# Hewlett-Packard Company

TPC Benchmark™ C
Full Disclosure Report
for

## HP Integrity rx4640

Using
Oracle Database 10g Standard Edition and
Red Hat Enterprise Linux AS 3

**First Edition**
**November 8, 2004**

First Edition – November 8, 2004

Hewlett Packard Company (HP) 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. HP 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, HP 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 were obtained in a rigorously controlled environment. Results obtained in other operating environments may vary significantly. HP 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.

Printed in U.S.A., 2004

Parallel Database Cluster Model PDC and ProLiant are registered trademarks of Hewlett Packard Company.

ORACLE 10i, Pro*C, PL/SQL, SQL*Net, SQL*Plus are registered trademarks of Oracle Corporation.

TPC Benchmark is a trademark of the Transaction Processing Performance Council.

All other brand or product names mentioned herein must be considered trademarks or registered trademarks of their respective owners.

# Table of Contents

# *Preface*

The TPC Benchmark C was developed by the Transaction Processing Performance Council (TPC). The TPC was founded to define transaction processing benchmarks and to disseminate objective, verifiable performance data to the industry. This full disclosure report is based on the TPC Benchmark C Standard Specifications Version 5.2, released December, 2003.

## TPC Benchmark C Overview

The TPC describes this benchmark in Clause 0.1 of the specifications as follows:

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.

TPC-C uses terminology and metrics that are similar to other benchmarks, originated by the TPC or others. Such similarity in terminology does not in any way imply that TPC-C results are comparable to other benchmarks. The only benchmark results comparable to TPC-C are other TPC-C results conformant with the same revision.

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.

Benchmark results are highly dependent upon workload, specific application requirements, and systems design and implementation. Relative system performance will vary as a result of these and other factors. Therefore, TPC-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.

# Abstract

## Overview

This report documents the methodology and results of the TPC Benchmark C test conducted on the hp integrity r4640. The operating system used for the benchmark was Red Hat Enterprise Linux AS 3 update 3. The DBMS used was Oracle Database 10g Standard Edition.

## 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:

161217 tpmC
$3.94 per tpmC
Available as of November 8, 2004.

## Standard and Executive Summary Statements

The following pages contain an executive summary of results for this benchmark.

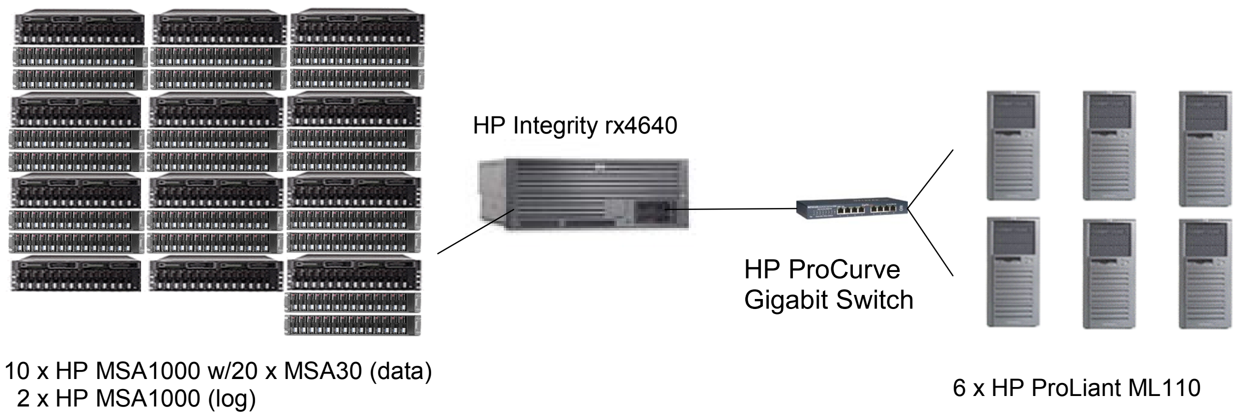
## Auditor

The benchmark configuration, environment and methodology were audited by Lorna Livingtree of Performance Metrics Inc. to verify compliance with the relevant TPC specifications.

| | | |
|---|---|---|
| | **HP Integrity rx4640**<br>**C/S with 6 ProLiant ML110** | **TPC-C Version 5.3**<br>Report Date<br>**November 8, 2004** |

| Total System Cost | TPC-C Throughput | Price/Performance | Availability Date |
|---|---|---|---|
| **$634,380 USD** | **161,217 tpmC** | **$3.94 USD/ tpmC** | **December 17, 2004** |

| Processors | Database Manager | Operating System | Other Software | Number of Users |
|---|---|---|---|---|
| 4 x 1.6GHz Intel Itanium2 9M Processors – Server<br>1 x Xeon 3.0GHz / Client | Oracle Database 10g Standard Edition | Red Hat Enterprise Linux AS 3<br>Update 3 | Microsoft COM+ | **129,000** |


HP Integrity rx4640
HP ProCurve Gigabit Switch
10 x HP MSA1000 w/20 x MSA30 (data)
2 x HP MSA1000 (log)
6 x HP ProLiant ML110

| | **Server** | | **Each Client** | |
|---|---|---|---|---|
| **System Components** | Quantity | Description | Quantity | Description |
| Processor | 4 | 1.6 GHz Itanium2 9M w/ 9MB Cache | 1 | 3.0GHz Xeon w/ 256K cache |
| Memory | 32 | 4GB | | 1.5GB |
| Disk Controllers | 6<br>1 | PCI-X HBA FC Dual Controller<br>Integrated SCSI Controller | 1 | Integrated IDE Controller |
| Disk Drives | 420<br>28 | 36GB 15K SCSI Drives<br>146GB 10K SCSI Drives | 1 | 80 GB ATA Drive |
| Total Storage | | 19,208 GB | | |

HP Integrity rx4640 1.60GHz/9MB 4P

TPC-C Version 5.3

Report Date: 8-Nov-04

| Description | Part Number | Third Party | | Unit Price | Qty | Extended Price | 3 yr. Maint. Price |
|---|---|---|---|---|---|---|---|
| **Server Hardware** | | **Brand** | **Pricing** | | | | |
| HP Integrity rx4640, Intel Itanium2 processor 1.60GHz with 9MB L3 cache | AB533A | | 1 | 56,700.00 | 1 | 56,700 | |
| Single power supply,1-Year Limited Warranty, Core I/O (2NICs, Mgt LAN, U320, SCSI, | | | | | | | |
| RS-232 sp, VGA, USB), 32-DIMM memory carrier board, 1 73GB/15krpm hard disk | | | | | | | |
| 16GB memory quad (4 x 4GB DIMMs) | AB475A | | 1 | 45,000 | 8 | 360,000 | |
| 73GB 15k Hot Plug Ultra320 SCSI Low Profile Drive | A9897A | | 1 | 1,350 | 1 | 1,350 | |
| Channel Adapter, PCI-X (64-bit, 133 MHz) with 2 LC connectors, auto | A6826A | | 1 | 4,395 | 6 | 26,370 | |
| USB Keyboard kit PC-104/105 (inc. USB Kydb and USB mouse) | A7861C | | 1 | 32 | 1 | 32 | |
| HP S5500 color monitor (carbon/silver 15-inch CRT) | P9006A#ABA | | 1 | 129 | 1 | 129 | |
| HP T1000 Low Voltage US Tower UPS | 204155-001 | | 1 | 399 | 1 | 399 | |
| Rack Model 5642 | 358254-B21 | | 1 | 689 | 3 | 2,067 | |
| | | | | | | | |
| 3YR 24X7/4HR for HP Integrity rx4640 | HA110A3-6KT | | 1 | 8,759 | 1 | | 8,759 |
| | | | | | **Server Hardware Subtotal** | **447,047** | **8,759** |
| **External Storage** | | | | | | | |
| Modular SAN Array 1000 | 201723-B22 | | 1 | 6,995 | 12 | 83,940 | |
| Modular SAN Array 1000, Support 3yr 24x7, 4 hr | 402164-002 | | 1 | 3,538 | 12 | | 42,456 |
| 2Gb SFF-SW Trncvr Kit | 221470-B21 | | 1 | 199 | 12 | 2,388 | |
| 2Gb SFF-SW Trncvr Kit (10% spares) | 221470-B21 | | 1 | 199 | 2 | 398 | |
| Myricom 3M US Fibre Cable | 257897-002 | | 1 | 75 | 12 | 900 | |
| Myricom 3M US Fibre Cable (10% spares) | 257897-002 | | 1 | 75 | 2 | 150 | |
| StorageWorks Enclosure Model MSA 30 SB - Rack-mountable | 302969-B21 | | 1 | 2,978 | 20 | 59,560 | |
| 146GB Pluggable Ultra320 SCSI 10,000 rpm Hard Drive (DB Log) | 286716-B22 | | 1 | 599 | 28 | 16,772 | |
| 36GB Pluggable Ultra320 SCSI 15,000 rpm Hard Drive (Database) | 286776-B22 | | 1 | 299 | 420 | 125,580 | |
| 36GB Pluggable Ultra320 SCSI 15,000 rpm Hard Drive (10% spares) | 286776-B22 | | 1 | 299 | 28 | | 8,372 |
| FM-4E724-36 3YR 24X7/4HR EMPTY DISK ENCL | 171242-002 | | 1 | 157 | 20 | | 3,140 |
| | | | | | **Server External Storage Subtotal** | **289,688** | **53,968** |
| **Server Software** | | | | | | | |
| Red Hat Enterprise Linux AS 3.0 | T2744AA-324 | HP | 1 | 1,908 | 1 | 1,908 | |
| 3 Yrs 24 x 7 Support Contract for Red Hat Enterprise Linux AS 3.0 | HA110A3-6L4 | HP | 1 | 4,839 | 1 | | 4,839 |
| Oracle Database 10g Standard Edition-Per Processor for 3 years, unlimited users | run-time | Oracle | 2 | 7,500 | 4 | 30,000 | |
| Oracle Database Server Support Package for 3 years | run-time | Oracle | 2 | 2,000 | 3 | | 6,000 |
| | | | | | **Server Software Subtotal** | **31,908** | **10,839** |
| **Client Hardware** | | | | | | | |
| HP ProLiant ML110 P3.0GHz 256MB memory 80GB Ultra ATA drive. | 359661-001 | | 1 | 729 | 6 | 4,374 | |
| PCI Gigabit NIC (embedded) 10/100/1000 WOL (Wake on LAN) | | | | | | | |
| ML110 3 Years 7x24 4hr Support | U4435A | | 1 | 448 | 6 | | 2,688 |
| 512 UNREG PC3200 1X512 ML110 WW | 354560-B21 | | 1 | 259 | 12 | 3,108 | |
| 256 UNREG PC3200 1X256 ML110 WW | 354557-B21 | | 1 | 149 | 6 | 894 | |
| | | | | | **Client Hardware Subtotal** | **8,376** | **2,688** |
| **Client Software** | | | | | | | |
| Microsoft Windows 2000 Server | C11-00821 | Microsoft | 3 | 738 | 6 | 4,428 | |
| | | | | | **Client Software Subtotal** | **4,428** | |
| **User Connectivity** | | | | | | | |
| HP Procurve 1GB - Switch 2824 | J4903A#ABA | | 1 | 2,499 | 1 | 2,499 | |
| | | | | | **Connectivity Subtotal** | **2,499** | |
| Large Purchase (Integrity Direct) and Net 30 discount | | | 1 | | | **($161,092)** | **($3,153)** |
| Large Purchase (Direct) and Net 30 discount | | | 1 | | | **($48,021)** | **($9,065)** |
| Oracle E-Business Suite Mandatory Discount | | | 2 | | | **($1,800)** | **0** |
| | | | | | **Total** | **$573,033** | **$61,348** |
| Prices used in TPC benchmarks reflect the actual prices a customer would pay for a one-time | | | | | | | |
| purchase of the stated components. Individually negotiated discounts are not permitted. Special | | | | | | | |
| prices based on assumptions about past or future purchases are not permitted. All discounts | | | | | **Three-Year Cost of Ownership:** | | **$634,380 USD** |
| reflect standard pricing policies for the listed components. For complete details, see the pricing | | | | | | | |
| sections of the TPC benchmark pricing specifications. If you find that the stated prices are not | | | | | | **tpmC Rating:** | **161,217** |

# Numerical Quantities Summary

**MQTH, Computed Maximum Qualified Throughput** **161,217 tpmC**

| Response Times (in seconds) | Average | 90% | Maximum |
|---|---|---|---|
| New-Order | 0.201 | 0.302 | 6.315 |
| Payment | 0.193 | 0.294 | 7.651 |
| Order-Status | 0.208 | 0.310 | 5.155 |
| Delivery (interactive portion) | 0.102 | 0.103 | 0.124 |
| Delivery (deferred portion) | 0.089 | 0.186 | 2.812 |
| Stock-Level | 0.195 | 0.296 | 5.570 |
| Menu | 0.102 | 0.103 | 0.126 |

| Transaction Mix, in percent of total transaction | |
|---|---|
| New-Order | 44.915% |
| Payment | 43.020% |
| Order-Status | 4.020% |
| Delivery | 4.025% |
| Stock-Level | 4.020% |

| Emulation Delay (in seconds) | Resp.Time | Menu |
|---|---|---|
| New-Order | 0.10 | 0.10 |
| Payment | 0.10 | 0.10 |
| Order-Status | 0.10 | 0.10 |
| Delivery (interactive) | 0.10 | 0.10 |
| Stock-Level | 0.10 | 0.10 |

| Keying/Think Times (in seconds) | Min. | Average | Max. |
|---|---|---|---|
| New-Order | 18.005/0.00 | 18.008/12.605 | 18.024/126.004 |
| Payment | 3.010/0.00 | 3.018/12.015 | 3.031/120.098 |
| Order-Status | 2.010/0.00 | 2.018/10.015 | 2.030/99.971 |
| Delivery (interactive) | 2.010/0.00 | 2.018/5.025 | 2.030/50.198 |
| Stock-Level | 2.010/0.00 | 2.018/5.015 | 2.030/49.934 |

| Test Duration | |
|---|---|
| Ramp-up time | 46.5 minutes |
| Measurement interval | 120 minutes |
| Transactions (all types) completed during measurement interval | 43,072,709 |
| Ramp down time | 50.5 minutes |

| Checkpointing | |
|---|---|
| Number of checkpoints | 5 |
| Checkpoint interval | 24.5 minutes |

# *General Items*

## 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 all source code implemented in this benchmark.

## Test Sponsor

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

This benchmark was sponsored by Hewlett Packard Company. The benchmark was developed and engineered by Hewlett Packard Company and Oracle Corporation. Testing took place at HP Database Performance Engineering Laboratory in Houston, Texas.

## Parameter Settings

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

- *Database options*
- *Recover/commit options*
- *Consistency locking options*
- *Operating system and application configuration parameters*

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

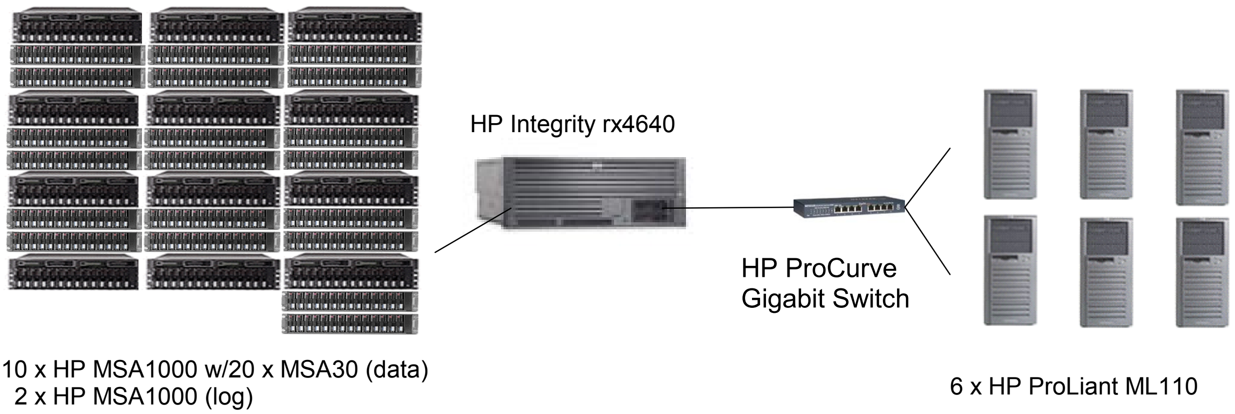
Appendix C contains the tunable parameters for the database, the operating system, and the transaction monitor.

## Configuration Items

*Diagrams of both measured and priced configurations must be provided, accompanied by a description of the differences.*

The configuration diagram for both the tested and priced system are the same and included on the following page

## Figure 1. Benchmarked and Priced Configuration



# Clause 1 Related Items

## Table Definitions

*Listing must be provided for all table definition statements and all other statements used to set up the database.*
Appendix B contains the code used to define and load the database tables.

## Physical Organization of Database

*The physical organization of tables and indices within the database must be disclosed.*
420 disks used in the benchmark had a capacity of 36.4.GB 15K rpm, and 28disks used in the benchmark had a capacity of 146.8 GB 10K rpm.

| Controller | Storage | Unformatted Capacity | Contents |
|---|---|---|---|
| 1. Host Fibre Channel Adapter | 2 Modular San Array 1000<br>4 Storageworks Enclosure Model MSA 30 SB<br>(6 x 14 x 36.4 GB 15K rpm disk drives) | 3057 GB | Tables, Indexes |
| 2. Host Fibre Channel Adapter | 2 Modular San Array 1000<br>4 Storageworks Enclosure Model MSA 30 SB<br>(6 x 14 x 36.4 GB 15K rpm disk drives) | 3057 GB | Tables, Indexes |
| 3. Host Fibre Channel Adapter | 2 Modular San Array 1000<br>4 Storageworks Enclosure Model MSA 30 SB<br>(6 x 14 x 36.4 GB 15K rpm disk drives) | 3057 GB | Tables, Indexes |
| 4. Host Fibre Channel Adapter | 2 Modular San Array 1000<br>4 Storageworks Enclosure Model MSA 30 SB<br>(6 x 14 x 36.4 GB 15K rpm disk drives) | 3057 GB | Tables, Indexes |
| 5. Host Fibre Channel Adapter | 2 Modular San Array 1000<br>4 Storageworks Enclosure Model MSA 30 SB<br>(6 x 14 x 36.4 GB 15K rpm disk drives) | 3057 GB | Tables, Indexes |
| 6. Host Fibre Channel Adapter | 2 Modular San Array 1000<br>(2 x 14 x 146 GB 15K rpm disk drives) | 4088 GB | Redo Logs |

## Priced Configuration:

All hardware and software remained the same between the benchmarked and priced configurations.

## 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 minimum key value for these new rows.*

All insert and delete functions were verified to be fully operational during the entire benchmark.

## 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.*

None.

## Replication, Duplication or Additions

*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.*

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

# Clause 2 Related Items

## Random Number Generation

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

Random numbers were generated using the drand48() and lrand48() UNIX calls. These functions generate pseudo random numbers using the linear congruential algorithm and 48-bit integer arithmetic. The random number generators are initially seeded using the srand48() call.

## Input/Output Screen Layout

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

All screen layouts followed the specifications exactly.

## 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 attributes were verified by the auditor manually exercising each specification on a representative  ProLiant ML110.

## Presentation Manager or Intelligent Terminal

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

Application code running on the client machines implemented the TPC-C user interface.  No presentation manager software or intelligent terminal features were used.  The source code for the forms applications is listed in Appendix A.

