



# TPC Benchmark™ E Report

## **Unisys ES7000 Model 7600R Enterprise Server (16s)**

**using**

**Microsoft SQL Server 2008 R2  
Datacenter Edition**

**on**

**Microsoft Windows Server 2008 R2  
Datacenter Edition**

**First Edition  
November 2, 2009**

First Edition - November 2009

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

All performance data contained in this report were obtained in a rigorously controlled environment, and therefore results obtained in other operating environments may vary significantly. Unisys Corporation and Microsoft Corporation do not warrant or represent that a user can or will achieve similar performance expressed in transaction per second (tpsE) or normalized price/performance (\$/tpsE). No warranty of system performance or price/performance is expressed or implied in this report.

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# *Abstract*

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## Overview

This report documents the methodology and results of the TPC Benchmark™ E (TPC-E) conducted on the Unisys Corporation ES7000 Model 7600R Enterprise Server (16s). The operating system on the server was Microsoft Windows Server 2008 R2 Datacenter Edition. The DBMS used was Microsoft SQL Server 2008 R2 Datacenter Edition. The TPC applications, which included TPC provided EGen software, were provided by Microsoft Corporation. The operating system on the client was Microsoft Windows Server 2008 R2 Standard Edition. The standard TPC Benchmark™ E metrics, tpsE (transactions per second), price per tpsE (three year capital cost per reported tpsE), and the availability date are reported as required by the benchmark specification.

## Executive Summary

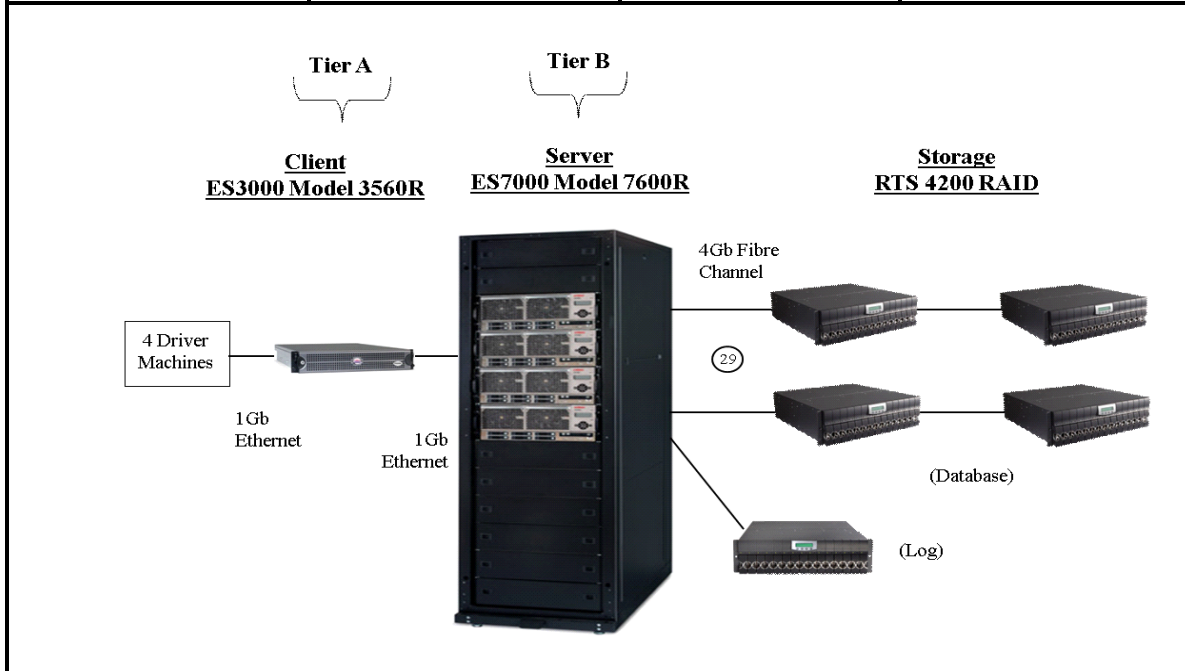
The following pages contain the **Executive Summary** results of the benchmark. The **Executive Summary Statement (ExecutiveSummary.pdf)** and the **(ES.xml)** file can be found in the *ExecutiveSummaryStatement* folder.

## Auditor

Lorna Livingtree of Performance Metrics, Inc., verified compliance with the relevant TPC specifications, audited the benchmark configuration, environment, and methodology used to produce and validate the test results, along with the pricing model used to calculate the price per tpsE.

<b>UNISYS</b>	<b>ES7000 Model 7600R Enterprise Server (16s)</b>		<b>TPC-E 1.9.0 TPC Pricing 1.5.0</b>
			<b>Report Date November 2, 2009</b>
TPC-E Throughput	Price/Performance	Availability Date	Total System Cost
<b>2012.77 tpsE</b>	<b>\$958.23 USD per tpsE</b>	<b>May 6, 2010</b>	<b>\$1,928,688 USD</b>

<b>Database Server Configuration</b>			
Operating System	Database Manager	Processors/Cores/ Threads	Memory
<b>Microsoft Windows Server 2008 R2 Datacenter Edition</b>	<b>Microsoft SQL Server 2008 R2 Datacenter Edition</b>	<b>16/96/96</b>	<b>1024GB</b>



<b>Client</b> <b>ES3000 Model 3560R</b> 2 x Intel® Quad-core Xeon™ E5520 2.26GHz w/8MB Smart cache, 6 GB memory, 1 x 73GB internal disk, 4 Inbuilt 1Gb Eth. cntrls.	<b>Server</b> <b>ES7000 Model 7600R</b> 16 x Intel® Hex-core Xeon™ X7460 2.66GHz w/ 16MB L3 cache, 1 TB memory, 2 x 73GB SAS disk, internal, 1 x PCI SAS RAID cntrl, internal, 15 x PCI Fibre Channel cntrls, 8 Inbuilt 1Gb Eth. cntrls. (2 used).	<b>Storage</b> <b>RTS 4200 RAID Storage</b> 870 x 73GB 12 x 146GB External Fibre Channel disks, 31 x FC External RAID controllers
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Initial Database Size	Redundancy Level: 1	Database Storage
<b>8,309 GB</b>	<b>RAID-10</b>	<b>870 x 73GB 15K rpm 12 x 146GB 15K rpm</b>



**ES7000 Model 7600R  
Enterprise Server (16s)**

**TPC-E 1.9.0  
TPC Pricing 1.5.0**

**Report Date  
November 2, 2009**

Description	Part Number	Price Source	Unit Price	Qty.	Extended Price	3-yr Maint. Price
<b>Server Hardware:</b>						
ES77600R 16x X7460, 64GB	ES7764163-100	1	\$145,290	1	\$145,290	\$6,768
ES7000 7600R Installation Accessory Kit	ES790001-IAK	1	\$100	1	\$100	
Snap-in 1U Filler	RCK4219421-1UP	1	\$20	3	\$60	
Snap-In 3U Filler	RCK4219421-3UP	1	\$22	4	\$88	
Power Strip	PWR4243001-SD	1	\$392	2	\$784	
Power Strip	PWR4243001-SVD	1	\$403	2	\$806	
42U Rack	RCK4219421-FSS	1	\$2,769	1	\$2,769	
Rack Trim Kit	RCK4219421-OTK	1	\$350	1	\$350	
Internal RAID + 2 x 73GB Hard Drive	FAC7760731-IDK	1	\$2,403	1	\$2,403	
Initial Memory - 16GB	FAC7102803-ICA	1	\$2,378	4	\$9,512	
Memory Expansion - 16GB	FAC7102803-16G	1	\$1,525	56	\$85,400	
Emulex LPe 12002 - Disk HBA	FCH9540231-PCE	1	\$3,986	15	\$59,790	
<b>Subtotal</b>					<b>\$307,352</b>	<b>\$6,768</b>
<b>Server Software:</b>						
Windows Server 2008 R2 Datacenter Edition	P71-06367	2	\$2,357	16	\$37,712	
SQL Server 2008 R2 Datacenter Edition	*	2*	\$45,807	16	\$732,912	
SRVC: Microsoft Problem Resolution Services		2		1		\$259
<b>Subtotal</b>					<b>\$770,624</b>	<b>\$259</b>
<b>Storage Hardware:</b>						
Rack Mount Kit	RTS400012-RK	1	\$220	30	\$6,600	
Disk Enclosure with (15) 73GB Disk - 30 Pack	RTS4307315-30P	S	\$333,144	1	\$333,144	
Disk for RAID Enclosure	RTS4307315-4FH	S	\$484	435	\$210,540	
Dual RAID Controller for Log	RTS422880-T2	1	\$15,840	1	\$15,840	
SAN Manager Software	RTS44101-SAN	1	\$2,246	1	\$2,246	
146GB Disk Drive	RTS4314615-4FH	1	\$660	12	\$7,920	
RAID Controller 1x1 Style 1 - 15 Pack	RTS4228801-P15	1	\$104,277	1	\$104,277	
RAID Controller 1x1 Style 1	RTS422880-1X1	1	\$10,102	6	\$60,612	
RAID Controller 1x1 Style 2 - 5 Pack	RTS4228802-P05	1	\$45,459	1	\$45,459	
RAID Controller 1x1 Style 2	RTS422880-T1	1	\$10,340	3	\$31,020	
Optical Tranceiver	RTS400150-SFP	1	\$110	29	\$3,190	
AC Power Cord	RTS400740-CBL	1	\$11	60	\$660	
UPS for Log Enclosure	UPS120	5	\$1,000	2	\$2,000	
<b>Subtotal</b>					<b>\$823,508</b>	<b>\$0</b>
<b>Infrastructure</b>						
8 port KVM switch	KVM9083101-SWC	1	\$1,300	1	\$1,300	
Rack mount LCD w/1U Drawer	MON2145-LCD	1	\$2,700	1	\$2,700	
Rack mount keyboard, w/touchpad, USB	KBR210501-USB	1	\$275	1	\$275	
42U Rack - No Doors	RM421940-FRM	1	\$1,286	4	\$5,144	
8 Outlet Power Strip	SFR9-PWR	1	\$170	17	\$2,890	
Power Cord	USE1936-LC6	1	\$90	17	\$1,530	
16 Port Ethernet Switch (Netgear) incl 2 spares	FS116	4	\$60	5	\$300	
Fiber Channel Cable incl 2 spares	GCFAZLLM20-M	3	\$24	32	\$768	
Ethernet Cable incl 2 spares	GCP0888650-BL	3	\$7	37	\$259	
<b>Subtotal</b>					<b>\$15,166</b>	<b>\$0</b>
<b>Client Hardware:</b>						
ES3/3560R Server	ES3560031-SVR	1	\$1,085	1	\$1,085	\$1,005
ES3/3560R Server, 2.26GHz CPU	ES3560341-CPU	1	\$579	1	\$579	
ES3/3560R No Bezel	ES3560012-BZL	1	\$69	1	\$69	
Hard Drive - 73GB, 10K SAS 2.5	ES3599011-DSK	1	\$239	1	\$239	
ES3/3560R Slide Ready Rail, No Cb Mng Arm	ES3560011-RCK	1	\$149	1	\$149	
ES3000 DVD ROM, SATA, Internal	ES3599021-ODD	1	\$30	1	\$30	
ES3/3560R High Output PSpdy, NonRdnt, 870W	ES3560111-PWR	1	\$30	1	\$30	
ES3000 6GB, 6x1GB, 1333M, 1R UD IMM, 2P, OP	ES3599591-MEM	1	\$272	1	\$272	
ES3/3560R Server, 2.26GHz 2nd CPU	ES3599341-CPU	1	\$579	1	\$579	
Power Cord	OSM1000-PRC	1	\$13	1	\$13	
USB to Cat5 KVM Adapter	KVM9002301-CNV	1	\$250	1	\$250	
<b>Subtotal</b>					<b>\$3,295</b>	<b>\$1,005</b>
<b>Client Software:</b>						
Windows Server 2008 R2 Standard Edition	P73-04980	2	\$711	1	\$711	
<b>Subtotal</b>					<b>\$711</b>	<b>\$0</b>
Unisys Product Pricing (List Pricing) - Michael Heifner (215)-986-4757 where Price Source = 1 or S					<b>Total USD</b>	<b>\$1,920,656</b>
						<b>\$8,032</b>

**Notes:**

- HW & SW maintenance at 24 x 7 w/ 4 hr. max. response time for spares.
- Price Source: 1 = Unisys Product Price, Unisys Maintenance Price  
2 = Microsoft 3 = CableSys 4 = NewEgg  
5 = IQstor

S One or more components of the measured configuration have been substituted in the Priced Configuration - see FDR for details  
\* This component is not immediately orderable. See the FDR for more information

**3-Year Cost of Ownership: \$1,928,688 USD**  
**TPC-E Throughput: 2,012.77 tps E**  
**Price/Performance: \$958.23 USD**

Benchmark results and test methodology audited by Lorna Livingtree of Performance Metrics, Inc.

Prices used in TPC benchmarks reflect the actual prices a customer would pay for a one-time purchase of the stated components. Individually negotiated discounts are not permitted. Special prices based on assumption about past or future purchases are not permitted. All discounts reflect standard pricing policies for the listed components. For complete details, see the pricing sections of the TPC benchmarks specifications. If you find that the stated prices are not available according to these terms, please inform the TPC at pricing@tpc.org. Thank You.

<b>UNISYS</b>	<b>ES7000 Model 7600R Enterprise Server (16s)</b>		<b>TPC-E 1.9.0</b>	
			<b>Report Date</b> November 2, 2009	
<b>Numerical Quantities Summary</b>				
<b>Reported Throughput:</b>			<b>2012.77</b>	
<b>Configured Customers:</b>			<b>1,025,000</b>	
<b>Response Time (in seconds)</b>	Minimum	Average	90 <sup>th</sup> %tile	Maximum
Broker-Volume	0.01	0.10	0.15	3.05
Customer-Position	0.00	0.04	0.07	2.19
Market-Feed	0.00	0.04	0.07	8.50
Market-Watch	0.00	0.05	0.09	7.04
Security-Detail	0.00	0.02	0.04	2.02
Trade-Lookup	0.00	0.48	0.72	4.08
Trade-Order	0.00	0.10	0.15	3.26
Trade-Result	0.00	0.11	0.18	12.03
Trade-Status	0.00	0.03	0.05	3.12
Trade-Update	0.01	0.53	0.73	4.01
Data-Maintenance	0.00	0.08	N/A	1.19
<b>Transaction Mix (in percent of total transactions)</b>		<b>Transaction Count</b>		<b>Mix</b>
Broker_Volume		7,101,094		4.900%
Customer-Position		18,841,160		13.000%
Market-Feed		1,449,216		1.000%
Market-Watch		26,087,012		18.000%
Security-Detail		20,289,638		14.000%
Trade-Lookup		11,594,027		8.000%
Trade-Order		14,638,092		10.100%
Trade-Result		14,491,978		9.999%
Trade-Status		27,536,991		19.001%
Trade-Update		2,898,338		2.000%
Data-Maintenance		120		N/A
<b>Test Duration and Timing</b>				
Ramp-up Time (hh:mm:ss)			0:53:25	
Measurement Interval (hh:mm:ss)			2:00:00	
Business Recovery Time (hh:mm:ss)			1:11:57	
Total Number of Transactions Completed in Measurement Interval			144,927,546	

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# *Preface*

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## **Document Structure**

The TPC Benchmark™ E Standard Specification requires test sponsors to publish, submit to the TPC, and make available to the public, a full disclosure report for any result to be considered compliant with the specification. The required contents of the full disclosure report are specified in Clause 9.

This report is submitted to satisfy the specification's requirement for full disclosure. It documents the compliance of the benchmark implementation and execution reported for the Unisys ES7000 Model 7600R Enterprise Server (16s) using Microsoft SQL Server 2008 R2 Datacenter Edition on Microsoft Windows Server 2008 R2 Datacenter Edition.

## **TPC Benchmark™ E Overview**

The Transaction Processing Performance Council (TPC) developed The TPC Benchmark™ E Standard Specification Revision 1.9.0. It is the intent of the TPC to develop a suite of benchmarks to measure the performance of computer systems executing a wide range of applications. Unisys and Microsoft Corporations are active participants in the TPC to define and develop such a suite of benchmarks. TPC Benchmark™ E (TPC-E) is an online Transaction Processing (OLTP) workload. It is a mixture of read-only and update intensive transactions that simulate the activities found in complex OLTP application environments. The benchmark exercises a breadth of system components associated with such environments, which are characterized by:

- The simultaneous execution of multiple transaction types that span a breadth of complexity;
- Moderate system and application execution time;
- A balanced mixture of disk input/output and processor usage;
- Transaction integrity (ACID properties);
- A mixture of uniform and non-uniform data access through primary and secondary keys;
- Databases consisting of many tables with a wide variety of sizes, attributes, and relationships with realistic content;
- Contention on data access and update.

