
HP Integrity rx6600

using

HP-UX 11.i v2 64-bit

and

Oracle Database 10g Enterprise Edition

TPC Benchmark[®] C Full Disclosure Report

Second Edition

Submitted for Review

August 15, 2006



i n v e n t

Second Edition - August 15, 2006

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

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

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

All performance data contained in this report was obtained in a rigorously controlled environment. Results obtained in other operating environments may vary significantly. Hewlett-Packard Company does not warrant or represent that a user can or will achieve similar performance expressed in transactions per minute (tpmC[®]) or normalized price/performance (\$/tpmC[®]). No warranty of system performance or price/performance is expressed or implied in this report.

©Copyright Hewlett-Packard Company 2006

All rights reserved. Permission is hereby granted to reproduce this document in whole or in part provided the copyright notice printed above is set forth in full text on the title page of each item reproduced.

Printed in U.S.A., August 15, 2006.

HP, HP-UX, HP C++/ANSI C Developer's Bundle /HP-UX, HP 9000 are registered trademarks of Hewlett-Packard Company.

ORACLE, SQL*DBA, SQL*Loader, SQL*Net, SQL*Plus, Oracle 10g, Pro *C, and PL/SQL are registered trademarks of Oracle Corporation.

TUXEDO 8.0 is a registered trademark of BEA System, Inc.

UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company Limited.

TPC Benchmark, TPC-C, and tpmC are registered certification marks of the Transaction Processing Performance Council.

All other brand or product names mentioned herein are trademarks or registered trademarks of their respective owners.

Abstract

Overview

This report documents the methodology and results of the TPC Benchmark[®] C test conducted on the HP Integrity rx6600 in a client/server configuration, using Oracle Database 10g Enterprise Edition and the TUXEDO 8.0 transaction monitor. The operating system used for the benchmark was Hewlett-Packard's HP-UX 11.i v2 64-bit. The application was written in C and compiled using HP C++/ANSI C Developer's Bundle /HP-UX.

TPC Benchmark C Metrics

The standard TPC Benchmark[®] C metrics, tpmC[®] (transactions per minute), price per tpmC[®] (three year capital cost per measured tpmC[®]), and the availability date are reported as required by the benchmark specification.

Standard and Executive Summary Statements

Page *iii* contains the standard system summary and pages *iv-vi* contain the executive summary of the benchmark results for the HP Integrity rx6600.

Auditor

The benchmark configuration, environment and methodology used to produce and validate the test results, and the pricing model used to calculate the price/performance, were audited by Lorna Livingtree for Performance Metrics, Inc. to verify compliance with the relevant TPC specifications.

Standard System Summary

Company Name	System Name	Database Software	Operating System Software
Hewlett-Packard Company	HP Integrity rx6600	Oracle Database 10g Enterprise Edition	HP-UX 11.i v2 64-bit
HP H/W Availability Date - December 1, 2006 S/W Availability Date - December 1, 2006			
Total System Cost	TPC-C [®] Throughput	Price/Performance	
Hardware Software 3-year maintenance	Sustained maximum throughput of System running TPC-C [®] expressed in transactions per minute	Total system cost/tpmC (\$606,689/230569)	
\$606,689	230,569.33 tpmC	\$2.63 per tpmC	



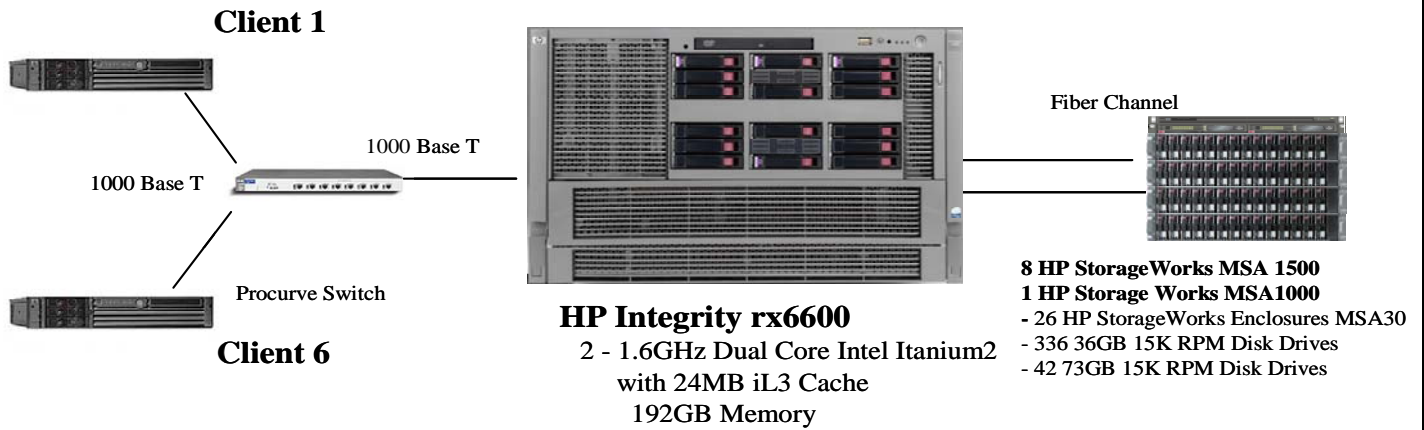
HP Integrity rx6600

TPC-C Revision 5.7

Report Date:
August 15, 2006

Total System Cost	TPC Throughput	Price/Performance	Availability Date
\$606,689	230,569 tpmC	\$2.63/tpmC	December 1, 2006
Server Processors/Cores/Threads	Database Manager	Operating System	Other Software
2/4/8 Dual-Core Intel Itanium2 1.6GHz	Oracle Database 10g Enterprise Edition	HP-UX 11.i v2 64-bit	TUXEDO 8.0
			Number of Users
			183,360

Server



System Components	Server (HP Integrity rx6600)		each Client (6 rx2620)	
	Qty	Type	Qty	Type
Processors/Cores/Threads	2/4/8	1.6GHz Dual-Core Intel Itanium2	2/2/2	1.3GHz Intel Itanium2
Cache Memory	2	24MB iL3 Cache	each	3M iL3 cache
Memory	192	GB	8	GB
Disk Controllers	2	Dual-Port PCI Fibre Channel 4X	1	Ultra2 SCSI LVD
Disk Drives	8	HP StorageWorks Modular Smart Array 1500 with 336 36GB 15K RPM	1	36 GB
	1	HP StorageWorks Modular Smart Array 1000 with 42 73GB 15K RPM		
	2	Internal 36GB/10kpm SAS hard disk drives		
Total Storage		12826 GB		
Tape Drives	1	DVD ROM		
Terminals	1	HP Server Thin Client	1	Console Terminal



HP Integrity rx6600

TPC-C Rev 5.7

Report Date: August 15, 2006

Description	Part Number	Brand	Price Key	US List Price	Qty	Price	3Year Main.Price
Server Hardware							
HP Integrity rx6600 Base System with 2 1.6GHz/24MB Dual-Core Processor Modules (incl dual-port 1000B-T adapter, 1 power supply)	AD132A, Opt 180**		1	27,350	1	27,350	
I/O backplane	AD296A**		1	0	1	0	
48-DIMM memory carrier board	AD127A**		1	4,495	1	4,495	
36GB/10kpm SAS hard disk drive	AD140A**		1	382	2	764	
DVD-ROM slimline drive	AD142A**		1	230	1	230	
16GB memory quad (4x4GB DIMMS)	AB566A**		1	18,977	12	227,724	
3 Year Svc & Support Price (Hardware and Software)	HA110A3**						\$13,551
PCI 4GB Fibre Channel Adapter (dual port)	AB379A		1	3,995	2	7,990	
Redundant Power Supply	AD9524A		1	749	1	749	
HP Server Thin Client (monitor, keyboard/mouse, cable i	AB300B		1	1,250	1	1,250	
Rack Model 5642	358254-B21		1	689	1	689	
Subtotal						271,241	13,551
Server Software							
Oracle Database 10g Enterprise Edition, Per Processor Unlimited Users, 3 years	Runtime**	Oracle	2	20,000	2*	40,000	
Oracle Database Server Support Package for 3 years		Oracle	2	2,000	3		6,000
HP-UX 11i v2 Foundation Operating Environment	BA503AC**		1	995	4	3,980	
HPUX Factory Integrated	B9106AA, Opt OD1**		1	199	1	199	
Subtotal						44,179	6,000
Storage							
Rack System/E R3000 XR UPS	AF422A		1	1,366	5	6,830	
HP StorageWorks SAN switch 2/8V	AA979A		1	4,149	3	12,447	
2meter Fibre Optic Cable	221691-B21		1	77	8	616	
5 meter Fibre Optic Cable	221691-B22		1	82	4	328	
HP StorageWorks MSA 1500	AA986A		1	8,995	8	71,960	17,416
HP StorageWorks MSA 1000	201723-B22		1	6,995	1	6,995	3,222
HP StorageWorks MSA 1000 Controller	218231-B22		1	4,290	1	4,290	
HP StorageWorks Enclosures MSA30 (26 + 3 spares)	302969-B21		1	2,829	29	82,041	
36GB 15K Ultra320 Hard Drive (336 + 34 spares)	286776-B22		1	269	370	99,530	
73GB 15K Ultra320 Hard Drive	286778-B22		1	399	14	5,586	Included
73GB 15K Ultra320 Hard Drive (28 + 3 spares)	286778-B22		1	399	31	12,369	
10642 (42U) Rack Cabinet	245161-B21		1	1,359	3	4,077	
200 - 240 volts North America	A5137AZ AW4		1	94	12	1,128	
Subtotal						308,197	20,638
Client Hardware							
HP server rx2620 w 1.3GHz Intel Itanium 2 Processor	AB333A		1	3,795	6	22,770	
1.3GHz Intel Itanium 2 Processor	AB336A		1	1,650	6	9,900	
3 Year Support Price (Hardware & Software)	HA110A3						27,294
36GB 15K RPM Ultra320 SCSI Internal Disk	AD186A		1	389	6	2,334	
4GB Memory Module (4 x 1GB DIMMS)	AB397A		1	2,550	12	30,600	
HP Server Thin Client (monitor, keyboard/mouse, cable i	AB300B		1	1,250	1	1,250	
HP CAT5 Lan Cables (qty 4)	263474-B24		1	29	2	58	
10642 (42U) Rack Cabinet	245161-B21		1	1,359	1	1,359	
200-240 Volts Power Option	A5137AZ, Opt AW4		1	94	4	376	
HP-UX Fndn OE DVD Media	B9106AA, Opt. AJR		1	565	6	3,390	
HP-UX Fndn OE DVD Media, Factory Integrated	B9106AA, Opt. OD1		1	199	6	1,194	
HP-UX Fndn OE Integrity PPL max2CPU w/sys	B9430AC		1	995	12	11,940	
Subtotal						85,171	27,294
Client Software							
HP C++/ANSI C Developer's Bundle	B9007AA, Opt. 2AH		1	966	1	966	256
BEA Tuxedo 8.0		Bea Sys.	3	1,200	6	7,200	4,536
Subtotal						8,166	4,792
User Connectivity							
HP ProCurve Switch 2724	J4897A		1	1,599	1	1,599	636
Subtotal						1,599	636
			3			(360)	
			2			(2,300)	
			4			(\$164,184)	(\$17,930)
Total						551,709	54,981
* 2 = 0.50 * 4. Explanation: For the purposes of counting the number of processors which require licensing, an Intel multicore chip with "n" cores shall be determined by multiplying "n" cores by a factor of 0.50.							
** These components are not immediately orderable. See the FDR for more information.							
*A 24.8% discount was based on the overall value of the specific components from HP (Price Key) in this single quotation. Discounts for similarly sized configurations will be similar to those quoted here, but may vary based on the components in the quotation.							
1=HP 2= Oracle (Pricing Contact: MaryBeth Pierantoni (see Appendix F) 3=BEA Systems						Three Year Cost of Ownership:	
4=HP's Large Quantity Pricing						tpmC Rating:	
Audited by Lorna Livingtree of Performance Metrics, Inc.						\$/tpmC:	
						\$606,689	
						230,569	
						\$2.63	
Prices used in TPC benchmarks reflect actual prices a customer would pay for a one-time purchase of the stated components. Individually negotiated discounts are not permitted. Special prices based on assumptions about past or future purchases are not permitted. All discounts reflect standard pricing policies for the listed components. For complete details, see the pricing sections of the TPC benchmark specifications. If you find that the stated prices are not available according to these terms, please inform the TPC at pricing@tpc.org. Thank you.							

Numerical Quantities Summary for HP Integrity rx6600

MQTH, Computed Maximum Qualified Throughput

230,569 tpmC

Response Times (in seconds)

	90th %-ile	Maximum	Average
New-Order	0.65s	9.15s	0.34s
Payment	0.65s	9.66s	0.33s
Order-Status	0.66s	8.45s	0.34s
Delivery (interactive portion)	0.26s	8.23s	0.14s
Delivery (deferred portion)	0.65s	8.86s	0.34s
Stock-Level	0.65s	8.41s	0.33s
Menu	0.10s	4.34s	0.07s

Transaction Mix, in percent of total transactions

New-Order	44.94%
Payment	43.02%
Order-Status	4.01%
Delivery	4.02%
Stock-Level	4.01%

Keying/Think Times

	Keying Time			Think Time		
	Min	Avg	Max	Min	Avg	Max
New-Order	18.02s	18.03s	18.24s	0.02s	12.14s	191.16s
Payment	3.02s	3.03s	3.26s	0.02s	12.07s	193.48s
Order-Status	2.02s	2.03s	2.24s	0.02s	10.12s	147.84s
Delivery (interactive)	2.02s	2.03s	2.24s	0.02s	5.07s	72.98s
Stock-Level	2.02s	2.03s	2.24s	0.02s	5.07s	72.48s

Test Duration

Ramp up time	84 minutes
Measurement interval	120 minutes
Transactions during measurement interval	61,564,078
Ramp down time	6.327 minutes

Checkpointing

Number of checkpoints in measurement interval	4
Checkpoint Interval	29.6 minutes

TPC Benchmark C Overview

This is the full disclosure report for a benchmark test of the HP Integrity rx6600 using Oracle Database 10g Enterprise Edition . It meets the requirements of the TPC Benchmark[®] C Standard Specification, Revision 5.7 dated April, 2006.

TPC Benchmark[®] C was developed by the Transaction Processing Performance Council (TPC). It is the intent of this group to develop a suite of benchmarks to measure the performance of computer systems executing a wide range of applications. Hewlett-Packard Company Oracle Corporation are active participants in the TPC.

TPC Benchmark[®] C is an On Line 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. It does so by exercising 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
- On-line and deferred transaction execution modes
- Multiple on-line terminal sessions
- Moderate system and application execution time
- Significant disk input/output
- Transaction integrity (ACID properties)
- Non-uniform distribution of data access through primary and secondary keys
- Databases consisting of many tables with a wide variety of sizes, attributes, and relationships
- Contention of data access and update

The performance metric reported by TPC-C[®] is a "business throughput" measuring the number of orders processed per minute. Multiple transactions are used to simulate the business activity of processing an order, and each transaction is subject to a response time constraint. The performance metric for this benchmark is expressed in transactions-per-minute-C[®] (tpmC[®]). To be compliant with the TPC-C[®] standard, all references to tpmC[®] results must include the tpmC[®] rate, the associated price-per-tpmC[®], and the availability date of the priced configuration.

Despite the fact that this benchmark offers a rich environment that emulates many OLTP applications, this benchmark does not reflect the entire range of OLTP requirements. In addition, the extent to which a customer can achieve the results reported by a vendor is highly dependent on how closely TPC-C[®] approximates the customer application. The relative performance of systems derived from this benchmark does not necessarily hold for other workloads or environments. Extrapolations to other environments are not recommended.

Hewlett-Packard Company does not warrant or represent that a user can or will achieve performance similar to the benchmark results contained in this report. No warranty of system performance or price/performance is expressed or implied by this report.

1	GENERAL ITEMS.....	1-1
1.1	APPLICATION CODE AND DEFINITION STATEMENTS	1-1
1.2	TEST SPONSOR	1-1
1.3	PARAMETER SETTINGS.....	1-1
1.4	CONFIGURATION DIAGRAMS.....	1-1
2	CLAUSE 1 RELATED ITEMS	2-1
2.1	TABLE DEFINITIONS.....	2-1
2.2	PHYSICAL ORGANIZATION OF DATABASE.....	2-1
2.3	INSERT AND DELETE OPERATIONS	2-1
2.4	PARTITIONING.....	2-1
3	CLAUSE 2 RELATED ITEMS	3-1
3.1	RANDOM NUMBER GENERATION	3-1
3.2	INPUT/OUTPUT SCREEN LAYOUT	3-1
3.3	PRICED TERMINAL FEATURE VERIFICATION	3-1
3.4	PRESENTATION MANAGER OR INTELLIGENT TERMINAL	3-1
3.5	TRANSACTION STATISTICS	3-2
3.6	QUEUEING MECHANISM.....	3-2
4	CLAUSE 3 RELATED ITEMS	4-1
4.1	TRANSACTION SYSTEM PROPERTIES (ACID).....	4-1
4.2	ATOMICITY	4-1
4.2.1	<i>Completed Transaction</i>	4-1
4.2.2	<i>Aborted Transaction</i>	4-1
4.3	CONSISTENCY	4-1
4.4	ISOLATION	4-2
4.4.1	<i>Isolation Test 1</i>	4-3
4.4.2	<i>Isolation Test 2</i>	4-3
4.4.3	<i>Isolation Test 3</i>	4-3
4.4.4	<i>Isolation Test 4</i>	4-4
4.4.5	<i>Isolation Test 5</i>	4-4
4.4.6	<i>Isolation Test 6</i>	4-5
4.4.7	<i>Isolation Test 7</i>	4-5
4.4.8	<i>Isolation Test 8</i>	4-5
4.4.9	<i>Isolation Test 9</i>	4-6
4.5	DURABILITY.....	4-6
4.5.1	<i>Loss of Log and Data Disks</i>	4-7
4.5.2	<i>Instantaneous Interruption and Loss of Memory</i>	4-7
5	CLAUSE 4 RELATED ITEMS	5-1
5.1	INITIAL CARDINALITY OF TABLES	5-1
5.2	DATABASE AND GROWTH LAYOUT.....	5-1
5.3	DATA MODEL & INTERFACES	5-6
5.4	PARTITIONS/REPLICATIONS	5-6
5.5	GROWTH REQUIREMENTS	5-6
6	CLAUSE 5 RELATED ITEMS	7
6.1	THROUGHPUT.....	7
6.2	RESPONSE TIME	7
6.3	KEYING AND THINK TIMES	7
6.4	RESPONSE TIME FREQUENCY DISTRIBUTION CURVES AND OTHER GRAPHS.....	8

6.5	STEADY STATE DETERMINATION.....	8
6.6	WORK PERFORMED DURING STEADY STATE.....	6-12
6.6.1	Checkpoint.....	6-12
6.6.2	Checkpoint Conditions.....	6-12
6.6.3	Checkpoint Implementation.....	6-12
6.6.4	Serializable Transactions.....	6-12
6.7	MEASUREMENT PERIOD DURATION.....	6-13
6.8	REGULATION OF TRANSACTION MIX.....	6-13
6.9	TRANSACTION MIX.....	6-14
6.10	TRANSACTION STATISTICS.....	6-14
6.11	CHECKPOINT COUNT AND LOCATION.....	6-14
7	CLAUSE 6 RELATED ITEMS.....	7-1
7.1	RTE DESCRIPTION.....	7-1
7.2	LOST CONNECTIONS.....	7-1
7.3	EMULATED COMPONENTS.....	7-1
7.4	FUNCTIONAL DIAGRAMS.....	7-1
7.5	NETWORKS.....	7-1
7.6	CLIENT SUBSTITUTION.....	7-1
8	CLAUSE 7 RELATED ITEMS.....	8-1
8.1	SYSTEM PRICING.....	8-1
8.2	SUPPORT PRICING.....	8-1
8.2.1	HP Hardware Support.....	8-1
8.2.2	HP Software Support.....	8-1
8.3	ORACLE CORPORATION STANDARD TECHNICAL SUPPORT.....	8-1
8.4	AVAILABILITY.....	8-1
8.5	PRICED SYSTEM CONFIGURATION.....	8-2
8.6	THROUGHPUT, PRICE/PERFORMANCE, AND AVAILABILITY DATE.....	8-2
9	CLAUSE 9 RELATED ITEMS.....	9-3
9.1	AUDITOR'S REPORT.....	9-3
10	REPORT AVAILABILITY.....	10-1
APPENDIX A	CLIENT/SERVER SOURCE.....	2
A.1	CLIENT FRONT-END.....	2
	CLIENT/CLIENT.C.....	2
	CLIENT/TUX_TRANSACTION.C.....	11
	CLIENT/MAKEFILE.....	12
A.2	TPC_LIB SOURCE.....	13
	LIB/TPCC.H.....	13
	LIB/KEY_CHARS.H.....	15
	LIB/ERRLOG.C.....	15
	LIB/FMT.C.....	16
	LIB/IOBUF.H.....	18
	LIB/IOBUF.C.....	19
	LIB/RANDOM.C.....	19
	LIB/MAKEFILE.....	20
A.3	TRANSACTION SOURCE.....	20
	CLIENT/SERVICE.C.....	20
	CLIENT/ORACLE/TRANSACTION.C.....	21
	CLIENT/ORACLE/TPCCPL.C.....	22
	CLIENT/ORACLE/PLNEW.C.....	27
	CLIENT/ORACLE/PLPAY.C.....	29
	CLIENT/ORACLE/PLORD.C.....	32

CLIENT/ORACLE/PLSTO.C	35
CLIENT/ORACLE/PLDEL.C	36
CLIENT/ORACLE/ORA_TPCC.H	40
CLIENT/ORACLE/TPCCFLAGS.H.....	43
A.4 SERVER STORED PROCEDURES	43
TKVCPDEL.SQL	43
TKVCPNEW.SQL	43
PAYZ.SQL.....	45
COUNT.ALL.USERS.SH	46
COUNTUSER	46
PAYNZ.SQL	46
TPCC.C	47
DELAY.C	47
RANDOM.H.....	47
CONFIG_PRSETS S.SH	47
MAKE_PSET	48
MOVE_INTS.PSET.....	48
NUMPROC.AUX	48
RESET_PSET	48
SERVERINFO	49
AUDIT_TABLE.SH	49
COUNTORDERS.SH.....	49
LOGSIZE.SH.....	49
APPENDIX B DATABASE DESIGN	50
B.1 SCRIPTS.....	50
ADDFILE.SH	50
ADDTS.SH	50
ANALYZE.SH	50
ANALYZE.SQL	50
CREATE_CACHE_VIEWS.SQL.....	51
CREATE_SPACESTATS.SQL.....	51
CREATE_STOREDPROCS.SQL.....	51
CREATEDB.SQL.....	52
CREATEINDEX_ICUST1.SQL.....	52
CREATEINDEX_ICUST2.SQL.....	52
CREATEINDEX_IDIST.SQL.....	52
CREATEINDEX_IITEM.SQL	52
CREATEINDEX_INORD.SQL.....	52
CREATEINDEX_IORDR1.SQL.....	52
CREATEINDEX_IORDR2.SQL.....	52
CREATEINDEX_ISTOK.SQL.....	53
CREATEINDEX_IWARE.SQL.....	53
CREATEMISC.SH.....	53
CREATESPACESTATS.SH	54
CREATESTATS.SH	54
CREATESTOREDPROCS.SH	55
CREATETABLE_CUST.SQL	55
CREATETABLE_DIST.SQL.....	55
CREATETABLE_HIST.SQL	56
CREATETABLE_ITEM.SQL.....	56
CREATETABLE_NORD.SQL	56
CREATETABLE_ORDL.SQL.....	57
CREATETABLE_ORDR.SQL.....	57
CREATETABLE_STOK.SQL	57
CREATETABLE_WARE.SQL.....	58

CREATETS.SH	58
CREATEUSER.SH.....	60
CREATEUSER.SQL	60
DDVIEW.SH	60
DML.SQL	60
DRIVER.SH	60
EXTENT.SQL.....	61
FREEEXT.SQL	61
INITPAY.SQL	61
LOADCUST.SH	62
LOADDIST.SH	62
LOADHIST.SH	62
LOADITEM.SH	63
LOADNORD.SH	63
LOADORDRORDL.SH.....	63
LOADSTOK.SH	64
LOADWARE.SH.....	64
LOCALOPTIONS.SH	64
NEW.SQL	65
P_BUILD.ORA	66
P_CREATE.ORA	66
PAY.SQL.....	66
PLSQL_MON.SQL.....	69
PST_C.SQL.....	69
SHUTDOWNDB.SQL	70
SPACE_GET.SQL.....	70
SPACE_INIT.SQL	71
SPACE_RPT.SQL.....	71
STARTUPDB.SQL.....	72
STEPENV.SH	72
VIEWS.SQL	73
APPENDIX C TUNABLE PARAMETERS	75
C.1 HP-UX CONFIGURATION - CLIENTS	75
CONFIG/CLIENT2/OSTUNE.VER.....	75
C.2 HP-UX CONFIGURTION – SERVER	75
CONFIG/SERVER/OSTUNE.VER	75
CONFIG/SERVER/DBTUNE.VER.....	76
C.3 TUXEDO UBBCONFIG	77
CONFIG/CLIENT2/TMCFG.VER	77
APPENDIX D RTE CONFIGURATION	78
D.1 FIELD VALUE GENERATION	78
SOURCE/SRC/DRIVER/GENERATE.C	78
APPENDIX E DISK STORAGE	79
APPENDIX F PRICE QUOTES	81

1 General Items

1.1 Application Code and Definition Statements

The application program (as defined in clause 2.1.7) must be disclosed. This includes, but is not limited to, the code implementing the five transactions and the terminal input output functions.

Appendix A contains the HP C++/ANSI C Developer's Bundle /HP-UX application code used in this TPC-C® test.

1.2 Test Sponsor

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

The Enterprise Unix Division of Hewlett-Packard Company is the test sponsor of this TPC Benchmark® C.

1.3 Parameter Settings

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

- Database options
- Recover/commit options
- Consistency/locking options
- Operating system and application configuration parameter
- Compilation and linkage options and run-time optimizations used to create/install applications, OS, and/or databases

This requirement can be satisfied by providing a full list of all parameters and options.

The intent of the above clause is that anyone attempting to recreate the benchmark environment has sufficient information to compile, link, optimize, and execute all software used to produce the disclosed benchmark result.

Appendix A contains the application "make" files. Appendix C contains the HP-UX operating system parameters used to generate the kernel for the configuration used in this benchmark. Also included are all of the Oracle Database 10g Enterprise Edition database parameters and the TUXEDO 8.0 transaction monitor parameters used.

1.4 Configuration Diagrams

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

- Number and type of processors
- Size of allocated memory, and any specific mapping/partitioning of memory unique to the test
- Number and type of disk units (and controllers, if applicable)
- Number of channels or bus connections to disk units, including the protocol type
- Number of LAN (e.g. Ethernet) connections, including routers, work stations, terminals, etc, that were physically used in the test or are incorporated into the pricing structure (See Clause 8.1.8)
- Type and run-time execution location of software components (e.g. DBMS, client processes, transaction monitors, software drivers, etc)

The server System Under Test, an HP Integrity rx6600 depicted in Figure 1.1, consisted of:

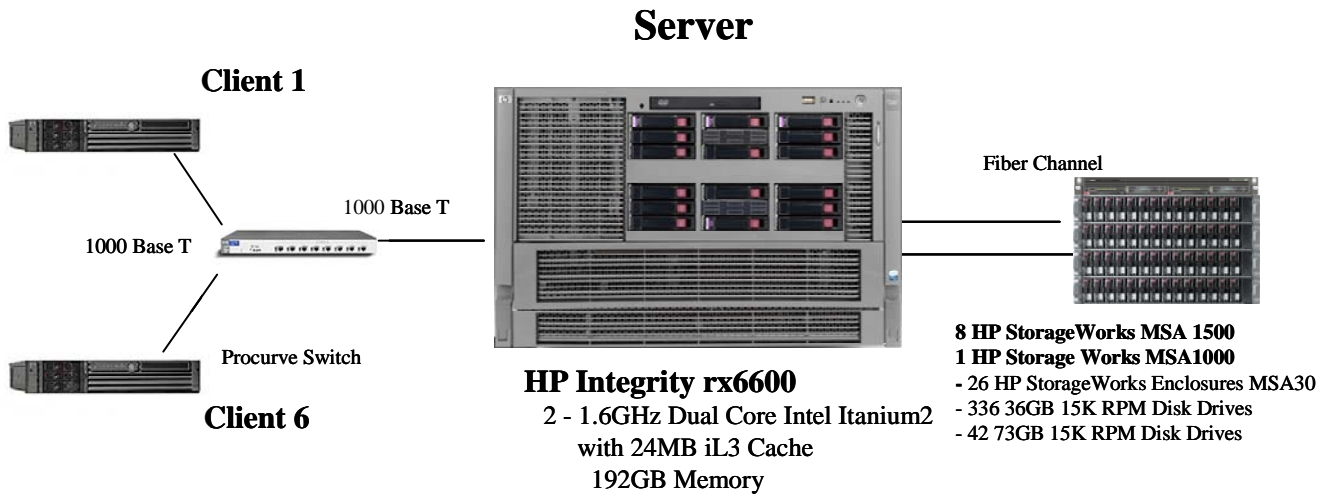
- 2 1.6GHz Dual-Core Intel Itanium2 System Processors
- 192 GB of memory

- 2 Dual-Port PCI Fibre Channel 4X Adapters
- 8 HP StorageWorks Modular Smart Array 1500 with 336 36GB 15K RPM disks
- 1 HP StorageWorks Modular Smart Array 1000 with 42 73GB 15K RPM disks.
- One LAN interfaces

As indicated in Figure 1.2, this benchmark configuration used Remote Terminal Emulator (RTE) programs that executed on 4 rx2620 Enterprise Server drivers to emulate TPC-C user sessions. The emulated users on the driver systems were directly connected to the client systems under test via via a 1000 Base-T local area network (LAN) and communicated using TCP/IP. The clients were connected to the SUT via one HP Procurve 2724 switch.

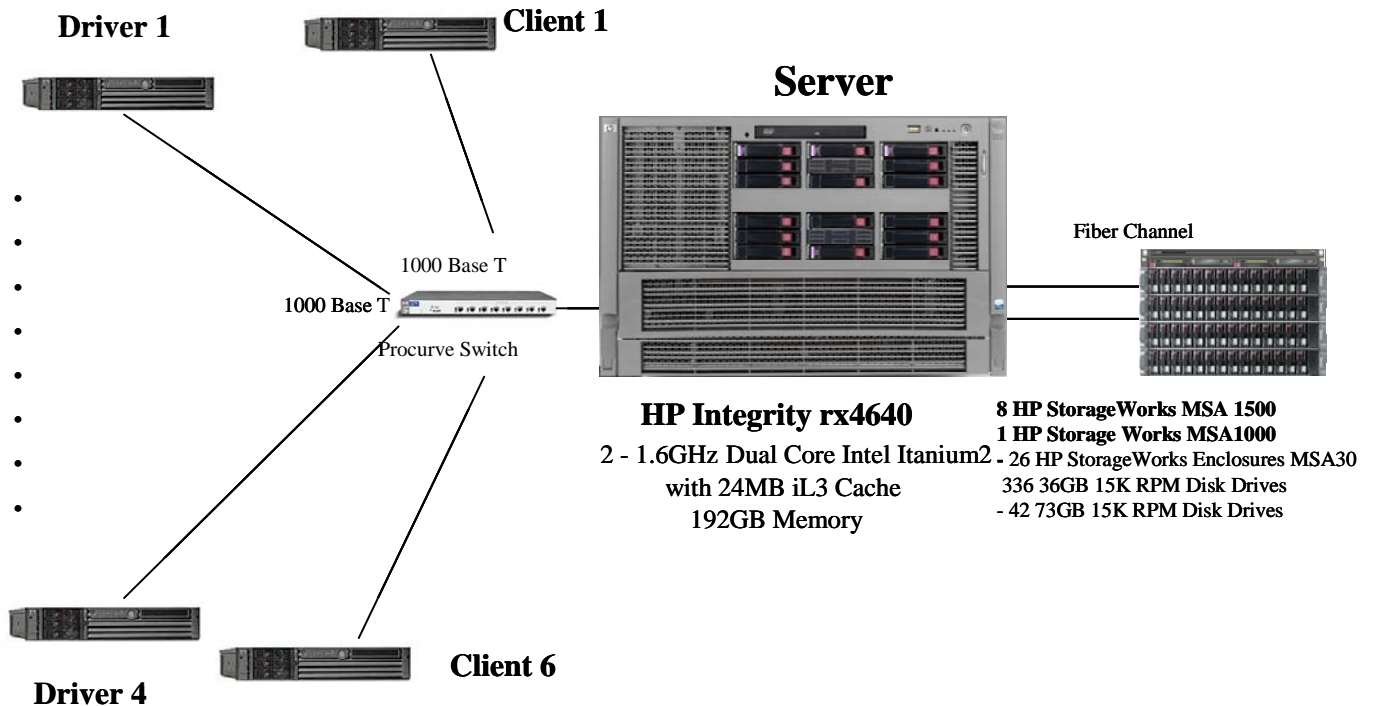
The priced configuration for the HP Integrity rx6600 is shown in Figure 1.1. In the priced configuration, the RTE shown in the benchmark configuration is replaced by the appropriate number of workstations (emulating ANSI terminals) connected to hubs.

Figure 1.1: HP Integrity rx6600 Priced Configuration



Clients – 6 hp rx2620 servers

Figure 1.2: HP Integrity rx6600 Server Benchmark Configuration



Clients – 6 hp rx2620 servers

Drivers – 4 hp rx2620

2 Clause 1 Related Items

2.1 Table Definitions

Listing must be provided for all table definition statements and all other statements used to set up the database.

Appendix B describes the programs that define, create, and populate the Oracle Database 10g Enterprise Edition database for TPC-C® testing.

2.2 Physical Organization of Database

The physical organization of tables and indices, within the database, must be disclosed.

Space was allocated to Oracle Database 10g Enterprise Edition according to the data in section 5.2. The size of the database table space on each disk drive was calculated to provide even distribution of load across the disk drives.

2.3 Insert and Delete Operations

It must be ascertained that insert and/or delete operations to any of the tables can occur concurrently with the TPC-C® transaction mix. Furthermore, any restrictions in the SUT database implementation that precludes inserts beyond the limits defined in Clause 1.4.11 must be disclosed. This includes the maximum number of rows that can be inserted and the maximum key value for these new rows.

There were no restrictions on insert and delete operations to any tables.

2.4 Partitioning

While there are a few restrictions placed upon horizontal or vertical partitioning of tables and rows in the TPC-C® benchmark, any such partitioning must be disclosed. Replication of tables, if used, must be disclosed. Additional and/or duplicated attributes in any table must be disclosed along with a statement on the impact on performance.

Partitioning of the database was not used.

Replication and additional or duplicated attributes were not used in this implementation.

3 Clause 2 Related Items

3.1 Random Number Generation

The method of verification for the random number generation must be disclosed.

The random number generator used can be found in the source appendix. It is from the book “The Art of Computer Systems Performance Analysis” by Raj Jain, page 443. The properties of this random number generator are documented in the book. It is a full-period multiplicative linear-congruential random number generator.

3.2 Input/Output Screen Layout

The actual layout of the terminal input/output screens must be disclosed.

The screen layouts corresponded exactly to those in Clauses 2.4.3, 2.5.3, 2.6.3, 2.7.3, and 2.8.3 of the TPC-C® Standard Specification.

3.3 Priced Terminal Feature Verification

The method used to verify that the emulated terminals provide all the features described in Clause 2.2.2.4 must be explained. Although not specifically priced, the type and model of the terminals used for the demonstration in 8.1.3.3 must be disclosed and commercially available (including supporting software and maintenance).

The terminal features were verified by manually exercising each specification on an HP 712/80 workstation running an ANSI terminal emulator.

3.4 Presentation Manager or Intelligent Terminal

Any usage of presentation managers or intelligent terminals must be explained.

Application code running on the client implemented the TPC-C user interface. A listing of this code is included in Appendix A. Used capabilities of the terminal beyond basic ASCII entry and display were restricted to cursor positioning.

A presentation manager was not used.

Table 3.1: Transaction Statistics

Type	Item	Value
New Order	Home warehouse items	99.00%
	Remote warehouse items	1.00%
	Rolled back transactions	1.00%
	Average items per order	10.00
Payment	Home warehouse	85.01%
	Remote warehouse	14.99%
	Non primary key access	60.00%
Order Status	Non primary key access	60.04%
Delivery	Skipped transactions	0
Transaction Mix	New Order	44.94%
	Payment	43.02%
	Order Status	4.01%
	Delivery	4.02%
	Stock Level	4.01%

3.5 Transaction Statistics

Table 3.1 lists the numerical quantities that Clauses 8.1.3.5 to 8.1.3.11 require.

3.6 Queuing Mechanism

The queuing mechanism used to defer the execution of the Delivery transaction must be disclosed.

Delivery transactions were submitted to servers using the same TUXEDO mechanism that other transactions used. The only difference was that the call was asynchronous, i.e., control would return to the client process immediately and the deferred delivery part would complete asynchronously.

4 Clause 3 Related Items

4.1 Transaction System Properties (ACID)

The results of the ACID tests must be disclosed along with a description of how the ACID requirements were met. This includes disclosing which case was followed for the execution of Isolation Test 7.

The TPC Benchmark® C 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 Atomicity, Consistency, Isolation, and Durability (ACID). This section quotes the specification definition of each of these properties and describes the tests done as specified and monitored by the auditor to demonstrate compliance.

4.2 Atomicity

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

4.2.1 Completed Transaction

Perform the Payment transaction for a randomly selected warehouse, district, and customer (by customer number as specified in Clause 2.5.1.2) and verify that the records in the CUSTOMER, WAREHOUSE, and DISTRICT tables have been changed appropriately.

These tests were performed on a system configured for 18,336 warehouses. The tests were completed using the same OS (HPUX 11i v2) and RDBMS (Oracle Database 10G Enterprise Edition).

The values of w_ytd, d_ytd, c_balance, c_ytd_payment, and c_payment_cnt of a randomly selected warehouse, district, and customer were retrieved. The Payment transaction was executed on the same warehouse, district, and customer. The transaction was committed. The values w_ytd, d_ytd, c_balance, c_ytd_payment, and c_payment_cnt were retrieved again. It was verified that all values had been changed appropriately.

4.2.2 Aborted Transaction

Perform the Payment transaction for a randomly selected warehouse, district, and customer (by customer number as specified in Clause 2.5.1.2) and substitute a ROLLBACK of the transaction for the COMMIT of the transaction. Verify that the records in the CUSTOMER, WAREHOUSE, and DISTRICT tables have NOT been changed

These tests were performed on a system configured for 18,336 warehouses. The tests were completed using the same OS (HPUX 11i v2) and RDBMS (Oracle Database 10G Enterprise Edition).

The values of w_ytd, d_ytd, c_balance, c_ytd_payment and c_payment_cnt of a randomly selected warehouse, district, and customer were retrieved. The Payment transaction was executed on the same warehouse, district, and customer. The transaction was rolled back. The values of w_ytd, d_ytd, c_balance, c_ytd_payment, c_payment_cnt were retrieved again. It was verified that none of the values had changed.

4.3 Consistency

Consistency is the property of the application that requires any execution of a database transaction to take the database from one consistent state to another assuming the database is initially in a consistent state.

These tests were performed on a system configured for 18,336 warehouses. The tests were completed using the same OS (HPUX 11i v2) and RDBMS (Oracle Database 10G Enterprise Edition).

The TPC Benchmark C standard requires the System Under Test to meet the following 12 consistency conditions (c.f. *TPC Standard Specification, Clauses 3.3.2.1 to 3.3.2.12*):

1. the sum of the district balances in a warehouse is equal to the warehouse balance;
2. for each district, the next order-id minus one is equal to maximum order-id in the ORDER table and equal to the maximum new-order-id in the NEW-ORDER table;
3. for each district, the maximum order-id minus minimum order-id in the ORDER table plus one equals the number of rows in the NEW-ORDER table for that district;
4. for each district, the sum of the order-line counts equals the number of rows in the ORDER-LINE table for that district;
5. for each row in the ORDER table, the carrier-id is set to a null value only if there is a corresponding row in the NEW-ORDER table;
6. for each row in the ORDER table, the order-line count must equal the number of rows in the ORDER-LINE table for that order;
7. for any row in the ORDER-LINE table, the delivery date/time is set to a null value only if the corresponding row in the ORDER table has the carrier-id set to a null value;
8. for each warehouse, the year-to-date amount must equal the sum of the amounts in the HISTORY table for that warehouse;
9. for each district, the year-to-date amount must equal the sum of the amounts in the HISTORY table for that district;
10. for each customer, the balance must equal the sum of the order-line amount minus the sum of the history amount for that customer;
11. for each district, the total orders minus the total new-orders must equal the sum of the customer delivery count;
12. for any randomly selected customer, the balance plus the year-to-date payment must equal the sum of the order-line amount.

The TPC Benchmark C Standard Specification requires explicit demonstration that the conditions are satisfied for the first four conditions only.

To demonstrate that consistency is maintained, conditions 1-4 were verified for a sample of warehouses before and after the durability tests.

4.4 Isolation

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

*This property is commonly called **serializability**. Sufficient conditions must be enabled at either the system or application level to ensure serializability of transactions under any arbitrary mix of TPC-C transactions, unless otherwise specified by the transaction profile. The system or application must have full serializability enabled (i.e., repeated reads of the same rows within any committed transaction must return identical data when run concurrently with any arbitrary mix of TPC-C transactions), except in the case of Stock-Level transaction. For the Stock-Level transaction, the isolation requirement is relaxed to simply require that the transaction see only committed data.*

The TPC Benchmark C Standard (Revision 3.5) defines nine required tests to be performed to demonstrate that the required levels of transaction isolation are met.

These tests were performed on a system configured for 18,336 warehouses. The tests were completed using the same OS (HPUX 11i v2) and RDBMS (Oracle Database 10G Enterprise Edition).

For conventional locking schemes, isolation should be tested as described below. Systems that implement other isolation schemes may require different validation techniques. It is the responsibility of the test sponsor to disclose those techniques and the tests for them. If isolation schemes other than conventional locking are used, it is permissible to implement these tests differently provided full details are disclosed. (Examples of different validation techniques are shown in Isolation Test 7, Clause 3.4.2.7).

4.4.1 Isolation Test 1

This test demonstrates isolation for read-write conflicts of Order-Status and New-Order transactions.

The execution of the above test proceeded as follows:

1. An Order-Status transaction T0 was executed for a randomly selected customer, and the order returned was noted. T0 was committed
2. A New-Order transaction T1 was started for the same customer used in T0. T1 was stopped prior to COMMIT.
3. An Order-Status transaction T2 was started for the same customer used in T1. T2 completed and was committed without being blocked by T1. T2 returned the same order that T0 had returned.
4. T1 was allowed to complete and was committed.
5. An Order-Status transaction T3 was started for the same customer used in T1. T3 returned the order inserted by T1.

This outcome demonstrates serialization of T2 before T1. It has equivalent validity to the outcome specified in the Standard which supposes T1 to be serialized before T2.

4.4.2 Isolation Test 2

This test demonstrates isolation for read-write conflicts of Order-Status and New-Order transactions when the New-Order transaction is ROLLED BACK.

The execution of the above test proceeded as follows:

1. An Order-Status transaction T0 was executed for a randomly selected customer and the order returned was noted. T0 was committed.
2. A New-Order transaction T1 with an invalid item number, was started for the same customer used in T0. T1 was stopped immediately prior to ROLLBACK.
3. An Order-Status transaction T2 was started for the same customer used in T1. T2 completed and was committed without being blocked by T1. T2 returned the same order that T0 had returned.
4. T1 was allowed to ROLLBACK.
5. An Order-Status transaction T3 was started for the same customer used in T1. T3 returned the same order that T0 had returned.

4.4.3 Isolation Test 3

This test demonstrates isolation for write-write conflicts of two New-Order transactions.

The execution of the above test proceeded as follows:

1. The D_NEXT_O_ID of a randomly selected district was retrieved.
2. A New-Order transaction T1 was started for a randomly selected customer within the district used in step 1. T1 was stopped immediately prior to COMMIT.
3. Another New-Order transaction T2 was started for the same customer used in T1. T2 waited.
4. T1 was allowed to complete. T2 completed and was committed.
5. The order number returned by T1 was the same as the D_NEXT_O_ID retrieved in step 1. The order number returned by T2 was one greater than the order number returned by T1.
6. The D_NEXT_O_ID of the same district was retrieved again. It had been incremented by two (i.e. it was one greater than the order number returned by T2).

4.4.4 Isolation Test 4

This test demonstrates isolation for write-write conflicts of two New-Order transactions when one transaction is ROLLED BACK.

The execution of the above test proceeded as follows:

1. The D_NEXT_O_ID of a randomly selected district was retrieved.
2. A New-Order transaction T1, with an invalid item number, was started for a randomly selected customer within the district used in step 1. T1 was stopped immediately prior to ROLLBACK.
3. Another New-Order transaction T2 was started for the same customer used in T1. T2 waited.
4. T1 was allowed to roll back, and T2 completed and was committed.
5. The order number returned by T2 was the same as the D_NEXT_O_ID retrieved in step 1.
6. The D_NEXT_O_ID of the same district was retrieved again. It had been incremented by one (i.e. one greater than the order number returned by T2).

4.4.5 Isolation Test 5

This test demonstrates isolation for write-write conflicts of Payment and Delivery transactions.

The execution of the above test proceeded as follows:

1. A query was executed to find out the customer who would be updated by the next delivery transaction for a randomly selected warehouse and district.
2. The C_BALANCE of the customer found in step 1 was retrieved.
3. A Delivery business transaction T1 was started for the same warehouse used in step 1. T1 was stopped immediately prior to the COMMIT of the database transaction corresponding to the district used in step 1.
4. A Payment transaction T2 was started for the same customer found in step 1. T2 waited.
5. T1 was allowed to complete. T2 completed and was committed.
6. The C_BALANCE of the customer found in step 1 was retrieved again. The C_BALANCE reflected the results of both T1 and T2.

4.4.6 Isolation Test 6

This test demonstrates isolation for write-write conflicts of Payment and Delivery transactions when the Delivery transaction is ROLLED BACK.

The execution of the above test proceeded as follows:

1. A query was executed to find out the customer who would be updated by the next delivery transaction for a randomly selected warehouse and district.
2. The C_BALANCE of the customer found in step 1 was retrieved.
3. A Delivery business transaction T1 was started for the same warehouse used in step 1. T1 was stopped immediately prior to the ROLLBACK of the database transaction corresponding to the district used in step 1.
4. A Payment transaction T2 was started for the same customer found in step 1. T2 waited.
5. T1 was allowed to ROLLBACK. T2 completed and was committed.

The C_BALANCE of the customer found in step 1 was retrieved again. The C_BALANCE reflected the results of only T2.

4.4.7 Isolation Test 7

This test demonstrates repeatable reads for the New-Order transaction while an interactive transaction updates the price of an item.

The execution of the above test proceeded as follows:

1. The I_PRICE of two randomly selected items X and Y were retrieved.
2. A New-Order transaction T2 with a group of items including items X and Y was started. T2 was stopped immediately after retrieving the prices of all items. The prices of items X and Y retrieved matched those retrieved in step 1.
3. A transaction T3 was started to increase the price of items X and Y by 10%.
4. T3 did not stall and no transaction was rolled back. T3 was committed.
5. T2 was resumed, and the prices of all items were retrieved again within T2. The prices of items X and Y matched those retrieved in step 1.
6. T2 was committed.
7. The prices of items X and Y were retrieved again. The values matched the values set by T3.

- Execution followed *Case D* of *Clause 3.4.2.7*.

4.4.8 Isolation Test 8

This test demonstrates isolation for phantom protection between New-Order and Order-Status transactions.

The execution of the above test proceeded as follows:

1. An Order-Status transaction T1 was started for a randomly selected customer.
2. T1 was stopped immediately after reading the order table for the selected customer. The most recent order for that customer was found.

3. A New-Order transaction T2 was started for the same customer. T2 completed and was committed without being blocked by T1.
4. T1 was resumed and the ORDER table was read again to determine the most recent order for the same customer. The order found was the same as the one found in step 2.
5. T1 completed and was committed.

4.4.9 Isolation Test 9

This test demonstrates isolation for phantom protection between New-Order and Delivery transactions.

The execution of the above test proceeded as follows:

1. The NO_D_ID of all new_ORDER rows for a randomly selected warehouse and district was changed to 11. The changes were committed.
2. A Delivery transaction T1 was started for the selected warehouse.
3. T1 was stopped immediately after reading the new_ORDER table for the selected warehouse and district. No qualifying row was found.
4. A New-Order transaction T2 was started for the same warehouse and district. T2 completed and was committed without being blocked by T1.
5. T1 was resumed and the new_ORDER table was read again. No qualifying row was found.
6. T1 completed and was committed.
7. The NO_D_ID of all new_ORDER rows for the selected warehouse and district was restored to the original value. The changes were committed.

4.5 Durability

The tested system must guarantee durability: the ability to preserve the effects of committed transaction and insure database consistency after recovery from any one of the failures listed in Clause 3.5.3.

List of single failures:

- *Permanent irrecoverable failure of any single durable medium containing TPC-C database tables or recovery log data.*
- *Instantaneous interruption (system crash / system hang) in processing which requires system reboot to recover.*
- *Failure of all or part of memory (loss of contents)...*

Specified durability tests were executed to demonstrate satisfaction of the durability requirements for this implementation of TPC Benchmark C. One durability test, described below, covering the following failure situations was performed under the auditor's supervision:

- *Permanent irrecoverable failure of any single durable medium containing TPC-C database tables or recovery log data (Clause 3.5.3.1).*

These tests were performed on a system configured for 18,336 warehouses. The tests were completed using the same OS (HPUX 11i v2) and RDBMS (Oracle Database 10G Enterprise Edition).

Both tests were performed under a load of 183,360 users on the full-scale database for the loss of recovery log and loss of data tests. Another durability test, described below, combining the following failure situations was performed under the auditor's supervision:

- *instantaneous interruption which requires system reboot [of processors] to recover. (Clause 3.5.3.2)*
- *failure of all or part of memory. (Clause 3.5.3.3).*

This test was performed under the full performance-measurement load of 183,360 users on the full-scale database.

4.5.1 Loss of Log and Data Disks

Because the log devices are Redundant Disk Arrays which each function independently of the rest of the system in ensuring data integrity under loss and/or replacement of any individual disk drive (and other failures as well), integrity under such failure and replacement does not entail any interruption in processing. The data devices are not mirrored and must be restored from backup after failure and subsequent transactions applied from the transaction logs. The tests below validates the durability by demonstrating persistence of the results of transactions processed both before and during these failures, validating the durability upon database recovery (in this instance, forced) of transactions which completed before the failure and the non-effect of transactions which did not complete.

1. The D_NEXT_O_ID fields for all rows in the DISTRICT table were summed up to determine the initial count of the total number of orders (count1).
2. A test was initiated with 183,360 terminals. On the driver system, completed/rolled-back transactions (including New-Orders) were recorded in a "success" file.
3. After running at steady state throughput levels for 5 minutes, an individual disk containing recovery log was unplugged from an array.
4. Because of the built-in redundancy in the disk array, the test continued normally.
5. After running again at steady state throughput levels for 5 minutes, an individual disk containing data was unplugged from an array.
6. The test failed with Oracle reporting errors when accessing the files on that array.
7. The disk was replaced.
8. The database files on that array were restored from backup.
9. Oracle was restarted and the transactions in the log were applied to the database.
10. The contents of the "success" file on the driver and the ORDER table were spot-compared to verify that records in the "success" file for completed New-Order transactions had corresponding records in the ORDER table.
11. Step 1 was repeated to determine the total number of orders (count2). Count2-Count1 (=8,012,501) matched exactly the number of records for successful New Orders in the RTE "success" file (=8,012,501).
12. Consistency test 3 was run on the database and the results were verified.

4.5.2 Instantaneous Interruption and Loss of Memory

Instantaneous interruption and loss of memory tests were combined because the loss of power erases the contents of memory. This failure was induced while the benchmark was running by turning off the power supplies to the server.

1. The D_NEXT_O_ID fields for all rows in district table were summed up to determine the initial count of the total number of orders (count1).
2. Transactions were started at full load. On the driver system, completed/rolled-back transactions (including New-Orders) were recorded in a "success" file.
3. After five minutes at steady state throughout, the server system was de-powered.
4. The test was aborted on the driver.
5. The server system was restarted.
6. The database was restarted and a recovery performed using the transaction log.
7. The contents of the "success" file on the driver and the ORDERS table were spot-compared to verify that records in the "success" file for completed New-Order transactions had corresponding records in the ORDERS table.
8. Step 1 was repeated to determine the current total number of orders (count2). Count2-count1 (=5,510,106) was 7 more than the number of records for successful New Orders in the RTE "success" file (=5,510,099). *This difference would be due only to transactions which were committed on the system under test but for which the output data was not displayed on the [emulated] input/output screen before the failure.*
9. Consistency test 3 was run on the database and the results were verified.

5 Clause 4 Related Items

5.1 Initial Cardinality of Tables

The cardinality (e.g. number of rows) of each table, as it existed at the start of the benchmark run, must be disclosed. If the database was overscaled and inactive rows of the WAREHOUSE table were deleted the cardinality of the WAREHOUSE table as initially configured and the number of rows deleted must be disclosed.

The TPC-C database for this test was configured with 20,000 warehouses.

Table	Occurrences
Warehouse	20,000
District	200,000
Customer	600,000,000
History	600,000,000
Orders	180,000,000
New Orders	600,000,000
Order Line	6,000,170,528
Item	100,000
Stock	2,000,000,000

During the measurement all of the warehouses and their associated data were accessed. This was confirmed using D_NEXT_O_ID and W_YTD as described in *Clause 4.2.2 Comment (2)*.

5.2 Database and Growth Layout

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

Table 5.2 indicates the distribution of the database tables over the disks of the tested and priced systems.

I) root, swap, file systems:

=====

The system has 2 internal SAS disk drives which are used for OS root, primary swap and file system.

Usage	Device	Size (GB)	Device Model
-----	-----	-----	-----
root+fs+swap	/dev/dsk/c0t0d0s2	33.0	HP DG036A8B53
fs	/dev/dsk/c0t1d0	33.9	HP DG036A8B53
swap	/dev/dsk/c1t2d4	29.3	MSA1000 VOLUME
swap	/dev/dsk/c3t2d4	29.3	MSA1000 VOLUME
swap	/dev/dsk/c5t2d4	29.3	MSA1000 VOLUME
swap	/dev/dsk/c9t2d4	29.3	MSA1000 VOLUME
swap	/dev/dsk/c11t2d4	29.3	MSA1000 VOLUME
swap	/dev/dsk/c13t2d4	29.3	MSA1000 VOLUME
swap	/dev/dsk/c15t2d4	29.3	MSA1000 VOLUME

II) Database files:

=====

We use 8 data arrays and 1 log array. Every array is attached to the system via Fibre Channel link. Each of the 8 data array contains 42 33.90GB disk drives for a total size of 1423.81GB . The 1 log array contains 42 68.36GB disk drives for a total size of 1435.54GB after mirroring.

The data arrays are partitioned as such:

Array number in the set (1, 3, 5, 9, 11, 13, 15, 17).

- c[array#]t0d[1-5] - raw partitions used for cust
- c[array#]t0d[6-7] - raw partitions used for stok
- c[array#]t1d[0-3] - raw partitions used for stok
- c[array#]t1d4 - raw partitions used for icust2
- c[array#]t1d7 - vgdata1_16k (logical volumes for DB excluding cust, stok and icust2, striped across all 8 arrays)

For each data array, there is one partition allocated for LVM and 12 15.63GB partitions for raw partitions (cust, stok & icust2). The partition allocated for LVM is 214.84GB on seven of the arrays and 213.86 GB on the eighth array. After formatting and lun allocation, the remaining available capacity of each data array is 1021.41GB on seven arrays and 1022.39GB on the other array.

The two Oracle logs are 38.09GB raw partitions on the 1 log array, leaving 1359.36GB of available capacity on each log array. The log array has enough space for 8 hours of redo logs.

Most of the space on the arrays in the tested system was unused during the performance tests, but is available to satisfy the 8-hour log and 60-day storage requirements.