## Transaction Statistics

*Table 2.1 lists the numerical quantities that Clauses 8.1.3.5 to 8.1.3.11 require.*

**Table 2. 1 Transaction Statistics**

| Statistic | | Value |
|---|---|---|
| New Order | Home warehouse order lines<br>Remote warehouse order lines<br>Rolled back transactions<br>Average items per order | 99.00%<br>1.00%<br>1.00%<br>10.00 |
| Payment | Home warehouse<br>Remote warehouse<br>Accessed by last name | 85.00%<br>15.00%<br>59.99% |
| Order Status | Accessed by last name | 60.05% |
| Delivery | Skipped transactions | None |
| Transaction Mix | New Order<br>Payment<br>Order status<br>Delivery<br>Stock level | 44.915%<br>43.020%<br>4.020%<br>4.025%<br>4.020% |

## Queuing Mechanism

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

Microsoft COM+ on each client system served as the queuing mechanism to the database. Each delivery request was submitted to Microsoft COM+ asynchronously with control being returned to the client process immediately and the deferred delivery part completing asynchronously.

# *Clause 3 Related Items*

## 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.*

All ACID property tests were successful. The executions are described below.

## Atomicity

*The system under test must guarantee that the database 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.*

### Completed Transactions

A row was randomly selected from the warehouse, district and customer tables, and the balances noted. A payment transaction was started with the same warehouse, district and customer identifiers and a known amount. The payment transaction was committed and the rows were verified to contain correctly updated balances.

### Aborted Transactions

A row was randomly selected from the warehouse, district and customer tables, and the balances noted. A payment transaction was started with the same warehouse, district and customer identifiers and a known amount. The payment transaction was rolled back and the rows were verified to contain the original balances.

## 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 that the database is initially in a consistent state.*

Consistency conditions one through four were tested using a shell script to issue queries to the database. The results of the queries verified that the database was consistent for all four tests.

A run was executed under full load over two hours with checkpoints.

The shell script was executed again. The result of the same queries verified that the database remained consistent after the run.

## Isolation

*Sufficient conditions must be enabled at either the system or application level to ensure the required isolation defined above (clause 3.4.1) is obtained.*

Isolation tests one through nine were executed using shell scripts to issue queries to the database. Each included timestamps to demonstrate the concurrency of operations. The results of the queries were captured to files. The captured files were verified by the auditor to demonstrate the required isolation had been met.

## 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.*

### Durable Media Failure

Durability from media failure was demonstrated on a database scaled for 12900 warehouses. The standard driving mechanism was used to generate the transaction load of 129000 users. The fully scaled database under full load would also have passed the following test.

### Loss of Data

To demonstrate recovery from a permanent failure of durable medium containing TPC-C tables, the following steps were executed:

1. A partition on a disk was backed up.
2. The total number of New Orders was determined by the sum of D_NEXT_O_ID of all rows in the DISTRICT table giving the beginning count. Consistency check 3 was verified before run.
3. The RTE was started with 129000 users
4. The test was allowed to run for a minimum of 10 minutes.
5. The backed up partition was overwritten with garbage information.
6. Oracle10g recorded errors about corrupt data on the partition. The database and the RTE were then shut down.
7. The database partition which was backed up in Step 1 was restored.
8. The database was then started. The database was recovered using the recover command from SQLPLUS. The database was opened and Oracle 10g performed instance recovery.
9. Consistency conditions were executed and verified.
10. Step 2 was repeated and the difference between the first and second counts was noted.
11. An RTE report was generated for the entire run time giving the number of NEW-ORDERS successfully returned to the RTE.
12. The counts in step 9 and 10 were compared and the results verified that all committed transactions had been successfully recovered.
13. Samples were taken from the RTE files and used to query the database to demonstrate successful transactions had corresponding rows in the ORDER table.

## Loss of Log

To demonstrate recovery from a permanent failure of durable medium containing TPC-C tables, the following steps were executed:

1. The total number of New Orders was determined by the sum of D_NEXT_O_ID of all rows in the DISTRICT table giving the beginning count. Consistency check 3 was verified before run.
2. The RTE was started with 4080 users.
3. The test was allowed to run for a minimum of 10 minutes.
4. A log disk containing log information was removed.
5. The system continued running because the logs are mirrored within Oracle.
6. The database and the RTE were then shut down.
7. The database was then started. Consistency conditions were executed and verified.
8. Step 1 was repeated and the difference between the first and second counts was noted.
9. An RTE report was generated for the entire run time giving the number of NEW-ORDERS successfully returned to the RTE.
10. The counts in step 7 and 8 were compared and the results verified that all committed transactions had been successfully recovered.
11. Samples were taken from the RTE files and used to query the database to demonstrate successful transactions had corresponding rows in the ORDER table.

## Instantaneous Interruption, Loss of Memory

Because loss of power erases the contents of memory, the instantaneous interruption and the loss of memory tests were combined into a single test. This test was executed on a fully scaled database of 12900 warehouses under a full load of 129000 users. The following steps were executed:

1. The total number of New Orders was determined by the sum of D_NEXT_O_ID of all rows in the DISTRICT table giving the beginning count.
2. The RTE was started with 129000 users.
3. The test was allowed to run for a minimum of 10 minutes.
4. A checkpoint was issued.
5. Upon completion of the checkpoint a system crash and loss of memory were induced by turning all six of the computers in the cluster off. No battery backup or Uninterruptible Power Supply (UPS) were used to preserve the contents of memory.
6. The RTE was shutdown.
7. Power was restored and one of the systems restarted.
8. Oracle10g was restarted and performed an automatic recovery.
9. Consistency conditions were executed and verified.
10. Step 1 was repeated and the difference between the first and second counts was noted.
11. An RTE report was generated for the entire run time giving the number of NEW-ORDERS successfully returned to the RTE.
12. The counts in step 9 and 10 were compared and the results verified that all committed transactions had been successfully recovered.
13. Samples were taken from the RTE files and used to query the database to demonstrate successful transactions had corresponding rows in the ORDER table.

# Clause 4 Related Items

## 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 over-scaled 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.*

**Table 4.1 Number of Rows for Server**

| Table | Occurrences |
|---|---:|
| Warehouse | 13530 |
| District | 135300 |
| Customer | 405900000 |
| History | 405900000 |
| Order | 405900000 |
| New Order | 38880000 |
| Order Line | 4059198408 |
| Stock | 1353000000 |
| Item | 100000 |
| Unused Warehouses | 630 |

## Database Layout

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

The benchmarked configuration used five dual port host fibre channel adapters attached to two Modular San Array 1000's each of which contained 14 36.4 GB drives and was attached to two Modular San Array 30's which contained 14 36.4 GB disk drives each for the database, and a sixth dual port host fibre channel adapter was attached to two Modular San Array 1000's each of which contained 14 146.6 GB disk drives for redo logs. Array accelerator cache for all volumes were set to 100% write.

Section 1.2 of this report details the distribution of database tables and logs across all disks. The code that creates the database and tables are included in Appendix B.

## Type of Database

*A statement must be provided that describes:*

1. *The data model implemented by DBMS used (e.g. relational, network, hierarchical).*
2. *The database interface (e.g. embedded, call level) and access language (e.g. SQL, DL/1, COBOL read/write used to implement the TPC-C transaction. 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 Standard Edition is a relational DBMS.

Anonymous block PL/SQL and stored procedures were accessed through the ORACLE Call Interface. Application code is included in Appendix A.

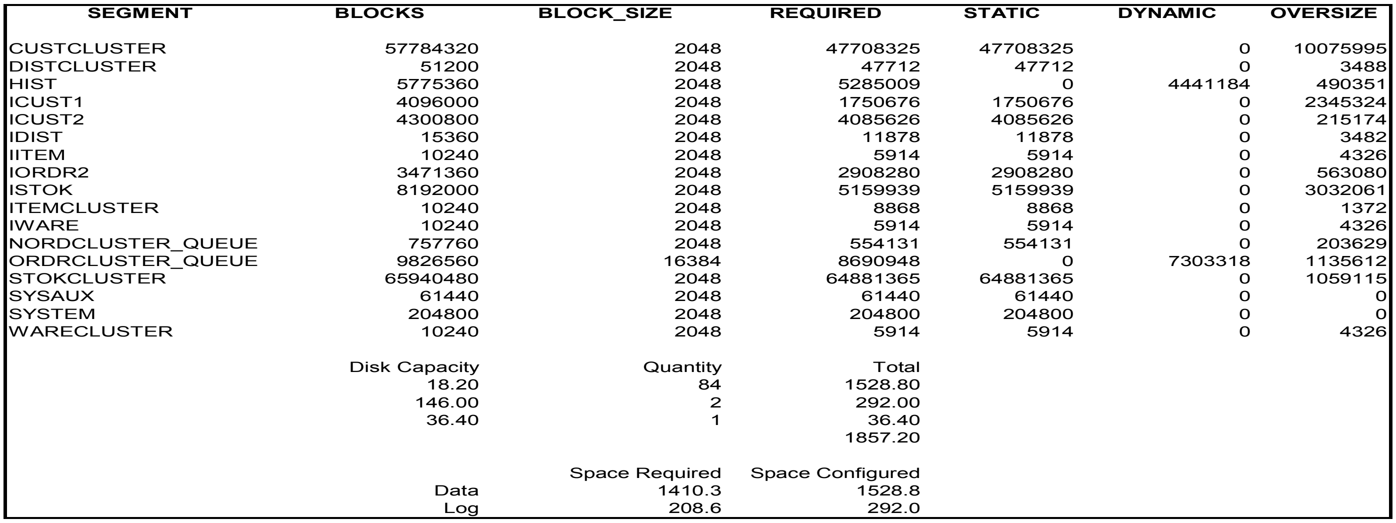
## Database Mapping

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

The database was not replicated. The tables were not partitioned.

## 60 Day Space

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



| SEGMENT | BLOCKS | BLOCK_SIZE | REQUIRED | STATIC | DYNAMIC | OVERSIZE |
|---|---|---|---|---|---|---|
| CUSTCLUSTER | 57784320 | 2048 | 47708325 | 47708325 | 0 | 10075995 |
| DISTCLUSTER | 51200 | 2048 | 47712 | 47712 | 0 | 3488 |
| HIST | 5775360 | 2048 | 5285009 | 0 | 4441184 | 490351 |
| ICUST1 | 4096000 | 2048 | 1750676 | 1750676 | 0 | 2345324 |
| ICUST2 | 4300800 | 2048 | 4085626 | 4085626 | 0 | 215174 |
| IDIST | 15360 | 2048 | 11878 | 11878 | 0 | 3482 |
| IITEM | 10240 | 2048 | 5914 | 5914 | 0 | 4326 |
| IORDR2 | 3471360 | 2048 | 2908280 | 2908280 | 0 | 563080 |
| ISTOK | 8192000 | 2048 | 5159939 | 5159939 | 0 | 3032061 |
| ITEMCLUSTER | 10240 | 2048 | 8868 | 8868 | 0 | 1372 |
| IWARE | 10240 | 2048 | 5914 | 5914 | 0 | 4326 |
| NORDCLUSTER_QUEUE | 757760 | 2048 | 554131 | 554131 | 0 | 203629 |
| ORDRCLUSTER_QUEUE | 9826560 | 16384 | 8690948 | 0 | 7303318 | 1135612 |
| STOKCLUSTER | 65940480 | 2048 | 64881365 | 64881365 | 0 | 1059115 |
| SYSAUX | 61440 | 2048 | 61440 | 61440 | 0 | 0 |
| SYSTEM | 204800 | 2048 | 204800 | 204800 | 0 | 0 |
| WARECLUSTER | 10240 | 2048 | 5914 | 5914 | 0 | 4326 |
| | | | | | | |
| | Disk Capacity | Quantity | Total | | | |
| | 18.20 | 84 | 1528.80 | | | |
| | 146.00 | 2 | 292.00 | | | |
| | 36.40 | 1 | 36.40 | | | |
| | | | 1857.20 | | | |
| | | | | | | |
| | | Space Required | Space Configured | | | |
| | Data | 1410.3 | 1528.8 | | | |
| | Log | 208.6 | 292.0 | | | |

# Clause 5 Related Items

## Throughput

*Measured tpmC must be reported*

Measured tpmC 161217 tpmC
Price per tpmC $3.94 per tpmC

## Response Times

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

**Table 5.1: Response Times**

| Type | Average | Maximum | 90th % |
|---|---|---|---|
| New-Order | 0.201 | 6.315 | .302 |
| Payment | 0.193 | 7.651 | 0.294 |
| Order-Status | 0.208 | 5.155 | 0.310 |
| Interactive Delivery | 0.102 | 0.124 | 0.103 |
| Deferred Delivery | 0..089 | 2.812 | 0.186 |
| Stock-Level | 0.195 | 5.570 | 0.296 |
| Menu | 0.102 | 0.126 | 0.103 |

## Keying and Think Times

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

**Table 5.2: Keying Times/Think Times**

| Type | Minimum | Average | Maximum |
|---|---|---|---|
| New-Order | 18.005/0.00 | 18.008/12.605 | 18.024/126.004 |
| Payment | 3.010/0.00 | 3.018/12.015 | 3.031/120.098 |
| Order-Status | 2.010/0.00 | 2.018/10.015 | 2.030/99.971 |
| Interactive Delivery | 2.010/0.00 | 2.018/5.025 | 2.030/50.198 |
| Stock-Level | 2.010/0.00 | 2.018/5.015 | 2.030/49.934 |

## Response Time Frequency Distribution Curves and Other Graphs

*Response Time frequency distribution curves (see Clause 5.6.1) must be reported for each transaction type.*

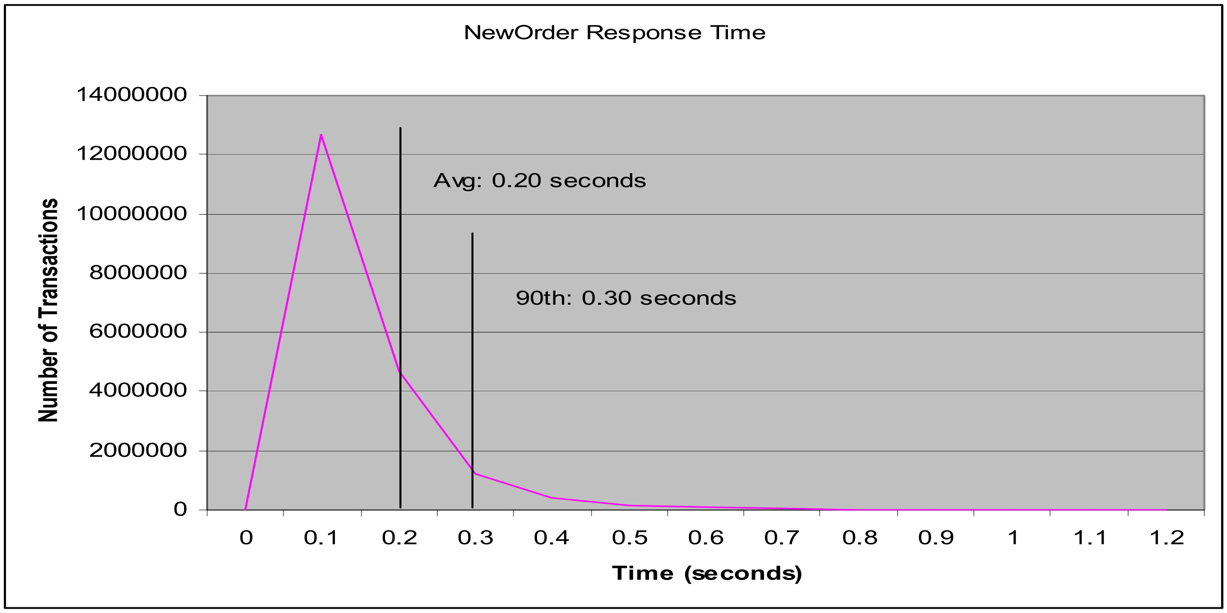
*The performance curve for response times versus throughput (see Clause 5.6.2) must be reported for the New-Order transaction.*

*Think Time frequency distribution curves (see Clause 5.6.3) must be reported for each transaction type.*

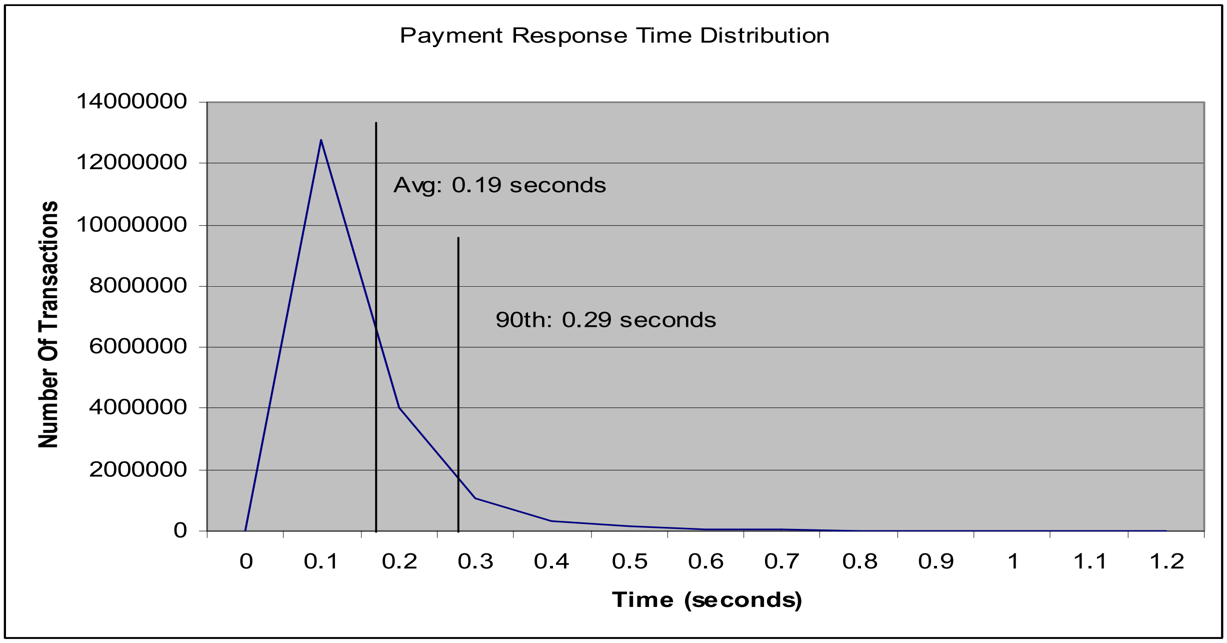
*Keying Time frequency distribution curves (see Clause 5.6.4) must be reported for each transaction type.*

A graph of throughput versus elapsed time (see Clause 5.6.5) must be reported for the New-Order transaction.