The TPC-E benchmark simulates the OLTP workload of a brokerage firm. The focus of the benchmark is the central database that exercises transactions related to the firm's customer accounts. In keeping with the goal of measuring the performance characteristics of the database system, the benchmark does not attempt to measure the complex flow of data between multiple application systems that would exist in a real environment.

The mixture and variety of transactions being executed on the benchmark system is designed to capture the characteristic components of a complex system. Different transaction types are defined to simulate the interactions of the firm with its customers as well as its business partners. Different transaction types have varying run-time requirements.



# ***Clause 1: General Items***

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## **1.1. Order and Titles**

*The order and titles of sections in the **Report** and **Supporting Files** must correspond with the order and titles of sections from the TPC-E Standard Specification (i.e., this document). The intent is to make it as easy as possible for readers to compare and contrast material in the different **Reports**. (9.1.1.1)*

The order and titles of the sections in this report correspond with those from the TPC-E standard specification.

## **1.2. Executive Summary Statement**

*The TPC **Executive Summary Statement** must be included near the beginning of the **Report**. (9.2)*

*The schema of the ES.xml document is defined by the XML schema document tpce-es.xsd (available from www.tpc.org). The ES.xml file must conform to the tpce-es.xsd (established by XML schema validation). (9.2.3.1)*

The TPC **Executive Summary Statement** is included in the *ExecutiveSummaryStatement* folder. The TPC **Executive Summary Statement** is located near the beginning of this report.

The **ES.xml** file conforms to the tpce-es-xsd specification and is included in the **ExecutiveSummaryStatement** folder.

## **1.3. Benchmark Sponsor**

*A statement identifying the benchmark **sponsor(s)** and other participating companies must be **reported** in the **Report**. (9.3.1.1)*

Unisys Corporation sponsored this TPC benchmark™ E. Microsoft and Unisys developed the benchmark test. The benchmark was conducted at Unisys, Mission Viejo, California.

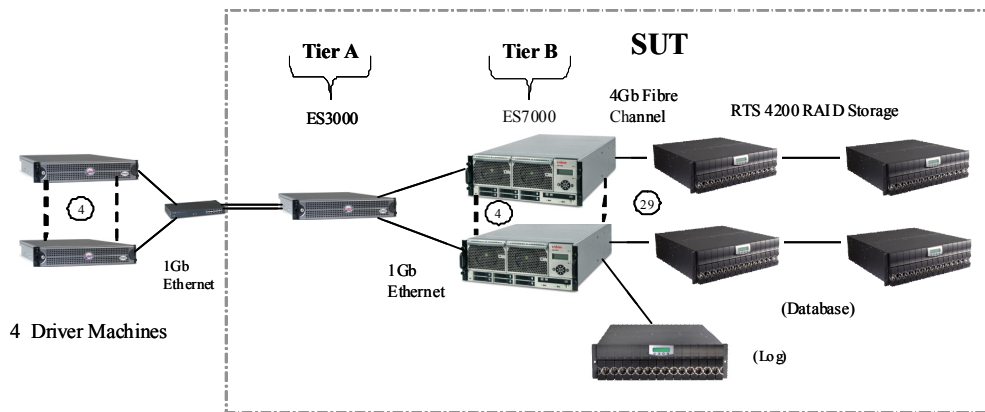
## **1.4. Configuration Diagrams**

*Diagrams of both the Measured and **Priced Configurations** must be **reported** in the **Report**, accompanied by a description of the differences. This includes, but is not limited to: (9.3.1.2)(9.3.1.3)*

- o Number and type of processors, number of cores, and number of threads.*
- o Size of allocated memory, and any specific mapping/partitioning of memory unique to the test.*
- o Number and type of disk units (and controllers, if applicable).*
- o Number of channels or bus connections to disk units, including their protocol type.*
- o Number of LAN (e.g., Ethernet) connections, including routers, workstations, etc., that were physically used in the test or are incorporated into the pricing structure.*
- o Type and the run-time execution location of software components (e.g., **DBMS**, client, processes, transaction monitors, software drivers, etc.).*

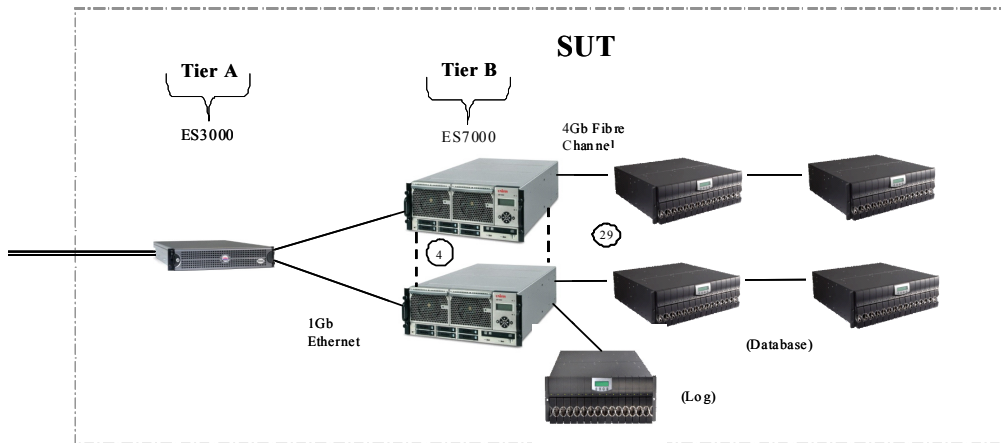
The **Benchmarked Configuration** of the drivers and Unisys ES7000 Model 7600R Enterprise Server (16s) is illustrated in Figure 1.1. The **Priced Configuration** is shown in Figure 1.2. Table 2.3 contains a detailed description of the disk configuration.

Figure 1-1: Benchmarked Configuration



<p><b>Client</b>  <b>ES3000 Model 3560R</b>                  2 x Intel® Quad-core Xeon™ E5520 2.26GHz w/ 8MB smart cache, 6 GB memory, 1 x 73GB internal disk, 4 Inbuilt 1Gb Eth. cntrls.</p>	<p><b>Server</b>  <b>ES7000 Model 7600R</b>                  16 x Intel® Hex-core Xeon™ X7460 2.66GHz w/ 16MB L3 cache, 1 TB memory, 2 x 73GB SAS disk, internal, 1 x PCI SAS RAID cntrl, internal, 15 x PCI Fibre Channel cntrls, 8 Inbuilt 1Gb Eth. cntrls. (2 used).</p>	<p><b>Storage</b>  <b>RTS 4200 RAID Storage</b>                  540 x 73GB (Style 1)                  330 x 73GB (Style 2)                  12 x 146GB                  External Fibre Channel disks, 21 x FC (Style 1)                  10 x FC (Style 2)                  External RAID controllers</p>
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Figure 1-2: Priced Configuration



<p><b>Client</b>  <b>ES3000 Model 3560R</b>                  2 x Intel® Quad-core Xeon™ E5520 2.26GHz w/ 8MB Smart cache, 6 GB memory, 1 x 73GB internal disk, 4 Inbuilt 1Gb Eth. cntrls.</p>	<p><b>Server</b>  <b>ES7000 Model 7600R</b>                  16 x Intel® Hex-core Xeon™ X7460 2.66GHz w/ 16MB L3 cache, 1 TB memory, 2 x 73GB SAS disk, internal, 1 x PCI SAS RAID cntrl, internal, 15 x PCI Fibre Channel cntrls, 8 Inbuilt 1Gb Eth. cntrls. (2 used).</p>	<p><b>Storage</b>  <b>RTS 4200 RAID Storage</b>                  870 x 73GB                  12 x 146GB                  External Fibre Channel disks, 21 x FC (Style 1)                  10 x FC (Style 2)                  External RAID controllers</p>
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## 1.5. Hardware Configuration

A description of the steps taken to configure all of the hardware must be **reported** in the **Report**. Any and all configuration scripts or step by step GUI instructions are **reported** in the **Supporting Files** (see Clause 9.4.1.1). The description, scripts and GUI instructions must be sufficient such that a reader knowledgeable of computer systems and the TPC-E specifications could recreate the hardware environment. This includes but is not limited to: (9.3.1.4)

- o A description of any firmware updates or patches to the hardware.
- o A description of any GUI configuration used to configure the system hardware.
- o A description of exactly how the hardware is combined to create the complete system.
- o A description of how the hardware components are connected. The description can assume the reader is knowledgeable of computer systems and the TPC-E specification.

The file **HardwareConfiguration.pdf** in the **SupportingFiles** Directory (“Introduction”) contains the hardware configuration used in running these TPC-E tests. It also contains the disk subsystem configuration in the file **RAID\_Hardware\_config.pdf** in the **DiskSubsystem** directory. Figure 1.3 shows the layout of the ES7000 Model 7600R server.

Figure 1.3: ES7000 Model 7600R Server Layout

CELL-3	4 x 2.66GHz HC Xeon Processor MP	FC-HBA-DATA15
		FC-HBA-DATA14
CELL-2	256GB RAM	FC-HBA-DATA13
		FC-HBA-DATA12
CELL-1	4 x 2.66GHz HC Xeon Processor MP	FC-HBA-DATA11
		FC-HBA-DATA10
CELL-0	256GB RAM	FC-HBA-DATA9
		FC-HBA-DATA8
CELL-1	4 x 2.66GHz HC Xeon Processor MP	FC-HBA-DATA7
		FC-HBA-DATA6
CELL-0	256GB RAM	FC-HBA-DATA5
		FC-HBA-DATA4
CELL-0	4 x 2.66GHz HC Xeon Processor MP	FC-HBA-DATA3
		FC-HBA-DATA2
CELL-0	256GB RAM	FC-HBA-LOG-DATA1

## 1.6. Software Configuration

*A description of the steps taken to configure all software must be **reported** in the **Report**. Any and all configuration scripts or step by step GUI instructions are **reported** in the **Supporting Files** (see Clause 9.4.1.2). The description, scripts and GUI instructions must be sufficient such that a reader knowledgeable of computer systems and the TPC-E specifications could recreate the software environment. This includes but is not limited to: (9.3.1.5)*

- o A description of any updates or patches to the software.*
- o A description of any changes to the software.*
- o A description of any GUI configurations used to configure the software.*

The file **SoftwareConfiguration.pdf** in the *SupportingFiles* Directory (“Introduction”) contains the configuration and system parameters used in running these TPC-E tests. It also contains all the client and server OS and SQL Server tunable parameters.

# Clause 2: Database Design, Scaling & Population

## 2.1. Physical Database Creation

*A description of the steps taken to create the database for the **Reported Throughput** must be reported in the **Report**. Any and all scripts or step by step GUI instructions are reported in the **Supporting Files** (see Clause 9.4.2). The description, scripts and GUI instructions must be sufficient such that a reader knowledgeable of database software environments and the TPC-E specification could recreate the database. (9.3.2)*

All the steps required to create the database are described in **MSTPCE Database Setup Reference.pdf** (included in *SupportingFiles\Clause2*). The Unisys customized scripts are located in *Supportingfiles\Clause2\Database*. These include:

- o Tempdb.sql (used to increase the size of tempdb)
- o Create\_Database.sql (used to create the customer TPCE database)
- o Backup.sql (used to backup the database once it has been built)
- o Restore.sql (used to restore the TPCE database from the backup)

## 2.2. Physical Database Organization

*The physical organization of tables and **User-Defined Objects**, within the database, must be reported in the **Report**. (9.3.2.1)*

The database tables and their corresponding User-Defined Objects were organized into four file groups as shown in Table 2.1 below. The *SupportingFiles/Clause2* folder contains the SQL definitions of all the required filegroups, tables and indexes.

**Table 2.1: Physical Database Organization**

Growing File Group	Scaling File Group	Fixed File Group
CASH_TRANSACTION	ACCOUNT_PERMISSION	CHARGE
HOLDING	ADDRESS	COMMISSION_RATE
HOLDING_HISTORY	BROKER	EXCHANGE
HOLDING_SUMMARY	COMPANY	INDUSTRY
SETTLEMENT	COMPANY_COMPETITOR	SECTOR
TRADE	CUSTOMER	STATUS_TYPE
TRADE_HISTORY	CUSTOMER_ACCOUNT	TAXRATE
TRADE_REQUEST	CUSTOMER_TAXRATE	TRADE_TYPE
	DAILY_MARKET	ZIP_CODE
	FINANCIAL	
	LAST_TRADE	
	NEWS_ITEM	
	NEWS_XREF	
	SECURITY	
	WATCH_ITEM	
	WATCH_LIST	

## 2.3. Table and Row Partitioning

*Any horizontal or vertical partitioning of tables and rows in the TPC-E benchmark (see Clause 2.3.3), must be **reported** in the **Report**. (9.3.2.2)*

No partitioning was done for this implementation.

## 2.4. Replications, Duplications, or Additions

*Replication of tables, if used, must be **reported** in the **Report**. (9.3.2.3)*

*Additional and/or duplicate columns in any table must be **reported** in the **Report** along with a statement on the impact on performance. (see Clause 2.3.5) (9.3.2.4)*

No replications, duplications or additional attributes were used in this implementation.

## 2.5. Initial Cardinality of Tables

*The cardinality (e.g. the number of rows) of each table, as it existed after the database load (see Clause 2.6) must be **reported** in the **Report**. (9.3.2.5)*

The TPC-E database for this test was configured with 1,025,000 customers. The cardinality of each table in the database is listed in Table 2.2

**Table 2.2: Initial Cardinality of Database**

Table	Rows
CASH_TRANSACTION	16,294,994,199
HOLDING	906,842,419
HOLDING_HISTORY	23,737,047,918
HOLDING_SUMMARY	50,974,251
SETTLEMENT	17,712,000,000
TRADE	17,712,000,000
TRADE_HISTORY	42,508,800,690
TRADE_REQUEST	0
ACCOUNT_PERMISSION	7,277,539
ADDRESS	1,537,504
BROKER	10,250
COMPANY	512,500
COMPANY_COMPETITOR	1,537,500
CUSTOMER	1,025,000
CUSTOMER_ACCOUNT	5,125,000
CUSTOMER_TAXRATE	2,050,000
DAILY_MARKET	916,273,125
FINANCIAL	10,250,000
LAST_TRADE	702,125
NEWS_ITEM	1,025,000
NEWS_XREF	1,025,000
SECURITY	702,125
WATCH_ITEM	102,484,524
WATCH_LIST	1,025,000
CHARGE	15
COMMISSION_RATE	240
EXCHANGE	4
INDUSTRY	102
SECTOR	12
STATUS_TYPE	5
TAXRATE	320
TRADE_TYPE	5
ZIP_CODE	14,741

## 2.6. Disk Configuration Data

The distribution of tables, partitions and logs across all media must be explicitly depicted for the measured and Priced Configurations. (9.3.2.6)

Table 2.2 lists the distribution of the database over 870 73GB disks for the measured configuration, of which, 540 disks were style RTS4307315-4F and 330 disks were style RTS4307315-4FH. For the Priced configuration, 870 73GB disks were used. The transaction log was distributed over 5 mirrored pairs of 146GB disks for both the priced and measured configurations. The tempdb log was distributed over 1 mirrored pair of 146GB disks for both the priced and measured configurations. In addition, there were two 73GB mirrored disks in the host server containing Microsoft Windows Server 2008 R2 Datacenter Edition and Microsoft SQL Server 2008 R2 Datacenter Edition code and the master database plus the paging file.

Each database disk volume, as seen by the Windows operating system, was configured as a RAID-10 disk array with 6 physical disks. There were a total of 145 such disk volumes. Each disk volume was configured in Windows as three partitions, one for scaling, one for growing, and the last partition was used by the *tempdb* during the measurements.