The 8 data arrays and their luns are accessed via the following paths:

- /dev/rdisk/c1t0d[1|2|3|4|5|6|7]
- /dev/rdisk/c3t0d[1|2|3|4|5|6|7]
- /dev/rdisk/c5t0d[1|2|3|4|5|6|7]
- /dev/rdisk/c9t0d[1|2|3|4|5|6|7]
- /dev/rdisk/c11t0d[1|2|3|4|5|6|7]
- /dev/rdisk/c13t0d[1|2|3|4|5|6|7]
- /dev/rdisk/c15t0d[1|2|3|4|5|6|7]
- /dev/rdisk/c17t0d[1|2|3|4|5|6|7]

```

/dev/rdisk/c1t1d[0|1|2|3]
/dev/rdisk/c3t1d[0|1|2|3]
/dev/rdisk/c5t1d[0|1|2|3]
/dev/rdisk/c9t1d[0|1|2|3]
/dev/rdisk/c11t1d[0|1|2|3]
/dev/rdisk/c13t1d[0|1|2|3]
/dev/rdisk/c15t1d[0|1|2|3]
/dev/rdisk/c17t1d[0|1|2|3]
/dev/dsk/c1t1d7 {SW striped as /dev/vgdata1_16k}
/dev/dsk/c3t1d7 {SW striped as /dev/vgdata1_16k}
/dev/dsk/c5t1d7 {SW striped as /dev/vgdata1_16k}
/dev/dsk/c9t1d7 {SW striped as /dev/vgdata1_16k}
/dev/dsk/c11t1d7 {SW striped as /dev/vgdata1_16k}
/dev/dsk/c13t1d7 {SW striped as /dev/vgdata1_16k}
/dev/dsk/c15t1d7 {SW striped as /dev/vgdata1_16k}
/dev/dsk/c17t1d7 {SW striped as /dev/vgdata1_16k}

```

The 1 log array are accessed via the following paths:

```

/dev/rdisk/c19t0d1
/dev/rdisk/c19t0d2

```

III) List of all Oracle datafiles and the corresponding device:

```

=====

```

DATAFILE	FILE_ID	SIZE(MB)	TABLESPACE	LVs/Disks
-----	-----	-----	-----	-----
cust_0_0	5	15360	CUST_0	/dev/rdisk/c5t0d1
cust_0_1	12	15360	CUST_0	/dev/rdisk/c11t0d5
cust_0_10	16	15360	CUST_0	/dev/rdisk/c17t0d4
cust_0_11	14	15360	CUST_0	/dev/rdisk/c3t0d4
cust_0_12	6	15360	CUST_0	/dev/rdisk/c5t0d5
cust_0_13	9	15360	CUST_0	/dev/rdisk/c13t0d4
cust_0_14	17	15360	CUST_0	/dev/rdisk/c1t0d1
cust_0_15	21	15360	CUST_0	/dev/rdisk/c15t0d2
cust_0_16	19	15360	CUST_0	/dev/rdisk/c15t0d5
cust_0_17	26	15360	CUST_0	/dev/rdisk/c3t0d5
cust_0_18	28	15360	CUST_0	/dev/rdisk/c13t0d5
cust_0_19	29	15360	CUST_0	/dev/rdisk/c9t0d3
cust_0_2	11	15360	CUST_0	/dev/rdisk/c13t0d1
cust_0_20	23	15360	CUST_0	/dev/rdisk/c15t0d4
cust_0_21	25	15360	CUST_0	/dev/rdisk/c11t0d3
cust_0_22	34	15360	CUST_0	/dev/rdisk/c9t0d1
cust_0_23	37	15360	CUST_0	/dev/rdisk/c5t0d3
cust_0_24	30	15360	CUST_0	/dev/rdisk/c17t0d1
cust_0_25	27	15360	CUST_0	/dev/rdisk/c1t0d4
cust_0_26	31	15360	CUST_0	/dev/rdisk/c15t0d3
cust_0_27	33	15360	CUST_0	/dev/rdisk/c9t0d2
cust_0_28	24	15360	CUST_0	/dev/rdisk/c11t0d4
cust_0_29	22	15360	CUST_0	/dev/rdisk/c17t0d5
cust_0_3	10	15360	CUST_0	/dev/rdisk/c17t0d3
cust_0_30	36	15360	CUST_0	/dev/rdisk/c11t0d1
cust_0_31	35	15360	CUST_0	/dev/rdisk/c9t0d4
cust_0_32	32	15360	CUST_0	/dev/rdisk/c3t0d2

cust_0_33	38	15360	CUST_0	/dev/rdisk/c1t0d2
cust_0_34	40	15360	CUST_0	/dev/rdisk/c1t0d5
cust_0_35	42	15360	CUST_0	/dev/rdisk/c3t0d1
cust_0_36	41	15360	CUST_0	/dev/rdisk/c9t0d5
cust_0_37	39	15360	CUST_0	/dev/rdisk/c15t0d1
cust_0_38	44	15360	CUST_0	/dev/rdisk/c3t0d3
cust_0_39	43	15360	CUST_0	/dev/rdisk/c11t0d2
cust_0_4	8	15360	CUST_0	/dev/rdisk/c5t0d4
cust_0_5	7	15360	CUST_0	/dev/rdisk/c13t0d3
cust_0_6	13	15360	CUST_0	/dev/rdisk/c13t0d2
cust_0_7	20	15360	CUST_0	/dev/rdisk/c1t0d3
cust_0_8	18	15360	CUST_0	/dev/rdisk/c17t0d2
cust_0_9	15	15360	CUST_0	/dev/rdisk/c5t0d2
dist_0_0	45	923	DIST_0	/dev/vgdata1/rdist_0_0
hist_0_0	46	6510	HIST_0	/dev/vgdata1/rhist_0_0
hist_0_1	47	6510	HIST_0	/dev/vgdata1/rhist_0_1
hist_0_2	49	6510	HIST_0	/dev/vgdata1/rhist_0_2
hist_0_3	48	6510	HIST_0	/dev/vgdata1/rhist_0_3
hist_0_4	52	6510	HIST_0	/dev/vgdata1/rhist_0_4
hist_0_5	51	6510	HIST_0	/dev/vgdata1/rhist_0_5
hist_0_6	53	6510	HIST_0	/dev/vgdata1/rhist_0_6
hist_0_7	50	6510	HIST_0	/dev/vgdata1/rhist_0_7
icust1_0_0	106	14635	ICUST1_0	/dev/vgdata1/ricust1_0_0
icust2_0_0	107	4244	ICUST2_0	/dev/rdisk/c1t1d4
icust2_0_1	109	4244	ICUST2_0	/dev/rdisk/c3t1d4
icust2_0_2	110	4244	ICUST2_0	/dev/rdisk/c5t1d4
icust2_0_3	113	4244	ICUST2_0	/dev/rdisk/c17t1d4
icust2_0_4	112	4244	ICUST2_0	/dev/rdisk/c9t1d4
icust2_0_5	111	4244	ICUST2_0	/dev/rdisk/c11t1d4
icust2_0_6	115	4244	ICUST2_0	/dev/rdisk/c15t1d4
icust2_0_7	114	4244	ICUST2_0	/dev/rdisk/c13t1d4
idist_0_0	108	110	IDIST_0	/dev/vgdata1/ridist_0_0
iitem_0_0	132	20	IITEM_0	/dev/vgdata1/riitem_0_0
iordr2_0_0	133	3920	IORDR2_0	/dev/vgdata1/riordr2_0_0
iordr2_0_1	134	3920	IORDR2_0	/dev/vgdata1/riordr2_0_1
iordr2_0_2	137	3920	IORDR2_0	/dev/vgdata1/riordr2_0_2
iordr2_0_3	135	3920	IORDR2_0	/dev/vgdata1/riordr2_0_3
iordr2_0_4	138	3920	IORDR2_0	/dev/vgdata1/riordr2_0_4
iordr2_0_5	136	3920	IORDR2_0	/dev/vgdata1/riordr2_0_5
iordr2_0_6	139	3920	IORDR2_0	/dev/vgdata1/riordr2_0_6
iordr2_0_7	140	3920	IORDR2_0	/dev/vgdata1/riordr2_0_7
istok_0_0	131	45226	ISTOK_0	/dev/vgdata1/ristok_0_0
item_0_0	87	20	ITEM_0	/dev/vgdata1/ritem_0_0
iware_0_0	105	30	IWARE_0	/dev/vgdata1/riware_0_0
nord_0_0	104	6670	NORD_0	/dev/vgdata1/rnord_0_0
ordr_0_0	103	44420	ORDR_0	/dev/vgdata1/rordr_0_0
ordr_0_1	116	44420	ORDR_0	/dev/vgdata1/rordr_0_1
ordr_0_10	119	44420	ORDR_0	/dev/vgdata1/rordr_0_10
ordr_0_11	126	44420	ORDR_0	/dev/vgdata1/rordr_0_11
ordr_0_12	122	44420	ORDR_0	/dev/vgdata1/rordr_0_12

ordr_0_13	121	44420	ORDR_0	/dev/vgdata1/rordr_0_13
ordr_0_14	127	44420	ORDR_0	/dev/vgdata1/rordr_0_14
ordr_0_15	130	44420	ORDR_0	/dev/vgdata1/rordr_0_15
ordr_0_2	117	44420	ORDR_0	/dev/vgdata1/rordr_0_3
ordr_0_3	118	44420	ORDR_0	/dev/vgdata1/rordr_0_2
ordr_0_4	128	44420	ORDR_0	/dev/vgdata1/rordr_0_4
ordr_0_5	125	44420	ORDR_0	/dev/vgdata1/rordr_0_5
ordr_0_6	123	44420	ORDR_0	/dev/vgdata1/rordr_0_6
ordr_0_7	129	44420	ORDR_0	/dev/vgdata1/rordr_0_7
ordr_0_8	120	44420	ORDR_0	/dev/vgdata1/rordr_0_8
ordr_0_9	124	44420	ORDR_0	/dev/vgdata1/rordr_0_9
roll1	3	8096	UNDO_1	/dev/vgdata1/rroll1_0_0
sp_0	141	2048	SP_0	/dev/vgdata1/rsp_0_0_0
stok_0_0	54	15940	STOK_0	/dev/rdisk/c15t1d0
stok_0_1	60	15940	STOK_0	/dev/rdisk/c3t1d3
stok_0_10	64	15940	STOK_0	/dev/rdisk/c15t1d1
stok_0_11	62	15940	STOK_0	/dev/rdisk/c1t1d2
stok_0_12	67	15940	STOK_0	/dev/rdisk/c5t1d1
stok_0_13	66	15940	STOK_0	/dev/rdisk/c17t1d3
stok_0_14	57	15940	STOK_0	/dev/rdisk/c15t0d6
stok_0_15	58	15940	STOK_0	/dev/rdisk/c9t1d2
stok_0_16	69	15940	STOK_0	/dev/rdisk/c3t1d0
stok_0_17	75	15940	STOK_0	/dev/rdisk/c13t0d7
stok_0_18	79	15940	STOK_0	/dev/rdisk/c11t1d3
stok_0_19	76	15940	STOK_0	/dev/rdisk/c1t1d0
stok_0_2	61	15940	STOK_0	/dev/rdisk/c13t1d3
stok_0_20	80	15940	STOK_0	/dev/rdisk/c15t1d2
stok_0_21	85	15940	STOK_0	/dev/rdisk/c13t1d1
stok_0_22	71	15940	STOK_0	/dev/rdisk/c13t1d2
stok_0_23	72	15940	STOK_0	/dev/rdisk/c3t0d6
stok_0_24	82	15940	STOK_0	/dev/rdisk/c11t0d6
stok_0_25	77	15940	STOK_0	/dev/rdisk/c9t1d1
stok_0_26	81	15940	STOK_0	/dev/rdisk/c1t0d7
stok_0_27	78	15940	STOK_0	/dev/rdisk/c5t1d0
stok_0_28	84	15940	STOK_0	/dev/rdisk/c3t0d7
stok_0_29	86	15940	STOK_0	/dev/rdisk/c11t1d1
stok_0_3	59	15940	STOK_0	/dev/rdisk/c17t0d7
stok_0_30	73	15940	STOK_0	/dev/rdisk/c11t1d0
stok_0_31	74	15940	STOK_0	/dev/rdisk/c9t0d7
stok_0_32	83	15940	STOK_0	/dev/rdisk/c5t0d6
stok_0_33	93	15940	STOK_0	/dev/rdisk/c9t1d0
stok_0_34	94	15940	STOK_0	/dev/rdisk/c1t0d6
stok_0_35	97	15940	STOK_0	/dev/rdisk/c3t1d2
stok_0_36	100	15940	STOK_0	/dev/rdisk/c17t1d2
stok_0_37	101	15940	STOK_0	/dev/rdisk/c13t1d0
stok_0_38	89	15940	STOK_0	/dev/rdisk/c5t0d7
stok_0_39	90	15940	STOK_0	/dev/rdisk/c9t1d3
stok_0_4	68	15940	STOK_0	/dev/rdisk/c13t0d6
stok_0_40	88	15940	STOK_0	/dev/rdisk/c9t0d6
stok_0_41	95	15940	STOK_0	/dev/rdisk/c17t1d0

stok_0_42	96	15940	STOK_0	/dev/rdisk/c17t1d1
stok_0_43	99	15940	STOK_0	/dev/rdisk/c1t1d1
stok_0_44	98	15940	STOK_0	/dev/rdisk/c5t1d2
stok_0_45	102	15940	STOK_0	/dev/rdisk/c11t1d2
stok_0_46	91	15940	STOK_0	/dev/rdisk/c17t0d6
stok_0_47	92	15940	STOK_0	/dev/rdisk/c11t0d7
stok_0_5	63	15940	STOK_0	/dev/rdisk/c3t1d1
stok_0_6	56	15940	STOK_0	/dev/rdisk/c15t1d3
stok_0_7	55	15940	STOK_0	/dev/rdisk/c1t1d3
stok_0_8	70	15940	STOK_0	/dev/rdisk/c5t1d3
stok_0_9	65	15940	STOK_0	/dev/rdisk/c15t0d7
system_1	1	400	SYSTEM	/dev/vgdata1/rsystem_1_0_0
tpccaux	2	120	SYSAUX	/dev/vgdata1/rtpccaux_0_0
ware_0_0	4	90	WARE_0	/dev/vgdata1/rware_0_0
log_3		39000		/dev/rdisk/c19t0d1
log_4		39000		/dev/rdisk/c19t0d2

The distribution of the database tables over the disk arrays of the priced system is an extension of the distribution described in Table 5.2; some ancillary details are mentioned in Appendix E. 60-day storage growth requirements are met with the unused space of this configuration. Figure 1.2 shows the configuration of the priced-system disks.

5.3 Data Model & Interfaces

A statement must be provided that describes:

1. *The data model implemented by the DBMS used (e.g. relational, network, hierarchical)*
2. *The database interface used (e.g. embedded, call-level) and access language (e.g. SQL, DL/I, COBOL, read/write) used to implement the TPC-C transactions. If more than one interface/access language is used to implement TPC-C, each interface/access language must be described and a list of which interface/access language is used with which transaction type must be disclosed.*

Oracle Database 10g Enterprise Edition is a relational DBMS. SQL stored procedures were used, invoked through the Oracle Call Interface (OCI); the application code appears in Appendix A.

5.4 Partitions/Replications

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

Partitioning was not used.

5.5 Growth Requirements

Details of the 60 day space computations along with proof that the database is configured to sustain 8 hours for the dynamic tables (Order, Order-Line, and History) must be disclosed.

See Appendix E.

6 Clause 5 Related Items

6.1 Throughput

Measured tpmC must be reported.

Table 6.1: Measured tpmC

tpmC®	230,569.33
-------	------------

6.2 Response Time

Ninetieth percentile, maximum and average response times must be reported for all transaction types as well as for the menu response time.

Table 6.2: Response Times

Response Times	Average	90th %-ile	Maximum
New-Order	0.34s	0.65s	9.15s
Payment	0.33s	0.65s	9.66s
Order-Status	0.34s	0.66s	8.45s
Delivery (interactive portion)	0.14s	0.26s	8.23s
Delivery (deferred portion)	0.34s	0.65s	8.86s
Stock-Level	0.33s	0.65s	8.41s
Menu	0.070s	0.10s	4.34s

6.3 Keying and Think Times

The minimum, the average, and the maximum keying and think times must be reported for each transaction type.

Table 6.3: Keying Times

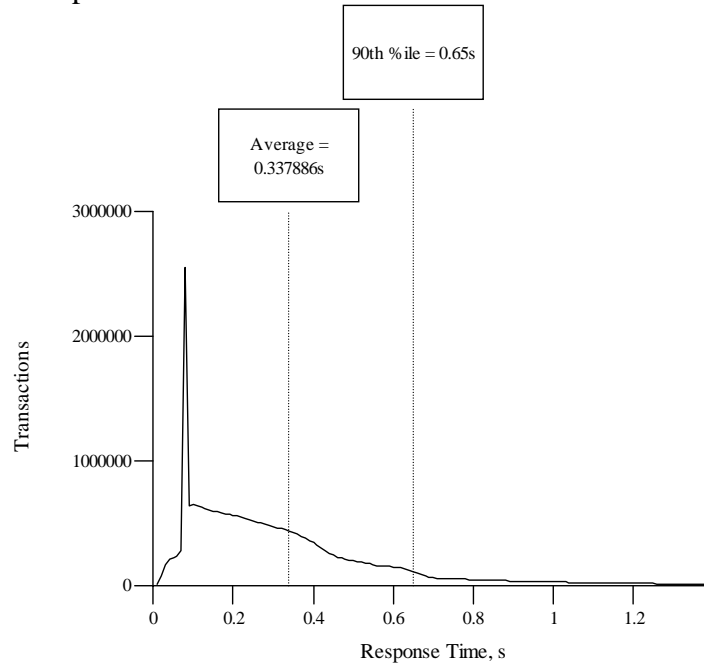
Keying Times	Minimum	Average	Maximum
New Order	18.02s	18.03s	18.24s
Payment	3.02s	3.03s	3.26s
Order Status	2.02s	2.03s	2.24s
Interactive Delivery	2.02s	2.03s	2.24s
Stock Level	2.02s	2.03s	2.24s

Table 6.4: Think Times

Think Times	Minimum	Average	Maximum
New Order	0.02s	12.14s	191.16s
Payment	0.02s	12.07s	193.48s
Order Status	0.02s	10.12s	147.84s
Interactive Delivery	0.02s	5.07s	72.98s
Stock Level	0.02s	5.07s	72.48s

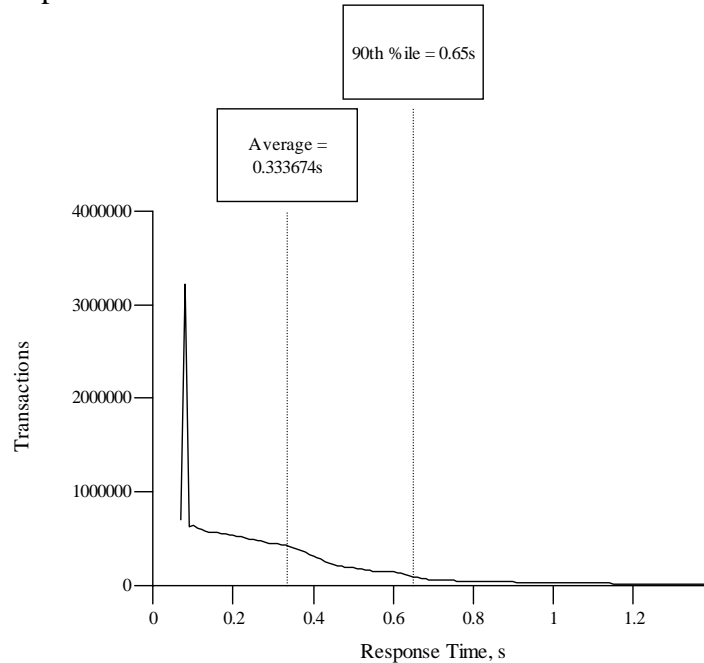
6.4 Response Time Frequency Distribution Curves and Other Graphs

Figure 6.1: New Order Response Time Distribution



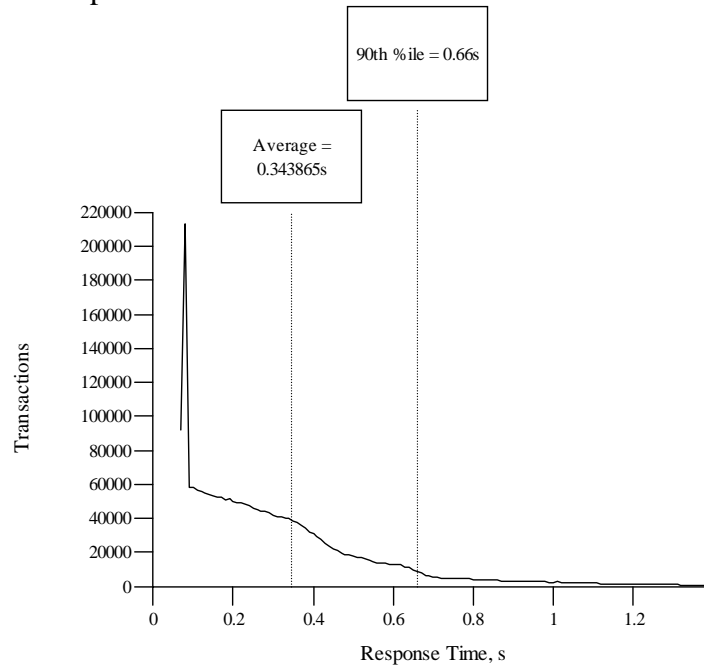
Response time frequency distribution for New Order transaction

Figure 6.2: Payment Response Time Distribution



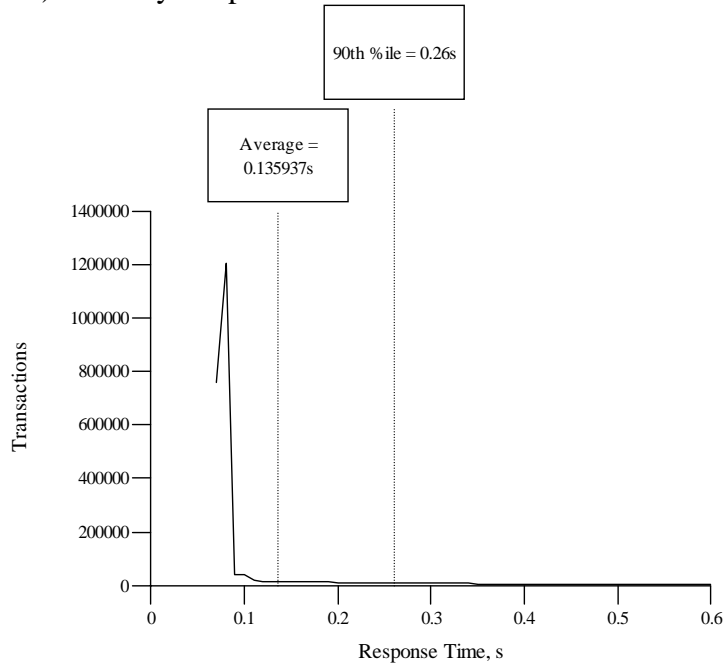
Response time frequency distribution for Payment transaction

Figure 6.3: Order Status Response Time Distribution



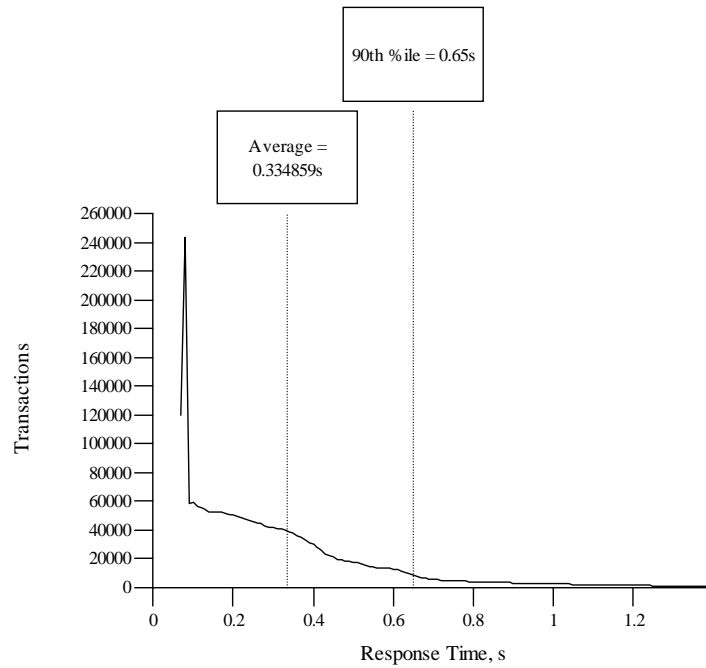
Response time frequency distribution for Order Status transaction

Figure 6.4: (Interactive) Delivery Response Time Distribution



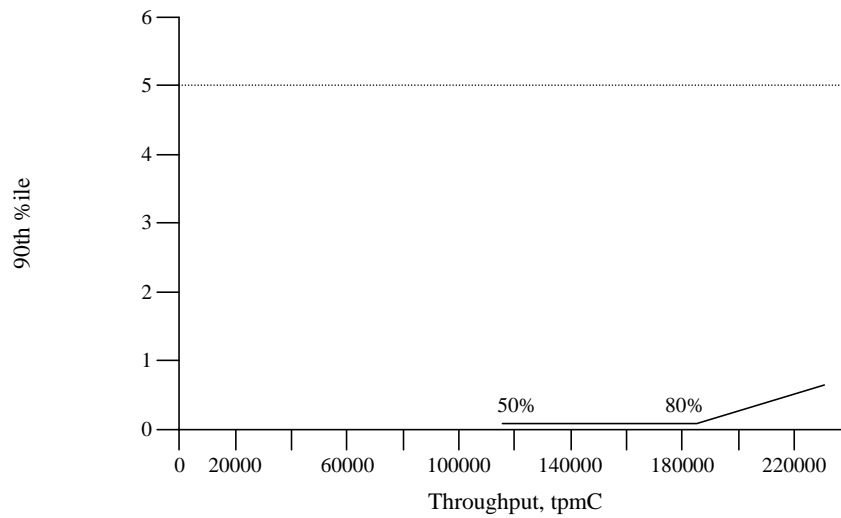
Response time frequency distribution for Delivery transaction

Figure 6.5: Stock Level Response Time Distribution



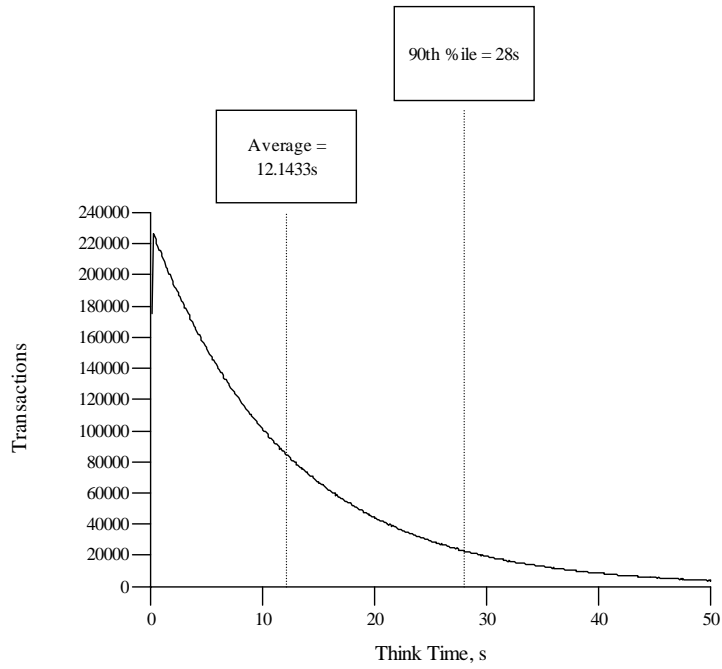
Response time frequency distribution for Stock Level transaction

Figure 6.6: Response Time Versus Throughput



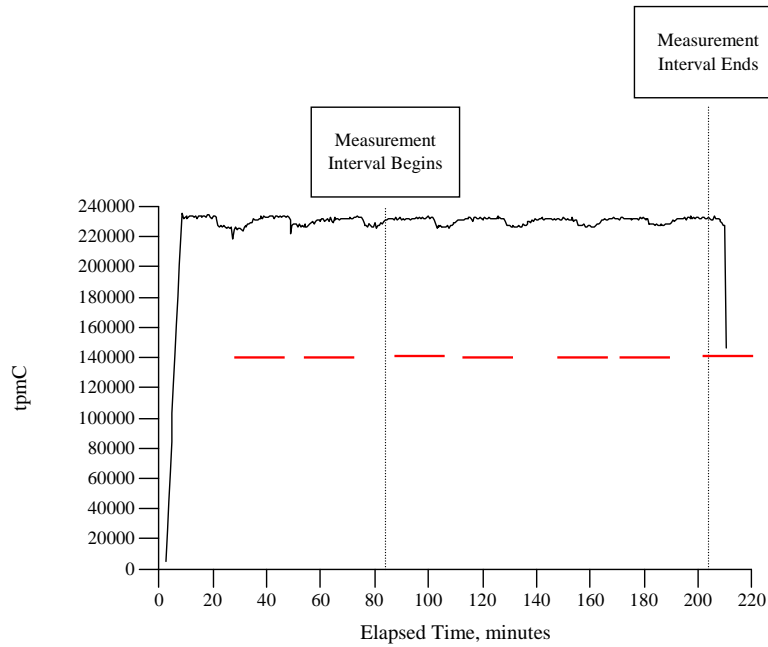
New Order response time versus Throughput

Figure 6.7: New Order Think Time Distribution



Think time frequency distribution for New Order transaction

Figure 6.8: Throughput Versus Elapsed Time



Throughput of the New-Order transaction versus elapsed time

6.5 Steady State Determination

The method used to determine that the SUT had reached a steady state prior to commencing the measurement interval must be disclosed.

Synchronization techniques employed in the benchmark process ensure that all emulated users are logged into the client and have opened the application before submitting transactions. Once all users are connected, each pauses a random amount of time before submitting transactions. The pause time distribution is controlled by a benchmark input parameter. The ramp-up interval is discernible in the graph of throughput over time. The data reduction also tracks the user load and indicates the point in time at which all users have submitted at least one transaction. The throughput is observed to be steady within the systematic and statistical variability of the measurement after all users are submitting transactions. A checkpoint is initiated upon the end of ramp-up.

6.6 Work Performed During Steady State

A description of how the work normally performed during a sustained test (for example checkpointing, writing redo/undo log records, etc.), actually occurred during the measurement interval must be reported.

Modified database buffers migrated to disk on a least-recently-used basis independent of transaction commits. In addition, every block modification was protected by redo log records. These redo log records were written to the redo log buffer (in memory) and were flushed to a redo log file on disk either when the transaction committed or when the redo log buffer became full. However, due to the rapid commit during this benchmark, the redo log buffer was always flushed by a commit before it became full. Also, because many transactions were committing in a short period of time, a single flush of the redo log buffer resulted in many transactions' redo log data being written to disk. This is called group commit.

6.6.1 Checkpoint

During an Oracle Database 10g Enterprise Edition checkpoint, all modified blocks in the shared buffer cache which had not been written to disk since the last checkpoint are written to disk.

6.6.2 Checkpoint Conditions

Oracle Database 10g Enterprise Edition performs a checkpoint for the following conditions:

1. A redo log switch occurs.
2. The amount of data written to a redo log reaches the `log_checkpoint_interval`
3. The amount of time since the last checkpoint reaches the `log_checkpoint_timeout`.

6.6.3 Checkpoint Implementation

The first method listed above, i.e., a log switch when the redo log file filled up, was used to cause checkpoints. After the initial checkpoint, a log switch was performed every 29.6 minutes in average. All checkpoint intervals were less than 30 minutes.

6.6.4 Serializable Transactions

Oracle supports serializable transaction isolation in full compliance with the SQL92 and TPC-C requirements. This is implemented by extending the multiversion concurrency control mechanism long supported by Oracle.

Oracle queries take no read locks and see only data committed as of the beginning of the query's execution. This means that readers and writers coexist without blocking one another, providing a high degree of concurrency and consistency. While this mode does prevent reading dirty data, Oracle's default isolation level also permits a transaction that issues a query twice to see non-repeatable reads and phantoms, as defined in SQL92 and TPC-C.

Beginning with Oracle7 release 7.3, a transaction may request a high degree of isolation with the command SET TRANSACTION ISOLATION LEVEL SERIALIZABLE, as defined in SQL92. This transaction mode prevents read/write and write/write conflicts that would cause serializability failures. A session can establish this mode as its default mode, so the SET TRANSACTION command need not be issued in each transaction.

Oracle implements SERIALIZABLE mode by extending of the scope of read consistency from the individual query to the entire transaction. Instead of limiting a query to data committed at the time a query begins, in a serializable transaction all queries see data as of the beginning of the transaction. Thus, a serializable transaction sees a fixed snapshot of the database, established as of the beginning of the transaction.

All reads within a serializable transaction see only committed data as of the start of that transaction, plus new updates done by the transaction itself. All reads by a serializable transaction are therefore repeatable, as the transaction will access prior versions of data changed (or deleted) by other transactions after the start of the serializable transaction. This behavior also results in phantom protection since new rows created by other transactions will be invisible to the serializable transaction.

To ensure proper isolation, a serializable transaction cannot modify rows that were changed by other transactions after the beginning of the serializable transaction. If a serializable transaction attempts to update (or delete) a row previously changed by another transaction (serializable or not) since the beginning of the serializable transaction, the update (or delete) statement will fail with error ORA-08177: "Can't serialize access", and the statement will rollback.

SET TRANSACTION ISOLATION

LEVEL SERIALIZABLE;

SELECT ...

SELECT...

UPDATE...

IF "Can't serialize access"

THEN ROLLBACK; LOOP and retry

ELSE COMMIT;

When a serializable transaction fails with this error, the application may either commit the work executed to that point, execute additional (but different) statements, or rollback the entire transaction. Repeated attempts to execute the same statement will always fail with the error "Can't serialize access", unless the other transaction has rolled back and released its lock. This error and these recovery options are similar to the treatment of deadlocks in systems that use read locks to ensure serializable execution. In both cases, conflicts between transactions cannot be resolved unless one of the transactions rolls back and restarts or commits without re-executing the statement receiving the error.

6.7 Measurement Period Duration

A statement of the duration of the measurement interval for the reported Maximum Qualified Throughput (tpmC_®) must be included.

The measurement interval was 120 minutes.

6.8 Regulation of Transaction Mix

The method of regulation of the transaction mix (e.g., card decks or weighted random distribution) must be described. If weighted distribution is used and the RTE adjusts the weights associated with each transaction type, the maximum adjustments to the weight from the initial value must be disclosed.

The weighted selection method of *Clause 5.2.4.1* was used. The weights were not adjusted during the run.

6.9 Transaction Mix

The percentage of the total mix for each transaction type must be disclosed.

Table 6.5: Transaction Mix

Type	Percentage
New Order	44.94%
Payment	43.02%
Order Status	4.01%
Delivery	4.02%
Stock Level	4.010%

6.10 Transaction Statistics

The percentage of New-Order transactions rolled back as a result of invalid item number must be disclosed. The average number of order-lines entered per New-Order transaction must be disclosed. The percentage of remote order-lines entered per New-Order transaction must be disclosed. The percentage of remote Payment transactions must be disclosed. The percentage of customer selections by customer last name in the Payment and Order-Status transactions must be disclosed. The percentage of Delivery transactions skipped due to there being fewer than necessary orders in the New-Order table must be disclosed.

See Table 3.1

6.11 Checkpoint Count and Location

The number of checkpoints in the measurement interval, the time in seconds from the start of the measurement interval to the first checkpoint, and the Checkpoint Interval must be disclosed.

Two checkpoints were completed before the measurement interval began. There were four checkpoints completed within the measurement interval. The first of those checkpoints (#2) starts approximately 2.42 minutes into the measurement interval. The average checkpoint interval is 29 minutes, 36 seconds and a checkpoint during the MI lasts approximately 26 minutes, 37 seconds.

The run started at 04:42:17. The Measurement Interval was 06:06:17 to 08:06:17.

The checkpoints during this run were:

Checkpoint	Start time	End time	Duration
	4:42:17		run starts
#0	5:09:08	5:36:07	
#1	5:39:01	6:05:48	26:47:00
	6:06:17		measurement starts
#2	6:08:42	6:35:11	26:29:00
#3	6:38:02	7:04:32	26:30:00
#4	7:07:25	7:34:06	26:41:00
#5	7:37:00	8:03:49	26:49:00
	8:06:17		measurement ends
#6	8:06:44		

7 Clause 6 Related Items

7.1 RTE Description

If the RTE is commercially available, then its inputs must be specified. Otherwise, a description must be supplied of what inputs (e.g., scripts) to the RTE had been used. The RTE input parameters, code fragments, functions, et cetera used to generate each transaction input field must be disclosed. Comment: The intent is to demonstrate the RTE was configured to generate transaction input data as specified in Clause 2.

The RTE (Remote Terminal Emulator) on the driver system was developed at Hewlett-Packard and is not commercially available. Appendix D lists RTE input parameters and code fragments used to generate each transaction input field.

For this instance of the TPC-C benchmark, 4 drivers and 6 clients were used. The drivers emulated users logged in to the clients. An overview of the benchmark software on the drivers, clients and server is shown in Figure 7.1.

The benchmark is started with the **run** command on the driver system. **Run** controls the overall execution of the benchmark. After reading a configuration file, **run** starts TUXEDO on the client, collects pre-benchmark audit information and inserts a timestamp into a database audit table. When all the initial steps are completed, **run** invokes another program, **driver**, to start the benchmark. As the benchmark completes, **run** shuts down TUXEDO and collects the benchmark results into a single location.

Driver is the heart of the benchmark software. It simulates users as they log in, execute transactions and view results. **Driver** collects response times for each transaction and saves them in a file for future analysis.

Qualify is the post-processing analysis program. It produces the numerical summaries and histograms needed for the disclosure report.

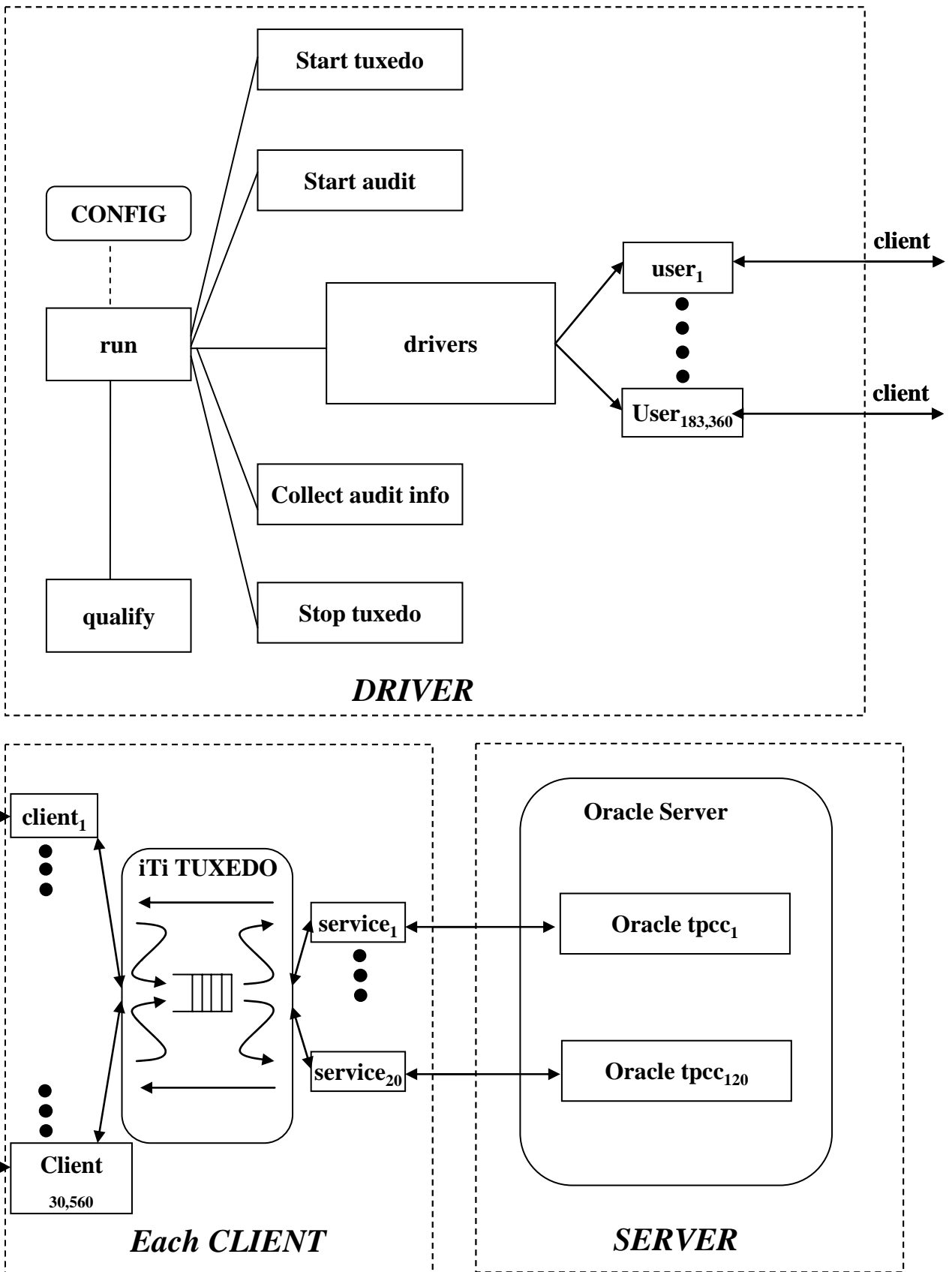


Figure 7.1: Benchmark Software

7.2 Lost Connections

No terminal connections were lost during the measurement interval.

7.3 Emulated Components

It must be demonstrated that the functionality and performance of the components being emulated in the Driver System are equivalent to the priced system.

In the benchmark configuration, the 183,360 simulated workstations connected to the clients over 1 1000BT lan through one hp procure switch. In the priced configuration, the 183,360 worksations would connect to the clients via a combination of hubs and switches which eventually mutipexed down to 1 1000BT lan.

7.4 Functional Diagrams

A complete functional diagram of both the benchmark and the configuration of the proposed (target) system must be disclosed. A detailed list of all hardware and software functionality being performed on the Driver System and its interface to the SUT must be disclosed.

Figures 1.1 and 1.2 (in Chapter 1) show functional diagrams of the benchmark and configured systems. A description of the RTE and benchmark software is provided above.

7.5 Networks

The network configuration of both the tested and proposed services which are being represented and a thorough explanation of exactly which parts are being replaced with the Driver System must be disclosed.

Figures 1.1 and 1.2 (in Chapter 1) diagram the network configurations of the benchmark and configured systems, and represent the Driver connected via LAN replacing the workstations and HUBs connected via LANs. The clients are connected via 1000 Base-T to one 100BT/1000BT-Ethernet switch which in turn are connected via 1000BT-Ethernet to the SUT.

The bandwidth of the networks used in the tested/priced configurations must be disclosed.

The 1000 Base-T local area networks (LAN) used, had a bandwidth of 1000 megabits per second.

7.6 Client Substitution

No client substitution was used.

8 Clause 7 Related Items

8.1 System Pricing

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

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

Each priced configuration consists of an integrated system package, additional options, and components. Prices for all Hewlett-Packard products that are not provided by a third party quote are HP's US list prices. A one (1) year warranty is standard with all Hewlett-Packard products.

8.2 Support Pricing

The three year support pricing for Hewlett-Packard products is based on twenty-four (24) months of monthly support costs; thirty-six (36) months minus the twelve month warranty period. The Oracle Corporation support pricing is based on thirty-six (36) months of monthly support costs. The following support products were priced in the benchmark:

- HP four-hour on-site repair hardware support,
- HP telephone support for software and updates
- Oracle Corporation Standard Technical Support and,
- BEA TUXEDO Standard Technical Support

8.2.1 HP Hardware Support

HP's on-site support for hardware provides service 24 hour, seven day support.

8.2.2 HP Software Support

HP Software Support provides the following:

- Access to the HP Response Centers for fault isolation and problem solving assistance,
- Guaranteed two (2) hour call return, immediate response for critical calls,
- Electronic access to product and support information,
- Electronic access to software patches,
- Right-to-use and copy software updates.

8.3 Oracle Corporation Standard Technical Support

Oracle Corporation Standard Technical Support includes:

Product updates,

- A regular technical publication,
- Unlimited, toll-free telephone service to assist in product installation, syntax, and usage that is available 24 hours, seven days a week.

8.4 Availability

The committed delivery date for general availability (availability date) of products used in the price calculation must be reported. When the priced system includes products with different availability dates, the reported availability date for the priced system must be the date at which all components are committed to be available.

see below

8.5 Priced System Configuration

The hardware, software, and support/maintenance products priced in this benchmark are detailed on page v.

8.6 Throughput, Price/Performance, and Availability Date

A statement of the measured $\text{tpmC}_{\text{®}}$ as well as the respective calculations for the 3-year pricing, price/performance ($\text{price}/\text{tpmC}_{\text{®}}$).

For Throughput and Price/Performance, please see page iv and v. The Price/Performance calculation spreadsheet appears on page v.

Description	Part Number	Order ability Date	Availability Date
HP Integrity rx6600 Base System with 2 1.6GHz/24MB Dual-Core Processor Modules (incl dual-port 1000B-T adapter, 1 power supply)	AD132A, Opt 180**	September 1, 2006	September 31, 2006
I/O backplane	AD296A**	September 1, 2006	September 31, 2006
48-DIMM memory carrier board	AD127A**	September 1, 2006	September 31, 2006
36GB/10kpm SAS hard disk drive	AD140A**	September 1, 2006	September 31, 2006
DVD-ROM slimline drive	AD142A**	September 1, 2006	September 31, 2006
16GB memory quad (4x4GB DIMMS)	AB566A**	December 1, 2006	December 1, 2006
3 Year Svc & Support Price (Hardware and Software)	HA110A3**	September 1, 2006	September 31, 2006
HP-UX 11i v2 Foundation Operating Environment	BA503AC**	December 1, 2006	December 1, 2006
Oracle Database 10g Enterprise Edition, Per Processor Unlimited Users, 3 years	Runtime**	December 1, 2006	December 1, 2006

For HP pricing verification, please contact HP Unix Sales Development at 408-447-2320

For Oracle pricing verification, please contact MaryBeth Pierantoni, mary.beth.pierantoni@oracle.com, 916-315-5081

9 Clause 9 Related Items

9.1 Auditor's Report

If the benchmark has been independently audited, then the auditor's name, address, phone number, and a brief audit summary report indicating compliance must be included in the Full Disclosure Report. A statement should be included, specifying when the complete audit report will become available and who to contact in order to obtain a copy.

If audited, the auditor's attestation letter must be made readily available to the public as part of the Full Disclosure Report, but a detailed report from the auditor is not required.

This implementation of the TPC Benchmark[®] C on the HP Integrity rx6600 was audited by Lorna Livingtree for Performance Metrics, Inc..

Lorna Livingtree
Performance Metrics, Inc.
P.O. Box 984
Klamath, CA 95548
U.S.A.
Phone: (707) 482-0523
Fax:(707) 482-1352

The attestation letter is shown on the following pages.



PERFORMANCE METRICS INC.
TPC Certified Auditors

July 26, 2006

Curt G. Thiem
 HP-UX Performance Manager
 Hewlett-Packard Company
 Mailstop 4220
 19447 Pruneridge Ave.
 Cupertino, CA 95014-0683

I have verified the TPC Benchmark™ C client/server for the following configuration:

Platform: HP Integrity rx6600
 Database Manager: Oracle Database 10g Enterprise Edition
 Operating System: HP-UX 11iV2
 Transaction Manager: BEA Tuxedo 8.0

Server: HP Integrity rx6600				
CPU's	Memory	Disks	90% Response	tpmC
2 dual-core processors @ 1.6GHz	Main: 192 GB	338 @ 36GB 42 @ 73GB	0.65	230,569

Clients: 6 HP server rx2620		
CPU's	Memory	Disks
2 1.3GHz Intel Itanium™ 2 Processors @ 1.3GHz	Main: 8GB	1 @ 36GB

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

- The transactions were correctly implemented.
- The database was properly sized and populated.
- The database was properly scaled with 20,000 warehouses, 18,336 of which were used. I verified that d_next_o_id and w_ytd contained initial values for the unused warehouses
- The ACID properties were met. The disk-loss tests used the full database and the performance exceeded 10% of the measured tpmC.
- Input data was generated according to the specified percentages.
- Eight hours of mirrored log space was configured on the measured system.
- Eight hours of dynamic table growth space was configured on the measured system.
- The 60-day space calculation was verified; the measured system had sufficient storage.
- There were 183,360 user contexts present on the system.
- Each user started with a different random number seed.
- The NURand constants used for database load and at run time were 1 and 86.
- The steady state portion of the test was 2 hours.
- The system pricing was checked for major components and maintenance.

Auditor Notes:

The tested system used a 2GB fiber channel HBA which is to be discontinued. The priced configuration used the (slightly cheaper) 4GB fiber channel HBA. I looked at web-based specification sheets which show the 4GB HBA is equal or faster than the 2GB HBA.

Sincerely,



Lorna Livingtree
Auditor

10 Report Availability

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

Transaction Processing Performance Council
c/o Tpc Administrator
P.O. Box 29920
San Francisco, CA 94129-0920

or your local Hewlett-Packard sales office.

Appendix A Client/Server Source

This appendix contains the source and makefiles for all client and server programs.

A.1 Client Front-End

client/client.c

```
/*
*****
@(#) Version: A.10.10 $Date: 2005/04/11 10:10:29 $
(c) Copyright 1996, Hewlett-Packard Company, all rights reserved.
*****
History
941101 JVM Fixed login screen to detect broken connection (used to loop)
941013 JVM Added audit strings to the login form
941013 VM modified the getfield procedure to add digit and char check
according to the field type.
941014 VM added the status_msg routine to display transaction results.
941015 VM added zip routine to format zip codes and phone routine
to format phone numbers.
*****
#include <stdlib.h>
#include <stdio.h>
#include <signal.h>
#include <sys/types.h>
#include <sys/socket.h>
#include <netinet/tcp.h>
#include <netinet/in.h>
#include <netdb.h>
#include <fcntl.h>
#include <errno.h>
#include <pthread.h>
#include <sched.h>
#include <math.h>

#include "key_chars.h"
#include "tpcc.h"
#include "tux_transaction.h"
#include "iobuf.h"

/* Macro to define an I/O buffer of x characters, initialized to empty */
#define define_iobuf(name, size) \
char name##_data[size]; \
iobuf name[1]

#define init_iobuf(name, size, _ifid, _ofd) \
name->ifid = _ifid; \
name->ofd = _ofd; \
name->beg = name##_data; \
name->end = name##_data + size; \
name->max = name##_data + size; \
name->cur = name##_data;

/*
* Input/Output buffers + screen buffers
*/

#define INPUT_BUF_SIZE 1024
#define OUTPUT_BUF_SIZE 4096
#define NEWORDER_FORM_SIZE 900
#define PAYMENT_FORM_SIZE 400
#define ORDSTAT_FORM_SIZE 300
#define DELIVERY_FORM_SIZE 300
#define STOCKLEV_FORM_SIZE 300

/* Number of Threads per Tuxedo Context */
#define MAX_THREADS_PER_CONTEXT 16

/* Maximum number of threads per server */
#ifdef _hpux
#define MAX_USERS_PER_PROCESS 1000
int number_of_servers = 15; /* default number of servers to spawn */
#else
#define MAX_USERS_PER_PROCESS 240 /* make it less than threads-per-process on
Linux:250 */
int number_of_servers = 64;

```

```
#endif

/* Process local only */
long tux_context; /* Tuxedo context to use */
int port_number = 11000; /* address to listen on */
int user_connections = 0; /* number of current connections */
pthread_t user_ids[MAX_USERS_PER_PROCESS] = {0}; /* thread ids spawned per
server */

struct thread_data {
int fd; /* Stream file descriptor */
long tux_context; /* Tuxedo context to use */
};
typedef struct thread_data thread_data;

/*
* Prototype definitions
*/
static int next_field(int current, int key, int max);
static int neworder(iobuf *in_buf, iobuf *out_buf, iobuf *neworder_form, void **data_ptr,
neworder_trans *t, ID warehouse);
static int neworder_read(iobuf *in_buf, iobuf *out_buf, neworder_trans *t, ID warehouse);
static void neworder_write(iobuf *out_buf, neworder_trans *t);
static void neworder_setup(iobuf *neworder_form, ID warehouse);
static int payment(iobuf *in_buf, iobuf *out_buf, iobuf *payment_form, void **data_ptr,
payment_trans *t, ID warehouse);
static void payment_setup(iobuf *payment_form, ID warehouse);
static int payment_read(iobuf *in_buf, iobuf *out_buf, payment_trans *t, ID warehouse);
static void payment_write(iobuf *out_buf, payment_trans *t);
static int ordstat(iobuf *in_buf, iobuf *out_buf, iobuf *ordstat_form, void **data_ptr,
ordstat_trans *t, ID warehouse);
static void ordstat_setup(iobuf *ordstat_form, ID warehouse);
static int ordstat_read(iobuf *in_buf, iobuf *out_buf, ordstat_trans *t, ID warehouse);
static void ordstat_write(iobuf *out_buf, ordstat_trans *t);
static int delivery(iobuf *in_buf, iobuf *out_buf, iobuf *delivery_form, void *data_ptr,
delivery_trans *t, ID warehouse);
static void delivery_setup(iobuf *delivery_form, ID warehouse);
static int delivery_read(iobuf *in_buf, iobuf *out_buf, delivery_trans *t, ID warehouse);
static void delivery_write(iobuf *out_buf, delivery_trans *t);
static int stocklev(iobuf *in_buf, iobuf *out_buf, iobuf *stocklev_form, void **data_ptr,
stocklev_trans *t, ID warehouse, ID district);
static void stocklev_setup(iobuf *stocklev_form, ID warehouse, ID district);
static int stocklev_read(iobuf *in_buf, iobuf *out_buf, stocklev_trans *t, ID warehouse, ID
district);
static void stocklev_write(iobuf *out_buf, stocklev_trans *t);
static int valid_char(int key, FIELD_TYPE ftype);
static int getfield(int row, int col, char buf[], int width, FIELD_TYPE ftype,
iobuf *in_buf, iobuf *out_buf);
static int read_text(int row, int col, char *s, int width, iobuf *in_buf,
iobuf *out_buf);
static int read_money(int row, int col, double *m, int width, iobuf *in_buf,
iobuf *out_buf);
static int read_number(int row, int col, int *n, int width, iobuf *in_buf,
iobuf *out_buf);

static void clear_screen(iobuf *out_buf);
static void position(iobuf *out_buf, int row, int col);
static void trigger(iobuf *out_buf);
static void trigger2(iobuf *out_buf);
static void status(iobuf *out_buf, int row, int col, int status);
static void blanks(iobuf *out_buf, int row, int col, int len);
static void empty(iobuf *out_buf, int row, int col, int len);
static void zip(iobuf *out_buf, int row, int col, char *str);
static void phone(iobuf *out_buf, int row, int col, char *str);
static void text(iobuf *out_buf, int row, int col, char str[]);
static void long_text(iobuf *out_buf, int row, int col, char *str, int width);
static void money(iobuf *out_buf, int row, int col, double x, int width);
static void date_only(iobuf *out_buf, int row, int col, char *date_str);
static void date(iobuf *out_buf, int row, int col, char *date_str);
static void real(iobuf *out_buf, int row, int col, double x, int width, int dec);
static void number(iobuf *out_buf, int row, int col, int n, int width);
static void cleanup(iobuf *out_buf);
static void msgline(iobuf *out_buf, char *str);
static int menu_read(iobuf *in_buf, iobuf *out_buf);
static void menu_setup(iobuf *out_buf);
static int login(iobuf *in_buf, iobuf *out_buf, ID *warehouse, ID *district);

void *
client_main(void *arg)
{
/*
* variables set up during initialization
*/
iobuf *in_buf;
iobuf *out_buf;
void *data_ptr; /* where data gets copied to Tuxedo */
ID warehouse;
ID district;
int key;
int user;

define_iobuf(output_stuff, OUTPUT_BUF_SIZE);
define_iobuf(input_stuff, INPUT_BUF_SIZE);
define_iobuf(payment_form, PAYMENT_FORM_SIZE);
define_iobuf(neworder_form, NEWORDER_FORM_SIZE);
define_iobuf(ordstat_form, ORDSTAT_FORM_SIZE);

```



```

/* make sure all necessary fields are filled in */
if (t->D_ID == EMPTY_NUM)
    {field=1; msgline(out_buf, "Please specify district"); goto retry;}
if (t->C_ID == EMPTY_NUM)
    {field=2; msgline(out_buf, "Please specify customer id"); goto retry;}

/* calculate how many items were entered */
ol_count = 0;
all_local = 1;
move_slot = -1;
for (i=0; i < 15; i++) {
    if ((t->item[i].OL_I_ID == EMPTY_NUM) &&
        (t->item[i].OL_SUPPLY_W_ID == EMPTY_NUM) &&
        (t->item[i].OL_QUANTITY == EMPTY_NUM)) {
            /* All are clear, so no item */
            if (move_slot == -1) {
                move_slot = i;
            } else {
                /* this is potentially an order line, so check it
out */
                if (t->item[i].OL_SUPPLY_W_ID == EMPTY_NUM) {
                    field=i*3+3;
                    msgline(out_buf, "Please enter
supply warehouse");
                    goto retry;
                }
                if (t->item[i].OL_I_ID == EMPTY_NUM) {
                    field=i*3+4;
                    msgline(out_buf, "Please enter
Item id");
                    goto retry;
                }
                if (t->item[i].OL_QUANTITY == EMPTY_NUM ||
                    t->item[i].OL_QUANTITY <= 0) {
                    field=i*3+5;
                    msgline(out_buf, "Please enter
quantity > 0");
                    goto retry;
                }
                /* It is a complete orderline, so count it */
                ol_count++;

                /* decide if they were all local */
                if (t->item[i].OL_SUPPLY_W_ID != t->W_ID) {
                    all_local = 0;
                }

                if (move_slot != -1) {
                    /* Move the item up to fill in a
hole */
                    t->item[move_slot] = t->item[i];
                    move_slot++; /* bump up to the
next slot */
                }
            }
        }
    }

if (ol_count == 0)
    {field=3; msgline(out_buf, "Please enter at least one orderline"); goto retry;}

t->O_OL_CNT = ol_count;
t->all_local = all_local;

/* display number of order lines */
number(out_buf, 6, 42, t->O_OL_CNT, 2);

msgline(out_buf, "");
flush(out_buf);
return key;
}

static void
neworder_write(iobuf *out_buf, neworder_trans *t)
{
    int i;
    MONEY amount, total_amount, cost;

    /* Rev. 3.3 error checking: both of the following branches are
    * skipped. We'll go to status and print an error message.
    */

    if (t->status == E_INVALID_ITEM) {
        /* CASE: invalid item, display only these values */
        text(out_buf, 5, 25, t->C_LAST);
        text(out_buf, 5, 52, t->C_CREDIT);
        number(out_buf, 6, 15, t->O_ID, 8);
    } else if (t->status == OK) {
        /* CASE: everything OK, display everything */
        text(out_buf, 5, 25, t->C_LAST);
        text(out_buf, 5, 52, t->C_CREDIT);
        number(out_buf, 6, 15, t->O_ID, 8);
        date(out_buf, 4, 61, t->O_ENTRY_D);
    }
}

```

```

real(out_buf, 5, 64, t->C_DISCOUNT * 100, 5, 2);
real(out_buf, 6, 59, t->W_TAX*100, 5, 2);
real(out_buf, 6, 74, t->D_TAX*100, 5, 2);

total_amount = 0;
for (i=0; i < t->O_OL_CNT; i++) {

    /* keep track of amount of each line and total */
    amount = t->item[i].I_PRICE * t->item[i].OL_QUANTITY;
    total_amount += amount;

    /* display the item line */
    number(out_buf, 9+i, 2, t->item[i].OL_SUPPLY_W_ID, 6);
    number(out_buf, 9+i, 10, t->item[i].OL_I_ID, 6);
    text(out_buf, 9+i, 19, t->item[i].I_NAME);
    number(out_buf, 9+i, 45, t->item[i].OL_QUANTITY, 2);
    number(out_buf, 9+i, 51, t->item[i].S_QUANTITY, 3);
    position(out_buf, 9+i, 58); pushc(out_buf, t->item[i].brand_generic);
    money(out_buf, 9+i, 62, t->item[i].I_PRICE, 7);
    money(out_buf, 9+i, 71, amount, 8);
}

/* Clear the screen of any empty input fields */
clear_screen(out_buf);

/* display the total cost */
text(out_buf, 24, 63, "Total:");
cost = total_amount * (1 - t->C_DISCOUNT) * (1 + t->W_TAX + t->D_TAX);
money(out_buf, 24, 71, cost, 9);
}

/* display the status message */
status(out_buf, 24, 1, t->status);
}

static void
neworder_setup(iobuf *neworder_form, ID warehouse)
{
    int item;
    iobuf *old;

    /* start with an empty form */
    reset(neworder_form);

    /* clear the iobuf below the menu */
    position(neworder_form, 3, 1);
    clear_screen(neworder_form);

    /* set up all the field labels */
    text(neworder_form, 3, 36, "New Order");
    text(neworder_form, 4, 1, "Warehouse:");
    number(neworder_form, 4, 12, warehouse, 6);
    text(neworder_form, 4, 19, "District:");
    empty(neworder_form, 4, 29, 2);
    text(neworder_form, 4, 55, "Date:");
    text(neworder_form, 5, 1, "Customer:");
    empty(neworder_form, 5, 12, 4);
    text(neworder_form, 5, 19, "Name:");
    text(neworder_form, 5, 44, "Credit:");
    text(neworder_form, 5, 57, "Disc:");
    text(neworder_form, 6, 1, "Order Number:");
    text(neworder_form, 6, 25, "Number of Lines:");
    text(neworder_form, 6, 52, "W_Tax:");
    text(neworder_form, 6, 67, "D_Tax:");
    text(neworder_form, 8, 2, "Supp_W Item_Num Item_Name");
    text(neworder_form, 8, 45, "Qty Stock B/G Price Amount");

    /* display blank fields for each item */
    for (item = 1; item <= 15; item++) {
        empty(neworder_form, 8+item, 2, 6);
        empty(neworder_form, 8+item, 10, 6);
        empty(neworder_form, 8+item, 45, 2);
    }
}

Payment form processing

static int
payment(iobuf *in_buf, iobuf *out_buf, iobuf *payment_form,
        void **data_ptr, payment_trans *t, ID warehouse)
{
    int key;
    display(payment_form);
    key = payment_read(in_buf, out_buf, t, warehouse);
    if (key != ENTER) return key;
    payment_transaction(data_ptr, t);
    payment_write(out_buf, t);
}

```

```

return key;
}

static void
payment_setup(iobuf *payment_form, ID warehouse)
{
    /* start with an empty form */
    reset(payment_form);

    /* clear the iobuf below the menu */
    position(payment_form, 3,1);
    clear_screen(payment_form);

    /* set up all the field labels */
    text(payment_form, 3, 38, "Payment");
    text(payment_form, 4, 1, "Date:");
    text(payment_form, 6, 1, "Warehouse:");
    number(payment_form, 6, 12, warehouse, 6);
    text(payment_form, 6, 42, "District:");
    empty(payment_form, 6, 52, 2);
    text(payment_form, 11, 1, "Customer:");
    empty(payment_form, 11, 11, 4);
    text(payment_form, 11, 17, "Cust-Warehouse:");
    empty(payment_form, 11, 33, 6);
    text(payment_form, 11, 40, "Cust-District:");
    empty(payment_form, 11, 54, 2);
    text(payment_form, 12, 1, "Name:");
    empty(payment_form, 12, 29, 16);
    text(payment_form, 12, 50, "Since:");
    text(payment_form, 13, 50, "Credit:");
    text(payment_form, 14, 50, "%Disc:");
    text(payment_form, 15, 50, "Phone:");
    text(payment_form, 17, 1, "Amount Paid:");
    empty(payment_form, 17, 23, 8);
    text(payment_form, 17, 37, "New Cust-Balance:");
    text(payment_form, 18, 1, "Credit Limit:");
    text(payment_form, 20, 1, "Cust-Data:");
}

static int
payment_read(iobuf *in_buf, iobuf *out_buf, payment_trans *t, ID warehouse)
{
    int i;
    int field;
    int key;

    /* Our warehouse number is fixed */
    t->W_ID = warehouse;
    t->C_ID = EMPTY_NUM;
    t->D_ID = EMPTY_NUM;
    t->C_W_ID = EMPTY_NUM;
    t->C_D_ID = EMPTY_NUM;
    t->H_AMOUNT = EMPTY_FLT;
    t->C_LAST[0] = '\0';

    /* Process fields until done */
    for (field = 1; field > 0; field = next_field(field, key, 6)) {
        retry: switch (field) {

            case 1: key = read_number(6, 52, &t->D_ID, 2, in_buf, out_buf);
                    break;

            case 2:
                /* if last name specified, skip this field */
                if (t->C_LAST[0] != '\0')
                    break;

                /* read in the customer id */
                key = read_number(11, 11, &t->C_ID, 4, in_buf, out_buf);

                /* if specified, don't allow last name to be entered */
                if (t->C_ID != EMPTY_NUM)
                {
                    blanks(out_buf, 12, 29, 16);
                    t->C_LAST[0] = '\0';
                }

                /* refresh the C_LAST underlines, if possibly needed */
                else if (t->C_LAST[0] == '\0')
                    empty(out_buf, 12, 29, 16);
                break;

            case 3: key = read_number(11, 33, &t->C_W_ID, 6, in_buf, out_buf);
                    break;

            case 4: key = read_number(11, 55, &t->C_D_ID, 2, in_buf, out_buf);
                    break;

            case 5:
                /* skip this field if C_ID was already specified */
                if (t->C_ID != EMPTY_NUM)
                    break;

                /* read in the customer last name */
                key = read_text(12, 29, t->C_LAST, 16, in_buf, out_buf);

                /* if specified, don't allow c_id to be entered */
                if (t->C_LAST[0] != '\0')
                {
                    blanks(out_buf, 11, 11, 4);
                    t->C_ID = EMPTY_NUM;
                }

                /* refresh the C_ID underlines, if possibly needed */
                else if (t->C_ID == EMPTY_NUM)
                    empty(out_buf, 11, 11, 4);
                break;

            case 6: key = read_money(17, 23, &t->H_AMOUNT, 8, in_buf, out_buf);
                    break;
        }
    }

    /* if Aborted, then done */
    if (key != ENTER) {
        return key;
    }

    /* Make sure all the fields were entered */
    if (t->D_ID == EMPTY_NUM)
        {field=1; msgline(out_buf, "Please enter district id"); goto retry;}
    if (t->C_ID == EMPTY_NUM && t->C_LAST[0] == '\0')
        {field=2; msgline(out_buf, "C_ID or C_LAST must be entered"); goto retry;}
    if (t->C_W_ID == EMPTY_NUM)
        {field=3; msgline(out_buf, "Please enter customer's warehouse"); goto retry;}
    if (t->C_D_ID == EMPTY_NUM)
        {field=4; msgline(out_buf, "please enter customer's district"); goto retry;}
    if (t->H_AMOUNT == EMPTY_FLT)
        {field=6; msgline(out_buf, "Please enter payment amount"); goto retry;}
    if (t->H_AMOUNT <= 0)
        {field=6; msgline(out_buf, "Please enter a positive payment"); goto retry;}

    t->byname = (t->C_ID == EMPTY_NUM);
    msgline(out_buf, "");
    flush(out_buf);
    return key;
}

static void
payment_write(iobuf *out_buf, payment_trans *t)
{
    /* if errors, display a message and quit */
    if (t->status != OK) {
        status(out_buf, 24, 1, t->status);
        return;
    }

    /* display the screen */
    date(out_buf, 4, 7, t->H_DATE);
    text(out_buf, 7, 1, t->W_STREET_1);
    text(out_buf, 7, 42, t->D_STREET_1);
    text(out_buf, 8, 1, t->W_STREET_2);
    text(out_buf, 8, 42, t->D_STREET_2);
    text(out_buf, 9, 1, t->W_CITY);
    text(out_buf, 9, 22, t->W_STATE);
    zip(out_buf, 9, 25, t->W_ZIP);
    text(out_buf, 9, 42, t->D_CITY);
    text(out_buf, 9, 63, t->D_STATE);
    zip(out_buf, 9, 66, t->D_ZIP);
    number(out_buf, 11, 11, t->C_ID, 4);
    text(out_buf, 12, 9, t->C_FIRST);
    text(out_buf, 12, 26, t->C_MIDDLE);
    text(out_buf, 12, 29, t->C_LAST);
    date_only(out_buf, 12, 58, t->C_SINCE);
    text(out_buf, 13, 9, t->C_STREET_1);
    text(out_buf, 13, 58, t->C_CREDIT);
    text(out_buf, 14, 9, t->C_STREET_2);
    real(out_buf, 14, 58, t->C_DISCOUNT*100, 5, 2); /* percentage or fraction? */
    text(out_buf, 15, 9, t->C_CITY);
    text(out_buf, 15, 30, t->C_STATE);
    zip(out_buf, 15, 33, t->C_ZIP);
    phone(out_buf, 15, 58, t->C_PHONE);
    money(out_buf, 17, 17, t->H_AMOUNT, 14);
    money(out_buf, 17, 55, t->C_BALANCE, 15);
    money(out_buf, 18, 17, t->C_CREDIT_LIM, 14);

    /* Display cust data if bad credit. */
    if (t->C_CREDIT[0] == 'B' && t->C_CREDIT[1] == 'C') {
        long_text(out_buf, 20, 12, t->C_DATA, 50);
    }

    trigger2(out_buf);
}

/*****