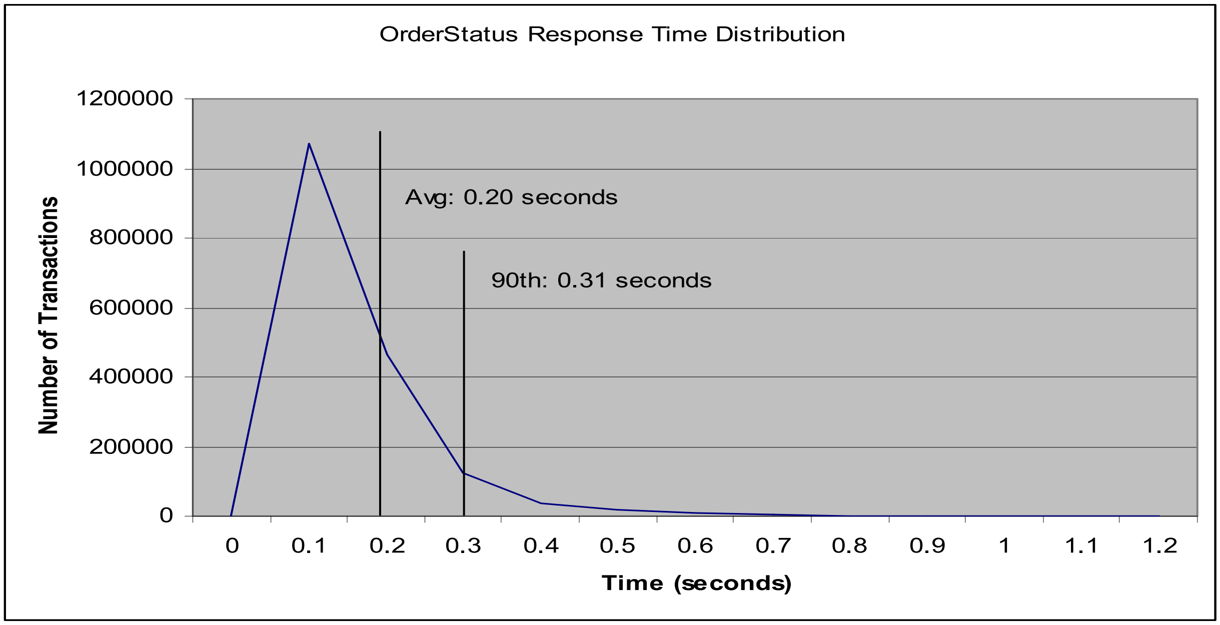
## Figure 5.1: Response Times Frequency Distribution for New Order Transactions



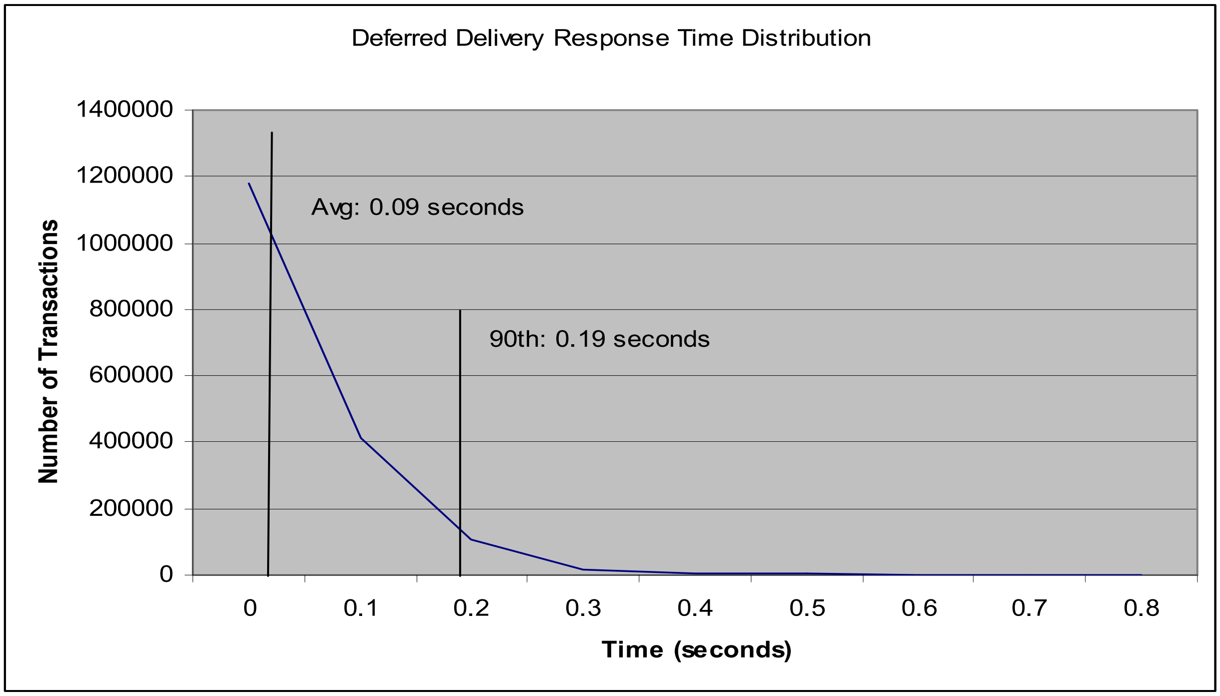
## Figure 5.2: Response Times Frequency Distribution for Payment Transactions



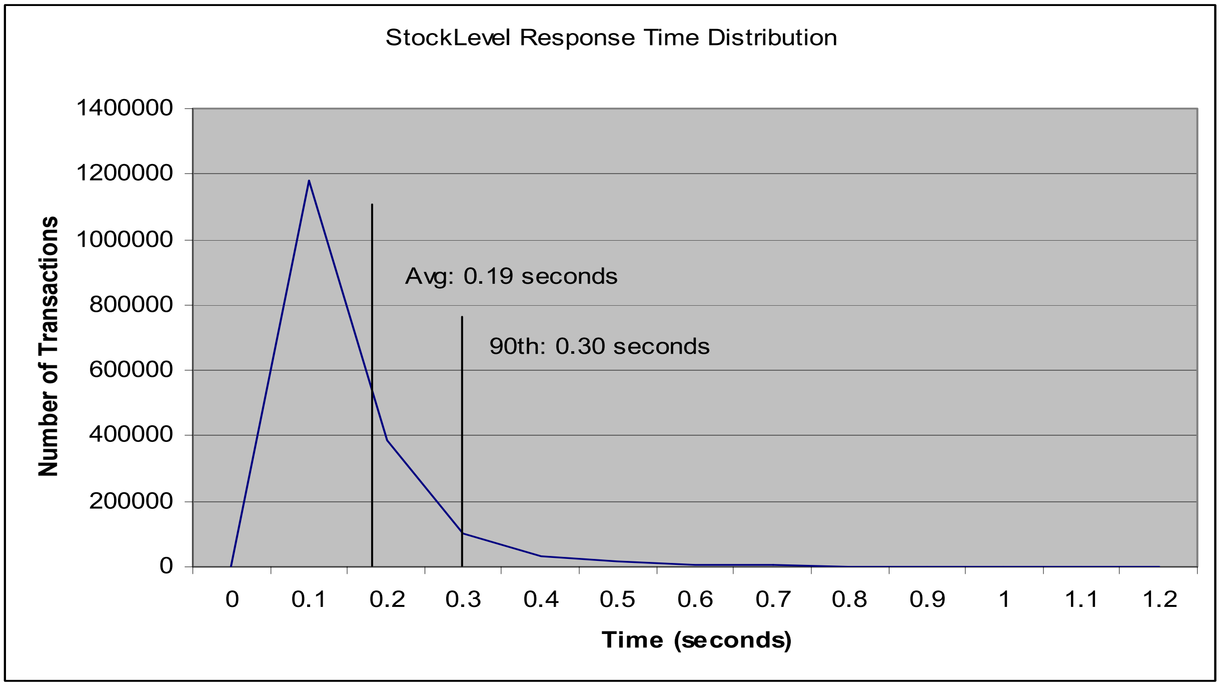
## Figure 5.3: Response Times Frequency Distribution for Order Status Transactions



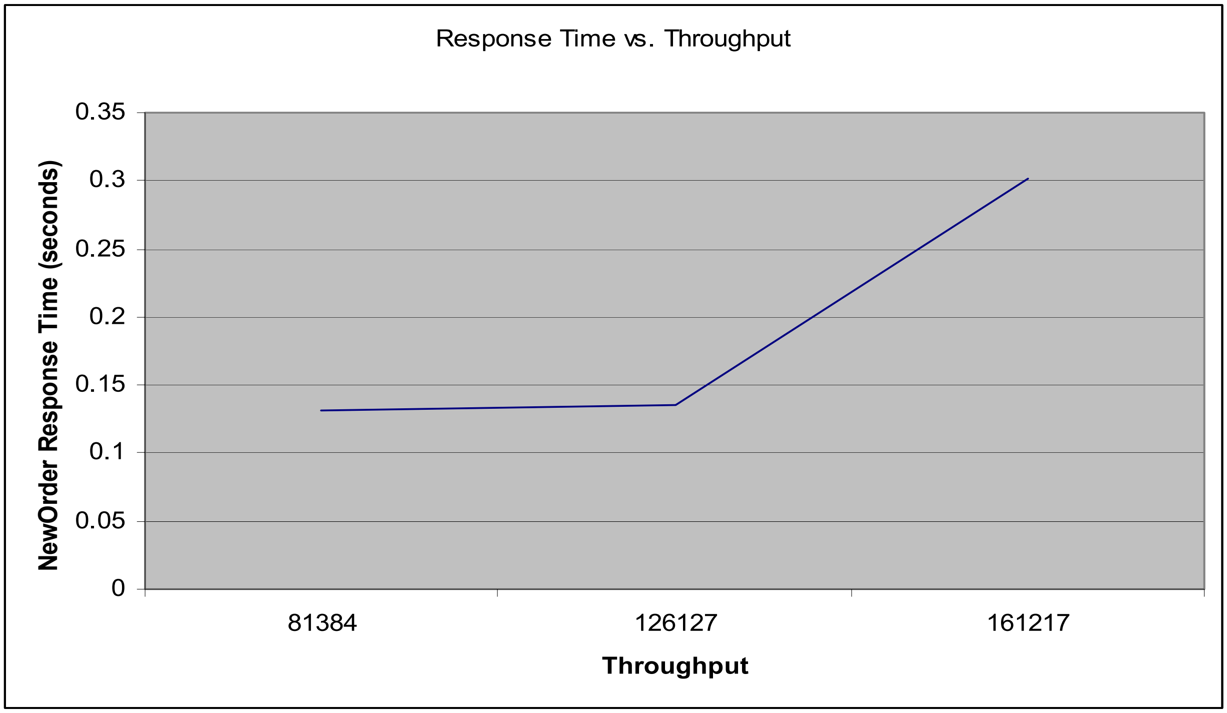
## Figure 5.4: Response Times Frequency Distribution for Delivery Transactions



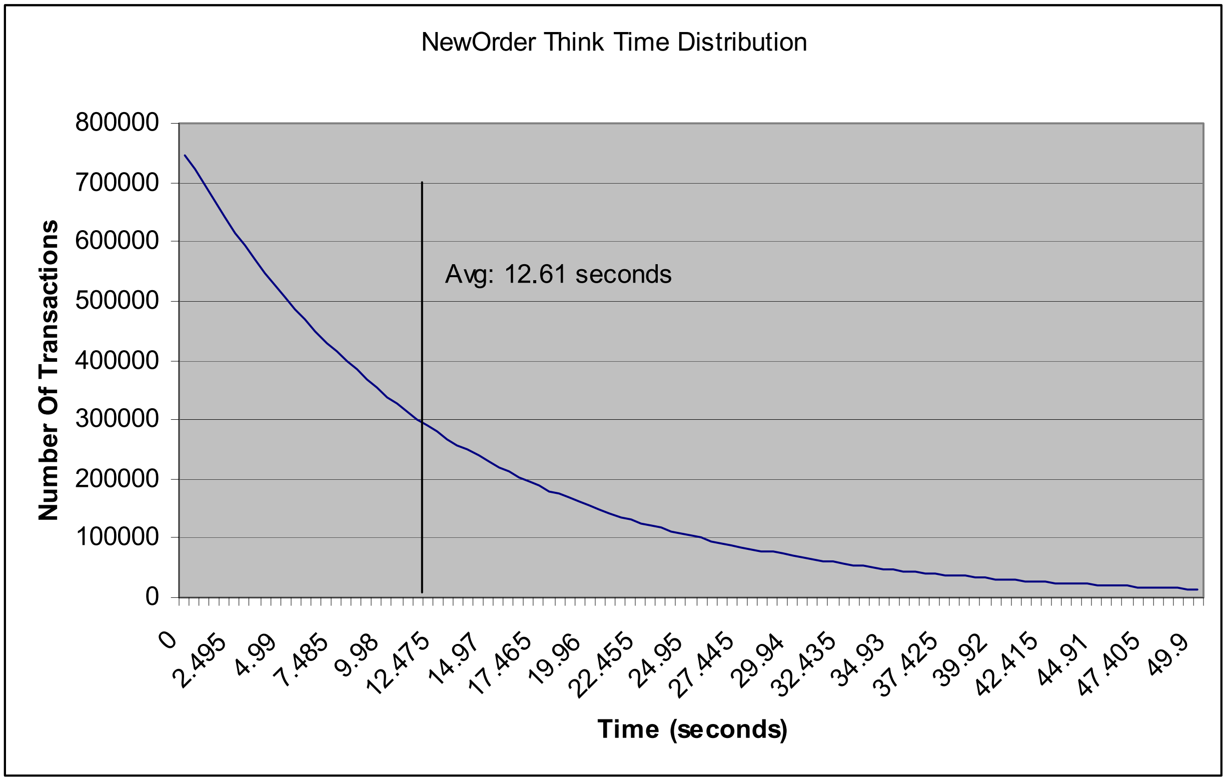
## Figure 5.5: Response Times Frequency Distribution for Stock Level Transactions



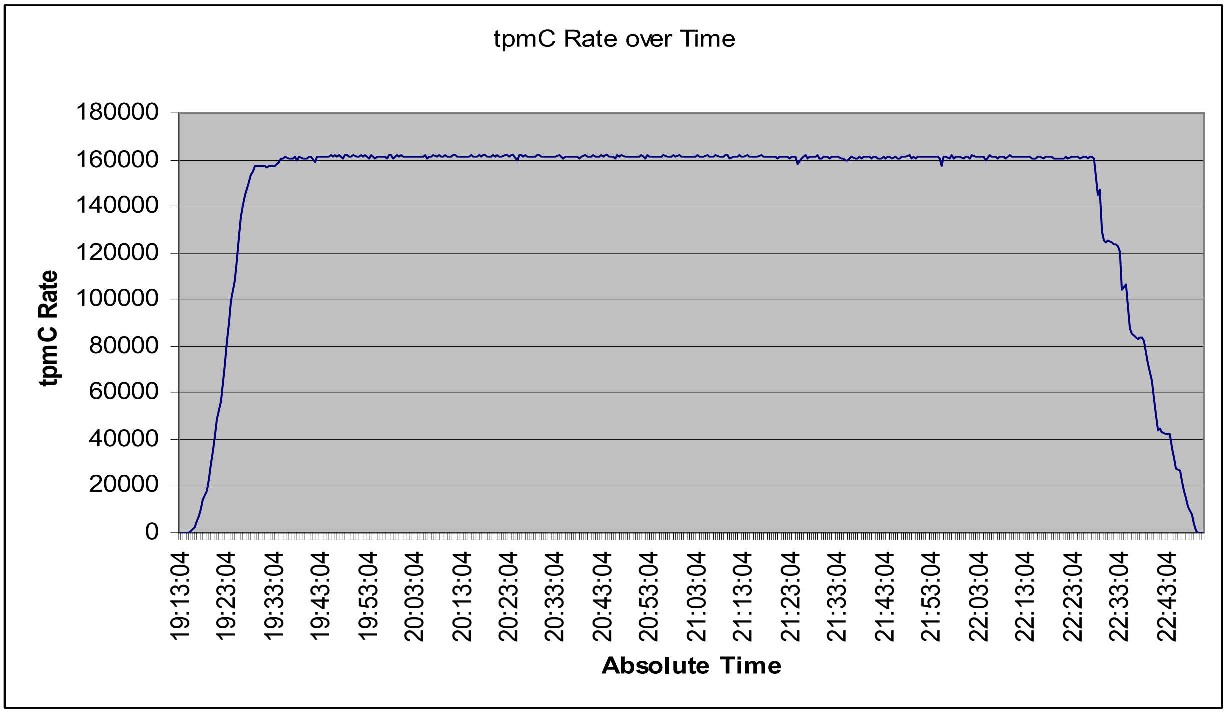
## Figure 5.6: Response Time versus Throughput



## Figure 5.7: Think Times distribution for New Order Transactions



## Figure 5.8: Throughput versus Time



## 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.*

Steady state was determined using real time monitor utilities from both the operating system and the RTE. Steady state was further confirmed by the throughput data collected during the run and graphed in Figure 5.8.

## 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.*

For each of the TPC Benchmark C transaction types, the following steps are executed. Each emulated user starts an Internet browser and asks to attach to the application on the desired client. The application formats the menus, input forms and data output using HTML (HyperText Markup Language). The HTML strings are transmitted over TCP/IP back to the client, where they can be
displayed by any Web Browser software. The application on the client is run under the control of the Apache Web Server.

Transactions are submitted by the RTE in accordance with the rules of the TPC-C benchmark. The emulated user chooses a transaction from the menu. The RTE records the time it takes from selecting the menu item to receiving the requested form. Data is generated for input to the form, then the user waits the specified keying time. The submit is sent and the RTE records the time it takes for the transaction to be processed and all the output data to be returned. The user then waits for the randomly generated think time before starting the process over again. All timings taken by the RTE generate a start and end timestamp. Keying and think times are calculated as the difference between end-time of a timing to the start of the next.

The database records transactions in the database tables and the transaction log. Writes to the database may stay in Oracle's in-memory data cache for a while before being written to disk. Checkpoints are initiated once the log files were filled and allowed to roll over.

## Measurement Period Duration

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

The reported measured interval was 7200 seconds.

## 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 RTE was given a weighted random distribution, which could not be adjusted during the run.

## Transaction Statistics

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

**Table 5.3: Transaction Statistics**

| Statistic | | Value |
|---|---|---|
| New Order | Home warehouse order lines | 99.00% |
| | Remote warehouse order lines | 1.00% |
| | Rolled back transactions | 1.00% |
| | Average items per order | 10.00 |
| Payment | Home warehouse | 85.00% |
| | Remote warehouse | 15.00% |
| | Accessed by last name | 59.99% |
| Order Status | Accessed by last name | 60.05% |
| Delivery | Skipped transactions | 0 |
| Transaction Mix | New Order | 44.915% |
| | Payment | 43.020% |
| | Order status | 4.020% |
| | Delivery | 4.025% |
| | Stock level | 4.020% |

## Checkpoint

*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.*

Oracle database was set for checkpointing at log switches. The logfiles were sized such that it would switch to a new logfile every 24.5 minutes. One checkpoint occurred during the warm-up period and 4 checkpoints started and completed during the measurement period. The first checkpoint that started in the measurement interval started 21 minutes and 38 seconds into the measurement interval.

## Checkpoint Duration

The average length of time for a checkpoint was 22 minutes and 5 seconds.

# Clause 6 Related Items

## RTE Descriptions

*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.*

PRTE Software was used to simulate terminal users, generate random data and record response times. This package ran on systems that are distinct from the system under test. PRTE command file used is included in Appendix A.

## 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. The results of the test described in Clause 6.6.3.4 must be disclosed.*

Due to the large number of PCs and associated hardware that would be required to run these tests, Remote Terminal Emulator was used to emulate the connected PCs and LAN. As configured for this test, the driver software emulates the traffic that would be observed from the users ' PCs connected by Ethernet to the front-end clients using HTTP (HyperText Transfer Protocol)over TCP/IP.

The driver system consisted of 5 ProLiant DL580 servers.

## Functional Diagrams

*A complete functional diagram of both the benchmark configuration 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.*

The diagram in Section 1 shows the tested and priced benchmark configurations.

## Networks

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

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

Section 1 of this report contains detailed diagrams of both the benchmark configuration and the priced configuration. In the tested configuration, the server system and two client systems were connected  to 24 port 1000BaseT Ethernet switch.

The drivers systems and client systems were connected using another 1000BaseT Ethernet switch.