**Table 2.3: Disk Rack Configuration**

Cell #	Slot #	HBA #	Controller #	Disk #	Drives	FileSystem	Size	Use		
					Enclosure model	RAID level			Partition	
Cell0	PCI Slot 1	HBA #1 port 1	RTS4200 #1, 2	0	10 X 146 GB RTS422880 RAID 10	C:\Bigdb\dblogs\tpcelog1\ (RAW)	677.93 GB	TPCE database Log		
				1	2 X 146 GB RTS422880 RAID 10	C:\Bigdb\dblogs\tpcelog2\ (NTFS)	133.93 GB	Tempdb Log		
		HBA #1 port 2	RTS4200 #3	2	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabA\Scaling1 (RAW) C:\Bigdb\cabA\Growing1 (RAW) C:\Bigdb\dbbackups\backupA1 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb, fixed_fg		
				3	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabA\Scaling2 (RAW) C:\Bigdb\cabA\Growing2 (RAW) C:\Bigdb\dbbackups\backupA2 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb		
				4	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabA\Scaling3 (RAW) C:\Bigdb\cabA\Growing3 (RAW) C:\Bigdb\dbbackups\backupA3 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb		
				5	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabA\Scaling4 (RAW) C:\Bigdb\cabA\Growing4 (RAW) C:\Bigdb\dbbackups\backupA4 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb		
	HBA #1 port 2	RTS4200 #4	6	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabA\Scaling5 (RAW) C:\Bigdb\cabA\Growing5 (RAW) C:\Bigdb\dbbackups\backupA5 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb			
			7	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabA\Scaling6 (RAW) C:\Bigdb\cabA\Growing6 (RAW) C:\Bigdb\dbbackups\backupA6 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb			
	PCI Slot 2	HBA #2 port 1	RTS4200 #4	8	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabA\Scaling7 (RAW) C:\Bigdb\cabA\Growing7 (RAW) C:\Bigdb\dbbackups\backupA7 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb		
				9	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabA\Scaling8 (RAW) C:\Bigdb\cabA\Growing8 (RAW) C:\Bigdb\dbbackups\backupA8 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb		
				10	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabA\Scaling9 (RAW) C:\Bigdb\cabA\Growing9 (RAW) C:\Bigdb\dbbackups\backupA9 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb		
				11	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabA\Scaling10 (RAW) C:\Bigdb\cabA\Growing10 (RAW) C:\Bigdb\dbbackups\backupA10 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb		
				HBA #2 port 2	RTS4200 #5	12	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabB\Scaling1 (RAW) C:\Bigdb\cabB\Growing1 (RAW) C:\Bigdb\dbbackups\backupB1 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb
						13	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabB\Scaling2 (RAW) C:\Bigdb\cabB\Growing2 (RAW) C:\Bigdb\dbbackups\backupB2 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb
		14	6 x 73GB RTS422880 RAID 10			C:\Bigdb\cabB\Scaling3 (RAW) C:\Bigdb\cabB\Growing3 (RAW) C:\Bigdb\dbbackups\backupB3 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb		
		15	6 x 73GB RTS422880 RAID 10			C:\Bigdb\cabB\Scaling4 (RAW) C:\Bigdb\cabB\Growing4 (RAW) C:\Bigdb\dbbackups\backupB4 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb		
				16	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabB\Scaling5 (RAW) C:\Bigdb\cabB\Growing5 (RAW) C:\Bigdb\dbbackups\backupB5 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb		

Table 2.3: Disk Rack Configuration (cont.)

Cell #	Slot #	HBA #	Controller #	Disk #	Drives	FileSystem	Size	Use
					Enclosure model	Partition		
					RAID level			
	PCI Slot 3	HBA #3 port 1	RTS4200 #6	17	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabB\Scaling6(RAW) C:\bigdb\cabB\Growing6 (RAW) C:\bigdb\dbbackups\backupB6 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
				18	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabB\Scaling7 (RAW) C:\bigdb\cabB\Growing7 (RAW) C:\bigdb\dbbackups\backupB7 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
				19	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabB\Scaling8 (RAW) C:\bigdb\cabB\Growing8 (RAW) C:\bigdb\dbbackups\backupB8 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
				20	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabB\Scaling9 (RAW) C:\bigdb\cabB\Growing9 (RAW) C:\bigdb\dbbackups\backupB9 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
				21	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabB\Scaling10 (RAW) C:\bigdb\cabB\Growing10 (RAW) C:\bigdb\dbbackups\backupB10 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
		HBA #3 port 2	RTS4200 #7	22	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabC\Scaling1 (RAW) C:\bigdb\cabC\Growing1 (RAW) C:\bigdb\dbbackups\backupC1 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
				23	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabC\Scaling2 (RAW) C:\bigdb\cabC\Growing2 (RAW) C:\bigdb\dbbackups\backupC2 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
				24	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabC\Scaling3 (RAW) C:\bigdb\cabC\Growing3 (RAW) C:\bigdb\dbbackups\backupC3 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
				25	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabC\Scaling4 (RAW) C:\bigdb\cabC\Growing4 (RAW) C:\bigdb\dbbackups\backupC4 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
				26	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabC\Scaling5 (RAW) C:\bigdb\cabC\Growing5 (RAW) C:\bigdb\dbbackups\backupC5 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
Cell 1	PCI Slot 1	HBA #4 port 1	RTS4200 #8	27	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabC\Scaling6(RAW) C:\bigdb\cabC\Growing6 (RAW) C:\bigdb\dbbackups\backupC6 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
				28	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabC\Scaling7 (RAW) C:\bigdb\cabC\Growing7 (RAW) C:\bigdb\dbbackups\backupC7 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
				29	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabC\Scaling8 (RAW) C:\bigdb\cabC\Growing8 (RAW) C:\bigdb\dbbackups\backupC8 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
				30	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabC\Scaling9 (RAW) C:\bigdb\cabC\Growing9 (RAW) C:\bigdb\dbbackups\backupC9 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
				31	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabC\Scaling10 (RAW) C:\bigdb\cabC\Growing10 (RAW) C:\bigdb\dbbackups\backupC10 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
		HBA #4 port 2	RTS4200 #9	32	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabD\Scaling1 (RAW) C:\bigdb\cabD\Growing1 (RAW) C:\bigdb\dbbackups\backupD1 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
				33	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabD\Scaling2 (RAW) C:\bigdb\cabD\Growing2 (RAW) C:\bigdb\dbbackups\backupD2 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
				34	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabD\Scaling3 (RAW) C:\bigdb\cabD\Growing3 (RAW) C:\bigdb\dbbackups\backupD3 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
				35	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabD\Scaling4 (RAW) C:\bigdb\cabD\Growing4 (RAW) C:\bigdb\dbbackups\backupD4 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
				36	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabD\Scaling5 (RAW) C:\bigdb\cabD\Growing5 (RAW) C:\bigdb\dbbackups\backupD5 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
PCI Slot 2	HBA #5 port 1	RTS4200 #10	37	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabD\Scaling6(RAW) C:\bigdb\cabD\Growing6 (RAW) C:\bigdb\dbbackups\backupD6 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
			38	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabD\Scaling7 (RAW) C:\bigdb\cabD\Growing7 (RAW) C:\bigdb\dbbackups\backupD7 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
			39	6 x 73GB RTS422880 RAID 10	C:\bigdb\cabD\Scaling8 (RAW) C:\bigdb\cabD\Growing8 (RAW) C:\bigdb\dbbackups\backupD8 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	

**Table 2.3: Disk Rack Configuration (cont.)**

Cell #	Slot #	HBA #	Controller #	Drives		File System		Size	Use
				Disk #	Enclosure model RAID level	Partition			
		HBA #5port 2	RTS4200 #11	40	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabD\Scaling9 (RAW) C:\Bigdb\cabD\Growing9 (RAW) C:\Bigdb\dbbackups\backupD9 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
				41	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabD\Scaling10 (RAW) C:\Bigdb\cabD\Growing10 (RAW) C:\Bigdb\dbbackups\backupD10 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
				42	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabE\Scaling1 (RAW) C:\Bigdb\cabE\Growing1 (RAW) C:\Bigdb\dbbackups\backupE1 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
				43	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabE\Scaling2 (RAW) C:\Bigdb\cabE\Growing2 (RAW) C:\Bigdb\dbbackups\backupE2 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
				44	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabE\Scaling3 (RAW) C:\Bigdb\cabE\Growing3 (RAW) C:\Bigdb\dbbackups\backupE3 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
				45	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabE\Scaling4 (RAW) C:\Bigdb\cabE\Growing4 (RAW) C:\Bigdb\dbbackups\backupE4 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
	PCI Slot 3	HBA #6 port 1	RTS4200 #12	47	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabE\Scaling6 (RAW) C:\Bigdb\cabE\Growing6 (RAW) C:\Bigdb\dbbackups\backupE6 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
				48	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabE\Scaling7 (RAW) C:\Bigdb\cabE\Growing7 (RAW) C:\Bigdb\dbbackups\backupE7 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
				49	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabE\Scaling8 (RAW) C:\Bigdb\cabE\Growing8 (RAW) C:\Bigdb\dbbackups\backupE8 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
				50	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabE\Scaling9 (RAW) C:\Bigdb\cabE\Growing9 (RAW) C:\Bigdb\dbbackups\backupE9 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
				51	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabE\Scaling10 (RAW) C:\Bigdb\cabE\Growing10 (RAW) C:\Bigdb\dbbackups\backupE10 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
		HBA #6 port 2	RTS4200 #13	52	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabF\Scaling1 (RAW) C:\Bigdb\cabF\Growing1 (RAW) C:\Bigdb\dbbackups\backupF1 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
				53	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabF\Scaling2 (RAW) C:\Bigdb\cabF\Growing2 (RAW) C:\Bigdb\dbbackups\backupF2 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
				54	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabF\Scaling3 (RAW) C:\Bigdb\cabF\Growing3 (RAW) C:\Bigdb\dbbackups\backupF3 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
				55	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabF\Scaling4 (RAW) C:\Bigdb\cabF\Growing4 (RAW) C:\Bigdb\dbbackups\backupF4 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
				56	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabF\Scaling5 (RAW) C:\Bigdb\cabF\Growing5 (RAW) C:\Bigdb\dbbackups\backupF5 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
				PCI Slot 4	HBA #7 port 1	RTS4200 #14	57	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabF\Scaling6 (RAW) C:\Bigdb\cabF\Growing6 (RAW) C:\Bigdb\dbbackups\backupF6 (NTFS)
	58	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabF\Scaling7 (RAW) C:\Bigdb\cabF\Growing7 (RAW) C:\Bigdb\dbbackups\backupF7 (NTFS)				1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
	59	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabF\Scaling8 (RAW) C:\Bigdb\cabF\Growing8 (RAW) C:\Bigdb\dbbackups\backupF8 (NTFS)				1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
	60	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabF\Scaling9 (RAW) C:\Bigdb\cabF\Growing9 (RAW) C:\Bigdb\dbbackups\backupF9 (NTFS)				1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
	61	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabF\Scaling10 (RAW) C:\Bigdb\cabF\Growing10 (RAW) C:\Bigdb\dbbackups\backupF10 (NTFS)				1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
	HBA #7 port 2	RTS4200 #15	62		6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabG\Scaling1 (RAW) C:\Bigdb\cabG\Growing1 (RAW) C:\Bigdb\dbbackups\backupG1 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	
			63		6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabG\Scaling2 (RAW) C:\Bigdb\cabG\Growing2 (RAW) C:\Bigdb\dbbackups\backupG2 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb	



Table 2.3: Disk Rack Configuration (cont.)

Cell #	Slot #	HBA #	Controller #	Disk #	Drives	File System	Size	Use
					Enclosure model	RAID level		
Cdl2	PCI Slot 1	HBA #8 port 1	RTS4200 #16	64	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabG\Scaling3 (RAW) C:\Bigdb\cabG\Growing3 (RAW) C:\Bigdb\dbbackups\backupG3 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb
				65	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabG\Scaling4 (RAW) C:\Bigdb\cabG\Growing4 (RAW) C:\Bigdb\dbbackups\backupG4 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb
				66	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabG\Scaling5 (RAW) C:\Bigdb\cabG\Growing5 (RAW) C:\Bigdb\dbbackups\backupG5 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb
				67	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabG\Scaling6 (RAW) C:\Bigdb\cabG\Growing6 (RAW) C:\Bigdb\dbbackups\backupG6 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb
				68	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabG\Scaling7 (RAW) C:\Bigdb\cabG\Growing7 (RAW) C:\Bigdb\dbbackups\backupG7 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb
				69	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabG\Scaling8 (RAW) C:\Bigdb\cabG\Growing8 (RAW) C:\Bigdb\dbbackups\backupG8 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb
	PCI Slot 2	HBA #8 port 2	RTS4200 #17	70	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabG\Scaling9 (RAW) C:\Bigdb\cabG\Growing9 (RAW) C:\Bigdb\dbbackups\backupG9 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb
				71	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabG\Scaling10 (RAW) C:\Bigdb\cabG\Growing10 (RAW) C:\Bigdb\dbbackups\backupG10 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb
				72	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabH\Scaling1 (RAW) C:\Bigdb\cabH\Growing1 (RAW) C:\Bigdb\dbbackups\backupH1 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb
				73	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabH\Scaling2 (RAW) C:\Bigdb\cabH\Growing2 (RAW) C:\Bigdb\dbbackups\backupH2 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb
				74	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabH\Scaling3 (RAW) C:\Bigdb\cabH\Growing3 (RAW) C:\Bigdb\dbbackups\backupH3 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb
				75	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabH\Scaling4 (RAW) C:\Bigdb\cabH\Growing4 (RAW) C:\Bigdb\dbbackups\backupH4 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb
		HBA #9 port 1	RTS4200 #18	76	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabH\Scaling5 (RAW) C:\Bigdb\cabH\Growing5 (RAW) C:\Bigdb\dbbackups\backupH5 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb
				77	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabH\Scaling6 (RAW) C:\Bigdb\cabH\Growing6 (RAW) C:\Bigdb\dbbackups\backupH6 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb
				78	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabH\Scaling7 (RAW) C:\Bigdb\cabH\Growing7 (RAW) C:\Bigdb\dbbackups\backupH7 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb
				79	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabH\Scaling8 (RAW) C:\Bigdb\cabH\Growing8 (RAW) C:\Bigdb\dbbackups\backupH8 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb
				80	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabH\Scaling9 (RAW) C:\Bigdb\cabH\Growing9 (RAW) C:\Bigdb\dbbackups\backupH9 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb
				81	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabH\Scaling10 (RAW) C:\Bigdb\cabH\Growing10 (RAW) C:\Bigdb\dbbackups\backupH10 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb
HBA #9 port 2	RTS4200 #19	82	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabI\Scaling1 (RAW) C:\Bigdb\cabI\Growing1 (RAW) C:\Bigdb\dbbackups\backupI1 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb		
		83	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabI\Scaling2 (RAW) C:\Bigdb\cabI\Growing2 (RAW) C:\Bigdb\dbbackups\backupI2 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb		
		84	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabI\Scaling3 (RAW) C:\Bigdb\cabI\Growing3 (RAW) C:\Bigdb\dbbackups\backupI3 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb		
		85	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabI\Scaling4 (RAW) C:\Bigdb\cabI\Growing4 (RAW) C:\Bigdb\dbbackups\backupI4 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb		
		86	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabI\Scaling5 (RAW) C:\Bigdb\cabI\Growing5 (RAW) C:\Bigdb\dbbackups\backupI5 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb		
		87	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabI\Scaling6 (RAW) C:\Bigdb\cabI\Growing6 (RAW) C:\Bigdb\dbbackups\backupI6 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb		
PCI Slot 3	HBA #10 port 1	RTS4200 #20	87	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabI\Scaling6 (RAW) C:\Bigdb\cabI\Growing6 (RAW) C:\Bigdb\dbbackups\backupI6 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup,tempdb	

Table 2.3: Disk Rack Configuration (cont.)

Cell #	Slot #	HBA #	Controller #	Drives		Filesystem		Size	Use
				Disk #	Enclosure model RAID level	Partition			
	HBA #10 port 2	RTS4200 #21	88	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabI\Scaling7 (RAW) C:\Bigdb\cabI\Growing7 (RAW) C:\Bigdb\dbbackups\backupI7 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb		
			89	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabI\Scaling8 (RAW) C:\Bigdb\cabI\Growing8 (RAW) C:\Bigdb\dbbackups\backupI8 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb		
			90	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabI\Scaling9 (RAW) C:\Bigdb\cabI\Growing9 (RAW) C:\Bigdb\dbbackups\backupI9 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb		
			91	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabI\Scaling10 (RAW) C:\Bigdb\cabI\Growing10 (RAW) C:\Bigdb\dbbackups\backupI10 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb		
			92	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabI\Scaling1 (RAW) C:\Bigdb\cabI\Growing1 (RAW) C:\Bigdb\dbbackups\backupJ1 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb		
			93	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabI\Scaling2 (RAW) C:\Bigdb\cabI\Growing2 (RAW) C:\Bigdb\dbbackups\backupJ2 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb		
			94	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabI\Scaling3 (RAW) C:\Bigdb\cabI\Growing3 (RAW) C:\Bigdb\dbbackups\backupJ3 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb		
			95	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabI\Scaling4 (RAW) C:\Bigdb\cabI\Growing4 (RAW) C:\Bigdb\dbbackups\backupJ4 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb		
	96	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabI\Scaling5 (RAW) C:\Bigdb\cabI\Growing5 (RAW) C:\Bigdb\dbbackups\backupJ5 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb				
	PCI Slot 4	HBA #11 port 1	RTS4200 #22	97	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabJ\Scaling6 (RAW) C:\Bigdb\cabJ\Growing6 (RAW) C:\Bigdb\dbbackups\backupJ6 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
				98	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabJ\Scaling7 (RAW) C:\Bigdb\cabJ\Growing7 (RAW) C:\Bigdb\dbbackups\backupJ7 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
				99	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabJ\Scaling8 (RAW) C:\Bigdb\cabJ\Growing8 (RAW) C:\Bigdb\dbbackups\backupJ8 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
				100	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabJ\Scaling9 (RAW) C:\Bigdb\cabJ\Growing9 (RAW) C:\Bigdb\dbbackups\backupJ9 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
				101	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabJ\Scaling10 (RAW) C:\Bigdb\cabJ\Growing10 (RAW) C:\Bigdb\dbbackups\backupJ10 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
		HBA #11 port 2	RTS4200 #23	102	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabK\Scaling1 (RAW) C:\Bigdb\cabK\Growing1 (RAW) C:\Bigdb\dbbackups\backupK1 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
				103	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabK\Scaling2 (RAW) C:\Bigdb\cabK\Growing2 (RAW) C:\Bigdb\dbbackups\backupK2 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
				104	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabK\Scaling3 (RAW) C:\Bigdb\cabK\Growing3 (RAW) C:\Bigdb\dbbackups\backupK3 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
				105	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabK\Scaling4 (RAW) C:\Bigdb\cabK\Growing4 (RAW) C:\Bigdb\dbbackups\backupK4 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
				106	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabK\Scaling5 (RAW) C:\Bigdb\cabK\Growing5 (RAW) C:\Bigdb\dbbackups\backupK5 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
	Cell3	PCI Slot 1	HBA #12 port 1	RTS4200 #24	107	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabK\Scaling6 (RAW) C:\Bigdb\cabK\Growing6 (RAW) C:\Bigdb\dbbackups\backupK6 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
108					6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabK\Scaling7 (RAW) C:\Bigdb\cabK\Growing7 (RAW) C:\Bigdb\dbbackups\backupK7 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
109					6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabK\Scaling8 (RAW) C:\Bigdb\cabK\Growing8 (RAW) C:\Bigdb\dbbackups\backupK8 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
110					6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabK\Scaling9 (RAW) C:\Bigdb\cabK\Growing9 (RAW) C:\Bigdb\dbbackups\backupK9 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	

Table 2.3: Disk Rack Configuration (cont.)