```

```

/* ORDSTAT form processing */
/*****

static int
ordstat(iobuf *in_buf, iobuf *out_buf, iobuf *ordstat_form,
        void **data_ptr, ordstat_trans *t, ID warehouse)
{
    int key;
    display(ordstat_form);
    key = ordstat_read(in_buf, out_buf, t, warehouse);
    if (key != ENTER) return key;
    ordstat_transaction(data_ptr, t);
    ordstat_write(out_buf, t);
    return key;
}

static void
ordstat_setup(iobuf *ordstat_form, ID warehouse)
{
    /* start with an empty form */
    reset(ordstat_form);

    /* clear the iobuf below the menu */
    position(ordstat_form, 3,1);
    clear_screen(ordstat_form);

    /* set up all the field labels */
    text(ordstat_form, 3, 35, "Order-Status");
    text(ordstat_form, 4, 1, "Warehouse:");
    number(ordstat_form, 4, 12, warehouse, 6);
    text(ordstat_form, 4, 19, "District:");
    empty(ordstat_form, 4, 29, 2);
    text(ordstat_form, 5, 1, "Customer:");
    empty(ordstat_form, 5, 11, 4);
    text(ordstat_form, 5, 18, "Name:");
    empty(ordstat_form, 5, 44, 16);
    text(ordstat_form, 6, 1, "Cust-Balance:");
    text(ordstat_form, 8, 1, "Order-Number");
    text(ordstat_form, 8, 26, "Entry-Date:");
    text(ordstat_form, 8, 60, "Carrier-Number:");
    text(ordstat_form, 9, 1, "Supply-W");
    text(ordstat_form, 9, 14, "Item-Num");
    text(ordstat_form, 9, 25, "Qty");
    text(ordstat_form, 9, 33, "Amount");
    text(ordstat_form, 9, 45, "Delivery-Date");
}

static int
ordstat_read(iobuf *in_buf, iobuf *out_buf, ordstat_trans *t, ID warehouse)
{
    int i;
    int field;
    int key;

    /* Our warehouse number is fixed */
    t->W_ID = warehouse;
    t->C_ID = EMPTY_NUM;
    t->D_ID = EMPTY_NUM;
    t->C_LAST[0] = '\0';

    /* Process fields until done */
    for (field = 1; field > 0; field = next_field(field, key, 3)) {
        retry: switch (field) {

            case 1: key = read_number(4, 29, &t->D_ID, 2, in_buf, out_buf);
                    break;

            case 2:
                /* if last name specified, skip this field */
                if (t->C_LAST[0] != '\0')
                    break;

                /* read in the customer id */
                key = read_number(5, 11, &t->C_ID, 4, in_buf, out_buf);

                /* if specified, don't allow last name to be entered */
                if (t->C_ID != EMPTY_NUM)
                {
                    blanks(out_buf, 5, 44, 16);
                    t->C_LAST[0] = '\0';
                }

                /* refresh the C_LAST underlines, if possibly needed */
                else if (t->C_LAST[0] == '\0')
                    empty(out_buf, 5, 44, 16);
                break;

            case 3:
                /* skip this field if C_ID was already specified */
                if (t->C_ID != EMPTY_NUM)
                    break;

                /* read in the customer last name */
                key = read_text(5, 44, t->C_LAST, 16, in_buf, out_buf);

                /* if specified, don't allow c_id to be entered */
                if (t->C_LAST[0] != '\0')
                {
                    blanks(out_buf, 5, 11, 4);
                    t->C_ID = EMPTY_NUM;
                }

                /* refresh the C_ID underlines, if possibly needed */
                else if (t->C_ID == EMPTY_NUM)
                    empty(out_buf, 5, 11, 4);
                break;
            }
        }

        /* if Aborted, then done */
        if (key != ENTER) {
            return key;
        }

        /* ensure all the necessary fields were entered */
        if (t->D_ID == EMPTY_NUM)
            {field=1; msgline(out_buf, "Please enter district id"); goto retry;}
        if (t->C_ID == EMPTY_NUM && t->C_LAST[0] == '\0')
            {field=2; msgline(out_buf, "C_ID or C_LAST must be entered"); goto retry;}

        t->byname = (t->C_ID == EMPTY_NUM);
        msgline(out_buf, "");
        flush(out_buf);
        return key;
    }

    static void
    ordstat_write(iobuf *out_buf, ordstat_trans *t)
    {
        int i;

        /* if errors, display a status message and quit */
        if (t->status != OK) {
            status(out_buf, 24, 1, t->status);
            return;
        }

        /* display the results */
        number(out_buf, 5, 11, t->C_ID, 4);
        text(out_buf, 5, 24, t->C_FIRST);
        text(out_buf, 5, 41, t->C_MIDDLE);
        text(out_buf, 5, 44, t->C_LAST);
        money(out_buf, 6, 15, t->C_BALANCE, 10);
        number(out_buf, 8, 15, t->O_ID, 8);
        date(out_buf, 8, 38, t->O_ENTRY_DATE);
        if (t->O_CARRIER_ID > 0) {
            number(out_buf, 8, 76, t->O_CARRIER_ID, 2);
        }

        for (i=0; i < t->o_cnt; i++) {
            number(out_buf, i+10, 3, t->item[i].OL_SUPPLY_W_ID, 6);
            number(out_buf, i+10, 14, t->item[i].OL_L_ID, 6);
            number(out_buf, i+10, 25, t->item[i].OL_QUANTITY, 2);
            money(out_buf, i+10, 32, t->item[i].OL_AMOUNT, 9);
            date_only(out_buf, i+10, 47, t->item[i].OL_DELIVERY_DATE);
        }
        trigger2(out_buf);
    }

    /******
    /* delivery form processing */
    /******

    static int
    delivery(iobuf *in_buf, iobuf *out_buf, iobuf *delivery_form,
            void **data_ptr, delivery_trans *t, ID warehouse)
    {
        int key;
        display(delivery_form);
        key = delivery_read(in_buf, out_buf, t, warehouse);
        if (key != ENTER) return key;
        delivery_enqueue(data_ptr, t);
        delivery_write(out_buf, t);
        return key;
    }

    static void
    delivery_setup(iobuf *delivery_form, ID warehouse)
    {
        /* start with an empty form */
        reset(delivery_form);

        /* clear the iobuf below the menu */
        position(delivery_form, 3,1);
        clear_screen(delivery_form);

        /* set up all the field labels */
        text(delivery_form, 3, 38, "Delivery");

```

```

text(delivery_form, 4, 1, "Warehouse:");
number(delivery_form, 4, 12, warehouse, 6);
text(delivery_form, 6, 1, "Carrier Number:");
empty(delivery_form, 6, 17, 2);
}

static int
delivery_read(iobuf *in_buf, iobuf *out_buf, delivery_trans *t, ID warehouse)
{
    int i;
    int field;
    int key;

    /* Our warehouse number is fixed */
    t->del.W_ID = warehouse;
    t->del.O_CARRIER_ID = EMPTY_NUM;

    /* Process fields until done */
    for (field = 1; field > 0; field = next_field(field, key, 1)) {
        retry: switch (field) {
            case 1: key = read_number(6, 17, &t->del.O_CARRIER_ID, 2, in_buf, out_buf);
                break;
        }
    }

    /* if Aborted, then done */
    if (key != ENTER) {
        return key;
    }

    /* Must enter the carrier id */
    if ((t->del.O_CARRIER_ID == EMPTY_NUM) ||
        (t->del.O_CARRIER_ID < 1) ||
        (t->del.O_CARRIER_ID > 10))
    {field=1; msgline(out_buf, "Please enter a Carrier Number within 1 and 10"); goto
    retry; }

    /* clear the message line */
    msgline(out_buf, "");
    flush(out_buf);
    return key;
}

static void
delivery_write(iobuf *out_buf, delivery_trans *t)
{
    if (t->del.status == OK) {
        text(out_buf, 8, 1, "Execution Status: Delivery has been queued");
        trigger2(out_buf);
    } else {
        status(out_buf, 8, 1, t->del.status);
    }
}

/*****
*/
/* stocklev form processing
*/
/*****

static int
stocklev(iobuf *in_buf, iobuf *out_buf, iobuf *stocklev_form,
        void **data_ptr, stocklev_trans *t, ID warehouse, ID district)
{
    int key;
    display(stocklev_form);
    key = stocklev_read(in_buf, out_buf, t, warehouse, district);
    if (key != ENTER) return key;
    stocklev_transaction(data_ptr, t);
    stocklev_write(out_buf, t);
    return key;
}

static void
stocklev_setup(iobuf *stocklev_form, ID warehouse, ID district)
{
    /* start with an empty form */
    reset(stocklev_form);

    /* clear the iobuf below the menu */
    position(stocklev_form, 3,1);
    clear_screen(stocklev_form);

    /* set up all the field labels */
    text(stocklev_form, 3, 35, "Stock-Level");
    text(stocklev_form, 4, 1, "Warehouse:");
    number(stocklev_form, 4, 12, warehouse, 6);
    text(stocklev_form, 4, 19, "District:");
    number(stocklev_form, 4, 29, district, 2);
    text(stocklev_form, 6, 1, "Stock Level Threshold:");
    empty(stocklev_form, 6, 24, 2);
    text(stocklev_form, 8, 1, "low stock");
}

```

```

static int
stocklev_read(iobuf *in_buf, iobuf *out_buf, stocklev_trans *t,
             ID warehouse, ID district)
{
    int field;
    int key;

    t->W_ID = warehouse;
    t->D_ID = district;
    t->threshold = EMPTY_NUM;

    /* Process fields until done */
    for (field = 1; field > 0; field = next_field(field, key, 1)) {
        retry: switch (field) {
            case 1: key = read_number(6, 24, &t->threshold, 2, in_buf, out_buf);
                break;
        }
    }

    /* if Aborted, then done */
    if (key != ENTER) {
        return key;
    }

    /* make sure the necessary fields were entered */
    if ((t->threshold == EMPTY_NUM) ||
        (t->threshold < 10) ||
        (t->threshold > 20))
    {field=1; msgline(out_buf, "Please enter a threshold within 10 and 20"); goto retry; }

    /* clear the message line */
    msgline(out_buf, "");
    flush(out_buf);
    return key;
}

static void
stocklev_write(iobuf *out_buf, stocklev_trans *t)
{
    if (t->status == OK) {
        number(out_buf, 8, 12, t->low_stock, 3);
        trigger2(out_buf);
    } else {
        status(out_buf, 10, 1, t->status);
    }
}

/*****
*/
login form processing
/*****

static int
login(iobuf *in_buf, iobuf *out_buf, ID *warehouse, ID *district)
{
    int field;
    int key;
    char auditstr[21];
    int w_id, d_id;

    /* assume the default values */
    w_id = *warehouse;
    d_id = *district;
    auditstr[0] = '\0';

    /* display the login menu */
    position(out_buf, 1,1); clear_screen(out_buf);
    text(out_buf, 3, 30, "Please login.");
    text(out_buf, 5,5, "Warehouse:");
    number(out_buf, 5, 16, w_id, 6);
    text(out_buf, 5, 24, "District:");
    number(out_buf, 5, 34, d_id, 2);
    text(out_buf, 15, 5, "Audit String:");
    text(out_buf, 15, 19, CLIENT_AUDIT_STRING);
    empty(out_buf, 16, 19, 20);

    /* Get values until done */
    for (field = 1; field > 0; field = next_field(field, key, 3)) {
        retry: switch (field) {
            case 1:
                key = read_number(5, 16, &w_id, 6, in_buf, out_buf);
                break;

            case 2:
                key = read_number(5, 34, &d_id, 2, in_buf, out_buf);
                break;

            case 3:

```

```

        key = read_text(16, 19, auditstr, 20, in_buf, out_buf);
        break;
    }
}

if (key != ENTER) {
    return EOF;
}

if (w_id == EMPTY_NUM && *warehouse == EMPTY_NUM) {
    msgline(out_buf, "You must enter a warehouse id");
    field = 1;
    goto retry;
}

if (d_id == EMPTY_NUM && *district == EMPTY_NUM) {
    msgline(out_buf, "You must enter a district id");
    field = 2;
    goto retry;
}

if (w_id != EMPTY_NUM) {
    *warehouse = w_id;
}
if (d_id != EMPTY_NUM) {
    *district = d_id;
}

/* done */
return key;
}

/*****
*****

menu form processing

*****
*****

static void
menu_setup(iobuf *out_buf)
{

    /* display the menu on the iobuf -- never erased */
    position(out_buf, 1, 1);
    clear_screen(out_buf);
    string(out_buf, "(1)New-Order (2)Payment (3)Order-Status ");
    string(out_buf, "(4)Delivery (5)StockLevel (9)Exit");
}

static int
menu_read(iobuf *in_buf, iobuf *out_buf)
{
    position(out_buf, 1, 1);
    trigger(out_buf);
    return getkey(in_buf, out_buf);
}

static int
next_field(int current, int key, int max)
{
    if (key == BACKTAB)
        if (current == 1) return max;
        else return current-1;
    else if (key == TAB)
        if (current == max) return 1;
        else return current+1;
    else
        return 0;
}

static void
msgline(iobuf *out_buf, char *str)
{
    position(out_buf, 24, 1);
    clear_screen(out_buf);
    string(out_buf, str);
}

static void
cleanup(iobuf *out_buf)
{
    /* detach from the delivery queue */
    delivery_done();

    /* clear the screen */
    position(out_buf, 1, 1);
    clear_screen(out_buf);
    trigger(out_buf);
    flush(out_buf);
}

```

```

/*****
*****

Screen Output Routines

*****
*****

static void
number(iobuf *out_buf, int row, int col, int n, int width)
{
    char str[81];
    fmt_num(str, n, width);
    text(out_buf, row, col, str);
}

static void
real(iobuf *out_buf, int row, int col, double x, int width, int dec)
{
    char str[81];
    fmtflt(str, x, width, dec);
    text(out_buf, row, col, str);
}

static void
date(iobuf *out_buf, int row, int col, char *date_str)
{
    text(out_buf, row, col, date_str);
}

static void
date_only(iobuf *out_buf, int row, int col, char *date_str)
{
    date_str[10] = '\0';
    text(out_buf, row, col, date_str);
}

static void
money(iobuf *out_buf, int row, int col, double x, int width)
{
    char str[81];
    fmt_money(str, x, width);
    text(out_buf, row, col, str);
}

static void
long_text(iobuf *out_buf, int row, int col, char *str, int width)
{
    int pos;

    /* repeat until the entire string is written out */
    for (pos = width; *str != '\0'; str++, pos++)
    {
        /* if at end of line, position the cursor to next line */
        if (pos >= width)
        {
            position(out_buf, row, col);
            pos = 0;
            row++;
        }

        /* output the next character */
        pushc(out_buf, *str);
    }
}

static void
text(iobuf *out_buf, int row, int col, char str[])
{
    position(out_buf, row, col);
    string(out_buf, str);
}

static void
phone(iobuf *out_buf, int row, int col, char *str)
{
    char temp[30];

    fmt_phone(temp, str);
    text(out_buf, row, col, temp);
}

static void
zip(iobuf *out_buf, int row, int col, char *str)
{
    char temp[30];

```

```

    ffmt_zip(temp, str);
    text(out_buf, row, col, temp);
}

static void
empty(iobuf *out_buf, int row, int col, int len)
{
    position(out_buf, row, col);
    while (len-- > 0)
        pushc(out_buf, '_');
}

static void
blanks(iobuf *out_buf, int row, int col, int len)
{
    position(out_buf, row, col);
    while (len-- > 0)
        pushc(out_buf, ' ');
}

static void
status(iobuf *out_buf, int row, int col, int status)
/******
status displays the transaction status
Note: must correspond to 'get_status' in driver/keystroke.c
*****
{
    text(out_buf, row, col, "Execution Status: ");

    if (status == OK)
        string(out_buf, "Transaction Committed");
    else if (status == E_INVALID_ITEM)
        string(out_buf, "Item number is not valid");
    /* Do the rev. 3.3 error checking here. */
    else if (status == E_INVALID_INPUT)
        string(out_buf, "Invalid input, transaction not executed");
    else
    {
        string(out_buf, "Rollback -- ");
        number(out_buf, row, col+30, status, 5);
    }
    trigger2(out_buf);
}

/******
ASCII terminal control
*****

static void
trigger(iobuf *out_buf)
/******
trigger sends a turnaround sequence to let the driver know to send input
*****
{
    pushc(out_buf, TRIGGER);
}

static void
trigger2(iobuf *out_buf)
/******
trigger2 sends another turnaround sequence to let the driver know what
is going on.
*****
{
    pushc(out_buf, TRIGGER2);
}

static void
position(iobuf *out_buf, int row, int col)
/******
position positions the cursor at the given row and column
*****
{
    pushc(out_buf, ESCAPE);
    pushc(out_buf, '[');
    if (row >= 10)
        pushc(out_buf, '0' + row/10);
    pushc(out_buf, '0' + row%10);
    pushc(out_buf, ':');
    if (col >= 10)
        pushc(out_buf, '0' + col/10);
    pushc(out_buf, '0' + col%10);
    pushc(out_buf, 'H');
}

static void
clear_screen(iobuf *out_buf)
/******

```

```

clear_screen clears the iobuf from cursor position to end of iobuf
*****
{
    pushc(out_buf, ESCAPE);
    pushc(out_buf, '[');
    pushc(out_buf, 'J');
}

/******
Screen Input Routines
*****
#define funny(key) (key != ENTER && key != TAB && key != BACKTAB)

static int
read_number(int row, int col, int *n, int width, iobuf *in_buf, iobuf *out_buf)
/******
read_number reads an integer field
*****
{
    char temp[81];
    int key;
    int err;
    debug("read_number: row=%d col=%d width=%d n=%d\n", row, col, width, *n);

    /* generate the current characters */
    ffmt_num(temp, *n, width);
    err = NO;

    /* repeat until a valid number or a funny key is pressed */
    for (;;)
    {
        /* Let the user edit the field */
        key = getfield(row, col, temp, width, Num, in_buf, out_buf);
        if (funny(key)) return key;

        /* convert the field to a number */
        *n = cvt_num(temp);
        if (*n != INVALID_NUM) break;

        msgline(out_buf, "Invalid digit entered");
        pushc(out_buf, BELL);
        err = YES;
    }

    /* display the new number */
    number(out_buf, row, col, *n, width);
    if (err) msgline(out_buf, "");
    debug("read_number: n=%d key=%d\n", *n, key);
    return key;
}

static int
read_money(int row, int col, double *m, int width, iobuf *in_buf, iobuf *out_buf)
{
    char temp[81];
    int key;
    int err;

    err = NO;
    ffmt_money(temp, *m, width);

    /* repeat until a valid number or a funny key is pressed */
    for (;;)
    {
        key = getfield(row, col, temp, width, Money, in_buf, out_buf);
        if (funny(key)) return key;

        *m = cvt_money(temp);
        if (*m != INVALID_FLT) break;

        msgline(out_buf, "Please enter amount $99999.99");
        pushc(out_buf, BELL);
        err = YES;
    }

    money(out_buf, row, col, *m, width);
    if (err) msgline(out_buf, "");
    return key;
}

static int
read_text(int row, int col, char *s, int width, iobuf *in_buf, iobuf *out_buf)
{
    char temp[81];
    int key;
    int i;

    /* generate the current characters */
    ffmt_text(temp, s, width);

```



```

/* let the user edit the field */
key = getfield(row, col, temp, width, Text, in_buf, out_buf);
if (funny(key)) return key;

/* Strip off leading and trailing space characters */
cvt_text(temp, s);

/* redisplay the current text */
fmt_text(temp, s, width);
text(out_buf, row, col, temp);

return key;
}

static int
getfield(int row, int col, char buf[], int width, FIELD_TYPE ftype,
         iobuf *in_buf, iobuf *out_buf)
{
    int pos, key;

    debug("getfield: width=%d buf=%s\n", width, width, buf);

    /* go to the beginning of the field */
    position(out_buf, row, col);
    trigger(out_buf);
    pos = 0;

    /* repeat until a special control character is pressed */
    for (;;)
    {
        /* get the next character */
        key = getkey(in_buf, out_buf);

        /* CASE: Add to buf if it fits and is a valid character ? */
        if (pos < width && valid_char(key, ftype))
        {
            buf[pos] = key;
            pos++;
            pushc(out_buf, key);
        }

        /* CASE: char is BACKSPACE. Erase last character. */
        else if (key == BACKSPACE && pos > 0)
        {
            pos--;
            buf[pos] = '_';
            pushc(out_buf, BACKSPACE);
            pushc(out_buf, '_');
            pushc(out_buf, BACKSPACE);
        }

        /* CASE: enter, tab, backtab, ^c. Exit loop */
        else if (key == ENTER || key == TAB || key == BACKTAB || key == CNTRL_C
                || key == EOF)
            break;

        else if (key == '\031') /* for debugging, let ^X == ENTER */
            {key = ENTER; break;}

        /* Otherwise, ignore the character and beep */
        else
            pushc(out_buf, BELL);
    }

    debug("getfield: final key: %d buf=%s\n", key, width, buf);
    return key;
}

static int
valid_char(int key, FIELD_TYPE ftype)
/******
valid_char is true if the key is valid for this type of field
*****
{
    int valid;
    switch(ftype)
    {
        case Num : valid = (isdigit(key) || key == '-' || key == '.');
                    break;

        case Text : valid = (isprint(key) || key == ' ');
                    break;

        case Money : valid = (isdigit(key) || key == '-' || key == '.'
                            || key == '$' || key == ' ');
                    break;

        default : valid = NO;
                    break;
    }
}

return valid;
}

```

```

static pthread_t
spawn_user(int c_fd, long tc)
{
    int pid;
    int ret;
    pthread_t t;
    thread_data *td;

    td = (thread_data *)malloc(sizeof(thread_data));
    if (td == NULL) {
        perror("Can't create thread argument data\n");
    }
    td->fd = c_fd;
    td->tux_context = tc;
    ret = pthread_create(&t, NULL, client_main, (void *)td);
    if (ret != 0) {
        perror("Can't create client thread\n");
    }
    return t;
}

int prepare_socket(int fd)
{
    int yes = 1;
    int level;

#ifdef __hpux
    level = SOL_SOCKET;
#else
    level = IPPROTO_TCP;
#endif

#ifdef
    if (setsockopt(fd, SOL_SOCKET, SO_KEEPALIVE, &yes, sizeof(yes)) < 0)
        return -1;
    if (setsockopt(fd, SOL_SOCKET, SO_REUSEADDR, &yes, sizeof(yes)) < 0)
        return -1;
    if (setsockopt(fd, level, TCP_NODELAY, &yes, sizeof(yes)) < 0)
        return -1;
    return 0;
}

int
connect_client(int server_fd)
/******
connect_client connects the clients who are waiting
*****
{
    int fd, vfd;
    struct sockaddr dummy_addr;
    int dummy_size = sizeof(dummy_addr);

    /* accept a connection to a new client. Exit if no more */
    fd = accept(server_fd, &dummy_addr, &dummy_size);
    if (fd < 0)
        perror("Can't accept new client\n");

    /* set the socket parameters */
    if (prepare_socket(fd) < 0)
        perror("Can't set socket parameters\n");

    return fd;
}

int
server_socket(int port)
/******
server_socket creates a socket for a server with the given name
*****
{
    int fd;
    struct sockaddr_in address;
    int retval;

    /* create a socket */
    fd = socket(AF_INET, SOCK_STREAM, 0);
    if (fd < 0)
        perror("Can't create a socket\n");
    if ((retval = prepare_socket(fd)) < 0)
        perror("Can't configure the socket, retval=%d\n", retval);

    /* build up an internet style address */
    address.sin_family = AF_INET;
    address.sin_port = htons(port);
    address.sin_addr.s_addr = INADDR_ANY;

    /* set up the socket to listen at the given address */
    if (bind(fd, (struct sockaddr *)&address, sizeof(struct sockaddr)) < 0) {
        perror("Can't bind the socket to address\n");
    }

    if (listen(fd, SOMAXCONN) < 0) {
        perror("Can't listen\n");
    }

    return fd;
}

```

```

}

static void
GetArgs(int argc, char **argv)
{
    extern char *optarg;
    extern int optind;
    char ch;
    int total_users=0;
    int nr_client=1; /* minimum nr_client */
    int req_servers=0;

    while((ch = getopt(argc, argv, "u:c:p:")) != EOF) {
        switch (ch) {
            case 'u':
                total_users = atoi(optarg);
                break;

            case 'c':
                nr_client = ((nr_client = atoi(optarg))>0 ? nr_client: 1);
                break;

            case 'p':
                port_number = atoi(optarg);
                break;

            default:
                printf("Usage: %s -u total_users -c nr_client -p port_number\n", argv[0]);
                exit(1);
        }
    }
    req_servers=(int)ceil((double)total_users/nr_client/MAX_USERS_PER_PROCESS);
    number_of_servers = (req_servers > number_of_servers) ?
        req_servers : number_of_servers;
}

int
main(int argc, char **argv)
{
    int server_fd;
    int client_fd;
    int i;
    int pid;
    int policy;
    long tux_context; /* Tuxedo context to use */
    struct sched_param param;

    /* We don't want zombie children */
    signal(SIGCHLD, SIG_IGN);

    /* Ignore SIGPIPE, since they occur normally */
    signal(SIGPIPE, SIG_IGN);

#ifdef __hpux
    policy = SCHED_NOAGE;
    param.sched_priority = PRI_HPUX_TO_POSIX(180);
#else
    policy = SCHED_OTHER;
    param.sched_priority = 0;
#endif

    if ( ( sched_setscheduler(0, policy, &param) < 0 ) {
        perror("Server can't run sched_noage");
    }

    GetArgs(argc, argv);

    /* create a socket to accept new requests */
    server_fd = server_socket(port_number);
    if (server_fd < 0) {
        perror("Can't create a listening socket\n");
    }

    /* Create more servers if requested */
    for(i = 0; i < (number_of_servers-1); i++) {
        if ((pid = fork()) == -1) {
            perror("Could not fork a new helper process\n");
        } else if (pid == 0) {
            /* Child */
            break;
        } else {
            /* Parent */
        }
    }

    /* repeat forever in each child */
    while (user_connections < MAX_USERS_PER_PROCESS) {
        client_fd = connect_client(server_fd);
        if ((user_connections % MAX_THREADS_PER_CONTEXT) == 0) {
            /* connect to the transaction processor */
            tux_context = transaction_begin();
        }
        user_ids[user_connections] = spawn_user(client_fd, tux_context);
        user_connections++;
    }

    /* Close listening socket */
}

```

```

close(server_fd);

for(i = 0; i < user_connections; i++) {
    if (pthread_join(user_ids[i], NULL) != 0) {
        message("Pthread message, error = %d, thread_id = %d, id = %d\n",
                errno, user_ids[i], i);
        perror("Pthread_join error\n");
    }
}

/* detach from transaction engine */
transaction_done();

return 0;
}

```

client/tux_transaction.c

```

*****
@(#) Version: A.10.10 $Date: 2005/04/11 10:11:33 $

(c) Copyright 1996, Hewlett-Packard Company, all rights reserved.
*****

#include <varargs.h>
#include <errno.h>
#include "tux_transaction.h"

#define MYMAX(a, b) (a > b) ? a : b

static void
tux_error(format, va_alist)
char *format;
va_dcl
{
    va_list argptr;

    va_start(argptr);
    vmessage(format, argptr);

    message("Tuxedo error %d\n", tpermo);

    errno = Uunixerr;
    if (tpermo == TPEOS) {
        perror("Tuxedo encountered O/S error\n");
    }

    if (tpermo == TPESVCERR || tpermo == TPETIME) {
        message("Retrying transaction\n");
        if (tpermo == TPETIME)
            /*JW
             *
             */
            delay(1.0);
    } else {
        error("EXITING !!!\n");
    }
}

TPCONTEXT_T
transaction_begin(void)
{
    static TPINIT *initialization_buffer = NULL;
    TPCONTEXT_T ctx = 0; /*JW: was NULL, Linux compiled with a warning message.
                        // TPCONTEXT_T is a typedef long.

    /* Create buffer needed to indicate MultiContexts operation */
    if (initialization_buffer == NULL) {
        initialization_buffer = (TPINIT *)tpalloc("TPINIT", NULL,
            TPINITNEED(0));
        if (initialization_buffer == NULL) {
            tux_error("Unable to allocate Tuxedo TPINIT memory\n");
        }
        initialization_buffer->flags = TPMULTICONTEXTS;
    }

    /* attach to Tuxedo */
    if (tpinit(initialization_buffer) == -1) {
        tux_error("Failed to attach to Tuxedo\n");
    }

    /* get the context */
    if (tpgetctx(&ctx, 0) == -1) {
        tux_error("Failed to get Tuxedo context\n");
    }

    return ctx;
}

```

```

}

void *
thread_transaction_begin(TPCONTEXT_T ctx)
{
    unsigned long alloc_size;
    void *data_ptr;

    if (tpsetctx(ctx, 0) == -1) {
        tux_error("Could not set Tuxedo context\n");
    }

    /* allocate structures for each transaction */
    alloc_size = MYMAX(sizeof(neworder_trans), sizeof(payment_trans));
    alloc_size = MYMAX(alloc_size, sizeof(ordstat_trans));
    alloc_size = MYMAX(alloc_size, sizeof(stocklev_trans));
    alloc_size = MYMAX(alloc_size, sizeof(delivery_trans));
    data_ptr = (void *)tpalloc("CARRAY", NULL, alloc_size);

    if (data_ptr == NULL) {
        tux_error("Unable to allocate Tuxedo memory\n");
    }
    return data_ptr;
}

void
transaction_done(void)
{
    if (tpterm() == -1) {
        tux_error("Unable to detach from Tuxedo\n");
    }
}

void
neworder_transaction(void **data_ptr, neworder_trans *t)
{
    long result;
    *((neworder_trans *)*data_ptr) = *t;
    while (tpcall("NEWO_SVC", (char *)*data_ptr, sizeof(neworder_trans),
        (char **)(&data_ptr), &result, TPSIGRSTRT|TPNOTIME) == -1) {
        tux_error("Tuxedo failed for neworder transaction\n");
        *((neworder_trans *)*data_ptr) = *t;
    }
    *t = *((neworder_trans *)*data_ptr);
}

void
payment_transaction(void **data_ptr, payment_trans *t)
{
    long result;
    *((payment_trans *)*data_ptr) = *t;
    while (tpcall("PMT_SVC", (char *)*data_ptr, sizeof(payment_trans),
        (char **)(&data_ptr), &result, TPSIGRSTRT|TPNOTIME) == -1) {
        tux_error("Tuxedo failed for payment transaction\n");
        *((payment_trans *)*data_ptr) = *t;
    }
    *t = *((payment_trans *)*data_ptr);
}

void
ordstat_transaction(void **data_ptr, ordstat_trans *t)
{
    long result;
    *((ordstat_trans *)*data_ptr) = *t;
    while (tpcall("ORDS_SVC", (char *)*data_ptr, sizeof(ordstat_trans),
        (char **)(&data_ptr), &result, TPSIGRSTRT|TPNOTIME) == -1) {
        tux_error("Tuxedo failed for ordstat transaction\n");
        *((ordstat_trans *)*data_ptr) = *t;
    }
    *t = *((ordstat_trans *)*data_ptr);
}

void
stocklev_transaction(void **data_ptr, stocklev_trans *t)
{
    long result;
    *((stocklev_trans *)*data_ptr) = *t;
    while (tpcall("STKL_SVC", (char *)*data_ptr, sizeof(stocklev_trans),
        (char **)(&data_ptr), &result, TPSIGRSTRT|TPNOTIME) == -1) {
        tux_error("Tuxedo failed for stocklev transaction\n");
        *((stocklev_trans *)*data_ptr) = *t;
    }
    *t = *((stocklev_trans *)*data_ptr);
}

void
delivery_init(int u)
{
}

void
delivery_enqueue(void **data_ptr, delivery_trans *t)
{

```

```

    gettimeofday(&t->del.enqueue[0], NULL);
    t->del.status = OK;

    *((delivery_trans *)*data_ptr) = *t;
    while (tpcall("DVRV_SVC", (char *)*data_ptr, sizeof(delivery_trans),
        TPNOREPLY) == -1) {
        tux_error("Tuxedo failed enqueueing delivery transaction\n");
        *((delivery_trans *)*data_ptr) = *t;
    }
}

void
delivery_done(void)
{
}

```

client/Makefile

```

#####
#(c) Version: A.10.10 $Date: 2003/06/26 16:03:06 $
#
#(c) Copyright 1996, Hewlett-Packard Company, all rights reserved.
#####

#
# Common makefile definitions that are used on all platforms.
#

P   = ${WORK_DIR}/src
L   = $(P)/lib
D   = $(P)/driver
S   = $(P)/client

include ./database.mk

SH_OPT =
OPT    = -Wl,-E
LDOPTS = -E -ldld

TUX_INCLUDE= -I${TUXDIR}/include

COMMON_FLAGS = $(OPTIMIZE) $(DD_DS_FLAGS) $(CINCLUDES)
SH_CFLAGS    = $(COMMON_FLAGS) $(SH_OPT) ${TUX_INCLUDE}
CFLAGS       = $(COMMON_FLAGS) $(OPT) ${TUX_INCLUDE}

PROGRAMS     = client client_batch client_batch_dumb service_real service_dumb raw

all: ${PROGRAMS}

${S}/dummy/transaction.o: ${S}/dummy/transaction.c
                        $(CC) ${CFLAGS} -o ${S}/dummy/transaction.o -c
${S}/dummy/transaction.c

raw: raw.o $(D)/socket.o
    cc ${CFLAGS} raw.o $(D)/socket.o $(L)/tpc_lib.a -o raw

client.o: client.c
    cc ${CFLAGS} -D_REENTRANT -c client.c

tux_transaction.o: tux_transaction.c
    cc ${CFLAGS} -D_REENTRANT -c tux_transaction.c

dummy_que.o: dummy_que.c
    cc ${CFLAGS} -D_REENTRANT -c dummy_que.c

post_dvry.o: post_dvry.c
    cc ${CFLAGS} -D_REENTRANT -c post_dvry.c

client: client.o tux_transaction.o
    ${TUXDIR}/bin/buildclient -v -o client \
    -f "${COMMON_FLAGS} -D_REENTRANT $(OPT) $(VMPSZ) \
    client.o tux_transaction.o $(L)/tpc_lib.a" -l -lnsl -lm -lc"

service_dumb: service.o post_dvry.o ${S}/dummy/transaction.o $(L)/tpc_lib.a
    ${TUXDIR}/bin/buildserver -v -b shm -s NEWO_SVC -s PMT_SVC \
    -s ORDS_SVC -s STKL_SVC -s DVRV_SVC -o service_dumb \
    -f "${SVC_VMPSZ} service.o post_dvry.o \
    ${S}/dummy/transaction.o $(L)/tpc_lib.a $(L)/load_lib.a" -l -lnsl -lm"

service_real: service.o post_dvry.o $(DB_OBJS) $(L)/tpc_lib.a
    ${TUXDIR}/bin/buildserver -v -b shm -s NEWO_SVC -s PMT_SVC \
    -s ORDS_SVC -s STKL_SVC -s DVRV_SVC -o service_real \

```

```

-f "$(SVC_VMPDZ) service.o post_dvry.o \
$(DB_OBJS) $L/tpc_lib.a ${DB_LDFLAGS}" -l "-lnsl"

client_batch: $(D)/driver.o $(D)/keystroke_batch.o $(D)/screen.o \
$(D)/generate.o $(D)/shm.o $(D)/tpcc.o \
post_dvry.o $(DB_OBJS) dummy_que.o $(L)/tpc_lib.a \
$(CC) $(D)/driver.o $(D)/keystroke_batch.o $(D)/screen.o \
$(D)/generate.o $(D)/shm.o $(D)/tpcc.o post_dvry.o \
$(DB_OBJS) dummy_que.o $(L)/tpc_lib.a \
${DB_LDFLAGS} -o client_batch;

client_batch_dumb: $(D)/driver.o $(D)/keystroke_batch.o $(D)/screen.o \
$(D)/generate.o $(D)/shm.o $(D)/tpcc.o \
post_dvry.o $(S)/dummy/transaction.o dummy_que.o \
$(L)/tpc_lib.a $(L)/load_lib.a \
$(CC) $(CFLAGS) $(D)/driver.o $(D)/keystroke_batch.o $(D)/screen.o \
$(D)/generate.o $(D)/shm.o $(D)/tpcc.o post_dvry.o \
$(S)/dummy/transaction.o dummy_que.o $(L)/tpc_lib.a $(L)/load_lib.a \
-lnsl -lm -lc -pthread \
-o client_batch_dumb;

#-lnsl -lm -lc -lcl

clean:
rm -f *.o
rm -f */*.o

clobber: clean
rm -f ${PROGRAMS}
rm -f ${WORK_DIR}/bin/service

install: ${PROGRAMS}
cp ${PROGRAMS} ${WORK_DIR}/bin
ln -s ./service_real ${WORK_DIR}/bin/service

```

```

/* tpc_start_time is declared in "delay.c" */
#include <time.h>
extern struct timeval tpc_start_time;
#define elapsed_time(t) ( ((t)->tv_sec - tpc_start_time.tv_sec) + \
((t)->tv_usec - tpc_start_time.tv_usec) / 1000000.0 )

typedef enum {Num,Money,Text,Time,Real,Date} FIELD_TYPE; /* screen field types */

/* Various TPCC constants */
#define W_ID_LEN 4
#define D_ID_LEN 2
#define C_ID_LEN 4
#define I_ID_LEN 6
#define OL_QTY_LEN 2
#define PMT_LEN 7
#define C_ID_LEN 4
#define C_LAST_LEN 16
#define CARRIER_LEN 2
#define THRESHOLD_LEN 2
#define DIST_PER_WARE 10
#define CUST_PER_DIST 3000
#define ORD_PER_DIST 3000
#define MAXITEMS 100000

/* database identifiers and populations */
#define no_item MAXITEMS /* 100000 */
#define no_dist_pw DIST_PER_WARE
#define no_cust_pd CUST_PER_DIST /* 3000 */
#define no_ord_pd ORD_PER_DIST /* 3000 */

/* fields to add to each transaction for acid testing */
#define ACID_STUFF \
char acid_txn[2]; \
int acid_timing; \
int acid_action

typedef struct
{
int tv_sec; /* use 4-byte int, 8-byte timeval across 32/64b machines */
int tv_usec;
} timeval_32b;

typedef struct {
ID OL_SUPPLY_W_ID;
ID OL_I_ID;
TEXT L_NAME[24+1];
COUNT OL_QUANTITY;
COUNT S_QUANTITY;
MONEY L_PRICE;
char brand_generic;
} neworder_item;

typedef struct {
int status;
LOGICAL all_local;
ID W_ID;
ID D_ID;
ID C_ID;
TEXT C_LAST[C_LAST_LEN+1];
TEXT C_CREDIT[2+1];
REAL C_DISCOUNT;
COUNT O_OL_CNT;
ID O_ID;
TEXT O_ENTRY_D[20]; /* dates as text fields */
REAL W_TAX;
REAL D_TAX;
neworder_item item[15];
ACID_STUFF;
} neworder_trans;

typedef struct {
int status;
LOGICAL byname;
ID W_ID;
ID D_ID;
ID C_ID;
ID C_D_ID;
ID C_W_ID;
MONEY H_AMOUNT;
TEXT H_DATE[20]; /* date as text field */
TEXT W_STREET_1[20+1];
TEXT W_STREET_2[20+1];
TEXT W_CITY[20+1];
TEXT W_STATE[2+1];
TEXT W_ZIP[9+1];
TEXT D_STREET_1[20+1];
TEXT D_STREET_2[20+1];
TEXT D_CITY[20+1];
TEXT D_STATE[2+1];
TEXT D_ZIP[9+1];
}

```

A.2 Tpc_lib Source

lib/tpcc.h

```

/* *****
****
@(#) Version: A.10.10 $Date: 2005/04/11 09:59:56 $

(c) Copyright 1996, Hewlett-Packard Company, all rights reserved.

History
@022801 ML Added Client Substitution Report for TPC-C TAB ID 334.

*****
****/
#ifndef TPCC_INCLUDED
#define TPCC_INCLUDED
#include <values.h>
#include <sys/time.h>
#include <sys/resource.h>
#include <errno.h>

/* The auditor can define these 20 char strings to be anything */
#define DRIVER_AUDIT_STRING "driver audit string"
#define CLIENT_AUDIT_STRING "client audit string"

#define BATCH_MODE ( tpc_mode == 1 || tpc_mode == 5 )

#ifdef DEBUG
#define debug printf
#else
#define debug (void)
#endif

#include <stdio.h>

typedef int ID; /* All id's */
typedef double MONEY; /* Large integer number of cents */
typedef char TEXT; /* Add an extra byte for null terminator */
typedef double TIME; /* Elapsed seconds from start of run (float?) */
typedef int COUNT; /* integer numbers of things */
typedef long long BIN_TYPE;
typedef double REAL; /* real numbers */
typedef int LOGICAL; /* YES or NO */
typedef struct {
int day; /* NULL represented by negative day */
int sec;
} DATE;

/* Macro to convert time of day to TIME */

```

```

TEXT C_FIRST[16+1];
TEXT C_MIDDLE[2+1];
TEXT C_LAST[16+1];
TEXT C_STREET_1[20+1];
TEXT C_STREET_2[20+1];
TEXT C_CITY[20+1];
TEXT C_STATE[2+1];
TEXT C_ZIP[9+1];
TEXT C_PHONE[16+1];
TEXT C_SINCE[20]; /* date as text field */
TEXT C_CREDIT[2+1];
MONEY C_CREDIT_LIM;
REAL C_DISCOUNT;
REAL C_BALANCE;
TEXT C_DATA[200+1];
ACID_STUFF;
} payment_trans;

typedef struct {
int status;
LOGICAL byname;
ID W_ID;
ID D_ID;
ID C_ID;
TEXT C_FIRST[16+1];
TEXT C_MIDDLE[2+1];
TEXT C_LAST[16+1];
MONEY C_BALANCE;
ID O_ID;
TEXT O_ENTRY_DATE[20]; /* date as text field */
ID O_CARRIER_ID;
COUNT ol_cnt;
struct {
ID OL_SUPPLY_W_ID;
ID OL_I_ID;
COUNT OL_QUANTITY;
MONEY OL_AMOUNT;
TEXT OL_DELIVERY_DATE[20]; /* date as text field */
} item[15];
ACID_STUFF;
} ordstat_trans;

typedef struct {
int status;
ID W_ID;
ID D_ID;
COUNT threshold;
COUNT low_stock;
ACID_STUFF;
} stocklev_trans;

typedef struct {
int status;
ID W_ID;
ID O_CARRIER_ID;
struct {
ID O_ID;
int status;
} order[10];
struct timeval enqueue[1];
struct timeval deque[1];
struct timeval complete[1];
ACID_STUFF;
} delivery_trans1;

/*
* Delivery structure needs to be padded to a multiple of 512-bytes
* for things to work properly with a sigle delivery file.
*/
typedef struct {
delivery_trans1 del;
char pad_data[512-sizeof(delivery_trans1)]; /* pad out to 512 bytes */
} delivery_trans;

typedef struct {
int status;
ID W_ID;
ID O_CARRIER_ID;
struct {
ID O_ID;
int status;
} order[10];
timeval_32b enqueue[1];
timeval_32b deque[1];
timeval_32b complete[1];
ACID_STUFF;
} delivery_rec; /* use delivery_rec to write/read to/from result files */

typedef union {
neworder_trans neworder;
payment_trans payment;
ordstat_trans ordstat;
delivery_trans delivery;
}

stocklev_trans stocklev;
int status;
} generic_trans;

/*****
Record formats for results
*****/
typedef struct
{
TIME t1, t2, t3, t4, t5;
int status;
unsigned int type :3;
unsigned int ol_cnt :4;
unsigned int remote_ol_cnt :4;
unsigned int byname :1;
unsigned int remote :1;
unsigned int skipped :4;
int clientnum;
int userid;
} success_t;

/*****
Record formats for loading routines. (DB's have own internal formats)
*****/
typedef struct
{
ID W_ID;
TEXT W_NAME[10+1];
TEXT W_STREET_1[20+1];
TEXT W_STREET_2[20+1];
TEXT W_CITY[20+1];
TEXT W_STATE[2+1];
TEXT W_ZIP[9+1];
REAL W_TAX;
MONEY W_YTD;
} warehouse_row;

typedef struct
{
ID D_ID;
ID D_W_ID;
TEXT D_NAME[10+1];
TEXT D_STREET_1[20+1];
TEXT D_STREET_2[20+1];
TEXT D_CITY[20+1];
TEXT D_STATE[2+1];
TEXT D_ZIP[9+1];
REAL D_TAX;
MONEY D_YTD;
ID D_NEXT_O_ID;
} district_row;

typedef struct
{
ID C_ID;
ID C_D_ID;
ID C_W_ID;
TEXT C_FIRST[16+1];
TEXT C_MIDDLE[2+1];
TEXT C_LAST[16+1];
TEXT C_STREET_1[20+1];
TEXT C_STREET_2[20+1];
TEXT C_CITY[20+1];
TEXT C_STATE[2+1];
TEXT C_ZIP[9+1];
TEXT C_PHONE[16+1];
DATE C_SINCE;
TEXT C_CREDIT[2+1];
MONEY C_CREDIT_LIM;
REAL C_DISCOUNT;
MONEY C_BALANCE;
MONEY C_YTD_PAYMENT;
COUNT C_PAYMENT_CNT;
COUNT C_DELIVERY_CNT;
TEXT C_DATA[500+1];
} customer_row;

typedef struct
{
ID H_C_ID;
ID H_C_D_ID;
ID H_C_W_ID;
ID H_D_ID;
ID H_W_ID;
DATE H_DATE;
MONEY H_AMOUNT;
TEXT H_DATA[24+1];
} history_row;

typedef struct
{
ID NO_O_ID;
ID NO_D_ID;
}

```

```

ID NO_W_ID;
} neworder_row;

typedef struct
{
ID O_ID;
ID O_D_ID;
ID O_W_ID;
ID O_C_ID;
DATE O_ENTRY_D;
ID O_CARRIER_ID;
COUNT O_OL_CNT;
LOGICAL O_ALL_LOCAL;
} order_row;

```

```

typedef struct
{
ID OL_O_ID;
ID OL_D_ID;
ID OL_W_ID;
ID OL_NUMBER;
ID OL_I_ID;
ID OL_SUPPLY_W_ID;
DATE OL_DELIVERY_D;
COUNT OL_QUANTITY;
MONEY OL_AMOUNT;
TEXT OL_DIST_INFO[24+1];
} orderline_row;

```

```

typedef struct
{
ID I_ID;
ID I_IM_ID;
TEXT I_NAME[24+1];
MONEY I_PRICE;
TEXT I_DATA[50+1];
} item_row;

```

```

typedef struct
{
ID S_I_ID;
ID S_W_ID;
COUNT S_QUANTITY;
TEXT S_DIST_01[24+1];
TEXT S_DIST_02[24+1];
TEXT S_DIST_03[24+1];
TEXT S_DIST_04[24+1];
TEXT S_DIST_05[24+1];
TEXT S_DIST_06[24+1];
TEXT S_DIST_07[24+1];
TEXT S_DIST_08[24+1];
TEXT S_DIST_09[24+1];
TEXT S_DIST_10[24+1];
COUNT S_YTD;
COUNT S_ORDER_CNT;
COUNT S_REMOTE_CNT;
TEXT S_DATA[50+1];
} stock_row;

```

```

/* Empty field values */
#define EMPTY_NUM (MAXINT-1)
#define INVALID_NUM (MAXINT)
#define EMPTY_FLT (MAXDOUBLE)
#define INVALID_FLT (MINDOUBLE)

```

```

/* Status conditions */
#define OK 0
#define E 1
#define E_INVALID_ITEM 2
#define E_NOT_ENOUGH_ORDERS 3
#define E_DB_ERROR 4
#define E_INVALID_INPUT 5
#define E_DB_IRRECERR 6

```

```

/* Error message strings */
extern const char *e_mesg[];

```

```

#define YES 1
#define NO 0

```

```

double cvtflt();
double cvtmoney();
TIME getclock();
TIME getlocalclock();

```

```

#define TPC_MSG_QUE 150

```

```

/*****
Transaction specific stuff
*****/

```

```

/* types of transactions */
#define NEWORDER 1
#define PAYMENT 2
#define ORDSTAT 3
#define DELIVERY 4
#define STOCKLEV 5
#define DEFERRED 6 /* deferred portion of delivery */

```

```

/* the name of each transaction */
extern const char *transaction_name[];

```

```

#endif /* TPCC_INCLUDED */

```

lib/key_chars.h

```

#ifndef __TPCC_KEY_CHARS__
#define __TPCC_KEY_CHARS__

```

```

/* Standard characters used for screen control */
#define ENTER '\015'
#define TAB '\t'
#define BACKTAB '\02' /* ^B */
#define CNTRL '\03'
#define BACKSPACE '\010'
#define BELL '\07'
#define BLANK ' '
#define UNDERLINE '_'
#define ESCAPE '\033'
#define TRIGGER '\021' /* dc1 */
#define TRIGGER2 '\022' /* dc2 */
#endif

```

lib/errlog.c

```

/*****
****
@(#) Version: A.10.10 $Date: 2005/04/11 10:00:24 $

```

```

(c) Copyright 1996, Hewlett-Packard Company, all rights reserved.
****

```

```

#include <stdio.h>
#include <varargs.h>
#include <unistd.h>
#include <errno.h>
#include <string.h>
#include <stdlib.h>
#include <fcntl.h>
#include "errlog.h"

```

```

#define MSG_BUF_SIZE 3*1024

```

```

static int msgfile_fd = -1;

```

```

static void
msg_buf(char *buf, int size)
{
char writebuf[MSG_BUF_SIZE+66];
int ltimestamp;
time_t tepoch = time(NULL);

ltimestamp = strftime(writebuf, 64, "%m/%d %T ", localtime(&tepoch));
strncpy(writebuf+ltimestamp, buf, size);
write(msgfile_fd, writebuf, ltimestamp + size);
}

```

```

void
vmessage(format, argptr)
/*****
*****/
char *format;
va_list argptr;
{
char buf[MSG_BUF_SIZE];

/* format a message id */

```

```

    sprintf(buf, "Host %-8s Pid %-6d ", getenv("HOST_NAME"), getpid());

    /* format the string and print it */
    vsprintf(buf+strlen(buf), format, argptr);
    if (getenv("NO_ERROR_LOG") == NULL) {
        msg_buf(buf, strlen(buf));
    }
    if (getenv("NO_STDERR") == NULL) {
        write(2, buf, strlen(buf));
    }
}

void
error(format, va_alist)
/******
error formats a message and outputs it to a standard location (stderr for now)
******/
{
    char *format;
    va_dcl

    va_list argptr;

    msg_buf("error \n", strlen("error \n"));

    /* point to the list of arguments */
    va_start(argptr);

    /* format and print to stderr */
    vmessage(format, argptr);

    /* done */
    va_end(argptr);

    /* take an error exit */
    exit(1);
}

void
message(format, va_alist)
/******
message formats a message and outputs it to a standard location (stderr for now)
******/
{
    char *format;
    va_dcl

    va_list argptr;

    msg_buf("message \n", strlen("message \n"));
    /* point to the list of arguments */
    va_start(argptr);

    /* format and print to stderr */
    vmessage(format, argptr);

    /* done */
    va_end(argptr);
}

void
syserror( format, va_alist )
/******
syserror logs a message with the system error code
******/
{
    char *format;
    va_dcl

    va_list argptr;
    int save_errno = errno;

    msg_buf("syserror \n", strlen("syserror \n"));
    /* point to the list of arguments */
    va_start(argptr);

    /* format and print to stderr */
    vmessage(format, argptr);

    /* done */
    va_end(argptr);

    /* display the system error message */
    message(" System error message: %d %s\n", save_errno,
            strerror(save_errno));

    /* take an error exit */
    exit(1);
}

void
console_error(char *str)
{
    int fd = open("/dev/tty", O_WRONLY);
    write(fd, str, strlen(str));
    close(fd);
    exit(1);
}

```

```

}

/*
 * Configure the file descriptor for the message subsystem.
 * This is not multithreaded, so it must be done by the master
 * process before threads are spawned.
 */
void
configure_error_log(void)
{
    char *fname;

    /* get the file name to use */
    fname = getenv("ERROR_LOG");
    if (fname == NULL) {
        fname = "/tmp/ERROR_LOG";
    }

    if (msgfile_fd == -1) {
        msgfile_fd = open(fname, O_WRONLY | O_CREAT |
O_APPEND, 0666);
        if (msgfile_fd < 0) {
            console_error("Can't open tpc error log file
ERROR_LOG\n");
        }
    }
}

```

lib/fmt.c

```

/******
****
@(#) Version: A.10.10 $Date: 2005/04/11 10:00:28 $

(c) Copyright 1996, Hewlett-Packard Company, all rights reserved.
*****
*****/
#include "tpcc.h"
#include <math.h> /* needed for ceil (VM) */
#include <strings.h>
#include <ctype.h>

/* formatting routines. */

/* Note: Currently use integer routines to format and convert. Need to
modify the code for cases when integers don't work. */
void fmt_float(char *str, double x, int width, int dec);
void cvt_text(char *s, char *text);
void fmtint(char *field, int value, int size, char fill);

void
fmt_money(char *str, MONEY m, int width)
{
    if (m == EMPTY_FLT)
    {
        memset(str, '_', width);
        str[width] = '\0';
        return;
    }

    /* format it as a number with a leading blank */
    *str = ' ';
    fmt_float(str+1, m/100, width-1, 2);

    /* fill in a leading dollar */
    while (*(str+1) == ' ')
        str++;
    *str = '$';
}

double
cvt_money(char *str)
{
    char temp[81], *t;
    double cvt_float(), f;

    /* skip leading and trailing blanks */
    cvt_text(str, temp);

    /* remove leading $ */
    if (*temp == '$') t = temp + 1;
    else t = temp;

    /* start scan at current character */
    s = t;
}

```

```

/* allow leading minus sign */
if (*s == '-')
    s++;

/* allow leading digits */
while (isdigit(*s))
    s++;

/* allow decimal pt and two decimal digits */
if (*s == '.') s++;
if (isdigit(*s)) s++;
if (isdigit(*s)) s++;

/* There should be no more characters */
if (*s != '\0') return INVALID_FLT;

/* convert the floating pt number */
f = cvtflt(t);
if (f == EMPTY_FLT) return EMPTY_FLT;
else if (f == INVALID_FLT) return INVALID_FLT;
else return rint(f*100);
}

void
fmt_num(char *str, int n, int width)
{
    /* mark the end of the string */
    str[width] = '\0';

    /* if empty number, return the empty field */
    if (n == EMPTY_NUM)
        memset(str, '_', width);

    /* otherwise, convert the integer */
    else
        fmtint(str, n, width, ' ');

    debug("fmt_num: n=%d str=%s\n", n, str);
}

int
cvt_num(char *str)
{
    char text[81];
    cvt_text(str, text);
    if (*text == '\0')
        return EMPTY_NUM;
    else
        return cvtint(text);
}

void
fmtflt(char *str, double x, int width, int dec)
/******
fmtflt converts a floating pt number to a string "999999.9999"
*****
{
    int negative;
    int integer, fract;
    double absolute;

    static const double pow10[] =
    {1., 10., 100., 1000., 10000., 100000., 1000000., 10000000.};

    /* mark the end of string */
    str[width] = '\0';

    /* if empty value, make it be an empty field */
    if (x == EMPTY_FLT)
    {
        memset(str, '_', width);
        return;
    }

    absolute = (x < 0)? -x; x;

    /* separate into integer and fractional parts */
    integer = (int) absolute;
    fract = (absolute - integer) * pow10[dec] + .5;

    /* let the integer portion contain the sign */
    if (x < 0) integer = -integer;

    /* Format integer and fraction separately */
    fmtint(str, integer, width-dec-1, ' ');
    str[width-dec-1] = '.';
    fmtint(str+width-dec, fract, dec, '0');
}

```

```

double
cvtflt(char *str)
{
    char text[81];
    char *t;
    double value;
    int div;
    int fract;
    int negative;
    int i;

    /* normalize the text */
    cvt_text(str, text);
    if (*text == '\0')
        return EMPTY_FLT;

    negative = NO;
    fract = NO;
    value = 0;
    div = 1.0;

    negative = (text[0] == '-');
    if (negative) t = text+1;
    else t = text;

    for (; *t != '\0'; t++)
    {
        if (*t == '.')
            if (fract) return INVALID_FLT;
            else fract = YES;

        else if (isdigit(*t))
            {
                value = value*10 + (int)*t - (int)'0';
                if (fract) div *= 10;
            }

        else
            return INVALID_FLT;
    }

    if (fract)
        value /= div;

    if (negative)
        value = -value;

    return value;
}

void
fmt_text(char *s, char *text, int width)
{
    /* if an empty string, then all underscores */
    if (*text == '\0')
        for (; width > 0; width--)
            *s++ = '_';

    /* otherwise, blank fill it */
    else
    {
        /* copy the text into the new buffer */
        for (; *text != '\0'; width--)
            *s++ = *text++;

        /* fill in the rest with blanks */
        for (; width > 0; width--)
            *s++ = ' ';

        /* and finally, terminate the string */
        *s = '\0';
    }
}

void
cvt_text(char *s, char *text)
{
    char *lastnb;

    /* skip leading blanks and underscores */
    for (; *s == ' ' || *s == '_'; s++);

    /* copy the characters, keeping track of last blank or underscore */

```



```

lastnb = text-1;
for (; *s != '\0'; *text++ = *s++)
    if (*s != ' ' && *s != '_')
        lastnb = text;

/* truncate the text string to last nonblank character */
*(lastnb+1) = '\0';
}

void
fmtint(char *field, int value, int size, char fill)
/*****
fmtint formats an integer value into a character field to make the integer
right-justified within the character field, padded with leading fill
characters (e.g. leading blanks if a blank is passed in for the fill argument
*****/
**/
{
    int negative;
    int dividend;
    int remainder;
    char *p;

    /* create characters from right to left */
    p = field + size - 1;

    /* make note if this is a negative number */
    negative = value < 0;
    if (negative)
        value = -value;

    /* Case: Null field. Can't do anything */
    if (p < field)
        ;

    /* Case: value is zero. Print a leading '0' */
    else if (value == 0)
        *p-- = '0';

    /* Otherwise, convert each digit in turn */
    else do
    {
        dividend = value / 10;
        remainder = value - dividend * 10;
        value = dividend;

        *p-- = (char) ( (int)'0' + remainder );

    } while (p >= field && value > 0);

    /* insert a minus sign if appropriate */
    if (negative && p >= field)
        *p-- = '-';

    /* fill in leading characters */
    while (p >= field)
        *p-- = fill;
}

int
cvtint(char *str)
/*****
getint extracts an integer value from the given character field
(ex: turns the string "123" into the integer 123)
*****/
**/
{
    int value;
    char c;
    int negative;
    debug("cvtint: str=%s\n", str);

    negative = (*str == '-');
    if (negative) str++;

    /* convert the integer */
    for (value = 0; isdigit(*str); str++)
        value = value*10 + (int)(*str) - (int)'0';

    /* if any non-digit characters, error */
    if (*str != '\0')
        return INVALID_NUM;

    /* make negative if there was a minus sign */
    if (negative)
        value = -value;

    debug("cvtint: value=%d\n", value);
    return value;
}

```

```

void
fmt_phone(char str[20], char *phone)
{
    /* copy phone number and insert dashes 999999-999-999-9999 */
    str[0] = phone[0]; str[1] = phone[1]; str[2] = phone[2];
    str[3] = phone[3]; str[4] = phone[4]; str[5] = phone[5];
    str[6] = '-';
    str[7] = phone[6]; str[8] = phone[7]; str[9] = phone[8];
    str[10] = '-';
    str[11] = phone[9]; str[12] = phone[10]; str[13] = phone[11];
    str[14] = '-';
    str[15] = phone[12]; str[16] = phone[13]; str[17] = phone[14];
    str[18] = phone[15];
    str[19] = '\0';
}

```

```

void
fmt_zip(char str[20], char *zip)
{
    /* copy zip code and insert dashes 99999-9999 */
    str[0] = zip[0]; str[1] = zip[1]; str[2] = zip[2];
    str[3] = zip[3]; str[4] = zip[4];
    str[5] = '-';
    str[6] = zip[5]; str[7] = zip[6]; str[8] = zip[7]; str[9] = zip[8];
    str[10] = '\0';
}

```

lib/iobuf.h

```

#ifndef __TPCC_IOBUF__
#define __TPCC_IOBUF__

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

/*
 * Input/Output Buffer management
 */
typedef struct {
    int ifd; /* input file descriptor */
    int ofd; /* output file descriptor */
    char *beg; /* Start of the buffer */
    char *end; /* for output buffers */
    char *max; /* Last address of the buffer */
    char *cur; /* for input buffers */
    char *data; /* data for the buffer */
} iobuf;

#define reset(b)
    if (1) {
        (b)->cur = (b)->end = (b)->beg;
        *(b)->beg = '\0';
    } else (void)0

#define flush(b)
    if (1) {
        display(b);
        reset(b);
    } else (void)0

#define pushc(b,c)
    if (1) {
        if ((b)->end >= (b)->max) {
            error("out_buf overflow: beg=0x%x end=%d
max=%d\n", \
                (b)->beg, (b)->end-(b)->beg, (b)->max-(b)->beg);
            *(b)->end++ = (c);
            *(b)->end = '\0'; /* debug */
        } else (void)0
    }

#define popc(b) (*(b)->cur++)

extern void string(iobuf *out_buf, char *str);
extern void display(iobuf *scr);
extern void input(iobuf *scr);
extern int getkey(iobuf *in_buf, iobuf *out_buf);

#endif