## Operator Intervention

*If the configuration requires operator intervention (see Clause 6.6.6), the mechanism and the frequency of this intervention must be disclosed.*

This configuration does not require any operator intervention to sustain eight hours of the reported throughput.

# *Clause 7 Related Items*

## System Pricing

*A detailed list of hardware and software used in the priced system must be reported. Each separately orderable item must have vendor part number, description, and release/revision level, and either general availability status or committed delivery date. If package-pricing is used, vendor part number of the package and a description uniquely identifying each of the components of the package must be disclosed. Pricing source 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.*

The details of the hardware and software are reported in the front of this report as part of the executive summary. All third party quotations are included at the end of this report as Appendix D.

## Availability, Throughput, and Price Performance

*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.*

*A statement of the measured tpmC as well as the respective calculations for the 3-year pricing, price/performance (price/tpmC), and the availability date must be included.*

- **Maximum Qualified Throughput 161217 tpmC**
- **Price per tpmC $3.94 per tpmC**
- **Available September 29, 2004**

All components are available now.

## Country Specific Pricing

*Additional Clause 7 related items may be included in the Full Disclosure Report for each country specific priced configuration. Country specific pricing is subject to Clause 7.1.7*

This system is being priced for the United States of America.

## Usage Pricing

*For any usage pricing, the sponsor must disclose:*

- *Usage level at which the component was priced.*
- *A statement of the company policy allowing such pricing.*

The component pricing based on usage is shown below:

- Oracle Database 10g Standard Edition One
- Red Hat Enterprise Linux AS 3.0
- Microsoft Windows 2000 Server

# *Clause 9 Related Items*

## Auditor’s Report

*The auditor’s name, address, phone number, and a copy of the auditor’s attestation letter indicating compliance must be included in the Full Disclosure Report.*

This implementation of the TPC Benchmark C was audited by Lorna Livingtree of Performance Metrics Inc.

Performance Metrics, Inc. 137 Yankton St. #101 Folsom, CA 95630
phone: 916-985-1131 fax: 916-985-1185 email: lorna@perfmetrics.com

## Availability of the Full Disclosure Report

*The Full Disclosure Report must be readily available to the public at a reasonable charge, similar to the charges for similar documents by the test sponsor. The report must be made available when results are made public. In order to use the phrase "TPC Benchmark™ C", the Full Disclosure Report must have been submitted to the TPC Administrator as well as written permission obtained to distribute same.*

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

Transaction Processing Performance Council
Presidio of San Francisco
Building 572B (surface)
P.O. Box 29920 (mail) San Francisco, CA 94129-0920
Voice: 415-561-6272
Fax: 415-561-6120
Email: info@tpc.org

or

Hewlett Packard Company
Database Performance Engineering
P.O. Box 692000
Houston, TX 77269-2000

C Full Disclosure Reports are available at www.tpc.org

November 8, 2004

Mr. Bryon Georgson
Database Performance Engineer
Hewlett-Packard Company
20555 SH 249
Houston, TX 77070

I have verified by remote the TPC Benchmark™ C for the following configuration:

Platform: HP Integrity rx4640
Database Manager: Oracle 10g Standard Edition
Operating System: Red Hat Enterprise Linux AS 3
Transaction Monitor: Microsoft COM+

| System Under Test: | | | | |
|---|---|---|---|---|
| CPU's | Memory | Disks (total) | 90% Response | TpmC |
| 4 Itanium2<br>@ 1.3 Ghz | Main: 128 GB | 240 @ 36 GB<br>28 @ 146 GB<br>2 @ 73 GB | 0.30 | 161,217 |

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 files were properly sized.
- The database was properly scaled with 13,530 warehouses, 12,900 of which were active during the measured interval.
- The ACID properties were successfully demonstrated.
- Input data was generated according to the specified percentages.
- Eight hours of mirrored log space was present on the tested system.
- Eight hours of growth space for the dynamic tables was present on the tested system.
- The data for the 60 days space calculation was verified.
- The steady state portion of the test was 120 minutes.
- There was one complete checkpoint in steady state before the measured interval.
- There were 4 checkpoints started and completed inside the measured interval.
- The system pricing was checked for major components and maintenance.
- Third party quotes were verified for compliance.