Cell #	Slot #	HBA #	Controller #	Disk #	Drives	File System	Size	Use	
					Enclosure model	Partition			
					RAID level				
		HBA #12 port 2	RTS4200 #25	111	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabK\Scaling10 (RAW) C:\Bigdb\cabK\Growing10 (RAW) C:\Bigdb\dbbackups\backupK10 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
				112	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabL\Scaling1 (RAW) C:\Bigdb\cabL\Growing1 (RAW) C:\Bigdb\dbbackups\backupL1 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
				113	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabL\Scaling2 (RAW) C:\Bigdb\cabL\Growing2 (RAW) C:\Bigdb\dbbackups\backupL2 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
				114	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabL\Scaling3 (RAW) C:\Bigdb\cabL\Growing3 (RAW) C:\Bigdb\dbbackups\backupL3 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
				115	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabL\Scaling4 (RAW) C:\Bigdb\cabL\Growing4 (RAW) C:\Bigdb\dbbackups\backupL4 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
				116	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabL\Scaling5 (RAW) C:\Bigdb\cabL\Growing5 (RAW) C:\Bigdb\dbbackups\backupL5 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
		PCI Slot 2	HBA #13 port 1	RTS4200 #26	117	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabL\Scaling6 (RAW) C:\Bigdb\cabL\Growing6 (RAW) C:\Bigdb\dbbackups\backupL6 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
					118	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabL\Scaling7 (RAW) C:\Bigdb\cabL\Growing7 (RAW) C:\Bigdb\dbbackups\backupL7 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
					119	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabL\Scaling8 (RAW) C:\Bigdb\cabL\Growing8 (RAW) C:\Bigdb\dbbackups\backupL8 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
					120	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabL\Scaling9 (RAW) C:\Bigdb\cabL\Growing9 (RAW) C:\Bigdb\dbbackups\backupL9 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
					121	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabL\Scaling10 (RAW) C:\Bigdb\cabL\Growing10 (RAW) C:\Bigdb\dbbackups\backupL10 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
					HBA #13 port 2	RTS4200 #27	122	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabM\Scaling1 (RAW) C:\Bigdb\cabM\Growing1 (RAW) C:\Bigdb\dbbackups\backupM1 (NTFS)
			123	6 x 73GB RTS422880 RAID 10			C:\Bigdb\cabM\Scaling2 (RAW) C:\Bigdb\cabM\Growing2 (RAW) C:\Bigdb\dbbackups\backupM2 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
			124	6 x 73GB RTS422880 RAID 10			C:\Bigdb\cabM\Scaling3 (RAW) C:\Bigdb\cabM\Growing3 (RAW) C:\Bigdb\dbbackups\backupM3 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
			125	6 x 73GB RTS422880 RAID 10			C:\Bigdb\cabM\Scaling4 (RAW) C:\Bigdb\cabM\Growing4 (RAW) C:\Bigdb\dbbackups\backupM4 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
	126		6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabM\Scaling5 (RAW) C:\Bigdb\cabM\Growing5 (RAW) C:\Bigdb\dbbackups\backupM5 (NTFS)			1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
	PCI Slot 3		HBA #14 port 1	RTS4200 #28			127	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabM\Scaling6 (RAW) C:\Bigdb\cabM\Growing6 (RAW) C:\Bigdb\dbbackups\backupM6 (NTFS)
					128	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabM\Scaling7 (RAW) C:\Bigdb\cabM\Growing7 (RAW) C:\Bigdb\dbbackups\backupM7 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb
		129			6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabM\Scaling8 (RAW) C:\Bigdb\cabM\Growing8 (RAW) C:\Bigdb\dbbackups\backupM8 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
		130			6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabM\Scaling9 (RAW) C:\Bigdb\cabM\Growing9 (RAW) C:\Bigdb\dbbackups\backupM9 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
		131			6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabM\Scaling10 (RAW) C:\Bigdb\cabM\Growing10 (RAW) C:\Bigdb\dbbackups\backupM10 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
		HBA #14 port 2	RTS4200 #29	132	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabN\Scaling1 (RAW) C:\Bigdb\cabN\Growing1 (RAW) C:\Bigdb\dbbackups\backupN1 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
				133	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabN\Scaling2 (RAW) C:\Bigdb\cabN\Growing2 (RAW) C:\Bigdb\dbbackups\backupN2 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb	
					134	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabN\Scaling3 (RAW) C:\Bigdb\cabN\Growing3 (RAW) C:\Bigdb\dbbackups\backupN3 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup_tempdb

**Table 2.3: Disk Rack Configuration (cont.)**

Cell #	Slot #	HBA #	Controller #	Disk #	Drives	FileSystem	Size	Use		
					Enclosure model	RAID level			Partition	
				135	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabN\Scaling4 (RAW) C:\Bigdb\cabN\Growing4 (RAW) C:\Bigdb\dbbackups\backupN4 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb		
				136	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabN\Scaling5 (RAW) C:\Bigdb\cabN\Growing5 (RAW) C:\Bigdb\dbbackups\backupN5 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb		
	PCI Slot 4	HBA #15 port 1	RTS4200 #30	137	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabN\Scaling6 (RAW) C:\Bigdb\cabN\Growing6 (RAW) C:\Bigdb\dbbackups\backupN6 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb		
				138	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabN\Scaling7 (RAW) C:\Bigdb\cabN\Growing7 (RAW) C:\Bigdb\dbbackups\backupN7 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb		
				139	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabN\Scaling8 (RAW) C:\Bigdb\cabN\Growing8 (RAW) C:\Bigdb\dbbackups\backupN8 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb		
				140	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabN\Scaling9 (RAW) C:\Bigdb\cabN\Growing9 (RAW) C:\Bigdb\dbbackups\backupN9 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb		
				141	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabN\Scaling10 (RAW) C:\Bigdb\cabN\Growing10 (RAW) C:\Bigdb\dbbackups\backupN10 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb		
				HBA #15 port 2	RTS4200 #31	142	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabO\Scaling1 (RAW) C:\Bigdb\cabO\Growing1 (RAW) C:\Bigdb\dbbackups\backupO1 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb
						143	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabO\Scaling2 (RAW) C:\Bigdb\cabO\Growing2 (RAW) C:\Bigdb\dbbackups\backupO2 (NTFS)	1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb
	144	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabO\Scaling3 (RAW) C:\Bigdb\cabO\Growing3 (RAW) C:\Bigdb\dbbackups\backupO3 (NTFS)			1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb			
	145	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabO\Scaling4 (RAW) C:\Bigdb\cabO\Growing4 (RAW) C:\Bigdb\dbbackups\backupO4 (NTFS)			1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb			
	146	6 x 73GB RTS422880 RAID 10	C:\Bigdb\cabO\Scaling5 (RAW) C:\Bigdb\cabO\Growing5 (RAW) C:\Bigdb\dbbackups\backupO5 (NTFS)			1.96 GB 81.85 GB 116.13 GB	scaling_fg growing_fg backup, tempdb			

## 2.7. Database Interface

A statement must be provided in the **Report** that describes:

- o The **Database Interface** (e.g. embedded, call level) and access language (e.g. **SQL**, **COBOL**, read/write) used to implement **TPC-E transactions**. If more than one interface/access language is used to implement **TPC-E**, each interface/access language must be described and a list of which interface/access language is used with which **Transaction** type must be reported.
- o The data model implemented by the **DBMS** (e.g. relational, network, hierarchical). (9.3.2.7).

The methodology used to load the database must be reported. (9.3.2.8)

Microsoft SQL Server 2008 R2 is a relational database.

The client software interfaced to SQL Server through Stored Procedures invoked through ODBC calls embedded in the C++ application code.

The methodology used to load the database used the flat files option on the EGenLoader command line. This generates flat files then a bulk insert of the data into the tables. For a more detailed description, refer to **Clause2** of the *SupportingFiles* directory (**MSTPCE Database Setup Steps.pdf**)

## ***Clause 3: Transaction Related Items***

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### **3.1. Code Functionality**

*A statement that vendor-supplied code is functionally equivalent to **Pseudo-code** in the specification (see Clause 3.2.1.6) must be **reported** in the **Report**. (9.3.3.1)*

Secondary sponsor-supplied code is functionally equivalent to the Pseudo-code in the specification.

### **3.2. Database Requirements**

*A statement that the database footprint requirements (as described in Clause 3.3) were met must be **reported** in the **Report**. (9.3.3.2)*

The database footprint requirements were met.



## ***Clause 4: SUT, Driver, and Network Items***

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### **4.1. Network Configurations**

*The **Network** configurations of both the measured and **Priced Configurations** must be described and **reported** in the **Report**. This includes the mandatory **Network** between the **Driver** and **Tier A** (see Clause 4.2.2) and any optional **Database Server** interface networks (see Clause 4.1.3.12). (9.3.4.1).*

Figures 1.1 and 1.2 in Clause 1 of this report diagram the network configurations of the measured and priced configurations and represent the drivers connected via LAN replacing the user PCs that are directly connected via LAN. Network measured and priced configurations are the same.

Local area networks (LANs) were used in the configurations. The database server contained eight (8) 1 gigabit-per-second LAN adapters of which two (2) were used. Tier A contained four (4) 1 gigabit-per-second inbuilt LAN controllers. The Tier A client was directly connected to the Tier B database server through two (2) 1 gigabit-per-second connections. The Tier A client and the driver systems were connected through a 1 gigabit-per-second switch.





## ***Clause 5: EGen Items***

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### **5.1. EGen Version**

*The version of EGen used in the benchmark must be **reported** in the **Report** (see Clause 5.3.1). (9.3.5.1)*

The EGen version used in this test was 1.9.0.

### **5.2. EGen Code**

*A statement that all required TPC-provided EGen code was used in the benchmark must be **reported** in the **Report**. (9.3.5.2)*

All required TPC-provided EGen code was used in the benchmark.

### **5.3. EGen Modifications**

*If the **Test Sponsor** modified the EGen, a statement EGen has been modified must be **reported** in the **Report**. all formal waivers from the TPC documenting the allowed changes to EGen must also be **reported** in the **Report** (see Clause 5.3.7.1). If any of the changes to EGen do not have a formal waiver, that must also be **reported** in the **Report**. (9.3.5.3)*

No modifications were made to EGen.

### **5.4. EGenLoader Extension Code**

*If the **Test Sponsor** extended EGenLoader (as described in Appendix A.6), the use of the extended EGenLoader and the audit of the extended code by an **Auditor** must be **reported** in the **Report** (see Clause 5.7.4). (9.3.5.4)*

No extensions were made to the EGenLoader for this test.

### **5.5. EGenLoader Make/Project Files**

*The make/project files used to compile/link EGenLoader and EGen Validate must be **reported** in the **Supporting Files**. The compiler/linker options and flags used to compile/link EGen Objects for the SUT must be **reported** in the **Supporting Files**. (9.3.5.5)*

The project files (and solution file) for EGen are located in the "SupportingFiles\Clause3\prj\VS2008\" folder. The project files (and solution file) for the SUT CE\_Server are located in the SupportingFiles\Clause3\SUT\_CE\_Server\ folder. The project files (and solution file) for the SUT MEE\_Server are located in the SupportingFiles\Clause3\SUT\_MEE\_Server\ folder.



## **Clause 6: Performance Metrics & Response Time**

### **6.1. EGenDriver Instances**

*The number of **EGenDriverMEE** and **EGenDriverCE** instances used in the benchmark must be reported in the Report. (see Clause 6.2.5) (9.3.6.1)*

There were 16 EGenDriverMEEs with a dynamic number of instances and 16 EGenDriverCEs with a total of 1745 instances used in this benchmark run.

### **6.2. Measured Throughput (tpsE)**

*The Measured Throughput must be reported in the Report. (see Clause 6.7.1.2) (9.3.6.2)*

The measured tpsE was 2012.77.

### **6.3. Test Run Times/Steady State Measurement**

*A Test Run Graph of throughput versus elapsed wall clock time must be reported in the Report for the Trade-Result Transaction (see Clause 6.7.2). (9.3.6.3)*

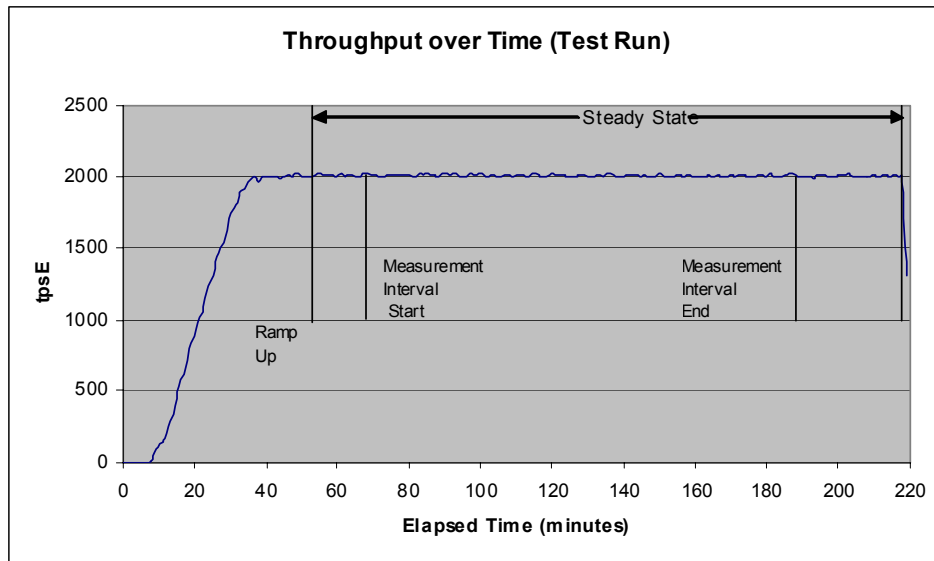
*The method used to determine that the SUT had reached a Steady State prior to commencing the Measurement Interval must be reported in the Report. (9.3.6.4)*

The transaction throughput rate (tpsE) and response time were relatively constant after the initial ramp-up period. The throughput and response time behavior were determined by examining data reported for each 60-second interval over the duration of the benchmark. Ramp-up and steady state are discernible in the graph presented in Figure 6.1

After the run, Steady State was confirmed by:

- Looking at the Test Run Graph and verifying that tpsE was steady prior to commencing the Measurement Interval.
- Calculated 60-minute average tpsE during the Steady State moving the time window 10 minutes each time. Then confirmed that the minimum 60-minute average tpsE was not less than 98% of the Reported Throughput, and that the maximum 60-minute average tpsE was not greater than 102% of the Reported Throughput.
- Calculated 10-minute average tpsE during the Steady State moving the window 1 minute each time. Then confirmed that the minimum 10-minute average tpsE was not less than 80% of the Reported Throughput, and the maximum 10-minute average tpsE was not greater than 120% of the Reported Throughput.