```

lib/iobuf.c

```
#include <unistd.h>
#include <stdlib.h>
#include <errno.h>
#include "iobuf.h"
#include "erlog.h"

void
string(iobuf *out_buf, char str[])
{
    for (; *str != '\0'; str++) {
        pushc(out_buf,*str);
    }
}

void
display(iobuf *scr)
{
    char *p;
    int len;
    for (p = scr->beg; p < scr->end; p+=len) {
        len = write(scr->ofd, p, scr->end - p);
        if (len <= 0) break;
    }
}

void
input(iobuf *scr)
{
    int len;

    /* read in as many characters as are available */
    len = read(scr->ifd, scr->end, scr->max - scr->end);

    /* if end of input, then pretend we read an END character */
    if (len == 0 || (len == -1 && errno == ECONNRESET)) {
        *scr->end = EOF;
        len = 1;
    } else if (len == -1) {
        /* Check for errors */
        perror("input(scr): unable to read stdin\n");
    }

    /* update the pointers to reflect the new data */
    scr->end += len;
    *scr->end = '\0'; /* for debugging */
}

int
getkey(iobuf *in_buf, iobuf *out_buf)
{
    if (in_buf->cur == in_buf->end) {
        flush(out_buf);
        reset(in_buf);
        input(in_buf);
    }

    return popc(in_buf);
}
```

lib/random.c

```
/*
*****
@(#) Version: A.10.10 $Date: 2005/11/14 15:34:50 $

(c) Copyright 1996, Hewlett-Packard Company, all rights reserved.
*****
*/
#include <stdlib.h>
#include <math.h>
#include <string.h>
#include <unistd.h>
#include "tpcc.h"
#include "random.h"

/*
* The are all write-once, read-many variables.
* In a multithreaded environment, they need to
* be setup in the main process before creating
* threads. This is done by calling InitRandomStrings().
*/
```

```
*/
char lastNames[1000][16];

#define THREAD_LOCAL

#ifdef _REENTRANT
# ifdef HPUX
# undef THREAD_LOCAL
# define THREAD_LOCAL __thread
# endif
#endif

/* The seed value needs to be per-thread given each call to
* the "randy" function modifies the seed. If it were not per
* thread, then corruption could occur as multiple threads
* access the randy function simultaneously.
*/
static THREAD_LOCAL int RandySeedIter;

static double exponential(double mean);

void
GenerateLastNames(void)
{
    int i;
    char *name;
    static const char *n[] = {"BAR", "OUGHT", "ABLE", "PRI", "PRES",
        "ESE", "ANTI", "CALLY", "ATION", "EING"};

    for(i = 0; i < 1000; i++) {
        name = lastNames[i];
        strcpy(name, n[(i/100)%10]);
        strcat(name, n[(i/10) %10]);
        strcat(name, n[(i/1) %10]);
    }
}

ID
RandomWarehouse(ID local, ID scale, int percent)
{
    ID w_id;

    /* For the given percent of the time, pick the local warehouse */
    if (RandomNumber(1, 100) > percent || scale == 1) {
        w_id = local;
    } else {
        /* Otherwise, pick a non-local warehouse */
        w_id = RandomNumber(2, scale);
        if (w_id == local) {
            w_id = 1;
        }
    }
    return w_id;
}

void
RandomDelay(double mean, double adjust)
/*
*****
random_sleep sleeps according to the TPC specification
*****
*/
{
    double secs;

    secs = exponential(mean);

    delay(secs+adjust);
}

static double
exponential(double mean)
/*
*****
exponential generates a reverse exponential distribution
*****
*/
{
    double x;

    x = -log(1.0-RandomValue()) * mean;
    return x;
}

void
SetRandomSeed(int val)
{
    #ifdef USE_DRAND48
    srand48(val);
    #else
    /*
    * Seed must be between 1 and 2147483646 inclusive
    * In particular, it can't be 0 or 2147483647
    */
    if (val < 1) {
        val = 1;
    } else if (val > 2147483646) {
        val = 2147483646;
    }
}
}
```

```

    RandySeedIter = val;
    randy();
#endif
}

/* Random number generator from Proceeding of the ACM */
#define RANDY_A_VAL 16807
/* 2^31 - 1 */
#define RANDY_M_VAL 2147483647
/* m / a */
#define RANDY_Q_VAL 127773
/* m % a */
#define RANDY_R_VAL 2836

double
randy(void)
{
    int hi, lo, test;

/*
 * Make sure the seed is not zero. It could be zero if someone calls this
 * function without first initializing the seed.
 */
    if (RandySeedIter == 0) RandySeedIter = 1;

    hi = RandySeedIter / RANDY_Q_VAL;
    lo = RandySeedIter % RANDY_Q_VAL;

    test = (RANDY_A_VAL * lo) - (RANDY_R_VAL * hi);
    RandySeedIter = (test > 0) ? test + RANDY_M_VAL;

    return( (double)RandySeedIter / (double)RANDY_M_VAL );
} /* end of fn randy */

/******
*****/
/* double RandomValue(void) */
/*
 * return a random value in the range [0.0 .. 1.0) */
/******
*****/
double
RandomValue(void)
{
#ifdef USE_DRAND48
    return drand48();
#else
    return randy();
#endif
}

```

lib/Makefile

```

#*****
*****/
# @(#) Version: A.10.10 $Date: 2002/12/10 14:23:24 $
#
#(c) Copyright 1996, Hewlett-Packard Company, all rights reserved.
#*****
*****/

CFLAGS=-DHOTWARE-D_REENTRANT $(BUILDFLAGS)

utils=delay.o errlog.o fmt.o random.o tas.o date.o spinlock.o iobuf.o
load_files=random_load.o

all: tpc_lib.a load_lib.a

tpc_lib.a: ${utils}
    rm -f tpc_lib.a
    ar -r tpc_lib.a ${utils}

load_lib.a: ${load_files}
    rm -f load_lib.a
    ar -r load_lib.a ${load_files}

clean:
    rm -f *.o
    rm -f *.a

clobber: clean

.s.o:
    cc $(BUILDFLAGS) -c $*.s

.c.o:
    cc $(BUILDFLAGS) -c $*.c

```

A.3 Transaction Source

client/service.c

```

/******
*****/
@(#) Version: A.10.10 $Date: 2005/04/11 10:11:31 $

(c) Copyright 1996, Hewlett-Packard Company, all rights reserved.
/******
*****/

#include <unistd.h>
#include <sys/types.h>
#include "tpcc.h"
#include "atmi.h"

int userid;
char *cmd = NULL;

int tpsvrinit(argc, argv)
int argc;
char **argv;
{
    char c;
    int ret;
    time_t t;

/* Configure the error log */
    configure_error_log();

    t = time((time_t *) NULL);
    userlog("starting up at time %s", ctime(&t));
/*
 * search for the options
 * "-S" server program
 * purpose: to get svr_id & progame for DVRY_LOG files
 */
    while ((c = getopt(argc, argv, "S:h:")) != EOF) {
        switch(c) {
            case 'S':
                cmd = optarg;
                break;
        }
    }

/* We just use a single file for delivery */
    userid=0;
    ret = transaction_begin(userid);
    dvry_open(userid);

    return 0;
}

void NEWQ_SVC(svcinfo)
TPSVCINFO *svcinfo;
{
    neworder_transaction((neworder_trans *)svcinfo->data);
    treturn(TPSUCCEESS, 0, svcinfo->data, svcinfo->len, 0);
}

void PMT_SVC(svcinfo)
TPSVCINFO *svcinfo;
{
    payment_transaction((payment_trans *)svcinfo->data);
    treturn(TPSUCCEESS, 0, svcinfo->data, svcinfo->len, 0);
}

void ORDS_SVC(svcinfo)
TPSVCINFO *svcinfo;
{
    ordstat_transaction((ordstat_trans *)svcinfo->data);
    treturn(TPSUCCEESS, 0, svcinfo->data, svcinfo->len, 0);
}

```

```

void STKL_SVC(svcinfo)
TPSVCINFO *svcinfo;
{
    stocklev_transaction((stocklev_trans *)svcinfo->data);
    tpreturn(TPSUCCESS, 0, svcinfo->data, svcinfo->len, 0);
}

void DVRY_SVC(svcinfo)
TPSVCINFO *svcinfo;
{
    delivery_trans *t = (delivery_trans *)svcinfo->data;
    gettimeofday(t->del.deque, NULL);
    delivery_transaction(t);
    gettimeofday(t->del.complete, NULL);
    post_dvry(t);

    /* Why do we return things ? */
    tpreturn(TPSUCCESS, 0, svcinfo->data, svcinfo->len, 0);
}

/*****
tpsrdone cleans up after the TPC transaction service
*****/
void tpsrdone()
{
    transaction_done();
    dvry_close();

    /* Log a message saying we are done */
    userlog("TUXEDO service %s has shutdown\n", cmd);
}

```

client/oracle/transaction.c

```

#include "ora_tpcc.h"
#include <time.h>
#include "tpcc.h"

/* Always use plsql for delivery. */
#define PLSQLEDEL

#ifdef __STDC__
#include "ociapr.h"
#else
#include "ocikpr.h"
#endif

extern TPCinit(int, char*, char*);

int numtrans = 0;

void
transaction_done (void)
{
    /* fprintf(stderr, "About to call TPCexit\n"); fflush(stderr); */
    TPCexit();
    /* fprintf(stderr, "TPCexit after %d transactions\n", numtrans); fflush(stderr); */
}

/* void */
int
transaction_begin(int id)
{
    int ret;

    if ((ret=TPCinit(id, "tpcc", "tpcc")) == -1)
    {
        fprintf(stderr, "TPCinit failure!\n"); fflush(stderr);
        /* Error */
    }
    numtrans = 0;
    return ret;
}

void
neworder_transaction(neworder_trans *str)
{
    int i;
    struct newstruct ora_str;

    ora_str.newin.w_id = str->W_ID;
    ora_str.newin.d_id = str->D_ID;
    ora_str.newin.c_id = str->C_ID;
    for (i = 0; i < str->O_OL_CNT; i++) {
        ora_str.newin.ol_i_id[i] = str->item[i].OL_I_ID;
        ora_str.newin.ol_supply_w_id[i] = str->item[i].OL_SUPPLY_W_ID;
        ora_str.newin.ol_quantity[i] = str->item[i].OL_QUANTITY;
    }
    for (i = str->O_OL_CNT; i < 15; i++) {

```

```

        ora_str.newin.ol_i_id[i] = 0;
        ora_str.newin.ol_supply_w_id[i] = 0;
        ora_str.newin.ol_quantity[i] = 0;
    }

    numtrans++;
    if (TPCnew(&ora_str) == -1) {
        str->status = E_DB_ERROR;
        return;
    } else {
        str->status = OK;
    }

    str->O_ID = ora_str.newout.o_id;
    str->O_OL_CNT = ora_str.newout.o_ol_cnt;
    strncpy (str->C_LAST, ora_str.newout.c_last, 17);
    strncpy (str->C_CREDIT, ora_str.newout.c_credit, 3);
    str->C_DISCOUNT = (REAL) ora_str.newout.c_discount;
    str->W_TAX = (REAL) ora_str.newout.w_tax;
    str->D_TAX = (REAL) ora_str.newout.d_tax;
    strncpy (str->O_ENTRY_D, ora_str.newout.o_entry_d, 20);
    for (i = 0; i < ora_str.newout.o_ol_cnt; i++) {
        strncpy (str->item[i].I_NAME, ora_str.newout.i_name[i], 25);
        str->item[i].S_QUANTITY = ora_str.newout.s_quantity[i];
        str->item[i].brand_generic = ora_str.newout.brand_generic[i];
        str->item[i].I_PRICE = (MONEY) ora_str.newout.i_price[i]*100.0; /* needs to be in cents */
    }
    str->status = ((ora_str.newout.status[0] != '\0') ? E_INVALID_ITEM : OK);
}

/*****
***
* Payment Query
*****/
**/

void
payment_transaction(payment_trans *str)
{
    int i;

    struct paystruct ora_str;

    ora_str.payin.w_id = str->W_ID;
    ora_str.payin.d_id = str->D_ID;
    ora_str.payin.c_w_id = str->C_W_ID;
    ora_str.payin.c_d_id = str->C_D_ID;
    ora_str.payin.h_amount = (float) str->H_AMOUNT; /* Amount in cents */
    ora_str.payin.bylastname = str->byname;
    if (ora_str.payin.bylastname) {
        ora_str.payin.c_id = 0;
        strncpy (ora_str.payin.c_last, str->C_LAST, 17);
        ora_str.payin.c_last[16] = '\0';
        for (i = 15; (i >= 0) && (ora_str.payin.c_last[i] == ' '); i--)
            ora_str.payin.c_last[i] = '\0';
    }
    else {
        ora_str.payin.c_id = str->C_ID;
        strcpy (ora_str.payin.c_last, " ");
    }
    retries = 0;

    numtrans++;
    if (TPCpay (&ora_str)) {
        str->status = E_DB_ERROR;
        return;
    } else {
        str->status = OK;
    }

    strncpy (str->W_STREET_1, ora_str.payout.w_street_1, 21);
    strncpy (str->W_STREET_2, ora_str.payout.w_street_2, 21);
    strncpy (str->W_CITY, ora_str.payout.w_city, 21);
    strncpy (str->W_STATE, ora_str.payout.w_state, 3);
    strncpy (str->W_ZIP, ora_str.payout.w_zip, 10);
    strncpy (str->D_STREET_1, ora_str.payout.d_street_1, 21);
    strncpy (str->D_STREET_2, ora_str.payout.d_street_2, 21);
    strncpy (str->D_CITY, ora_str.payout.d_city, 21);
    strncpy (str->D_STATE, ora_str.payout.d_state, 3);
    strncpy (str->D_ZIP, ora_str.payout.d_zip, 10);
    str->C_ID = ora_str.payout.c_id;
    strncpy (str->C_FIRST, ora_str.payout.c_first, 17);
    strncpy (str->C_MIDDLE, ora_str.payout.c_middle, 3);
    strncpy (str->C_LAST, ora_str.payout.c_last, 17);
    strncpy (str->C_STREET_1, ora_str.payout.c_street_1, 21);
    strncpy (str->C_STREET_2, ora_str.payout.c_street_2, 21);
    strncpy (str->C_CITY, ora_str.payout.c_city, 21);
    strncpy (str->C_STATE, ora_str.payout.c_state, 3);
    strncpy (str->C_ZIP, ora_str.payout.c_zip, 10);
    strncpy (str->C_PHONE, ora_str.payout.c_phone, 17);
    strncpy (str->C_SINCE, ora_str.payout.c_since, 11);

    strncpy (str->C_CREDIT, ora_str.payout.c_credit, 3);

```

```

str->C_CREDIT_LIM = (MONEY) ora_str.payout.c_credit_lim*100.0; /* needs to be in
cents */
str->C_DISCOUNT = (REAL) ora_str.payout.c_discount;
str->C_BALANCE = (REAL) ora_str.payout.c_balance*100.0; /* needs to be in cents */
/* Oracle passes 201 characters, we copy 200 and terminate on 201. */
strncpy (str->C_DATA, ora_str.payout.c_data, 200);
str->C_DATA[200] = '\0';
strncpy (str->H_DATE, ora_str.payout.h_date, 20);
}

void
ordstat_transaction(ordstat_trans *str)
{
int i;

struct ordstruct ora_str;

ora_str.ordin.w_id = str->W_ID;
ora_str.ordin.d_id = str->D_ID;
ora_str.ordin.bylastname = str->byname;
if (ora_str.ordin.bylastname) {
ora_str.ordin.c_id = 0;
strncpy (ora_str.ordin.c_last, str->C_LAST, 17);
ora_str.ordin.c_last[16] = '\0';
for (i = 15; (i >= 0) && (ora_str.ordin.c_last[i] == ' '); i--)
ora_str.ordin.c_last[i] = '\0';
}
else {
ora_str.ordin.c_id = str->C_ID;
strcpy (ora_str.ordin.c_last, " ");
}
retries = 0;

numtrans++;
if (TPCord (&ora_str)) {
str->status = ora_str.ordout.terror;
if (ora_str.ordin.bylastname) {
message("Order status error: wid = %d, did = %d, name = %s\n", str-
>W_ID, str->D_ID, ora_str.ordin.c_last);
} else {
message("Order status error: wid = %d, did = %d, ID = %d\n", str->W_ID,
str->D_ID, str->C_ID);
}
return;
} else {
str->status = OK;
}

str->C_ID = ora_str.ordout.c_id;
strncpy (str->C_LAST, ora_str.ordout.c_last, 17);
strncpy (str->C_FIRST, ora_str.ordout.c_first, 17);
strncpy (str->C_MIDDLE, ora_str.ordout.c_middle, 3);
str->C_BALANCE = (MONEY) ora_str.ordout.c_balance*100.0; /* needs to be in cents
*/
str->O_ID = ora_str.ordout.o_id;
strncpy (str->O_ENTRY_DATE, ora_str.ordout.o_entry_d, 20);
str->O_CARRIER_ID = ora_str.ordout.o_carrier_id;
str->o_cnt = ora_str.ordout.o_cnt;
for (i = 0; i < ora_str.ordout.o_cnt; i++) {
str->item[i].OL_SUPPLY_W_ID = ora_str.ordout.ol_supply_w_id[i];
str->item[i].OL_I_ID = ora_str.ordout.ol_i_id[i];
str->item[i].OL_QUANTITY = ora_str.ordout.ol_quantity[i];
str->item[i].OL_AMOUNT = (MONEY) ora_str.ordout.ol_amount[i]*100.0; /* needs
to be in cents */
strncpy (str->item[i].OL_DELIVERY_DATE, ora_str.ordout.ol_delivery_d[i], 11);
}
}

/******
***
* Delivery Query
*****
**/

void
delivery_transaction(delivery_trans *str)
{
double tr_end;
int i;

struct delstruct ora_str;

/* set psql or OCI delivery */
#ifdef PLSQDEL
ora_str.delin.psqlflag=1;
#else
ora_str.delin.psqlflag=0;
#endif

ora_str.delin.w_id = str->del.W_ID;
ora_str.delin.o_carrier_id = str->del.O_CARRIER_ID;
retries = 0;

numtrans++;

```

```

if (TPCdel (&ora_str)) {
str->del.status = E_DB_ERROR;
return;
} else {
str->del.status = OK;
}

for (i = 0; i < 10; i++) {
if (del_o_id[i] <= 0) {
str->del.order[i].status = E_NOT_ENOUGH_ORDERS;
} else {
str->del.order[i].status = OK;
str->del.order[i].O_ID = del_o_id[i];
}
}
}

/******
***
* Stock Level Query
*****
**/

void
stocklev_transaction(stocklev_trans *str)
{
struct stostruct ora_str;
ora_str.stoin.w_id = str->W_ID;
ora_str.stoin.d_id = str->D_ID;
ora_str.stoin.threshold = str->threshold;
retries = 0;

numtrans++;
if (TPCsto (&ora_str)) {
str->status = E_DB_ERROR;
return;
} else {
str->status = OK;
}
str->low_stock = ora_str.stoout.low_stock;
}

client/oracle/tpccpl.c

#ifdef RCSID
static char *RCSid =
"$Header: tpccpl.c,v 1.4 2003/07/01 15:42:13 mliu Exp $ Copyr (c) 1994 Oracle";
#endif /* RCSID */

/*=====
====+
| Copyright (c) 1994 Oracle Corp. Redwood Shores, CA |
| OPEN SYSTEMS PERFORMANCE GROUP |
| All Rights Reserved |
+=====
====+
| FILENAME
| tpccpl.c
| DESCRIPTION
| TPC-C transactions in PL/SQL.
+=====
====*/

#include <stdio.h>
#include <time.h>
#include "ora_tpcc.h"
#ifdef TUX
#include <userlog.h>
#else
#include <stdarg.h>
#endif

#define SQLTXT "alter session set isolation_level = serializable"
#define SQLXTTRC "alter session set sql_trace = true"
#define SQLXTTIM "alter session set timed_statistics = true"

FILE *fopen ();
#ifdef ORA_NT
#undef boolean
#include "dpbcore.h"
#define gettime dpbtimef
#else

```

```

extern double gettime ();
#endif
int proc_no = 0;
static int logon = 0;
static int new_init = 0;
static int pay_init = 0;
static int ord_init = 0;
static int del_init_oci = 0;
static int del_init_plsql = 0;
static int sto_init = 0;
static int res_init = 0;

```

```

int execstatus;
int errcode;

```

```

OCIEnv *tpcenv;
OCIServer *tpcsrv;
OCIError *errhp;
OCISvcCtx *tpcsvc;
OCISession *tpcsr;
OCISunt *curi;

```

```

/* for stock-level transaction */

```

```

int w_id;
int d_id;
int c_id;
int threshold;
int low_stock;

```

```

/* for delivery transaction */

```

```

int del_o_id[10];
int retries;

```

```

/* for order-status transaction */

```

```

int bylastname;
char c_last[17];
char c_first[17];
char c_middle[3];
double c_balance;
int o_id;
text o_entry_d[20];
ub4 datelen;
int o_carrier_id;
int o_ol_cnt;
int ol_supply_w_id[15];
int ol_i_id[15];
int ol_quantity[15];
int ol_amount[15];
ub4 ol_del_len[15];
text ol_delivery_d[15][11];
/* xnie - begin */
OCIRowid *o_rowid;
/* xnie - end */

```

```

/* for payment transaction */

```

```

int c_w_id;
int c_d_id;
int h_amount;
char w_street_1[21];
char w_street_2[21];
char w_city[21];
char w_state[3];
char w_zip[10];
char d_street_1[21];
char d_street_2[21];
char d_city[21];
char d_state[3];
char d_zip[10];
char c_street_1[21];
char c_street_2[21];
char c_city[21];
char c_state[3];
char c_zip[10];
char c_phone[17];
ub4 sincelen;
text c_since_d[11];
float c_discount;
char c_credit[3];
int c_credit_lim;
char c_data[20];
ub4 hlen;
text h_date[20];

```

```

/* for new order transaction */

```

```

int nol_i_id[15];
int nol_supply_w_id[15];
int nol_quantity[15];
int nol_quant10[15];
int nol_quant91[15];

```

```

int nol_ytdqty[15];
int nol_amount[15];
int o_all_local;
float w_tax;
float d_tax;
float total_amount;
char i_name[15][25];
int s_quantity[15];
char brand_gen[15];
int i_price[15];
char brand_generic[15][1];
int status;
int tracelevel = 0;

```

```

OCIDate cr_date;
OCIDate c_since;
OCIDate o_entry_d_base;
OCIDate ol_d_base[15];
dvoid *xmem;

```

```

#ifdef AVOID_DEADLOCK
int indx[NITEMS], ordl_cnt;
void swap(struct newstruct *str, int i, int j);
void q_sort(int *arr, struct newstruct *str, int left, int right);
#endif

```

```

/*
extern char oracle_home[256];
*/

```

```

/* NewOrder Binding stuff */

```

```

#ifdef TUX
void userlog (char* fmp, ...)
{
va_list va;
va_start(va,fmp);
vfprintf(stderr,fmp,va);
va_end(va);
}
#endif

```

```

/* vmm313 void ocierror(fname, lineno, errhp, status) */
int ocierror(fname, lineno, errhp, status)

```

```

char *fname;
int lineno;
OCIError *errhp;
sword status;
{
text errbuf[512];
sb4 errcode;
sb4 lstat;
ub4 recno=2;

```

```

switch (status) {
case OCI_SUCCESS:
break;
case OCI_SUCCESS_WITH_INFO:
fprintf(stderr,"Module %s Line %d\n", fname, lineno);
fprintf(stderr,"Error - OCI_SUCCESS_WITH_INFO\n");
lstat = OCIErrorGet (errhp, recno++, (text *) NULL, &errcode, errbuf,
(ub4) sizeof(errbuf), OCI_HTYPE_ERROR);
fprintf(stderr,"Error - %s\n", errbuf);
break;
case OCI_NEED_DATA:
fprintf(stderr,"Module %s Line %d\n", fname, lineno);
fprintf(stderr,"Error - OCI_NEED_DATA\n");
return (IRRECERR);
case OCI_NO_DATA:
fprintf(stderr,"Module %s Line %d\n", fname, lineno);
fprintf(stderr,"Error - OCI_NO_DATA\n");
return (IRRECERR);
case OCI_ERROR:
lstat = OCIErrorGet (errhp, (ub4) 1,
(text *) NULL, &errcode, errbuf,
(ub4) sizeof(errbuf), OCI_HTYPE_ERROR);
if (errcode == NOT_SERIALIZABLE) return (errcode);
if (errcode == SNAPSHOT_TOO_OLD) return (errcode);
while (lstat != OCI_NO_DATA)
{
fprintf(stderr,"Module %s Line %d\n", fname, lineno);
fprintf(stderr,"Error - %s\n", errbuf);
lstat = OCIErrorGet (errhp, recno++, (text *) NULL, &errcode, errbuf,
(ub4) sizeof(errbuf), OCI_HTYPE_ERROR);
}
return (errcode);
}
/* vmm313 TPCexit(1); */
/* vmm313 exit(1); */
case OCI_INVALID_HANDLE:
fprintf(stderr,"Module %s Line %d\n", fname, lineno);
fprintf(stderr,"Error - OCI_INVALID_HANDLE\n");
TPCexit(1);
exit(-1);

```

```

case OCI_STILL_EXECUTING:
    fprintf(stderr, "Module %s Line %d\n", fname, lineno);
    fprintf(stderr, "Error - OCI_STILL_EXECUTE\n");
    return (IRRECERR);
case OCI_CONTINUE:
    fprintf(stderr, "Module %s Line %d\n", fname, lineno);
    fprintf(stderr, "Error - OCI_CONTINUE\n");
    return (IRRECERR);
default:
    fprintf(stderr, "Module %s Line %d\n", fname, lineno);
    fprintf(stderr, "Status - %s\n", status);
    return (IRRECERR);
}
return (RECOVERR);
}

FILE *vopen(fnam,mode)
char *fnam;
char *mode;
{
FILE *fd;

#ifdef DEBUG
    fprintf(stderr, "tkvopen() fnam: %s, mode: %s\n", fnam, mode);
#endif

    fd = fopen((char *)fnam,(char *)mode);
    if (!fd){
        fprintf(stderr, "fopen on %s failed %d\n",fnam,fd);
        exit(-1);
    }
    return(fd);
}

int sqlfile(fnam,linebuf)
char *fnam;
text *linebuf;
{
FILE *fd;
int nulpt = 0;
char realfile[512];

#ifdef DEBUG
    fprintf(stderr, "sqlfile() fnam: %s, linebuf: %#x\n", fnam, linebuf);
#endif

/*
    sprintf(realfile,"%s/bench/tpc/tpcc/blocks/%s",oracle_home,fnam);
*/
    sprintf(realfile,"project/tpcc/blocks/%s",fnam);
    /* sprintf(realfile,"%s",fnam); */
    fd = vopen(realfile,"r");
    while (fgets((char *)linebuf+nulpt, SQL_BUF_SIZE,fd))
    {
        nulpt = strlen((char *)linebuf);
    }
    return(nulpt);
}

#ifdef NOT
void vgetdate (unsigned char *oradt)
{
struct tm *loctime;
time_t int_time;

struct ORADATE {
unsigned char century;
unsigned char year;
unsigned char month;
unsigned char day;
unsigned char hour;
unsigned char minute;
unsigned char second;
} Date;
int century;
int cnvrtOK;

/* assume convert is successful */
cnvrtOK = 1;

/* get the current date and time as an integer */
time( &int_time);

/* Convert the current date and time into local time */
loctime = localtime( &int_time);

century = (1900+loctime->tm_year) / 100;

Date.century = (unsigned char)(century + 100);
if (Date.century < 119 || Date.century > 120) cnvrtOK = 0;
Date.year = (unsigned char)(loctime->tm_year+100);
if (Date.year < 100 || Date.year > 199) cnvrtOK = 0;
Date.month = (unsigned char)(loctime->tm_mon + 1);
if (Date.month < 1 || Date.month > 12) cnvrtOK = 0;

```

```

Date.day = (unsigned char)loctime->tm_mday;
if (Date.day < 1 || Date.day > 31) cnvrtOK = 0;
Date.hour = (unsigned char)(loctime->tm_hour + 1);
if (Date.hour < 1 || Date.hour > 24) cnvrtOK = 0;
Date.minute = (unsigned char)(loctime->tm_min + 1);
if (Date.minute < 1 || Date.minute > 60) cnvrtOK = 0;
Date.second = (unsigned char)(loctime->tm_sec + 1);
if (Date.second < 1 || Date.second > 60) cnvrtOK = 0;

if (cnvrtOK)
    memcpy(oradt,&Date,7);
else
    *oradt = '\0';

return;

}

void cvtdmy (unsigned char *oradt, char *outdate)
{
struct ORADATE {
unsigned char century;
unsigned char year;
unsigned char month;
unsigned char day;
unsigned char hour;
unsigned char minute;
unsigned char second;
} Date;

int day,month,year;

memcpy(&Date,oradt,7);

year = (Date.century-100)*100 + Date.year-100;
month = Date.month;
day = Date.day;
sprintf(outdate,"%02d-%02d-%4d0",day,month,year);

return;
}

void cvtdmyhms (unsigned char *oradt, char *outdate)
{
struct ORADATE {
unsigned char century;
unsigned char year;
unsigned char month;
unsigned char day;
unsigned char hour;
unsigned char minute;
unsigned char second;
} Date;

int day,month,year;
int hour,min,sec;

memcpy(&Date,oradt,7);

year = (Date.century-100)*100 + Date.year-100;
month = Date.month;
day = Date.day;
hour = Date.hour - 1;
min = Date.minute - 1;
sec = Date.second - 1;

sprintf(outdate,"%02d-%02d-%4d %02d:%02d:%02d0",
day,month,year,hour,min,sec);

return;
}
#endif

void TPCexit (void)
{
if (new_init) {
tkvcndone();
new_init = 0;
}
if (pay_init) {
tkvcpdone();
pay_init = 0;
}
if (ord_init) {
tkvcodone();
ord_init = 0;
}
if (del_init_oci) {

```

```

    tkvcddone(0);
    del_init_oci = 0;
}
if (del_init_plsql) {
    tkvcddone(1);
    del_init_plsql = 0;
}
if (sto_init) {
    tkvcddone();
    sto_init = 0;
}

OCIHandleFree((dvoid *)tpcusr, OCI_HTYPE_SESSION);
OCIHandleFree((dvoid *)tpcsvc, OCI_HTYPE_SVCCTX);
OCIHandleFree((dvoid *)errhp, OCI_HTYPE_ERROR);
OCIHandleFree((dvoid *)tpcsrv, OCI_HTYPE_SERVER);
OCIHandleFree((dvoid *)tpcenv, OCI_HTYPE_ENV);
}

TPCinit (id, uid, pwd)

int id;
char *uid;
char *pwd;

{
    char filename[40];
    text stmbuf[100];

    OCIInitialize(OCI_DEFAULT|OCI_OBJECT,(dvoid *)0,0,0,0);
    OCIEnvInit(&tpcenv, OCI_DEFAULT, 0, (dvoid **)0);
    OCIHandleAlloc((dvoid *)tpcenv, (dvoid **)&tpcsrv, OCI_HTYPE_SERVER, 0, (dvoid
    ***)0);
    OCIHandleAlloc((dvoid *)tpcenv, (dvoid **)&errhp, OCI_HTYPE_ERROR, 0, (dvoid
    ***)0);
    OCIHandleAlloc((dvoid *)tpcenv, (dvoid **)&tpcsvc, OCI_HTYPE_SVCCTX, 0, (dvoid
    ***)0);
    OCIServerAttach(tpcsrv, errhp, (text *)0,OCI_DEFAULT);
    OCIAttrSet((dvoid *)tpcsvc, OCI_HTYPE_SVCCTX, (dvoid *)tpcsrv,
    (ub4)0,OCI_ATTR_SERVER, errhp);
    OCIHandleAlloc((dvoid *)tpcenv, (dvoid **)&tpcusr, OCI_HTYPE_SESSION, 0, (dvoid
    ***)0);
    OCIAttrSet((dvoid *)tpcusr, OCI_HTYPE_SESSION, (dvoid *)uid,
    (ub4)strlen(uid),OCI_ATTR_USERNAME, errhp);
    OCIAttrSet((dvoid *)tpcusr, OCI_HTYPE_SESSION, (dvoid *)pwd, (ub4)strlen(pwd),
    OCI_ATTR_PASSWORD, errhp);
    OCIERROR(errhp, OCISessionBegin(tpcsvc, errhp, tpcusr, OCI_CRED_RDBMS,
    OCI_DEFAULT));

    OCIAttrSet(tpcsvc, OCI_HTYPE_SVCCTX, tpcusr, 0, OCI_ATTR_SESSION, errhp);

    /* run all transaction in serializable mode */

    OCIHandleAlloc(tpcenv, (dvoid **)&curi, OCI_HTYPE_STMT, 0, (dvoid**)0);
    sprintf ((char *) stmbuf, SQLTXTR);
    OCISmtPrepare(curi, errhp, stmbuf, strlen((char *)stmbuf), OCI_NTV_SYNTAX,
    OCI_DEFAULT);
    OCIERROR(errhp, OCISmtExecute(tpcsvc, curi, errhp,1,0,0,0,OCI_DEFAULT));
    OCIHandleFree(curi, OCI_HTYPE_STMT);

    /*
    This is done in cvdrv.c
    if (tracelevel == 2) {
        OCIHandleAlloc(tpcenv, (dvoid **)&curi, OCI_HTYPE_STMT, 0, (dvoid**)0);
        memset(stmbuf,0,100);
        sprintf ((char *) stmbuf, SQLTXTR);
        OCISmtPrepare(curi, errhp, stmbuf, strlen((char *)stmbuf),
        OCI_NTV_SYNTAX, OCI_DEFAULT);
        OCIERROR(errhp, OCISmtExecute(tpcsvc, curi, errhp,1,0,0,0,OCI_DEFAULT));
        OCIHandleFree((dvoid *)curi, OCI_HTYPE_STMT);
    }
    */
    if (tracelevel == 3) {
        OCIHandleAlloc(tpcenv, (dvoid **)&curi, OCI_HTYPE_STMT, 0, (dvoid**)0);
        memset(stmbuf,0,100);
        sprintf ((char *) stmbuf, SQLTXTR);
        OCISmtPrepare(curi, errhp, stmbuf, strlen((char *)stmbuf),
        OCI_NTV_SYNTAX, OCI_DEFAULT);
        OCIERROR(errhp, OCISmtExecute(tpcsvc, curi, errhp,1,0,0,0,OCI_DEFAULT));
        OCIHandleFree((dvoid *)curi, OCI_HTYPE_STMT);
    }

    logon = 1;

    OCIERROR(errhp, OCIDateSysDate(errhp, &cr_date));

    if (tkvcninit ()) { /* new order */
        TPCexit ();
        return (-1);
    }

    else
        new_init = 1;

    if (tkvcpinit ()) { /* payment */
        TPCexit ();
        return (-1);
    }
    else
        pay_init = 1;

    if (tkvcoint ()) { /* order status */
        TPCexit ();
        return (-1);
    }
    else
        ord_init = 1;

    if (tkvcidinit (0)) { /* delivery */
        TPCexit ();
        return (-1);
    }
    else
        del_init_oci = 1;

    if (tkvcidinit (1)) { /* delivery */
        TPCexit ();
        return (-1);
    }
    else
        del_init_plsql = 1;

    if (tkvcsinit ()) { /* stock level */
        TPCexit ();
        return (-1);
    }
    else
        sto_init = 1;

    return (0);
}

TPCnew (str)
struct newstruct *str;

{
    int i;

    w_id = str->newin.w_id;
    d_id = str->newin.d_id;
    c_id = str->newin.c_id;
    for (i = 0; i < 15; i++) {
        nol_i_id[i] = str->newin.ol_i_id[i];
        nol_supply_w_id[i] = str->newin.ol_supply_w_id[i];
        nol_quantity[i] = str->newin.ol_quantity[i];
    }
    retries = 0;

#ifdef AVOID_DEADLOCK
    for (i = NITEMS; i > 0; i--) {
        if (nol_i_id[i-1] > 0) {
            ordl_cnt = i;
            break;
        }
    }
    for (i = 0; i < NITEMS; i++) indx[i] = i;
    q_sort(nol_i_id, str, 0, ordl_cnt-1);
#endif

    /*
    vgetdate(cr_date); */

    OCIERROR(errhp, OCIDateSysDate(errhp, &cr_date));

    if (str->newout.terror = tkvcn ()) {
        if (str->newout.terror != RECOVER)
            str->newout.terror = IRRECERR;
        return (-1);
    }

    /* fill in date for o_entry_d from time in beginning of txn */
    /*
    cvtdmyhms(cr_date, o_entry_d);
    */
    datelen = sizeof(o_entry_d);
    OCIERROR(errhp,

```



```

OCIDateToText(errhp,&cr_date,(text*)FULLDATE,SIZ(FULLDATE),(text*)0,0,
&datelen,o_entry_d);

str->newout.terror = NOERR;
str->newout.o_id = o_id;
str->newout.o_ol_cnt = o_ol_cnt;
strncpy (str->newout.c_last, c_last, 17);
strncpy (str->newout.c_credit, c_credit, 3);
str->newout.c_discount = c_discount;
str->newout.w_tax = (float)(w_tax);
str->newout.d_tax = (float)(d_tax);
strncpy (str->newout.o_entry_d, (char*)o_entry_d, 20);
str->newout.total_amount = total_amount;
for (i = 0; i < o_ol_cnt; i++) {
    strncpy (str->newout.i_name[i], i_name[i], 25);
    str->newout.s_quantity[i] = s_quantity[i];
    str->newout.brand_generic[i] = brand_generic[i][0];
    str->newout.i_price[i] = (float)i_price[i]/100;
    str->newout.ol_amount[i] = (float)ol_amount[i]/100;
}

#ifdef AVOID_DEADLOCK
    q_sort(indx, str, 0, ordl_cnt-1);
#endif

if (status)
    strcpy (str->newout.status, "Item number is not valid");
else
    str->newout.status[0] = '\0';
str->newout.retry = retries;
#ifdef TOP || defined(TUX) /* changed mjb 17 feb for tuxedo */
    return(1);
#else
    return (0);
#endif
}

TPCpay (str)

struct paystruct *str;

{

    w_id = str->payin.w_id;
    d_id = str->payin.d_id;
    c_w_id = str->payin.c_w_id;
    c_d_id = str->payin.c_d_id;
    h_amount = str->payin.h_amount;
    bylastname = str->payin.bylastname;

    /*
    vgetdate(cr_date); /*
    OCIERROR(errhp,OCIDateSysDate(errhp,&cr_date));

    if (bylastname) {
        c_id = 0;
        strncpy (c_last, str->payin.c_last, 17);
    }
    else {
        c_id = str->payin.c_id;
        strcpy (c_last, " ");
    }
    retries = 0;

    if (str->payout.terror = tkvcp ()) {
        if (str->payout.terror != RECOVER)
            str->payout.terror = IRRECERR;
        return (-1);
    }

    /*
    cvtdmyhms(cr_date,h_date);
    /*
    hlen=SIZ(h_date);
    OCIERROR(errhp,OCIDateToText(errhp,&cr_date,
        (text*)FULLDATE,strlen(FULLDATE),(text*)0,0,&hlen,h_date));

    /*
    cvtdmy(c_since,c_since_d);
    /*
    sincelen=SIZ(c_since_d);
    OCIERROR(errhp,OCIDateToText(errhp,&c_since,
        (text*)SHORTDATE,strlen(SHORTDATE),(text*)0,0,&sincelen,c_since_d);

    str->payout.terror = NOERR;
    strncpy (str->payout.w_street_1, w_street_1, 21);
    strncpy (str->payout.w_street_2, w_street_2, 21);
    strncpy (str->payout.w_city, w_city, 21);
    strncpy (str->payout.w_state, w_state, 3);
    strncpy (str->payout.w_zip, w_zip, 10);

```

```

    strncpy (str->payout.d_street_1, d_street_1, 21);
    strncpy (str->payout.d_street_2, d_street_2, 21);
    strncpy (str->payout.d_city, d_city, 21);
    strncpy (str->payout.d_state, d_state, 3);
    strncpy (str->payout.d_zip, d_zip, 10);
    str->payout.c_id = c_id;
    strncpy (str->payout.c_first, c_first, 17);
    strncpy (str->payout.c_middle, c_middle, 3);
    strncpy (str->payout.c_last, c_last, 17);
    strncpy (str->payout.c_street_1, c_street_1, 21);
    strncpy (str->payout.c_street_2, c_street_2, 21);
    strncpy (str->payout.c_city, c_city, 21);
    strncpy (str->payout.c_state, c_state, 3);
    strncpy (str->payout.c_zip, c_zip, 10);
    strncpy (str->payout.c_phone, c_phone, 17);
    strncpy (str->payout.c_since, (char*)c_since_d, 11);
    strncpy (str->payout.c_credit, c_credit, 3);
    str->payout.c_credit_lim = (float)(c_credit_lim)/100;
    str->payout.c_discount = c_discount;
    str->payout.c_balance = (float)(c_balance)/100;
    strncpy (str->payout.c_data, c_data, 201);
    strncpy (str->payout.h_date, (char*)h_date, 20);
    str->payout.retry = retries;
#ifdef TOP || defined(TUX) /* changed mjb 17 Feb */
    return(1);
#else
    return (0);
#endif
}

TPCord (str)

struct ordstruct *str;

{

    int i;
    w_id = str->ordin.w_id;
    d_id = str->ordin.d_id;
    bylastname = str->ordin.bylastname;
    if (bylastname) {
        c_id = 0;
        strncpy (c_last, str->ordin.c_last, 17);
    }
    else {
        c_id = str->ordin.c_id;
        strcpy (c_last, " ");
    }
    retries = 0;

    if (str->ordout.terror = tkvco ()) {
        if (str->ordout.terror != RECOVER)
            str->ordout.terror = IRRECERR;
        return (-1);
    }

    datelen = sizeof(o_entry_d);
    OCIERROR(errhp,

OCIDateToText(errhp,&o_entry_d_base,(text*)FULLDATE,SIZ(FULLDATE),(text*)0,0,
&datelen,o_entry_d);

    str->ordout.terror = NOERR;
    str->ordout.c_id = c_id;
    strncpy (str->ordout.c_last, c_last, 17);
    strncpy (str->ordout.c_first, c_first, 17);
    strncpy (str->ordout.c_middle, c_middle, 3);
    str->ordout.c_balance = c_balance/100;
    str->ordout.o_id = o_id;
    strncpy (str->ordout.o_entry_d, (char*)o_entry_d, 20);
    if ( o_carrier_id == 11 )
        str->ordout.o_carrier_id = 0;
    else
        str->ordout.o_carrier_id = o_carrier_id;
    str->ordout.o_ol_cnt = o_ol_cnt;
    for (i = 0; i < o_ol_cnt; i++) {
        ol_delivery_d[i][10] = '\0';
        if ( !strcmp((char*)ol_delivery_d[i],"15-09-1911") )
            strncpy((char*)ol_delivery_d[i],"NOT DELIVR",10);
        str->ordout.ol_supply_w_id[i] = ol_supply_w_id[i];
        str->ordout.ol_i_id[i] = ol_i_id[i];
        str->ordout.ol_quantity[i] = ol_quantity[i];
        str->ordout.ol_amount[i] = (float)ol_amount[i]/100;
        strncpy (str->ordout.ol_delivery_d[i], (char*)ol_delivery_d[i], 11);
    }
    str->ordout.retry = retries;
#ifdef TOP || defined(TUX)
    return(1);
#else
    return (0);
#endif
}

```

```

}

TPCdel (str)

struct delstruct *str;

{

double tr_end;
int i;

w_id = str->delin.w_id;
o_carrier_id = str->delin.o_carrier_id;
retries = 0;
/*
vgetdate(cr_date); */
OCIERROR(errhp,OCIDateSysDate(errhp,&cr_date));

if (str->delout.terror = tkvcd (str->delin.plsqlflag)) {
if (str->delout.terror == DEL_ERROR)
return DEL_ERROR;
if (str->delout.terror != RECOVERR)
str->delout.terror = IRRECERR;
return (-1);
}

str->delout.terror = NOERR;
str->delout.retry = retries;
#if defined(TOP) || defined(TUX) /* changed mjb 17 feb */
return(1);
#else
return (0);
#endif
}

}

```

```

TPCsto (str)

struct stostruct *str;

{

w_id = str->stoin.w_id;
d_id = str->stoin.d_id;
threshold = str->stoin.threshold;
retries = 0;

if (str->stoout.terror = tkvcs ()) {
if (str->stoout.terror != RECOVERR)
str->stoout.terror = IRRECERR;
return (-1);
}

str->stoout.terror = NOERR;
str->stoout.low_stock = low_stock;
str->stoout.retry = retries;
#if defined(TOP) || defined(TUX) /* changed mjb 17 feb */
return(1);
#else
return (0);
#endif
}

}

```

```

#ifndef AVOID_DEADLOCK

void q_sort(int *arr,struct newstruct *str,int left, int right)
{
int i, last;

if(left >= right)
return;
swap(str,left,(left+right)/2);
last = left;
for(i=left+1;i<=right;i++)
if(arr[i] < arr[left])
swap(str,last,i);
swap(str,left,last);
q_sort(arr,str,left,last-1);
q_sort(arr,str,last+1,right);
}

void swap(struct newstruct *str, int i, int j)
{
int temp;
char tmpstr[25];
char tmpch;

temp = indx[i];
indx[i] = indx[j];
indx[j] = temp;

```

```

temp = nol_i_id[i];
nol_i_id[i] = nol_i_id[j];
nol_i_id[j] = temp;

temp = nol_supply_w_id[i];
nol_supply_w_id[i] = nol_supply_w_id[j];
nol_supply_w_id[j] = temp;

temp = nol_quantity[i];
nol_quantity[i] = nol_quantity[j];
nol_quantity[j] = temp;

temp = str->newout.i_price[i];
str->newout.i_price[i] = str->newout.i_price[j];
str->newout.i_price[j] = temp;

temp = str->newout.ol_amount[i];
str->newout.ol_amount[i] = str->newout.ol_amount[j];
str->newout.ol_amount[j] = temp;

temp = str->newout.s_quantity[i];
str->newout.s_quantity[i] = str->newout.s_quantity[j];
str->newout.s_quantity[j] = temp;
strncpy(tmpstr,str->newout.i_name[i], 25);
strncpy(str->newout.i_name[i],str->newout.i_name[j], 25);
strncpy(str->newout.i_name[j],tmpstr, 25);

tmpch = str->newout.brand_generic[i];
str->newout.brand_generic[i] = str->newout.brand_generic[j];
str->newout.brand_generic[j] = tmpch;

}

#endif

```

client/oracle/plnew.c

```

#ifdef RCSID
static char *RCSid =
"SHader: plnew.c,v 1.4 2003/08/05 14:10:58 root Exp $ Copyr (c) 1994 Oracle";
#endif /* RCSID */

/*=====
==+
| Copyright (c) 1996 , 1997, 1998 Oracle Corp, Redwood Shores, CA |
| OPEN SYSTEMS PERFORMANCE GROUP |
| All Rights Reserved |
+=====
==+
| FILENAME
| plnew.c
| DESCRIPTION
| OCI version (using PL/SQL stored procedure) of
| NEW ORDER transaction in TPC-C benchmark.
+=====
==*/

#ifndef ORA_TPCC
# define ORA_TPCC
# include "ora_tpcc.h"
#endif

#ifdef TUX
#include <userlog.h>
#endif

#define SQLTXT2 "BEGIN initpcc.init_no(cidx1arr); END;"

#define NITEMS 15
#define ROWIDLEN 20
#define OCIROWLEN 20

struct newctx {

ub2 nol_i_id_len[NITEMS];
ub2 nol_supply_w_id_len[NITEMS];
ub2 nol_quantity_len[NITEMS];
ub2 nol_amount_len[NITEMS];
ub2 s_quantity_len[NITEMS];
ub2 i_name_len[NITEMS];

```

```

ub2 i_price_len[NITEMS];
ub2 s_dist_info_len[NITEMS];
ub2 ol_o_id_len[NITEMS];
ub2 ol_number_len[NITEMS];
ub2 s_remote_len[NITEMS];
ub2 s_quant_len[NITEMS];
ub2 ol_dist_info_len[NITEMS];
ub2 s_bg_len[NITEMS];

int ol_o_id[NITEMS];
int ol_number[NITEMS];

int s_remote[NITEMS];
char s_dist_info[NITEMS][25];
OCISmt *curn1;
OCIBind *ol_i_id_bp;
OCIBind *ol_supply_w_id_bp;
OCIBind *i_price_bp;
OCIBind *i_name_bp;
OCIBind *s_bg_bp;
ub4 nol_i_count;
ub4 nol_s_count;
ub4 nol_q_count;
ub4 nol_item_count;
ub4 nol_name_count;
ub4 nol_qty_count;
ub4 nol_bg_count;
ub4 nol_am_count;
ub4 s_remote_count;
OCISmt *curn2;
OCIBind *ol_quantity_bp;
OCIBind *s_remote_bp;
OCIBind *s_quantity_bp;
OCIBind *w_id_bp;
OCIBind *d_id_bp;
OCIBind *c_id_bp;
OCIBind *o_all_local_bp;
OCIBind *o_all_cnt_bp;
OCIBind *w_tax_bp;
OCIBind *d_tax_bp;
OCIBind *o_id_bp;
OCIBind *c_discount_bp;
OCIBind *c_credit_bp;
OCIBind *c_last_bp;
OCIBind *retries_bp;
OCIBind *cr_date_bp;
OCIBind *ol_o_id_bp;
OCIBind *ol_amount_bp;

sb2 w_id_len;
ub2 d_id_len;
ub2 c_id_len;
ub2 o_all_local_len;
ub2 o_all_cnt_len;
ub2 w_tax_len;
ub2 d_tax_len;
ub2 o_id_len;
ub2 c_discount_len;
ub2 c_credit_len;
ub2 c_last_len;
ub2 retries_len;
ub2 cr_date_len;
};

typedef struct newctx newctx;

static newctx *nctx;

tkvcninit ()
{
    int i;
    text stmbuff[32*1024];

    nctx = (newctx *) malloc (sizeof(newctx));
    DISCARD memset(nctx,(char)0,sizeof(newctx));
    nctx->w_id_len = sizeof(w_id);
    nctx->d_id_len = sizeof(d_id);
    nctx->c_id_len = sizeof(c_id);
    nctx->o_all_local_len = sizeof(o_all_local);
    nctx->o_all_cnt_len = sizeof(o_all_cnt);
    nctx->w_tax_len = 0;
    nctx->d_tax_len = 0;
    nctx->o_id_len = sizeof(o_id);
    nctx->c_discount_len = 0;
    nctx->c_credit_len = 0;
    nctx->c_last_len = 0;
    nctx->retries_len = sizeof(retries);
    nctx->cr_date_len = sizeof(cr_date);

    /* open first cursor */
    DISCARD OCIERROR(errhp,OCIHandleAlloc(tpeenv,(dvoid **)&nctx->curn1),
        OCI_HTYPE_STMT, 0, (dvoid**)0);
    #if defined(ISO)
    sqlfile("../blocks/tkvcnnew_iso.sql",stmbuff);
    #endif
}

#else
#endif

DISCARD OCIERROR(errhp,OCIStmtPrepare(nctx->curn1, errhp, stmbuff,
    strlen(char *)stmbuff), OCI_NTV_SYNTAX, OCI_DEFAULT);

/* bind variables */

OCIBNDPL(nctx->curn1, nctx->w_id_bp, errhp, ":w_id",ADR(w_id),SIZ(w_id),
    SQLT_INT, &nctx->w_id_len);
OCIBNDPL(nctx->curn1, nctx->d_id_bp, errhp, ":d_id",ADR(d_id),SIZ(d_id),
    SQLT_INT, &nctx->d_id_len);
OCIBNDPL(nctx->curn1, nctx->c_id_bp, errhp, ":c_id",ADR(c_id),SIZ(c_id),
    SQLT_INT, &nctx->c_id_len);
OCIBNDPL(nctx->curn1, nctx->o_all_local_bp, errhp, ":o_all_local",
    ADR(o_all_local), SIZ(o_all_local),SQLT_INT, &nctx->o_all_local_len);
OCIBNDPL(nctx->curn1, nctx->o_all_cnt_bp, errhp, ":o_all_cnt",ADR(o_all_cnt),
    SIZ(o_all_cnt),SQLT_INT, &nctx->o_all_cnt_len);
OCIBNDPL(nctx->curn1, nctx->w_tax_bp, errhp, ":w_tax",ADR(w_tax),SIZ(w_tax),
    SQLT_FLT, &nctx->w_tax_len);
OCIBNDPL(nctx->curn1, nctx->d_tax_bp, errhp, ":d_tax",ADR(d_tax),SIZ(d_tax),
    SQLT_FLT, &nctx->d_tax_len);
OCIBNDPL(nctx->curn1, nctx->o_id_bp, errhp, ":o_id",ADR(o_id),SIZ(o_id),
    SQLT_INT, &nctx->o_id_len);
OCIBNDPL(nctx->curn1, nctx->c_discount_bp, errhp, ":c_discount",
    ADR(c_discount), SIZ(c_discount),SQLT_FLT, &nctx->c_discount_len);
OCIBNDPL(nctx->curn1, nctx->c_credit_bp, errhp, ":c_credit",c_credit,
    SIZ(c_credit),SQLT_CHR, &nctx->c_credit_len);
OCIBNDPL(nctx->curn1, nctx->c_last_bp, errhp, ":c_last",c_last,SIZ(c_last),
    SQLT_STR, &nctx->c_last_len);
OCIBNDPL(nctx->curn1, nctx->retries_bp, errhp, ":retries",ADR(retries),
    SIZ(retries),SQLT_INT, &nctx->retries_len);
OCIBNDPL(nctx->curn1, nctx->cr_date_bp, errhp, ":cr_date",&cr_date,
    SIZ(OCIDate), SQLT_ODT, &nctx->cr_date_len);

OCIBNDPLA(nctx->curn1, nctx->ol_i_id_bp,errhp,":ol_i_id",nol_i_id,
    SIZ(int), SQLT_INT, nctx->nol_i_id_len,NITEMS,&nctx->nol_i_count);
OCIBNDPLA(nctx->curn1, nctx->ol_supply_w_id_bp, errhp, ":ol_supply_w_id",
    nol_supply_w_id,SIZ(int),SQLT_INT, nctx->nol_supply_w_id_len,
    NITEMS, &nctx->nol_s_count);
OCIBNDPLA(nctx->curn1, nctx->ol_quantity_bp,errhp,":ol_quantity",
    nol_quantity, SIZ(int),SQLT_INT,nctx->nol_quantity_len,
    NITEMS,&nctx->nol_q_count);
OCIBNDPLA(nctx->curn1, nctx->i_price_bp,errhp,":i_price",i_price,SIZ(int),
    SQLT_INT, nctx->i_price_len, NITEMS, &nctx->nol_item_count);
OCIBNDPLA(nctx->curn1, nctx->i_name_bp,errhp,":i_name",i_name,
    SIZ(i_name[0]),SQLT_STR, nctx->i_name_len,NITEMS,
    &nctx->nol_name_count);
OCIBNDPLA(nctx->curn1, nctx->s_quantity_bp,errhp,":s_quantity",s_quantity,
    SIZ(int), SQLT_INT,nctx->s_quant_len,NITEMS,&nctx->nol_qty_count);
OCIBNDPLA(nctx->curn1, nctx->s_bg_bp,errhp,":brand_generic",brand_generic,
    SIZ(char), SQLT_CHR,nctx->s_bg_len,NITEMS,&nctx->nol_bg_count);
OCIBNDPLA(nctx->curn1, nctx->ol_amount_bp,errhp,":ol_amount",nol_amount,
    SIZ(int),SQLT_INT, nctx->nol_amount_len,NITEMS,&nctx->nol_am_count);
OCIBNDPLA(nctx->curn1, nctx->s_remote_bp,errhp,":s_remote",nctx->s_remote,
    SIZ(int),SQLT_INT, nctx->s_remote_len,NITEMS,&nctx->s_remote_count);

/* open second cursor */
DISCARD OCIERROR(errhp,OCIHandleAlloc(tpeenv, (dvoid **)&nctx->curn2),
    OCI_HTYPE_STMT, 0, (dvoid**)0);
DISCARD sprintf ((char *) stmbuff, SQLTTEXT2);
DISCARD OCIERROR(errhp,OCIStmtPrepare(nctx->curn2, errhp, stmbuff,
    strlen(char *)stmbuff), OCI_NTV_SYNTAX, OCI_DEFAULT);

/* execute second cursor to init newinit package */
{
    int idx1arr[NITEMS];
    OCIBind *idx1arr_bp;
    ub2 idx1arr_len[NITEMS];
    ub2 idx1arr_rcode[NITEMS];
    sb2 idx1arr_ind[NITEMS];
    ub4 idx1arr_count;
    ub2 idx;

    for (idx = 0; idx < NITEMS; idx++) {
        idx1arr[idx] = idx + 1;
        idx1arr_ind[idx] = TRUE;
        idx1arr_len[idx] = sizeof(int);
    }
    idx1arr_count = NITEMS;
    o_all_cnt = NITEMS;

    /* Bind array */
    OCIBNDPLA(nctx->curn2, idx1arr_bp,errhp,":idx1arr",idx1arr,
        SIZ(int), SQLT_INT, idx1arr_len, NITEMS,&idx1arr_count);

    execstatus = OCIStmtExecute(tpescv,nctx->curn2,errhp,1,0,
        NULLP(CONST OCISnapshot),NULLP(OCI_Snapshot),OCI_DEFAULT);
}

```

```

if(execstatus != OCI_SUCCESS) {
    OCITransRollback(tpcsvc, errhp, OCI_DEFAULT);
    errcode = OCIERROR(errhp, execstatus);
    return -1;
}
}

return (0);
}

tkvcn ()
{
    int i;
    int rcount;

retry:

    status = 0;          /* number of invalid items */

    /* get number of order lines, and check if all are local */

    o_ol_cnt = NITEMS;
    o_all_local = 1;
    for (i = 0; i < NITEMS; i++) {
        if (nol_i_id[i] == 0) {
            o_ol_cnt = i;
            break;
        }
        if (nol_supply_w_id[i] != w_id) {
            nctx->s_remote[i] = 1;
            o_all_local = 0;
        }
        else
            nctx->s_remote[i] = 0;
    }

    nctx->w_id_len = sizeof(w_id);
    nctx->d_id_len = sizeof(d_id);
    nctx->c_id_len = sizeof(c_id);
    nctx->o_all_local_len = sizeof(o_all_local);
    nctx->o_ol_cnt_len = sizeof(o_ol_cnt);
    nctx->w_tax_len = 0;
    nctx->d_tax_len = 0;
    nctx->o_id_len = sizeof(o_id);
    nctx->c_discount_len = 0;
    nctx->c_credit_len = 0;
    nctx->c_last_len = 0;
    nctx->retries_len = sizeof(retries);
    nctx->cr_date_len = sizeof(cr_date);
    /* this is the row count */
    rcount = o_ol_cnt;
    nctx->nol_i_count = o_ol_cnt;
    nctx->nol_q_count = o_ol_cnt;
    nctx->nol_s_count = o_ol_cnt;
    nctx->s_remote_count = o_ol_cnt;

    nctx->nol_qty_count = 0;
    nctx->nol_bg_count = 0;
    nctx->nol_item_count = 0;
    nctx->nol_name_count = 0;
    nctx->nol_am_count = 0;

    /* initialization for array operations */
    for (i = 0; i < o_ol_cnt; i++) {
        nctx->ol_number[i] = i + 1;
        nctx->nol_i_id_len[i] = sizeof(int);
        nctx->nol_supply_w_id_len[i] = sizeof(int);
        nctx->nol_quantity_len[i] = sizeof(int);
        nctx->nol_amount_len[i] = sizeof(int);
        nctx->ol_o_id_len[i] = sizeof(int);
        nctx->ol_number_len[i] = sizeof(int);
        nctx->ol_dist_info_len[i] = nctx->s_dist_info_len[i];
        nctx->s_remote_len[i] = sizeof(int);
        nctx->s_quant_len[i] = sizeof(int);
        nctx->i_name_len[i] = 0;
        nctx->s_bg_len[i] = 0;
    }
    for (i = o_ol_cnt; i < NITEMS; i++) {

        nctx->nol_i_id_len[i] = 0;
        nctx->nol_supply_w_id_len[i] = 0;
        nctx->nol_quantity_len[i] = 0;
        nctx->nol_amount_len[i] = 0;
        nctx->ol_o_id_len[i] = 0;
        nctx->ol_number_len[i] = 0;
        nctx->ol_dist_info_len[i] = 0;
        nctx->s_remote_len[i] = 0;
        nctx->s_quant_len[i] = 0;
        nctx->i_name_len[i] = 0;
        nctx->s_bg_len[i] = 0;
    }
}