Auditor Notes:  None

Sincerely,

Lorna Livingtree

Lorna Livingtree
Auditor

# *Appendix A: Source Code*

```
----------------------------------------------------------
buf.c
----------------------------------------------------------
/*
**
** File:
**
**  buf.c double buffering code to emulate c runtime file reading
**
** Author:
**
**  Bill Carr
**
** Revisions:
**
**   10/04/95 WCarr
**  - Original
**
**
*/

/*#ifdef HISTORY

  02-Jun-97 WCarr Removed use of Mutex objects in favor of critical
      sections.  These prove to be at least one order of
      magnitude faster.

  31-Oct-97 WCarr Fixed a buffer wrap problem where if the data
were
      to end exactly on the buffer end, the code would
      not wrap to the beginning.

      Also added code that causes a writer to block if
      there is no room to write in data.  Fixed the
      timeout code so that a non-blocking read or write
      can function.

  06-Nov-97 WCarr Modified APIs to allow the read and write
operaions
      to supply the timeout values.

      Fixed a bug where the critical section was not
      released when a buffer read or write operation
      timed out.
*/

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

#include <crtdbg.h>
#include <windows.h>

#include "buf.h"

int
bufopen(size_t bufsize, BUFPTR *bufptr)
{
  BUFPTR buf;

  *bufptr = NULL;
  if( NULL == (buf = (BUFPTR) malloc( (sizeof( BUF ) - BUF_MINSIZE)
+ bufsize )))
    return (BUF_MALLOCFAIL);
  buf->freestart = (uchar *) buf->buf;
  buf->storedstart = (uchar *) buf->buf;
  buf->size = bufsize;
  buf->maxplus1 = (uchar *) buf->buf + bufsize;
  buf->full = FALSE;
  buf->blockedreadercount = 0;
  buf->blockedwritercount = 0;
  InitializeCriticalSection( &buf->control );
  if((HANDLE)NULL == (buf->dataready = CreateEvent(NULL, FALSE,
FALSE, NULL))) {
    free(buf);
    return (BUF_CREEVENT);
  }
  if((HANDLE)NULL == (buf->spacefreed = CreateEvent(NULL, FALSE,
FALSE, NULL))){
    free(buf);
    return (BUF_CREEVENT);
  }

  *bufptr = buf;
  return(BUF_SUCCESS);
}

static void
calcstoredsize(BUFPTR buf, size_t *storedsize, size_t
*storedsizehigh)
{
  if( buf->storedstart < buf->freestart ) {
    *storedsizehigh = *storedsize = buf->freestart - buf-
>storedstart;
  }
  else if( buf->full || buf->storedstart > buf->freestart ) {
    *storedsizehigh = ((uchar *) buf->buf + buf->size) - buf-
>storedstart;
    *storedsize = *storedsizehigh + (buf->freestart - (uchar *)buf-
>buf);
  }
  else {
    *storedsizehigh = *storedsize = 0;
  }
  return;
}

/* bufread.
 * Current implementation mixes two paradigms.  API implies
 * partial read of buffer is possible however implementation
 * insists on a complete read.
 * Possible fixes include:
 *    Add a bufread_complete routine which only returns with
 *   full data.
 *    Return partial data from read and have the caller verify
 *   that they got the data they requested.
 *
 */
int
bufread(void *rbuf, size_t btr, size_t *br, uint timeout, BUFPTR
buf)
{
  size_t storedsize, storedsizehigh;
  DWORD status, last_error;

  if( btr <= 0 )
    return BUF_SUCCESS;

  if( btr > buf->size )
    return BUF_READWAYTOOBIG;

  EnterCriticalSection( &buf->control );
  while( 1 ) {

    /* see if we have enough data to get from the buffer */
    calcstoredsize( buf, &storedsize, &storedsizehigh );
    if( btr <= storedsize )
      break;

    /* not enough data. if no wait, return else block until data
available. */
    if( 0 == timeout ) {
      LeaveCriticalSection( &buf->control );
      return BUF_READTIMEOUT;
    }
    buf->blockedreadercount++;
    LeaveCriticalSection( &buf->control );
    status = WaitForSingleObjectEx( buf->dataready, timeout, TRUE
);
    EnterCriticalSection( &buf->control );
    buf->blockedreadercount--;
    if( WAIT_OBJECT_0 == status )
      continue;
    LeaveCriticalSection( &buf->control );
    if( WAIT_TIMEOUT == status )
      return BUF_READTIMEOUT;
    else if( WAIT_IO_COMPLETION == status )
      return BUF_IOCOMPLETE;
    else {
      last_error = GetLastError( );
      return BUF_READWAITFAILED;
    }
  }

  if( btr <= storedsizehigh ) {
    CopyMemory( rbuf, buf->storedstart, btr );
    buf->storedstart += btr;
    if( buf->storedstart == buf->maxplus1 )
      buf->storedstart = (uchar *) buf->buf;
    else if( buf->storedstart > buf->maxplus1 )
      /* error */
      _ASSERT( FALSE );
  }
  else {
    CopyMemory( rbuf, buf->storedstart, storedsizehigh );
    CopyMemory( (uchar *)rbuf + storedsizehigh, buf->buf, btr -
storedsizehigh);
    buf->storedstart = (uchar *)buf->buf + (btr - storedsizehigh);
  }
  storedsize -= btr;

  if( buf->freestart == buf->storedstart ) {
#ifdef NDEBUG  /* keep messages in the buffer as long a possible
for debugging*/
    buf->freestart = buf->storedstart = (uchar *)buf->buf;
#endif
  }
  buf->full = FALSE;
  /* if data is in the buffer and a reader is blocked, unblock it
*/
  if(( 0 < storedsize ) && ( 0 != buf->blockedreadercount )) {
    SetEvent( buf->dataready );
  }

  /* see if a writer is blocked and unblock one */
  if( 0 != buf->blockedwritercount ) {
    SetEvent( buf->spacefreed );
  }

  LeaveCriticalSection( &buf->control );

  *br = btr;

  return BUF_SUCCESS;
}

static void calcfreesize(BUFPTR buf, size_t *freesize, size_t
*freesizehigh)
{
  if( buf->storedstart > buf->freestart ) {
    *freesizehigh = *freesize = buf->storedstart - buf->freestart;
  }
  else if( !buf->full && buf->storedstart <= buf->freestart ) {
    *freesizehigh = ((uchar *)buf->buf + buf->size) - buf-
>freestart;
    *freesize = *freesizehigh + (buf->storedstart - (uchar *)buf-
>buf);
  }
  else {
    *freesizehigh = *freesize = 0;
  }
  return;
}

int
bufwrite(const void *wbuf, size_t btw, size_t *bw, uint timeout,
BUFPTR buf)
{
  size_t freesize, freesizehigh;
  DWORD status, last_error;

  if( btw <= 0 )
    return BUF_SUCCESS;

  if( btw > buf->size )
    return BUF_WRITEWAYTOOBIG;

  EnterCriticalSection( &buf->control );
  while( 1 ) {

    /* see if we have enough room to put all data in the buffer */
    calcfreesize( buf, &freesize, &freesizehigh );
    if( !buf->full && btw <= freesize )
      break;

    /* not enough room. if no wait, return else block until space
available. */
    if( 0 == timeout ) {
      LeaveCriticalSection( &buf->control );
      return BUF_WRITETIMEOUT;
    }
    buf->blockedwritercount++;
    LeaveCriticalSection( &buf->control );
    status = WaitForSingleObject( buf->spacefreed, timeout );
    EnterCriticalSection( &buf->control );
    buf->blockedwritercount--;
    if( WAIT_OBJECT_0 == status )
      continue;
    LeaveCriticalSection( &buf->control );
    if( WAIT_TIMEOUT == status )
      return BUF_WRITETIMEOUT;
    else {
      last_error = GetLastError( );
      return BUF_WRITEWAITFAILED;
    }
  }

  if( btw <= freesizehigh ) {
    CopyMemory( buf->freestart, wbuf, btw );
    buf->freestart += btw;
    if( buf->freestart == buf->maxplus1 )
      buf->freestart = (uchar *)buf->buf;
    else if( buf->freestart > buf->maxplus1 )
      /* error */
      _ASSERT( FALSE );
  }
  else {
    CopyMemory( buf->freestart, wbuf, freesizehigh );
    CopyMemory( buf->buf, (uchar *)wbuf + freesizehigh, btw -
freesizehigh );
    buf->freestart = (uchar *)buf->buf + ( btw - freesizehigh );
  }
  freesize -= btw;

  if( buf->freestart == buf->storedstart )
    buf->full = TRUE;

  /* see if a reader is blocked and unblock one */
  if( 0 != buf->blockedreadercount ) {
    SetEvent( buf->dataready );
  }

  /* if space is available and a writer is blocked, unblock it */
  if(( 0 < freesize ) && ( 0 != buf->blockedwritercount )) {
    SetEvent( buf->spacefreed );
  }

  LeaveCriticalSection( &buf->control );

  *bw = btw;

  return BUF_SUCCESS;
}

void __cdecl bufclose(BUFPTR buf)
{
  DeleteCriticalSection( &buf->control );
  CloseHandle( buf->dataready );
  CloseHandle( buf->spacefreed );
  free( buf );
}



---------------------------------------------------------
buf.h
---------------------------------------------------------
/*
**
** File:
**
**  buf.h double buffering code to emulate c runtime file reading
**
** Author:
**
**  Bill Carr
**
** Revisions:
**
**   10/04/95 WCarr
**  - Original
**
**
*/

/*#ifdef HISTORY

  02-Jun-97 WCarr Removed use of Mutex objects in favor of critical
      sections.  These prove to be at least one order of
      magnitude faster.

*/

#ifndef _buf_h_
#define _buf_h_

#ifndef WIN32_LEAN_AND_MEAN
# define WIN32_LEAN_AND_MEAN
#endif
#include <windows.h>

#define BUF_INFINITE INFINITE

#define BUF_SUCCESS 0
#define BUF_READFAIL 1    /* Read thread exited unexpectedly */
#define BUF_CREEVENT 2    /* internal error Failure to create event
*/
#define BUF_READTIMEOUT 3 /* Reading thread timed out */
#define BUF_WRITETIMEOUT 4  /* Writing thread timed out */
#define BUF_MALLOCFAIL 5  /* failed to allocate needed worksapce */
#define BUF_READWAYTOOBIG 6 /* request larger than whole buffer */
#define BUF_WRITEWAYTOOBIG 7  /* request larger than whole buffer
*/
#define BUF_WRITETOOBIG 8 /* request larger than available space */
#define BUF_READWAITFAILED 9  /* internal error while waiting for
data */
#define BUF_WRITEWAITFAILED 10  /* internal error while waiting to
store */
#define BUF_IOCOMPLETE 11 /* an external async I/O operation
completed */

#define BUF_MINSIZE 4

typedef unsigned int uint;
typedef unsigned char uchar;

struct _buf
{
  uchar *freestart;
  uchar *storedstart;
  size_t size;
  uchar *maxplus1;
  BOOL full;
  int blockedreadercount;
  int blockedwritercount;
  CRITICAL_SECTION control;
  HANDLE dataready;
  HANDLE spacefreed;
  char  buf[BUF_MINSIZE]; /* MUST BE AT END for malloc to succeed
*/
```

```
};
typedef struct _buf BUF, *BUFPTR;

int bufopen(size_t bufsize, BUFPTR *buf);
int bufread(void *rbuf, size_t btr, size_t *br, uint timeout,
BUFPTR buf);
int bufwrite(const void *wbuf, size_t btw, size_t *bw, uint
timeout,BUFPTR buf);
void __cdecl bufclose(BUFPTR);

#endif



----------------------------------------------------------
code.txt
----------------------------------------------------------




----------------------------------------------------------
DBConnection.cpp
----------------------------------------------------------
// DBConnection.cpp : Defines the entry point for the DLL
application.
//

#include "stdafx.h"
#include "DBConnection.h"

#define OPS_LOGIN
//#define CONNECTION_MUTEX
//#define DEBUG
//#define DEBUG_DETAIL
//#define LOOPBACK

BOOL APIENTRY DllMain( HANDLE hModule,
                       DWORD  ul_reason_for_call,
                       LPVOID lpReserved
           )
{
  char string[MAXLEN];

  if (ul_reason_for_call == DLL_PROCESS_ATTACH) {

  DisableThreadLibraryCalls((HMODULE)hModule);

  GetModuleFileName((HMODULE)hModule, DllPath, MAXLEN-1);
  if (DllPath[0]=='\\' && DllPath[1]=='\\' && DllPath[2]=='?' &&
DllPath[3]=='\\')
    strcpy(DllPath, DllPath+4);
  for (int i=strlen(DllPath); DllPath[i]!='\\' && i; i--);
  DllPath[i]='\0';
  sprintf(LogFile, "%s\\%s", DllPath, LogName);
  sprintf(InitFile, "%s\\%s", DllPath, InitName);
    sprintf(DelLogFile, "%s\\%s", DllPath, DelLogName);

    if (!SetCurrentDirectory(DllPath)) {
      userlog("Cannot change current directory to %s, Error: %n",
DllPath, GetLastError());
      return FALSE;
    }

    if ((TlsPtr = TlsAlloc()) == 0xFFFFFFFF) {
      userlog("Error during TlsAlloc\n");
      return FALSE;
    }

    readInit(string, "DBConnections", Default_DBConnections);
  DBConnections = atoi(string);
  userlog("number of DBConnections is %d\n", DBConnections);

  TotalLoop=DBConnections*2;

  DBExecution_lock=(HANDLE*)malloc(sizeof(HANDLE)*DBConnections);
  for (i=0; i<DBConnections; i++)
    if ((DBExecution_lock[i]=CreateMutex(NULL, FALSE, NULL))==NULL)
{
      userlog("Cannot create mutex : DBExecution_lock[%d]\n", i);
      return FALSE;
    }

  if (initializeDBExecutionPool() != TRUE) {
    userlog("initializeDBExecutionPool failed\n");
    return FALSE;
  }

  if ((waitIdle = CreateEvent(NULL, FALSE, FALSE, "Wait Idle
Event")) == NULL) {
    userlog("Cannot create event : waitIdle\n");
    return FALSE;
  }

  ready=1;

  }
  else if (ul_reason_for_call == DLL_PROCESS_DETACH) {

    if ((TlsFree(TlsPtr)) == NULL) {
      userlog("Error during TlsFree\n");
      return FALSE;
```

```
    }
  for (int i=0; i<DBConnections; i++) {
    ((DBExecution *)(DBExecution_pool[i].pointer))->TPCexit();
    free(DBExecution_pool[i].pointer);
  }
  free (DBExecution_pool);
  CloseHandle(waitIdle);

  for (i=0; i<DBConnections; i++)
    CloseHandle(DBExecution_lock[i]);

  }

  return TRUE;
}

void initDelLog(int DelThreads)
{
  char filename[MAXLEN];

  DelFiles=(FILE **)malloc(sizeof(FILE *)*DelThreads);
  for (int i=0; i<DelThreads; i++) {
    sprintf(filename, "%s%d", DelLogFile, i);

      if ((DelFiles[i]=fopen(filename, "a"))==(FILE *) NULL) {
    userlog("Can't open file : %s\n", filename);
    exit(-1);
    }
    setvbuf(DelFiles[i], NULL, _IOFBF, 102400);
  }
}

void endDelLog(int DelThreads)
{
  for (int i=0; i<DelThreads; i++) {
    fclose(DelFiles[i]);
  }
  free(DelFiles);
}

/*******************************************************************
****************************
*  Execute transactions
*
********************************************************************
**************************/

#ifndef LOOPBACK

int mod_tpcc_neworder(T_neworder_data *output)
{
#ifdef CONNECTION_MUTEX
  HANDLE *mutexptr=NULL;
#endif
    DBExecution_pool_info* ptr;

  DBExecution *dbexec;
  struct newstruct input;

  input.newin.w_id = output->w_id;
  input.newin.d_id = output->d_id;
  input.newin.c_id = output->c_id;

  for (int i=0; i<output->o_ol_cnt; i++) {
      input.newin.ol_i_id[i] = output->o_orderline[i].ol_i_id;
    input.newin.ol_supply_w_id[i] = output-
>o_orderline[i].ol_supply_w_id;
      input.newin.ol_quantity[i] = output-
>o_orderline[i].ol_quantity;
  }

  for (; i<15; i++) {
      input.newin.ol_i_id[i] = 0;
    input.newin.ol_supply_w_id[i] = 0;
      input.newin.ol_quantity[i] = 0;
  }

#ifdef CONNECTION_MUTEX
  ptr=findIdleDBExecution(mutexptr);
#else
  ptr=findIdleDBExecution();
#endif
  dbexec=(DBExecution *)(ptr->pointer);
//  ptr->neworder_count++;


  if (dbexec->TPCnew(&input) == -1) {
    convert_status(output->txn_status, dbexec->execstatus);
#ifdef CONNECTION_MUTEX
    freeDBExecution(ptr, mutexptr);
#else
    freeDBExecution(ptr);
#endif
    userlog("TPCnew returns -1\n");
    return SUCCESS;
  } else {
      output->txn_status = DB_RETURN_OCI_SUCCESS;
  }

  output->status = dbexec->status;
```

```
#ifdef CONNECTION_MUTEX
  freeDBExecution(ptr, mutexptr);
#else
  freeDBExecution(ptr);
#endif

  output->o_id = input.newout.o_id;
  output->o_ol_cnt = input.newout.o_ol_cnt;
  output->c_discount = input.newout.c_discount;
  output->w_tax = input.newout.w_tax;
  output->d_tax = input.newout.d_tax;
  output->total_amount = input.newout.total_amount;
  strncpy(output->o_entry_d.DateString, input.newout.o_entry_d,20);
  strncpy(output->c_last, input.newout.c_last,17);
  strncpy(output->c_credit, input.newout.c_credit,3);
  for (i=0; i<output->o_ol_cnt; i++) {
    output->o_orderline[i].ol_amount = input.newout.ol_amount[i];
    output->o_orderline[i].i_price = input.newout.i_price[i];
    output->o_orderline[i].s_quantity = input.newout.s_quantity[i];
    output->o_orderline[i].b_g[0] = input.newout.brand_generic[i];
    strncpy(output->o_orderline[i].i_name, input.newout.i_name[i],
25);
  }

  return SUCCESS;
}


int mod_tpcc_payment(T_payment_data *output)
{
#ifdef CONNECTION_MUTEX
  HANDLE *mutexptr=NULL;
#endif
    DBExecution_pool_info* ptr;
  DBExecution *dbexec;
  struct paystruct input;

  input.payin.w_id = output->w_id;
  input.payin.d_id = output->d_id;
  input.payin.c_w_id = output->c_w_id;
  input.payin.c_d_id = output->c_d_id;
  input.payin.bylastname = output->by_last_name;
  input.payin.h_amount = (int)(output->h_amount * 100);

  if (input.payin.bylastname) {
    input.payin.c_id = 0;
    strncpy(input.payin.c_last, output->c_last, 17);
    input.payin.c_last[16]='\0';
  } else {
    input.payin.c_id = output->c_id;
    input.payin.c_last[0]='\0';
  }

#ifdef CONNECTION_MUTEX
  ptr=findIdleDBExecution(mutexptr);
#else
  ptr=findIdleDBExecution();
#endif
  dbexec=(DBExecution *)(ptr->pointer);
//  ptr->payment_count++;

  if (dbexec->TPCpay(&input) == -1) {
    convert_status(output->txn_status, dbexec->execstatus);
#ifdef CONNECTION_MUTEX
  freeDBExecution(ptr, mutexptr);
#else
  freeDBExecution(ptr);
#endif
    userlog("TPCpay returns -1\n");
    return SUCCESS;
  } else {
    output->txn_status = DB_RETURN_OCI_SUCCESS;
  }

#ifdef CONNECTION_MUTEX
  freeDBExecution(ptr, mutexptr);
#else
  freeDBExecution(ptr);
#endif

  strncpy(output->w_street_1, input.payout.w_street_1, 21);
  strncpy(output->w_street_2, input.payout.w_street_2, 21);
  strncpy(output->w_city, input.payout.w_city, 21);
  strncpy(output->w_state, input.payout.w_state, 3);
  strncpy(output->w_zip, input.payout.w_zip, 10);
  strncpy(output->d_street_1, input.payout.d_street_1, 21);
  strncpy(output->d_street_2, input.payout.d_street_2, 21);
  strncpy(output->d_city, input.payout.d_city, 21);
  strncpy(output->d_state, input.payout.d_state, 3);
  strncpy(output->d_zip, input.payout.d_zip, 10);
  output->c_id = input.payout.c_id;
  strncpy(output->c_first, input.payout.c_first, 17);
  strncpy(output->c_middle, input.payout.c_middle, 3);
  strncpy(output->c_last, input.payout.c_last, 17);
  strncpy(output->c_street_1, input.payout.c_street_1, 21);
  strncpy(output->c_street_2, input.payout.c_street_2, 21);
  strncpy(output->c_city, input.payout.c_city, 21);
  strncpy(output->c_state, input.payout.c_state, 3);
  strncpy(output->c_zip, input.payout.c_zip, 10);
  strncpy(output->c_phone, input.payout.c_phone, 17);
  strncpy(output->c_credit, input.payout.c_credit, 3);
```

```
  strncpy(output->c_since.DateString, input.payout.c_since, 11);
  strncpy(output->h_date.DateString, input.payout.h_date, 20);
  strncpy(output->c_data, input.payout.c_data, 200);
  output->c_credit_lim = input.payout.c_credit_lim;
  output->c_discount = input.payout.c_discount;
  output->c_balance = input.payout.c_balance;

  return SUCCESS;
}



int mod_tpcc_delivery(T_delivery_data *output, int id)
{
#ifdef CONNECTION_MUTEX
  HANDLE *mutexptr=NULL;
#endif
    DBExecution_pool_info *ptr;
  DBExecution *dbexec;;
  struct delstruct input;

  input.delin.w_id = output->w_id;
  input.delin.plsqlflag = 1;
  input.delin.o_carrier_id = output->o_carrier_id;
  output->dequeue_time = (double) GetTickCount();

#ifdef CONNECTION_MUTEX
  ptr=findIdleDBExecution(mutexptr);
#else
  ptr=findIdleDBExecution();
#endif
  dbexec=(DBExecution *)(ptr->pointer);
//  ptr->delivery_count++;

  if (dbexec->TPCdel(&input) == -1) {
    convert_status(output->txn_status, dbexec->execstatus);
#ifdef CONNECTION_MUTEX
    freeDBExecution(ptr, mutexptr);
#else
    freeDBExecution(ptr);
#endif
    userlog("TPCdel returns -1\n");
    return SUCCESS;
  } else {
    output->txn_status = DB_RETURN_OCI_SUCCESS;