Figure 6.1: Test Run Graph



## 6.4. Work Measurements (Test Run)

*A description of how the work normally performed during a **Test Run**, actually occurred during the **Measurement Interval** must be **reported** in the **Report** (for example checkpointing, writing **Undo/Redo Log**, etc.). (9.3.6.5)*

The driver engines generated the required transactions and their input data. This data was timestamped. The response for the requested transaction was verified and time-stamped in the driver log files. Each driver engine maintains its own log file. Log file contents are consolidated for the reports.

The driver engines transactions were sent to the SUT processes running on the Tier A machines through Ethernet LANs. These Tier A SUT processes handled all requests to the database on the server. The SUT processes communicated with the database server over a TCP/IP network using Microsoft SQL Server ODBC library and RPC calls.

To perform checkpoints at specific intervals, the SQL Server recovery interval was set to 32767. Continuous checkpoints every 450 seconds were performed during the steady state before and during the measurement interval by a script running on the database server. SQL Server was started with trace flag 3502, which caused it to log the occurrence and duration of the checkpoints. This information was used to verify that the checkpoints occurred at the appropriate times during the test run.

During a checkpoint, SQL Server flushes all dirty pages from its cache to disk. It places a record in the database transaction log indicating that the checkpoint has completed and that all dirty pages for transactions which were committed prior to the checkpoint have been written to disk.

Data Maintenance was run every 60 seconds.

## 6.5. Transaction Report (Averages)

The recorded averages over the *Measurement Interval* for each of the *Transaction* input parameters specified by Clause 6.4.1 must be **reported** in the **Report**. (9.3.6.6)

Table 6.3 shows the **Transaction Report** Averages.

**Table 6.3: Transaction Parameters (Averages)**

Transaction	Overall	Parameter	Value	Range Check	Acceptable Range	
					Min	Max
Customer Position	Ok	By Tax ID	50.00%	Ok	48.00%	52.00%
		Get history	50.00%	Ok	48.00%	52.00%
Trade Lookup	Ok	Frame 1	29.99%	Ok	28.50%	31.50%
		Frame 2	30.02%	Ok	28.50%	31.50%
		Frame 3	30.00%	Ok	28.50%	31.50%
		Frame 4	10.00%	Ok	9.50%	10.50%
Market Watch	Ok	By Watch List	60.00%	Ok	57.00%	63.00%
		By Customer Account	34.99%	Ok	33.00%	37.00%
		By Industry	5.00%	Ok	4.50%	5.50%
Trade Update	Ok	Frame 1	33.00%	Ok	31.00%	35.00%
		Frame 2	33.01%	Ok	31.00%	35.00%
		Frame 3	33.98%	Ok	32.00%	36.00%
Security Detail	Ok	Access LOB	1.00%	Ok	0.90%	1.10%
Trade Order	Ok	By Non-Owner	9.99%	Ok	9.50%	10.50%
		By Company Name	40.02%	Ok	38.00%	42.00%
		Buy on Margin	8.00%	Ok	7.50%	8.50%
		Rollback	1.00%	Ok	0.94%	1.04%
		LIFO	35.02%	Ok	33.00%	37.00%
		Trade Quantity 100	25.01%	Ok	24.00%	26.00%
		Trade Quantity 200	24.98%	Ok	24.00%	26.00%
		Trade Quantity 400	25.02%	Ok	24.00%	26.00%
		Trade Quantity 800	24.98%	Ok	24.00%	26.00%
		Market Buy	29.99%	Ok	29.70%	30.30%
		Market Sell	30.02%	Ok	29.70%	30.30%
		Limit buy	20.01%	Ok	19.80%	20.20%
		Limit sell	9.98%	Ok	9.90%	10.10%
		Stop Loss	10.00%	Ok	9.90%	10.10%



# ***Clause 7: Transaction and System Properties***

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## **7.1. Transaction System Properties (ACID)**

*The results of the ACID tests must be reported in the Report along with a description of how the ACID requirements were met, and how the ACID tests were run. (9.3.7.1)*

The TPC Benchmark™ E Standard Specification defines a set of transaction processing system properties that a system under test (SUT) must support during the execution of the benchmark. Those properties are Transaction System Properties (ACID) and Redundancy.

This section defines each of these properties, describes the steps taken to ensure that they were present during the test and describes a series of tests done to demonstrate compliance with the specification. See file *MSTPCE ACID Procedures.pdf* in the *SupportingFiles* directory (Clause 7).

## **7.2. Redundancy Level**

*The Test Sponsor must report in the Report the Redundancy Level (see Clause 7.5.7.1) and describe the Data Accessibility test(s) used to demonstrate compliance. (9.3.7.2)*

Redundancy level 1 was used for all tests.

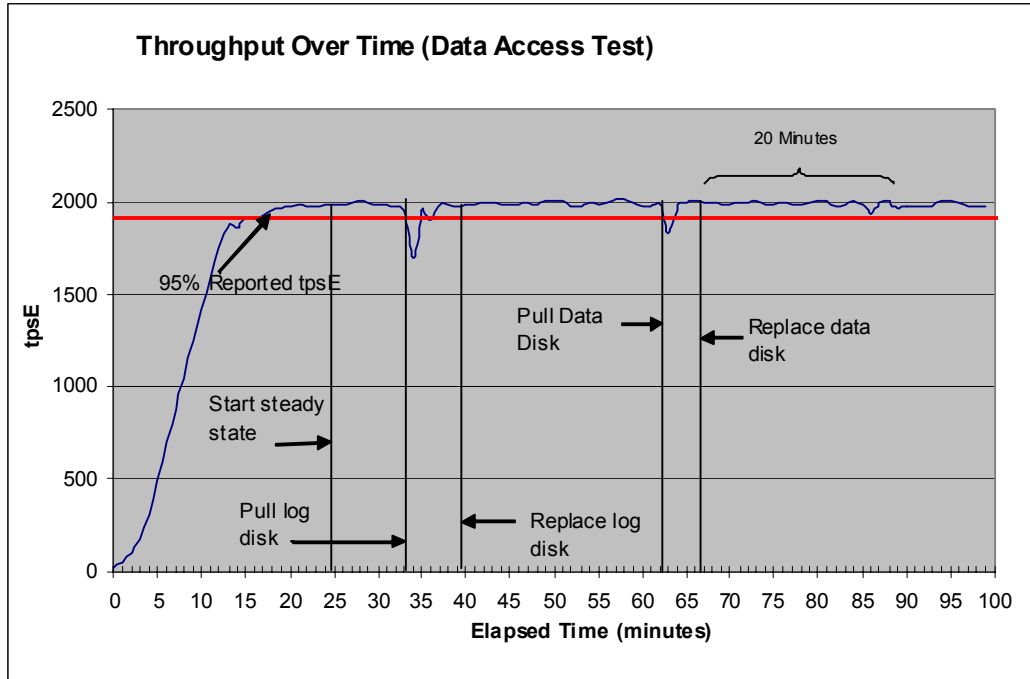
The following is a description of the Data Accessibility Tests:

1. The rows in the Settlement table were counted to determine the initial count of completed trades present in the database (count1).
2. The benchmark was executed above 95% load with the same number of configured customers and driver load used for the measurement interval.
3. After five minutes of running at steady state, a hot-pluggable log disk was removed from the disk cabinet.
4. A spare disk drive was installed in the RAID subsystem and configured to replace the faulty drive.
5. The Drivers continued running for a minimum of 20 minutes with no errors on the OS or SQL Server. The performance was at or above 95% of Reported throughput this period.
6. A data disk was removed from the disk cabinet.
7. A spare disk drive was installed in the RAID subsystem and configured to replace the faulty drive.
8. The Drivers continued running for a minimum of 20 minutes with no errors on the OS or SQL Server.
9. The Drivers were stopped gracefully.
10. No errors were reported by the Drivers during steps 2 through 8.
11. Step 1 was repeated to determine the total number of completed trades present in the database (count2).
12. Count2 minus count1 was verified to be equal to the number of successful Trade-Result transaction records in the driver log file.
13. The recovery process completed.

### 7.3. Data Accessibility Graph

A **Data Accessibility** Graph for each run demonstrating a Redundancy Level must be **reported** in the **Report** (see Clause 7.5.7.2). (9.3.7.3)

Figure 7-2: Data Accessibility Test Run



### 7.4. Business Recovery Tests

The **Test Sponsor** must describe in the **Report** the test(s) used to demonstrate **Business Recovery**. (9.3.7.4)

Removing the primary power to the SUT while the benchmark was executing induced this failure:

1. The rows in the Settlement table were summed up to determine the initial count of completed trades present in the database (count1).
2. The benchmark was executed above 95% load with the same number of configured customers and driver load used for the measurement interval for a minimum of twenty minutes.
3. The primary power to the Tier B server and the Tier A client was removed.
4. After transaction failures were noted by the drivers, the drivers were stopped.
5. Power was restored to the SUT, the system rebooted, SQL Server was restarted, and automatic database recovery was performed. The database recovery used the transaction log to reapply all committed transactions and rollback any (in progress) uncommitted transactions, so that the database disks were correct.
6. Business Recovery started when SQL Server reported "Starting up database 'master'". Database recovery ended when SQL Server reported "Recovery is complete".
7. The Trade-Cleanup Transaction was executed.



8. After Trade-Cleanup finished, SQL Server was restarted and the benchmark was executed above 95% load with same number of configured customers and driver load used for the measurement interval for a minimum of twenty minutes.
9. Business Recovery ended successfully.
10. The drivers were stopped gracefully.
11. No errors were reported by the Drivers during steps 8 through 9.
12. Step 1 was repeated to determine the total number of completed trades present in the database (count2).
13. Count2 minus count1 was not less than the aggregate number of successful Trade-Result transaction records in the driver log file for the runs performed in step 2 and step 8.
14. Finally, consistency conditions as specified in Clause 7.3.1.1 were executed to verify that the database was consistent.

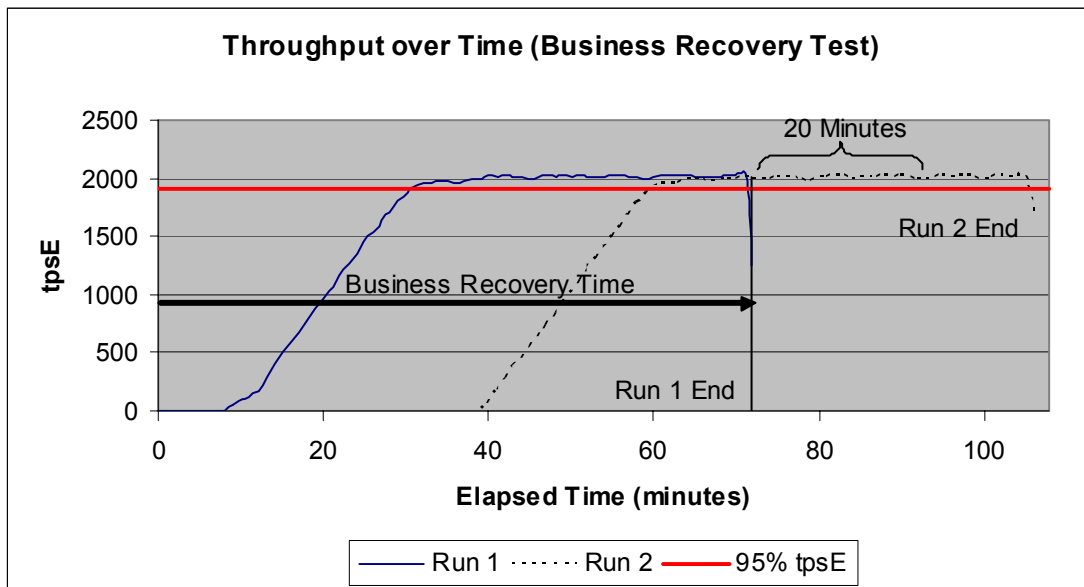
## 7.5. Business Recovery Time

*The **Business Recovery Time** must be reported on the Executive Summary Statement and in the **Report**. If the **failures** described in Clauses 7.5.2.2, 7.5.2.3, and 7.5.2.4 were **not** combined into one Durability Test (usually powering off the database during the run), then the Business Recovery Time for the failure described for instantaneous interruption is the **Business Recovery Time** that must be reported in the **Executive Summary Statement**. All the **Business Recovery Times** for each test requiring Business Recovery must be **reported in the Report**. (9.3.7.5)*

*A **Business Recovery Time Graph** (see Clause 7.5.7.4) must be reported in the **Report** for all **Business Recovery Tests**. (9.3.7.6)*

Business Recovery time was 01:11:57. This time is also reported in the Executive Summary Statement.

**Figure 7-2: Business Recovery Time**





# Clause 8: Pricing

## 8.1. 60-Day Space

Details of the **60-Day Space** computations (see Clause 8.2.2) along with proof that the database is configured to sustain a **Business Day** of growth (see Clause 6.6.6.1) must be reported in the Report. (9.3.8.1)

Figure 8.1 contains the details of the 60-Day Space Requirements.

**Figure 8-1: Disk Space Requirements**

Customers Used	1,025,000		Performance	2012.77		tpsE	
Growing File Group	Initial Rows	Data (KB)	Index size (KB)	Extra 5% (KB)	Total + 5% (KB)	After run (KB)	Growth (KB)
CASH_TRANSACTION	16,294,994,199	1,682,115,224	3,552,784		1,685,668,008	1,690,069,520	4,401,512
HOLDING	906,842,419	60,460,608	38,293,280		98,753,888	100,212,640	1,458,752
HOLDING_HISTORY	23,737,047,918	863,165,744	498,912,576		1,362,078,320	1,366,824,888	4,746,568
HOLDING_SUMMARY	50,974,251	2,223,472	10,832		2,234,304	2,234,304	0
SETLEMENT	17,712,000,000	938,918,712	1,981,360		940,900,072	943,502,488	2,602,416
TRADE	17,712,000,000	2,113,333,176	1,063,156,136		3,176,489,312	3,187,693,304	11,203,992
TRADE_HISTORY	42,508,800,690	1,278,460,544	3,337,448		1,281,797,992	1,286,230,920	4,432,928
TRADE_REQUEST	0	0	0		0	40,552	40,552
<b>Scaling File Group</b>							
ACCOUNT_PERMISSION	7,277,539	619,760	5,936	31,285	656,981	625,984	288
ADDRESS	1,537,504	88,928	2,704	4,582	96,214	91,688	56
BROKER	10,250	752	1,008	88	1,848	1,760	0
COMPANY	512,500	111,816	36,400	7,411	155,627	148,232	16
COMPANY_COMPETITOR	1,537,500	41,504	37,664	3,958	83,126	79,168	0
CUSTOMER	1,025,000	173,904	50,192	11,205	235,301	224,104	8
CUSTOMER_ACCOUNT	5,125,000	464,664	103,384	28,402	596,450	568,056	8
CUSTOMER_TAXRATE	2,050,000	43,008	2,704	2,286	47,998	45,864	152
DAILY_MARKET	91,627,312	47,454,864	169,152	2,381,201	50,005,217	47,625,416	1,400
FINANCIAL	10,250,000	1,206,272	6,080	60,618	1,272,970	1,212,688	336
LAST_TRADE	702,125	43,864	2,704	2,328	48,896	46,568	0
NEWS_ITEM	1,025,000	111,129,856	3,920	5,556,689	116,690,465	111,133,832	56
NEWS_XREF	1,025,000	25,800	2,704	1,425	29,929	28,504	0
SECURITY	702,125	111,056	29,592	7,032	147,680	140,672	24
WATCH_ITEM	102,484,524	2,859,400	13,128	143,626	3,016,154	2,872,816	288
WATCH_LIST	1,025,000	25,744	25,016	2,538	53,298	50,760	0
<b>Fixed File Group</b>							
CHARGE	15	8	8	1	17	16	0
COMMISSION_RATE	240	16	16	2	34	32	0
EXCHANGE	4	8	8	1	17	16	0
INDUSTRY	102	8	24	2	34	32	0
SECTOR	12	8	24	2	34	32	0
STATUS_TYPE	5	8	8	1	17	16	0
TAXRATE	320	24	16	2	42	56	16
TRADE_TYPE	5	8	1,032	52	1,092	1,040	0
ZIP_CODE	14,741	488	16	25	529	504	0
<b>TOTALS (KB)</b>		<b>7,103,079,248</b>	<b>1,609,737,856</b>	<b>8,244,760</b>	<b>8,721,061,864</b>		
<b>Initial Database Size (MB)</b>		<b>8,508.610</b>	<b>8,309 GB</b>	<b>8.11 TB</b>			
<b>Db/Filegroups</b>	<b>LUN Count</b>	<b>Partition Size(KB)</b>	<b>MB allocated</b>	<b>MB Loaded</b>	<b>MB Loaded +5%</b>	<b>Ending size</b>	<b>8 Hours</b>
Growing_FG	145	85,811,200	12,151,000	8,347,580	8,347,580	8,375,790	8,416,366
Scaling_FG	145	2,048,000	290,000	161,029	169,080	161,031	161,035
Fixed_FG	1	512,000	500	1.69	2	2	2
<b>Settlements</b>	<b>23,772,895</b>						
<b>Initial Growing Space (MB)</b>	<b>8,347,580</b>						
<b>Final Growing Space (MB)</b>	<b>8,375,790</b>	<b>Data LUNS</b>	<b>145</b>	<b>Initial Log size (MB)</b>	<b>3,845</b>	<b>Log Disks</b>	<b>10</b>
<b>Delta (MB)</b>	<b>28,210</b>	<b>Disks per LUN</b>	<b>6</b>	<b>Final Log size (MB)</b>	<b>158,273</b>	<b>Disk Capacity (MB)</b>	<b>138,841</b>
<b>Data Space per TR (MB)</b>	<b>0.001186632</b>	<b>Disk Capacity (MB)</b>	<b>68,881</b>	<b>Log Growth (MB)</b>	<b>154,427</b>	<b>RAID10 overhead</b>	<b>50%</b>
<b>1 Day Data Growth (MB)</b>	<b>68,786</b>	<b>RAID10 overhead</b>	<b>50%</b>	<b>Log Growth/TR (MB)</b>	<b>0.006495947129</b>	<b>Tempdb Log</b>	<b>-</b>
<b>60 Day Space (MB)</b>	<b>12,635,797</b>	<b>Total Space (MB)</b>	<b>29,963,235</b>	<b>1 Day log space (MB)</b>	<b>376,556</b>	<b>Log Space (MB)</b>	<b>694,207</b>

## 8.2. Attestation Letter

*The Auditor's Attestation Letter, which indicates compliance, must be included in the Report. (9.3.8.2)*

Lorna Livingtree, a TPC certified auditor, audited this implementation of the TPC Benchmark™ E on the Unisys ES7000 Model 7600R Enterprise Server (16s) representing:

Performance Metrics, Inc.  
P.O. Box 984  
Klamath, CA 95548-0984

Phone: (707) 482-0523  
Fax: (707) 482-0575  
Email: Lorna@PerfMetrics.com  
The attestation letter is shown near the end of this section.