```

```

execstatus = OCISntExecute(tpcsvc, nctx->curr1, errhp, 1, 0, 0,
                           OCI_DEFAULT |
OCI_COMMIT_ON_SUCCESS);

if(execstatus != OCI_SUCCESS) {
    OCITransRollback(tpcsvc, errhp, OCI_DEFAULT);
    errcode = OCIERROR(errhp, execstatus);
    if(errcode == NOT_SERIALIZABLE) {
        retries++;
        goto retry;
    } else if (errcode == RECOVERERR) {
        retries++;
        goto retry;
    } else if (errcode == SNAPSHOT_TOO_OLD) {
        retries++;
        goto retry;
    } else {
        return -1;
    }
}

/* did the txn succeed ? */
if (rcount != o_ol_cnt)
{
    status = rcount - o_ol_cnt;
    o_ol_cnt = rcount;
}

#ifdef DEBUG
    printf("w_id = %d, d_id = %d, c_id = %d\n", w_id, d_id, c_id);
#endif

total_amount = 0;
for (i = 0; i < o_ol_cnt; i++) total_amount += nol_amount[i];
total_amount *= ((float)(1.0 - c_discount)) * (float)(1.0 + ((float)(d_tax)) + ((float)
(w_tax)));
total_amount = total_amount/100;

return (0);
}

void tkvcndone ()
{
    int i;

    if (nctx)
    {
        DISCARD OCIHandleFree((dvoid *)nctx->curr1, OCI_HTYPE_STMT);
        DISCARD OCIHandleFree((dvoid *)nctx->curr2, OCI_HTYPE_STMT);
        free (nctx);
    }
}

client/oracle/plpay.c

#ifdef RCSID
static char *RCSid =
    "$Header: plpay.c,v 1.3 2003/07/01 15:44:03 mliu Exp $ Copyr (c) 1994 Oracle";
#endif /* RCSID */

/*=====
|   Copyright (c) 1995 Oracle Corp. Redwood Shores, CA   |
|   OPEN SYSTEMS PERFORMANCE GROUP                       |
|   All Rights Reserved                                   |
+=====
==+
| FILENAME
| plpay.c
| DESCRIPTION
| OCI version (using PL/SQL stored procedure) of
| PAYMENT transaction in TPC-C benchmark.
+=====
==*/

#include "ora_tpcc.h"

```

```

#ifdef TUX
#include <userlog.h>
#endif

#define SQLTXT_INIT "BEGIN inittpc.init_pay; END;"

struct payctx {
    OCISmt *curpi;
    OCISmt *curp0;
    OCISmt *curp1;
    OCIBind *w_id_bp[2];
    ub2 w_id_len;

    OCIBind *d_id_bp[2];
    ub2 d_id_len;

    OCIBind *c_w_id_bp[2];
    ub2 c_w_id_len;

    OCIBind *c_d_id_bp[2];
    ub2 c_d_id_len;

    OCIBind *c_id_bp[2];
    ub2 c_id_len;

    OCIBind *h_amount_bp[2];
    ub2 h_amount_len;

    OCIBind *c_last_bp[2];
    ub2 c_last_len;

    OCIBind *w_street_1_bp[2];
    ub2 w_street_1_len;

    OCIBind *w_street_2_bp[2];
    ub2 w_street_2_len;

    OCIBind *w_city_bp[2];
    ub2 w_city_len;

    OCIBind *w_state_bp[2];
    ub2 w_state_len;

    OCIBind *w_zip_bp[2];
    ub2 w_zip_len;

    OCIBind *d_street_1_bp[2];
    ub2 d_street_1_len;

    OCIBind *d_street_2_bp[2];
    ub2 d_street_2_len;

    OCIBind *d_city_bp[2];
    ub2 d_city_len;

    OCIBind *d_state_bp[2];
    ub2 d_state_len;

    OCIBind *d_zip_bp[2];
    ub2 d_zip_len;

    OCIBind *c_first_bp[2];
    ub2 c_first_len;

    OCIBind *c_middle_bp[2];
    ub2 c_middle_len;

    OCIBind *c_street_1_bp[2];
    ub2 c_street_1_len;

    OCIBind *c_street_2_bp[2];
    ub2 c_street_2_len;

    OCIBind *c_city_bp[2];
    ub2 c_city_len;

    OCIBind *c_state_bp[2];
    ub2 c_state_len;

    OCIBind *c_zip_bp[2];
    ub2 c_zip_len;

    OCIBind *c_phone_bp[2];
    ub2 c_phone_len;

    OCIBind *c_since_bp[2];
    ub2 c_since_len;

    OCIBind *c_credit_bp[2];
    ub2 c_credit_len;

    OCIBind *c_credit_lim_bp[2];
    ub2 c_credit_lim_len;

    OCIBind *c_discount_bp[2];
    ub2 c_discount_len;

    OCIBind *c_balance_bp[2];
    ub2 c_balance_len;

    OCIBind *c_data_bp[2];
    ub2 c_data_len;

    OCIBind *h_date_bp[2];
    ub2 h_date_len;

    OCIBind *retries_bp[2];
    ub2 retries_len;

    OCIBind *cr_date_bp[2];
    ub2 cr_date_len;

    OCIBind *byln_bp[2];
    ub2 byln_len;
};

typedef struct payctx payctx;

payctx *pctx;

int tkvcpinit (void)
{
    text stmbuf[SQL_BUF_SIZE];
    pctx = (payctx *)malloc(sizeof(payctx));
    memset(pctx, char 0, sizeof(payctx));

    /* cursor for init */
    DISCARD OCIERROR(errhp, OCIHandleAlloc(tpcenv, (dvoid **)&(pctx->curpi),
        OCI_HTYPE_STMT, 0, (dvoid** 0)));

    DISCARD OCIERROR(errhp, OCIHandleAlloc(tpcenv, (dvoid **)&(pctx->curp0),
        OCI_HTYPE_STMT, 0, (dvoid** 0)));
    DISCARD OCIERROR(errhp, OCIHandleAlloc(tpcenv, (dvoid **)&(pctx->curp1),
        OCI_HTYPE_STMT, 0, (dvoid** 0)));

    /* build the init statement and execute it */

    sprintf ((char*)stmbuf, SQLTXT_INIT);
    DISCARD OCIERROR(errhp, OCISmtPrepare(pctx->curpi, errhp, stmbuf,
        strlen((char *)stmbuf), OCI_NTV_SYNTAX, OCI_DEFAULT));
    DISCARD OCIERROR(errhp, OCISmtExecute(tpcenv, pctx->curpi, errhp, 1, 0,
        NULLP(CONST OCISnapshot), NULLP(OCISnapshot), OCI_DEFAULT));

    /* customer id != 0, go by last name */

    sqlfile("../blocks/paynz.sql", stmbuf);
    DISCARD OCIERROR(errhp, OCISmtPrepare(pctx->curp0, errhp, stmbuf,
        strlen((char *)stmbuf), OCI_NTV_SYNTAX, OCI_DEFAULT));

    /* customer id == 0, go by last name */

    sqlfile("../blocks/payz.sql", stmbuf); /* sqlfile opens $O/bench/.../blocks/... */
    DISCARD OCIERROR(errhp, OCISmtPrepare(pctx->curp1, errhp, stmbuf,
        strlen((char *)stmbuf), OCI_NTV_SYNTAX, OCI_DEFAULT));

    pctx->w_id_len = SIZ(w_id);
    pctx->d_id_len = SIZ(d_id);
    pctx->c_w_id_len = SIZ(c_w_id);
    pctx->c_d_id_len = SIZ(c_d_id);
    pctx->c_id_len = 0;
    pctx->h_amount_len = SIZ(h_amount);
    pctx->c_last_len = 0;
    pctx->w_street_1_len = 0;
    pctx->w_street_2_len = 0;
    pctx->w_city_len = 0;
    pctx->w_state_len = 0;
    pctx->w_zip_len = 0;
    pctx->d_street_1_len = 0;
    pctx->d_street_2_len = 0;
    pctx->d_city_len = 0;
    pctx->d_state_len = 0;
    pctx->d_zip_len = 0;
    pctx->c_first_len = 0;
    pctx->c_middle_len = 0;
    pctx->c_street_1_len = 0;
    pctx->c_street_2_len = 0;
    pctx->c_city_len = 0;
    pctx->c_state_len = 0;
    pctx->c_zip_len = 0;
    pctx->c_phone_len = 0;
    pctx->c_since_len = 0;
    pctx->c_credit_len = 0;
    pctx->c_credit_lim_len = 0;
    pctx->c_discount_len = 0;
}

```

```

ptcx->c_balance_len = sizeof(double);
ptcx->c_data_len = 0;
ptcx->h_date_len = 0;
ptcx->retries_len = SIZ(retries);
ptcx->cr_date_len = 7;

/* bind variables */

OCIBNDPL(ptcx->curp0, ptcx->w_id_bp[0], errhp, "w_id",ADR(w_id),SIZ(int),
  SQLT_INT, NULL);
OCIBNDPL(ptcx->curp0, ptcx->d_id_bp[0], errhp, "d_id",ADR(d_id),SIZ(int),
  SQLT_INT, NULL);
OCIBNDPL(ptcx->curp0, ptcx->c_w_id_bp[0], errhp, "c_w_id",ADR(c_w_id),SIZ(int),
  SQLT_INT);
OCIBNDPL(ptcx->curp0, ptcx->c_d_id_bp[0], errhp, "c_d_id",ADR(c_d_id),SIZ(int),
  SQLT_INT);
OCIBNDPL(ptcx->curp0, ptcx->c_id_bp[0], errhp, "c_id",ADR(c_id),SIZ(int),
  SQLT_INT);
OCIBNDPL(ptcx->curp0, ptcx->h_amount_bp[0], errhp, "h_amount",ADR(h_amount),
  SIZ(int),SQLT_INT, &ptcx->h_amount_len);
OCIBNDPL(ptcx->curp0, ptcx->c_last_bp[0], errhp, "c_last",c_last,SIZ(c_last),
  SQLT_STR, &ptcx->c_last_len);
OCIBNDPL(ptcx->curp0, ptcx->w_street_1_bp[0], errhp, "w_street_1",w_street_1,
  SIZ(w_street_1),SQLT_STR, &ptcx->w_street_1_len);
OCIBNDPL(ptcx->curp0, ptcx->w_street_2_bp[0], errhp, "w_street_2",w_street_2,
  SIZ(w_street_2),SQLT_STR, &ptcx->w_street_2_len);
OCIBNDPL(ptcx->curp0, ptcx->w_city_bp[0], errhp, "w_city",w_city,SIZ(w_city),
  SQLT_STR, &ptcx->w_city_len);
OCIBNDPL(ptcx->curp0, ptcx->w_state_bp[0], errhp, "w_state",w_state,
  SIZ(w_state), SQLT_STR, &ptcx->w_state_len);
OCIBNDPL(ptcx->curp0, ptcx->w_zip_bp[0], errhp, "w_zip",w_zip,SIZ(w_zip),
  SQLT_STR, &ptcx->w_zip_len);
OCIBNDPL(ptcx->curp0, ptcx->d_street_1_bp[0], errhp, "d_street_1",d_street_1,
  SIZ(d_street_1),SQLT_STR, &ptcx->d_street_1_len);
OCIBNDPL(ptcx->curp0, ptcx->d_street_2_bp[0], errhp, "d_street_2",d_street_2,
  SIZ(d_street_2),SQLT_STR, &ptcx->d_street_2_len);
OCIBNDPL(ptcx->curp0, ptcx->d_city_bp[0], errhp, "d_city",d_city,SIZ(d_city),
  SQLT_STR, &ptcx->d_city_len);
OCIBNDPL(ptcx->curp0, ptcx->d_state_bp[0], errhp, "d_state",d_state,
  SIZ(d_state), SQLT_STR, &ptcx->d_state_len);
OCIBNDPL(ptcx->curp0, ptcx->d_zip_bp[0], errhp, "d_zip",d_zip,SIZ(d_zip),
  SQLT_STR, &ptcx->d_zip_len);
OCIBNDPL(ptcx->curp0, ptcx->c_first_bp[0], errhp, "c_first",c_first,
  SIZ(c_first), SQLT_STR, &ptcx->c_first_len);
OCIBNDPL(ptcx->curp0, ptcx->c_middle_bp[0], errhp, "c_middle",c_middle,2,
  SQLT_AFC, &ptcx->c_middle_len);
OCIBNDPL(ptcx->curp0, ptcx->c_street_1_bp[0], errhp, "c_street_1",c_street_1,
  SIZ(c_street_1),SQLT_STR, &ptcx->c_street_1_len);
OCIBNDPL(ptcx->curp0, ptcx->c_street_2_bp[0], errhp, "c_street_2",c_street_2,
  SIZ(c_street_2),SQLT_STR, &ptcx->c_street_2_len);
OCIBNDPL(ptcx->curp0, ptcx->c_city_bp[0], errhp, "c_city",c_city,SIZ(c_city),
  SQLT_STR, &ptcx->c_city_len);
OCIBNDPL(ptcx->curp0, ptcx->c_state_bp[0], errhp, "c_state",c_state,
  SIZ(c_state), SQLT_STR, &ptcx->c_state_len);
OCIBNDPL(ptcx->curp0, ptcx->c_zip_bp[0], errhp, "c_zip",c_zip,SIZ(c_zip),
  SQLT_STR, &ptcx->c_zip_len);
OCIBNDPL(ptcx->curp0, ptcx->c_phone_bp[0], errhp, "c_phone",c_phone,
  SIZ(c_phone), SQLT_STR, &ptcx->c_phone_len);
OCIBNDPL(ptcx->curp0, ptcx->c_since_bp[0], errhp, "c_since",&c_since,
  SIZ(OCIDate), SQLT_ODT, &ptcx->c_since_len);
OCIBNDPL(ptcx->curp0, ptcx->c_credit_bp[0], errhp, "c_credit",c_credit,
  SIZ(c_credit),SQLT_CHR, &ptcx->c_credit_len);
OCIBNDPL(ptcx->curp0, ptcx->c_credit_lim_bp[0], errhp, "c_credit_lim",
  ADR(c_credit_lim),SIZ(int), SQLT_INT, &ptcx->c_credit_lim_len);
OCIBNDPL(ptcx->curp0, ptcx->c_discount_bp[0], errhp, "c_discount",
  ADR(c_discount),SIZ(c_discount), SQLT_FLT, &ptcx->c_discount_len);
OCIBNDPL(ptcx->curp0, ptcx->c_balance_bp[0], errhp, "c_balance",
  ADR(c_balance), SIZ(double),SQLT_FLT, &ptcx->c_balance_len);
OCIBNDPL(ptcx->curp0, ptcx->c_data_bp[0], errhp, "c_data",c_data,SIZ(c_data),
  SQLT_STR, &ptcx->c_data_len);

/*
OCIBNDR(ptcx->curp0, ptcx->h_date_bp, errhp, "h_date",h_date,SIZ(h_date),
  SQLT_STR, &ptcx->h_date_ind, &ptcx->h_date_len, &ptcx->h_date_rc);
*/
OCIBNDPL(ptcx->curp0, ptcx->retries_bp[0], errhp, "retries",ADR(retries),
  SIZ(int), SQLT_INT, &ptcx->retries_len);
OCIBNDPL(ptcx->curp0, ptcx->cr_date_bp[0], errhp, "cr_date",ADR(cr_date),
  SIZ(OCIDate),SQLT_ODT, &ptcx->cr_date_len);

/* ---- Binds for the second cursor */

OCIBNDPL(ptcx->curp1, ptcx->w_id_bp[1], errhp, "w_id",ADR(w_id),SIZ(int),
  SQLT_INT, &ptcx->w_id_len);
OCIBNDPL(ptcx->curp1, ptcx->d_id_bp[1], errhp, "d_id",ADR(d_id),SIZ(int),
  SQLT_INT, &ptcx->d_id_len);
OCIBNDPL(ptcx->curp1, ptcx->c_w_id_bp[1], errhp, "c_w_id",ADR(c_w_id),SIZ(int),
  SQLT_INT);
OCIBNDPL(ptcx->curp1, ptcx->c_d_id_bp[1], errhp, "c_d_id",ADR(c_d_id),SIZ(int),
  SQLT_INT);
OCIBNDPL(ptcx->curp1, ptcx->c_id_bp[1], errhp, "c_id",ADR(c_id),SIZ(int),
  SQLT_INT, &ptcx->c_id_len);

OCIBNDPL(ptcx->curp1, ptcx->h_amount_bp[1], errhp, "h_amount",ADR(h_amount),
  SIZ(int),SQLT_INT, &ptcx->h_amount_len);
OCIBNDPL(ptcx->curp1, ptcx->c_last_bp[1], errhp, "c_last",c_last,SIZ(c_last),
  SQLT_STR);
OCIBNDPL(ptcx->curp1, ptcx->w_street_1_bp[1], errhp, "w_street_1",w_street_1,
  SIZ(w_street_1),SQLT_STR, &ptcx->w_street_1_len);
OCIBNDPL(ptcx->curp1, ptcx->w_street_2_bp[1], errhp, "w_street_2",w_street_2,
  SIZ(w_street_2),SQLT_STR, &ptcx->w_street_2_len);
OCIBNDPL(ptcx->curp1, ptcx->w_city_bp[1], errhp, "w_city",w_city,SIZ(w_city),
  SQLT_STR, &ptcx->w_city_len);
OCIBNDPL(ptcx->curp1, ptcx->w_state_bp[1], errhp, "w_state",w_state,
  SIZ(w_state), SQLT_STR, &ptcx->w_state_len);
OCIBNDPL(ptcx->curp1, ptcx->w_zip_bp[1], errhp, "w_zip",w_zip,SIZ(w_zip),
  SQLT_STR, &ptcx->w_zip_len);
OCIBNDPL(ptcx->curp1, ptcx->d_street_1_bp[1], errhp, "d_street_1",d_street_1,
  SIZ(d_street_1),SQLT_STR, &ptcx->d_street_1_len);
OCIBNDPL(ptcx->curp1, ptcx->d_street_2_bp[1], errhp, "d_street_2",d_street_2,
  SIZ(d_street_2),SQLT_STR, &ptcx->d_street_2_len);
OCIBNDPL(ptcx->curp1, ptcx->d_city_bp[1], errhp, "d_city",d_city,SIZ(d_city),
  SQLT_STR, &ptcx->d_city_len);
OCIBNDPL(ptcx->curp1, ptcx->d_state_bp[1], errhp, "d_state",d_state,
  SIZ(d_state), SQLT_STR, &ptcx->d_state_len);
OCIBNDPL(ptcx->curp1, ptcx->d_zip_bp[1], errhp, "d_zip",d_zip,SIZ(d_zip),
  SQLT_STR, &ptcx->d_zip_len);
OCIBNDPL(ptcx->curp1, ptcx->c_first_bp[1], errhp, "c_first",c_first,
  SIZ(c_first), SQLT_STR, &ptcx->c_first_len);
OCIBNDPL(ptcx->curp1, ptcx->c_middle_bp[1], errhp, "c_middle",c_middle,2,
  SQLT_AFC, &ptcx->c_middle_len);
OCIBNDPL(ptcx->curp1, ptcx->c_street_1_bp[1], errhp, "c_street_1",c_street_1,
  SIZ(c_street_1),SQLT_STR, &ptcx->c_street_1_len);
OCIBNDPL(ptcx->curp1, ptcx->c_street_2_bp[1], errhp, "c_street_2",c_street_2,
  SIZ(c_street_2),SQLT_STR, &ptcx->c_street_2_len);
OCIBNDPL(ptcx->curp1, ptcx->c_city_bp[1], errhp, "c_city",c_city,
  SIZ(c_city),SQLT_STR, &ptcx->c_city_len);
OCIBNDPL(ptcx->curp1, ptcx->c_state_bp[1], errhp, "c_state",c_state,
  SIZ(c_state), SQLT_STR, &ptcx->c_state_len);
OCIBNDPL(ptcx->curp1, ptcx->c_zip_bp[1], errhp, "c_zip",c_zip,SIZ(c_zip),
  SQLT_STR, &ptcx->c_zip_len);
OCIBNDPL(ptcx->curp1, ptcx->c_phone_bp[1], errhp, "c_phone",c_phone,
  SIZ(c_phone), SQLT_STR, &ptcx->c_phone_len);
OCIBNDPL(ptcx->curp1, ptcx->c_since_bp[1], errhp, "c_since",&c_since,
  SIZ(OCIDate), SQLT_ODT, &ptcx->c_since_len);
OCIBNDPL(ptcx->curp1, ptcx->c_credit_bp[1], errhp, "c_credit",c_credit,
  SIZ(c_credit),SQLT_CHR, &ptcx->c_credit_len);
OCIBNDPL(ptcx->curp1, ptcx->c_credit_lim_bp[1], errhp, "c_credit_lim",
  ADR(c_credit_lim),SIZ(int), SQLT_INT, &ptcx->c_credit_lim_len);
OCIBNDPL(ptcx->curp1, ptcx->c_discount_bp[1], errhp, "c_discount",
  ADR(c_discount),SIZ(c_discount), SQLT_FLT, &ptcx->c_discount_len);
OCIBNDPL(ptcx->curp1, ptcx->c_balance_bp[1], errhp, "c_balance",
  ADR(c_balance), SIZ(double),SQLT_FLT, &ptcx->c_balance_len);
OCIBNDPL(ptcx->curp1, ptcx->c_data_bp[1], errhp, "c_data",c_data,SIZ(c_data),
  SQLT_STR, &ptcx->c_data_len);

/*
OCIBNDR(ptcx->curp1, ptcx->h_date_bp1, errhp, "h_date",h_date,SIZ(h_date),
  SQLT_STR, &ptcx->h_date_ind, &ptcx->h_date_len, &ptcx->h_date_rc);
*/
OCIBNDPL(ptcx->curp1, ptcx->retries_bp[1], errhp, "retries",ADR(retries),
  SIZ(int), SQLT_INT, &ptcx->retries_len);
OCIBNDPL(ptcx->curp1, ptcx->cr_date_bp[1], errhp, "cr_date",ADR(cr_date),
  SIZ(OCIDate),SQLT_ODT, &ptcx->cr_date_len);

return (0);
}

tkvcvp ()
{
retry:
  ptcx->w_id_len = SIZ(w_id);
  ptcx->d_id_len = SIZ(d_id);
  ptcx->c_w_id_len = 0;
  ptcx->c_d_id_len = 0;
  ptcx->c_id_len = 0;
  ptcx->h_amount_len = SIZ(h_amount);
  ptcx->c_last_len = SIZ(c_last);
  ptcx->w_street_1_len = 0;
  ptcx->w_street_2_len = 0;
  ptcx->w_city_len = 0;
  ptcx->w_state_len = 0;
  ptcx->w_zip_len = 0;
  ptcx->d_street_1_len = 0;
  ptcx->d_street_2_len = 0;
  ptcx->d_city_len = 0;
  ptcx->d_state_len = 0;
  ptcx->d_zip_len = 0;
  ptcx->c_first_len = 0;
  ptcx->c_middle_len = 0;
  ptcx->c_street_1_len = 0;
  ptcx->c_street_2_len = 0;

```

```

pctx->c_city_len = 0;
pctx->c_state_len = 0;
pctx->c_zip_len = 0;
pctx->c_phone_len = 0;
pctx->c_since_len = 0;
pctx->c_credit_len = 0;
pctx->c_credit_lim_len = 0;
pctx->c_discount_len = 0;
pctx->c_balance_len = sizeof(double);
pctx->c_data_len = 0;
pctx->h_date_len = 0;
pctx->retries_len = SIZ(retries);
pctx->cr_date_len = 7;

if(bylastname) {
    execstatus=OCIStmtExecute(tpcsvc,pctx->curp1,errhp,1,0,
        NULLP(CONST OCISnapshot),NULLP(OCISnapshot),
        OCI_DEFAULT|OCI_COMMIT_ON_SUCCESS);
} else {
    execstatus=OCIStmtExecute(tpcsvc,pctx->curp0,errhp,1,0,
        NULLP(CONST OCISnapshot),NULLP(OCISnapshot),
        OCI_DEFAULT|OCI_COMMIT_ON_SUCCESS);
}

if(execstatus != OCI_SUCCESS) {
    OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
    errcode = OCIERROR(errhp,execstatus);
    if(errcode == NOT_SERIALIZABLE) {
        retries++;
        goto retry;
    } else if (errcode == RECOVER) {
        retries++;
        goto retry;
    } else if (errcode == SNAPSHOT_TOO_OLD) {
        retries++;
        goto retry;
    } else {
        return -1;
    }
}
return 0;
}

```

```
void tkvcpdone ()
```

```

{
    if(pctx) {
        free(pctx);
    }
}

```

client/oracle/plord.c

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

```
/*
```

```

NAME
tkvcordq.c - OCI version using queues of ORDER STATUS
transaction in TPC-C benchmark.

```

```

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

```

```
EXPORT FUNCTION(S)
```

```

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

```

```

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

```

```

NOTES
<other useful comments, qualifications, etc.>

```

```
MODIFIED (MM/DD/YY)
```

```

xnie 06/25/02 - queue open cluster join.
heri 05/07/02 - Fix error in cursor.
heri 02/01/02 - Cleanup, remove indicator values and return codes.
lwang 07/25/01 - Merged lwang_tpccitc

```

```

lwang 07/23/01 - fix include
lwang 07/23/01 - Creation

```

```
*/
```

```
#include "ora_tpcc.h"
```

```

/*-----
PRIVATE TYPES AND CONSTANTS
-----*/

```

```

/*-----
STATIC FUNCTION DECLARATIONS
-----*/

```

```

#define SQLCUR0 "SELECT rowid FROM cust \
WHERE c_d_id = :d_id AND c_w_id = :w_id AND c_last = :c_last \
ORDER BY c_last, c_d_id, c_w_id, c_first"

```

```

#define SQLCUR1 "SELECT /*+ USE_NL(cust) INDEX_DESC(ordr iordr2) */ \
c_id, c_balance, c_first, c_middle, c_last, \
o_id, o_entry_d, o_carrier_id, o_ol_cnt, ordr.rowid \
FROM cust, ordr \
WHERE cust.rowid = :cust_rowid \
AND o_d_id = c_d_id AND o_w_id = c_w_id AND o_c_id = c_id \
ORDER BY o_c_id DESC, o_d_id DESC, o_w_id DESC, o_id DESC"

```

```

#define SQLCUR2 "SELECT /*+ USE_NL(cust) INDEX_DESC (ordr iordr2) */ \
c_balance, c_first, c_middle, c_last, \
o_id, o_entry_d, o_carrier_id, o_ol_cnt, ordr.rowid \
FROM cust, ordr \
WHERE c_id = :c_id AND c_d_id = :d_id AND c_w_id = :w_id \
AND o_d_id = c_d_id AND o_w_id = c_w_id AND o_c_id = c_id \
ORDER BY o_c_id DESC, o_d_id DESC, o_w_id DESC, o_id DESC"

```

```

#define SQLCUR3 "SELECT /*+ ORDERED USE_NL(ordl) CLUSTER(ordl) */ \
ol_i_id, ol_supply_w_id, ol_quantity, ol_amount, ol_delivery_d \
FROM ordr, ordl \
WHERE ordr.rowid = :ordr_rowid \
AND o_id = ol_o_id AND ol_d_id = o_d_id AND ol_w_id = o_w_id"

```

```

#define SQLCUR4 "SELECT count(c_last) FROM cust \
WHERE c_d_id = :d_id AND c_w_id = :w_id AND c_last = :c_last "

```

```
struct ordctx {
```

```

    ub2 c_rowid_len[100];
    ub2 ol_supply_w_id_len[NITEMS];
    ub2 ol_i_id_len[NITEMS];
    ub2 ol_quantity_len[NITEMS];
    ub2 ol_amount_len[NITEMS];
    ub2 ol_delivery_d_len[NITEMS];
    ub2 ol_w_id_len;
    ub2 ol_d_id_len;
    ub2 ol_o_id_len;

```

```

    ub4 ol_supply_w_id_csize;
    ub4 ol_i_id_csize;
    ub4 ol_quantity_csize;
    ub4 ol_amount_csize;
    ub4 ol_delivery_d_csize;
    ub4 ol_w_id_csize;
    ub4 ol_d_id_csize;
    ub4 ol_o_id_csize;

```

```

OCISmt *curo0;
OCISmt *curo1;
OCISmt *curo2;
OCISmt *curo3;
OCISmt *curo4;
OCIBind *c_id_bp;
OCIBind *w_id_bp[4];
OCIBind *d_id_bp[4];
OCIBind *c_last_bp[2];
OCIBind *o_id_bp;
OCIBind *c_rowid_bp;
OCIBind *o_rowid_bp;
OCIDefine *c_rowid_dp;
OCIDefine *c_last_dp[2];
OCIDefine *c_id_dp;
OCIDefine *c_first_dp[2];
OCIDefine *c_middle_dp[2];
OCIDefine *c_balance_dp[2];
OCIDefine *o_rowid_dp[2];
OCIDefine *o_id_dp[2];
OCIDefine *o_entry_d_dp[2];
OCIDefine *o_cr_id_dp[2];
OCIDefine *o_ol_cnt_dp[2];

```

```

OCIDefine *ol_d_dp;
OCIDefine *ol_i_dp;
OCIDefine *ol_supply_w_id_dp;
OCIDefine *ol_quantity_dp;
OCIDefine *ol_amount_dp;
OCIDefine *ol_d_base_dp;
OCIDefine *c_count_dp;
OCIRowid *c_rowid_ptr[100];
OCIRowid *c_rowid_cust;
OCIRowid *o_rowid;
int cs;
int cust_idx;
int norow;
int rcount;
int somerows;
};

typedef struct ordctx ordctx;

struct defctx
{
    boolean reexec;
    ub4 count;
};
typedef struct defctx defctx;

static ordctx *octx;

static defctx cbctx;

tkvcoint ()
{
    int i;
    text stmbuf[SQL_BUF_SIZE];

    octx = (ordctx *) malloc (sizeof(ordctx));
    DISCARD memset(octx,(char)0,sizeof(ordctx));
    octx->cs = 1;
    octx->norow = 0;
    octx->somerows = 10;
    /* get the rowid handles */
    OCIERROR( errhp, OCIDescriptorAlloc((dvoid *)tpcenv,(dvoid **) &octx->o_rowid,
        (ub4)OCI_DTYPE_ROWID, (size_t) 0, (dvoid **)0));
    for(i=0;i<100;i++) {
        DISCARD OCIERROR( errhp, OCIDescriptorAlloc(tpcenv,
            (dvoid **) &octx->c_rowid_ptr[i], OCI_DTYPE_ROWID,0,(dvoid **)0));
    }

    DISCARD OCIERROR( errhp,
        OCIHandleAlloc(tpcenv,(dvoid **) &octx->uro0,OCI_HTYPE_STMT,0,(dvoid **)0));
    DISCARD OCIERROR( errhp,
        OCIHandleAlloc(tpcenv,(dvoid **) &octx->uro1,OCI_HTYPE_STMT,0,(dvoid **)0));
    DISCARD OCIERROR( errhp,
        OCIHandleAlloc(tpcenv,(dvoid **) &octx->uro2,OCI_HTYPE_STMT,0,(dvoid **)0));
    DISCARD OCIERROR( errhp,
        OCIHandleAlloc(tpcenv,(dvoid **) &octx->uro3,OCI_HTYPE_STMT,0,(dvoid **)0));
    DISCARD OCIERROR( errhp,
        OCIHandleAlloc(tpcenv,(dvoid **) &octx->uro4,OCI_HTYPE_STMT,0,(dvoid **)0));

    /* c_id = 0, use find customer by lastname. Get an array or rowid's back*/
    DISCARD sprintf((char *) stmbuf, SQLCUR0);
    DISCARD OCIERROR( errhp,
        OCISmtPrepare(octx->uro0, errhp, stmbuf, (ub4)strlen((char *)stmbuf),
            OCI_NTV_SYNTAX,OCI_DEFAULT));
    DISCARD OCIERROR( errhp,
        OCIAttrSet(octx->uro0,OCI_HTYPE_STMT,&octx->norow,0,
            OCI_ATTR_PREFETCH_ROWS, errhp));
    /* get order/customer info back based on rowid */
    DISCARD sprintf((char *) stmbuf, SQLCUR1);
    DISCARD OCIERROR( errhp,
        OCISmtPrepare(octx->uro1, errhp, stmbuf, (ub4)strlen((char *)stmbuf),
            OCI_NTV_SYNTAX,OCI_DEFAULT));
    DISCARD OCIERROR( errhp,
        OCIAttrSet(octx->uro1,OCI_HTYPE_STMT,&octx->norow,0,
            OCI_ATTR_PREFETCH_ROWS, errhp));

    /* c_id == 0, use lastname to find customer */
    DISCARD sprintf((char *) stmbuf, SQLCUR2);
    DISCARD OCIERROR( errhp,
        OCISmtPrepare(octx->uro2, errhp, stmbuf, (ub4)strlen((char *)stmbuf),
            OCI_NTV_SYNTAX,OCI_DEFAULT));
    DISCARD OCIERROR( errhp,
        OCIAttrSet(octx->uro2,OCI_HTYPE_STMT,&octx->norow,0,
            OCI_ATTR_PREFETCH_ROWS, errhp));

    DISCARD sprintf((char *) stmbuf, SQLCUR3);
    DISCARD OCIERROR( errhp,
        OCISmtPrepare(octx->uro3, errhp, stmbuf, (ub4)strlen((char *)stmbuf),
            OCI_NTV_SYNTAX,OCI_DEFAULT));

    DISCARD OCIERROR( errhp,
        OCIAttrSet(octx->uro3,OCI_HTYPE_STMT,&octx->norow,0,
            OCI_ATTR_PREFETCH_ROWS, errhp));

    DISCARD OCIERROR( errhp,
        OCISmtPrepare(octx->uro4, errhp, stmbuf, (ub4)strlen((char *)stmbuf),
            OCI_NTV_SYNTAX,OCI_DEFAULT));

    DISCARD OCIERROR( errhp,
        OCISmtPrepare(octx->uro4, errhp, stmbuf, (ub4)strlen((char *)stmbuf),
            OCI_NTV_SYNTAX,OCI_DEFAULT));

    for (i = 0; i < NITEMS; i++) {
        octx->ol_supply_w_id_len[i] = sizeof(int);
        octx->ol_i_id_len[i] = sizeof(int);
        octx->ol_quantity_len[i] = sizeof(int);
        octx->ol_amount_len[i] = sizeof(int);
        octx->ol_delivery_d_len[i] = sizeof(ol_d_base[0]);
    }
    octx->ol_supply_w_id_csize = NITEMS;
    octx->ol_i_id_csize = NITEMS;
    octx->ol_quantity_csize = NITEMS;
    octx->ol_amount_csize = NITEMS;
    octx->ol_delivery_d_csize = NITEMS;
    octx->ol_w_id_csize = NITEMS;
    octx->ol_o_id_csize = NITEMS;
    octx->ol_d_id_csize = NITEMS;
    octx->ol_w_id_len = sizeof(int);
    octx->ol_d_id_len = sizeof(int);
    octx->ol_o_id_len = sizeof(int);

    /* bind variables */

    /* c_id (customer id) is not known */
    OCIBND(octx->uro0,octx->w_id_bp[0],errhp,":w_id",ADR(w_id),
        SIZ(int),SQLT_INT);
    OCIBND(octx->uro0,octx->d_id_bp[0],errhp,":d_id",ADR(d_id),
        SIZ(int),SQLT_INT);
    OCIBND(octx->uro0,octx->c_last_bp[0],errhp,":c_last",c_last,
        SIZ(c_last), SQLT_STR);
    OCIDFNRA(octx->uro0,octx->c_rowid_dp, errhp, 1, octx->c_rowid_ptr,
        SIZ(OCIRowid*), SQLT_RDD, NULL, octx->c_rowid_len, NULL);

    OCIBND(octx->uro1,octx->c_rowid_bp, errhp, ":cust_rowid", &octx->c_rowid_cust,
        sizeof(octx->c_rowid_ptr[0]),SQLT_RDD);
    OCIDEF(octx->uro1,octx->c_id_dp, errhp, 1, ADR(c_id), SIZ(int), SQLT_INT);
    OCIDEF(octx->uro1,octx->c_balance_dp[0], errhp, 2, ADR(c_balance),
        SIZ(double), SQLT_FLT);
    OCIDEF(octx->uro1,octx->c_first_dp[0], errhp, 3, c_first, SIZ(c_first)-1,
        SQLT_CHR);
    OCIDEF(octx->uro1,octx->c_middle_dp[0], errhp, 4, c_middle,
        SIZ(c_middle)-1, SQLT_AFC);
    OCIDEF(octx->uro1,octx->c_last_dp[0], errhp, 5, c_last, SIZ(c_last)-1,
        SQLT_CHR);
    OCIDEF(octx->uro1,octx->o_id_dp[0], errhp, 6, ADR(o_id), SIZ(int), SQLT_INT);
    OCIDEF(octx->uro1,octx->o_entry_d_dp[0], errhp, 7,
        &o_entry_d_base, SIZ(OCIDate), SQLT_ODT);
    OCIDEF(octx->uro1,octx->o_cr_id_dp[0], errhp, 8, ADR(o_carrier_id),
        SIZ(int), SQLT_INT);
    OCIDEF(octx->uro1,octx->o_ol_cnt_dp[0], errhp, 9, ADR(o_ol_cnt),
        SIZ(int), SQLT_INT);
    OCIDEF(octx->uro1,octx->o_rowid_dp[0], errhp, 10, ADR(octx->o_rowid),
        SIZ(OCIRowid*), SQLT_RDD);

    /* Bind for third cursor, no-zero customer id */
    OCIBND(octx->uro2,octx->w_id_bp[1],errhp,":w_id",ADR(w_id),
        SIZ(int),SQLT_INT);
    OCIBND(octx->uro2,octx->d_id_bp[1],errhp,":d_id",ADR(d_id),
        SIZ(int),SQLT_INT);
    OCIBND(octx->uro2,octx->c_id_bp, errhp, ":c_id", ADR(c_id),
        SIZ(int),SQLT_INT);
    OCIDEF(octx->uro2,octx->c_balance_dp[1], errhp, 1, ADR(c_balance),
        SIZ(double),SQLT_FLT);
    OCIDEF(octx->uro2,octx->c_first_dp[1], errhp, 2, c_first, SIZ(c_first)-1,
        SQLT_CHR);
    OCIDEF(octx->uro2,octx->c_middle_dp[1], errhp, 3, c_middle,
        SIZ(c_middle)-1, SQLT_AFC);
    OCIDEF(octx->uro2,octx->c_last_dp[1], errhp, 4, c_last, SIZ(c_last)-1,
        SQLT_CHR);
    OCIDEF(octx->uro2,octx->o_id_dp[1], errhp, 5, ADR(o_id), SIZ(int), SQLT_INT);
    OCIDEF(octx->uro2,octx->o_entry_d_dp[1], errhp, 6, &o_entry_d_base,
        SIZ(OCIDate), SQLT_ODT);
    OCIDEF(octx->uro2, octx->o_cr_id_dp[1], errhp, 7, ADR(o_carrier_id),
        SIZ(int), SQLT_INT);
    OCIDEF(octx->uro2,octx->o_ol_cnt_dp[1], errhp, 8, ADR(o_ol_cnt),
        SIZ(int),SQLT_INT);
    OCIDEF(octx->uro2,octx->o_rowid_dp[1], errhp, 9, ADR(octx->o_rowid),
        SIZ(OCIRowid*), SQLT_RDD);

    /* Bind for last cursor */
}

```



```

OCIBND(octx->curo3,octx->w_id_bp[2],errhp,":w_id",ADR(w_id),
SIZ(int),SQLT_INT);
OCIBND(octx->curo3,octx->d_id_bp[2],errhp,":d_id",ADR(d_id), SIZ(int),SQLT_INT);
OCIBND(octx->curo3,octx->o_id_bp,errhp,":o_id",ADR(o_id), SIZ(int),SQLT_INT);
OCIBND(octx->curo3,octx->c_id_bp,errhp,":c_id",ADR(c_id), SIZ(int),SQLT_INT);
*/
OCIBND(octx->curo3,octx->o_rowid_bp,errhp,":ordr_rowid",
&octx->o_rowid, SIZ(OCIRowid*),SQLT_RDD);

OCIDFNRA(octx->curo3, octx->ol_i_id_dp, errhp, 1, ol_i_id,SIZ(int),SQLT_INT,
NULL,octx->ol_i_id_len, NULL);
OCIDFNRA(octx->curo3,octx->ol_supply_w_id_dp,errhp,2, ol_supply_w_id,
SIZ(int),SQLT_INT, NULL,
octx->ol_supply_w_id_len, NULL);
OCIDFNRA(octx->curo3, octx->ol_quantity_dp,errhp,3, ol_quantity,SIZ(int),
SQLT_INT, NULL,octx->ol_quantity_len, NULL);
OCIDFNRA(octx->curo3,octx->ol_amount_dp,errhp,4,ol_amount, SIZ(int),
SQLT_INT,NULL, octx->ol_amount_len, NULL);
OCIDFNRA(octx->curo3,octx->ol_d_base_dp,errhp,5,ol_d_base,SIZ(OCIDate),
SQLT_ODT, NULL,octx->ol_delivery_d_len,NULL);

OCIBND(octx->curo4,octx->w_id_bp[3],errhp,":w_id",ADR(w_id),
SIZ(int),SQLT_INT);
OCIBND(octx->curo4,octx->d_id_bp[3],errhp,":d_id",ADR(d_id),
SIZ(int),SQLT_INT);
OCIBND(octx->curo4,octx->c_last_bp[1],errhp,":c_last",c_last,
SIZ(c_last), SQLT_STR);
OCIDEP(octx->curo4,octx->c_count_dp,errhp,1,ADR(octx->rcount),SIZ(int),
SQLT_INT);

return (0);
}

tkvco ()
{
int i;
int rcount;

#if defined(ISO9)
int secondread = 0;
char sdate[30];
ub4 datelen;
sysdate(sdate);
printf("Order Status started at: %s\n", sdate);
#endif

for (i = 0; i < NITEMS; i++) {
octx->ol_supply_w_id_len[i] = sizeof(int);
octx->ol_i_id_len[i] = sizeof(int);
octx->ol_quantity_len[i] = sizeof(int);
octx->ol_amount_len[i] = sizeof(int);
octx->ol_delivery_d_len[i] = sizeof(OCIDate);
}

octx->ol_supply_w_id_csize = NITEMS;
octx->ol_i_id_csize = NITEMS;
octx->ol_quantity_csize = NITEMS;
octx->ol_amount_csize = NITEMS;
octx->ol_delivery_d_csize = NITEMS;
retry:
if(bylastname)
{
cbctx.reexec = FALSE;
execstatus=OCISmtExecute(tpcsvc,octx->curo0,errhp,100,0,
NULLP(CONST OCISnapshot),NULLP(OCISnapshot),OCI_DEFAULT);
/* will get OCI_NO_DATA if <100 found */
if ((execstatus != OCI_NO_DATA) && (execstatus != OCI_SUCCESS))
{
errcode=OCIERROR(errhp, execstatus);
if((errcode == NOT_SERIALIZABLE) || (errcode == RECOVER))
{
DISCARD OCITransCommit(tpcsvc,errhp,OCI_DEFAULT);
retries++;
goto retry;
} else {
return -1;
}
}
if (execstatus == OCI_NO_DATA) /* there are no more rows */
{
/* get rowcount, find middle one */
DISCARD OCIAtrGet(octx->curo0,OCI_HTYPE_STMT,&rcount,NULL,
OCI_ATTR_ROW_COUNT,errhp);
if (rcount < 1)
{
userlog("ORDERSTATUS rcount=%d\n",rcount);
return (-1);
}
octx->cust_idx=(rcount)/2 ;
}
}

```

```

else
{
/* count the number of rows */
execstatus=OCISmtExecute(tpcsvc,octx->curo4,errhp,1,0,
NULLP(CONST OCISnapshot),NULLP(OCISnapshot),OCI_DEFAULT);
if ((execstatus != OCI_NO_DATA) && (execstatus != OCI_SUCCESS))
{
errcode=OCIERROR(errhp, execstatus);
if ((errcode == NOT_SERIALIZABLE) || (errcode == RECOVER))
{
DISCARD OCITransCommit(tpcsvc,errhp,OCI_DEFAULT);
retries++;
goto retry;
} else {
return -1;
}
}
if (octx->rcount+1 < 2*10 )
octx->cust_idx=(octx->rcount+1)/2 ;
else /* */
{
cbctx.reexec = TRUE;
cbctx.count = (octx->rcount+1)/2 ;
execstatus=OCISmtExecute(tpcsvc,octx->curo0,errhp,cbctx.count,
0,NULLP(CONST OCISnapshot),
NULLP(OCISnapshot),OCI_DEFAULT);
/* will get OCI_NO_DATA if <100 found */
if (cbctx.count > 0)
{
userlog ("did not get all rows ");
return (-1);
}

if ((execstatus != OCI_NO_DATA) && (execstatus != OCI_SUCCESS))
{
errcode=OCIERROR(errhp, execstatus);
if((errcode == NOT_SERIALIZABLE) || (errcode == RECOVER))
{
DISCARD OCITransCommit(tpcsvc,errhp,OCI_DEFAULT);
retries++;
goto retry;
} else {
return -1;
}
}
octx->cust_idx=0 ;
}
}

octx->c_rowid_cust = octx->c_rowid_ptr[octx->cust_idx];
execstatus=OCISmtExecute(tpcsvc,octx->curo1,errhp,1,0,
NULLP(CONST OCISnapshot),NULLP(OCISnapshot),OCI_DEFAULT);
if (execstatus != OCI_SUCCESS)
{
errcode=OCIERROR(errhp,execstatus);
DISCARD OCITransCommit(tpcsvc,errhp,OCI_DEFAULT);
if((errcode == NOT_SERIALIZABLE) || (errcode == RECOVER))
|| (errcode == SNAPSHOT_TOO_OLD))
{
retries++;
goto retry;
} else {
return -1;
}
}
}
else
{
execstatus=OCISmtExecute(tpcsvc,octx->curo2,errhp,1,0,
NULLP(CONST OCISnapshot),NULLP(OCISnapshot),
OCI_DEFAULT);
if (execstatus != OCI_SUCCESS)
{
errcode=OCIERROR(errhp,execstatus);
DISCARD OCITransCommit(tpcsvc,errhp,OCI_DEFAULT);
if((errcode == NOT_SERIALIZABLE) || (errcode == RECOVER))
|| (errcode == SNAPSHOT_TOO_OLD))
{
retries++;
goto retry;
} else {
return -1;
}
}
}
}

#ifdef ISO9
sysdate (sdate);
if (!secondread)
printf ("----- FIRST READ RESULT (out) %s ----- \n", sdate);
else
printf ("----- SECOND READ RESULT (out) %s ----- \n", sdate);

printf ("c_id = %d\n", c_id);
printf ("c_last = %s\n", c_last);

```

```

    printf ("c_first = %s\n", c_first);
    printf ("c_middle = %s\n", c_middle);
    printf ("c_balance = %7.2f\n", (float)c_balance/100);
    printf ("o_id = %d\n", o_id);
    datelen = sizeof(o_entry_d);

OCIERROR(errhp,OCIDateToText(errhp,&o_entry_d_base,(text*)FULLDATE,SIZ(FULL
DATE),(text*
)0,0,&datelen,o_entry_d));
    printf ("o_entry_d = %s\n", o_entry_d);
    printf ("o_carrier_id = %d\n", o_carrier_id);
    printf ("o_ol_cnt = %d\n", o_ol_cnt);
    printf ("-----\n\n", sdate);

if (!secondread) {
    printf ("Sleep before re-read order at: %s\n", sdate);
    sleep (30);
    sysdate (sdate);
    printf ("Wake up and reread at: %s\n", sdate);
    secondread = 1;
    goto retry;
}
#endif /* ISO9 */
}
octx->o_l_w_id_len = sizeof(int);
octx->o_l_d_id_len = sizeof(int);
octx->o_l_o_id_len = sizeof(int);

execstatus = OCISmtExecute(tpcsvc,octx->куро3,errhp,o_ol_cnt,0,
    NULLP(CONST OCISnapshot),NULLP(OCISnapshot),
    OCI_DEFAULT | OCI_COMMIT_ON_SUCCESS);
if (execstatus != OCI_SUCCESS )
{
    errcode=OCIERROR(errhp,execstatus);
    DISCARD OCITransCommit(tpcsvc,errhp,OCI_DEFAULT);
    if((errcode == NOT_SERIALIZABLE) || (errcode == RECOVERR)
        || (errcode == SNAPSHOT_TOO_OLD))
    {
        retries++;
        goto retry;
    }
    else
    {
        return -1;
    }
}

/* clean up and convert the delivery dates */
for (i = 0; i < o_ol_cnt; i++)
{
    ol_del_len[i]=sizeof(ol_delivery_d[i]);
    DISCARD OCIERROR(errhp,OCIDateToText(errhp,&o_l_d_base[i],
        (const text*)SHORTDATE,(ub1)strlen(SHORTDATE),(text*)0,0,
        &o_l_del_len[i], ol_delivery_d[i]));
}

/*
    cvtdmy(o_l_d_base[i],ol_delivery_d[i]);
*/
}

return (0);
}

void tkvcodone ()
{
}

if (octx)
    free (octx);
}

/* end of file tkvcord.c */

```

client/oracle/plsto.c

```

#ifdef RCSID
static char *RCSid =
    "$Header: plsto.c,v 1.3 2003/07/01 15:40:19 mliu Exp $ Copyr (c) 1994 Oracle";
#endif /* RCSID */

/*=====
===+
| Copyright (c) 1994 Oracle Corp, Redwood Shores, CA |

```

```

| OPEN SYSTEMS PERFORMANCE GROUP |
| All Rights Reserved |
|=====
===+
| FILENAME
| plsto.c
| DESCRIPTION
| OCI version of STOCK LEVEL transaction in TPC-C benchmark.
|=====
===*/

#include "ora_tpcc.h"

#ifdef PLSQLSTO
#define SQLTXT "BEGIN stocklevel.getstocklevel (:w_id, :d_id, :threshold, \
:low_stock); END;"
#else
#define SQLTXT "SELECT /*+ nocache(stok) */ count (DISTINCT s_i_id) \
FROM ordl, stok, dist \
WHERE d_id = :d_id AND d_w_id = :w_id AND \
d_id = ol_d_id AND d_w_id = ol_w_id AND \
ol_i_id = s_i_id AND ol_w_id = s_w_id AND \
s_quantity < :threshold AND \
ol_o_id BETWEEN (d_next_o_id - 20) AND (d_next_o_id - 1) \
order by ol_o_id desc"
#endif

struct stoctx {
    OCISmt *curs;
    OCIBind *w_id_bp;
    OCIBind *d_id_bp;
    OCIBind *threshold_bp;
#ifdef PLSQLSTO
    OCIBind *low_stock_bp;
#else
    OCIDefine *low_stock_bp;
#endif
    int norow;
};

typedef struct stoctx stoctx;

stoctx *sctx;

tkvcsinit ()
{
    text stmbuf[SQL_BUF_SIZE];
    sctx = (stoctx *)malloc(sizeof(stoctx));
    memset(sctx,char0,sizeof(stoctx));

    sctx->norow=0;

    OCIERROR(errhp,
        OCIHandleAlloc(tpcenv,(dvoid*)&sctx->curs,OCI_HTYPE_STMT,0,(dvoid**)0));
    sprintf ((char *) stmbuf, SQLTXT);
    OCIERROR(errhp,OCISmtPrepare(sctx->curs,errhp,stmbuf,strlen((char *)stmbuf),
        OCI_NTV_SYNTAX,OCI_DEFAULT));

#ifdef PLSQLSTO
    OCIERROR(errhp,
        OCIAttrSet(sctx->curs,OCI_HTYPE_STMT,(dvoid*)&sctx->norow,0,
        OCI_ATTR_PREFETCH_ROWS,errhp));
#endif

    /* bind variables */

    OCIBND(sctx->curs,sctx->w_id_bp,errhp, ":w_id", ADR(w_id),sizeof(int),
        SQLT_INT);
    OCIBND(sctx->curs,sctx->d_id_bp,errhp, ":d_id", ADR(d_id),sizeof(int),
        SQLT_INT);
    OCIBND(sctx->curs,sctx->threshold_bp,errhp, ":threshold", ADR(threshold),
        sizeof(int),SQLT_INT);
#ifdef PLSQLSTO
    OCIBND(sctx->curs,sctx->low_stock_bp,errhp,":low_stock", ADR(low_stock),
        sizeof(int), SQLT_INT);
#else
    OCIDEFINE(sctx->curs,sctx->low_stock_bp,errhp, 1, ADR(low_stock),
        sizeof(int), SQLT_INT);
#endif

    return (0);
}

tkvcs ()
{
}

retry:
    execstatus= OCISmtExecute(tpcsvc,sctx->curs,errhp,1,0,0,0,
        OCI_COMMIT_ON_SUCCESS | OCI_DEFAULT);

```

```

if (execstatus != OCI_SUCCESS)
{
errcode=OCIERROR(errhp,execstatus);
OCITransCommit(tpesvc,errhp,OCI_DEFAULT);
if((errcode == NOT_SERIALIZABLE) || (errcode == RECOVER)
|| (errcode == SNAPSHOT_TOO_OLD))
{
retries++;
goto retry;
} else {
return -1;
}
}

return (0);
}

void tkvcsdone ()
{
if(sctx) free(sctx);
}

```

client/oracle/pldel.c

```

#ifdef RCSID
static char *RCSid =
"$Header: pldel.c,v 1.3 2003/07/01 15:33:25 mliu Exp $ Copyr (c) 1994 Oracle";
#endif /* RCSID */

```

```

/*=====
==+
| Copyright (c) 1996 Oracle Corp, Redwood Shores, CA |
| OPEN SYSTEMS PERFORMANCE GROUP |
| All Rights Reserved |
+=====

```

```

==+
| FILENAME
| pldel.c
| DESCRIPTION
| OCI version of DELIVERY transaction in TPC-C benchmark.
+=====
==*/

```

```

#include "ora_tpcc.h"
#ifdef TUX
#include <userlog.h>
#endif

```

```

/*
extern int userlog();
*/

```

```

#define DMLRETDL

```

```

#define SQLTXT "BEGIN inittpc.init_del ; END;"

```

```

#define SQLTXT1 "DELETE FROM nord WHERE no_d_id = :d_id \
AND no_w_id = :w_id and rownum <= 1 \
RETURNING no_o_id into :o_id "

```

```

#define SQLTXT3 "UPDATE odr SET o_carrier_id = :carrier_id \
WHERE o_id = :o_id and o_d_id = :d_id and o_w_id = :w_id \
returning o_c_id into :o_c_id"

```

```

#define SQLTXT4 "UPDATE ordl \
SET ol_delivery_d = :cr_date \
WHERE ol_w_id = :w_id AND ol_d_id = :d_id AND ol_o_id = :o_id \
RETURNING sum(ol_amount) into :ol_amount "

```

```

#define SQLTXT6 "UPDATE cust SET c_balance = c_balance + :amt, \
c_delivery_cnt = c_delivery_cnt + 1 WHERE c_w_id = :w_id AND \
c_d_id = :d_id AND c_id = :c_id"

```

```

#define NDISTS 10
#define ROWIDLEN 20

```

```

struct delctx {
sb2 del_o_id_ind[NDISTS];
sb2 d_id_ind[NDISTS];
sb2 c_id_ind[NDISTS];
sb2 del_date_ind[NDISTS];

```

```

sb2 carrier_id_ind[NDISTS];
sb2 amt_ind[NDISTS];

```

```

ub4 del_o_id_len[NDISTS];
ub4 c_id_len[NDISTS];
int oid_ctx;
int cid_ctx;
OCIBind *olamt_bp;

```

```

ub2 w_id_len[NDISTS];
ub2 d_id_len[NDISTS];
ub2 del_date_len[NDISTS];
ub2 carrier_id_len[NDISTS];
ub2 amt_len[NDISTS];

```

```

ub2 del_o_id_rcode[NDISTS];
ub2 cons_rcode[NDISTS];
ub2 w_id_rcode[NDISTS];
ub2 d_id_rcode[NDISTS];
ub2 c_id_rcode[NDISTS];
ub2 del_date_rcode[NDISTS];
ub2 carrier_id_rcode[NDISTS];
ub2 amt_rcode[NDISTS];

```

```

int del_o_id[NDISTS];
int del_d_id[NDISTS];
int cons[NDISTS];
int w_id[NDISTS];
int d_id[NDISTS];
int c_id[NDISTS];
int carrier_id[NDISTS];
int amt[NDISTS];
ub4 del_o_id_rcnt;
int retry;
OCIRowid *no_rowid_ptr[NDISTS];
OCIRowid *o_rowid_ptr[NDISTS];
OCIDate del_date[NDISTS];
OCISmt *curd0;
OCISmt *curd1;
OCISmt *curd2;
OCISmt *curd3;
OCISmt *curd4;
OCISmt *curd5;
OCISmt *curd6;
OCISmt *curdtest;

```

```

OCIBind *w_id_bp;
OCIBind *w_id_bp3;
OCIBind *w_id_bp4;
OCIBind *w_id_bp5;
OCIBind *w_id_bp6;
OCIBind *d_id_bp;
OCIBind *d_id_bp3;
OCIBind *d_id_bp4;
OCIBind *d_id_bp6;
OCIBind *o_id_bp;
OCIBind *cr_date_bp;
OCIBind *c_id_bp;
OCIBind *c_id_bp3;
OCIBind *no_rowid_bp;
OCIBind *carrier_id_bp;
OCIBind *o_rowid_bp;
OCIBind *del_o_id_bp;
OCIBind *del_o_id_bp3;
OCIBind *amt_bp;
OCIBind *bstr1_bp[10];
OCIBind *bstr2_bp[10];
OCIBind *retry_bp;
OCIDefine *inum_dp;
OCIDefine *d_id_dp;
OCIDefine *del_o_id_dp;
OCIDefine *no_rowid_dp;
OCIDefine *c_id_dp;
OCIDefine *o_rowid_dp;
OCIDefine *cons_dp;
OCIDefine *amt_dp;

```

```

int norow;
};

```

```

typedef struct delctx delctx;
struct pldelctx {

ub2 del_d_id_len[NDISTS];
ub2 del_o_id_len[NDISTS];

```

```

ub2 w_id_len;
ub2 d_id_len[NDISTS];
ub2 o_c_id_len[NDISTS];
ub2 sums_len[NDISTS];
ub2 carrier_id_len;
ub2 ordcnt_len;
ub2 del_date_len;

```

```

int del_o_id[NDISTS];
int del_d_id[NDISTS];
int o_c_id[NDISTS];
int sums[NDISTS];
OCIDate del_date;
int carrier_id;
int ordcnt;

ub4 del_o_id_rcnt;
ub4 del_d_id_rcnt;
ub4 o_c_id_rcnt;
ub4 sums_rcnt;

int retry;
OCISmt *curp1;
OCISmt *curp2;
OCIBind *w_id_bp;
OCIBind *d_id_bp;
OCIBind *o_id_bp;
OCIBind *o_c_id_bp;
OCIBind *ordcnt_bp;
OCIBind *sums_bp;
OCIBind *del_date_bp;
OCIBind *carrier_id_bp;
OCIBind *retry_bp;

int norow;
};
typedef struct pldeletx pldeletx;

static pldeletx *pldctx;

static delctx *dctx;

#ifdef DMLRETDDEL
struct amtctx {
    int ol_amt[NITEMS];
    sb2 ol_amt_ind[NITEMS];
    ub4 ol_amt_len[NITEMS];
    ub2 ol_amt_rcode[NITEMS];
    int ol_cnt;
};
typedef struct amtctx amtctx;
amtctx *actx;

#endif

#ifdef DMLRETDDEL
sb4 no_data(dvoid *ctxp, OCIBind *bp, ub4 iter, ub4 index,
            dvoid **bufpp, ub4 **alenp, ub1 *piecep,
            dvoid **indpp)
{
    *bufpp = (dvoid*)0;
    *alenp = 0;
    *indpp = (dvoid*)0;
    *piecep = OCL_ONE_PIECE;
    return (OCI_CONTINUE);
}

sb4 TPC_oid_data(dvoid *ctxp, OCIBind *bp, ub4 iter, ub4 index,
                dvoid **bufpp, ub4 **alenp, ub1 *piecep,
                dvoid **indpp, ub2 **rcodepp)
{
    *bufpp = &dctx->del_o_id[iter];
    *indpp = &dctx->del_o_id_ind[iter];
    dctx->del_o_id_len[iter]=sizeof(dctx->del_o_id[0]);
    *alenp = &dctx->del_o_id_len[iter];
    *rcodepp = &dctx->del_o_id_rcode[iter];
    *piecep = OCL_ONE_PIECE;
    return (OCI_CONTINUE);
}

sb4 cid_data(dvoid *ctxp, OCIBind *bp, ub4 iter, ub4 index,
            dvoid **bufpp, ub4 **alenp, ub1 *piecep,
            dvoid **indpp, ub2 **rcodepp)
{
    *bufpp = &dctx->c_id[iter];
    *indpp = &dctx->c_id_ind[iter];
    dctx->c_id_len[iter]=sizeof(dctx->c_id[0]);
    *alenp = &dctx->c_id_len[iter];
    *rcodepp = &dctx->c_id_rcode[iter];
    *piecep = OCL_ONE_PIECE;
    return (OCI_CONTINUE);
}

#endif

#ifdef OLD
sb4 amt_data(dvoid *ctxp, OCIBind *bp, ub4 iter, ub4 index,
            dvoid **bufpp, ub4 **alenp, ub1 *piecep,
            dvoid **indpp, ub2 **rcodepp)
{
    amtctx *actx;
    actx = (amtctx*)ctxp;
    actx->ol_cnt=actx->ol_cnt+1;
    *bufpp = &actx->ol_amt[index];
    *indpp = &actx->ol_amt_ind[index];
    actx->ol_amt_len[index]=sizeof(actx->ol_amt[0]);
    *alenp = &actx->ol_amt_len[index];
    *rcodepp = &actx->ol_amt_rcode[index];
    *piecep = OCL_ONE_PIECE;
    if (iter == 1 )
        return (OCI_CONTINUE);
    else
        return (OCI_ERROR);
}
} else
sb4 amt_data(dvoid *ctxp, OCIBind *bp, ub4 iter, ub4 index,
            dvoid **bufpp, ub4 **alenp, ub1 *piecep,
            dvoid **indpp, ub2 **rcodepp)
{
    amtctx *actx;
    actx = (amtctx*)ctxp;
    *bufpp = &actx->ol_amt[index];
    *indpp = &actx->ol_amt_ind[index];
    actx->ol_amt_len[index]=sizeof(actx->ol_amt[0]);
    *alenp = &actx->ol_amt_len[index];
    *rcodepp = &actx->ol_amt_rcode[index];
    *piecep = OCL_ONE_PIECE;
    return (OCI_CONTINUE);
}
} #endif

#endif

tkvcddinit (int plsqliflag)
{
    text stmbuf[SQL_BUF_SIZE];

    if (plsqliflag)
    {
        pldctx = (pldeletx *) malloc (sizeof(pldeletx));
        DISCARD memset(pldctx,(char)0,(ub4)sizeof(pldeletx));
        /* Initialize */
        DISCARD OCIHandleAlloc(tpcenv, (dvoid**) &pldctx->curp1, OCI_HTYPE_STMT, 0,
                                (dvoid**)0);
        DISCARD sprintf ((char *) stmbuf, SQLTXT);
        DISCARD OCISmtPrepare(pldctx->curp1, errhp, stmbuf,
                                (ub4) strlen((char *)stmbuf),
                                OCI_NTV_SYNTAX, OCI_DEFAULT);
        DISCARD OCIERROR(errhp,
                                OCISmtExecute(tpcenv,pldctx->curp1,errhp,1,0,NULL(OCISnapshot),
                                NULL(OCISnapshot), OCI_DEFAULT));

        DISCARD OCIHandleAlloc(tpcenv,(dvoid**) &pldctx->curp2, OCI_HTYPE_STMT,
                                0, (dvoid**)0);
#ifdef defined(ISO5) || defined(ISO6) || defined(ISO8)
        #if defined(ISO5)
            sqlfile("../blocks/tkvcpdel_iso5.sql",stmbuf);
        #endif
        #if defined(ISO6)
            sqlfile("../blocks/tkvcpdel_iso6.sql",stmbuf);
        #endif
        #if defined(ISO8)
            sqlfile("../blocks/tkvcpdel_iso8.sql",stmbuf);
        #endif
        #else
            sqlfile("../blocks/tkvcpdel.sql",stmbuf);
        #endif
        DISCARD OCISmtPrepare(pldctx->curp2, errhp, stmbuf,
                                (ub4)strlen((char *)stmbuf), OCI_NTV_SYNTAX, OCI_DEFAULT);
        OCIBNDPL(pldctx->curp2, pldctx->w_id_bp, errhp, "w_id",
                ADR(w_id), SIZ(int), SQLT_INT,&pldctx->w_id_len);
        OCIBNDPL(pldctx->curp2, pldctx->ordcnt_bp, errhp, "ordcnt",
                ADR(pldctx->ordcnt), SIZ(int), SQLT_INT,&pldctx->ordcnt_len);
        OCIBNDPL(pldctx->curp2, pldctx->del_date_bp,errhp, "now",
                ADR(pldctx->del_date), SIZ(OCIDate), SQLT_ODT,&pldctx->del_date_len);
        OCIBNDPL(pldctx->curp2, pldctx->carrier_id_bp, errhp,
                "carrier_id", ADR(o_carrier_id), SIZ(int),
                SQLT_INT, &pldctx->carrier_id_len);

        OCIBNDPLA(pldctx->curp2, pldctx->d_id_bp, errhp, "d_id",
                pldctx->del_d_id, SIZ(int),SQLT_INT, pldctx->del_d_id_len,
                NDISTS, &pldctx->del_d_id_rcnt);
        OCIBNDPLA(pldctx->curp2, pldctx->o_id_bp, errhp, "order_id",
                pldctx->del_o_id,SIZ(int),SQLT_INT, pldctx->del_o_id_len,NDISTS,
                &pldctx->del_o_id_rcnt);
        OCIBNDPLA(pldctx->curp2, pldctx->sums_bp, errhp, "sums",
                pldctx->sums,SIZ(int),SQLT_INT, pldctx->sums_len,NDISTS,
                &pldctx->sums_rcnt);
        OCIBNDPLA(pldctx->curp2, pldctx->o_c_id_bp, errhp, "o_c_id",
                pldctx->o_c_id,SIZ(int),SQLT_INT, pldctx->o_c_id_len,NDISTS,
                &pldctx->o_c_id_rcnt);
        OCIBND(pldctx->curp2, pldctx->retry_bp, errhp, "retry",