  }

  output->complete_time = (double) GetTickCount();
  for (int i=0; i<10; i++)
    output->o_id[i]=dbexec->del_o_id[i];

#ifdef CONNECTION_MUTEX
  freeDBExecution(ptr, mutexptr);
#else
  freeDBExecution(ptr);
#endif

  write_delivery_log(output, id);

  return SUCCESS;
}


int mod_tpcc_orderstatus(T_orderstatus_data *output)
{
#ifdef CONNECTION_MUTEX
  HANDLE *mutexptr=NULL;
#endif
    DBExecution_pool_info* ptr;
  DBExecution *dbexec;
  struct ordstruct input;

  input.ordin.w_id = output->w_id;
  input.ordin.d_id = output->d_id;
  input.ordin.bylastname = output->by_last_name;
  if (input.ordin.bylastname) {
    input.ordin.c_id = 0;
    strncpy(input.ordin.c_last, output->c_last, 17);
    input.ordin.c_last[16]='\0';
  }
  else {
    input.ordin.c_id = output->c_id;
    input.ordin.c_last[0]='\0';
  }

#ifdef CONNECTION_MUTEX
  ptr=findIdleDBExecution(mutexptr);
#else
  ptr=findIdleDBExecution();
#endif
  dbexec=(DBExecution *)(ptr->pointer);
//  ptr->orderstatus_count++;


  if (dbexec->TPCord(&input) == -1) {
    convert_status(output->txn_status, dbexec->execstatus);
#ifdef CONNECTION_MUTEX
    freeDBExecution(ptr, mutexptr);
#else
    freeDBExecution(ptr);
#endif
```

```
    userlog("TPCord returns -1\n");
    return SUCCESS;
  } else {
    output->txn_status = DB_RETURN_OCI_SUCCESS;
  }

#ifdef CONNECTION_MUTEX
  freeDBExecution(ptr, mutexptr);
#else
  freeDBExecution(ptr);
#endif

  output->c_id = input.ordout.c_id;
  strncpy(output->c_last, input.ordout.c_last, 17);
  strncpy(output->c_first, input.ordout.c_first, 17);
  strncpy(output->c_middle, input.ordout.c_middle, 3);
  strncpy(output->o_entry_d.DateString, input.ordout.o_entry_d,
20);
  output->c_balance = input.ordout.c_balance;
  output->o_id = input.ordout.o_id;
  output->o_carrier_id = input.ordout.o_carrier_id;
  output->o_ol_cnt = input.ordout.o_ol_cnt;
  for (int i=0; i<output->o_ol_cnt; i++) {
    output->o_orderline[i].ol_supply_w_id =
input.ordout.ol_supply_w_id[i];
    output->o_orderline[i].ol_i_id = input.ordout.ol_i_id[i];
    output->o_orderline[i].ol_quantity =
input.ordout.ol_quantity[i];
    output->o_orderline[i].ol_amount = input.ordout.ol_amount[i];
    strncpy(output->o_orderline[i].ol_delivery_d.DateString,
input.ordout.ol_delivery_d[i], 11);
  }

  return SUCCESS;
}


int mod_tpcc_stocklevel(T_stocklevel_data *output)
{
#ifdef CONNECTION_MUTEX
  HANDLE *mutexptr=NULL;
#endif
    DBExecution_pool_info* ptr;
  DBExecution *dbexec;
  struct stostruct input;

  input.stoout.low_stock=-123;
  input.stoin.w_id = output->w_id;
  input.stoin.d_id = output->ld_id;
  input.stoin.threshold = output->threshold;

#ifdef CONNECTION_MUTEX
  ptr=findIdleDBExecution(mutexptr);
#else
  ptr=findIdleDBExecution();
#endif
  dbexec=(DBExecution *)(ptr->pointer);
//  ptr->stocklevel_count++;

  if (dbexec->TPCsto(&input) == -1) {
    convert_status(output->txn_status, dbexec->execstatus);
#ifdef CONNECTION_MUTEX
    freeDBExecution(ptr, mutexptr);
#else
    freeDBExecution(ptr);
#endif
    userlog("TPCsto returns -1\n");
    return SUCCESS;
    } else {
    output->txn_status = DB_RETURN_OCI_SUCCESS;
  }

#ifdef CONNECTION_MUTEX
  freeDBExecution(ptr, mutexptr);
#else
  freeDBExecution(ptr);
#endif

  output->low_stock = input.stoout.low_stock;

  return SUCCESS;
}

#endif



void write_delivery_log(T_delivery_data *pdata, int threadId)
{
  fprintf(DelFiles[threadId],
          "Q %1d %1d %6.5f %6.5f %6.5f %1d %1d %1d %1d %1d %1d %1d
%1d %1d %1d %1d\n",
          pdata->w_id, pdata->ld_id, pdata->enqueue_time,
          pdata->complete_time - pdata->enqueue_time,
          pdata->dequeue_time - pdata->enqueue_time, pdata-
>txn_status,
          pdata->o_id[0], pdata->o_id[1], pdata->o_id[2], pdata-
>o_id[3],
          pdata->o_id[4], pdata->o_id[5], pdata->o_id[6], pdata-
>o_id[7],
          pdata->o_id[8], pdata->o_id[9]);
```

```
}


#ifdef CONNECTION_MUTEX
int freeDBExecution(DBExecution_pool_info *ptr, HANDLE *mutexptr)
#else
int freeDBExecution(DBExecution_pool_info *ptr)
#endif
{
  ptr->current_status = IDLE;

#ifdef DEBUG_DETAIL
  userlog("Thread %d release connection\n", GetCurrentThreadId());
#endif


#ifdef CONNECTION_MUTEX
  if (mutexptr==NULL)
    userlog("Thread %d has mutexptr=NULL\n", GetCurrentThreadId());
  ReleaseMutex((*mutexptr));
#endif
  if (!SetEvent(waitIdle)) {
    userlog("Error on SetEvent, in function: free DBExection\n");
    return FALSE;
  }

  return TRUE;
}


#ifdef CONNECTION_MUTEX
DBExecution_pool_info* findIdleDBExecution(HANDLE *mutexptr)
#else
DBExecution_pool_info* findIdleDBExecution()
#endif
{
  int current=GetCurrentThreadId() % DBConnections;

#ifdef DEBUG
  findDBExecutionCall++;
#endif

  while (1) {

    for (int count=0; count<TotalLoop; count++) {

      if (DBExecution_pool[current].current_status == IDLE) {
        switch(WaitForSingleObject(DBExecution_lock[current], 0)) {

          case WAIT_ABANDONED:
#ifdef DEBUG
            userlog("connection mutex returns WAIT_ABANDONED\n");
#endif

          case WAIT_OBJECT_0:

#ifdef DEBUG_DETAIL
            userlog("Thread %d get connection: %d\n",
GetCurrentThreadId(), current);
#endif

            if (DBExecution_pool[current].current_status == IDLE) {
              DBExecution_pool[current].current_status = IN_USE;
#ifndef CONNECTION_MUTEX
              ReleaseMutex(DBExecution_lock[current]);
#else
              mutexptr=&(DBExecution_lock[current]);
#endif
              TlsSetValue(TlsPtr, (void *)
DBExecution_pool[current].pointer);
              return &(DBExecution_pool[current]);
            }
            else {
              ReleaseMutex(DBExecution_lock[current]);
#ifdef DEBUG
              userlog("get connection mutex, but current_status is
not IDLE\n");
#endif
            }
            break;

          case WAIT_TIMEOUT:
            break;

          default:
            userlog("Error on WaitForSingleObject, DBExecution\n");
            return NULL;
        }

      }

      current++;
      if (current==DBConnections) current=0;
    }

#ifdef DEBUG
    findDBExecutionWait++;
    if (findDBExecutionWait !=0 && findDBExecutionWait % 100000 ==
0)
      userlog("wait: %d,  total call: %d\n", findDBExecutionWait,
findDBExecutionCall);
#endif

    if ((WaitForSingleObject(waitIdle, INFINITE)) != WAIT_OBJECT_0)
{
      userlog("Error on WaitForSingleObject, in function
findIdleDBExecution\n");
      return NULL;
    }
  }

  return NULL;
}



void readInit(char *output, char *parameter, char *default_value)
{
  if (_access(InitFile, 0x00) != NULL) {
    userlog("Cannot access init file: %s\n", InitFile);
    strcpy(output, default_value);
  }
  else
      GetPrivateProfileString("TPCC", parameter, default_value,
output, MAXLEN, InitFile);
}



int initializeDBExecutionPool()
{
    DBExecution *ptr;

  userlog("execute initializeDBExecutionPool()\n");

    DBExecution_pool = (DBExecution_pool_info *) malloc
(sizeof(DBExecution_pool_info)*DBConnections);
  if (DBExecution_pool == 0) {
    userlog("malloc failed in initializeDBExecutionPool\n");
    return FALSE;
  }
  memset((void*)DBExecution_pool, 0,
sizeof(DBExecution_pool_info)*DBConnections);

  for (int i=0; i<DBConnections; i++) {
    if ((ptr=new DBExecution) == NULL) {
      userlog("Cannot create DBExecution object\n");
      return FALSE;
    }

    if ((TlsSetValue(TlsPtr, (void *) ptr)) == NULL) {
      userlog("TlsSetValue failed\n");
      return FALSE;
    }

    if (ptr->TPCinit(i, "tpcc", "tpcc")) {
      userlog("TPCinit failed\n");
      return FALSE;
    }

    DBExecution_pool[i].current_status = IDLE;
    DBExecution_pool[i].pointer = (void *) ptr;

    userlog ("DBExecution %d is initialized\n", i);
  }

  return TRUE;
}



void userlog (char * str, ...)
{
  HANDLE logMutex;
  FILE *file;
  time_t t;
  struct tm *currtime;
  va_list va;
  int threadId;

  logMutex = CreateMutex(NULL, FALSE, "TPCC_LOG");
  // Wait for initialization ended
  WaitForSingleObject(logMutex, INFINITE);

  threadId = GetCurrentThreadId();
    time (&t);
  currtime = localtime(&t);
  if ((file=fopen(LogFile, "a"))==(FILE *) NULL) {
    fprintf(stderr, "Can't open file : %s\n", LogFile);
    exit(-1);
  }
  va_start(va, str);
  fprintf(file, "[Time %d:%d:%d  Thread: %d]  ", currtime->tm_hour,
currtime->tm_min, currtime->tm_sec, threadId);
  vfprintf(file, str, va);
  fprintf(file, "\n");
  va_end(va);
  fclose(file);

  ReleaseMutex(logMutex);
  CloseHandle(logMutex);
}
```

```
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 =OCI_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)
{

  DBExecution *dbc;

  dbc = (DBExecution*) TlsGetValue(TlsPtr);
  if (dbc == 0) {
  userlog("TlsGetValue failed in TPC_oid_data\n");
  exit(-1);
  }

  *bufpp = &dbc->dctx->del_o_id[iter];
  *indpp= &dbc->dctx->del_o_id_ind[iter];
  dbc->dctx->del_o_id_len[iter]=sizeof(dbc->dctx->del_o_id[0]);
  *alenp= &dbc->dctx->del_o_id_len[iter];
  *rcodepp = &dbc->dctx->del_o_id_rcode[iter];
  *piecep =OCI_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)
{

  DBExecution *dbc;

  dbc = (DBExecution*) TlsGetValue(TlsPtr);
  if (dbc == 0) {
  userlog("TlsGetValue failed in cid_data\n");
  exit(-1);
  }

  *bufpp = &dbc->dctx->c_id[iter];
  *indpp= &dbc->dctx->c_id_ind[iter];
  dbc->dctx->c_id_len[iter]=sizeof(dbc->dctx->c_id[0]);
  *alenp= &dbc->dctx->c_id_len[iter];
  *rcodepp = &dbc->dctx->c_id_rcode[iter];
  *piecep =OCI_ONE_PIECE;
  return (OCI_CONTINUE);
}


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 =OCI_ONE_PIECE;
  return (OCI_CONTINUE);
}



/*******************************************************************
**************************
*  DBExecution member functions
*
********************************************************************
*************************/

DBExecution::DBExecution()
{
  tracelevel = 0;
  logon = 0;
  new_init = 0;
  pay_init = 0;
  ord_init = 0;
  del_init_oci = 0;
  del_init_plsql = 0;
  sto_init = 0;
}

DBExecution::~DBExecution()
{

}
```

```
#define SQLTXTNEW2 "BEGIN inittpcc.init_no(:idx1arr); END;"
#define SQLTXTDEL "BEGIN inittpcc.init_del ; END;"
#define SQLTXTDEL1 "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 SQLTXTDEL3 "UPDATE ordr 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 SQLTXTDEL4 "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 SQLTXTDEL6 "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 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 \
                 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 \
                 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  /*+ INDEX(ordl) */ \
                ol_i_id, ol_supply_w_id, ol_quantity, ol_amount,
ol_delivery_d \
                FROM ordl \
                WHERE ol_o_id = :o_id AND  ol_d_id = :d_id AND
ol_w_id = :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 "

#ifdef PLSQLSTO
#define SQLTXTSTO "BEGIN stocklevel.getstocklevel (:w_id, :d_id,
:threshold, \
   :low_stock); END;"
#else
#define SQLTXTSTO "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


#define SQLTXT_INIT "BEGIN inittpcc.init_pay; END;"



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

  sprintf(realfile,"%s",fnam);
  fd = fopen(realfile,"r");
  if (!fd){
      fprintf(stderr," fopen on %s failed %d\n",fnam,fd);
      exit(-1);
  }
  while (fgets((char *)linebuf+nulpt, SQL_BUF_SIZE,fd))
    nulpt = strlen((char *)linebuf);

  return(nulpt);
}


int DBExecution::ocierror(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:
    userlog("ocierror: Module %s Line %d\n", fname, lineno);
    userlog("ocierror: Error - OCI_SUCCESS_WITH_INFO\n");
    lstat = OCIErrorGet (errhp, recno++, (text *) NULL, &errcode,
errbuf,
                           (ub4) sizeof(errbuf), OCI_HTYPE_ERROR);
    userlog("ocierror: Error - %s\n", errbuf);
    break;
  case OCI_NEED_DATA:
    userlog("ocierror: Module %s Line %d\n", fname, lineno);
    userlog("ocierror: Error - OCI_NEED_DATA\n");
    return (IRRECERR);
  case OCI_NO_DATA:
    userlog("ocierror: Module %s Line %d\n", fname, lineno);
    userlog("ocierror: 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)
    {
      userlog("ocierror: Module %s Line %d\n", fname, lineno);
      userlog("ocierror: 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:
    userlog("ocierror: Module %s Line %d\n", fname, lineno);
    userlog("ocierror: Error - OCI_INVALID_HANDLE\n");
    TPCexit();
    exit(-1);
  case OCI_STILL_EXECUTING:
    userlog("ocierror: Module %s Line %d\n", fname, lineno);
    userlog("ocierror: Error - OCI_STILL_EXECUTE\n");
    return (IRRECERR);
  case OCI_CONTINUE:
    userlog("ocierror: Module %s Line %d\n", fname, lineno);
    userlog("ocierror: Error - OCI_CONTINUE\n");
    return (IRRECERR);
  default:
    userlog("ocierror: Module %s Line %d\n", fname, lineno);
    userlog("ocierror: Status - %s\n", status);
    return (IRRECERR);
  }
  return (RECOVERR);
}


/*******************************************************************
****************************
* TPCinit   TPCexit
*
********************************************************************
***************************/


DBExecution::TPCinit (int id, char *uid, char *pwd)
{

#ifndef LOOPBACK

   text stmbuf[100];

#define SQLTXT "alter session set isolation_level = serializable"
#define SQLTXTTRC "alter session set sql_trace = true"
#define SQLTXTTIM "alter session set timed_statistics = true"
#define SQLTXTOPS "alter session set current_schema = tpcc"

   proc_no = id;
/*
   char *temp;

   if ((temp = getenv("LOCAL"))==NULL)
    _putenv( "LOCAL=tpcc" );

   OCIInitialize(OCI_DEFAULT|OCI_OBJECT,(dvoid *)0,0,0,0); */
// OCIERROR(errhp, OCIInitialize(OCI_THREADED|OCI_OBJECT,(dvoid
*)0,0,0,0));
```

```
   OCIERROR(errhp, OCIEnvInit(&tpcenv, OCI_DEFAULT, 0, (dvoid
**)0));
   OCIERROR(errhp, OCIHandleAlloc((dvoid *)tpcenv, (dvoid
**)&tpcsrv, OCI_HTYPE_SERVER, 0 , (dvoid **)0));
   OCIERROR(errhp, OCIHandleAlloc((dvoid *)tpcenv, (dvoid
**)&errhp, OCI_HTYPE_ERROR, 0 , (dvoid **)0));
   OCIERROR(errhp, OCIHandleAlloc((dvoid *)tpcenv, (dvoid
**)&tpcsvc, OCI_HTYPE_SVCCTX, 0 , (dvoid **)0));

   for (int i=0; i<100; i++) {

    execstatus = OCIServerAttach(tpcsrv, errhp, (text
*)0,0,OCI_DEFAULT);
    if (execstatus == OCI_SUCCESS || execstatus ==
OCI_SUCCESS_WITH_INFO)
      break;
    OCIERROR(errhp, execstatus);
    Sleep(10);
   }

   if (i==100) {
     userlog("Can't attach to Server after 100 tries\n");
     return -1;
   }

   OCIERROR(errhp, OCIAttrSet((dvoid *)tpcsvc, OCI_HTYPE_SVCCTX,
(dvoid *)tpcsrv, (ub4)0,OCI_ATTR_SERVER, errhp));
   OCIERROR(errhp, OCIHandleAlloc((dvoid *)tpcenv, (dvoid
**)&tpcusr, OCI_HTYPE_SESSION, 0 , (dvoid **)0));
#ifdef OPS_LOGIN
   OCIERROR(errhp, OCISessionBegin(tpcsvc, errhp, tpcusr,
OCI_CRED_EXT, OCI_DEFAULT));
#else
   OCIERROR(errhp, OCIAttrSet((dvoid *)tpcusr, OCI_HTYPE_SESSION,
(dvoid *)uid, (ub4)strlen(uid),OCI_ATTR_USERNAME, errhp));
   OCIERROR(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));
#endif

   OCIERROR(errhp, 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, SQLTXT);
   OCIStmtPrepare(curi, errhp, stmbuf, strlen((char *)stmbuf),
OCI_NTV_SYNTAX, OCI_DEFAULT);
   OCIERROR(errhp,OCIStmtExecute(tpcsvc, curi,
errhp,1,0,0,0,OCI_DEFAULT));

   OCIHandleFree(curi, OCI_HTYPE_STMT);

#ifdef OPS_LOGIN
     OCIHandleAlloc(tpcenv, (dvoid **)&curi, OCI_HTYPE_STMT, 0,
(dvoid**)0);
     memset(stmbuf,0,100);
     sprintf ((char *) stmbuf, SQLTXTOPS);
     OCIStmtPrepare(curi, errhp, stmbuf, strlen((char *)stmbuf),
      OCI_NTV_SYNTAX, OCI_DEFAULT);
     OCIERROR(errhp, OCIStmtExecute(tpcsvc, curi,
errhp,1,0,0,0,OCI_DEFAULT));
     OCIHandleFree((dvoid *)curi, OCI_HTYPE_STMT);
#endif


   if (tracelevel == 3) {
     OCIHandleAlloc(tpcenv, (dvoid **)&curi, OCI_HTYPE_STMT, 0,
(dvoid**)0);
     memset(stmbuf,0,100);
     sprintf ((char *) stmbuf, SQLTXTTIM);
     OCIStmtPrepare(curi, errhp, stmbuf, strlen((char *)stmbuf),
      OCI_NTV_SYNTAX, OCI_DEFAULT);
     OCIERROR(errhp, OCIStmtExecute(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 (tkvcoinit ()) {   /* order status */
      TPCexit ();
      return (-1);
   }
   else
      ord_init = 1;

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

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

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

#endif

   return (0);
}



void DBExecution::TPCexit()
{

#ifndef LOOPBACK

   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) {
      tkvcsdone();
      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);

#endif

}


/*******************************************************************
***************************
* tkvcninit  tkvcndone  tkvcpinit  tkvcpdone  tkvcdinit  tkvcddone
tkvcoinit  tkvcodone      *
* tkvcsinit  tkvcsdone
*
********************************************************************
***************************/


int DBExecution::tkvcninit ()
{

  text stmbuf[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_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);

  /* open first cursor */
  DISCARD OCIERROR(errhp,OCIHandleAlloc(tpcenv,(dvoid **)(&nctx-
>curn1),
           OCI_HTYPE_STMT, 0, (dvoid**)0));

#if defined(ISO)
  sqlfile(".\\blocks\\tkvcpnew_iso.sql",stmbuf);
#else
#if defined(ISO7)
  sqlfile(".\\blocks\\tkvcpnew_iso7.sql",stmbuf);
#else
  sqlfile(".\\blocks\\tkvcpnew.sql",stmbuf);
#endif
#endif

  DISCARD OCIERROR(errhp,OCIStmtPrepare(nctx->curn1, errhp, stmbuf,
           strlen((char *)stmbuf), 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_ol_cnt",ADR(o_ol_cnt),
          SIZ(o_ol_cnt),SQLT_INT, &nctx->o_ol_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,
":retry",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);

#ifdef USE_IEEE_NUMBER
  OCIBNDPLA(nctx->curn1, nctx->ol_quantity_bp,errhp,":ol_quantity",
           nol_quantity, SIZ(float),SQLT_BFLOAT,nctx-
>nol_quantity_len,
           NITEMS,&nctx->nol_q_count);

  OCIBNDPLA(nctx->curn1, nctx-
>i_price_bp,errhp,":i_price",i_price,SIZ(float),
           SQLT_BFLOAT, nctx->i_price_len, NITEMS, &nctx-
>nol_item_count);
#else
  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);
#endif /* USE_IEEE_NUMBER */
  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);
```

```
#ifdef USE_IEEE_NUMBER
  OCIBNDPLA(nctx->curn1, nctx-
>s_quantity_bp,errhp,":s_quantity",s_quantity,
           SIZ(float), SQLT_BFLOAT,nctx->s_quant_len,NITEMS,&nctx-
>nol_qty_count);
#else
  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);
#endif /* USE_IEEE_NUMBER */

  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);
#ifdef USE_IEEE_NUMBER
  OCIBNDPLA(nctx->curn1, nctx-
>ol_amount_bp,errhp,":ol_amount",nol_amount,
           SIZ(float),SQLT_BFLOAT, nctx-
>nol_amount_len,NITEMS,&nctx->nol_am_count);

  OCIBNDPLA(nctx->curn1, nctx->s_remote_bp,errhp,":s_remote",nctx-
>s_remote,
           SIZ(float),SQLT_BFLOAT, nctx->s_remote_len,NITEMS,&nctx-
>s_remote_count);
#else
  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);
#endif /* USE_IEEE_NUMBER */

  /* open second cursor */