**PERFORMANCE METRICS INC.**  
**TPC Certified Auditors**

November 02, 2009

Mr. Jerrold Buggert  
Director of Product Development & Technology Performance Group  
Unisys Corporation  
25725 Jeronimo Road  
Mission Viejo, CA 92691

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

Platform: Unisys ES7000 Model 7600R Enterprise (16s)  
Database Manager: Microsoft SQL Server 2008 R2 Datacenter Edition  
Operating System: Microsoft Windows Server 2008 R2 Datacenter Edition

Server (Tier B): ES7000 Model 7600R			
CPU's	Memory	Disks (total)	tpsE
16 Intel @ 2.66 GHz	1024 GB	12 @ 146 GB 872 @ 73 GB	<b>2012.77</b>
Clients (Tier A): ES3000 Model 3560R			
2 Intel @ 2.26 GHz	6 GB	1 @ 73 GB	Na

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

- All EGen components were verified to be version 1.9.0.
- The database files were properly sized and populated for 1,025,000 customers.
- The transaction components were properly implemented.
- The required network between the driver and the transaction harness was configured.
- The ACID properties were successfully demonstrated.
- It was verified that the trade-cleanup completed successfully before the test run.
- The test run met all the requirements for timing, mix, and response times.
- Input data was generated according to the specified percentages.

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**TPC Certified Auditors**

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- One and only one Data-Maintenance process was running during the test run.
- There were no inactive load units during the test run.
- Eight hours of mirrored log space was present on the measured system.
- Eight hours of growth space was present on the measured system.
- The data for the 60 day space calculation was verified.
- There were 1745 user contexts present on the system.
- The measurement interval portion of the test was 120 minutes.
- One checkpoint was taken after steady state and before the measured interval.
- Checkpoint interval was verified to be less than 7.5 minutes.
- The system pricing was checked for major components and maintenance.
- Third party quotes were verified for compliance.
- The FDR was reviewed and verified as required.

Auditor Notes:

The tested system had 870 disks at 73GB. Of these, 540 were older style 73GB drives and are no longer orderable. The technical specifications were reviewed and the new drives meet or exceed all technical details. Data collected during a TPC-E performance run demonstrated the priced disks were performing better than the obsolete disks. Therefore 540 disks of the new style were substituted one for one in the priced configuration. This disks substitution meets the substitution requirements.

Sincerely,



Lorna Livingtree  
Auditor

# Clause 9: Supporting Files

## 9.0. Supporting Files Index Table

An index for all files required by Clause 9.4 **Supporting Files** must be provided in the **Report**. The **Supporting Files** index is presented in a tabular format where the columns specify the following:

- o The first column denotes the clause in the TPC Specification
- o The second column provides a short description of the file contents
- o The third column contains the path name for the file starting at the SupportingFiles directory.

If there are no **Supporting Files** provided then the description column must indicate that there is no supporting file and the path name column must be left blank. (9.3.9)

The **Supporting Files** Index Table must be provided in the **Report**. (9.3.9.1)

The **Supporting Files** Index table is shown below. Individual files within the htm file can be viewed by clicking on the active links under *Pathname* in the file.

**Table 9.1: Index of Supporting Files**

Clause	Description	Pathname
Introduction	Disk Configuration	SupportingFiles\SupportingFilesIndex.htm SupportingFiles\Introduction\DatabaseDisks\disks.txt SupportingFiles\Introduction\DatabaseDisks\formats.cmd SupportingFiles\Introduction\DatabaseDisks\in.put.txt SupportingFiles\Introduction\DatabaseDisks\mkdir.cmd SupportingFiles\Introduction\DatabaseDisks\Mounts.txt
	Hardware Configuration	SupportingFiles\Introduction\Hardware_Configuration\Hardware_Configuration.pdf SupportingFiles\Introduction\Hardware_Configuration\Raid_Configuration.pdf
	Software Configuration Documents	SupportingFiles\Introduction\Software_Configuration\Software_Configuration.pdf
	Checkpoint scripts	SupportingFiles\Introduction\Software_Configuration\Checkpoint.cmd SupportingFiles\Introduction\Software_Configuration\Checkpoint_TPCE_Database.SQL
	Database Tunables	SupportingFiles\Introduction\Software_Configuration\SQLaliases.reg SupportingFiles\Introduction\Software_Configuration\SQLServerNodeConfiguration.reg SupportingFiles\Introduction\Software_Configuration\SQLServer_IPAll.reg SupportingFiles\Introduction\Software_Configuration\sql_config.sql SupportingFiles\Introduction\Software_Configuration\STARTSQL_CMD
	Tier-A Scripts	SupportingFiles\Introduction\Software_Configuration\TierA_Start-CE.cmd SupportingFiles\Introduction\Software_Configuration\TierA_Start-MEE.cmd
	System Information	SupportingFiles\Introduction\Software_Configuration\systeminfo_DBMS.txt SupportingFiles\Introduction\Software_Configuration\systeminfo_tierA.txt
	Clause 2	Database Setup Procedure
Clause 2	Database Audit Scripts	SupportingFiles\Clause2\Audit_Scripts\Database\Create_DB_Audit_Tables.SQL SupportingFiles\Clause2\Audit_Scripts\Database\DB_Check.sql SupportingFiles\Clause2\Audit_Scripts\Database\DB_FK_Constraints.sql SupportingFiles\Clause2\Audit_Scripts\Database\DB_Primary_Key_Check.SQL SupportingFiles\Clause2\Audit_Scripts\Database\DB_Tables.sql SupportingFiles\Clause2\Audit_Scripts\Database\Drop_DB_Audit_Tables.SQL SupportingFiles\Clause2\Audit_Scripts\Database\Insert_Duplicates_Tests.sql SupportingFiles\Clause2\Audit_Scripts\Database\Referential_Integrity_Tests.sql
	Database Space Scripts	SupportingFiles\Clause2\Audit_Scripts\Space\SPFiles.sql SupportingFiles\Clause2\Audit_Scripts\Space\SPLog.sql SupportingFiles\Clause2\Audit_Scripts\Space\SPUsed.sql
	Database Creation Scripts	SupportingFiles\Clause2\1025000.Cust\Database\Backup_Database.sql SupportingFiles\Clause2\1025000.Cust\Database\Create_Database.sql SupportingFiles\Clause2\1025000.Cust\Database\flatfiles.txt SupportingFiles\Clause2\1025000.Cust\Database\Restore_Database.sql SupportingFiles\Clause2\1025000.Cust\Database\tempdb.sql
	Database Constraints Scripts	SupportingFiles\Clause2\DDL\Create_Check_Constraints_Fixed.sql SupportingFiles\Clause2\DDL\Create_Check_Constraints_Growing.sql

**Table 9.1: Index of Supporting Files (cont.)**

Clause	Description	Pathname
		SupportingFiles\Clause2\DDL\Create_Check_Constraints_Scaling.sql SupportingFiles\Clause2\DDL\Create_FK_Constraints.sql SupportingFiles\Clause2\DDL\Drop_FK_Constraints.sql
	Table Creation Scripts	SupportingFiles\Clause2\DDL\Create_Tables_Fixed.sql SupportingFiles\Clause2\DDL\Create_Tables_Growing.sql SupportingFiles\Clause2\DDL\Create_Tables_Scaling.sql SupportingFiles\Clause2\DDL\Create_Tables_Scaling_Flat.sql SupportingFiles\Clause2\DDL\Create_TPC_E_Types.sql SupportingFiles\Clause2\DDL\Drop_Tables_Fixed.sql SupportingFiles\Clause2\DDL\Drop_Tables_Growing.sql SupportingFiles\Clause2\DDL\Drop_Tables_Scaling.sql SupportingFiles\Clause2\DDL\Convert_NI_ITEM_Data.SQL SupportingFiles\Clause2\DDL\BulkInsert_1.sql SupportingFiles\Clause2\DDL\BulkInsert_10.sql SupportingFiles\Clause2\DDL\BulkInsert_100.sql SupportingFiles\Clause2\DDL\BulkInsert_101.sql SupportingFiles\Clause2\DDL\BulkInsert_102.sql SupportingFiles\Clause2\DDL\BulkInsert_103.sql SupportingFiles\Clause2\DDL\BulkInsert_104.sql SupportingFiles\Clause2\DDL\BulkInsert_105.sql SupportingFiles\Clause2\DDL\BulkInsert_106.sql SupportingFiles\Clause2\DDL\BulkInsert_107.sql SupportingFiles\Clause2\DDL\BulkInsert_108.sql SupportingFiles\Clause2\DDL\BulkInsert_109.sql SupportingFiles\Clause2\DDL\BulkInsert_11.sql SupportingFiles\Clause2\DDL\BulkInsert_110.sql SupportingFiles\Clause2\DDL\BulkInsert_111.sql SupportingFiles\Clause2\DDL\BulkInsert_112.sql SupportingFiles\Clause2\DDL\BulkInsert_113.sql SupportingFiles\Clause2\DDL\BulkInsert_114.sql SupportingFiles\Clause2\DDL\BulkInsert_115.sql SupportingFiles\Clause2\DDL\BulkInsert_116.sql SupportingFiles\Clause2\DDL\BulkInsert_117.sql SupportingFiles\Clause2\DDL\BulkInsert_118.sql SupportingFiles\Clause2\DDL\BulkInsert_119.sql SupportingFiles\Clause2\DDL\BulkInsert_12.sql SupportingFiles\Clause2\DDL\BulkInsert_120.sql SupportingFiles\Clause2\DDL\BulkInsert_121.sql SupportingFiles\Clause2\DDL\BulkInsert_122.sql SupportingFiles\Clause2\DDL\BulkInsert_123.sql SupportingFiles\Clause2\DDL\BulkInsert_124.sql SupportingFiles\Clause2\DDL\BulkInsert_125.sql SupportingFiles\Clause2\DDL\BulkInsert_126.sql SupportingFiles\Clause2\DDL\BulkInsert_127.sql SupportingFiles\Clause2\DDL\BulkInsert_128.sql SupportingFiles\Clause2\DDL\BulkInsert_129.sql SupportingFiles\Clause2\DDL\BulkInsert_13.sql SupportingFiles\Clause2\DDL\BulkInsert_130.sql SupportingFiles\Clause2\DDL\BulkInsert_131.sql SupportingFiles\Clause2\DDL\BulkInsert_132.sql SupportingFiles\Clause2\DDL\BulkInsert_133.sql SupportingFiles\Clause2\DDL\BulkInsert_134.sql SupportingFiles\Clause2\DDL\BulkInsert_135.sql SupportingFiles\Clause2\DDL\BulkInsert_136.sql SupportingFiles\Clause2\DDL\BulkInsert_137.sql SupportingFiles\Clause2\DDL\BulkInsert_138.sql SupportingFiles\Clause2\DDL\BulkInsert_139.sql SupportingFiles\Clause2\DDL\BulkInsert_14.sql SupportingFiles\Clause2\DDL\BulkInsert_140.sql SupportingFiles\Clause2\DDL\BulkInsert_15.sql SupportingFiles\Clause2\DDL\BulkInsert_16.sql SupportingFiles\Clause2\DDL\BulkInsert_17.sql SupportingFiles\Clause2\DDL\BulkInsert_18.sql SupportingFiles\Clause2\DDL\BulkInsert_19.sql SupportingFiles\Clause2\DDL\BulkInsert_2.sql SupportingFiles\Clause2\DDL\BulkInsert_20.sql SupportingFiles\Clause2\DDL\BulkInsert_21.sql SupportingFiles\Clause2\DDL\BulkInsert_22.sql SupportingFiles\Clause2\DDL\BulkInsert_23.sql





**Table 9.1: Index of Supporting Files (cont.)**

Clause	Description	Pathname
		SupportingFiles\Clause2\DDL\BulkInsert_87.sql SupportingFiles\Clause2\DDL\BulkInsert_88.sql SupportingFiles\Clause2\DDL\BulkInsert_89.sql SupportingFiles\Clause2\DDL\BulkInsert_9.sql SupportingFiles\Clause2\DDL\BulkInsert_90.sql SupportingFiles\Clause2\DDL\BulkInsert_91.sql SupportingFiles\Clause2\DDL\BulkInsert_92.sql SupportingFiles\Clause2\DDL\BulkInsert_93.sql SupportingFiles\Clause2\DDL\BulkInsert_94.sql SupportingFiles\Clause2\DDL\BulkInsert_95.sql SupportingFiles\Clause2\DDL\BulkInsert_96.sql SupportingFiles\Clause2\DDL\BulkInsert_97.sql SupportingFiles\Clause2\DDL\BulkInsert_98.sql SupportingFiles\Clause2\DDL\BulkInsert_99.sql
	Index Creation Scripts	SupportingFiles\Clause2\DDL\Unified_Create_Indexes.sql
	Misc Scripts	SupportingFiles\Clause2\Utility\Checkpoint_TPCE_Database.SQL SupportingFiles\Clause2\Utility\Count_Customers.sql SupportingFiles\Clause2\Utility\Create_DM_Audit_Table.sql SupportingFiles\Clause2\Utility\Create_TID_Ranges_Table.sql SupportingFiles\Clause2\Utility\Create_Timer_Table.sql SupportingFiles\Clause2\Utility\Create_TL_TU_Warnings_Table.sql SupportingFiles\Clause2\Utility\Create_TPCE_VERSIONS_Table.sql SupportingFiles\Clause2\Utility\Database_Options_1.sql SupportingFiles\Clause2\Utility\Database_Options_2.sql SupportingFiles\Clause2\Utility\Drop_and_Create_TPCE_INFO.sql SupportingFiles\Clause2\Utility\End_Load_Timer.sql SupportingFiles\Clause2\Utility\Get_Next_T_ID.sql SupportingFiles\Clause2\Utility\Install_Load_Timer_Proc.sql SupportingFiles\Clause2\Utility\Load_TPCE_Info.sql SupportingFiles\Clause2\Utility\Output_TPCE_VERSIONS_Table.SQL SupportingFiles\Clause2\Utility\SQL_Server_Configuration.sql SupportingFiles\Clause2\Utility\Trade_Cleanup.sql SupportingFiles\Clause2\Utility\Version.sql
Clause 3	Transaction Frames	SupportingFiles\Clause3\BrokerVolume.sql SupportingFiles\Clause3\CustomerPosition.sql SupportingFiles\Clause3\DataMaintenance.sql SupportingFiles\Clause3\Get_Next_T_ID.sql SupportingFiles\Clause3\MarketFeed.sql SupportingFiles\Clause3\MarketWatch.sql SupportingFiles\Clause3\SecurityDetail.sql SupportingFiles\Clause3\TradeLookup.sql SupportingFiles\Clause3\TradeOrder.sql SupportingFiles\Clause3\TradeResult.sql SupportingFiles\Clause3\TradeStatus.sql SupportingFiles\Clause3\TradeUpdate.sql SupportingFiles\Clause3\Trade_Cleanup.sql
	BaseServer	SupportingFiles\Clause3\BaseServer\BaseServer.cpp SupportingFiles\Clause3\BaseServer\BaseServer.h SupportingFiles\Clause3\BaseServer\BaseServer.vcproj SupportingFiles\Clause3\BaseServer\stdafx.cpp SupportingFiles\Clause3\BaseServer\stdafx.h SupportingFiles\Clause3\BaseServer\SUTServersLocals.h
	EGen Make/Project files	SupportingFiles\Clause3\prj\Makefile SupportingFiles\Clause3\prj\VS2008\EGen.sln SupportingFiles\Clause3\prj\VS2008\EGen.suo SupportingFiles\Clause3\prj\VS2008\EGenBaseLoader.vcproj SupportingFiles\Clause3\prj\VS2008\EGenDriverCELib.vcproj SupportingFiles\Clause3\prj\VS2008\EGenDriverDMLib.vcproj SupportingFiles\Clause3\prj\VS2008\EGenDriverMEELib.vcproj SupportingFiles\Clause3\prj\VS2008\EGenFlatFileLoad.vcproj SupportingFiles\Clause3\prj\VS2008\EGenGenerateAndLoad.vcproj SupportingFiles\Clause3\prj\VS2008\EGenLoader.vcproj SupportingFiles\Clause3\prj\VS2008\EGenLogger.vcproj SupportingFiles\Clause3\prj\VS2008\EGenMSSQLLoader.vcproj SupportingFiles\Clause3\prj\VS2008\EGenNullLoader.vcproj SupportingFiles\Clause3\prj\VS2008\EGenTables.vcproj SupportingFiles\Clause3\prj\VS2008\EGenUtilities.vcproj SupportingFiles\Clause3\prj\VS2008\EGenValidate.vcproj
	SUT CE Server	SupportingFiles\Clause3\SUT_CE_Server\CEServer.cpp