```

```

ADR(pldctx->retry), SIZ(int),SQLT_INT);
}
else
{
dctx = (delctx *) malloc (sizeof(delctx));
memset(dctx,(char)0,sizeof(delctx));
dctx->norow = 0;
actx = (amtctx *) malloc (sizeof(amtctx));
memset(actx,(char)0,sizeof(amtctx));

OCIHandleAlloc(tpcenv, (dvoid **)&dctx->curd1, OCI_HTYPE_STMT, 0,
(dvoid**)0);
DISCARD sprintf ((char *) stmbuf, "%s", SQLTXT1);
DISCARD OCISmtPrepare(dctx->curd1, errhp, stmbuf,
strlen(char *)stmbuf,OCI_NTV_SYNTAX, OCI_DEFAULT);

OCIBND(dctx->curd1, dctx->w_id_bp,errhp,":w_id",dctx->w_id,SIZ(int),
SQLT_INT);
OCIBNDRA(dctx->curd1, dctx->d_id_bp,errhp,":d_id",dctx->d_id,SIZ(int),
SQLT_INT,NULL,NULL,NULL);

OCIBNRAD(dctx->curd1, dctx->del_o_id_bp, errhp, ":o_id",
SIZ(int),SQLT_INT,NULL,
&dctx->oid_ctx,no_data,TPC_oid_data);

/* open third cursor */

DISCARD OCIHandleAlloc(tpcenv, (dvoid **)&dctx->curd3, OCI_HTYPE_STMT,
0, (dvoid**)0);
DISCARD sprintf ((char *) stmbuf, SQLTXT3);
DISCARD OCISmtPrepare(dctx->curd3, errhp, stmbuf, strlen(char *)stmbuf,
OCI_NTV_SYNTAX, OCI_DEFAULT);

/* bind variables */

OCIBNDRA(dctx->curd3, dctx->carrier_id_bp,errhp,":carrier_id",
dctx->carrier_id,SIZ(dctx->carrier_id[0]),SQLT_INT,
dctx->carrier_id_ind, dctx->carrier_id_len,dctx->carrier_id_rcode);

OCIBNDRA(dctx->curd3, dctx->w_id_bp3, errhp, ":w_id", dctx->w_id,SIZ(int),
SQLT_INT, NULL, NULL, NULL);
OCIBNDRA(dctx->curd3, dctx->d_id_bp3, errhp, ":d_id", dctx->d_id,SIZ(int),
SQLT_INT,NULL, NULL, NULL);
OCIBNDRA(dctx->curd3, dctx->del_o_id_bp3, errhp, ":o_id", dctx->del_o_id,
SIZ(int), SQLT_INT,NULL,NULL,NULL);
OCIBNRAD(dctx->curd3, dctx->c_id_bp3, errhp, ":o_c_id", SIZ(int),
SQLT_INT,NULL,&dctx->cid_ctx,no_data, cid_data);

/* open fourth cursor */

DISCARD OCIHandleAlloc(tpcenv, (dvoid **)&dctx->curd4, OCI_HTYPE_STMT,
0,
(dvoid**)0);
DISCARD sprintf ((char *) stmbuf, SQLTXT4);
DISCARD OCISmtPrepare(dctx->curd4, errhp, stmbuf, strlen(char *)stmbuf,
OCI_NTV_SYNTAX, OCI_DEFAULT);

/* bind variables */

OCIBND(dctx->curd4, dctx->w_id_bp4,errhp,":w_id",dctx->w_id,
SIZ(int), SQLT_INT);
OCIBND(dctx->curd4, dctx->d_id_bp4,errhp,":d_id",dctx->d_id,
SIZ(int), SQLT_INT);
OCIBND(dctx->curd4, dctx->o_id_bp,errhp,":o_id",dctx->del_o_id,
SIZ(int),SQLT_INT);
OCIBND(dctx->curd4, dctx->cr_date_bp,errhp,":cr_date", dctx->del_date,
SIZ(OCIDate), SQLT_ODT);
OCIBNRAD(dctx->curd4, dctx->olamt_bp, errhp, ":ol_amount",
SIZ(int), SQLT_INT,NULL, actx,no_data,amt_data);

/* open sixth cursor */

DISCARD OCIHandleAlloc(tpcenv, (dvoid **)&dctx->curd6, OCI_HTYPE_STMT,
0, (dvoid**)0);
DISCARD sprintf ((char *) stmbuf, SQLTXT6);
DISCARD OCISmtPrepare(dctx->curd6, errhp, stmbuf, strlen(char *)stmbuf,
OCI_NTV_SYNTAX, OCI_DEFAULT);

/* bind variables */

OCIBND(dctx->curd6,dctx->amt_bp,errhp,":amt",dctx->amt,SIZ(int),
SQLT_INT);
OCIBND(dctx->curd6,dctx->w_id_bp6,errhp,":w_id",dctx->w_id,SIZ(int),
SQLT_INT);
OCIBND(dctx->curd6,dctx->d_id_bp6,errhp,":d_id",dctx->d_id,SIZ(int),
SQLT_INT);
OCIBND(dctx->curd6,dctx->c_id_bp,errhp,":c_id",dctx->c_id,SIZ(int),
SQLT_INT);
}

```

```

return (0);
}

void shiftdata(from)
int from ;
{
int i;
for (i=from;i<NDISTS-1; i++)
{
dctx->del_o_id_ind[i] = dctx->del_o_id_ind[i+1];
dctx->del_o_id[i] = dctx->del_o_id[i+1];
dctx->w_id[i] = dctx->w_id[i+1];
dctx->d_id[i] = dctx->d_id[i+1];
dctx->carrier_id[i] = dctx->carrier_id[i+1];
}
}

tkvcd (int plsqflflag)
{
int i, j;
int rpc_rcount,count;
int invalid;

if (plsqflflag)
{
pldctx->w_id_len = sizeof (int);
pldctx->carrier_id_len = sizeof (int);
for (i = 0; i < NDISTS; i++)
{
pldctx->del_o_id_len[i] = sizeof(int);
del_o_id[i] = 0;
}
pldctx->del_date_len = DEL_DATE_LEN;
DISCARD memcpy(&pldctx->del_date,&cr_date,sizeof(OCIDate));

pldctx->retry=0;

DISCARD OCIERROR(errhp,
OCISmtExecute(tpcvc,pldctx->curp2,errhp,1,0,NULLP(CONST OCISnapshot),
NULLP(OCISnapshot),OCI_DEFAULT));
for (i = 0; i < NDISTS; i++)
{
del_o_id[i] = 0;
}
for (i = 0; i < pldctx->del_o_id_rcnt; i++)
del_o_id[pldctx->del_d_id[i] - 1] = pldctx->del_o_id[i];
}
else
{
retry:

invalid = 0;

/* initialization for array operations */

for (i = 0; i < NDISTS; i++)
{
dctx->del_o_id_ind[i] = TRUE;
dctx->d_id_ind[i] = TRUE;
dctx->c_id_ind[i] = TRUE;
dctx->del_date_ind[i] = TRUE;
dctx->carrier_id_ind[i] = TRUE;
dctx->amt_ind[i] = TRUE;

dctx->del_o_id_len[i] = SIZ(dctx->del_o_id[0]);
dctx->w_id_len[i] = SIZ(dctx->w_id[0]);
dctx->d_id_len[i] = SIZ(dctx->d_id[0]);
dctx->c_id_len[i] = SIZ(dctx->c_id[0]);
dctx->del_date_len[i] = DEL_DATE_LEN;
dctx->carrier_id_len[i] = SIZ(dctx->carrier_id[0]);
dctx->amt_len[i] = SIZ(dctx->amt[0]);

dctx->w_id[i] = w_id;
dctx->d_id[i] = i+1;
dctx->carrier_id[i] = o_carrier_id;
memcpy(&dctx->del_date[i],&cr_date,sizeof(OCIDate));
}

memset(actx,(char)0,sizeof(amtctx));

/* array select from new_order and orders tables */

execstatus=OCISmtExecute(tpcvc,dctx->curd1,errhp,NDISTS,0,
NULLP(CONST OCISnapshot),NULLP(OCISnapshot),OCI_DEFAULT);
if((execstatus != OCI_SUCCESS) && (execstatus != OCI_NO_DATA))
{
DISCARD OCITransRollback(tpcvc,errhp,OCI_DEFAULT);
}
}
}

```

```

errcode = OCIERROR(errhp,execstatus);
if(errcode == NOT_SERIALIZABLE)
{
    retries++;
    goto retry;
}
else if (errcode == RECOVERR)
{
    retries++;
    goto retry;
}
else if (errcode == SNAPSHOT_TOO_OLD)
{
    retries++;
    goto retry;
}
else
{
    return -1;
}
}
/* mark districts with no new order */
DISCARD OCIAttrGet(dctx->curd1,OCI_HTYPE_STMT,&rcount,NULLP(ub4),
    OCI_ATTR_ROW_COUNT,errhp);
rpc = rcount;
if (rcount != NDISTS )
{
    int j = 0;
    for (i=0;i < NDISTS; i++)
    {
        if (dctx->del_o_id_ind[j] == 0) /* there is data here */
            j++;
        else
            shiftdata(j);
    }
}

execstatus=OCIStmtExecute(tpesvc,dctx->curd3,errhp,rpc,0,
    NULLP(CONST OCISnapshot),NULLP(OCISnapshot),OCI_DEFAULT);
if(execstatus != OCI_SUCCESS)
{
    DISCARD OCITransRollback(tpesvc,errhp,OCI_DEFAULT);
    errcode = OCIERROR(errhp,execstatus);
    if(errcode == NOT_SERIALIZABLE)
    {
        retries++;
        goto retry;
    }
    else if (errcode == RECOVERR)
    {
        retries++;
        goto retry;
    }
    else if (errcode == SNAPSHOT_TOO_OLD)
    {
        retries++;
        goto retry;
    }
    else
    {
        return -1;
    }
}

DISCARD OCIAttrGet(dctx->curd3,OCI_HTYPE_STMT,&rcount,NULLP(ub4),
    OCI_ATTR_ROW_COUNT,errhp);

if (rcount != rpc)
{
#ifdef TUX
    userlog ("Error in TPC-C server %d: %d rows selected, %d ords updated\n",
        proc_no, rpc, rcount);
#else
    DISCARD fprintf(stderr,
        "Error in TPC-C server %d: %d rows selected, %d ords updated\n",
        proc_no, rpc, rcount);
#endif
    DISCARD OCITransRollback(tpesvc,errhp,OCI_DEFAULT);
    return (-1);
}

/* array update of order_line table */
execstatus=OCIStmtExecute(tpesvc,dctx->curd4,errhp,rpc,0,
    NULLP(CONST OCISnapshot),NULLP(OCISnapshot),OCI_DEFAULT);
if(execstatus != OCI_SUCCESS)
{
    DISCARD OCITransRollback(tpesvc,errhp,OCI_DEFAULT);
    errcode = OCIERROR(errhp,execstatus);
    if(errcode == NOT_SERIALIZABLE)
    {
        retries++;
        goto retry;
    }
    else if (errcode == RECOVERR)
    {
        retries++;
        goto retry;
    }
}

retries++;
goto retry;
}
else if (errcode == SNAPSHOT_TOO_OLD)
{
    retries++;
    goto retry;
}
else
{
    return -1;
}
}
DISCARD OCIAttrGet(dctx->curd4,OCI_HTYPE_STMT,&rcount,NULLP(ub4),
    OCI_ATTR_ROW_COUNT,errhp);
/* transfer amounts */
for (i=0;i<rpc;i++)
{
    dctx->amt[i]=0;
    if ( actx->ol_amt_rcode[i] == 0)
    {
        dctx->amt[i] = actx->ol_amt[i];
    }
}
#ifdef OLD
if (rcount > rpc) {
    userlog
        ("Error in TPC-C server %d: %d ordnrs updated, %d ordl updated\n",
        proc_no, rpc, rcount);
}
#endif

/* array update of customer table */
execstatus=OCIStmtExecute(tpesvc,dctx->curd6,errhp,rpc,0,
    NULLP(CONST OCISnapshot),NULLP(OCISnapshot),
    OCI_COMMIT_ON_SUCCESS | OCI_DEFAULT);

if(execstatus != OCI_SUCCESS)
{
    OCITransRollback(tpesvc,errhp,OCI_DEFAULT);
    errcode = OCIERROR(errhp,execstatus);
    if(errcode == NOT_SERIALIZABLE)
    {
        retries++;
        goto retry;
    }
    else if (errcode == RECOVERR)
    {
        retries++;
        goto retry;
    }
    else if (errcode == SNAPSHOT_TOO_OLD)
    {
        retries++;
        goto retry;
    }
    else
    {
        return -1;
    }
}

DISCARD OCIAttrGet(dctx->curd6,OCI_HTYPE_STMT,&rcount,NULLP(ub4),
    OCI_ATTR_ROW_COUNT,errhp);

if (rcount != rpc) {
#ifdef TUX
    userlog ("Error in TPC-C server %d: %d rows selected, %d cust updated\n",
        proc_no, rpc, rcount);
#else
    DISCARD fprintf(stderr,
        "Error in TPC-C server %d: %d rows selected, %d cust updated\n",
        proc_no, rpc, rcount);
#endif
}
DISCARD OCITransRollback(tpesvc, errhp, OCI_DEFAULT);
return (-1);
}

/* return o_id's in district id order */

for (i = 0; i < NDISTS; i++)
    del_o_id[i] = 0;
for (i = 0; i < rpc; i++)
    del_o_id[dctx->d_id[i] - 1] = dctx->del_o_id[i];
}
return (0);
}

void tkvcdone (int plsqflflag)
{
    if (plsqflflag)
    {

```

```

if (pldctx)
{
    DISCARD OCIHandleFree((dvoid *)dctx->curd0,OCI_HTYPE_STMT);
    DISCARD free(pldctx);
}
else
{
    if (dctx)
    {
        OCIHandleFree((dvoid *)dctx->curd1,OCI_HTYPE_STMT);
        OCIHandleFree((dvoid *)dctx->curd2,OCI_HTYPE_STMT);
        OCIHandleFree((dvoid *)dctx->curd3,OCI_HTYPE_STMT);
        OCIHandleFree((dvoid *)dctx->curd4,OCI_HTYPE_STMT);
        OCIHandleFree((dvoid *)dctx->curd5,OCI_HTYPE_STMT);
        OCIHandleFree((dvoid *)dctx->curd6,OCI_HTYPE_STMT);
        DISCARD free (dctx);
    }
}
}

```

```

extern int TPCdumpinit ();
extern void TPCdumpnew ();
extern void TPCdumppay ();
extern void TPCdumpord ();
extern void TPCdumpdel ();
extern void TPCdumpsto ();
extern void TPCdumpexit ();
extern void userlog(char* fmp, ...);

```

```
/* Error codes */
```

```

#define RECOVERR -10
#define IRRECERR -20
#define NOERR 111
#define DEL_ERROR -666
#define DEL_DATE_LEN 7
#define NDISTS 10
#define NITEMS 15
#define SQL_BUF_SIZE 8192

```

```

#define FULLDATE "dd-mon-yy.hh24:mi:ss"
#define SHORTDATE "dd-mm-yyyy"

```

```
#define DELRT 80.0
```

```

extern int tkvcninit ();
extern int tkvcpinit ();
extern int tkvcoint ();
extern int tkvcidinit ();
extern int tkvcsinit ();

```

```

extern int tkvcn ();
extern int tkvcp ();
extern int tkvco ();
extern int tkvcd ();
extern int tkvcs ();

```

```

extern void tkvcndone ();
extern void tkvcpdone ();
extern void tkvcodone ();
extern void tkvcddone ();
extern void tkvcsdone ();

```

```

extern int tkvcss (); /* for alter session to get memory size and trace */
extern boolean multitrans;
extern int ord_init;

```

```

extern void errprt ();
extern int ocierror(char *fname, int lineno,OCIError *errhp, sword status);
extern int sqlfile(char *fname, text *linebuf);

```

```

extern FILE *lfp;
extern FILE *fopen ();
extern int proc_no;
extern int doid[];

```

```

extern int execstatus;
extern int errcode;

```

```

extern OCIEnv *tpcenv;
extern OCIServer *tpcsrv;
extern OCIError *errhp;
extern OCISvcCtx *tpcsvc;
extern OCISession *tpcus;
extern OCISmt *curntest;
/* The bind and define handles for each transaction are
   included in their respective header files. */

```

```
/* for stock-level transaction */
```

```

extern int w_id;
extern int d_id;
extern int c_id;
extern int threshold;
extern int low_stock;

```

```
/* for delivery transaction */
```

```

extern int del_o_id[10];
extern int carrier_id;
extern int retries;

```

```
/* for order-status transaction */
```

```

extern int bylastname;
extern char c_last[17];
extern char c_first[17];
extern char c_middle[3];
extern double c_balance;

```

client/oracle/ora_tpcc.h

```

/*
 * $Header: ora_tpcc.h,v 1.3 2003/07/01 15:31:08 mliu Exp $ Copyr (c) 1993 Oracle
 */

```

```

=====
==+
| Copyright (c) 1995 Oracle Corp, Redwood Shores, CA |
| OPEN SYSTEMS PERFORMANCE GROUP |
| All Rights Reserved |
=====

```

```

=====
==+
| FILENAME
| tpcc.h
| DESCRIPTION
| Include file for TPC-C benchmark programs.
=====
==*/

```

```

#ifndef TPCC_H
#define TPCC_H

```

```

#ifndef FALSE
# define FALSE 0
#endif

```

```

#ifndef TRUE
# define TRUE 1
#endif

```

```

#include <stdio.h>
#include <stdlib.h>
#include <ctype.h>
#include <string.h>

```

```

#ifndef boolean
#define boolean int
#endif

```

```

#include <oratypes.h>
#include <oci.h>
#include <ocidfn.h>

```

```

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

```

```

typedef struct cda_def csrdef;
typedef struct cda_def ldadef;

```

```
/* TPC-C transaction functions */
```

```

extern int TPCinit ();
extern int TPCnew ();
extern int TPCpay ();
extern int TPCord ();
extern int TPCdel ();
extern int TPCsto ();
extern void TPCexit ();

```

```

extern int o_id;
extern text o_entry_d[20];
extern int o_carrier_id;
extern int o_ol_cnt;
extern int ol_supply_w_id[15];
extern int ol_i_id[15];
extern int ol_quantity[15];
extern int ol_amount[15];
extern int ol_del_len[15];
extern text ol_delivery_d[15][11];
/* xnie - begin */
extern OCIRowid *o_rowid;
/* xnie - end */

/* for payment transaction */

extern int c_w_id;
extern int c_d_id;
extern int h_amount;
extern char w_street_1[21];
extern char w_street_2[21];
extern char w_city[21];
extern char w_state[3];
extern char w_zip[10];
extern char d_street_1[21];
extern char d_street_2[21];
extern char d_city[21];
extern char d_state[3];
extern char d_zip[10];
extern char c_street_1[21];
extern char c_street_2[21];
extern char c_city[21];
extern char c_state[3];
extern char c_zip[10];
extern char c_phone[17];
extern text c_since_d[11];
extern char c_credit[3];
extern int c_credit_lim;
extern float c_discount;
extern char c_data[201];
extern text h_date[20];

/* for new order transaction */

extern int nol_i_id[15];
extern int nol_supply_w_id[15];
extern int nol_quantity[15];
extern int nol_quant10[15];
extern int nol_quant9[15];
extern int nol_ytdqty[15];
extern int nol_amtout[15];
extern int o_all_local;
extern float w_tax;
extern float d_tax;
extern float total_amount;
extern char i_name[15][25];
extern int i_name_strlen[15];
extern ub2 i_name_strlen_len[15];
extern ub2 i_name_strlen_rcode[15];
extern ub4 i_name_strlen_csize;
extern int s_quantity[15];
extern char brand_gen[15];
extern ub2 brand_gen_len[15];
extern ub2 brand_gen_rcode[15];
extern ub4 brand_gen_csize;
extern int i_price[15];
extern char brand_generic[15][1];
extern int status;
extern int tracelevel;

/* Miscellaneous */
extern OCIDate cr_date;
extern OCIDate c_since;
extern OCIDate o_entry_d_base;
extern OCIDate ol_d_base[15];

#ifdef DISCARD
# define DISCARD (void)
#endif

#ifdef sword
# define sword int
#endif

#define VER7      2

#define NA        -1 /* ANSI SQL NULL */
#define NLT       1 /* length for string null terminator */
#define DEADLOCK  60 /* ORA-00060: deadlock */
#define NO_DATA_FOUND 1403 /* ORA-01403: no data found */
#define NOT_SERIALIZABLE 8177 /* ORA-08177: transaction not serializable */
#define SNAPSHOT_TOO_OLD 1555 /* ORA-01555: snapshot too old */

#ifdef NULLP
# define NULLP(x) (x * )NULL
#endif
#endif /* NULL */

#define ADR(object) ((ub1 *) &(object))
#define SIZ(object) ((sword) sizeof(object))

typedef char date[24+NLT];
typedef char varchar2;

#define min(x,y) (((x) < (y)) ? (x) : (y))

#define OCIERROR(errp,function)
ocierror(__FILE__, __LINE__, (errp), (function));

#define OCIBND(stmp, bndp, errp, sqlvar, progvl, progvl, ftype)
ocierror(__FILE__, __LINE__, (errp), \
OCIHandleAlloc((stmp), (dvoid**) &(bndp), OCI_HTYPE_BIND, 0, (dvoid**) 0)); \
ocierror(__FILE__, __LINE__, (errp), \
OCIBindByName((stmp), &(bndp), (errp), \
(text *) (sqlvar), strlen((sqlvar)), \
(progvl), (progvl), (ftype), 0, 0, 0, 0, OCI_DEFAULT));

/* bind arrays for sql */
#define OCIBNDRA(stmp, bndp, errp, sqlvar, progvl, progvl, ftype, indp, alen, arcode) \
DISCARD ocierror(__FILE__, __LINE__, (errp), \
OCIHandleAlloc((stmp), (dvoid**) &(bndp), OCI_HTYPE_BIND, 0, (dvoid**) 0)); \
DISCARD ocierror(__FILE__, __LINE__, (errp), \
OCIBindByName((stmp), &(bndp), (errp), (text *) (sqlvar), strlen((sqlvar)), \
(progvl), (progvl), (ftype), (indp), (alen), (rcode), 0, 0, OCI_DEFAULT));

/* use with callback data */
#define OCIBNDRAD(stmp, bndp, errp, sqlvar, progvl, progvl, ftype, indp, ctxp, \
cbf_nodata, cbf_data) \
DISCARD ocierror(__FILE__, __LINE__, (errp), \
OCIHandleAlloc((stmp), (dvoid**) &(bndp), OCI_HTYPE_BIND, 0, (dvoid**) 0)); \
DISCARD ocierror(__FILE__, __LINE__, (errp), \
OCIBindByName((stmp), &(bndp), (errp), (text *) (sqlvar), \
strlen((sqlvar)), 0, (progvl), (ftype), \
indp, 0, 0, 0, OCI_DATA_AT_EXEC)); \
DISCARD ocierror(__FILE__, __LINE__, (errp), \
OCIBindDynamic((bndp), (errp), (ctxp), (cbf_nodata), (ctxp), (cbf_data)));

/* bind in/out for plsql without indicator and rcode */
#define OCIBNDPL(stmp, bndp, errp, sqlvar, progvl, progvl, ftype, alen) \
DISCARD ocierror(__FILE__, __LINE__, (errp), \
OCIHandleAlloc((stmp), (dvoid**) &(bndp), OCI_HTYPE_BIND, 0, (dvoid**) 0)); \
DISCARD ocierror(__FILE__, __LINE__, (errp), \
OCIBindByName((stmp), &(bndp), (errp), (CONST text *) (sqlvar), \
(sb4) strlen((CONST char *) (sqlvar)), (dvoid *) (progvl), (progvl), (ftype), \
NULLP(dvoid), (alen), NULLP(ub2), 0, NULLP(ub4), OCI_DEFAULT));

/* bind in values for plsql with indicator and rcode */
#define OCIBNDR(stmp, bndp, errp, sqlvar, progvl, progvl, ftype, indp, alen, arcode) \
DISCARD ocierror(__FILE__, __LINE__, (errp), \
OCIHandleAlloc((stmp), (dvoid**) &(bndp), OCI_HTYPE_BIND, 0, (dvoid**) 0)); \
DISCARD ocierror(__FILE__, __LINE__, (errp), \
OCIBindByName((stmp), &(bndp), (errp), (text *) (sqlvar), strlen((sqlvar)), \
(progvl), (progvl), (ftype), (indp), (alen), (rcode), 0, 0, \
OCI_DEFAULT));

/* bind in/out for plsql arrays without indicator and rcode */
#define OCIBNDPLA(stmp, bndp, errp, sqlvar, progvl, progvl, ftype, alen, ms, cu) \
DISCARD ocierror(__FILE__, __LINE__, (errp), \
OCIHandleAlloc((stmp), (dvoid**) &(bndp), OCI_HTYPE_BIND, 0, (dvoid**) 0)); \
DISCARD ocierror(__FILE__, __LINE__, (errp), \
OCIBindByName((stmp), &(bndp), (errp), (CONST text *) (sqlvar), \
(sb4) strlen((CONST char *) (sqlvar)), (void *) (progvl), \
(progvl), (ftype), NULL, (alen), NULL, (ms), (cu), OCI_DEFAULT));

/* bind in/out values for plsql with indicator and rcode */
#define OCIBNDRAA(stmp, bndp, errp, sqlvar, progvl, progvl, ftype, indp, alen, arcode, \
ms, cu) \
ocierror(__FILE__, __LINE__, (errp), \
OCIHandleAlloc((stmp), (dvoid**) &(bndp), OCI_HTYPE_BIND, 0, (dvoid**) 0)); \
ocierror(__FILE__, __LINE__, (errp), \
OCIBindByName((stmp), &(bndp), (errp), (text *) (sqlvar), strlen((sqlvar)), \
(progvl), (progvl), (ftype), (indp), (alen), (rcode), (ms), (cu), OCI_DEFAULT));

#define OCIDEFINE(stmp, dfnp, errp, pos, progvl, progvl, ftype) \
OCIDefineByPos((stmp), &(dfnp), (errp), (pos), (progvl), (progvl), (ftype), \
0, 0, 0, OCI_DEFAULT);

#define OCIDEF(stmp, dfnp, errp, pos, progvl, progvl, ftype) \
OCIHandleAlloc((stmp), (dvoid**) &(dfnp), OCI_HTYPE_DEFINE, 0, \
(dvoid**) 0); \
OCIDefineByPos((stmp), &(dfnp), (errp), (pos), (progvl), (progvl), \
(ftype), NULL, NULL, NULL, OCI_DEFAULT); \

```



```

#define OCIDFNRA(stmp,dfnp,errp,pos,progv,progv1,ftype,indp,alen,arcode) \
    OCIHandleAlloc((stmp),(dvoid**)&(dfnp),OCI_HTYPE_DEFINE,0, \
        (dvoid**0)); \
    OCIDefineByPos((stmp),&(dfnp),(errp),(pos),(progv), \
        (progv1),(ftype),(indp),(alen), \
        (arcode),OCI_DEFAULT);

#define OCIDFNNDYN(stmp,dfnp,errp,pos,progv,progv1,ftype,indp,ctxp,cbf_data) \
    ocierror(__FILE__,__LINE__,(errp), \
    OCIHandleAlloc((stmp),(dvoid**)&(dfnp),OCI_HTYPE_DEFINE,0, \
        (dvoid**0)); \
    ocierror(__FILE__,__LINE__,(errp), \
    OCIDefineByPos((stmp),&(dfnp),(errp),(pos),(progv), (progv1),(ftype), \
        (indp),NULL,NULL, OCI_DYNAMIC_FETCH)); \
    ocierror(__FILE__,__LINE__,(errp), \
    OCIDefineDynamic((dfnp),(errp),(ctxp),(cbf_data)));

/* New order */
struct newinstruct {
    int w_id;
    int d_id;
    int c_id;
    int ol_i_id[15];
    int ol_supply_w_id[15];
    int ol_quantity[15];
};

struct newoutstruct {
    int terror;
    int o_id;
    int o_ol_cnt;
    char c_last[17];
    char c_credit[3];
    float c_discount;
    float w_tax;
    float d_tax;
    char o_entry_d[20];
    float total_amount;
    char i_name[15][25];
    int s_quantity[15];
    char brand_generic[15];
    float i_price[15];
    float ol_amount[15];
    char status[26];
    int retry;
};

struct newstruct {
    struct newinstruct newin;
    struct newoutstruct newout;
};

/* Payment */
struct payinstruct {
    int w_id;
    int d_id;
    int c_w_id;
    int c_d_id;
    int c_id;
    int bylastname;
    float h_amount;
    char c_last[17];
};

struct payoutstruct {
    int terror;
    char w_street_1[21];
    char w_street_2[21];
    char w_city[21];
    char w_state[3];
    char w_zip[10];
    char d_street_1[21];
    char d_street_2[21];
    char d_city[21];
    char d_state[3];
    char d_zip[10];
    int c_id;
    char c_first[17];
    char c_middle[3];
    char c_last[17];
    char c_street_1[21];
    char c_street_2[21];
    char c_city[21];
    char c_state[3];
    char c_zip[10];
    char c_phone[17];
    char c_since[11];
    char c_credit[3];

    double c_credit_lim;
    float c_discount;
    double c_balance;
    char c_data[201];
    char h_date[20];
    int retry;
};

struct paystruct {
    struct payinstruct payin;
    struct payoutstruct payout;
};

/* Order status */
struct ordinstruct {
    int w_id;
    int d_id;
    int c_id;
    int bylastname;
    char c_last[17];
};

struct ordoutstruct {
    int terror;
    int c_id;
    char c_last[17];
    char c_first[17];
    char c_middle[3];
    double c_balance;
    int o_id;
    char o_entry_d[20];
    int o_carrier_id;
    int o_ol_cnt;
    int ol_supply_w_id[15];
    int ol_i_id[15];
    int ol_quantity[15];
    float ol_amount[15];
    char ol_delivery_d[15][11];
    int retry;
};

struct ordstruct {
    struct ordinstruct ordin;
    struct ordoutstruct ordout;
};

/* Delivery */
struct delinstruct {
    int w_id;
    int o_carrier_id;
    double qtime;
    int in_timing_int;
    int plsflag;
};

struct deloutstruct {
    int terror;
    int retry;
};

struct delstruct {
    struct delinstruct delin;
    struct deloutstruct delout;
};

/* Stock level */
struct stoinstruct {
    int w_id;
    int d_id;
    int threshold;
};

struct stooutstruct {
    int terror;
    int low_stock;
    int retry;
};

struct stostruct {
    struct stoinstruct stoin;
    struct stooutstruct stoout;
};

#endif

```

client/oracle/tpccflags.h

```
#define PLSQLNO
#define DMLRETDEL
```

A.4 Server Stored Procedures

tkvcpdel.sql

```
declare
TYPE numarray IS TABLE OF NUMBER INDEX BY BINARY_INTEGER;
TYPE numlist is varray (10) of number;
dist numarray;
amt numarray;
cnt pls_integer;

not_serializable EXCEPTION;
PRAGMA EXCEPTION_INIT(not_serializable,-8177);
deadlock EXCEPTION;
PRAGMA EXCEPTION_INIT(deadlock,-60);
snapshot_too_old EXCEPTION;
PRAGMA EXCEPTION_INIT(snapshot_too_old,-1555);

BEGIN
LOOP BEGIN
FORALL d IN 1..10
DELETE FROM nord N
WHERE no_d_id = inittpc.dist(d)
AND no_w_id = :w_id
AND no_o_id = (select min (no_o_id)
from nord
where no_d_id = N.no_d_id
and no_w_id = N.no_w_id)
RETURNING no_d_id, no_o_id BULK COLLECT INTO :d_id, :order_id;

:ordcnt := SQL%ROWCOUNT;

FORALL o in 1..:ordcnt
UPDATE ord SET o_carrier_id = :carrier_id
WHERE o_id = :order_id(o)
AND o_d_id = :d_id(o)
AND o_w_id = :w_id
RETURNING o_c_id BULK COLLECT INTO :o_c_id;

FORALL o in 1..:ordcnt
UPDATE ord SET ol_delivery_d = :now
WHERE ol_w_id = :w_id
AND ol_d_id = :d_id(o)
AND ol_o_id = :order_id(o)
RETURNING sum(ol_amount) BULK COLLECT INTO :sums;

FORALL c IN 1..:ordcnt
UPDATE cust
SET c_balance = c_balance + :sums(c),
c_delivery_cnt = c_delivery_cnt + 1
WHERE c_w_id = :w_id
AND c_d_id = :d_id(c)
AND c_id = :o_c_id(c);
COMMIT;
EXIT;
EXCEPTION
WHEN not_serializable OR deadlock OR snapshot_too_old
THEN
ROLLBACK;
:retry := :retry + 1;
END;

END LOOP; -- for retry
END;
```

tkvcpnew.sql

```
-- New Order Anonymous block

DECLARE
idx PLS_INTEGER;
dummy_local PLS_INTEGER;
cache_ol_cnt PLS_INTEGER;
not_serializable EXCEPTION;
PRAGMA EXCEPTION_INIT(not_serializable,-8177);
deadlock EXCEPTION;
PRAGMA EXCEPTION_INIT(deadlock,-60);
snapshot_too_old EXCEPTION;
PRAGMA EXCEPTION_INIT(snapshot_too_old,-1555);

PROCEDURE u1 IS
BEGIN
FORALL idx IN 1.. cache_ol_cnt
UPDATE stock_item
SET s_order_cnt = s_order_cnt + 1,
s_ytd = s_ytd + :ol_quantity(idx),
s_remote_cnt = s_remote_cnt + :s_remote(idx),
s_quantity = (CASE WHEN s_quantity < :ol_quantity (idx) + 10
THEN s_quantity +91
ELSE s_quantity
END) - :ol_quantity(idx)
WHERE i_id = :ol_i_id(idx)
AND s_w_id = :ol_supply_w_id(idx)
RETURNING i_price, i_name, s_quantity, s_dist_01,
i_price*:ol_quantity(idx),
CASE WHEN i_data NOT LIKE '%ORIGINAL%'
THEN 'G'
ELSE (CASE WHEN s_data NOT LIKE '%ORIGINAL%'
THEN 'G'
ELSE 'B'
END)
END
BULK COLLECT INTO :i_price, :i_name, :s_quantity, inittpc.s_dist,
:ol_amount,:brand_generic;

END u1;

PROCEDURE u2 IS
BEGIN
FORALL idx IN 1.. cache_ol_cnt
UPDATE stock_item
SET s_order_cnt = s_order_cnt + 1,
s_ytd = s_ytd + :ol_quantity(idx),
s_remote_cnt = s_remote_cnt + :s_remote(idx),
s_quantity = (CASE WHEN s_quantity < :ol_quantity (idx) + 10
THEN s_quantity +91
ELSE s_quantity
END) - :ol_quantity(idx)
WHERE i_id = :ol_i_id(idx)
AND s_w_id = :ol_supply_w_id(idx)
RETURNING i_price, i_name, s_quantity, s_dist_02,
i_price*:ol_quantity(idx),
CASE WHEN i_data NOT LIKE '%ORIGINAL%'
THEN 'G'
ELSE (CASE WHEN s_data NOT LIKE '%ORIGINAL%'
THEN 'G'
ELSE 'B'
END)
END
BULK COLLECT INTO :i_price, :i_name, :s_quantity, inittpc.s_dist,
:ol_amount,:brand_generic;

END u2;

PROCEDURE u3 IS
BEGIN
FORALL idx IN 1.. cache_ol_cnt
UPDATE stock_item
SET s_order_cnt = s_order_cnt + 1,
s_ytd = s_ytd + :ol_quantity(idx),
s_remote_cnt = s_remote_cnt + :s_remote(idx),
s_quantity = (CASE WHEN s_quantity < :ol_quantity (idx) + 10
THEN s_quantity +91
ELSE s_quantity
END) - :ol_quantity(idx)
WHERE i_id = :ol_i_id(idx)
AND s_w_id = :ol_supply_w_id(idx)
RETURNING i_price, i_name, s_quantity, s_dist_03,
i_price*:ol_quantity(idx),
CASE WHEN i_data NOT LIKE '%ORIGINAL%'
THEN 'G'
ELSE (CASE WHEN s_data NOT LIKE '%ORIGINAL%'
```

```

        THEN 'G'
        ELSE 'B'
        END)
    END
    BULK COLLECT INTO :i_price, :i_name, :s_quantity, initpcc.s_dist,
        :ol_amount, :brand_generic;
END u3;

```

```

PROCEDURE u4 IS
BEGIN
    FORALL idx IN 1 .. cache_ol_cnt
    UPDATE stock_item
    SET s_order_cnt = s_order_cnt + 1,
        s_ytd = s_ytd + :ol_quantity(idx),
        s_remote_cnt = s_remote_cnt + :s_remote(idx),
        s_quantity = (CASE WHEN s_quantity < :ol_quantity (idx) + 10
            THEN s_quantity +91
            ELSE s_quantity
            END) - :ol_quantity(idx)
    WHERE i_id = :ol_i_id(idx)
    AND s_w_id = :ol_supply_w_id(idx)
    RETURNING i_price, i_name, s_quantity, s_dist_04,
        i_price*:ol_quantity(idx),
        CASE WHEN i_data NOT LIKE '%ORIGINAL%'
        THEN 'G'
        ELSE (CASE WHEN s_data NOT LIKE '%ORIGINAL%'
            THEN 'G'
            ELSE 'B'
            END)
        END
    END
    BULK COLLECT INTO :i_price, :i_name, :s_quantity, initpcc.s_dist,
        :ol_amount, :brand_generic;
END u4;

```

```

PROCEDURE u5 IS
BEGIN
    FORALL idx IN 1 .. cache_ol_cnt
    UPDATE stock_item
    SET s_order_cnt = s_order_cnt + 1,
        s_ytd = s_ytd + :ol_quantity(idx),
        s_remote_cnt = s_remote_cnt + :s_remote(idx),
        s_quantity = (CASE WHEN s_quantity < :ol_quantity (idx) + 10
            THEN s_quantity +91
            ELSE s_quantity
            END) - :ol_quantity(idx)
    WHERE i_id = :ol_i_id(idx)
    AND s_w_id = :ol_supply_w_id(idx)
    RETURNING i_price, i_name, s_quantity, s_dist_05,
        i_price*:ol_quantity(idx),
        CASE WHEN i_data NOT LIKE '%ORIGINAL%'
        THEN 'G'
        ELSE (CASE WHEN s_data NOT LIKE '%ORIGINAL%'
            THEN 'G'
            ELSE 'B'
            END)
        END
    END
    BULK COLLECT INTO :i_price, :i_name, :s_quantity, initpcc.s_dist,
        :ol_amount, :brand_generic;
END u5;

```

```

PROCEDURE u6 IS
BEGIN
    FORALL idx IN 1 .. cache_ol_cnt
    UPDATE stock_item
    SET s_order_cnt = s_order_cnt + 1,
        s_ytd = s_ytd + :ol_quantity(idx),
        s_remote_cnt = s_remote_cnt + :s_remote(idx),
        s_quantity = (CASE WHEN s_quantity < :ol_quantity (idx) + 10
            THEN s_quantity +91
            ELSE s_quantity
            END) - :ol_quantity(idx)
    WHERE i_id = :ol_i_id(idx)
    AND s_w_id = :ol_supply_w_id(idx)
    RETURNING i_price, i_name, s_quantity, s_dist_06,
        i_price*:ol_quantity(idx),
        CASE WHEN i_data NOT LIKE '%ORIGINAL%'
        THEN 'G'
        ELSE (CASE WHEN s_data NOT LIKE '%ORIGINAL%'
            THEN 'G'
            ELSE 'B'
            END)
        END
    END
    BULK COLLECT INTO :i_price, :i_name, :s_quantity, initpcc.s_dist,
        :ol_amount, :brand_generic;
END u6;

```

```

PROCEDURE u7 IS
BEGIN
    FORALL idx IN 1 .. cache_ol_cnt
    UPDATE stock_item
    SET s_order_cnt = s_order_cnt + 1,
        s_ytd = s_ytd + :ol_quantity(idx),
        s_remote_cnt = s_remote_cnt + :s_remote(idx),
        s_quantity = (CASE WHEN s_quantity < :ol_quantity (idx) + 10
            THEN s_quantity +91

```

```

        ELSE s_quantity
        END) - :ol_quantity(idx)
    WHERE i_id = :ol_i_id(idx)
    AND s_w_id = :ol_supply_w_id(idx)
    RETURNING i_price, i_name, s_quantity, s_dist_07,
        i_price*:ol_quantity(idx),
        CASE WHEN i_data NOT LIKE '%ORIGINAL%'
        THEN 'G'
        ELSE (CASE WHEN s_data NOT LIKE '%ORIGINAL%'
            THEN 'G'
            ELSE 'B'
            END)
        END
    END
    BULK COLLECT INTO :i_price, :i_name, :s_quantity, initpcc.s_dist,
        :ol_amount, :brand_generic;
END u7;

```

```

PROCEDURE u8 IS
BEGIN
    FORALL idx IN 1 .. cache_ol_cnt
    UPDATE stock_item
    SET s_order_cnt = s_order_cnt + 1,
        s_ytd = s_ytd + :ol_quantity(idx),
        s_remote_cnt = s_remote_cnt + :s_remote(idx),
        s_quantity = (CASE WHEN s_quantity < :ol_quantity (idx) + 10
            THEN s_quantity +91
            ELSE s_quantity
            END) - :ol_quantity(idx)
    WHERE i_id = :ol_i_id(idx)
    AND s_w_id = :ol_supply_w_id(idx)
    RETURNING i_price, i_name, s_quantity, s_dist_08,
        i_price*:ol_quantity(idx),
        CASE WHEN i_data NOT LIKE '%ORIGINAL%'
        THEN 'G'
        ELSE (CASE WHEN s_data NOT LIKE '%ORIGINAL%'
            THEN 'G'
            ELSE 'B'
            END)
        END
    END
    BULK COLLECT INTO :i_price, :i_name, :s_quantity, initpcc.s_dist,
        :ol_amount, :brand_generic;
END u8;

```

```

PROCEDURE u9 IS
BEGIN
    FORALL idx IN 1 .. cache_ol_cnt
    UPDATE stock_item
    SET s_order_cnt = s_order_cnt + 1,
        s_ytd = s_ytd + :ol_quantity(idx),
        s_remote_cnt = s_remote_cnt + :s_remote(idx),
        s_quantity = (CASE WHEN s_quantity < :ol_quantity (idx) + 10
            THEN s_quantity +91
            ELSE s_quantity
            END) - :ol_quantity(idx)
    WHERE i_id = :ol_i_id(idx)
    AND s_w_id = :ol_supply_w_id(idx)
    RETURNING i_price, i_name, s_quantity, s_dist_09,
        i_price*:ol_quantity(idx),
        CASE WHEN i_data NOT LIKE '%ORIGINAL%'
        THEN 'G'
        ELSE (CASE WHEN s_data NOT LIKE '%ORIGINAL%'
            THEN 'G'
            ELSE 'B'
            END)
        END
    END
    BULK COLLECT INTO :i_price, :i_name, :s_quantity, initpcc.s_dist,
        :ol_amount, :brand_generic;
END u9;

```

```

PROCEDURE u10 IS
BEGIN
    FORALL idx IN 1 .. cache_ol_cnt
    UPDATE stock_item
    SET s_order_cnt = s_order_cnt + 1,
        s_ytd = s_ytd + :ol_quantity(idx),
        s_remote_cnt = s_remote_cnt + :s_remote(idx),
        s_quantity = (CASE WHEN s_quantity < :ol_quantity (idx) + 10
            THEN s_quantity +91
            ELSE s_quantity
            END) - :ol_quantity(idx)
    WHERE i_id = :ol_i_id(idx)
    AND s_w_id = :ol_supply_w_id(idx)
    RETURNING i_price, i_name, s_quantity, s_dist_10,
        i_price*:ol_quantity(idx),
        CASE WHEN i_data NOT LIKE '%ORIGINAL%'
        THEN 'G'
        ELSE (CASE WHEN s_data NOT LIKE '%ORIGINAL%'
            THEN 'G'
            ELSE 'B'
            END)
        END
    END
    BULK COLLECT INTO :i_price, :i_name, :s_quantity, initpcc.s_dist,
        :ol_amount, :brand_generic;
END u10;

```

```

PROCEDURE fix_items IS
rows_lost          PLS_INTEGER;
max_index          PLS_INTEGER;
temp_index         PLS_INTEGER;
BEGIN
idx := 1;
rows_lost := 0;
max_index := dummy_local;

WHILE (max_index != cache_ol_cnt) LOOP

WHILE (idx <= sql%rowcount AND
sql%bulk_rowcount(idx + rows_lost) = 1)
LOOP
idx := idx + 1;
END LOOP;

temp_index := max_index;
WHILE (temp_index >= idx + rows_lost) LOOP
:ol_amount(temp_index + 1) := :ol_amount(temp_index);
:i_price(temp_index + 1) := :i_price(temp_index);
:i_name(temp_index + 1) := :i_name(temp_index);
:s_quantity(temp_index + 1) := :s_quantity(temp_index);
inittpc.s_dist(temp_index + 1) := inittpc.s_dist(temp_index);
:brand_generic(temp_index + 1) := :brand_generic(temp_index);
temp_index := temp_index - 1;
END LOOP;

IF (idx + rows_lost <= cache_ol_cnt) THEN
:i_price(idx + rows_lost) := 0;
:i_name(idx + rows_lost) := 'NO ITEM';
:s_quantity(idx + rows_lost) := 0;
inittpc.s_dist(idx + rows_lost) := NULL;
:brand_generic(idx + rows_lost) := '';
:ol_amount(idx + rows_lost) := 0;
rows_lost := rows_lost + 1;
max_index := max_index + 1;
END IF;

END LOOP;
END fix_items;

BEGIN
LOOP BEGIN
cache_ol_cnt := :o_ol_cnt;

UPDATE dist SET d_next_o_id = d_next_o_id + 1
WHERE d_id = :d_id AND d_w_id = :w_id
RETURNING d_tax, d_next_o_id-1
INTO :d_tax, :o_id;

SELECT c_discount, c_last, c_credit, w_tax
INTO :c_discount, :c_last, :c_credit, :w_tax
FROM cust, ware
WHERE c_id = :c_id AND c_d_id = :d_id AND c_w_id = w_id
AND w_id = :w_id;

INSERT INTO nord (no_o_id, no_d_id, no_w_id)
VALUES (:o_id, :d_id, :w_id);

INSERT INTO ord (o_id, o_d_id, o_w_id, o_c_id, o_entry_d,
o_carrier_id, o_ol_cnt, o_all_local)
VALUES (:o_id, :d_id, :w_id, :c_id,
:cr_date, 11, :o_ol_cnt, :o_all_local);

dummy_local := :d_id;

IF (dummy_local < 6) THEN
IF (dummy_local < 3) THEN
IF (dummy_local = 1) THEN
u1;
ELSE
u2;
END IF;
ELSE
IF (dummy_local = 3) THEN
u3;
ELSIF (dummy_local = 4) then
u4;
ELSE
u5;
END IF;
END IF;
ELSE
IF (dummy_local < 8) THEN
IF (dummy_local = 6) THEN
u6;
ELSE
u7;
END IF;
ELSE
IF (dummy_local = 8) THEN
u8;

```

```

ELSIF (dummy_local = 9) then
u9;
ELSE
u10;
END IF;
END IF;
END IF;

dummy_local := sql%rowcount;

IF (dummy_local != cache_ol_cnt) THEN fix_items; END IF;

FORALL idx IN 1..dummy_local
INSERT INTO ordl
(ol_o_id, ol_d_id, ol_w_id, ol_number, ol_delivery_d, ol_i_id,
ol_supply_w_id, ol_quantity, ol_amount, ol_dist_info)
VALUES (:o_id, :d_id, :w_id, inittpc.idx1arr(idx), inittpc.nulldate,
:ol_i_id(idx), :ol_supply_w_id(idx),
:ol_quantity(idx), :ol_amount(idx), inittpc.s_dist(idx));

IF (dummy_local != :o_ol_cnt) THEN
:o_ol_cnt := dummy_local;
ROLLBACK;
END IF;

EXIT;

EXCEPTION
WHEN not_serializable OR deadlock OR snapshot_too_old THEN
ROLLBACK;
:retry := :retry + 1;
END;
END LOOP;
END;

```

payz.sql

```

DECLARE /* payz */
not_serializable EXCEPTION;
PRAGMA EXCEPTION_INIT(not_serializable,-8177);
deadlock EXCEPTION;
PRAGMA EXCEPTION_INIT(deadlock,-60);
snapshot_too_old EXCEPTION;
PRAGMA EXCEPTION_INIT(snapshot_too_old,-1555);
BEGIN
LOOP BEGIN
UPDATE ware
SET w_ytd = w_ytd+ :h_amount
WHERE w_id = :w_id
RETURNING w_name,
w_street_1, w_street_2, w_city, w_state, w_zip
INTO inittpc.ware_name,
:w_street_1, :w_street_2, :w_city, :w_state, :w_zip;

SELECT rowid
BULK COLLECT INTO inittpc.row_id
FROM cust
WHERE c_d_id = :c_d_id AND c_w_id = :c_w_id AND c_last = :c_last
ORDER BY c_last, c_d_id, c_w_id, c_first;

inittpc.c_num := sql%rowcount;
inittpc.cust_rowid := inittpc.row_id((inittpc.c_num) / 2);

UPDATE cust
SET c_balance = c_balance - :h_amount,
c_ytd_payment = c_ytd_payment+ :h_amount,
c_payment_cnt = c_payment_cnt+1
WHERE rowid = inittpc.cust_rowid
RETURNING
c_id, c_first, c_middle, c_last, c_street_1, c_street_2,
c_city, c_state, c_zip, c_phone,
c_since, c_credit, c_credit_lim,
c_discount, c_balance
INTO :c_id, :c_first, :c_middle, :c_last,
:c_street_1, :c_street_2, :c_city, :c_state,
:c_zip, :c_phone, :c_since, :c_credit,
:c_credit_lim, :c_discount, :c_balance;

:c_data := '';
IF :c_credit = 'BC' THEN
UPDATE cust
SET c_data = substr ((to_char (:c_id) || '' ||
to_char (:c_d_id) || '' ||
to_char (:c_w_id) || '' ||
to_char (:d_id) || '' ||
to_char (:w_id) || '' ||

```

```

        to_char (:h_amount/100, '9999.99') || ' ')
        || c_data, 1, 500)
WHERE rowid = inittpc.cust_rowid
RETURNING substr(c_data,1, 200)
INTO :c_data;

END IF;

UPDATE dist
SET d_ytd = d_ytd+ :h_amount
WHERE d_id = :d_id
AND d_w_id = :w_id
RETURNING d_name, d_street_1, d_street_2, d_city,
d_state, d_zip
INTO inittpc.dist_name, :d_street_1, :d_street_2, :d_city,
:d_state, :d_zip;

IF SQL%NOTFOUND
THEN
    raise NO_DATA_FOUND;
END IF;

INSERT INTO hist (h_c_id, h_c_d_id, h_c_w_id, h_d_id, h_w_id,
h_amount, h_date, h_data)
VALUES (:c_id, :c_d_id, :c_w_id, :d_id, :w_id, :h_amount,
:cr_date, inittpc.ware_name || ' ' || inittpc.dist_name);

EXIT;

EXCEPTION
WHEN not_serializable OR deadlock OR snapshot_too_old THEN
ROLLBACK;
:retry := :retry + 1;
END;

END LOOP;
END;

```

count.all.users.sh

```

#!/bin/csh

#####
#####
#####
#@(#) Version: A.10.10 $Date: 2001/12/06 11:22:59 $
#
#(c) Copyright 1996, Hewlett-Packard Company, all rights reserved.
#####
#####

sleep $1
~tpcc/bin/countusers.sh > /tmp/countusers.before

sleep $2
~tpcc/bin/countusers.sh > /tmp/countusers.after

```

countuser

```

#!/bin/csh

#####
#####
#####
#@(#) Version: A.10.10 $Date: 2002/07/18 21:14:54 $
#
#(c) Copyright 1996, Hewlett-Packard Company, all rights reserved.
#####
#####

echo "Number of clients on `hostname` at `date`:"
setenv UNIX95 1
ps -L -ef

#echo "Number of clients on `hostname` at `date`: `ps -e | fgrep client | wc -l`"

```

paynz.sql

```

DECLARE /* paynz */
not_serializable EXCEPTION;
PRAGMA EXCEPTION_INIT(not_serializable,-8177);
deadlock EXCEPTION;
PRAGMA EXCEPTION_INIT(deadlock,-60);
snapshot_too_old EXCEPTION;
PRAGMA EXCEPTION_INIT(snapshot_too_old,-1555);
BEGIN
LOOP BEGIN
UPDATE ware
SET w_ytd = w_ytd + :h_amount
WHERE w_id = :w_id
RETURNING w_name, w_street_1, w_street_2, w_city, w_state, w_zip
INTO inittpc.ware_name, :w_street_1, :w_street_2, :w_city,
:w_state, :w_zip;

UPDATE cust
SET c_balance = c_balance - :h_amount,
c_ytd_payment = c_ytd_payment + :h_amount,
c_payment_cnt = c_payment_cnt + 1
WHERE c_id = :c_id AND c_d_id = :c_d_id AND
c_w_id = :c_w_id
RETURNING rowid, c_first, c_middle, c_last, c_street_1,
c_street_2, c_city, c_state, c_zip, c_phone,
c_since, c_credit, c_credit_lim,
c_discount, c_balance
INTO inittpc.cust_rowid, :c_first, :c_middle, :c_last, :c_street_1,
:c_street_2, :c_city, :c_state, :c_zip, :c_phone,
:c_since, :c_credit, :c_credit_lim,
:c_discount, :c_balance;
IF SQL%NOTFOUND THEN
raise NO_DATA_FOUND;
END IF;

IF :c_credit = 'BC' THEN
UPDATE cust
SET c_data = substr ((to_char (:c_id) || ' ' ||
to_char (:c_d_id) || ' ' ||
to_char (:c_w_id) || ' ' ||
to_char (:d_id) || ' ' ||
to_char (:w_id) || ' ' ||
to_char (:h_amount/100, '9999.99') || ' ')
|| c_data, 1, 500)
WHERE rowid = inittpc.cust_rowid
RETURNING substr(c_data,1, 200)
INTO :c_data;

END IF;

UPDATE dist
SET d_ytd = d_ytd + :h_amount
WHERE d_id = :d_id
AND d_w_id = :w_id
RETURNING d_name, d_street_1, d_street_2, d_city, d_state, d_zip
INTO inittpc.dist_name, :d_street_1, :d_street_2, :d_city, :d_state,
:d_zip;
IF SQL%NOTFOUND THEN
raise NO_DATA_FOUND;
END IF;

INSERT INTO hist (h_c_id, h_c_d_id, h_c_w_id, h_d_id, h_w_id,
h_amount, h_date, h_data)
VALUES (:c_id, :c_d_id, :c_w_id, :d_id, :w_id, :h_amount,
:cr_date, inittpc.ware_name || ' ' || inittpc.dist_name);
EXIT;

EXCEPTION
WHEN not_serializable OR deadlock OR snapshot_too_old THEN
ROLLBACK;
:retry := :retry + 1;
END;

END LOOP;
END;

```

```

return elapsed_time(&current);
}

```

tpcc.c

```

#include "tpcc.h"

/* Error message strings */
const char *e_msg[]={"Transaction complete.", "Error", "Invalid item number.",
                    "Not enough orders.", "Database ERROR !!!!"};

/* the name of each transaction */
const char *transaction_name[] =
{"", "New_Order", "Payment", "Order-Status",
 "Delivery", "Stock-Level", "Deferred-Delivery"};

```

delay.c

```

/*****
@(#) Version: A.10.10 $Date: 2005/04/11 10:00:23 $

(c) Copyright 1996, Hewlett-Packard Company, all rights reserved.
*****/
#include <sys/time.h>
#include <errno.h>
#include <time.h>
#include "tpcc.h"

void
delay(double sec)
/*****
delay sleeps for the specified number of seconds. (to closest 1/100th second)
*****/
{
    struct timespec delay;

    /* if no delay, done */
    if (sec <= 0.0) return;

    /* add a portion of a clock tick to keep averages correct */
    sec += 1.0 / CLK_TCK;

    /* convert the delay to seconds and nanoseconds */
    delay.tv_sec = sec;
    delay.tv_nsec = (sec - delay.tv_sec) * 1000000000;

    if (nanosleep(&delay, NULL) == -1) {
        if (errno != EINTR) {
            if (errno == ENOSYS) {
                struct timeval delay_select;
                /* Use select instead */
                delay_select.tv_sec = sec;
                delay_select.tv_usec = (sec -
                    delay_select.tv_sec)*1000000;
                if (select(0, NULL, NULL, NULL, &delay_select) < 0) {
                    perror("select");
                } else {
                    perror("nanosleep");
                }
            }
        }
    }
}

struct timeval tpcc_start_time;

void
initclock(void)
{
    gettimeofday(&tpcc_start_time, NULL);
}

TIME getclock(void)
/*****
getclock returns the current time, expressed in seconds from start of run
*****/
{
    struct timeval current;
    gettimeofday(&current, NULL);
}

```

random.h

```

/*****
@(#) Version: A.10.10 $Date: 2005/04/11 09:59:50 $

(c) Copyright 1996, Hewlett-Packard Company, all rights reserved.
*****/
#include "tpcc.h"

/*
 * Linux does not have efficient thread local data like HP-UX, so
 * just use the built in drand48 library which will provide a
 * thread-safe implementation probably by a mutex.
 */
#ifdef __linux
#define USE_DRAND48
#endif

#ifdef USE_DRAND48
double randy(void);
#endif

extern void GenerateLastNames(void);
extern ID RandomWarehouse(ID local, ID scale, int percent);
extern void RandomDelay(double mean, double adjust);
extern void Randomize(void);
extern void SetRandomSeed(int val);

/* Return a random value in the range [0.0..1.0) */
extern double RandomValue(void);

extern char lastNames[1000][16];

/*****
 * RandomNumber selects a uniform random number from min to max inclusive */
*****/
#ifdef USE_DRAND48
#define RandomNumber(min,max) \
    ((int)(drand48() * ((int)(max) - (int)(min) + 1)) + (int)(min))
#else
#define RandomNumber(min,max) \
    ((int)(randy() * ((int)(max) - (int)(min) + 1)) + (int)(min))
#endif

/*****
 * NURandomNumber selects a non-uniform random number */
*****/
#define NURandomNumber(a, min, max, c) \
    ((RandomNumber(0, a) | RandomNumber(min, max)) + (c)) % \
    ((max) - (min) + 1) + (min)

/*****
 * LastName selects a random TPC-C style last name.
*****/
#define LastName(num, name) strcpy(name, lastNames[num])

#endif

```

config_prsets.s.sh

```

#!/bin/ksh

sleep ${1}
###
cd /BUILD/server_config

```

```
./reset_pset
./make_pset
./move_ints.pset
./serverinfo > /tmp/TPCC_STATS.server
```

make_pset

```
#!/usr/bin/ksh -x

ps -fu oracle | grep 'ora_' > core_asgn.ora
ps -fu oracle | grep 'LOCAL=NO' | grep 'oracletpcc' > core_asgn.tpcc

let curr_pset=/usr/sbin/psrset -R 6 7 | awk '/successfully created pset/ {print SNF}'
head -34 core_asgn.tpcc | tail -34 | awk '{print $2}' > core_asgn.pset67
sed 's/^/usr/sbin/psrset -b {curr_pset} /' core_asgn.pset67 | ksh -x

let curr_pset=/usr/sbin/psrset -c 4 5 | awk '/successfully created pset/ {print SNF}'
head -55 core_asgn.tpcc | tail -21 | awk '{print $2}' > core_asgn.pset45
awk '/ora_dbw/ {print $2}' core_asgn.ora >> core_asgn.pset45
awk '/ora_lgw/ {print $2}' core_asgn.ora >> core_asgn.pset45
sed 's/^/usr/sbin/psrset -b {curr_pset} /' core_asgn.pset45 | ksh -x

/usr/bin/mpsched -c 4 -p `awk '/ora_dbw/ {print $2}' core_asgn.ora`
/usr/bin/mpsched -c 5 -p `awk '/ora_lgw/ {print $2}' core_asgn.ora`

let curr_pset=/usr/sbin/psrset -R 2 3 | awk '/successfully created pset/ {print SNF}'
head -89 core_asgn.tpcc | tail -34 | awk '{print $2}' > core_asgn.pset23
sed 's/^/usr/sbin/psrset -b {curr_pset} /' core_asgn.pset23 | ksh -x

ps -ef | grep vxfsd | sed '/grep/d' > core_asgn.sys
/usr/bin/mpsched -c 1 -p `awk '/vxfsd/ {print $2}' core_asgn.sys`
```

Move_ints.pset

```
#!/usr/bin/ksh

/usr/contrib/bin/intctl -M -H 0/4/2/1 -I 1 -c 0 #lan1

/usr/contrib/bin/intctl -M -H 0/3/1/0 -I 1 -c 5 #log array
/usr/contrib/bin/intctl -M -H 0/3/1/1 -I 1 -c 4 #data array
/usr/contrib/bin/intctl -M -H 0/7/1/0 -I 1 -c 4 #data array
/usr/contrib/bin/intctl -M -H 0/7/1/1 -I 1 -c 4 #data array
```

numproc.aux

```
#!/usr/bin/ksh

# Create a string that contains the names of all drivers, clients, or servers.
construct_string()
{
if [ $# = 2 ]
then
systems=$1
else
systems=""
this_system=1
max=`expr $3 + 1`
while [ ${this_system} -lt ${max} ]
do
systems="${systems} ${2}${this_system}"
(( this_system=${this_system}+1 ))
done
done
fi

echo $systems
```

```
}

if [ XXX${BATCH_TPCC} = XXX ]
then
BATCH_TPCC="0"
fi
if [ ${BATCH_TPCC} = "1" ]
then
DRVR_PROG="client_batch"
else
DRVR_PROG="driver"
fi

drivers=$(construct_string ${DRIVER} ${DRIVER} ${NR_DRIVER})
clients=$(construct_string ${CLIENT} ${CLIENT} ${NR_CLIENT})
servers=$(construct_string ${SERVER} ${SERVER} ${NR_SERVER})

SLEEP=30
N=`expr $TRANS_TIME \% 60`
N=`expr $N / $SLEEP`
N=`expr $N + 10` ## Margin for Tuxedo startup and drivers creation.
echo `date` "Runtime: $TRANS_TIME -> $N samples"

I=1
while [ $I -le $N ]
do

echo
date

## Header
print -n " #"
J=1
while [ $J -le $NR_CLIENT ]
do
printf "%7d" $J
J=`expr $J + 1`
done
printf "\n"

## Driver driver
print -n "drv:"
for drv in ${drivers}
do
ND=`remsh $drv -n "ps -u tpcc | grep -c $DRVR_PROG"`
printf "%7d" $ND
done
printf "\n"

if [ ${BATCH_TPCC} != "1" ]
then

## Client client + service
print -n "clt:"
for clt in ${clients}
do
NC=`remsh $clt -n "ps -u tuxedo > /tmp/ps.tuxedo; grep -c client /tmp/ps.tuxedo"`
NS=`remsh $clt -n "grep -c service /tmp/ps.tuxedo"`
printf "%4d/%2d" $NC $NS
done
printf "\n"

fi

## Sut oracletpcc
print -n "sut:"
for sut in ${servers}
do
NO=`remsh $sut -n "ps -ef | fgrep -v fgrep | fgrep -c oracletpcc"`
printf "%7d" $NO
done
printf "\n"
date
echo

sleep $SLEEP
I=`expr $I + 1`

done

reset_pset

#!/bin/ksh
/usr/sbin/psrset | awk '/^PSET/ {print("/usr/sbin/psrset -s "$2)}' | csh -v
/usr/sbin/psrset -a 0 2 3 4 5 6 7
```

```
/usr/sbin/psrset -d all
/BUILD/server_config/serverinfo > /tmp/TPCC_STATS.server
```

```
#####
****
echo "Log segment size at `date`"
```

serverinfo

```
#!/bin/ksh

print "Interrupts";    /usr/contrib/bin/intctl
print "Processor Sets"; /usr/sbin/psrset -i
print "Shared memory";  ipcs -b
print "Locality Domains"; /tools/bin/locinfo
print "Scheduler";      mpsched -q
```

audit_table.sh

```
#!/bin/sh
#
# $Header: upd_date.sh 01-jun-98.19:12:54 skareenh Exp $
#
# upd_date.sh
#
# Copyright (c) Oracle Corporation 1998. All Rights Reserved.
#
# NAME
#   upd_date.sh
#
# DESCRIPTION
#   Insert start time into tpcc_audit_tab.
#
# NOTES
#   <other useful comments, qualifications, etc.>
#
# MODIFIED (MM/DD/YY)
#   skareenh 06/01/98 - Creation
#
```

```
sqlplus tpcc/tpcc <<!
delete from tpcc_audit_tab;
insert into tpcc_audit_tab (starttime)
select sysdate from dual;
commit;
quit;
!
```

countorders.sh

```
#!/usr/bin/sh
#####
#####
#@(#) Version: A.10.10 $Date: 2001/12/06 11:26:59 $
#
#(c) Copyright 1996, Hewlett-Packard Company, all rights reserved.
#####
#####

echo "'date': counting orders in dist table"

sqlplus -s tpcc/tpcc <<!
select sum(d_next_o_id) from dist;
exit;
!
```

logsize.sh

```
#!/usr/bin/sh
#####
#####
#@(#) Version: A.10.10 $Date: 2001/08/24 15:20:45 $
#
#(c) Copyright 1996, Hewlett-Packard Company, all rights reserved.
```


Appendix B Database Design

The source code for the process to define, create and populate the **Oracle Database 10g Enterprise Edition** TPC-C database is included in this appendix.

