product Number | Description | Qty | Unit List Price | Disc | Unit Net Price | Extended Net Price |
|---|---|---|---|---|---|---|---|
| | | SunFire V880 Server - 8x32 Configuration | | | | | |
| 1 | | Configuration: A30-WTF8-32GRF | 1 | $121,133.00 | N/A | $101,063.09 | $101,063.09 |
| 1.1 | A30-WTF8-32GRF | SunFire V880 Server w/8x1050Mhz CPUs, 32G memory, 6x73G disk drives | 1 | $109,995.00 | 15.00% | $93,495.75 | $93,495.75 |
| 1.1.1 | X311L | Localized Power Cord Kit North American/Asian | 3 | N/C | N/A | N/C | N/C |
| 1.2 | SOLZS-090C9AYS | Solaris 9 (latest release) Slim kit. Contains Multilingual CD & DVD Media with minimal documentation, no bonus software, SPARC Platform Edition. | 1 | $50.00 | 45.00% | $27.50 | $27.50 |
| 1.3 | W9D-A30-3G | SUN FIRE V880 UPGRADE TO 3 YEARS OF GOLD SUPPORT | 1 | $11,088.00 | 32.00% | $7,539.84 | $7,539.84 |
| | | | | | | | |

| | |
|---|---|
| List Price Total: | $121,133.00 |

| | |
|---|---|
| Total: | $101,063.09 |


***Date:*** May 27, 03

Quote# 052703SUN

***To:*** Jay Halloran
Sun Microsystems

***Ph:*** 781-442-2635

***From:***
Nick Defino/Dave Mancusi
Continental Resources, Inc.
175 Middlesex Turnpike
Bedford, MA 01730
Tel: 781-533-0307/0454

| Qty. | Part Number | Description | List $ | Your Unit $ | Extended $ |
|---|---|---|---|---|---|
| | | **SUN Microsystems** | | | |
| 1 | XTA3310R01A0R876 | SE3310-876GB-12x73-JBOD | $14,995.00 | $10,707.00 | $10,707.00 |
| 1 | XTA-3310-73GB-10K | 73GB-SCSI-10Krpm-disk | $1,595.00 | $1,139.00 | $1,139.00 |
| 1 | X6758A | dual-ultra-3-SCSI-HBA | $800.00 | $571.00 | $571.00 |
| 1 | X1138A | 2M-SCSI-cable | $95.00 | $82.00 | $82.00 |

Orders subject to credit approval.
Payment terms net 30 days.
Prices and availability subject to change.