**Table 9.1: Index of Supporting Files (cont.)**

Clause	Description	Pathname
		SupportingFiles\Clause3\SUT_CE_Server\CEServer.h SupportingFiles\Clause3\SUT_CE_Server\CEServerMain.cpp SupportingFiles\Clause3\SUT_CE_Server\PortDefinitions.h SupportingFiles\Clause3\SUT_CE_Server\stdafx.cpp SupportingFiles\Clause3\SUT_CE_Server\stdafx.h SupportingFiles\Clause3\SUT_CE_Server\SUTServer.sln SupportingFiles\Clause3\SUT_CE_Server\SUTServer.suo SupportingFiles\Clause3\SUT_CE_Server\SUTStructs.h SupportingFiles\Clause3\SUT_CE_Server\SUT_CE_Server.vcproj
	SUT_MEE_Server	SupportingFiles\Clause3\SUT_MEE_Server\MEESEServer.cpp SupportingFiles\Clause3\SUT_MEE_Server\MEESEServer.h SupportingFiles\Clause3\SUT_MEE_Server\MEESEServerMain.cpp SupportingFiles\Clause3\SUT_MEE_Server\stdafx.cpp SupportingFiles\Clause3\SUT_MEE_Server\stdafx.h SupportingFiles\Clause3\SUT_MEE_Server\SUT_MEE_Server.vcproj
	TransactionsSP	SupportingFiles\Clause3\TransactionsSP\BrokerVolumeDB_SP.cpp SupportingFiles\Clause3\TransactionsSP\BrokerVolumeDB_SP.h SupportingFiles\Clause3\TransactionsSP\CheckpointDB_SP.cpp SupportingFiles\Clause3\TransactionsSP\CheckpointDB_SP.h SupportingFiles\Clause3\TransactionsSP\CustomerPositionDB_SP.cpp SupportingFiles\Clause3\TransactionsSP\CustomerPositionDB_SP.h SupportingFiles\Clause3\TransactionsSP\DataMaintenanceDB_SP.cpp SupportingFiles\Clause3\TransactionsSP\DataMaintenanceDB_SP.h SupportingFiles\Clause3\TransactionsSP\MarketFeedDB_SP.cpp SupportingFiles\Clause3\TransactionsSP\MarketFeedDB_SP.h SupportingFiles\Clause3\TransactionsSP\MarketWatchDB_SP.cpp SupportingFiles\Clause3\TransactionsSP\MarketWatchDB_SP.h SupportingFiles\Clause3\TransactionsSP\SecurityDetailDB_SP.cpp SupportingFiles\Clause3\TransactionsSP\SecurityDetailDB_SP.h SupportingFiles\Clause3\TransactionsSP\stdafx.cpp SupportingFiles\Clause3\TransactionsSP\stdafx.h SupportingFiles\Clause3\TransactionsSP\TradeLookupDB_SP.cpp SupportingFiles\Clause3\TransactionsSP\TradeLookupDB_SP.h SupportingFiles\Clause3\TransactionsSP\TradeOrderDB_SP.cpp SupportingFiles\Clause3\TransactionsSP\TradeOrderDB_SP.h SupportingFiles\Clause3\TransactionsSP\TradeResultDB_SP.cpp SupportingFiles\Clause3\TransactionsSP\TradeResultDB_SP.h SupportingFiles\Clause3\TransactionsSP\TradeStatusDB_SP.cpp SupportingFiles\Clause3\TransactionsSP\TradeStatusDB_SP.h SupportingFiles\Clause3\TransactionsSP\TradeUpdateDB_SP.cpp SupportingFiles\Clause3\TransactionsSP\TradeUpdateDB_SP.h SupportingFiles\Clause3\TransactionsSP\TransactionsSP.vcproj SupportingFiles\Clause3\TransactionsSP\TxnHarnessDBBase.cpp SupportingFiles\Clause3\TransactionsSP\TxnHarnessDBBase.h SupportingFiles\Clause3\TransactionsSP\TxnHarnessDBConn.cpp SupportingFiles\Clause3\TransactionsSP\TxnHarnessDBConn.h
	TxnHarness	SupportingFiles\Clause3\TxnHarness\TxnHarness.vcproj SupportingFiles\Clause3\TxnHarness\TxnHarnessSendToMarket.cpp SupportingFiles\Clause3\TxnHarness\TxnHarnessSendToMarket.h SupportingFiles\Clause3\TxnHarness\TxnHarness_stdafx.cpp SupportingFiles\Clause3\TxnHarness\TxnHarness_stdafx.h
Clause 4	No Requirements	
Clause 5	No EGen Modifications	
	No EGenLoader Extentions	
	EGenDriver Configuration	SupportingFiles\Clause5\1025k.xml
	EGenLoader Parameters	SupportingFiles\Clause5\BuildSteps1.log SupportingFiles\Clause5\BuildSteps2.log SupportingFiles\Clause5\BuildSteps3.log SupportingFiles\Clause5\BuildSteps4.log SupportingFiles\Clause5\EGenLoaderFrom1003001To1010000.log SupportingFiles\Clause5\EGenLoaderFrom1010001To1018000.log SupportingFiles\Clause5\EGenLoaderFrom1018001To1025000.log SupportingFiles\Clause5\EGenLoaderFrom103001To110000.log SupportingFiles\Clause5\EGenLoaderFrom110001To117000.log SupportingFiles\Clause5\EGenLoaderFrom117001To124000.log SupportingFiles\Clause5\EGenLoaderFrom124001To132000.log SupportingFiles\Clause5\EGenLoaderFrom132001To139000.log SupportingFiles\Clause5\EGenLoaderFrom139001To146000.log SupportingFiles\Clause5\EGenLoaderFrom146001To154000.log

**Table 9.1: Index of Supporting Files (cont.)**

Clause	Description	Pathname
		SupportingFiles\Clause5\GenLoaderFrom15001To22000.log
		SupportingFiles\Clause5\GenLoaderFrom154001To161000.log
		SupportingFiles\Clause5\GenLoaderFrom161001To168000.log
		SupportingFiles\Clause5\GenLoaderFrom168001To176000.log
		SupportingFiles\Clause5\GenLoaderFrom176001To183000.log
		SupportingFiles\Clause5\GenLoaderFrom183001To190000.log
		SupportingFiles\Clause5\GenLoaderFrom190001To198000.log
		SupportingFiles\Clause5\GenLoaderFrom198001To205000.log
		SupportingFiles\Clause5\GenLoaderFrom1To7000.log
		SupportingFiles\Clause5\GenLoaderFrom205001To212000.log
		SupportingFiles\Clause5\GenLoaderFrom212001To220000.log
		SupportingFiles\Clause5\GenLoaderFrom220001To227000.log
		SupportingFiles\Clause5\GenLoaderFrom22001To29000.log
		SupportingFiles\Clause5\GenLoaderFrom227001To234000.log
		SupportingFiles\Clause5\GenLoaderFrom234001To242000.log
		SupportingFiles\Clause5\GenLoaderFrom242001To249000.log
		SupportingFiles\Clause5\GenLoaderFrom249001To256000.log
		SupportingFiles\Clause5\GenLoaderFrom256001To264000.log
		SupportingFiles\Clause5\GenLoaderFrom264001To271000.log
		SupportingFiles\Clause5\GenLoaderFrom271001To278000.log
		SupportingFiles\Clause5\GenLoaderFrom278001To286000.log
		SupportingFiles\Clause5\GenLoaderFrom286001To293000.log
		SupportingFiles\Clause5\GenLoaderFrom29001To37000.log
		SupportingFiles\Clause5\GenLoaderFrom293001To300000.log
		SupportingFiles\Clause5\GenLoaderFrom300001To308000.log
		SupportingFiles\Clause5\GenLoaderFrom308001To315000.log
		SupportingFiles\Clause5\GenLoaderFrom315001To322000.log
		SupportingFiles\Clause5\GenLoaderFrom322001To329000.log
		SupportingFiles\Clause5\GenLoaderFrom329001To337000.log
		SupportingFiles\Clause5\GenLoaderFrom337001To344000.log
		SupportingFiles\Clause5\GenLoaderFrom344001To351000.log
		SupportingFiles\Clause5\GenLoaderFrom351001To359000.log
		SupportingFiles\Clause5\GenLoaderFrom359001To366000.log
		SupportingFiles\Clause5\GenLoaderFrom366001To373000.log
		SupportingFiles\Clause5\GenLoaderFrom37001To44000.log
		SupportingFiles\Clause5\GenLoaderFrom373001To381000.log
		SupportingFiles\Clause5\GenLoaderFrom381001To388000.log
		SupportingFiles\Clause5\GenLoaderFrom388001To395000.log
		SupportingFiles\Clause5\GenLoaderFrom395001To403000.log
		SupportingFiles\Clause5\GenLoaderFrom403001To410000.log
		SupportingFiles\Clause5\GenLoaderFrom410001To417000.log
		SupportingFiles\Clause5\GenLoaderFrom417001To425000.log
		SupportingFiles\Clause5\GenLoaderFrom425001To432000.log
		SupportingFiles\Clause5\GenLoaderFrom432001To439000.log
		SupportingFiles\Clause5\GenLoaderFrom439001To447000.log
		SupportingFiles\Clause5\GenLoaderFrom44001To51000.log
		SupportingFiles\Clause5\GenLoaderFrom447001To454000.log
		SupportingFiles\Clause5\GenLoaderFrom454001To461000.log
		SupportingFiles\Clause5\GenLoaderFrom461001To469000.log
		SupportingFiles\Clause5\GenLoaderFrom469001To476000.log
		SupportingFiles\Clause5\GenLoaderFrom476001To483000.log
		SupportingFiles\Clause5\GenLoaderFrom483001To491000.log
		SupportingFiles\Clause5\GenLoaderFrom491001To498000.log
		SupportingFiles\Clause5\GenLoaderFrom498001To505000.log
		SupportingFiles\Clause5\GenLoaderFrom505001To513000.log
		SupportingFiles\Clause5\GenLoaderFrom51001To59000.log
		SupportingFiles\Clause5\GenLoaderFrom513001To520000.log
		SupportingFiles\Clause5\GenLoaderFrom520001To527000.log
		SupportingFiles\Clause5\GenLoaderFrom527001To534000.log
		SupportingFiles\Clause5\GenLoaderFrom534001To542000.log
		SupportingFiles\Clause5\GenLoaderFrom542001To549000.log
		SupportingFiles\Clause5\GenLoaderFrom549001To556000.log
		SupportingFiles\Clause5\GenLoaderFrom556001To564000.log
		SupportingFiles\Clause5\GenLoaderFrom564001To571000.log
		SupportingFiles\Clause5\GenLoaderFrom571001To578000.log
		SupportingFiles\Clause5\GenLoaderFrom578001To586000.log
		SupportingFiles\Clause5\GenLoaderFrom586001To593000.log
		SupportingFiles\Clause5\GenLoaderFrom59001To66000.log
		SupportingFiles\Clause5\GenLoaderFrom593001To600000.log

**Table 9.1: Index of Supporting Files (cont.)**

Clause	Description	Pathname
		SupportingFiles\Clause5\EGenLoaderFrom600001To608000.log SupportingFiles\Clause5\EGenLoaderFrom608001To615000.log SupportingFiles\Clause5\EGenLoaderFrom615001To622000.log SupportingFiles\Clause5\EGenLoaderFrom622001To630000.log SupportingFiles\Clause5\EGenLoaderFrom630001To637000.log SupportingFiles\Clause5\EGenLoaderFrom637001To644000.log SupportingFiles\Clause5\EGenLoaderFrom644001To652000.log SupportingFiles\Clause5\EGenLoaderFrom652001To659000.log SupportingFiles\Clause5\EGenLoaderFrom659001To666000.log SupportingFiles\Clause5\EGenLoaderFrom666001To730000.log SupportingFiles\Clause5\EGenLoaderFrom666001To674000.log SupportingFiles\Clause5\EGenLoaderFrom674001To681000.log SupportingFiles\Clause5\EGenLoaderFrom681001To688000.log SupportingFiles\Clause5\EGenLoaderFrom688001To696000.log SupportingFiles\Clause5\EGenLoaderFrom696001To703000.log SupportingFiles\Clause5\EGenLoaderFrom7001To15000.log SupportingFiles\Clause5\EGenLoaderFrom703001To710000.log SupportingFiles\Clause5\EGenLoaderFrom710001To718000.log SupportingFiles\Clause5\EGenLoaderFrom718001To725000.log SupportingFiles\Clause5\EGenLoaderFrom725001To732000.log SupportingFiles\Clause5\EGenLoaderFrom73001To810000.log SupportingFiles\Clause5\EGenLoaderFrom732001To739000.log SupportingFiles\Clause5\EGenLoaderFrom739001To747000.log SupportingFiles\Clause5\EGenLoaderFrom747001To754000.log SupportingFiles\Clause5\EGenLoaderFrom754001To761000.log SupportingFiles\Clause5\EGenLoaderFrom761001To769000.log SupportingFiles\Clause5\EGenLoaderFrom769001To776000.log SupportingFiles\Clause5\EGenLoaderFrom776001To783000.log SupportingFiles\Clause5\EGenLoaderFrom783001To791000.log SupportingFiles\Clause5\EGenLoaderFrom791001To798000.log SupportingFiles\Clause5\EGenLoaderFrom798001To805000.log SupportingFiles\Clause5\EGenLoaderFrom805001To813000.log SupportingFiles\Clause5\EGenLoaderFrom81001To880000.log SupportingFiles\Clause5\EGenLoaderFrom813001To820000.log SupportingFiles\Clause5\EGenLoaderFrom820001To827000.log SupportingFiles\Clause5\EGenLoaderFrom827001To835000.log SupportingFiles\Clause5\EGenLoaderFrom835001To842000.log SupportingFiles\Clause5\EGenLoaderFrom842001To849000.log SupportingFiles\Clause5\EGenLoaderFrom849001To857000.log SupportingFiles\Clause5\EGenLoaderFrom857001To864000.log SupportingFiles\Clause5\EGenLoaderFrom864001To871000.log SupportingFiles\Clause5\EGenLoaderFrom871001To879000.log SupportingFiles\Clause5\EGenLoaderFrom879001To886000.log SupportingFiles\Clause5\EGenLoaderFrom88001To950000.log SupportingFiles\Clause5\EGenLoaderFrom886001To893000.log SupportingFiles\Clause5\EGenLoaderFrom893001To9010000.log SupportingFiles\Clause5\EGenLoaderFrom901001To9080000.log SupportingFiles\Clause5\EGenLoaderFrom908001To9150000.log SupportingFiles\Clause5\EGenLoaderFrom915001To9230000.log SupportingFiles\Clause5\EGenLoaderFrom923001To9300000.log SupportingFiles\Clause5\EGenLoaderFrom930001To9370000.log SupportingFiles\Clause5\EGenLoaderFrom937001To9440000.log SupportingFiles\Clause5\EGenLoaderFrom944001To9520000.log SupportingFiles\Clause5\EGenLoaderFrom95001To1030000.log SupportingFiles\Clause5\EGenLoaderFrom952001To9590000.log SupportingFiles\Clause5\EGenLoaderFrom959001To9660000.log SupportingFiles\Clause5\EGenLoaderFrom966001To9740000.log SupportingFiles\Clause5\EGenLoaderFrom974001To9810000.log SupportingFiles\Clause5\EGenLoaderFrom981001To9880000.log SupportingFiles\Clause5\EGenLoaderFrom988001To9960000.log SupportingFiles\Clause5\EGenLoaderFrom996001To10030000.log
	EGenLogger Output	SupportingFiles\Clause5\EGenLogs.xlt
Clause 6	EGenValidate Output	SupportingFiles\Clause6\EGenValidate.out
Clause 7	ACID Procedure document	SupportingFiles\Clause7\MSTPCE ACID Procedures.pdf
	ACID Procedure Scripts	SupportingFiles\Clause7\AcidProcs\AcidProc.cmd SupportingFiles\Clause7\AcidProcs\Remove_AcidProcs.cmd SupportingFiles\Clause7\AcidProcs\Scripts\AcidProc.vbs SupportingFiles\Clause7\AcidProcs\Scripts\CustomerPosition_Iso3.sql SupportingFiles\Clause7\AcidProcs\Scripts\CustomerPosition_Iso4.sql