  DISCARD OCIERROR(errhp,OCIHandleAlloc(tpcenv, (dvoid **)(&nctx-
>curn2),
                   OCI_HTYPE_STMT, 0, (dvoid**)0));
  DISCARD sprintf ((char *) stmbuf, SQLTXTNEW2);
  DISCARD OCIERROR(errhp,OCIStmtPrepare(nctx->curn2, errhp, stmbuf,
                   strlen((char *)stmbuf), OCI_NTV_SYNTAX,
OCI_DEFAULT));

  /* execute second cursor to init newinit package */
  {
    int idx1arr[NITEMS];
    OCIBind *idx1arr_bp;
    ub2 idx1arr_len[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_ol_cnt = NITEMS;


    /* Bind array */
    OCIBNDPLA(nctx->curn2, idx1arr_bp,errhp,":idx1arr",idx1arr,
             SIZ(int), SQLT_INT, idx1arr_len,
NITEMS,&idx1arr_count);

     execstatus = OCIStmtExecute(tpcsvc,nctx->curn2,errhp,1,0,
                  NULLP(CONST
OCISnapshot),NULLP(OCISnapshot),OCI_DEFAULT);

   if(execstatus != OCI_SUCCESS) {
     OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
       errcode = OCIERROR(errhp,execstatus);
       return -1;
     }
   }

  return (0);
}



void DBExecution::tkvcndone ()
{
   if (nctx)
   {
     DISCARD OCIHandleFree((dvoid *)nctx->curn1,OCI_HTYPE_STMT);
     DISCARD OCIHandleFree((dvoid *)nctx->curn2,OCI_HTYPE_STMT);
     free (nctx);
   }
}



int DBExecution::tkvcdinit (int plsqlflag)
```

```
{

   text stmbuf[SQL_BUF_SIZE];

   if (plsqlflag)
   {
     pldctx = (pldelctx *) malloc (sizeof(pldelctx));
     DISCARD memset(pldctx,(char)0,(ub4)sizeof(pldelctx));
     /* Initialize */
     DISCARD OCIHandleAlloc(tpcenv, (dvoid**)&pldctx->curp1,
OCI_HTYPE_STMT, 0,
                           (dvoid**)0);
     DISCARD sprintf ((char *) stmbuf, SQLTXTDEL);
     DISCARD OCIStmtPrepare(pldctx->curp1, errhp, stmbuf,
                           (ub4) strlen((char *)stmbuf),
                    OCI_NTV_SYNTAX, OCI_DEFAULT);
     DISCARD OCIERROR(errhp,
        OCIStmtExecute(tpcsvc,pldctx-
>curp1,errhp,1,0,NULLP(OCISnapshot),
                       NULLP(OCISnapshot), OCI_DEFAULT));


     DISCARD OCIHandleAlloc(tpcenv,(dvoid**) &pldctx->curp2,
OCI_HTYPE_STMT,
                    0, (dvoid**)0);
#if 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 OCIStmtPrepare(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);
#ifdef USE_IEEE_NUMBER
     OCIBNDPLA(pldctx->curp2, pldctx->sums_bp, errhp,":sums",
               pldctx->sums,SIZ(float),SQLT_BFLOAT, pldctx-
>sums_len,NDISTS,
               &pldctx->sums_rcnt);
#else
     OCIBNDPLA(pldctx->curp2, pldctx->sums_bp, errhp,":sums",
               pldctx->sums,SIZ(int),SQLT_INT, pldctx-
>sums_len,NDISTS,
               &pldctx->sums_rcnt);
#endif

     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",    SQLTXTDEL1);
     DISCARD OCIStmtPrepare(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);

     OCIBNDRAD(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, SQLTXTDEL3);
     DISCARD OCIStmtPrepare(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);
     OCIBNDRAD(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, SQLTXTDEL4);
     DISCARD OCIStmtPrepare(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);
     OCIBNDRAD(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, SQLTXTDEL6);
     DISCARD OCIStmtPrepare(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 DBExecution::shiftdata(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];
   }
}


void DBExecution::tkvcddone(int plsqlflag)
{
   if (plsqlflag)
   {
     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);
     }
   }
}


int DBExecution::tkvcoinit ()
{
   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;
   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-
>curo0,OCI_HTYPE_STMT,0,(dvoid**)0));
   DISCARD OCIERROR(errhp,
     OCIHandleAlloc(tpcenv,(dvoid**)&octx-
>curo0,OCI_HTYPE_STMT,0,(dvoid**)0));
   DISCARD OCIERROR(errhp,
     OCIHandleAlloc(tpcenv,(dvoid**)&octx-
>curo1,OCI_HTYPE_STMT,0,(dvoid**)0));
   DISCARD OCIERROR(errhp,
     OCIHandleAlloc(tpcenv,(dvoid**)&octx-
>curo2,OCI_HTYPE_STMT,0,(dvoid**)0));
   DISCARD OCIERROR(errhp,
     OCIHandleAlloc(tpcenv,(dvoid**)&octx-
>curo3,OCI_HTYPE_STMT,0,(dvoid**)0));
   DISCARD OCIERROR(errhp,
     OCIHandleAlloc(tpcenv,(dvoid**)&octx-
>curo4,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,
      OCIStmtPrepare(octx->curo0,errhp,stmbuf,(ub4)strlen((char
*)stmbuf),
                OCI_NTV_SYNTAX,OCI_DEFAULT));
   DISCARD OCIERROR(errhp,
      OCIAttrSet(octx->curo0,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,
      OCIStmtPrepare(octx->curo1,errhp,stmbuf,(ub4)strlen((char
*)stmbuf),
                    OCI_NTV_SYNTAX,OCI_DEFAULT));
   DISCARD OCIERROR(errhp,
      OCIAttrSet(octx->curo1,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,
      OCIStmtPrepare(octx->curo2,errhp,stmbuf,(ub4)strlen((char
*)stmbuf),
                    OCI_NTV_SYNTAX,OCI_DEFAULT));
```

```
   DISCARD OCIERROR(errhp,
      OCIAttrSet(octx->curo2,OCI_HTYPE_STMT,&octx->norow,0,
                 OCI_ATTR_PREFETCH_ROWS,errhp));

   DISCARD sprintf((char *) stmbuf, SQLCUR3);
   DISCARD OCIERROR(errhp,
      OCIStmtPrepare(octx->curo3,errhp,stmbuf,(ub4)strlen((char
*)stmbuf),
                     OCI_NTV_SYNTAX,OCI_DEFAULT));
   DISCARD OCIERROR(errhp,
      OCIAttrSet(octx->curo3,OCI_HTYPE_STMT,&octx->norow,0,
                 OCI_ATTR_PREFETCH_ROWS,errhp));

   DISCARD sprintf((char *) stmbuf, SQLCUR4);
   DISCARD OCIERROR(errhp,
      OCIStmtPrepare(octx->curo4,errhp,stmbuf,(ub4)strlen((char
*)stmbuf),
                     OCI_NTV_SYNTAX,OCI_DEFAULT));
   DISCARD OCIERROR(errhp,
      OCIAttrSet(octx->curo4,OCI_HTYPE_STMT,&octx->norow,0,
                 OCI_ATTR_PREFETCH_ROWS,errhp));

   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->curo0,octx->w_id_bp[0],errhp,":w_id",ADR(w_id),
         SIZ(int),SQLT_INT);
   OCIBND(octx->curo0,octx->d_id_bp[0],errhp,":d_id",ADR(d_id),
         SIZ(int),SQLT_INT);
   OCIBND(octx->curo0,octx->c_last_bp[0],errhp,":c_last",c_last,
         SIZ(c_last), SQLT_STR);
   OCIDFNRA(octx->curo0,octx->c_rowid_dp,errhp,1,octx->c_rowid_ptr,
            SIZ(OCIRowid*), SQLT_RDD, NULL, octx->c_rowid_len,
NULL);

   OCIBND(octx->curo1,octx->c_rowid_bp,errhp,":cust_rowid", &octx-
>c_rowid_cust,
         sizeof( octx->c_rowid_ptr[0]),SQLT_RDD);
   OCIDEF(octx->curo1,octx-
>c_id_dp,errhp,1,ADR(c_id),SIZ(int),SQLT_INT);
#ifdef USE_IEEE_NUMBER
   OCIDEF(octx->curo1,octx->c_balance_dp[0],errhp,2,ADR(c_balance),
          SIZ(double),SQLT_BDOUBLE);
#else
   OCIDEF(octx->curo1,octx->c_balance_dp[0],errhp,2,ADR(c_balance),
          SIZ(double),SQLT_FLT);
#endif /* USE_IEEE_NUMBER */
   OCIDEF(octx->curo1,octx-
>c_first_dp[0],errhp,3,c_first,SIZ(c_first)-1,
          SQLT_CHR);
   OCIDEF(octx->curo1,octx->c_middle_dp[0],errhp,4,c_middle,
          SIZ(c_middle)-1,SQLT_AFC);
   OCIDEF(octx->curo1,octx-
>c_last_dp[0],errhp,5,c_last,SIZ(c_last)-1,
          SQLT_CHR);
   OCIDEF(octx->curo1,octx-
>o_id_dp[0],errhp,6,ADR(o_id),SIZ(int),SQLT_INT);
   OCIDEF(octx->curo1,octx->o_entry_d_dp[0],errhp,7,
          &o_entry_d_base,SIZ(OCIDate),SQLT_ODT);
   OCIDEF(octx->curo1,octx-
>o_cr_id_dp[0],errhp,8,ADR(o_carrier_id),
          SIZ(int),SQLT_INT);
   OCIDEF(octx->curo1,octx->o_ol_cnt_dp[0],errhp,9,ADR(o_ol_cnt),
          SIZ(int),SQLT_INT);

/* Bind for third cursor , no-zero customer id */
   OCIBND(octx->curo2,octx->w_id_bp[1],errhp,":w_id",ADR(w_id),
         SIZ(int),SQLT_INT);
   OCIBND(octx->curo2,octx->d_id_bp[1],errhp,":d_id",ADR(d_id),
     SIZ(int),SQLT_INT);
   OCIBND(octx->curo2,octx->c_id_bp,errhp,":c_id",ADR(c_id),
     SIZ(int),SQLT_INT);
#ifdef USE_IEEE_NUMBER
   OCIDEF(octx->curo2,octx->c_balance_dp[1],errhp,1,ADR(c_balance),
          SIZ(double),SQLT_BDOUBLE);
#else
   OCIDEF(octx->curo2,octx->c_balance_dp[1],errhp,1,ADR(c_balance),
          SIZ(double),SQLT_FLT);
#endif /* USE_IEEE_NUMBER */
   OCIDEF(octx->curo2,octx-
>c_first_dp[1],errhp,2,c_first,SIZ(c_first)-1,
          SQLT_CHR);
   OCIDEF(octx->curo2,octx->c_middle_dp[1],errhp,3,c_middle,
          SIZ(c_middle)-1,SQLT_AFC);
   OCIDEF(octx->curo2,octx-
>c_last_dp[1],errhp,4,c_last,SIZ(c_last)-1,
         SQLT_CHR);
   OCIDEF(octx->curo2,octx-
>o_id_dp[1],errhp,5,ADR(o_id),SIZ(int),SQLT_INT);
   OCIDEF(octx->curo2,octx->o_entry_d_dp[1],errhp,6,
&o_entry_d_base,
         SIZ(OCIDate),SQLT_ODT);
   OCIDEF(octx->curo2, octx-
>o_cr_id_dp[1],errhp,7,ADR(o_carrier_id),
          SIZ(int), SQLT_INT);
   OCIDEF(octx->curo2,octx->o_ol_cnt_dp[1],errhp,8,ADR(o_ol_cnt),
          SIZ(int),SQLT_INT);

/* 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);
 */

   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);
#ifdef USE_IEEE_NUMBER
   OCIDFNRA(octx->curo3, octx->ol_quantity_dp,errhp,3,
ol_quantity,SIZ(float),
           SQLT_BFLOAT, NULL,octx->ol_quantity_len, NULL);
   OCIDFNRA(octx->curo3,octx->ol_amount_dp,errhp,4,ol_amount,
SIZ(float),
           SQLT_BFLOAT,NULL, octx->ol_amount_len, NULL);
#else
   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);
#endif /* USE_IEEE_NUMBER */
   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);
   OCIDEF(octx->curo4,octx->c_count_dp,errhp,1,ADR(octx-
>rcount),SIZ(int),
         SQLT_INT);

   return (0);
}



void DBExecution::tkvcodone ()
{

   if (octx)
      free (octx);

}



int DBExecution::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,OCIStmtPrepare(pctx->curpi, errhp,
stmbuf,
            strlen((char *)stmbuf), OCI_NTV_SYNTAX, OCI_DEFAULT));
   DISCARD OCIERROR(errhp, OCIStmtExecute(tpcsvc,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,OCIStmtPrepare(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,OCIStmtPrepare(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;
  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;



   /* bind variables */


   OCIBNDPL(pctx->curp0, pctx->w_id_bp[0],
errhp,":w_id",ADR(w_id),SIZ(int),
          SQLT_INT, NULL);
   OCIBNDPL(pctx->curp0, pctx->d_id_bp[0],
errhp,":d_id",ADR(d_id),SIZ(int),
          SQLT_INT, NULL);
   OCIBND(pctx->curp0, pctx->c_w_id_bp[0],
errhp,":c_w_id",ADR(c_w_id),SIZ(int),
          SQLT_INT);
   OCIBND(pctx->curp0, pctx->c_d_id_bp[0],
errhp,":c_d_id",ADR(c_d_id),SIZ(int),
          SQLT_INT);
   OCIBND(pctx->curp0, pctx->c_id_bp[0],
errhp,":c_id",ADR(c_id),SIZ(int),
          SQLT_INT);
#ifdef USE_IEEE_NUMBER
   OCIBNDPL(pctx->curp0, pctx->h_amount_bp[0],
errhp,":h_amount",ADR(h_amount),
          SIZ(float),SQLT_BFLOAT,  &pctx->h_amount_len);
#else
   OCIBNDPL(pctx->curp0, pctx->h_amount_bp[0],
errhp,":h_amount",ADR(h_amount),
          SIZ(int),SQLT_INT,  &pctx->h_amount_len);
#endif /* USE_IEEE_NUMBER */
   OCIBNDPL(pctx->curp0, pctx->c_last_bp[0],
errhp,":c_last",c_last,SIZ(c_last),
          SQLT_STR, &pctx->c_last_len);
   OCIBNDPL(pctx->curp0, pctx->w_street_1_bp[0],
errhp,":w_street_1",w_street_1,
          SIZ(w_street_1),SQLT_STR, &pctx->w_street_1_len);
   OCIBNDPL(pctx->curp0, pctx->w_street_2_bp[0],
errhp,":w_street_2",w_street_2,
          SIZ(w_street_2),SQLT_STR, &pctx->w_street_2_len);
   OCIBNDPL(pctx->curp0, pctx->w_city_bp[0],
errhp,":w_city",w_city,SIZ(w_city),
          SQLT_STR, &pctx->w_city_len);
   OCIBNDPL(pctx->curp0, pctx->w_state_bp[0],
errhp,":w_state",w_state,
          SIZ(w_state), SQLT_STR, &pctx->w_state_len);
   OCIBNDPL(pctx->curp0, pctx->w_zip_bp[0],
errhp,":w_zip",w_zip,SIZ(w_zip),
          SQLT_STR, &pctx->w_zip_len);
   OCIBNDPL(pctx->curp0, pctx->d_street_1_bp[0],
errhp,":d_street_1",d_street_1,
          SIZ(d_street_1),SQLT_STR, &pctx->d_street_1_len);
   OCIBNDPL(pctx->curp0, pctx->d_street_2_bp[0],
errhp,":d_street_2",d_street_2,
          SIZ(d_street_2),SQLT_STR, &pctx->d_street_2_len);
   OCIBNDPL(pctx->curp0, pctx->d_city_bp[0],
errhp,":d_city",d_city,SIZ(d_city),
          SQLT_STR, &pctx->d_city_len);
   OCIBNDPL(pctx->curp0, pctx->d_state_bp[0],
errhp,":d_state",d_state,
          SIZ(d_state), SQLT_STR, &pctx->d_state_len);
   OCIBNDPL(pctx->curp0, pctx->d_zip_bp[0],
errhp,":d_zip",d_zip,SIZ(d_zip),
          SQLT_STR, &pctx->d_zip_len);
   OCIBNDPL(pctx->curp0, pctx->c_first_bp[0],
errhp,":c_first",c_first,
          SIZ(c_first), SQLT_STR, &pctx->c_first_len);
   OCIBNDPL(pctx->curp0, pctx->c_middle_bp[0],
errhp,":c_middle",c_middle,2,
          SQLT_AFC, &pctx->c_middle_len);
   OCIBNDPL(pctx->curp0, pctx->c_street_1_bp[0],
errhp,":c_street_1",c_street_1,
          SIZ(c_street_1),SQLT_STR, &pctx->c_street_1_len);
   OCIBNDPL(pctx->curp0, pctx->c_street_2_bp[0],
errhp,":c_street_2",c_street_2,
          SIZ(c_street_2),SQLT_STR, &pctx->c_street_2_len);
   OCIBNDPL(pctx->curp0, pctx->c_city_bp[0],
errhp,":c_city",c_city,SIZ(c_city),
          SQLT_STR, &pctx->c_city_len);
   OCIBNDPL(pctx->curp0, pctx->c_state_bp[0],
errhp,":c_state",c_state,
          SIZ(c_state), SQLT_STR, &pctx->c_state_len);
   OCIBNDPL(pctx->curp0, pctx->c_zip_bp[0],
errhp,":c_zip",c_zip,SIZ(c_zip),
          SQLT_STR,&pctx->c_zip_len);
   OCIBNDPL(pctx->curp0, pctx->c_phone_bp[0],
errhp,":c_phone",c_phone,
          SIZ(c_phone), SQLT_STR, &pctx->c_phone_len);
   OCIBNDPL(pctx->curp0, pctx->c_since_bp[0],
errhp,":c_since",&c_since,
          SIZ(OCIDate), SQLT_ODT, &pctx->c_since_len);
   OCIBNDPL(pctx->curp0, pctx->c_credit_bp[0],
errhp,":c_credit",c_credit,
          SIZ(c_credit),SQLT_CHR, &pctx->c_credit_len);
   OCIBNDPL(pctx->curp0, pctx->c_credit_lim_bp[0],
errhp,":c_credit_lim",
          ADR(c_credit_lim),SIZ(int), SQLT_INT, &pctx-
>c_credit_lim_len);
   OCIBNDPL(pctx->curp0, pctx->c_discount_bp[0],
errhp,":c_discount",
          ADR(c_discount),SIZ(c_discount), SQLT_FLT, &pctx-
>c_discount_len);
#ifdef USE_IEEE_NUMBER
   OCIBNDPL(pctx->curp0, pctx->c_balance_bp[0], errhp,":c_balance",
          ADR(c_balance), SIZ(double),SQLT_BDOUBLE, &pctx-
>c_balance_len);
#else
   OCIBNDPL(pctx->curp0, pctx->c_balance_bp[0], errhp,":c_balance",
          ADR(c_balance), SIZ(double),SQLT_FLT, &pctx-
>c_balance_len);
#endif /* USE_IEEE_NUMBER */
   OCIBNDPL(pctx->curp0, pctx->c_data_bp[0],
errhp,":c_data",c_data,SIZ(c_data),
          SQLT_STR, &pctx->c_data_len);
/*
   OCIBNDR(pctx->curp0, pctx->h_date_bp,
errhp,":h_date",h_date,SIZ(h_date),
          SQLT_STR, &pctx->h_date_ind, &pctx->h_date_len, &pctx-
>h_date_rc);
*/
   OCIBNDPL(pctx->curp0, pctx->retries_bp[0],
errhp,":retry",ADR(retries),
          SIZ(int), SQLT_INT, &pctx->retries_len);
   OCIBNDPL(pctx->curp0, pctx->cr_date_bp[0],
errhp,":cr_date",ADR(cr_date),
          SIZ(OCIDate),SQLT_ODT, &pctx->cr_date_len);

/* ---- Binds for  the second cursor   */


   OCIBNDPL(pctx->curp1, pctx->w_id_bp[1],
errhp,":w_id",ADR(w_id),SIZ(int),
          SQLT_INT, &pctx->w_id_len);
   OCIBNDPL(pctx->curp1, pctx->d_id_bp[1],
errhp,":d_id",ADR(d_id),SIZ(int),
          SQLT_INT, &pctx->d_id_len);
   OCIBND(pctx->curp1, pctx->c_w_id_bp[1],
errhp,":c_w_id",ADR(c_w_id),SIZ(int),
          SQLT_INT);
   OCIBND(pctx->curp1, pctx->c_d_id_bp[1],
errhp,":c_d_id",ADR(c_d_id),SIZ(int),
          SQLT_INT);
   OCIBNDPL(pctx->curp1, pctx->c_id_bp[1],
errhp,":c_id",ADR(c_id),SIZ(int),
          SQLT_INT, &pctx->c_id_len);
#ifdef USE_IEEE_NUMBER
   OCIBNDPL(pctx->curp1, pctx->h_amount_bp[1],
errhp,":h_amount",ADR(h_amount),
          SIZ(float),SQLT_BFLOAT, &pctx->h_amount_len);
#else
   OCIBNDPL(pctx->curp1, pctx->h_amount_bp[1],
errhp,":h_amount",ADR(h_amount),
          SIZ(int),SQLT_INT, &pctx->h_amount_len);
#endif /* USE_IEEE_NUMBER */
   OCIBND(pctx->curp1, pctx->c_last_bp[1],
errhp,":c_last",c_last,SIZ(c_last),
          SQLT_STR);
   OCIBNDPL(pctx->curp1, pctx->w_street_1_bp[1],
errhp,":w_street_1",w_street_1,
          SIZ(w_street_1),SQLT_STR, &pctx->w_street_1_len);
   OCIBNDPL(pctx->curp1, pctx->w_street_2_bp[1],
errhp,":w_street_2",w_street_2,
          SIZ(w_street_2),SQLT_STR, &pctx->w_street_2_len);
   OCIBNDPL(pctx->curp1, pctx->w_city_bp[1],
errhp,":w_city",w_city,SIZ(w_city),
          SQLT_STR, &pctx->w_city_len);
   OCIBNDPL(pctx->curp1, pctx->w_state_bp[1],
errhp,":w_state",w_state,
          SIZ(w_state), SQLT_STR, &pctx->w_state_len);
   OCIBNDPL(pctx->curp1, pctx->w_zip_bp[1],
errhp,":w_zip",w_zip,SIZ(w_zip),
          SQLT_STR, &pctx->w_zip_len);
   OCIBNDPL(pctx->curp1, pctx->d_street_1_bp[1],
errhp,":d_street_1",d_street_1,
          SIZ(d_street_1),SQLT_STR, &pctx->d_street_1_len);
   OCIBNDPL(pctx->curp1, pctx->d_street_2_bp[1],
errhp,":d_street_2",d_street_2,
          SIZ(d_street_2),SQLT_STR, &pctx->d_street_2_len);
   OCIBNDPL(pctx->curp1, pctx->d_city_bp[1],
errhp,":d_city",d_city,SIZ(d_city),
          SQLT_STR, &pctx->d_city_len);
   OCIBNDPL(pctx->curp1, pctx->d_state_bp[1],
errhp,":d_state",d_state,
          SIZ(d_state), SQLT_STR, &pctx->d_state_len);
   OCIBNDPL(pctx->curp1, pctx->d_zip_bp[1],
errhp,":d_zip",d_zip,SIZ(d_zip),
          SQLT_STR, &pctx->d_zip_len);
   OCIBNDPL(pctx->curp1, pctx->c_first_bp[1],
errhp,":c_first",c_first,
          SIZ(c_first), SQLT_STR, &pctx->c_first_len);
   OCIBNDPL(pctx->curp1, pctx->c_middle_bp[1],
errhp,":c_middle",c_middle,2,
          SQLT_AFC, &pctx->c_middle_len);

   OCIBNDPL(pctx->curp1, pctx->c_street_1_bp[1],
errhp,":c_street_1",c_street_1,
          SIZ(c_street_1),SQLT_STR, &pctx->c_street_1_len);
   OCIBNDPL(pctx->curp1, pctx->c_street_2_bp[1],
errhp,":c_street_2",c_street_2,
          SIZ(c_street_2),SQLT_STR, &pctx->c_street_2_len);
   OCIBNDPL(pctx->curp1, pctx->c_city_bp[1],
errhp,":c_city",c_city,
          SIZ(c_city),SQLT_STR, &pctx->c_city_len);
   OCIBNDPL(pctx->curp1, pctx->c_state_bp[1],
errhp,":c_state",c_state,
          SIZ(c_state), SQLT_STR, &pctx->c_state_len);
   OCIBNDPL(pctx->curp1, pctx->c_zip_bp[1],
errhp,":c_zip",c_zip,SIZ(c_zip),
          SQLT_STR, &pctx->c_zip_len);
   OCIBNDPL(pctx->curp1, pctx->c_phone_bp[1],
errhp,":c_phone",c_phone,
          SIZ(c_phone), SQLT_STR, &pctx->c_phone_len);
   OCIBNDPL(pctx->curp1, pctx->c_since_bp[1],
errhp,":c_since",&c_since,
          SIZ(OCIDate), SQLT_ODT, &pctx->c_since_len);
   OCIBNDPL(pctx->curp1, pctx->c_credit_bp[1],
errhp,":c_credit",c_credit,
          SIZ(c_credit),SQLT_CHR, &pctx->c_credit_len);
   OCIBNDPL(pctx->curp1, pctx->c_credit_lim_bp[1],
errhp,":c_credit_lim",
          ADR(c_credit_lim),SIZ(int), SQLT_INT, &pctx-
>c_credit_lim_len);
   OCIBNDPL(pctx->curp1, pctx->c_discount_bp[1],
errhp,":c_discount",
          ADR(c_discount),SIZ(c_discount), SQLT_FLT, &pctx-
>c_discount_len);
#ifdef USE_IEEE_NUMBER
   OCIBNDPL(pctx->curp1, pctx->c_balance_bp[1], errhp,":c_balance",
          ADR(c_balance), SIZ(double),SQLT_BDOUBLE, &pctx-
>c_balance_len);
#else
   OCIBNDPL(pctx->curp1, pctx->c_balance_bp[1], errhp,":c_balance",
          ADR(c_balance), SIZ(double),SQLT_FLT, &pctx-
>c_balance_len);
#endif /* USE_IEEE_NUMBER */
   OCIBNDPL(pctx->curp1, pctx->c_data_bp[1],
errhp,":c_data",c_data,SIZ(c_data),
          SQLT_STR, &pctx->c_data_len);
/*
   OCIBNDR(pctx->curp1, pctx->h_date_bp1,
errhp,":h_date",h_date,SIZ(h_date),
          SQLT_STR, &pctx->h_date_ind, &pctx->h_date_len, &pctx-
>h_date_rc);
*/
```

```
   OCIBNDPL(pctx->curp1, pctx->retries_bp[1],
errhp,":retry",ADR(retries),
           SIZ(int), SQLT_INT, &pctx->retries_len);