B.1 Scripts

addfile.sh

```
#!/bin/sh
# $1 = tablespace name
# $2 = filename
# $3 = size
# $4 = temporary ts (1) or not (0)
# global variable $tpcc_listfiles, does not execute sql

if expr x$tpcc_listfiles = xt > /dev/null; then
  echo $2 $3 >> $tpcc_bench/files.dat
  exit 0
fi

if expr $4 = 1 > /dev/null; then
  altersql="alter tablespace $1 add tempfile '$2' size $3 reuse;"
else
  altersql="alter tablespace $1 add datafile '$2' size $3 reuse autoextend on;"
fi

$tpcc_sqlplus $tpcc_user_pass <<!
  spool addfile_$1.log
  set echo on
  $altersql
  set echo off
  spool off
  exit ;
!
```

addts.sh

```
#!/bin/sh
# $1 = tablespace name
# $2 = filename
# $3 = size
# $4 = uniform size
# $5 = block size
# $6 = temporary ts (1) or not (0)
# $7 = bitmapped manage (t) or not (f) or (d) for dictionary
# global variable $tpcc_listfiles, does not execute sql

if expr x$tpcc_listfiles = xt > /dev/null; then
  echo $2 $3 >> $tpcc_bench/files.dat
  exit 0
fi

if expr $5 = auto > /dev/null; then
  bssql=
else
  bssql="blocksize $5"
fi

if expr $6 = 1 > /dev/null; then
  createsql="create temporary tablespace $1 tempfile '$2' size $3 reuse extent management local uniform size $4;"
else
  if expr x$7 = xt > /dev/null; then
    createsql="create tablespace $1 datafile '$2' size $3 reuse extent management local uniform size $4 segment
space management auto $bssql nologging ;"
  else
    if expr x$7 = xd > /dev/null; then
      createsql="create tablespace $1 datafile '$2' size $3 reuse extent management dictionary nologging $bssql;"
    else
      createsql="create tablespace $1 datafile '$2' size $3 reuse extent management local uniform size $4 segment
space management manual $bssql nologging ;"
    fi
  fi
fi

$tpcc_sqlplus $tpcc_user_pass <<!
  spool createts_$1.log
  set echo on
  drop tablespace $1 including contents;
  $createsql
  set echo off
  spool off
  exit ;
!
```

analyze.sh

```
#!/bin/sh
$tpcc_sqlplus $tpcc_user_pass @$ {tpcc_sql_dir}/analyze > $tpcc_log_dir/junk 2>&1

if test $? -ne 0
then
  exit 1;
else
  exit 0;
fi
```

Analyze.sql

```
spool analyze.log;
set echo on;

connect tpcc/tpcc

execute dbms_stats.GATHER_TABLE_STATS (OWNNAME=>'TPCC', -
  TABNAME=>'STOK', -
  PARTNAME=>NULL, -
  ESTIMATE_PERCENT=>1, -
  BLOCK_SAMPLE=>TRUE, -
  METHOD_OPT=>'FOR ALL COLUMNS SIZE 1', -
  DEGREE=>10, -
  GRANULARITY=>'DEFAULT', -
  CASCADE=>TRUE);

execute dbms_stats.GATHER_TABLE_STATS (OWNNAME=>'TPCC', -
  TABNAME=>'CUST', -
  PARTNAME=>NULL, -
  ESTIMATE_PERCENT=>1, -
  BLOCK_SAMPLE=>TRUE, -
  METHOD_OPT=>'FOR ALL COLUMNS SIZE 1', -
  DEGREE=>10, -
```

```

GRANULARITY=>DEFAULT', -
CASCADE=>TRUE);

execute dbms_stats.GATHER_TABLE_STATS (OWNNAME=>'TPCC', -
TABNAME=>'ORDR', -
PARTNAME=>NULL, -
ESTIMATE_PERCENT=>1, -
BLOCK_SAMPLE=>TRUE, -
METHOD_OPT=>'FOR ALL COLUMNS SIZE 1', -
DEGREE=>10, -
GRANULARITY=>'DEFAULT', -
CASCADE=>TRUE);

execute dbms_stats.GATHER_TABLE_STATS (OWNNAME=>'TPCC', -
TABNAME=>'ORDL', -
PARTNAME=>NULL, -
ESTIMATE_PERCENT=>1, -
BLOCK_SAMPLE=>TRUE, -
METHOD_OPT=>'FOR ALL COLUMNS SIZE 1', -
DEGREE=>10, -
GRANULARITY=>'DEFAULT', -
CASCADE=>TRUE);

execute dbms_stats.GATHER_TABLE_STATS (OWNNAME=>'TPCC', -
TABNAME=>'NORD', -
PARTNAME=>NULL, -
ESTIMATE_PERCENT=>1, -
BLOCK_SAMPLE=>TRUE, -
METHOD_OPT=>'FOR ALL COLUMNS SIZE 1', -
DEGREE=>10, -
GRANULARITY=>'DEFAULT', -
CASCADE=>TRUE);

execute dbms_stats.GATHER_TABLE_STATS(OWNNAME=>'TPCC', -
TABNAME=>'HIST', -
PARTNAME=>NULL, -
ESTIMATE_PERCENT=>1, -
BLOCK_SAMPLE=>TRUE, -
METHOD_OPT=>'FOR ALL COLUMNS SIZE 1', -
DEGREE=>10, -
GRANULARITY=>'DEFAULT', -
CASCADE=>TRUE);

execute dbms_stats.GATHER_TABLE_STATS(OWNNAME=>'TPCC', -
TABNAME=>'DIST', -
PARTNAME=>NULL, -
ESTIMATE_PERCENT=>1, -
BLOCK_SAMPLE=>TRUE, -
METHOD_OPT=>'FOR ALL COLUMNS SIZE 1', -
DEGREE=>10, -
GRANULARITY=>'DEFAULT', -
CASCADE=>TRUE);

execute dbms_stats.GATHER_TABLE_STATS(OWNNAME=>'TPCC', -
TABNAME=>'ITEM', -
PARTNAME=>NULL, -
ESTIMATE_PERCENT=>10, -
BLOCK_SAMPLE=>TRUE, -
METHOD_OPT=>'FOR ALL COLUMNS SIZE 1', -
DEGREE=>1, -
GRANULARITY=>'DEFAULT', -
CASCADE=>TRUE);

execute dbms_stats.GATHER_TABLE_STATS(OWNNAME=>'TPCC', -
TABNAME=>'WARE', -
PARTNAME=>NULL, -
ESTIMATE_PERCENT=>10, -
BLOCK_SAMPLE=>TRUE, -
METHOD_OPT=>'FOR ALL COLUMNS SIZE 1', -
DEGREE=>10, -
GRANULARITY=>'DEFAULT', -
CASCADE=>TRUE);

```

```

set echo off;
spool off;

exit sql.sqlcode;

```

create_cache_views.sql

```

rem This script creates four views that when queried will return
rem the total number of buffers in the buffer cache and the total
rem number of cloned buffers from each of the database's tablespaces.
rem

```

```

rem This assumes that each table and index is in its own tablespace.
rem If this is not the case, another query can be used which uses the
rem database's object tables to decipher the different objects. However,
rem this query is slower.

```

```

rem
rem This script assumes 7.3.x. If you are using V7.2.x or below, please
rem replace svrmgr1 with sqldba lmode=y.
rem
rem Modification History:
rem
rem whattist 16-Jun-1996 Create two additional views to keep
rem track of the number of clones in each
rem tablespace.
rem
rem whattist 24-May-1995 Add the state check for the cbf view
rem to ensure that cloned blocks are not
rem counted.

```

```

connect Soraacle_dba/$oraacle_dba_password;
set echo on;
drop view cbf;
create view cbf as
select distinct(dbarfil) file#, count(1) blocks
from x$bh
where dbarfil > 0 and state <> 3
group by dbarfil;
drop view cbt;
create view cbt as
select ts.name name,sum(cbf.blocks) buffers
from cbf, file$, ts$
where cbf.file#=file$.file# and file$.ts#=ts$.ts#
group by file$.ts#, ts$.name;
drop view cbfcln;
create view cbfcln as
select distinct(dbarfil) file#, count(1) blocks
from x$bh
where dbarfil > 0
group by dbarfil;
drop view cbtn;
create view cbtn as
select ts.name name,sum(cbfcln.blocks) buffers
from cbfcln, file$, ts$
where cbfcln.file#=file$.file# and file$.ts#=ts$.ts#
group by file$.ts#, ts$.name;

```

```

set echo off;

```

Create_spacestats.sql

```

@space_init
@space_get 230600 18336
@space_rpt
spool off
exit sql.sqlcode;

```

Create_storedprocs.sql

```

spool createstoreprocs.log
@tkvcin.sql
spool off
exit sql.sqlcode;

```

Createdb.sql

```
/* created automatically by /BUILD/scripts/buildcreatedb.sh Wed Jun 14 11:51:42 PDT 2006 */
spool createdb.log
```

```
set echo on
```

```
shutdown abort
```

```
startup pfile=p_create.ora nomount
```

```
create database tpcc
controlfile reuse
maxinstances 1
datafile
'/project/oracle/build20k.4K/dbs/tpcc_disks/system_1' size 400M reuse
logfile '/project/oracle/build20k.4K/dbs/tpcc_disks/log_1_1' size 5120M reuse,
'/project/oracle/build20k.4K/dbs/tpcc_disks/log_1_2' size 5120M reuse
sysaux datafile '/project/oracle/build20k.4K/dbs/tpcc_disks/tpccaux' size 120M reuse ;
```

```
create undo tablespace undo_1 datafile
'/project/oracle/build20k.4K/dbs/tpcc_disks/roll1' size 8096M reuse blocksize 8K;
```

```
set echo off
exit sql.sqlcode
```

createindex_icust1.sql

```
/* created automatically by /BUILD/scripts/buildcreateindex.sh Wed Jun 14 11:52:06 PDT 2006 */
```

```
set timing on
set sqlblanklines on
spool createindex_icust1.log ;
set echo on ;
drop index icust1 ;
create unique index icust1 on cust ( c_w_id
, c_d_id
, c_id )
pctfree 1 intrans 3
storage ( buffer_pool default )
parallel 8
compute statistics
tablespace icust1_0 ;
set echo off
spool off
exit sql.sqlcode;
```

createindex_icust2.sql

```
/* created automatically by /BUILD/scripts/buildcreateindex.sh Wed Jun 14 11:52:07 PDT 2006 */
```

```
set timing on
set sqlblanklines on
spool createindex_icust2.log ;
set echo on ;
drop index icust2 ;
create unique index icust2 on cust ( c_last
, c_w_id
, c_d_id
, c_first
, c_id )
pctfree 1 intrans 3
storage ( buffer_pool default )
parallel 32
compute statistics
tablespace icust2_0 ;
set echo off
spool off
exit sql.sqlcode;
```

createindex_idist.sql

```
/* created automatically by /BUILD/scripts/buildcreateindex.sh Wed Jun 14 11:52:08 PDT 2006 */
```

```
set timing on
set sqlblanklines on
spool createindex_idist.log ;
```

```
set echo on ;
drop index idist ;
create unique index idist on dist ( d_w_id
, d_id )
pctfree 5 intrans 3
storage ( buffer_pool default )
parallel 1
compute statistics
tablespace idist_0 ;
set echo off
spool off
exit sql.sqlcode;
```

createindex_iitem.sql

```
/* created automatically by /BUILD/scripts/buildcreateindex.sh Wed Jun 14 11:52:09 PDT 2006 */
```

```
set timing on
set sqlblanklines on
spool createindex_iitem.log ;
set echo on ;
drop index iitem ;
create unique index iitem on item ( i_id )
pctfree 5 intrans 4
storage ( buffer_pool default )
```

```
compute statistics
tablespace iitem_0 ;
set echo off
spool off
exit sql.sqlcode;
```

createindex_inord.sql

```
/* created automatically by /BUILD/scripts/buildcreateindex.sh Wed Jun 14 11:52:12 PDT 2006 */
```

```
set timing on
exit 0;
```

createindex_iordr1.sql

```
/* created automatically by /BUILD/scripts/buildcreateindex.sh Wed Jun 14 11:52:10 PDT 2006 */
```

```
set timing on
exit 0;
```

createindex_iordr2.sql

```
/* created automatically by /BUILD/scripts/buildcreateindex.sh Wed Jun 14 11:52:11 PDT 2006 */
```

```
set timing on
set sqlblanklines on
spool createindex_iordr2.log ;
set echo on ;
drop index iordr2 ;
create unique index iordr2 on ordcr ( o_c_id
, o_d_id
, o_w_id
, o_id )
pctfree 25 intrans 4
storage ( buffer_pool default )
parallel 32
compute statistics
tablespace iordr2_0 ;
set echo off
spool off
exit sql.sqlcode;
```

createindex_istok.sql

```
/* created automatically by /BUILD/scripts/buildcreateindex.sh Wed Jun 14 11:52:09 PDT 2006 */
set timing on
set sqlblanklines on
spool createindex_istok.log ;
set echo on ;
drop index istok ;
create unique index istok on stok ( s_i_id
, s_w_id )
pctfree 1 initrans 3
storage ( buffer_pool default )
parallel 16
compute statistics
tablespace istok_0 ;
set echo off
spool off
exit sql.sqlcode;
```

Createindex_iware.sql

```
/* created automatically by /BUILD/scripts/buildcreateindex.sh Wed Jun 14 11:52:06 PDT 2006 */
set timing on
set sqlblanklines on
spool createindex_iware.log ;
set echo on ;
drop index iware ;
create unique index iware on ware ( w_id )
pctfree 1 initrans 3
storage ( buffer_pool default )
parallel 1
compute statistics
tablespace iware_0 ;
set echo off
spool off
exit sql.sqlcode;
```

createmisc.sh

```
#!/bin/sh

$tpcc_sqlplus $tpcc_sqlplus_args << !
$tpcc_internal_connect

spool createmisc.log
set echo on;
alter user tpcc temporary tablespace system;
grant execute on dbms_lock to public;
grant execute on dbms_pipe to public;
grant select on v_$(parameter) to public;

REM
REM begin plsql_mon.sql
REM

connect tpcc/tpcc;
set echo on;
CREATE OR REPLACE PACKAGE plsql_mon_pack
IS
  PROCEDURE print
  (
    info    VARCHAR2
  );
END;
/
show errors;

CREATE OR REPLACE PACKAGE BODY plsql_mon_pack
IS
  PROCEDURE print
  (
    info    VARCHAR2
  )
  IS
    s      NUMBER;
  BEGIN
    dbms_pipe.pack_message (info);
    s := dbms_pipe.send_message ('plsql_mon');
    IF (s <> 0) THEN
      raise_application_error (-20000, 'Error: ' || to_char(s) ||
        ' sending on pipe');
    END IF;
  END;
END;
/
show errors;

set echo off;

REM
REM end plsql_mon.sql
REM

REM
REM begin cre_tab.sql
REM

connect tpcc/tpcc;
set echo on;

drop table temp_o1;
drop table temp_no;
drop table temp_o2;
drop table temp_ol;
drop table tpcc_audit_tab;

create table temp_o1 (
  o_w_id integer,
  o_d_id integer,
  o_o_id integer);

create table temp_no (
  no_w_id integer,
  no_d_id integer,
  no_o_id integer);

create table temp_o2 (
  o_w_id integer,
  o_d_id integer,
  o_count integer);

create table temp_ol (
  ol_w_id integer,
  ol_d_id integer,
  ol_count integer);

create table tpcc_audit_tab (starttime date);

delete from tpcc_audit_tab;
```

```

set echo off;

REM
REM end cre_tab.sql
REM

REM
REM begin views.sql
REM

connect tpcc/tpcc;
set echo on;

create or replace view wh_cust
(w_id, w_tax, c_id, c_d_id, c_w_id, c_discount, c_last, c_credit)
as select w.w_id, w.w_tax,
        c.c_id, c.c_d_id, c.c_w_id, c.c_discount, c.c_last, c.c_credit
   from cust c, ware w
  where w.w_id = c.c_w_id;

create or replace view wh_dist
(w_id, d_id, d_tax, d_next_o_id, w_tax )
as select w.w_id, d.d_id, d.d_tax, d.d_next_o_id, w.w_tax
   from dist d, ware w
  where w.w_id = d.d_w_id;

create or replace view stock_item
(i_id, s_w_id, i_price, i_name, i_data, s_data, s_quantity,
s_order_cnt, s_ytd, s_remote_cnt,
s_dist_01, s_dist_02, s_dist_03, s_dist_04, s_dist_05,
s_dist_06, s_dist_07, s_dist_08, s_dist_09, s_dist_10)
as
select i.i_id, s.w_id, i.i_price, i.i_name, i.i_data, s_data, s_quantity,
s_order_cnt, s_ytd, s_remote_cnt,
s_dist_01, s_dist_02, s_dist_03, s_dist_04, s_dist_05,
s_dist_06, s_dist_07, s_dist_08, s_dist_09, s_dist_10
   from stok s, item i
  where i.i_id = s.s_i_id;

set echo off;

REM
REM end views.sql
REM

REM
REM begin dml.sql
REM
connect tpcc/tpcc;
set echo on;

alter table ware disable table lock;
alter table dist disable table lock;
alter table cust disable table lock;
alter table hist disable table lock;
alter table item disable table lock;
alter table stok disable table lock;
alter table ordr disable table lock;
alter table nord disable table lock;
alter table ordl disable table lock;

set echo off;

REM
REM end dml.sql
REM

REM
REM begin extent.sql
REM

$$SYS_CONNECTION_STRING

@$tpcc_sql_dir/extent

@$tpcc_sql_dir/freext

exit sql.sqlcode;

!
```

createspacestats.sh

```

#!/bin/sh
cd $tpcc_genscripts_dir
$tpcc_sqlplus $tpcc_dba_user_pass @$tpcc_genscripts_dir/createspacestats > junk 2>&1

if test $? -ne 0
then
  exit 1;
else
  exit 0;
fi
```

creatstats.sh

```

#!/bin/sh

cstat=c_stat
if test $tpcc_np -gt 1 ; then
  cstat=c_stat_rac
fi

$tpcc_sqlplus $tpcc_sqlplus_args << !
$tpcc_internal_connect

REM
REM create tablespace for statspack user sp begin
REM

spool creatstats.log

set echo on
drop tablespace sp_0 including contents;
create tablespace sp_0 datafile '${tpcc_disks_location}sp_0' size $tpcc_statspack_size reuse autoextend on
extent management local uniform size 1M nologging ;
spool off

REM
REM create tablespace for statspack user sp end
REM

REM
REM begin now call spcreate to create statspack sp package
REM

$tpcc_internal_connect

define default_tablespace='sp_0'

define temporary_tablespace='temp_0'

@$ORACLE_HOME/rdbms/admin/spcreate
perfstat

REM note that the last thing (after spcreate) is the perfstat password.
REM since we're not worried about security, perfstat will do.

REM
REM tpcc stat table for NT, it is not working so I comment it out
REM shui.lau@oracle.com it is better to use perfmon
REM

@$tpcc_sql_dir/cs_tpcc
@$tpcc_sql_dir/cs_cpu
@$tpcc_sql_dir/cs_os
@$tpcc_sql_dir/cs_proc
@$tpcc_sql_dir/cs_thread

REM
REM tpcc result table for unix and NT
REM

@$tpcc_sql_dir/${cstat}
@$tpcc_sql_dir/pst_c

!
```

createstoredprocs.sh

```
#!/bin/sh
cd $tpcc_genscripts_dir
$tpcc_sqlplus $tpcc_user_pass @$ {tpcc_genscripts_dir}/createstoredprocs > junk 2>&1

if test $? -ne 0
then
  exit 1;
else
  exit 0;
fi
```

createtable_cust.sql

```
/* created automatically by /BUILD/scripts/buildcreatetable.sh Wed Jun 14 11:51:45 PDT 2006 */
set timing on
set sqlblanklines on
spool createtable_cust.log
set echo on
drop cluster custcluster including tables ;

create cluster custcluster (
  c_id number
, c_d_id number
, c_w_id number
)
single table
hashkeys 600000000
hash is ((c_id * (20000 * 10) + c_w_id * 10 + c_d_id) )
size 360
pctfree 0 initrans 3
storage ( buffer_pool recycle ) parallel ( degree 8 )
tablespace cust_0;

create table cust (
  c_id number
, c_d_id number
, c_w_id number
, c_discount number
, c_credit char(2)
, c_last varchar2(16)
, c_first varchar2(16)
, c_credit_lim number
, c_balance number
, c_ytd_payment number
, c_payment_cnt number
, c_delivery_cnt number
, c_street_1 varchar2(20)
, c_street_2 varchar2(20)
, c_city varchar2(20)
, c_state char(2)
, c_zip char(9)
, c_phone char(16)
, c_since date
, c_middle char(2)
, c_data char(500)
)
cluster custcluster (
  c_id
, c_d_id
, c_w_id
);
set echo off
spool off
exit sql.sqlcode;
```

Createtable_dist.sql

```
/* created automatically by /BUILD/scripts/buildcreatetable.sh Wed Jun 14 11:51:50 PDT 2006 */
set timing on
set sqlblanklines on
spool createtable_dist.log
set echo on
drop cluster distcluster including tables ;

create cluster distcluster (
  d_id number
, d_w_id number
)
single table
hashkeys 200000
hash is (((d_w_id * 10) + d_id) )
size 1796
initrans 4
storage ( buffer_pool default )
tablespace dist_0;

create table dist (
  d_id number
, d_w_id number
, d_ytd number
, d_next_o_id number
, d_tax number
, d_name varchar2(10)
, d_street_1 varchar2(20)
, d_street_2 varchar2(20)
, d_city varchar2(20)
, d_state char(2)
)
```

```

, d_zip char(9)
)
cluster distcluster (
  d_id
, d_w_id
);
set echo off
spool off
exit sql.sqlcode;

```

createtable_hist.sql

```

/* created automatically by /BUILD/scripts/buildcreatetable.sh Wed Jun 14 11:51:52 PDT 2006 */
set timing on
set sqlblanklines on
spool createtable_hist.log
set echo on
drop table hist ;

create table hist (
  h_c_id number
, h_c_d_id number
, h_c_w_id number
, h_d_id number
, h_w_id number
, h_date date
, h_amount number
, h_data varchar2(24)
)
pctfree 5 initrans 4
storage ( buffer_pool recycle )
tablespace hist_0 ;
set echo off
spool off
exit sql.sqlcode;

```

createtable_item.sql

```

/* created automatically by /BUILD/scripts/buildcreatetable.sh Wed Jun 14 11:51:57 PDT 2006 */
set timing on
set sqlblanklines on
spool createtable_item.log
set echo on
drop cluster itemcluster including tables ;

create cluster itemcluster (
  i_id number(6,0)
)
single table
hashkeys 100000
hash is ( (i_id) )
size 120
pctfree 0 initrans 3
storage ( buffer_pool keep )
tablespace item_0;

create table item (
  i_id number(6,0)
, i_name varchar2(24)
, i_price number
, i_data varchar2(50)
, i_im_id number
)
cluster itemcluster (
  i_id
);
set echo off
spool off
exit sql.sqlcode;

```

createtable_nord.sql

```

/* created automatically by /BUILD/scripts/buildcreatetable.sh Wed Jun 14 11:52:02 PDT 2006 */
set timing on
set sqlblanklines on
spool createtable_nord.log
set echo on
drop cluster nordcluster_queue including tables ;

create cluster nordcluster_queue (
  no_w_id number
, no_d_id number
, no_o_id number SORT
)

hashkeys 200000
hash is ( (no_w_id - 1) * 10 + no_d_id - 1 )
size 190
tablespace nord_0;

```

```

create table nord (
  no_w_id number
, no_d_id number
, no_o_id number sort
  , constraint nord_uk primary key ( no_w_id
, no_d_id
, no_o_id )
)
cluster nordcluster_queue (
  no_w_id
, no_d_id
, no_o_id
);
set echo off
spool off
exit sql.sqlcode;

```

createtable_ordl.sql

```

/* created automatically by /BUILD/scripts/buildcreatetable.sh Wed Jun 14 11:52:00 PDT 2006 */
set timing on
set sqlblanklines on
spool createtable_ordl.log
set echo on
create table ordl (
  ol_w_id number
, ol_d_id number
, ol_o_id number sort
, ol_number number sort
, ol_i_id number
, ol_delivery_d date
, ol_amount number
, ol_supply_w_id number
, ol_quantity number
, ol_dist_info char(24)
  , constraint ordl_uk primary key (ol_w_id, ol_d_id, ol_o_id, ol_number )) CLUSTER
ordrcluster_queue(ol_w_id, ol_d_id, ol_o_id, ol_number);
set echo off
spool off
exit sql.sqlcode;

```

createtable_ordr.sql

```

/* created automatically by /BUILD/scripts/buildcreatetable.sh Wed Jun 14 11:51:59 PDT 2006 */
set timing on
set sqlblanklines on
spool createtable_ordr.log
set echo on
drop cluster ordrcluster_queue including tables ;

create cluster ordrcluster_queue (
  o_w_id number
, o_d_id number
, o_id number SORT
, o_number number SORT
)

hashkeys 200000
hash is ((o_w_id - 1) * 10 + o_d_id - 1)
size 1490
tablespace ordr_0;

create table ordr (
  o_id number sort
, o_w_id number
, o_d_id number
, o_c_id number
, o_carrier_id number
, o_ol_cnt number
, o_all_local number
, o_entry_d date
  , constraint ordr_uk primary key ( o_w_id
, o_d_id
, o_id )
)
cluster ordrcluster_queue (
  o_w_id
, o_d_id
, o_id
);
set echo off
spool off
exit sql.sqlcode;

```

createtable_stok.sql

```

/* created automatically by /BUILD/scripts/buildcreatetable.sh Wed Jun 14 11:51:53 PDT 2006 */
set timing on
set sqlblanklines on
spool createtable_stok.log
set echo on
drop cluster stokcluster including tables ;

create cluster stokcluster (
  s_i_id number
, s_w_id number
)

```



```

single table
hashkeys 200000000
hash is ( (s_i_id * 20000 + s_w_id) )
size 290
pctfree 0 initrans 2 maxtrans 2
storage ( buffer_pool keep ) parallel ( degree 8 )
tablespace stok_0;

```

```

create table stok (
  s_i_id number
, s_w_id number
, s_quantity number
, s_ytd number
, s_order_cnt number
, s_remote_cnt number
, s_data varchar2(50)
, s_dist_01 char(24)
, s_dist_02 char(24)
, s_dist_03 char(24)
, s_dist_04 char(24)
, s_dist_05 char(24)
, s_dist_06 char(24)
, s_dist_07 char(24)
, s_dist_08 char(24)
, s_dist_09 char(24)
, s_dist_10 char(24)
)
cluster stocluster (
  s_i_id
, s_w_id
);
set echo off
spool off
exit sql.sqlcode;

```

Createtable_ware.sql

/* created automatically by /BUILD/scripts/buildcreatetable.sh Wed Jun 14 11:51:43 PDT 2006 */

```

set timing on
set sqlblanklines on
spool createtable_ware.log
set echo on
drop cluster warecluster including tables ;

```

```

create cluster warecluster (
  w_id number
)
single table
hashkeys 20000
hash is ( (w_id - 1) )
size 3496
initrans 2
storage ( buffer_pool default )
tablespace ware_0;

```

```

create table ware (
  w_id number
, w_ytd number
, w_tax number
, w_name varchar2(10)
, w_street_1 varchar2(20)
, w_street_2 varchar2(20)
, w_city varchar2(20)
, w_state char(2)
, w_zip char(9)
)
cluster warecluster (
  w_id
);
set echo off
spool off
exit sql.sqlcode;

```

Createts.sh

#created automatically by /BUILD/scripts/buildcreatets.sh Wed Jun 14 11:51:30 PDT 2006

```

### Tablespace ware, ts size 90M (92160K)
### # each file 90M (92160K)
### # extents 86624K (86624K)
### # 1 files
###
### $tpcc_createts ware 1 1 90M 86624K unix 0 0 8 2K t
### if expr $? != 0 > /dev/null; then
### echo Creating tablespace for ware failed. Exiting.
### exit 0
### fi

### # Tablespace cust, ts size 614400M (629145600K)
### # each file 15360M (15728640K)
### # extents 125756K (125756K)
### # 40 files
###
### $tpcc_createts cust 40 1 15360M 125756K unix 0 1 8 auto t
### if expr $? != 0 > /dev/null; then
### echo Creating tablespace for cust failed. Exiting.
### exit 0
### fi

# Tablespace dist, ts size 923M (860160K)
# each file 923M (860160K)
# extents 225280K (857024K)
# 1 files

$tpcc_createts dist 1 1 923M 225280K unix 0 41 8 2K t
if expr $? != 0 > /dev/null; then
echo Creating tablespace for dist failed. Exiting.
exit 0
fi

### # Tablespace hist, ts size 52080M (53329920K)
### # each file 6510M (6666240K)
### # extents 102432K (102432K)
### # 8 files
###
### $tpcc_createts hist 8 1 6510M 102432K unix 0 42 8 auto t
### if expr $? != 0 > /dev/null; then
### echo Creating tablespace for hist failed. Exiting.
### exit 0
### fi

```

```

### # Tablespace stok, ts size 765120M (783482880K)
### # each file 15940M (16322560K)
### # extents 156912K (156912K)
### # 48 files
###
### # $tpcc_create$ stok 48 1 15940M 156912K unix 0 50 8 auto t
### # if expr $? != 0 > /dev/null; then
### # echo Creating tablespace for stok failed. Exiting.
### # exit 0
### # fi

### # Tablespace item, ts size 20M (20480K)
### # each file 20M (20480K)
### # extents 16892K (16892K)
### # 1 files
###
### # $tpcc_create$ item 1 1 20M 16892K unix 0 98 8 2K t
### # if expr $? != 0 > /dev/null; then
### # echo Creating tablespace for item failed. Exiting.
### # exit 0
### # fi

### # Tablespace iitem, ts size 20M (20480K)
### # each file 20M (20480K)
### # extents 11264K (11264K)
### # 1 files
###
### # $tpcc_create$ iitem 1 1 20M 11264K unix 0 128 8 2K t
### # if expr $? != 0 > /dev/null; then
### # echo Creating tablespace for iitem failed. Exiting.
### # exit 0
### # fi

### # Tablespace iordr2, ts size 31360M (32112640K)
### # each file 3920M (4014080K)
### # extents 62540K (62540K)
### # 8 files
###
### # $tpcc_create$ iordr2 8 1 3920M 62540K unix 0 129 8 auto t
### # if expr $? != 0 > /dev/null; then
### # echo Creating tablespace for iordr2 failed. Exiting.
### # exit 0
### # fi

### # Tablespace iordr, ts size 710720M (72777280K)
### # each file 44420M (45486080K)
### # extents 103360K (103360K)
### # 16 files
###
### # $tpcc_create$ iordr 16 1 44420M 103360K unix 0 99 8 16K t
### # if expr $? != 0 > /dev/null; then
### # echo Creating tablespace for iordr failed. Exiting.
### # exit 0
### # fi

### # Tablespace nord, ts size 6670M (6830080K)
### # each file 6670M (6830080K)
### # extents 682332K (682332K)
### # 1 files
###
### # $tpcc_create$ nord 1 1 6670M 682332K unix 0 115 8 auto t
### # if expr $? != 0 > /dev/null; then
### # echo Creating tablespace for nord failed. Exiting.
### # exit 0
### # fi

### # Tablespace iware, ts size 30M (30720K)
### # each file 30M (30720K)
### # extents 26024K (26024K)
### # 1 files
###
### # $tpcc_create$ iware 1 1 30M 26024K unix 0 116 8 2K t
### # if expr $? != 0 > /dev/null; then
### # echo Creating tablespace for iware failed. Exiting.
### # exit 0
### # fi

### # Tablespace icust1, ts size 14635M (14469120K)
### # each file 14635M (14469120K)
### # extents 226032K (226032K)
### # 1 files
###
### # $tpcc_create$ icust1 1 1 14635M 226032K unix 0 117 8 16K t
### # if expr $? != 0 > /dev/null; then
### # echo Creating tablespace for icust1 failed. Exiting.
### # exit 0
### # fi

### # Tablespace icust2, ts size 32240M (33013760K)
### # each file 4244M (4126720K)
### # extents 65536K (64308K)
### # 8 files
###
### # $tpcc_create$ icust2 8 1 4244M 65536K unix 0 118 8 16K t
### # if expr $? != 0 > /dev/null; then
### # echo Creating tablespace for icust2 failed. Exiting.
### # exit 0
### # fi

### # Tablespace idist, ts size 110M (112640K)
### # each file 110M (112640K)
### # extents 101024K (101024K)
### # 1 files
###
### # $tpcc_create$ idist 1 1 110M 101024K unix 0 126 8 2K t
### # if expr $? != 0 > /dev/null; then
### # echo Creating tablespace for idist failed. Exiting.
### # exit 0
### # fi

### # Tablespace istok, ts size 45226M (42741760K)
### # each file 45226M (42741760K)
### # extents 667696K (667696K)
### # 1 files
###
### # $tpcc_create$ istok 1 1 45226M 667696K unix 0 127 8 16K t
### # if expr $? != 0 > /dev/null; then
### # echo Creating tablespace for istok failed. Exiting.
### # exit 0
### # fi

```

createuser.sh

```
#!/bin/sh

echo Creating user tpcc...
$tpcc_sqlplus $tpcc_dba_user_pass @$tpcc_sql_dir/createuser > junk 2>&1
if test $? -ne 0
then
    exit 1;
else
    exit 0;
fi
```

Createuser.sql

```
spool createusertpcc.log;

set echo on;

create user tpcc identified by tpcc;

grant dba to tpcc;

set echo off;
spool off;

exit ;
```

ddview.sh

```
#!/bin/sh

$tpcc_sqlplus $tpcc_sqlplus_args << !
$tpcc_internal_connect

spool ddview.log

REM
REM In an ade/nde view we might need to run standard.sql and dbmsstdx manually
REM catalog and catproc suppose to take care of it
REM

@$ORACLE_HOME/plsql/admin/standard
@$ORACLE_HOME/rdbms/admin/dbmsstdx

@$ORACLE_HOME/rdbms/admin/catalog
@$ORACLE_HOME/rdbms/admin/catproc

REM
REM In an ade/nde view we might need to run pupbld manually
REM catalog and catproc suppose to take care of it
REM

connect system/manager
REM @$ORACLE_HOME/sqlplus/admin/pupbld

REM
REM Oracle
REM

REM if test $NUMBER_ORACLE_NODE -gt 1
REM then

REM @$ORACLE_HOME/rdbms/admin/catparr

REM fi

spool off
!

#sh $tpcc_scripts/queue.sh
```

dml.sql

```
REM=====
REM Copyright (c) 1996 Oracle Corp, Redwood Shores, CA |
REM OPEN SYSTEMS PERFORMANCE GROUP |
REM All Rights Reserved |
REM=====
REM FILENAME
REM dml.sql
REM DESCRIPTION
REM Disable table locks for TPC-C tables.
REM USAGE
REM sqlplus tpcc/tpcc dml.sql
REM=====
```

```
connect tpcc/tpcc;
set echo on;

alter table ware disable table lock;
alter table dist disable table lock;
alter table cust disable table lock;
alter table hist disable table lock;
alter table item disable table lock;
alter table stok disable table lock;
alter table ordr disable table lock;
alter table nord disable table lock;
alter table ordl disable table lock;

set echo off;

connect $oracle_dba/$oracle_dba_password;
```

driver.sh

```
#!/bin/sh

./stepenv.sh

if expr $# \< 1 > /dev/null; then
    echo "$0 <starting stepname> <optional: only>"
    echo OR use:
    echo "$0 buildcreate - to build the database creation scripts"
    echo "$0 create - to create the database (after buildcreate)"
    echo "$0 steps - to list individual steps"
    exit 1
fi

if expr x$1 = xsteps > /dev/null; then
    echo stepnames are from creation scripts: $tpcc_create_steps
    echo
    echo or running steps: $tpcc_steps
    echo "use the 'only' option to only do that step (otherwise all steps after will also be executed.)"
    echo " (e.g. $0 listfiles only)"
    echo "use the 'through' option to do a sequence of steps (inclusively.)"
    echo " (e.g. $0 shutdowndb through startupdb-p-build)"
    exit 1
fi

startstep=$1
controlcmd=$2
endstep=$3

# Aliases for special steps
if test $startstep = buildcreate; then
    startstep=`echo $tpcc_create_steps | cut -d' ' -f1`
fi

if test $startstep = create; then
    startstep=`echo $tpcc_steps | cut -d' ' -f1`
fi

if test "x$controlcmd" = x; then
    endstep=
    # Since endstep is null it won't match any other steps, so we keep going.
    # SKS avoid letting things just run on
    controlcmd=only
elif test "x$controlcmd" = xonly; then
    controlcmd=only
    # this is allowed
elif test "x$controlcmd" = xthrough; then
    actualstep=f
    for step in $tpcc_create_steps $tpcc_steps ; do
        if test "x$step" = "x$endstep"; then
            actualstep=t
        fi
    done
```

```

if test $actualstep = f; then
  echo "Invalid step $endstep. Use $0 steps to show steps."
  exit 1
fi
else
  echo "Invalid syntax. Use $0 by itself for help."
  exit 1
fi

echo Starting from step: $startstep

dostep=f
for step in $tpcc_create_steps $tpcc_steps ; do
  if expr $step = $startstep > /dev/null; then
    dostep=t
  fi

  if expr $dostep = t > /dev/null; then
    echo STEP: $step
    cd $tpcc_bench
    $tpcc_scripts/echo $step | cut -d- -f1 .sh `echo $step | sed -e's/-*/-/` | cut -d- -f2- | sed -e's/-/ /g`
    lasterror=$?
    cd $tpcc_bench
    if test -n "`find $tpcc_bench/scripts -name *.log`"; then
      mv -f *.log `find $tpcc_bench/scripts -name *.log` $tpcc_bench/log/
    else
      if test -n "`find $tpcc_bench/ -name *.log`"; then
        mv -f *.log $tpcc_bench/log/
      fi
    fi

    if expr $lasterror != 0 > /dev/null; then
      if expr $lasterror != 99 > /dev/null; then
        echo Step $step failed. Stopping driver.
        exit 1
      else
        echo Step $step has completed and requested stop. Stopping driver.
        exit 0
      fi
    fi
    if test "x$controlcmd" = xonly; then
      exit 0
    fi
    if test "x$endstep" = "x$step"; then
      echo The driver reached the last desired step. Stopping driver.
      exit 0
    fi
  fi
done

if expr $dostep = f > /dev/null; then
  echo No such step: $1
fi

```

extent.sql

```

REM Copyright (c) 1994 Oracle Corp. Belmont, CA |
REM OPEN SYSTEMS PERFORMANCE GROUP |
REM All Rights Reserved |
REM=====
REM FILENAME
REM extent.sql
REM DESCRIPTION
REM List all extents in all the TPCC tablespaces.
REM
REM Usage: sqlplus 'sys/change_on_install as sysdba' @extent
REM=====*/

set space 2
set pagesize 2000
set echo off
set termout off
set verify off
set feedback off
spool extent.rpt
select substr(e.tablespace_name,1,8) tspace,
       substr(segment_name,1,11) segment, substr(segment_type,1,15) type,
       substr(extent_id,1,5) eid, substr(file_id,1,5) fid, blocks,
       blocks * t.block_size / 1048576 size_MB
from dba_extents e, dba_tablespaces t
where owner = 'TPCC' AND ( segment_type = 'INDEX' OR
       segment_type = 'INDEX PARTITION' OR segment_type = 'CLUSTER'
       OR segment_type = 'TABLE' OR segment_type = 'TABLE PARTITION')
       AND e.tablespace_name <> 'SYSTEM'
       AND e.tablespace_name = t.tablespace_name
order by e.tablespace_name, segment_name, extent_id, file_id;

select substr(e.tablespace_name,1,8) tspace,
       substr(segment_name,1,11) segment,
       sum(blocks) tot_blk, sum(blocks) * t.block_size / 1048576 size_MB
from dba_extents e, dba_tablespaces t
where owner = 'TPCC' AND ( segment_type = 'INDEX' OR
       segment_type = 'INDEX PARTITION' OR segment_type = 'CLUSTER'
       OR segment_type = 'TABLE' OR segment_type = 'TABLE PARTITION')
       AND e.tablespace_name <> 'SYSTEM'
       AND e.tablespace_name = t.tablespace_name
group by e.tablespace_name, segment_name, t.block_size
order by e.tablespace_name, segment_name;
spool off;

```

freext.sql

```

REM=====
REM Copyright (c) 1994 Oracle Corp. Belmont, CA |
REM OPEN SYSTEMS PERFORMANCE GROUP |
REM All Rights Reserved |
REM=====
REM FILENAME
REM freext.sql
REM DESCRIPTION
REM List all free extents in all the TPCC tablespace
REM
REM Usage: sqlplus 'sys/change_on_install as sysdba' @freext
REM=====*/

set space 2
set pagesize 2000
set echo off
set termout off
set verify off
set feedback off
spool freext.rpt
select substr(e.tablespace_name,1,8) tspace, file_id, block_id, blocks,
       blocks * t.block_size / 1048576 size_MB
from dba_free_space e, dba_tablespaces t
where e.tablespace_name = t.tablespace_name
order by e.tablespace_name, file_id, block_id;

select substr(e.tablespace_name,1,8) tspace, sum(blocks) tot_blk,
       sum(blocks) * t.block_size / 1048576 size_MB
from dba_free_space e, dba_tablespaces t
where e.tablespace_name = t.tablespace_name
group by e.tablespace_name, t.block_size
order by e.tablespace_name;

```

initpay.sql

```

CREATE OR REPLACE PACKAGE initpay
AS
TYPE rowidarray IS TABLE OF ROWID INDEX BY BINARY_INTEGER;

```

```

row_id          rowidarray;
cust_rowid      ROWID;
dist_name       VARCHAR2(11);
ware_name       VARCHAR2(11);
c_num          BINARY_INTEGER;
PROCEDURE pay_init;
END initpay;
/
CREATE OR REPLACE PACKAGE BODY initpay AS
PROCEDURE pay_init IS
BEGIN
  NULL;
END pay_init;
END initpay;
/
exit;

```

loadcust.sh

```

#created automatically by /BUILD/scripts/generated/gen_loadcust.awk Thu Jun 29 13:32:53 PDT 2006
rm -f loadcust*.log
cd $tpcc_bench
allprocs=
Stpcc_load -M 20000 -C -1 1 -m 144 >> loadcust0.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 145 -m 280 >> loadcust1.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 281 -m 416 >> loadcust2.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 417 -m 552 >> loadcust3.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 553 -m 688 >> loadcust4.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 689 -m 824 >> loadcust5.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 825 -m 960 >> loadcust6.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 961 -m 1096 >> loadcust7.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 1097 -m 1232 >> loadcust8.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 1233 -m 1368 >> loadcust9.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 1369 -m 1504 >> loadcust10.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 1505 -m 1640 >> loadcust11.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 1641 -m 1776 >> loadcust12.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 1777 -m 1912 >> loadcust13.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 1913 -m 2048 >> loadcust14.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 2049 -m 2184 >> loadcust15.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 2185 -m 2320 >> loadcust16.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 2321 -m 2456 >> loadcust17.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 2457 -m 2592 >> loadcust18.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 2593 -m 2728 >> loadcust19.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 2729 -m 2864 >> loadcust20.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -C -1 2865 -m 3000 >> loadcust21.log 2>&1 &
allprocs="$Sallprocs ${!}"
error=0
for curproc in $allprocs; do
  wait $curproc
  error=`expr $? + $error`
done
exit `expr $error != 0`

```

loaddist.sh

```

cd $tpcc_bench
Stpcc_load -M $tpcc_scale -d > loaddist.log 2>&1

```

loadhist.sh

```

#created automatically by /BUILD/scripts/evencload.sh Wed Jun 14 11:52:03 PDT 2006
rm -f loadhist*.log
cd $tpcc_bench
allprocs=
Stpcc_load -M 20000 -h -b 1 -e 1250 >> loadhist0.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -h -b 1251 -e 2500 >> loadhist1.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -h -b 2501 -e 3750 >> loadhist2.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -h -b 3751 -e 5000 >> loadhist3.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -h -b 5001 -e 6250 >> loadhist4.log 2>&1 &
allprocs="$Sallprocs ${!}"
Stpcc_load -M 20000 -h -b 6251 -e 7500 >> loadhist5.log 2>&1 &

```

```

allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -h -b 7501 -e 8750 >> loadhist6.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -h -b 8751 -e 10000 >> loadhist7.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -h -b 10001 -e 11250 >> loadhist8.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -h -b 11251 -e 12500 >> loadhist9.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -h -b 12501 -e 13750 >> loadhist10.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -h -b 13751 -e 15000 >> loadhist11.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -h -b 15001 -e 16250 >> loadhist12.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -h -b 16251 -e 17500 >> loadhist13.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -h -b 17501 -e 18750 >> loadhist14.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -h -b 18751 -e 20000 >> loadhist15.log 2>&1 &
allprocs="Sallprocs ${!}"
error=0
for curproc in Sallprocs; do
    wait $curproc
    error=`expr $? + $error`
done
exit `expr $error != 0`

```

loaditem.sh

```

cd Stpcc_bench
Stpcc_load -M Stpcc_scale -i > loaditem.log 2>&1

```

loadnord.sh

```

#created automatically by /BUILD/scripts/eventload.sh Wed Jun 14 11:52:03 PDT 2006
rm -f loadnord*.log
cd Stpcc_bench
allprocs=
Stpcc_load -M 20000 -n -b 1 -e 1250 >> loadnord0.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -n -b 1251 -e 2500 >> loadnord1.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -n -b 2501 -e 3750 >> loadnord2.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -n -b 3751 -e 5000 >> loadnord3.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -n -b 5001 -e 6250 >> loadnord4.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -n -b 6251 -e 7500 >> loadnord5.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -n -b 7501 -e 8750 >> loadnord6.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -n -b 8751 -e 10000 >> loadnord7.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -n -b 10001 -e 11250 >> loadnord8.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -n -b 11251 -e 12500 >> loadnord9.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -n -b 12501 -e 13750 >> loadnord10.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -n -b 13751 -e 15000 >> loadnord11.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -n -b 15001 -e 16250 >> loadnord12.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -n -b 16251 -e 17500 >> loadnord13.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -n -b 17501 -e 18750 >> loadnord14.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -n -b 18751 -e 20000 >> loadnord15.log 2>&1 &
allprocs="Sallprocs ${!}"
error=0
for curproc in Sallprocs; do
    wait $curproc
    error=`expr $? + $error`
done
exit `expr $error != 0`

```

loadordrordl.sh

```

#created automatically by /BUILD/scripts/eventload.sh Wed Jun 14 11:52:04 PDT 2006
rm -f loadordrordl*.log
cd Stpcc_bench
allprocs=
Stpcc_load -M 20000 -o ${tpcc_disks_location}dummy0.dat -b 1 -e 1250 >> loadordrordl0.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -o ${tpcc_disks_location}dummy1.dat -b 1251 -e 2500 >> loadordrordl1.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -o ${tpcc_disks_location}dummy2.dat -b 2501 -e 3750 >> loadordrordl2.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -o ${tpcc_disks_location}dummy3.dat -b 3751 -e 5000 >> loadordrordl3.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -o ${tpcc_disks_location}dummy4.dat -b 5001 -e 6250 >> loadordrordl4.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -o ${tpcc_disks_location}dummy5.dat -b 6251 -e 7500 >> loadordrordl5.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -o ${tpcc_disks_location}dummy6.dat -b 7501 -e 8750 >> loadordrordl6.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -o ${tpcc_disks_location}dummy7.dat -b 8751 -e 10000 >> loadordrordl7.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -o ${tpcc_disks_location}dummy8.dat -b 10001 -e 11250 >> loadordrordl8.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -o ${tpcc_disks_location}dummy9.dat -b 11251 -e 12500 >> loadordrordl9.log 2>&1 &
allprocs="Sallprocs ${!}"

```

```

Stpcc_load -M 20000 -o ${tpcc_disks_location}dummy10.dat -b 12501 -e 13750 >> loadordrord110.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -o ${tpcc_disks_location}dummy11.dat -b 13751 -e 15000 >> loadordrord111.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -o ${tpcc_disks_location}dummy12.dat -b 15001 -e 16250 >> loadordrord112.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -o ${tpcc_disks_location}dummy13.dat -b 16251 -e 17500 >> loadordrord113.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -o ${tpcc_disks_location}dummy14.dat -b 17501 -e 18750 >> loadordrord114.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -o ${tpcc_disks_location}dummy15.dat -b 18751 -e 20000 >> loadordrord115.log 2>&1 &
allprocs="Sallprocs ${!}"
error=0
for curproc in Sallprocs; do
  wait $curproc
  error=`expr $? + $error`
done
exit `expr $error != 0`

```

loadstok.sh

```

Created automatically by /BUILD/scripts/generated/gen_loadstok.awk Fri Jun 16 14:07:37 PDT 2006
rm -f loadstok*.log
cd $tpcc_bench
allprocs=
Stpcc_load -M 20000 -S -j 1 -k 4555 >> loadstok0.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 4556 -k 9100 >> loadstok1.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 9101 -k 13645 >> loadstok2.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 13646 -k 18190 >> loadstok3.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 18191 -k 22735 >> loadstok4.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 22736 -k 27280 >> loadstok5.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 27281 -k 31825 >> loadstok6.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 31826 -k 36370 >> loadstok7.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 36371 -k 40915 >> loadstok8.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 40916 -k 45460 >> loadstok9.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 45461 -k 50005 >> loadstok10.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 50006 -k 54550 >> loadstok11.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 54551 -k 59095 >> loadstok12.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 59096 -k 63640 >> loadstok13.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 63641 -k 68185 >> loadstok14.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 68186 -k 72730 >> loadstok15.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 72731 -k 77275 >> loadstok16.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 77276 -k 81820 >> loadstok17.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 81821 -k 86365 >> loadstok18.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 86366 -k 90910 >> loadstok19.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 90911 -k 95455 >> loadstok20.log 2>&1 &
allprocs="Sallprocs ${!}"
Stpcc_load -M 20000 -S -j 95456 -k 100000 >> loadstok21.log 2>&1 &
allprocs="Sallprocs ${!}"
error=0
for curproc in Sallprocs; do
  wait $curproc
  error=`expr $? + $error`
done
exit `expr $error != 0`

```

loadware.sh

```

cd $tpcc_bench
Stpcc_load -M $tpcc_scale -w > loadware.log 2>&1

```

localoptions.sh

```

#LOCAL OPTION FILE- You must fill these in
# before the driver will work.