**Table 9.1: Index of Supporting Files (cont.)**

Clause	Description	Pathname
		SupportingFiles\Clause7\AcidProcs\Scripts\Remove_AcidProcs.vbs SupportingFiles\Clause7\AcidProcs\Scripts\TradeOrder_C.sql SupportingFiles\Clause7\AcidProcs\Scripts\TradeOrder_Iso1_1.sql SupportingFiles\Clause7\AcidProcs\Scripts\TradeOrder_Iso1_2.sql SupportingFiles\Clause7\AcidProcs\Scripts\TradeOrder_Iso2.sql SupportingFiles\Clause7\AcidProcs\Scripts\TradeOrder_Iso3.sql SupportingFiles\Clause7\AcidProcs\Scripts\TradeOrder_Iso4.sql SupportingFiles\Clause7\AcidProcs\Scripts\TradeOrder_RB.sql SupportingFiles\Clause7\AcidProcs\Scripts\TradeResult_Iso1_1.sql SupportingFiles\Clause7\AcidProcs\Scripts\TradeResult_Iso1_2.sql SupportingFiles\Clause7\AcidProcs\Scripts\TradeResult_Iso2_1.sql SupportingFiles\Clause7\AcidProcs\Scripts\TradeResult_Iso2_2.sql SupportingFiles\Clause7\AcidProcs\Scripts\TradeResult_Iso3.sql SupportingFiles\Clause7\AcidProcs\Scripts\TradeResult_Iso4.sql
	ACID Procedure output	SupportingFiles\Clause7\AcidProcs\AcidProc.out
	Atomicity Scripts	SupportingFiles\Clause7\Atomicity\Atomicity.cmd SupportingFiles\Clause7\Atomicity\Scripts\atom.vbs SupportingFiles\Clause7\Atomicity\Scripts\Atomicity_C.sql SupportingFiles\Clause7\Atomicity\Scripts\Atomicity_RB.sql
	Atomicity Output	SupportingFiles\Clause7\Atomicity\Atomicity_C.out SupportingFiles\Clause7\Atomicity\Atomicity_RB.out
	Consistency Scripts	SupportingFiles\Clause7\Consistency\Consistency.cmd SupportingFiles\Clause7\Consistency\Scripts\Consistency.sql SupportingFiles\Clause7\Consistency\Scripts\Consistency.vbs
	Consistency Output	SupportingFiles\Clause7\Consistency\Consistency.out
	Durability Business Recovery	SupportingFiles\Clause7\Durability\BusinessRecovery\1025k.xml SupportingFiles\Clause7\Durability\BusinessRecovery\app_event.txt SupportingFiles\Clause7\Durability\BusinessRecovery\cntb.txt SupportingFiles\Clause7\Durability\BusinessRecovery\cnte.txt SupportingFiles\Clause7\Durability\BusinessRecovery\Consistency.out SupportingFiles\Clause7\Durability\BusinessRecovery\CountSettlement.sql SupportingFiles\Clause7\Durability\BusinessRecovery\ERRORLOG_recovery.txt SupportingFiles\Clause7\Durability\BusinessRecovery\ERRORLOG_run1.txt SupportingFiles\Clause7\Durability\BusinessRecovery\ERRORLOG_run2.txt SupportingFiles\Clause7\Durability\BusinessRecovery\SQL_Server_Configuration_BusinessRecovery.txt SupportingFiles\Clause7\Durability\BusinessRecovery\sys_event.txt SupportingFiles\Clause7\Durability\BusinessRecovery\TierA_application.log SupportingFiles\Clause7\Durability\BusinessRecovery\TierA_systemlog.log SupportingFiles\Clause7\Durability\BusinessRecovery\TradeRequest_cntb.ver SupportingFiles\Clause7\Durability\BusinessRecovery\TradeRequest_cntbe.ver SupportingFiles\Clause7\Durability\BusinessRecovery\Tradesb.txt SupportingFiles\Clause7\Durability\BusinessRecovery\Tradese.txt SupportingFiles\Clause7\Durability\BusinessRecovery\trade_cleanup_after_database_recovery.txt SupportingFiles\Clause7\Durability\BusinessRecovery\TxnErrorlog_BusinessRecovery_Run1.xlt SupportingFiles\Clause7\Durability\BusinessRecovery\TxnErrorlog_BusinessRecovery_Run2.xlt SupportingFiles\Clause7\Durability\BusinessRecovery\TxnReportE_BusinessRecovery_Run1-20min.xls SupportingFiles\Clause7\Durability\BusinessRecovery\TxnReportE_BusinessRecovery_Run2-20min.xls SupportingFiles\Clause7\Durability\BusinessRecovery\TxnReport_BusinessRecovery_Run1-20min.xlt SupportingFiles\Clause7\Durability\BusinessRecovery\TxnReport_BusinessRecovery_Run1-All.xlt SupportingFiles\Clause7\Durability\BusinessRecovery\TxnReport_BusinessRecovery_Run2-20min.xlt SupportingFiles\Clause7\Durability\BusinessRecovery\TxnReport_BusinessRecovery_Run2-all.xlt SupportingFiles\Clause7\Durability\BusinessRecovery\TxnStep_BusinessRecovery_Run1.xlt SupportingFiles\Clause7\Durability\BusinessRecovery\TxnStep_BusinessRecovery_Run2.xlt
	Durability Data Accessibility	SupportingFiles\Clause7\Durability\DataAccessibility\1025k.xml SupportingFiles\Clause7\Durability\DataAccessibility\app_event.txt SupportingFiles\Clause7\Durability\DataAccessibility\cntb.txt SupportingFiles\Clause7\Durability\DataAccessibility\cnte.txt SupportingFiles\Clause7\Durability\DataAccessibility\Consistency_e.out SupportingFiles\Clause7\Durability\DataAccessibility\ERRORLOG.txt SupportingFiles\Clause7\Durability\DataAccessibility\SQL_Server_Configuration.txt SupportingFiles\Clause7\Durability\DataAccessibility\sys_event.txt SupportingFiles\Clause7\Durability\DataAccessibility\TradeRequest_cntb.ver SupportingFiles\Clause7\Durability\DataAccessibility\trade_cleanup.txt SupportingFiles\Clause7\Durability\DataAccessibility\TxnErrorlog_DataAccessibility-All.xlt SupportingFiles\Clause7\Durability\DataAccessibility\TxnReportE_DataAccessibility-5min.xls SupportingFiles\Clause7\Durability\DataAccessibility\TxnReportE_DataAccessibility-data-recovery-20min.xls SupportingFiles\Clause7\Durability\DataAccessibility\TxnReportE_DataAccessibility-loc-recovery-20min.xls SupportingFiles\Clause7\Durability\DataAccessibility\TxnReport_DataAccessibility-5min.xlt SupportingFiles\Clause7\Durability\DataAccessibility\TxnReport_DataAccessibility-All.xlt

**Table 9.1: Index of Supporting Files (cont.)**

Clause	Description	Pathname
		SupportingFiles\Clause7\Durability\DataAccessibility\TxnReport_DataAccessibility-data-recovery-20min.xlt SupportingFiles\Clause7\Durability\DataAccessibility\TxnReport_DataAccessibility-log-recovery-20min.xlt SupportingFiles\Clause7\Durability\DataAccessibility\TxnStep_DataAccessibility.xlt
	Isolation Scripts	SupportingFiles\Clause7\Isolation\Scripts\Isolation1_S1.sql SupportingFiles\Clause7\Isolation\Scripts\Isolation1_S2.sql SupportingFiles\Clause7\Isolation\Scripts\Isolation1_S3.sql SupportingFiles\Clause7\Isolation\Scripts\Isolation1_S4.sql SupportingFiles\Clause7\Isolation\Scripts\Isolation2_S1.sql SupportingFiles\Clause7\Isolation\Scripts\Isolation2_S2.sql SupportingFiles\Clause7\Isolation\Scripts\Isolation2_S3.sql SupportingFiles\Clause7\Isolation\Scripts\Isolation2_S4.sql SupportingFiles\Clause7\Isolation\Scripts\Isolation3_S1.sql SupportingFiles\Clause7\Isolation\Scripts\Isolation3_S2.sql SupportingFiles\Clause7\Isolation\Scripts\Isolation3_S3.sql SupportingFiles\Clause7\Isolation\Scripts\Isolation4_S1.sql SupportingFiles\Clause7\Isolation\Scripts\Isolation4_S2.sql SupportingFiles\Clause7\Isolation\Scripts\Isolation4_S3.sql
	Isolation Output	SupportingFiles\Clause7\Isolation\Isolation1_S1.ver SupportingFiles\Clause7\Isolation\Isolation1_S2.ver SupportingFiles\Clause7\Isolation\Isolation1_S3.ver SupportingFiles\Clause7\Isolation\Isolation1_S4.ver SupportingFiles\Clause7\Isolation\Isolation2_S1.ver SupportingFiles\Clause7\Isolation\Isolation2_S2.ver SupportingFiles\Clause7\Isolation\Isolation2_S3.ver SupportingFiles\Clause7\Isolation\Isolation2_S4.ver SupportingFiles\Clause7\Isolation\Isolation3_S1.ver SupportingFiles\Clause7\Isolation\Isolation3_S2.ver SupportingFiles\Clause7\Isolation\Isolation3_S3.ver SupportingFiles\Clause7\Isolation\Isolation4_S1.ver SupportingFiles\Clause7\Isolation\Isolation4_S2.ver SupportingFiles\Clause7\Isolation\Isolation4_S3.ver
Clause 8	60-day Space Calculation	SupportingFiles\Clause8\tpce_space.xls

## 9.1. Supporting Files

The **Supporting Files** contain human readable and machine executable (i.e., able to be performed by the appropriate program without modification) scripts that are required to recreate the benchmark **Result**. If there is a choice of using a GUI or a script, then the machine executable script must be provided in the **Supporting Files**. If no corresponding script is available for a GUI, then the **Supporting Files** must contain a step-by-step description of how to manipulate the GUI. (9.4)

All **Supporting Files** can be found in the *SupportingFiles* Directory.





# ***Appendix A - Third Party Price Quotations***

Microsoft Corporation  
One Microsoft Way  
Redmond, WA 98052-6399

Tel 425 882 8080  
Fax 425 936 7329  
<http://www.microsoft.com/>

**Microsoft**

October 28, 2009

Unisys Corporation  
Rick Freeman  
25725 Jeronimo Road  
Mission Viejo, CA 92691

Here is the information you requested regarding pricing for several Microsoft products to be used in conjunction with your TPC-E benchmark testing.

All pricing shown is in US Dollars (\$).

<b>Part Number</b>	<b>Description</b>	<b>Unit Price</b>	<b>Quantity</b>	<b>Price</b>
*	<b>SQL Server 2008 R2 Datacenter Edition</b> <i>Per Processor License</i> <i>Discount Schedule: Open Program – Level C</i> <i>Unit Price reflects a 15% discount from the retail unit price of \$53,700.</i>	\$45,807	16	\$732,912
P71-06367	<b>Windows Server 2008 R2 Datacenter Edition</b> <i>Per Processor License</i> <i>Discount Schedule: Open Program - Level C</i> <i>Unit Price reflects a 21% discount from the retail unit price of \$2,999.</i>	\$2,357	16	\$37,712
P73-04980	<b>Windows Server 2008 R2 Standard Edition</b> <i>Server License Only - No CALs</i> <i>Discount Schedule: Open Program – Level C</i> <i>Unit Price reflects a 31% discount from the retail unit price of \$1,029.</i>	\$711	1	\$711
N/A	<b>Microsoft Problem Resolution Services</b> <i>Professional Support</i> <i>(1 Incident)</i>	\$259	1	\$259

Windows Server 2008 R2 Datacenter Edition and Windows Server 2008 R2 Standard Edition are currently orderable and available through Microsoft's normal distribution channels. A list of Microsoft's resellers can be found at the Microsoft Product Information Center at <http://www.microsoft.com/products/info/render.aspx?view=22&type=how>.

SQL Server 2008 R2 Datacenter Edition will be orderable and available by May 6, 2010.

\* The part number for SQL Server 2008 R2 Datacenter Edition is not available yet. It will be available by May 6, 2010.

Defect support is included in the purchase price. Additional support is available from Microsoft CSS on an incident by incident basis at \$259 per call.

This quote is valid for the next 90 days.

Reference ID: PERifr1027090000006884.

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  - 50/125 & 62.5/125 Multimode Duplex
  - 50/125 & 62.5/125 Multimode Simplex
  - 9/125 Singlemode Duplex
  - 9/125 Singlemode Simplex
  - Fiber Accessories
  - Fiber Optic Connector
  - Fiber Optics Cables
  - MPO
  - Plenum Fibers
- Patch Cords
- Networking
- Peripherals
- Telephone
- Accessories
- Audio and Video
- Mini Coax

SHIPPING CART

Product Name	SKU	Image	Unit Price	Qty	Price	Remove	
* CAT6 PATCH CORD 50FT BLUE Customization: Without Boot,50FT,BL,N	GCP0888650-BL		\$6.64	37	\$245.68		
62.5/125 MULTIMODE DUPLEX FIBER CABLE LC TO LC 20M Customization: 62.5/125µ Multimode Duplex,LC/LC	GCFAZLLM20-M		\$24.07	32	\$770.24		
Sub Total:					\$1,015.92		
Shipping/Handling: Select Shipping Service					\$0.00		
Tax: -- State --					\$0.00		
Coupon Code: <input type="text"/>					<input type="button" value="Validate"/>		
Total:					\$1,015.92		
					<input type="button" value="Continue"/>	<input type="button" value="Recalculate"/>	<input type="button" value="Checkout"/>

\* Discount is not applicable on this product.

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Subtotal:			\$299.95
Calculate Shipping Zip Code: <input type="text"/> UPS Guaranteed 3 Day Service <input type="button" value="GO"/>			Shipping: \$0.00
Redeem Gift Certificates Claim Code: <input type="text"/> Security Code: <input type="text"/> <input type="button" value="Redeem"/>			Gift Certificates: \$0.00
Apply Promo Codes: Enter up to 5 promo codes, please note that stacking is not permitted. Promo Code: <input type="text"/> <input type="button" value="Apply"/> (For Example:code1,code2,code3,code4,code5)			Promo Code: \$0.00

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QUOTATION

Quotation: 10122009001  
 Date: October 15, 2009  
 Sales Person: Richard Eng  
 email: reng@qstor.com  
 Phone: (805) 376-1000 x102  
 Fax: (805) 376-1001

Customer: Unisys Corp  
 Address:  
 Contact / email: [Rick.Freeman@unisys.com](mailto:Rick.Freeman@unisys.com)  
 Phone / Fax:

REQ Number:  
 Payment: Net 30 days

LINE	QUANTITY	PRODUCT CODE	DESCRIPTION	UNIT PRICE	AMOUNT
1	1	UPS120	1000VA/640W UPS with network management card, 19" 1U, 120V AC, US	1,000	1,000
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28	SERVICE AND SUPPORT OPTIONS (partner product not covered)			TOTAL:	\$1,000
29		HM1	iQ Solutions, 9x5 annual hardware support, next business day on-site		
30		SM2	24x7 annual software/firmware support, 4-hour phone response		
31		TS1	Remote service and system installation per system		
32					
33					
34					

Three years hardware and one year software/firmware warranty with 9x5 telephone support. One year warranty on UPS, and battery. Partner product warranty subject to manufacturer's policy. Quotation valid for 30 days. Delivery 30 days after receipt of PO. FOB Newbury Park, California, USA. Product subject to availability.

For and on behalf of iQstor

Confirmed and accepted by

\_\_\_\_\_  
 Authorized Signature

\_\_\_\_\_  
 Authorized Signature