```

```

#oracle sid to use for the run
ORACLE_SID=tpcc

```

```

#folder location of the database files (or links to raw partitions)
tpcc_disks_location=/project/oracle/build20k.4K/dbs/tpcc_disks

```

```

#FOR NT
#tpcc_disks_location=\\.\

```

```

#FOR RAC

#node id
#tpcc_rac_id=1

# How many createts_node*.sh will be run in this node, started from tpcc_rac_id
# eq. if tpcc_rac_id is 3 and tpcc_rac_createts_count is 2
# createts_node3.sh and createts_node4.sh will be executed

#tpcc_rac_createts_count=1

#locations of various files used in the generation scripts.
#(you can usually leave these alone.)
tpcc_sql_dir=$(tpcc_bench)/scripts/sql
tpcc_log_dir=$(tpcc_bench)/log
tpcc_genscripts_dir=$(tpcc_bench)/scripts/generated

#Once you have filled all the options, comment
#out or delete this line.
#tpcc_no_options=t

```

new.sql

```

rem
rem =====+
rem Copyright (c) 1996 Oracle Corp, Redwood Shores, CA |
rem OPEN SYSTEMS PERFORMANCE GROUP |
rem All Rights Reserved |
rem =====+
rem FILENAME
rem new.sql
rem DESCRIPTION
rem SQL script to create a stored package for new order
rem transactions.
rem =====+
rem

CREATE OR REPLACE PACKAGE neworder
IS
  PROCEDURE enterorder
  (
    ware_id          INTEGER,
    dist_id          INTEGER,
    cust_id          INTEGER,
    ord_o_l_cnt      INTEGER,
    ord_all_local    INTEGER,
    cust_discount    OUT NUMBER,
    cust_last        OUT VARCHAR2,
    cust_credit      OUT VARCHAR2,
    dist_tax         OUT NUMBER,
    ware_tax         OUT NUMBER,
    ord_id           IN OUT INTEGER,
    ord_entry_d      IN OUT VARCHAR2,
    retry           IN OUT INTEGER,
    cur_date         IN          DATE
  );
END;
/
show errors;

CREATE OR REPLACE PACKAGE BODY neworder
IS
  PROCEDURE enterorder
  (
    ware_id          INTEGER,
    dist_id          INTEGER,
    cust_id          INTEGER,
    ord_o_l_cnt      INTEGER,
    ord_all_local    INTEGER,
    cust_discount    OUT NUMBER,
    cust_last        OUT VARCHAR2,
    cust_credit      OUT VARCHAR2,
    dist_tax         OUT NUMBER,
    ware_tax         OUT NUMBER,
    ord_id           IN OUT INTEGER,
    ord_entry_d      IN OUT VARCHAR2,
    retry           IN OUT INTEGER,
    cur_date         IN          DATE
  )
  IS
    timestamp        DATE;
    dist_rowid       rowid;
    node_num         varchar2(512);
    not_serializable EXCEPTION;
    PRAGMA EXCEPTION_INIT(not_serializable,-8177);
    deadlock         EXCEPTION;
    PRAGMA EXCEPTION_INIT(deadlock,-60);
    snapshot_too_old EXCEPTION;
    PRAGMA EXCEPTION_INIT(snapshot_too_old,-1555);
  BEGIN
    SELECT substr(value,1,5)
      INTO node_num
      FROM v$parameter
      WHERE name = 'instance_number';

    plsql_mon_pack.print('New Order started at ' ||
      to_char(sysdate, 'HH24:MI:SS') || ' on node ' ||
      node_num);

    LOOP BEGIN
      SELECT dist.rowid, d_tax, d_next_o_id, w_tax
      INTO dist_rowid, dist_tax, ord_id, ware_tax
      FROM dist, ware
      WHERE d_id = dist_id AND d_w_id = ware_id
            AND w_id = ware_id;
      UPDATE dist SET d_next_o_id = ord_id + 1
      WHERE rowid = dist_rowid;
      SELECT c_discount, c_last, c_credit
      INTO cust_discount, cust_last, cust_credit
      FROM cust
      WHERE c_id = cust_id AND c_d_id = dist_id AND c_w_id = ware_id;
      timestamp := cur_date;
      ord_entry_d := TO_CHAR(timestamp, 'DD-MM-YYYY.HH24:MI:SS');
      INSERT INTO nord(no_o_id,no_d_id,no_w_id) VALUES
        (ord_id, dist_id, ware_id);
    END LOOP;
  END;

```



```

INSERT INTO odrdr(o_id,o_d_id,o_w_id,o_c_id,o_entry_d,o_carrier_id,
o_of_cnt,o_all_local)
VALUES (ord_id , dist_id, ware_id, cust_id,
timestamp, 11, ord_of_cnt, ord_all_local);
EXIT;

EXCEPTION
  WHEN not_serializable OR deadlock OR snapshot_too_old THEN
    ROLLBACK;
    retry := retry + 1;
  END;
END LOOP;
END;
END;
/
show errors;

quit;

```

p_build.ora

```

compatible = 10.1.0.0.0
db_name = tpcc
control_files =
(/project/oracle/build20k.4K/dbs/tpcc_disks/control_001./project/oracle/build20k.4K/dbs/tpcc_disks/control_002)
parallel_max_servers = 40
recovery_parallelism = 40
db_files = 245
db_cache_size = 65536M
db_8k_cache_size = 24576M
db_16k_cache_size = 65536M
dml_locks = 500
statistics_level = basic
log_buffer = 1048576
processes = 200
sessions = 200
transactions = 200
shared_pool_size = 12288M
cursor_space_for_time = TRUE
db_block_size = 4096
undo_management = auto
undo_retention = 2
plsql_optimize_level=2

UNDO_TABLESPACE = undo_1
db_2k_cache_size = 2000M

```

p_create.ora

```

compatible = 10.1.0.0.0
db_name = tpcc
control_files = (/project/oracle/build20k.4K/dbs/tpcc_disks/control_001,
/project/oracle/build20k.4K/dbs/tpcc_disks/control_002)
db_block_size = 4096
db_cache_size = 65536M
db_8k_cache_size = 24576M
log_buffer = 1048576
db_16k_cache_size = 65536M
undo_management = manual
statistics_level = basic
shared_pool_size = 12288M
plsql_optimize_level=2
db_2k_cache_size = 20M

```

pay.sql

```

rem
rem =====
rem      Copyright (c) 1996 Oracle Corp. Redwood Shores, CA   |
rem      OPEN SYSTEMS PERFORMANCE GROUP                       |
rem      All Rights Reserved                                   |
rem =====
rem FILENAME
rem   pay.sql
rem DESCRIPTION
rem   SQL script to create a stored procedure for payment
rem   transactions.
rem =====
rem

CREATE OR REPLACE PACKAGE payment
IS
  PROCEDURE dopayment_z
  (
    ware_id      INTEGER,
    dist_id      INTEGER,
    cust_w_id    INTEGER,
    cust_d_id    INTEGER,
    cust_id      IN OUT INTEGER,
    bylastname   INTEGER,
    hist_amount  INTEGER,
    cust_last    IN OUT VARCHAR2,
    ware_street_1 OUT VARCHAR2,

```



```

        d_state, d_zip, d_ytd + hist_amount,
        ware.rowid, w_name, w_street_1, w_street_2, w_city,
        w_state, w_zip, w_ytd + hist_amount
    INTO cust_rowid, dist_name, dist_street_1, dist_street_2, dist_city,
        dist_state, dist_zip, dist_ytd,
        ware_rowid, ware_name, ware_street_1, ware_street_2, ware_city,
        ware_state, ware_zip, ware_ytd
    FROM dist, ware
    WHERE d_id = dist_id
        AND d_w_id = ware_id
        AND w_id = ware_id;

UPDATE dist
SET d_ytd = dist_ytd
WHERE rowid = cust_rowid;

UPDATE ware
SET w_ytd = ware_ytd
WHERE rowid = ware_rowid;

history_date := cur_date;

INSERT INTO hist(h_c_id,h_c_d_id,h_c_w_id,h_d_id,h_w_id,h_date,
    h_amount, h_data) VALUES
(cust_id, cust_d_id, cust_w_id, dist_id, ware_id, history_date,
    hist_amount, ware_name || ' ' || dist_name);
COMMIT;
hist_date := to_char(history_date, 'DD-MM-YYYY.HH24:MI:SS');
EXIT;

EXCEPTION
    WHEN not_serializable OR deadlock OR snapshot_too_old THEN
        ROLLBACK;
        retry := retry + 1;
    END;

END LOOP;
END;

PROCEDURE dopayment_nz
(
    ware_id          INTEGER,
    dist_id          INTEGER,
    cust_w_id        INTEGER,
    cust_d_id        INTEGER,
    cust_id          IN OUT INTEGER,
    bylastname      INTEGER,
    hist_amount      INTEGER,
    cust_last        IN OUT VARCHAR2,
    ware_street_1   OUT VARCHAR2,
    ware_street_2   OUT VARCHAR2,
    ware_city        OUT VARCHAR2,
    ware_state      OUT VARCHAR2,
    ware_zip        OUT VARCHAR2,
    dist_street_1   OUT VARCHAR2,
    dist_street_2   OUT VARCHAR2,
    dist_city        OUT VARCHAR2,
    dist_state      OUT VARCHAR2,
    dist_zip        OUT VARCHAR2,
    cust_first      OUT VARCHAR2,
    cust_middle     OUT VARCHAR2,
    cust_street_1   OUT VARCHAR2,
    cust_street_2   OUT VARCHAR2,
    cust_city        OUT VARCHAR2,
    cust_state      OUT VARCHAR2,
    cust_zip        OUT VARCHAR2,
    cust_phone      OUT VARCHAR2,
    cust_since      OUT VARCHAR2,
    cust_credit     IN OUT VARCHAR2,
    cust_credit_lim OUT NUMBER,
    cust_discount   OUT NUMBER,
    cust_balance    IN OUT NUMBER,
    cust_data       OUT VARCHAR2,
    hist_date       OUT VARCHAR2,
    retry           IN OUT INTEGER,
    cur_date        IN DATE
)
IS
    TYPE rowidarray IS TABLE OF ROWID INDEX BY BINARY_INTEGER;
    cust_rowid      ROWID;
    ware_rowid      ROWID;
    dist_ytd        NUMBER(12);
    dist_name       VARCHAR2(11);
    ware_ytd        NUMBER(12);
    ware_name       VARCHAR2(11);
    history_date    DATE;
    c_num           BINARY_INTEGER;
    row_id          rowidarray;
    cust_payments  PLS_INTEGER;
    cust_ytd       NUMBER(12);
    cust_data_temp VARCHAR2(500);
    node_num       VARCHAR2(512);
    not_serializable EXCEPTION;
    PRAGMA EXCEPTION_INIT(not_serializable,-8177);

```

```

    deadlock        EXCEPTION;
    PRAGMA EXCEPTION_INIT(deadlock,-60);
    snapshot_too_old EXCEPTION;
    PRAGMA EXCEPTION_INIT(snapshot_too_old,-1555);
    CURSOR c_cur IS
        SELECT rowid
        FROM cust
        WHERE c_d_id = cust_d_id AND c_w_id = cust_w_id AND c_last = cust_last
        ORDER BY c_w_id, c_d_id, c_last, c_first;
    BEGIN
        SELECT substr(value,1,5)
        INTO node_num
        FROM v$parameter
        WHERE name = 'instance_number';

    plsql_mon_pack.print ('Payment started at ' ||
        to_char(sysdate, 'HH24:MI:SS') || ' on node ' ||
        node_num);
    LOOP BEGIN

        c_num := 0;
        FOR c_id_rec IN c_cur LOOP
            c_num := c_num + 1;
            row_id(c_num) := c_id_rec.rowid;
        END LOOP;
        cust_rowid := row_id((c_num + 1) / 2); -- use row_id.count ?

        SELECT c_id, c_first, c_middle, c_last, c_street_1, c_street_2,
            c_city, c_state, c_zip, c_phone,
            to_char(c_since, 'DD-MM-YYYY'), c_credit, c_credit_lim,
            c_discount, c_balance - hist_amount, c_payment_cnt,
            c_ytd_payment + hist_amount, decode(c_credit, 'BC', c_data, '')
        INTO cust_id, cust_first, cust_middle, cust_last,
            cust_street_1, cust_street_2, cust_city, cust_state,
            cust_zip, cust_phone, cust_since, cust_credit,
            cust_credit_lim, cust_discount, cust_balance, cust_payments,
            cust_ytd, cust_data_temp
        FROM cust
        WHERE rowid = cust_rowid;
        cust_payments := cust_payments + 1;
        IF cust_credit = 'BC' THEN
            cust_data_temp := substr((to_char(cust_id) || '' ||
                to_char(cust_d_id) || '' ||
                to_char(cust_w_id) || '' ||
                to_char(dist_id) || '' ||
                to_char(ware_id) || '' ||
                to_char(hist_amount/100, '9999.99') || '|')
                || cust_data_temp, 1, 500);

            UPDATE cust
            SET c_balance = cust_balance,
                c_ytd_payment = cust_ytd,
                c_payment_cnt = cust_payments,
                c_data = cust_data_temp
            WHERE rowid = cust_rowid;

            cust_data := substr(cust_data_temp, 1, 200);
        ELSE
            UPDATE cust
            SET c_balance = cust_balance,
                c_ytd_payment = cust_ytd,
                c_payment_cnt = cust_payments
            WHERE rowid = cust_rowid;

            cust_data := cust_data_temp;
        END IF;

        SELECT dist.rowid, d_name, d_street_1, d_street_2, d_city,
            d_state, d_zip, d_ytd + hist_amount,
            ware.rowid, w_name, w_street_1, w_street_2, w_city,
            w_state, w_zip, w_ytd + hist_amount
        INTO cust_rowid, dist_name, dist_street_1, dist_street_2, dist_city,
            dist_state, dist_zip, dist_ytd,
            ware_rowid, ware_name, ware_street_1, ware_street_2, ware_city,
            ware_state, ware_zip, ware_ytd
        FROM dist, ware
        WHERE d_id = dist_id
            AND d_w_id = ware_id
            AND w_id = ware_id;

        UPDATE dist
        SET d_ytd = dist_ytd
        WHERE rowid = cust_rowid;

        UPDATE ware
        SET w_ytd = ware_ytd
        WHERE rowid = ware_rowid;

        history_date := cur_date;

        INSERT INTO hist VALUES
            (cust_id, cust_d_id, cust_w_id, dist_id, ware_id, history_date,

```

```

hist_amount, ware_name || ' ' || dist_name);
COMMIT;
hist_date := to_char(history_date, 'DD-MM-YYYY.HH24:MI:SS');
EXIT;

EXCEPTION
  WHEN not_serializable OR deadlock OR snapshot_too_old THEN
    ROLLBACK;
    retry := retry + 1;
END;

END LOOP;
END;
END;
/
show errors;

quit;

```

plsqli_mon.sql

```

rem
rem =====+
rem Copyright (c) 1995 Oracle Corp, Redwood Shores, CA |
rem OPEN SYSTEMS PERFORMANCE GROUP |
rem All Rights Reserved |
rem =====+
rem FILENAME
rem plsqli_mon.sql
rem DESCRIPTION
rem SQL script to create a stored package for PL/SQL stored
rem procedures to dump messages.
rem =====+
rem
rem Usage: sqlplus tpcc/tpcc @plsqli_mon
rem

connect tpcc/tpcc;
set echo on;
CREATE OR REPLACE PACKAGE plsqli_mon_pack
IS
  PROCEDURE print
  (
    info VARCHAR2
  );
END;
/
show errors;

CREATE OR REPLACE PACKAGE BODY plsqli_mon_pack
IS
  PROCEDURE print
  (
    info VARCHAR2
  )
  IS
    s NUMBER;
  BEGIN
    dbms_pipe.pack_message (info);
    s := dbms_pipe.send_message ('plsqli_mon');
    IF (s <> 0) THEN
      raise_application_error (-20000, 'Error: ' || to_char(s) ||
        ' sending on pipe');
    END IF;
  END;
END;
/
show errors;

set echo off;

```

Pst_c.sql

```

rem
rem =====+
rem Copyright (c) 1992 Oracle Corp, Belmont, CA |
rem OPEN SYSTEMS PERFORMANCE GROUP |
rem All Rights Reserved |
rem =====+
rem FILENAME
rem pst_c.sql
rem DESCRIPTION
rem Create Table for OS Specific Process Stats
rem =====+
rem
rem Tables for Unix-specific process statistics
rem
rem Usage: sqlplus internal/internal @pst_c
rem

connect tpcc/tpcc;
set echo on;
DROP TABLE proc_resource;
DROP TABLE os_stat;

rem
rem Resource usage for a process.
rem

CREATE TABLE proc_resource
(
  config VARCHAR2(10),
  run NUMBER,
  proc NUMBER,

```

```

child NUMBER,
user_cpu_ms NUMBER,
system_cpu_ms NUMBER,
maxrss NUMBER,
pagein NUMBER,
reclaim NUMBER,
zerofill NUMBER,
pfincr NUMBER,
pffincr NUMBER,
swap NUMBER,
syscall NUMBER,
volcsw NUMBER,
involcsw NUMBER,
signal NUMBER,
lread NUMBER,
lwrite NUMBER,
bread NUMBER,
bwrite NUMBER,
phread NUMBER,
phwrite NUMBER
);

rem
rem OS statistics.
rem These results are from the measurement interval only.
rem

```

```

CREATE TABLE os_stat
(
  config VARCHAR2(10),
  run NUMBER,
  hid NUMBER,
  syscall NUMBER,
  intr NUMBER,
  cswitch NUMBER,
  pagefault NUMBER,
  usr NUMBER,
  sys NUMBER,
  idl NUMBER,
  wio NUMBER
);

```

```
set echo off;
```

Shutdowndb.sql

```

#!/bin/sh

echo "Shutting down database..."

$tpcc_sqlplus $tpcc_sqlplus_args << !
$tpcc_internal_connect

spool shutdowndb.log;

set echo on;

alter system switch logfile;
alter system switch logfile;

shutdown immediate;

set echo off;
spool off;

exit
!

```

Space_get.sql

```

REM=====
REM Copyright (c) 1995 Oracle Corp. Redwood Shores, CA |
REM OPEN SYSTEMS PERFORMANCE GROUP |
REM All Rights Reserved |
REM=====
REM FILENAME
REM space_get.sql
REM DESCRIPTION
REM Get sizes of tables, indexes and tablespaces.
REM Usage: sqlplus 'sys/change_on_install as sysdba' @space_get [<tpm> <# of warehouses>]
REM=====*/

set echo on;
delete from tpcc_data;
delete from tpcc_space;
delete from tpcc_totSPACE;

insert into tpcc_data
select substr(segment_name,1,18), substr(segment_type,1,15),
sum(blocks), t.block_size,
round(sum(blocks) * 0.05), 0,
sum(blocks) + round(sum(blocks) * 0.05)
from dba_extents e, dba_tablespaces t
where owner = 'TPCC' AND ( segment_type = 'INDEX' OR
segment_type = 'INDEX PARTITION' OR segment_type = 'CLUSTER'
OR segment_type = 'TABLE' OR segment_type = 'TABLE PARTITION')
AND e.tablespace_name <> 'SYSTEM' AND e.tablespace_name <> 'SP_0'
AND e.tablespace_name = t.tablespace_name
group by segment_name, segment_type, t.block_size;

insert into tpcc_data
select 'SYSTEM', 'SYS', sum(blocks), t.block_size, 0, 0, sum(blocks)
from dba_data_files f, dba_tablespaces t
where f.tablespace_name = 'SYSTEM' and t.tablespace_name = f.tablespace_name
group by t.block_size;

insert into tpcc_data
select 'SYSAUX', 'SYS', sum(blocks), t.block_size, 0, 0, sum(blocks)
from dba_data_files f, dba_tablespaces t
where f.tablespace_name = 'SYSAUX' and t.tablespace_name = f.tablespace_name
group by t.block_size;

insert into tpcc_data
select 'ROLL_SEG', 'SYS', sum(blocks), t.block_size, 0, 0, sum(blocks)
from dba_data_files f, dba_tablespaces t
where f.tablespace_name like '%UNDO_TS%' and f.tablespace_name = t.tablespace_name
group by f.tablespace_name, t.block_size;

insert into tpcc_data
select 'DB_STAT', 'SYS', sum(blocks), t.block_size, 0, 0, sum(blocks)
from dba_data_files f, dba_tablespaces t
where f.tablespace_name like '%SP_0%' and f.tablespace_name = t.tablespace_name
group by f.tablespace_name, t.block_size;

update tpcc_data
set five_pct = 0,
daily_grow = round(blocks * &&1 / 62.5 / &&2),
total = blocks + round(blocks * &&1 / 62.5 / &&2)
where segment = 'HIST' OR segment = 'ORDRCLUSTER_QUEUE' OR
segment = 'IORDL';

```

```

insert into tpcc_space
select substr(ex$.name,1,18), sum(sp$.sz_blocks), sp$.block_size, 0, 0, 0, 0
from
(select f.tablespace_name , sum(blocks) sz_blocks, t.block_size block_size
from dba_data_files f, dba_tablespaces t
where f.tablespace_name <> 'SYSTEM' and f.tablespace_name = t.tablespace_name
group by f.tablespace_name, t.block_size
) sp$,
(select distinct tablespace_name, segment_name name
from dba_extents
where owner = 'TPCC'
and (segment_type = 'CLUSTER' or segment_type = 'TABLE'
or segment_type = 'TABLE PARTITION' or segment_type = 'INDEX'
or segment_type = 'INDEX PARTITION')
and tablespace_name <> 'SYSTEM'
) ex$
where sp$.tablespace_name = ex$.tablespace_name
group by ex$.name, sp$.block_size;

insert into tpcc_space
select substr(f.tablespace_name,1,18), sum(blocks), t.block_size, 0, 0, 0, 0
from dba_data_files f, dba_tablespaces t
where (f.tablespace_name = 'SYSTEM' or f.tablespace_name = 'SYSAUX')
and f.tablespace_name = t.tablespace_name
group by f.tablespace_name, t.block_size;

insert into tpcc_space
select 'ROLL_SEG', sum(blocks), t.block_size, 0, 0, 0, 0
from dba_data_files f, dba_tablespaces t
where f.tablespace_name = 'UNDO_TS' and f.tablespace_name = t.tablespace_name
group by f.tablespace_name, t.block_size;

insert into tpcc_space
select 'DB_STAT', sum(blocks), t.block_size, 0, 0, 0, 0
from dba_data_files f, dba_tablespaces t
where f.tablespace_name = 'SP_0' and f.tablespace_name = t.tablespace_name
group by f.tablespace_name, t.block_size;

update tpcc_space
set required =
(
select sum(total)
from tpcc_data
where tpcc_data.segment = tpcc_space.segment
)
where segment in
(
select segment from tpcc_data
);

update tpcc_space
set static =
(
select sum(total)
from tpcc_data
where tpcc_data.segment = tpcc_space.segment
)
where segment in
(
select segment from tpcc_data
);

update tpcc_space
set static = 0,
dynamic =
(
select sum(blocks)
from tpcc_data
where tpcc_data.segment = tpcc_space.segment
)
where segment in ('HIST', 'ORDRCLUSTER_QUEUE', 'TORDL');

update tpcc_space
set oversize = blocks - required;

insert into tpcc_totSPACE
select &&1, &&2, sum(static * block_size)/1024, sum(dynamic * block_size)/1024, sum(oversize *
block_size)/1024, 0, 0, 0
from tpcc_space;

update tpcc_totSPACE
set daily_grow =
(
select sum(daily_grow * block_size)/1024
from tpcc_data
);
update tpcc_totSPACE
set space60 = static + 60 * daily_grow;
set echo off;

```

Space_init.sql

```

REM=====
REM FILENAME
REM space_init.sql
REM DESCRIPTION
REM Create tables for space calculations.
REM Usage: sqlplus 'sys/change_on_install as sysdba' @space_init.sql
REM=====*/

set echo on;
drop table tpcc_data;
drop table tpcc_space;
drop table tpcc_totSPACE;
create table tpcc_data (
segment varchar2(18),
type varchar2(15),
blocks number,
block_size number,
five_pct number,
daily_grow number,
total number
);
create table tpcc_space (
segment varchar2(18),
blocks number,
block_size number,
required number,
static number,
dynamic number,
oversize number
);
create table tpcc_totSPACE (
tpm number,
nware number,
static number,
dynamic number,
oversize number,
daily_grow number,
daily_spre number,
space60 number
);
create unique index itpcc_data on tpcc_data (segment);
create unique index itpcc_space on tpcc_space (segment);
set echo off;

```

Space_rpt.sql

```

REM=====
REM Copyright (c) 1995 Oracle Corp, Redwood Shores, CA |
REM OPEN SYSTEMS PERFORMANCE GROUP |
REM All Rights Reserved |
REM=====*/

REM FILENAME
REM space_rpt.sql
REM DESCRIPTION
REM Generate space report and save it in space.rpt
REM Usage: sqlplus 'sys/change_on_install as sysdba' @space_rpt.sql
REM=====*/

set space 2
set pagesize 2000
set echo off
set termout off
set verify off
set feedback off
set pagesize 60 linesize 120
spool space.rpt
select tpm, nware from tpcc_totSPACE;
select * from tpcc_data order by segment;
select * from tpcc_space order by segment;
select static, dynamic, oversize, daily_grow, daily_spre, space60
from tpcc_totSPACE;
spool off;

```

startupdb.sql

```
#!/bin/sh
echo "Starting up database using $1..."

init_file=${1}.ora

if test $tpcc_np -gt 1 ; then
    init_file=build_init_${tpcc_rac_id}.ora
fi

tpcc_sqlplus tpcc_sqlplus_args << !
tpcc_internal_connect

spool startdb.log

set echo on

startup pfile=$init_file open

spool off
set echo off
exit sql.sqlcode
!
```

stepenv.sh

```
# forces any env variables we set to be exported
set -a
tpcc_kit=t
tpcc_bench=$PWD
tpcc_scripts=$tpcc_bench/scripts
tpcc_require=$tpcc_scripts/require_vars.sh
tpcc_lcm=$tpcc_scripts/lcm.sh
tpcc_tokolobytes=$tpcc_scripts/tokolobytes.sh
tpcc_fromkilobytes=$tpcc_scripts/fromkilobytes.sh
tpcc_estsize=$tpcc_scripts/estsize.sh
tpcc_notneg=$tpcc_scripts/notneg.sh
tpcc_isneg=$tpcc_scripts/isneg.sh

# need a better way to check for bc, may
# resort to checking each directory in path
# if this doesn't work
#11/7/02 - alex.ni this is causing too many problems
#because systems have bc in some odd place. typically
#mangled cygwin installs w/ mksnt/cygwin mixes
#if test -x /usr/bin/bc -o -x /bin/bc; then
tpcc_bcexpr=$tpcc_scripts/bcexpr.sh
#else
tpcc_bcexpr=expr
#fi

# the ksh version is a bit faster, so we want
# to use it if we have ksh. Otherwise we have
# a compatible version.
#if test -x /bin/ksh; then
#tpcc_createts=$tpcc_scripts/createts.ksh
#else
tpcc_createts=$tpcc_scripts/createts.sh
#fi

tpcc_tabledata=$tpcc_scripts/taledata.sh
tpcc_load=$tpcc_bench/benchrun/bin/tpccload.exe
tpcc_createtablespace=$tpcc_scripts/createtablespace.sh

##
tpcc_sqlplus=cat
tpcc_sqlplus_args="/nolog"
tpcc_internal_connect="connect / as sysdba"
tpcc_user_pass="tpcc/tpcc"
tpcc_dba_user_pass="system/manager"
oracle_dba=system
oracle_dba_password=manager
tpcc_sqlplus=sqlplus

# import options generated by gui
. ${tpcc_bench}/options.sh

#8gb oracle filesize limit (in k)
tpcc_fsize_limit_k=8243200
#2gb - 1k oracle extent limit (in k)
tpcc_extent_limit_k=2048000
#file number limit: 1024
```

```
tpcc_file_number_limit=1024

# Runlen calculations should be in hours, but
# this was the old calculation, which assumed
# minutes, and also 8 times:
tpcc_runlen=$tpcc_bcexpr 8 \* 60 \* $tpcc_runlen`
# we just want to keep the value as it is.

tpcc_system_size=400M
tpcc_kilo_bytes=1024
tpcc_logfile_size=$tpcc_bcexpr 20 + \$( $tpcc_scale \`)

if test $tpcc_np -gt 1 ; then
    # 4.69k per commit * 2.1 commit per TPMC ~ 9.85K
    # 9.85k * 30 minutes * 12.5 TPMC per Warehouse = 3693
    tpcc_logfile_size=$tpcc_bcexpr \$( $tpcc_scale \* 3693 \) / $tpcc_kilo_bytes`
else
    # 2.4k per commit * 2.1 commit per TPMC ~ 5k
    # 5k * 30 minutes * 12.5 TPMC per Warehouse = 1875
    tpcc_logfile_size=$tpcc_bcexpr \$( $tpcc_scale \* 1875 \) / $tpcc_kilo_bytes`
fi
tpcc_logfile_size=5120 #sks kludge

if test $tpcc_logfile_size -lt 1024; then
    tpcc_logfile_size=1024
fi
tpcc_logfile_size="\${tpcc_logfile_size}M"

tpcc_undo_size=$tpcc_bcexpr 2 \* $tpcc_scale`
if test $tpcc_undo_size -gt 8096; then
    tpcc_undo_size=8096
fi
if test $tpcc_undo_size -lt 512; then
    tpcc_undo_size=512
fi
tpcc_undo_size="\${tpcc_undo_size}M"

tpcc_undo_bs=8K

tpcc_statspack_size=$tpcc_bcexpr 1 \* $tpcc_scale`
if test $tpcc_statspack_size -gt 2048; then
    tpcc_statspack_size=2048
fi
if test $tpcc_statspack_size -lt 300; then
    tpcc_statspack_size=300
fi
tpcc_statspack_size="\${tpcc_statspack_size}M"

tpcc_sysaux_size=120M

# fixed table params

#table list (note temp is always at the end since it may use numbers from other tables, and it's not included in
these lists)
tpcc_table_list='ware cust dist hist stok item ordr ordl nord'
tpcc_index_list='iware icust1 icust2 idist istok item iordr1 iordr2 iordl inord'
#for these I use average row length, calculated from multi-blocksize stats.
#we figure out how many new rows we will gain in a run (in createtablespace.sh)
#and add that much to the base tablespace size.
tpcc_hist_growth=51
tpcc_ordr_growth=35
tpcc_nord_growth=regular
tpcc_ordl_growth=660
tpcc_ordl_growth=900

#i started indices at 1/10th... need an exact figure
tpcc_iordr1_growth=20
tpcc_iordr2_growth=20
tpcc_iordl_growth=66
tpcc_inord_growth=2

tpcc_item_growth=0
tpcc_iitem_growth=0
tpcc_temp_growth=0

tpcc_cust_growth=regular
tpcc_icust1_growth=regular
tpcc_icust2_growth=regular

tpcc_stok_growth=regular
tpcc_istok_growth=regular

tpcc_ware_growth=regular
tpcc_iware_growth=regular

tpcc_dist_growth=regular
tpcc_idist_growth=regular

# minimum size of temp tablespace
tpcc_tempt_min=10240

# for Linux, set appropriate tablespace heuristics
# to set high io tables to have 64 files, and minimize
# others.
if expr $tpcc_os = linux > /dev/null; then
```

```

# for table in $tpcc_table_list $tpcc_index_list temp; do
#   eval "tpcc_${table}_tsfileinc=1"
# done
if test $tpcc_numfiles = 0 ; then
  tpcc_numfiles=256
  fi
  tpcc_os=unix

# tpcc_stok_tsfileinc=64
# tpcc_cust_tsfileinc=64
# tpcc_iordl2_tsfileinc=16
# tpcc_icust2_tsfileinc=16
# tpcc_iordl_tsfileinc=16
else
#in case someone changes out of linux, and the shell is stuck
for table in $tpcc_table_list $tpcc_index_list temp; do
  eval "tpcc_${table}_tsfileinc="
  done
fi
  tpcc_stok_tsfileinc=
  tpcc_cust_tsfileinc=
  tpcc_iordl2_tsfileinc=
  tpcc_icust2_tsfileinc=
  tpcc_iordl_tsfileinc=
#fi

# import local options
. $(tpcc_bench)/localoptions.sh

if expr `echo x$tpcc_no_options` = xt > /dev/null; then
  echo Please modify $(tpcc_bench)/localoptions.sh to configure the generator.
  exit 1
fi

tpcc_fixordrordl=${tpcc_genscripts_dir}/loadfixordrordl.sh
tpcc_updateordrordl=${tpcc_scripts}/updateordrordl.sh

#tp- get table param. (that is, $tpcc_tablename_tableparam)
tpO{
  eval echo `"$tpcc_${1}_$2"`
}

# automatically generated variables
if expr `echo $tpcc_version | cut -b1` = t > /dev/null; then
  tpcc_auto_undo=t
else
  tpcc_auto_undo=f
fi
if expr `echo $tpcc_version | cut -b2` = t > /dev/null; then
  tpcc_autospace_avail=t
else
  tpcc_autospace_avail=f
fi
if expr `echo $tpcc_version | cut -b3` = t > /dev/null; then
  tpcc_queue_avail=t
  tpcc_use_sysaux=t
else
  tpcc_queue_avail=f
  tpcc_use_sysaux=f
fi

# for NT, ORACLE does not like $variables in sql scripts, so we must
# hardcode these things for it.
if test x$tpcc_os = xnt; then
  tpcc_hardcode=t
else
  tpcc_hardcode=f
fi

# if this is unset we need to make sure it's something anyway
if test x$tpcc_defbs = x; then
  tpcc_defbs=2
fi

# used for loading program
if test x$tpcc_hash_overflow = xt; then
  tpcc_hash_overflow=t
else
  unset tpcc_hash_overflow
fi
if test x$tpcc_overflow = xt; then
  tpcc_hash_overflow=t
else
  unset tpcc_hash_overflow
fi

tpcc_create_steps="buildtpccflags buildcreatets buildcreatedb \
buildcreatetable-ware buildcreatetable-cust buildcreatetable-dist buildcreatetable-hist buildcreatetable-stock \
buildcreatetable-item buildcreatetable-ordr buildcreatetable-ordl buildcreatetable-nord \
buildloadware buildloaddist buildloaditem buildloadhist buildloadnord buildloadordrordl buildloadcust \
buildloadstok \
buildcreateindex-iware buildcreateindex-icust1 buildcreateindex-icust2 buildcreateindex-idist buildcreateindex-istok \
buildcreateindex-istok buildcreateindex-iitem buildcreateindex-iordr1 buildcreateindex-iordr2 buildcreateindex-iordl \
buildcreateindex-inord \

```

```

buildstoreprocsql buildspacestats listfiles
"

# remove runscript-loadfixordrordl - shuang. 030626

tpcc_steps="runsqllocal-createdb shutdowndb startupdb-p_build createuser ddview runscript-createts assigntemp \
\
runsql-createtable-ware runsql-createtable-cust runsql-createtable-dist runsql-createtable-hist runsql-
createtable-stok runsql-createtable-item runsql-createtable-ordr runsql-createtable-ordl runsql-createtable-nord \
runscript-loadware runscript-loaddist runscript-loaditem runscript-loadhist runscript-loadnord runscript-
loadordrordl runscript-loadcust runscript-loadstok \
analyze runsql-createindex-iware runsql-createindex-icust1 runsql-createindex-icust2 runsql-createindex-idist
runsql-createindex-istok runsql-createindex-iitem runsql-createindex-iordr1 runsql-createindex-iordr2 runsql-
createindex-iordl runsql-createindex-inord \
createtests createstoredprocs createspacestats createmisc"

tpcc_total_files=524

# no longer automatically exports env variables
set +a

# check for problems with configuration
badconf=
for table in $tpcc_table_list; do
  if expr `tp $table imp` = queue > /dev/null; then
    if expr $tpcc_queue_avail = f > /dev/null; then
      echo Table $table may not be a queue, since queues are
      echo are unavailable in the selected Oracle version.
      badconf=t
    fi
  fi
  if expr $tpcc_autospace_avail = f & `tp $table autospace` = t > /dev/null; then
    echo Table $table may not use bitmapped space management
    echo since it is not available in the selected Oracle version.
    badconf=t
  fi
done

if test -n "$badconf"; then
  exit 1
fi

# make sure we have everything
if $tpcc_require ORACLE_SID \
  tpcc_tokilobytes tpcc_createts tpcc_lcm \
  tpcc_sqlplus tpcc_internal_connect \
  tpcc_np tpcc_cpu tpcc_os tpcc_runlen tpcc_ldrive tpcc_scale tpcc_disks_location tpcc_auto_undo
  tpcc_temptms_min \
  tpcc_system_size tpcc_logfile_size \
  tpcc_undo_size tpcc_undo_bs \
  oracle_dba oracle_dba_password tpcc_dba_user_pass
then exit 1; fi

if test x$tpcc_hardcode != xt; then
  tpcc_disks_location=${tpcc_disks_location}/
  # tpcc_sql_dir=$tpcc_sql_dir
  # tpcc_statspack_size=$tpcc_statspack_size
  # tpcc_genscripts_dir=$tpcc_genscripts_dir
fi

```

views.sql

```

connect tpcc/tpcc;
set echo on;

create or replace view wh_cust
(w_id, w_tax, c_id, c_d_id, c_w_id, c_discount, c_last, c_credit)
as select w.w_id, w.w_tax,
        c.c_id, c.c_d_id, c.c_w_id, c.c_discount, c.c_last, c.c_credit
from cust c, ware w
where w.w_id = c.c_w_id;

create or replace view wh_dist
(w_id, d_id, d_tax, d_next_o_id, w_tax )
as select w.w_id, d.d_id, d.d_tax, d.d_next_o_id, w.w_tax
from dist d, ware w
where w.w_id = d.d_w_id;

create or replace view stock_item
(i_id, s_w_id, i_price, i_name, i_data, s_data, s_quantity,
s_order_cnt, s_ytd, s_remote_cnt,
s_dist_01, s_dist_02, s_dist_03, s_dist_04, s_dist_05,
s_dist_06, s_dist_07, s_dist_08, s_dist_09, s_dist_10)
as
select /*+ leading(s) use_nl(i) */
i.i_id, s.w_id, i.i_price, i.i_name, i.i_data, s_data, s_quantity,

```



```
s_order_cnt, s_ytd, s_remote_cnt,  
s_dist_01, s_dist_02, s_dist_03, s_dist_04, s_dist_05,  
s_dist_06, s_dist_07, s_dist_08, s_dist_09, s_dist_10  
from stok s, item i  
where i.i_id = s.s_i_id;
```

```
set echo off;
```

Appendix C Tunable Parameters

The HP-UX operating system tunable parameters employed to generate the kernel for the HP Integrity rx6600 and the 6 HP 9000 Model rx2620 clients are listed below. Included as well are the Oracle Database 10g Enterprise Edition and TUXEDO 8.0 parameters.

C.1 HP-UX Configuration - Clients

Config/Client2/ostune.ver

```
*
* Created on Sat Jul 15 05:59:20 2006
*
version 1
configuration nextboot "loaded from "TPCC_driver" [44b8e6a3]
*
* Module entries
*
module gvid_info loaded 0.1.0
module rng loaded 0.1.0
module dev_config best [3F56E2F0]
module dmem best [3F56E2F0]
module diag2 best [3F56E2F0]
module pdh best [3F56E2F0]
module lion_psm best [3F56E2F0]
module ia64_psm best [3F56E2F0]
module wxb_hp best [3F56E2F0]
module sac best [3F56E2F0]
module acpi_node best [3F56E2F0]
module LCentlf best [3F56E2F0]
module ipmi best [3F56E2F0]
module pty1 best [3F56E2F0]
module pty0 best [3F56E2F0]
module azusa_psm best [3F56E2F0]
module pfil auto 0.1.0
module mpt best [3F4A8371]
module vols best [3F41B706]
module vol best [3F41B706]
module vxdmp best [3F41B577]
module vxvm best [3F41B706]
module iether best [3F4542A0]
module gelan best [3F454178]
module fddi4 best [3F4122D1]
module td best [3F533FD9]
module cifs best [3F465E27]
module cdfs best 0.1.0
module gvid_core best [3F56E2F0]
module asio0 best [3F56E2F0]
module igelan best [3F454271]
module sctl best [3F56E2F0]
module sdisk best [3F56E2F0]
module side best [3F56E2F0]
module side_multi best [3F56E2F0]
module ehci best [3F56E2F0]
module hub best [3F56E2F0]
module hcd best [3F56E2F0]
module lba best [3F56E2F0]
module sba best [3F56E2F0]
module drmfgl auto 0.1.0
module gvid_him_rad auto 0.1.0
module gvid_him_fgl auto 0.1.0
module inet best [3F559170]
module uipc best [3F56E2F0]
module tun best [3F559170]
module telm best [3F559170]
module tels best [3F559170]
module btlan best [3F559170]
module intl100 best [3F559170]
module dlpi best [3F559170]
module token_arpr best [3F559170]
module netdiag1 best [3F56E2F0]
module nms best [3F559170]
module nfs_core best [3F559170]
module nfs_server best [3F559170]
module nfs_client best [3F559170]
module nfsm best [3F559170]
module rpcmod best [3F559170]
module autofsc best [3F559170]
module cachefsc best [3F559170]
module hpstreams best [3F559170]
module clone best [3F559170]
```

```
module strlog best [3F559170]
module sad best [3F559170]
module echo best [3F559170]
module sc best [3F559170]
module timod best [3F559170]
module tirdwr best [3F559170]
module pipedev best [3F559170]
module pipemod best [3F559170]
module ffs best [3F559170]
module ldterm best [3F559170]
module ptem best [3F559170]
module pts best [3F559170]
module ptm best [3F559170]
module pckt best [3F559170]
module vxfs best [3F559170]
module vxportal best [3F559170]
module lvm best [3F559170]
module lv best [3F559170]
module drmfglrx auto 0.1.0
*
* Swap entries
*
* Dump entries
*
dump lvol
*
* Driver binding entries
*
* Tunables entries
*
tunable nhtbl_scale 1
tunable aio_proc_thread_pct 70
tunable maxdsiz_64bit 4294967296
tunable vps_ceiling 4
tunable shmseg 16
tunable shmmin 16
tunable shmmax 0x40000000
tunable semmni 32
tunable semvmx 62000
tunable semume 4
tunable nstrpty 200
tunable npty 128
tunable maxuprc 1334
tunable nproc (100+maxuprc)
tunable ninode 1024
tunable nfile 62000
tunable msgmnb 2097152
tunable msgmax 32768
tunable msgsz 512
tunable msgseg (msgmni*2)
tunable msgmni (nkthread/16)
tunable msgtql 2048
tunable msgmap (msgtql+2)
tunable nkthread 75000
tunable max_thread_proc 1330
tunable maxswapchunks 4096
tunable maxssiz 0x10000000
tunable maxdsiz 0x80000000
tunable maxfiles_lim 2048
tunable maxfiles 2048
tunable fs_async 1
tunable default_disk_ir 1
tunable create_fastlinks 1
tunable STRMSGSZ 65535
tunable vxfs_ifree_timelag 0xf000000
tunable vxfs_bc_bufhwm 0
tunable secure_sid_scripts 0
tunable vx_ninode 20000
tunable dbc_max_pct 5
tunable dbc_min_pct 1
tunable bufpages 8192
tunable swapmem_on 1
```

C.2 HP-UX Configuration – Server

Config/Server/ostune.ver

```
*
* Created on Sun Jul 23 15:55:10 2006
*
version 1
configuration nextboot "booted from 'ic046a_stage1'" [44c3fe33]
*
* Module entries
```

```

*
module ipf loaded 0.1.0
module pfil auto 0.1.0
module fdd best 0.1.0
module vxportal41 best [428EDDCC]
module vxfs41 best [428EDDCC]
module ixgbe best [435982D5]
module mpt best [4420E223]
module dmpahsalua best 0.1.0
module dmpahpalua best 0.1.0
module dmpjbod best 0.1.0
module dmpapf best 0.1.0
module dmpapg best 0.1.0
module dmpap best 0.1.0
module dmpaaa best 0.1.0
module dmpaa best 0.1.0
module vols best [42931793]
module vol best [42931793]
module vxdmp best [4292E92B]
module vxvm best [42931793]
module UsbOhci best 1.0.0
module UsbEhci best 1.0.0
module UsbHid best [43A8B3EB]
module UsbMiniBus best 1.0.0
module hid best [445A632F]
module hub best [445A632F]
module hcd best [445A632F]
module sas_vbus best [44342FE1]
module sasd best [44342FE1]
module ciss best [4420E1FA]
module prm best [445A632B]
module asyncdsk best [445A6373]
module mip6mod best [42A90340]
module ipmi_psm best [445A6341]
module ipmi best [445A6341]
module lv best [445A633C]
module lvm best [445A633C]
module igelan best [4420E1BE]
module iether best [4432F83E]
module gelan best [435D560A]
module fddi4 best [41237311]
module fcd_vbus best [441B4682]
module fcd_fcp best [441B4682]
module fcd best [441B4682]
module td best [435D5614]
module cifs best [426980D7]
module cachefsc best [42279EC7]
module autofs best [42E01411]
module rpcmod best [41F5F18C]
module nfsm best [412E8CC4]
module nfs_client best [41F61CCE]
module nfs_server best [412E8CC4]
module nfs_core best [41F61CCE]
module pkt best [445A62F9]
module ptr best [445A62F9]
module pts best [445A62F9]
module ptem best [445A62F9]
module ldterm best [445A62F9]
module ffs best [41C37402]
module pipemod best [41C37402]
module pipedev best [41C37402]
module tirdwr best [41C37402]
module timod best [41C37402]
module sc best [41C37402]
module echo best [41C37402]
module sad best [41C37402]
module strlog best [41C37402]
module clone best [41C37402]
module hpstreams best [41C37402]
module nms best [445A636E]
module token_arp best [412E9113]
module dlpi best [412E9113]
module intl100 best [412E8A84]
module btlan best [412E8A46]
module netdiag1 best [445A6357]
module tels best [412E8D79]
module telm best [412E8D79]
module tun best [4133B744]
module uipc best [445A6367]
module inet best [445A636D]
module rng loaded 0.1.0
module cdfs best 0.1.0
module dev_config best [445A632E]
module dmem best [445A634E]
module diag2 best [445A634C]
module c8xx best [445A634C]
module pdh best [445A6354]
module lion_psm best [445A6354]
module ia64_psm best [445A6354]
module wxb_hp best [445A6373]
module sac best [445A6373]
module acpi_node best [445A6355]
module LCentIf best [445A6373]
module pty1 best [445A62C0]
module pty0 best [445A62C0]

```

```

module azusa_psm best [445A6354]
module sdisk best [445A634C]
module tgt best [445A634C]
module UsbBootMouse best 1.0.0
module UsbBootKeyboard best 1.0.0
module asio0 best [445A6373]
module rmp3f01 best [445A6373]
module lba best [445A6348]
module sba best [445A632E]
module root best [445A6354]
module msrset loaded 0.1.0
*
* Swap entries
*
*
* Dump entries
*
*
* Driver binding entries
*
*
* Tunables entries
*
tunable vxfs_bc_bufhwm 40960
tunable max_thread_proc 2048
tunable nstrpty 200
tunable cmc_plat_poll 15
tunable STRMSGSZ 65535
tunable create_fastlinks 1
tunable dbc_min_pct 1
tunable max_async_ports 1000
tunable maxdsiz 3221225472
tunable maxdsiz_64bit 274877906944
tunable maxssiz 100610048
tunable maxssiz_64bit 1073741824
tunable maxtsiz 1073741824
tunable maxtsiz_64bit 4294967296
tunable maxuprc 2040
tunable maxvgs 80
tunable msgmnb 65536
tunable msgseg 20480
tunable msgssz 128
tunable msgtql 5120
tunable nfile 30000
tunable ninode 8192
tunable nproc 2048
tunable npty 200
tunable nswapdev 25
tunable o_sync_is_o_dsync 1
tunable physical_io_buffers 768
tunable secure_sid_scripts 0
tunable semmni 4096
tunable semmns 8192
tunable semmnu 2040
tunable semmsl 128
tunable semume 512
tunable shmmax 0x8000000000
tunable shmmni 512
tunable shmseg 512
tunable swapmem_on 0
tunable swchunk 65536
tunable unlockable_mem 1
tunable vps_ceiling 64
tunable vxfs_ifree_timelag 3600000
tunable dbc_max_pct 1
tunable msgmap 5122
tunable msgmax 32768
tunable perfmon_max_locked_pages 0x100
tunable bufpages 30000

```

Config/Server/dbtune.ver

```

HPUX_SCHED_NOAGE =180
UNDO_TABLESPACE = undo_1
aq_tm_processes = 0
compatible = 10.1.0.0.0
control_files =
(/project/oracle/build20k.4K/dbs/tpcc_disks/control_001,/project/oracle/build20k.4K/dbs/tp
cc_disks/control_002)
cursor_space_for_time = TRUE
db_block_checking =false
db_block_checksum = false
db_block_size = 4096
shared_pool_size = 3200M
db_2k_cache_size = 640M
db_cache_size = 13888M
db_8k_cache_size = 320M
db_16k_cache_size = 20032M

```

```

db_keep_cache_size = 112000M
db_recycle_cache_size = 32128M
db_files = 180
db_name = tpcc
db_writer_processes = 1
disk_asynch_io = true
dml_locks = 400
fast_start_mttr_target = 0
java_pool_size = 0
job_queue_processes = 0
lock_sga = TRUE
log_buffer = 10485760
log_checkpoint_interval = 0
log_checkpoint_timeout = 0
log_checkpoints_to_alert = true
parallel_max_servers = 32
pga_aggregate_target = 0
plsql_optimize_level = 2
processes = 330
query_rewrite_enabled = false
recovery_parallelism = 8
replication_dependency_tracking = false
sessions = 350
statistics_level = basic
timed_statistics = false
trace_enabled = false
transactions = 350
undo_management = auto
undo_retention = 1

```

```

ULOGPFX="/tmp/TUXEDO_LOG"

# for debugging, put both into the same log on the same machine
# ULOGPFX="/home/tuxedo/conf/tpcc/ULOG"
# but for a big run, need some space, and want them local to the
# machine rather than across the net.

# Leave TUXCONFIG alone on the MASTER machine; over-ride for each
# other machine?
plebe24 LMID=plebe24
TUXCONFIG="/project/tpcc/tuxconfs/TUXconfig.plebe24"
#-----
*GROUPS
#-----
group1 LMID=plebe24
GRPNO=1

#-----
#-----
#-----
*SERVERS
#-----
#
# "--" is application-specific arguments to be passed to server
# "-n" is designed to specify server-id

service SRVGRP=group1
CLOPT="-s NEWO_SVC -s PMT_SVC -s ORDS_SVC -s STKL_SVC -s
DVRV_SVC"
MIN=20 MAX=20 RQADDR=tpcc_1 REPLYQ=Y SRVID=1
#-----
*SERVICES
#-----
*ROUTING
#-----

```

C.3 Tuxedo UBBconfig

Config/Client2/tmcfg.ver

```

# This is a UBBconfig for a client1-server configuration.
#
# This UBBconfig requires settings for:
# SERVER_NAME CLIENT_NAME MASTER_NAME SERVER_ADDR
# CLIENT_ADDR NODE_NAMES
# TLISTEN_PORT TBRIDGE_PORT
# In addition, it requires setting the things all UBBconfig.gens need:
# IPCKEY some decent IPCKEY, should be different for
# each config
# ROOTDIR
# TUXCONFIG
# APPDIR
# ULOGDIR
#
#-----
*RESOURCES
#-----
IPCKEY 40001
PERM 0666
MASTER plebe24

MAXACCESSORS 1960 # num_users + 50
MAXGTT 1024
MAXSERVERS 25 # num_servers + 5
MAXSERVICES 110 # num_servers * #-of-services-each-server(5) + 10( for
BBL)
MODEL SHM
LDBAL N
OPTIONS NO_AA,NO_XA

# During benchmark, don't want to scan too often. In particular, while
# the client1s are stabilizing in virtual memory, we don't want to sanity
# scan; and if we do sanity scan, we want large timeouts, since the BRIDGE
# the BBL, the DBBL, and the client1s aren't getting much CPU time during that
# period. Current settings:
# * scan servers every 5 minutes (maximum allowed by TUXEDO);
# * wait 1 minute for sanity responses (maximum allowed by TUXEDO);
# * scan all the BBLs from DBBL every 30 minutes (want one scan in the
# audited results);
# * timeout a blocking call after 5 minutes (the maximum).
SCANUNIT 60
SANITYSCAN 5
DBBLWAIT 1
BBLQUERY 30
BLOCKTIME 5

#
#-----
*MACHINES
#-----
DEFAULT:
TUXCONFIG="/project/tpcc/tuxconfs/TUXconfig.plebe24"
ROOTDIR="/project/tuxedo"
APPDIR="/project/tpcc/bin"

```

Appendix D RTE Configuration

This appendix lists RTE input parameters and code fragments used to generate each transaction input file, to demonstrate the RTE was configured to generate transaction input data as specified in *Clause 2* of the specification.

D.1 Field Value Generation

Source/src/driver/generate.c

```
*****
@(#) Version: A.10.10 $Date: 2005/04/11 09:40:08 $

(c) Copyright 1996, Hewlett-Packard Company, all rights reserved.
*****
#include <stdio.h>
#include <stdlib.h>
#include <values.h>
#include <unistd.h>
#include <time.h>
#include <sys/types.h>
#include <sys/ipc.h>
#include <fcntl.h>
#include <signal.h>
#include <math.h>
#include <string.h>

#include "random.h"
#include "shm_lookup.h"

#include <time.h>

int CLAST_CONST_C = 208;
int CID_CONST_C = 37;
int IID_CONST_C = 75;

int trans_type = 0; /* type of transaction 0 == all */

void
neworder_gen(neworder_trans *t, ID warehouse, ID district)
{
    int i;

    t->W_ID = warehouse;

    t->D_ID = RandomNumber(1, no_dist_pw);
    t->C_ID = NURandomNumber(1023, 1, no_cust_pd, CID_CONST_C);

    t->O_OL_CNT = RandomNumber(5, 15);

    for (i=0; i<t->O_OL_CNT; i++)
    {
        t->item[i].OL_I_ID = NURandomNumber(8191, 1, no_item, IID_CONST_C);
        t->item[i].OL_SUPPLY_W_ID = RandomWarehouse(warehouse, db_size, 1);
        t->item[i].OL_QUANTITY = RandomNumber(1, 10);
    }
    /* Zero out the non-used items as the oracle driver does. */
    for (; i< 15; i++)
    {
        t->item[i].OL_I_ID = 0;
        t->item[i].OL_SUPPLY_W_ID = 0;
        t->item[i].OL_QUANTITY = 0;
    }

    /* 1% of transactions roll back. Give the last order line a bad item */
    if (RandomNumber(1, 100) == 1)
        t->item[t->O_OL_CNT - 1].OL_I_ID = -1;
}

void
payment_gen(payment_trans *t, ID warehouse, ID district)
{
    /* home warehouse is fixed */
```

```
t->W_ID = warehouse;

/* Random district */
t->D_ID = RandomNumber(1, no_dist_pw);

/* Customer is from remote warehouse and district 15% of the time */
t->C_W_ID = RandomWarehouse(warehouse, db_size, 15);
if (t->C_W_ID == t->W_ID)
    t->C_D_ID = t->D_ID;
else
    t->C_D_ID = RandomNumber(1, no_dist_pw);

/* by name 60% of the time */
t->byname = RandomNumber(1, 100) <= 60;
if (t->byname)
    LastName(NURandomNumber(255, 0, no_cust_pd/3 - 1, CLAST_CONST_C),
            t->C_LAST);
else
    t->C_ID = NURandomNumber(1023, 1, no_cust_pd, CID_CONST_C);

/* amount is random from [1.00..5,000.00] */
t->H_AMOUNT = RandomNumber(100, 500000);

}

void
ordstat_gen(ordstat_trans *t, ID warehouse, ID district)
{
    /* home warehouse is fixed */
    t->W_ID = warehouse;

    /* district is randomly selected from warehouse */
    t->D_ID = RandomNumber(1, no_dist_pw);

    /* by name 60% of the time */
    t->byname = RandomNumber(1, 100) <= 60;
    if (t->byname)
        LastName(NURandomNumber(255, 0, no_cust_pd/3 - 1, CLAST_CONST_C),
                t->C_LAST);
    else
        t->C_ID = NURandomNumber(1023, 1, no_cust_pd, CID_CONST_C);
}

void
delivery_gen(delivery_trans *t, ID warehouse, ID district)
{
    t->del.W_ID = warehouse;
    t->del.O_CARRIER_ID = RandomNumber(1,10);
}

void
stocklev_gen(stocklev_trans *t, ID warehouse, ID district)
{
    t->W_ID = warehouse;
    t->D_ID = district;
    t->threshold = RandomNumber(10, 20);
}

int get_trans_type()
/******
* get_trans_type selects a transaction according to the weighted average
* For TPC-C rev 3.0 and less and TPC-C rev 3.2 this is:
* new-order : ???
* payment : 43.0%
* order stat: 4.0%
* delivery : 4.0%
* stock : 4.0%
*****/
{
    static const double weight[] = { 0.0, 0.0, .4301, .0401, .0402, .0401};
    int type;
    double r;

    /* choose a random number between 0.0 and 1.0 */
    if (trans_type == 0) {
        r = RandomValue();

        /*
        * select one of STOCKLEV, DELIVERY, ORDSTAT and PAYMENT
        * based on weight
        */
        for (type = STOCKLEV; type > NEWORDER; type--) {
            r -= weight[type];
            if (r < 0) break;
        }
    } else if (trans_type > 0) {
        /* user wants only a certain type (say all stocklevel) so do that
        instead */
        type = trans_type;
    }
}
/* return the value of the selected card, or NEWORDER if none selected */
return type;
}
```

Appendix E Disk Storage

The calculations for the 8 hours recovery log were based on how often the oracle redo log files were filling up and needed to be switched. The database took a checkpoint, and switched from the "current" log file to the other, "active" log file, every 29.6 minutes. Each log file is 39000MB. So, to run for 8 hours, we need:

$$((8 * 60) / 29.6) * 39000 / 1024 = 617.61 \text{ GB (must be mirrored)}$$

The log disk array has a total of 1435.54 GB (mirrored) available for the 8-hour recovery log.

The calculation for 60 day space yields 7425.70GB. Each of the 8 data arrays have an available capacity of 1423.81GB for a total of 11390.45GB.

TPC-C 60-Day Space Requirements

TPM 203569
Warehouses 20000

SEGMENT	TYPE	BLOCKS	BLOCK_SIZE	FIVE_PCT	DAILY_GROW	TOTAL
CUSTCLUSTER	CLUSTER	140,406,574	4,096	7,020,329	0	147,426,903
DB_STAT	SYS	524,288	4,096	0	0	524,288
DISTCLUSTER	CLUSTER	225,280	2,048	11,264	0	236,544
HIST	TABLE	8,757,936	4,096	0	1,793,625	10,551,561
ICUST1	INDEX	861,747	16,384	43,087	0	904,834
ICUST2	INDEX	1,835,008	16,384	91,750	0	1,926,758
IDIST	INDEX	50,512	2,048	2,526	0	53,038
IITEM	INDEX	5,632	2,048	282	0	5,914
IORDR2	INDEX	5,644,235	4,096	282,212	0	5,926,447
ISTOK	INDEX	2,670,784	16,384	133,539	0	2,804,323
ITEMCLUSTER	CLUSTER	8,446	2,048	422	0	8,868
IWARE	INDEX	13,012	2,048	651	0	13,663
NORDCLUSTER_QUEUE	CLUSTER	1,364,664	4,096	68,233	0	1,432,897
ORDRCLUSTER_QUEUE	CLUSTER	30,484,740	16,384	0	6,243,275	36,728,015
STOKCLUSTER	CLUSTER	154,009,128	4,096	7,700,456	0	161,709,584
SYSAUX	SYS	30,720	4,096	0	0	30,720
SYSTEM	SYS	102,400	4,096	0	0	102,400
SYS_IQ0000009744\$\$	INDEX	129,200	16,384	6,460	0	135,660
SYS_IQ0000009748\$\$	INDEX	170,583	4,096	8,529	0	179,112
WARECLUSTER	CLUSTER	43,312	2,048	2,166	0	45,478
TOTAL						370,747,007

SEGMENT	BLOCKS	BLOCK_SIZE	REQUIRED	STATIC	DYNAMIC	OVERSIZE
CUSTCLUSTER	157,286,400	4,096	147,426,903	147,426,903	0	9,859,497
DB_STAT	524,288	4,096	524,288	524,288	0	0
DISTCLUSTER	472,576	2,048	236,544	236,544	0	236,032
HIST	13,332,480	4,096	10,551,561	0	8,757,936	2,780,919
ICUST1	936,640	16,384	904,834	904,834	0	31,806
ICUST2	2,172,928	16,384	1,926,758	1,926,758	0	246,170
IDIST	56,320	2,048	53,038	53,038	0	3,282
IITEM	10,240	2,048	5,914	5,914	0	4,326
IORDR2	8,028,160	4,096	5,926,447	5,926,447	0	2,101,713
ISTOK	2,894,464	16,384	2,804,323	2,804,323	0	90,141
ITEMCLUSTER	10,240	2,048	8,868	8,868	0	1,372
IWARE	15,360	2,048	13,663	13,663	0	1,697
NORDCLUSTER_QUEUE	1,707,520	4,096	1,432,897	1,432,897	0	274,623
ORDRCLUSTER_QUEUE	45,486,080	16,384	36,728,015	0	30,484,740	8,758,065
STOKCLUSTER	195,870,720	4,096	161,709,584	161,709,584	0	34,161,136
SYSAUX	30,720	4,096	30,720	30,720	0	0
SYSTEM	102,400	4,096	102,400	102,400	0	0
SYS_IQ0000009744\$\$	45,486,080	16,384	135,660	135,660	0	45,350,420
SYS_IQ0000009748\$\$	1,707,520	4,096	179,112	179,112	0	1,528,408
WARECLUSTER	46,080	2,048	45,478	45,478	0	602

DYNAMIC	522,787,584	Initial MB for (History+Orders)
STATIC	1,362,401,614	Initial Blocks + 5% - Dynamic
DAILY_GROW	107,066,900	Total Dynamic [(calc. as (Initial Blocks)*tpmC/(WHS*62.5)]
DAILY_SPREAD	0	Oracle may be configured so that daily spread is 0
SPACE60	7,786,415,614	Static + 60*(Daily Growth+Daily Spread)
SPACE60 GB	7,603,921	Excludes OS, Paging and RDBMS Logs
OVERSIZE	1,074,945,438	
8-hour log (GB)	617.61	RDBMS Logs
Server swap (GB)	192	OS: Paging
Server OS (GB)	20	OS: UNIX File System
Total Space Needed	7,604,751	GB

Priced-System Configuration	Size in GB	Quantity	Total (GB)
Log arrays: MSA1000 with 42 72.8GB disk drives in RAID 1 mode	1,435.540	1	1,435.54
Data arrays: MSA1500 with 336 36.4GB disk drives in RAID 0 mode	1,423.810	8	11,390.48
Total Storage in Priced System (GB)			12,826.02

Appendix F Price Quotes

The following pages contain the price quotes for the hardware included in this FDR.

From: Mary.Beth Pierantoni [mailto:mary.beth.pierantoni@oracle.com]
Sent: Monday, July 17, 2006 9:51 AM
To: Boushey, Lucille
Subject: Oracle Pricing

Product	Price	Quantity	Extended Price
Oracle Database 10g Enterprise Edition, Per Processor, Unlimited Users, 3 years	\$20,000	2*	\$40,000
Oracle Database Server Support Package for 3 years	\$2,000	3	\$6,000
Oracle Mandatory E-Business Discount			<\$2,300>
Oracle TOTAL			\$43,700

* 2 = 0.50 * 4. Explanation: For the purposes of counting the number of processors which require licensing, an Intel multicore chip with "n" cores shall be determined by multiplying "n" cores by a factor of 0.50.

Oracle pricing contact: MaryBeth Pierantoni, mary.beth.pierantoni@oracle.com, 916-315-5081

This quote is valid for 90 days.

July 13, 2006

Lucille Boushey
Hewlett Packard Company
(408) 447-7364; Pne
(408) 447-5958; Fax

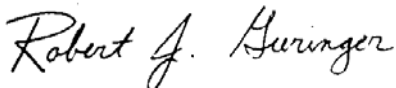
Per your request I am enclosing the pricing information regarding TUXEDO 8.0 that you requested. This pricing applies to Tuxedo 6.4, 6.5, 7.1,8.0,8.1,9.0, and 9.1. Please note that Tuxedo 9.0 is our most recent version of Tuxedo. Core functionality services (CFS)-R pricing is appropriate for your activities. As per the table below HP/Compaq systems are classified as either a Tier 1, 2, 3, 4 or 5 systems depending on the performance and CPU capacity of the system. The HP RX 2620 machines are Tier 1 machines – price is \$1,200 per server (License), eligible for a 5% discount = \$1,140 per server + \$252 per server (7x24) for support – support is non discountable. This quote is valid for 60 days from the date of this letter.

Tuxedo Core Functionality Services (CFS-R) Program Product Pricing and Description

TUX-CFS-R provides a basic level of middleware support for distributed computing, and is best used by organizations with substantial resources and knowledge for advanced distributed computing implementations.

TUX-CFS-R prices are server only and are based on the overall performance characteristics of the server and uses the same five tier computer classification as TUXEDO 6.4, 6.5,7.1,8.0, 8.1,9.0, and 9.1. Prices range from \$1,200 for Tier 1 to \$100,000 for Tier 5. Under this pricing option EVERY system running TUX-CFS-R at the user site must have a TUXEDO license installed and pay the appropriate per server license fees.

Very Truly Yours,



Rob Gieringer,
Worldwide Pricing Manager

BEA Tux/CFS-R Unlimited User License Fees Per Server

Unlimited User License fees per server	Number of Users	Dollar Amount	Maintenance (5 x 9) per year	Maintenance (7 x 24) per year
Tier 1 -- PC Servers with 1 or 2 CPUs, entry level RISC Uni-processor workstations and servers	Unlimited	\$1,200.00	\$216	\$252
Tier 2 - PC Servers with 3 or 4 CPUs, Midrange RISC Uni-processor servers and workstations with up to 2 CPUs	Unlimited	\$4,800.00	\$864	\$1,008
Tier 3 - Midrange Multiprocessors, up to 8 CPUs per system capacity	Unlimited	\$12,000.00	\$2,160	\$2,520
Tier 4 - Large (more than 8, less than 32 CPUs)	Unlimited	\$40,000.00	\$7,200	\$8,400
Tier 5 - Massively Parallel Systems, > 32 processors	Unlimited	\$100,000.00	\$18,000	\$21,000

	Tier 1	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5
Operating System						
HP/UX 9.X;10.X	Uni-processor Workstation B Class - 132/180/2000 C Class (3000/3600 / 3700) 2P Client Machines Compaq DL360	9000/E25 9000/E35 9000/E45 9000/E55 9000/G30 9000/G40 9000/A180 9000/A180C 9000/A400 RX 2600 RX 2620	9000/G50 9000/G60 Multi-Processor Workstations J Class (J282/J2240/J5600/J6000/J6700) 9000/R380,390 9000/D200,210 220/30/50/60/80 D310/20/30 D350/60/70/80 9000 /A500 9000 – L1000 9000 – R Class	9000/H20, 30 9000/H40, 50 9000/I30, 40 9000/K1XX 9000 – L2000/L3000 9000/I50,60 9000/H60 9000/G70 9000/H70 9000/I70 9000/K2XX 9000/K3XX 9000/K4XX 9000/K5XX N4xxx Series	9000/T500, T520, T600 1-16 CPUs S-Class RP8400 Superdome < 32 CPU's RP8420 SuperDome (PA-8800 bases) w/ < 32 dual-core CPU's	9000/V series all models X-Class Superdome >= 32 CPU's SuperDome (PA-8800 bases) w/ >= 32 dual-core CPU's