   OCIBNDPL(pctx->curp1, pctx->cr_date_bp[1],
errhp,":cr_date",ADR(cr_date),
           SIZ(OCIDate),SQLT_ODT, &pctx->cr_date_len);

   return (0);
}



void DBExecution::tkvcpdone ()

{
  if(pctx) {
    free(pctx);
  }
}



int DBExecution::tkvcsinit ()
{
   text stmbuf[SQL_BUF_SIZE];
   sctx = (stoctx *)malloc(sizeof(stoctx));
   memset(sctx,(char)0,sizeof(stoctx));

   sctx->norow=0;

   OCIERROR(errhp,
      OCIHandleAlloc(tpcenv,(dvoid**)&sctx-
>curs,OCI_HTYPE_STMT,0,(dvoid**)0));
   sprintf ((char *) stmbuf, SQLTXTSTO);
   OCIERROR(errhp,OCIStmtPrepare(sctx-
>curs,errhp,stmbuf,strlen((char *)stmbuf),
      OCI_NTV_SYNTAX,OCI_DEFAULT));
#ifndef 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);
#ifdef USE_IEEE_NUMBER
   OCIBND(sctx->curs,sctx->threshold_bp,errhp, ":threshold",
ADR(threshold),
      sizeof(float),SQLT_BFLOAT);
#else
   OCIBND(sctx->curs,sctx->threshold_bp,errhp, ":threshold",
ADR(threshold),
      sizeof(int),SQLT_INT);
#endif /* USE_IEEE_NUMBER */
#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);
}



void DBExecution::tkvcsdone ()
{
  if(sctx) free(sctx);
}


/******************************************************************
****************************
*  tkvcn  tkvcd  tkvcp  tkvco  tkvcs
*
*******************************************************************
***************************/


int DBExecution::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) {
#ifdef USE_IEEE_NUMBER
         nctx->s_remote[i] = 1.0;
#else
         nctx->s_remote[i] = 1;
#endif /* USE_IEEE_NUMBER */
         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 = OCIStmtExecute(tpcsvc,nctx->curn1,errhp,1,0,0,0,
             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 == RECOVERR) {
  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;
   }

   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);
}



int DBExecution::tkvcd (int plsqlflag)
{

   int i;
   int rpc,rcount;
   int invalid;

   if (plsqlflag)
   {

     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,
        OCIStmtExecute(tpcsvc,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 < (int)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=OCIStmtExecute(tpcsvc,dctx->curd1,errhp,NDISTS,0,
                 NULLP(CONST
OCISnapshot),NULLP(OCISnapshot),OCI_DEFAULT);
     if((execstatus != OCI_SUCCESS) && (execstatus != OCI_NO_DATA))
     {
       DISCARD OCITransRollback(tpcsvc,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(tpcsvc,dctx->curd3,errhp,rpc,0,
                 NULLP(CONST
OCISnapshot),NULLP(OCISnapshot),OCI_DEFAULT);
     if(execstatus != OCI_SUCCESS)
     {
       DISCARD OCITransRollback(tpcsvc,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)
     {
       userlog ("Error in TPC-C server %d: %d rows selected, %d
ords updated\n",
               proc_no, rpc, rcount);
       DISCARD OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
       return (-1);
     }

     /* array update of order_line table */
     execstatus=OCIStmtExecute(tpcsvc,dctx->curd4,errhp,rpc,0,
                  NULLP(CONST
OCISnapshot),NULLP(OCISnapshot),OCI_DEFAULT);
     if(execstatus != OCI_SUCCESS)
     {
       DISCARD OCITransRollback(tpcsvc,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-
>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(tpcsvc,dctx->curd6,errhp,rpc,0,
                  NULLP(CONST OCISnapshot),NULLP(OCISnapshot),
                  OCI_COMMIT_ON_SUCCESS | OCI_DEFAULT);

     if(execstatus != OCI_SUCCESS)
     {
       OCITransRollback(tpcsvc,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) {
       userlog ("Error in TPC-C server %d: %d rows selected, %d
cust updated\n",
               proc_no, rpc, rcount);
       DISCARD OCITransRollback(tpcsvc, 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);

}



int DBExecution::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=OCIStmtExecute(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 == RECOVERR))
       {
         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 OCIAttrGet(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=OCIStmtExecute(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 == RECOVERR))
         {
           DISCARD OCITransCommit(tpcsvc,errhp,OCI_DEFAULT);
           retries++;
           goto retry;
         } else {
           return -1;
         }
       }
       cbctx.reexec = TRUE;
       cbctx.count = (octx->rcount+1)/2 ;
       execstatus=OCIStmtExecute(tpcsvc,octx-
>curo0,errhp,cbctx.count,
                                 0,NULLP(CONST OCISnapshot),
                                 NULLP(OCISnapshot),OCI_DEFAULT);

       DISCARD OCIAttrGet(octx->curo0,OCI_HTYPE_STMT,&rcount,NULL,
                                    OCI_ATTR_ROW_COUNT,errhp);

       /* will get OCI_NO_DATA if <100 found */
       if ((int)cbctx.count != rcount)
       {
/*
       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 == RECOVERR))
         {
           DISCARD OCITransCommit(tpcsvc,errhp,OCI_DEFAULT);
           retries++;
           goto retry;
         } else {
           return -1;
         }
       }
       octx->cust_idx=cbctx.count - 1 ;
     }

     octx->c_rowid_cust = octx->c_rowid_ptr[octx->cust_idx];
     execstatus=OCIStmtExecute(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 == RECOVERR)
           || (errcode == SNAPSHOT_TOO_OLD))
        {
           retries++;
           goto retry;
           } else {
           return -1;
        }
      }
```

```
    }
    else
    {
      execstatus=OCIStmtExecute(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 == RECOVERR)
           || (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(FULLDATE),(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->ol_w_id_len = sizeof(int);
    octx->ol_d_id_len = sizeof(int);
    octx->ol_o_id_len = sizeof(int);

    execstatus = OCIStmtExecute(tpcsvc,octx-
>curo3,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,&ol_d_base[i],
         (const text*)SHORTDATE,(ub1)strlen(SHORTDATE),(text*)0,0,
          &ol_del_len[i], ol_delivery_d[i]));
/*
  cvtdmy(ol_d_base[i],ol_delivery_d[i]);
*/
    }

   return (0);

}



int DBExecution::tkvcp ()
{

retry:

  pctx->w_id_len = SIZ(w_id);
  pctx->d_id_len = SIZ(d_id);
  pctx->c_w_id_len = 0;
  pctx->c_d_id_len = 0;
  pctx->c_id_len = 0;
  pctx->h_amount_len = SIZ(h_amount);
  pctx->c_last_len = SIZ(c_last);
  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;
  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 == RECOVERR) {
        retries++;
        goto retry;
     } else if (errcode == SNAPSHOT_TOO_OLD) {
        retries++;
        goto retry;
     } else {
        return -1;
     }
   }
   return 0;
}



int DBExecution::tkvcs ()
{

retry:

    execstatus= OCIStmtExecute(tpcsvc,sctx->curs,errhp,1,0,0,0,
                               OCI_COMMIT_ON_SUCCESS |
OCI_DEFAULT);

  if (execstatus != OCI_SUCCESS)
    {

      errcode=OCIERROR(errhp,execstatus);
      OCITransCommit(tpcsvc,errhp,OCI_DEFAULT);
      if((errcode == NOT_SERIALIZABLE) || (errcode == RECOVERR)
          || (errcode == SNAPSHOT_TOO_OLD))
      {
         retries++;
         goto retry;
      } else {
         return -1;
      }
     }

  return (0);
}


/******************************************************************
***************************
```

```
*  TPCnew  TPCpay  TPCdel  TPCord  TPCsto
*
*******************************************************************
**************************/


int DBExecution::TPCnew (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] = (float)str->newin.ol_quantity[i];
   }
   retries = 0;

#ifndef 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 != RECOVERR)
         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.brand_generic[i] = brand_generic[i][0];
#ifdef USE_IEEE_NUMBER
      str->newout.s_quantity[i] = (int) s_quantity[i];
      str->newout.i_price[i] = i_price[i]/100;
      str->newout.ol_amount[i] = nol_amount[i]/100;
#else
      str->newout.s_quantity[i] = s_quantity[i];
      str->newout.i_price[i] = (float)(i_price[i])/100;
      str->newout.ol_amount[i] = (float)(nol_amount[i])/100;
#endif /* USE_IEEE_NUMBER */
   }

#ifndef 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;
   return(1);
}



int DBExecution::TPCpay (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;
#ifdef USE_IEEE_NUMBER
   h_amount = (float) str->payin.h_amount;
#else
   h_amount = str->payin.h_amount;
#endif /* USE_IEEE_NUMBER */
   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 != RECOVERR)
         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;
   return(1);
}



int DBExecution::TPCord (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 != RECOVERR)
         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];
#ifdef USE_IEEE_NUMBER
      str->ordout.ol_quantity[i] = (int) ol_quantity[i];
      str->ordout.ol_amount[i] = ol_amount[i]/100;
#else
      str->ordout.ol_quantity[i] = ol_quantity[i];
      str->ordout.ol_amount[i] = (float)(ol_amount[i])/100;
#endif /* USE_IEEE_NUMBER */
      strncpy (str->ordout.ol_delivery_d[i],
(char*)ol_delivery_d[i], 11);
   }
   str->ordout.retry = retries;
   return(1);
}



int DBExecution::TPCdel (struct delstruct *str)
{
   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);
   }

   for (i = 0; i < 10; i++) {
      if (del_o_id[i] <= 0) {
         userlog ("DELIVERY: no new order for w_id: %d, d_id %d\n",
                  w_id, i + 1);
      }
   }
   str->delout.terror = NOERR;
   str->delout.retry = retries;
   return(1);
}



int DBExecution::TPCsto (struct stostruct *str)
{
   w_id = str->stoin.w_id;
   d_id = str->stoin.d_id;
#ifdef USE_IEEE_NUMBER
   threshold = (float) str->stoin.threshold;
#else
   threshold = str->stoin.threshold;
#endif /* USE_IEEE_NUMBER */
   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;
   return(1);
```

```
}



#ifndef AVOID_DEADLOCK

void DBExecution::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 DBExecution::swap(struct newstruct *str, int i, int j)
{
  int temp;
  char tmpstr[25];
  char tmpch;
#ifdef USE_IEEE_NUMBER
  float temp_float;
#endif;

  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;

#ifdef USE_IEEE_NUMBER
  temp_float = nol_quantity[i];
  nol_quantity[i] = nol_quantity[j];
  nol_quantity[j] = temp_float;

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

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

  temp_float = (float)str->newout.s_quantity[i];
  str->newout.s_quantity[i] = str->newout.s_quantity[j];
  str->newout.s_quantity[j] = (int)temp_float;
#else
  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;
#endif /* USE_IEEE_NUMBER */

  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




#ifdef LOOPBACK

int mod_tpcc_neworder(T_neworder_data *output)
{
  output->txn_status= DB_RETURN_OCI_SUCCESS;
  output->d_id=1;
  output->c_id=1;
  output->o_ol_cnt=7;
  output->o_all_local=0;
  strcpy(output->o_entry_d.DateString, "20-01-2004 11:59:10");
  strcpy(output->c_last, "TESTLASTNAME<>\"&");
  strcpy(output->c_credit, "GC");
  output->c_discount=.1791;
  output->w_tax=.093099996;
  output->d_tax=.159700006;
  output->o_id=2101;

  output->o_orderline[0].ol_i_id=98752;
  output->o_orderline[0].ol_supply_w_id=2;
  output->o_orderline[0].ol_quantity=5;
  output->o_orderline[0].ol_amount=2576.48;
  output->o_orderline[0].i_price=3.71;
  output->o_orderline[0].s_quantity=45;
  strcpy(output->o_orderline[0].i_name,  "item98752");
  output->o_orderline[0].b_g[0]='G';

  output->o_orderline[1].ol_i_id=80479;
  output->o_orderline[1].ol_supply_w_id=1;
  output->o_orderline[1].ol_quantity=6;
  output->o_orderline[1].ol_amount=3490.03;
  output->o_orderline[1].i_price=6.81;
  output->o_orderline[1].s_quantity=58;
  strcpy(output->o_orderline[1].i_name,  "item80479");
  output->o_orderline[1].b_g[0]='G';

  output->o_orderline[2].ol_i_id=58617;
  output->o_orderline[2].ol_supply_w_id=1;
  output->o_orderline[2].ol_quantity=6;
  output->o_orderline[2].ol_amount=1234.56;
  output->o_orderline[2].i_price=4.01;
  output->o_orderline[2].s_quantity=22;
  strcpy(output->o_orderline[2].i_name,  "item58617");
  output->o_orderline[2].b_g[0]='G';

  output->o_orderline[3].ol_i_id=3394;
  output->o_orderline[3].ol_supply_w_id=1;
  output->o_orderline[3].ol_quantity=5;
  output->o_orderline[3].ol_amount=2345.67;
  output->o_orderline[3].i_price=1.73;
  output->o_orderline[3].s_quantity=18;
  strcpy(output->o_orderline[3].i_name,  "item3394");
  output->o_orderline[3].b_g[0]='G';

  output->o_orderline[4].ol_i_id=2242;
  output->o_orderline[4].ol_supply_w_id=1;
  output->o_orderline[4].ol_quantity=4;
  output->o_orderline[4].ol_amount=3456.78;
  output->o_orderline[4].i_price=4.48;
  output->o_orderline[4].s_quantity=29;
  strcpy(output->o_orderline[4].i_name,  "item2242");
  output->o_orderline[4].b_g[0]='G';

  output->o_orderline[6].ol_i_id=37310;
  output->o_orderline[6].ol_supply_w_id=1;
  output->o_orderline[6].ol_quantity=5;
  output->o_orderline[6].ol_amount=4567.89;
  output->o_orderline[6].i_price=5.50;
  output->o_orderline[6].s_quantity=21;
  strcpy(output->o_orderline[6].i_name,  "item37310");
  output->o_orderline[6].b_g[0]='G';

  output->o_orderline[5].ol_i_id=19395;
  output->o_orderline[5].ol_supply_w_id=3;
  output->o_orderline[5].ol_quantity=6;
  output->o_orderline[5].ol_amount=5678.90;
  output->o_orderline[5].i_price=10.19;
  output->o_orderline[5].s_quantity=80;
  strcpy(output->o_orderline[5].i_name,  "item19395");
  output->o_orderline[5].b_g[0]='G';

  return SUCCESS;
}



int mod_tpcc_payment(T_payment_data *output)
{
  int i;
  char c;

  output->txn_status= DB_RETURN_OCI_SUCCESS;
  output->d_id=2;
  output->c_id=99;
  strcpy(output->c_last, "paymentCLast");
  output->c_w_id=2;
  output->c_d_id=5;
  output->h_amount=54321.09;
  strcpy(output->h_date.DateString, "20-01-2004 11:59:10");
  strcpy(output->w_street_1, "WareStreet1");
  strcpy(output->w_street_2, "WareStreet2");
  strcpy(output->w_city, "WareCity");
  strcpy(output->w_state, "WareState");
  strcpy(output->w_zip, "WareZip");
  strcpy(output->d_street_1, "DistStreet1");
  strcpy(output->d_street_2, "DistStreet2");
  strcpy(output->d_city, "DistCity");
  strcpy(output->d_state, "DistState");
  strcpy(output->d_zip, "DistZip");
  strcpy(output->c_first, "CFirst");
  strcpy(output->c_middle, "PA");
  strcpy(output->c_street_1, "CustStreet1");
  strcpy(output->c_street_2, "CustStreet2");
  strcpy(output->c_city, "CustCity");
  strcpy(output->c_state, "CustState");
  strcpy(output->c_zip, "CustZip");
  strcpy(output->c_phone, "9876543");
  strcpy(output->c_since.DateString, "20-01-2004 11:59:05");
  strcpy(output->c_credit, "BC");
  output->c_credit_lim=34567.89;
  output->c_discount=.234;
  output->c_balance=876543.21;

  for (i=0, c='a'; i<143; i++, c++) {
    if (c=='z') c='a';
    output->c_data[i]=(char) c;
  }
  return SUCCESS;
}



int mod_tpcc_delivery(T_delivery_data *output, int id)
{
  output->txn_status= DB_RETURN_OCI_SUCCESS;
  output->o_carrier_id=4;
  write_delivery_log(output, id);
  return SUCCESS;
}



int mod_tpcc_orderstatus(T_orderstatus_data *output)
{
  output->txn_status= DB_RETURN_OCI_SUCCESS;
  output->d_id=8;
  output->c_id=4321;
  strcpy(output->c_last, "orderstatusCLast");
  strcpy(output->c_first, "CFirst");
  strcpy(output->c_middle, "OS");
  output->c_balance=7543.21;
  output->o_id=9832;
  output->o_ol_cnt=5;
  output->o_carrier_id=2;
  strcpy(output->o_entry_d.DateString, "20-01-2004 11:59:08");

  output->o_orderline[0].ol_i_id=98752;
  output->o_orderline[0].ol_supply_w_id=2;
  output->o_orderline[0].ol_quantity=5;
  output->o_orderline[0].ol_amount=2576.48;
  strcpy(output->o_orderline[0].ol_delivery_d.DateString, "20-01-
2004 11:58:00");

  output->o_orderline[1].ol_i_id=80479;
  output->o_orderline[1].ol_supply_w_id=1;
  output->o_orderline[1].ol_quantity=6;
  output->o_orderline[1].ol_amount=3490.03;
  strcpy(output->o_orderline[1].ol_delivery_d.DateString, "20-01-
2004 11:58:01");

  output->o_orderline[2].ol_i_id=58617;
  output->o_orderline[2].ol_supply_w_id=1;
  output->o_orderline[2].ol_quantity=6;
  output->o_orderline[2].ol_amount=1234.56;
  strcpy(output->o_orderline[2].ol_delivery_d.DateString, "20-01-
2004 11:58:02");

  output->o_orderline[3].ol_i_id=3394;
  output->o_orderline[3].ol_supply_w_id=1;
  output->o_orderline[3].ol_quantity=5;
  output->o_orderline[3].ol_amount=2345.67;
  strcpy(output->o_orderline[3].ol_delivery_d.DateString, "20-01-
2004 11:58:03");

  output->o_orderline[4].ol_i_id=2242;
  output->o_orderline[4].ol_supply_w_id=1;
  output->o_orderline[4].ol_quantity=4;
  output->o_orderline[4].ol_amount=3456.78;
  strcpy(output->o_orderline[4].ol_delivery_d.DateString, "20-01-
2004 11:58:04");

  return SUCCESS;
}



int mod_tpcc_stocklevel(T_stocklevel_data *output)
{
  output->threshold=10;
  output->low_stock=1;
  output->txn_status= DB_RETURN_OCI_SUCCESS;
  return SUCCESS;
}


#endif
```

```
---------------------------------------------------------
DBConnection.h
---------------------------------------------------------
#include "tpccpl.h"
#include "tpccstruct.h"
#include "tpcc_struct.h"
#include "mod_tpcc_error.h"
#include "mod_tpcc.h"


#define MAXLEN 100
#define LogName "log\\DBConnection.log"
#define InitName "DBInit.ini"

// Execution Pool Status
#define IDLE 1
#define IN_USE 2

#define Default_DBConnections "20"
#define DelLogName "log\\DeliveryLog"

#define convert_status(A,B) \
{\
  switch (B) { \
    case OCI_SUCCESS: (A)=DB_RETURN_OCI_SUCCESS; break; \
    case OCI_SUCCESS_WITH_INFO:
(A)=DB_RETURN_OCI_SUCCESS_WITH_INFO; break; \
    case OCI_NEED_DATA: (A)=DB_RETURN_OCI_NEED_DATA; break; \
    case OCI_NO_DATA: (A)=DB_RETURN_OCI_NO_DATA; break; \
    case OCI_ERROR: (A)=DB_RETURN_OCI_ERROR; break; \
    case OCI_INVALID_HANDLE: (A)=DB_RETURN_OCI_INVALID_HANDLE;
break; \
    case OCI_STILL_EXECUTING: (A)=DB_RETURN_OCI_STILL_EXECUTING;
break; \
    case OCI_CONTINUE: (A)=DB_RETURN_OCI_CONTINUE; break; \
  }; \
}

/*******************************************************************
****************************
* DBExecution_pool_info
*
********************************************************************
***************************/


typedef struct _DBExecution_pool_info {

  int current_status;
  int neworder_count;
  int payment_count;
  int orderstatus_count;
  int delivery_count;
  int stocklevel_count;
  void *pointer;

} DBExecution_pool_info;


/*******************************************************************
****************************
* global functions
*
********************************************************************
***************************/

sb4 no_data(dvoid *,OCIBind *,ub4,ub4,dvoid **,ub4 *,ub1 *,dvoid
**);
sb4 TPC_oid_data(dvoid *,OCIBind *,ub4,ub4,dvoid **,ub4 **,ub1
*,dvoid **,ub2 **);
sb4 cid_data(dvoid *,OCIBind *,ub4,ub4,dvoid **,ub4 **,ub1 *,dvoid
**,ub2 **);
sb4 amt_data(dvoid *,OCIBind *,ub4,ub4,dvoid **,ub4 **,ub1 *,dvoid
**,ub2 **);
void userlog (char *, ...);
void readInit(char *, char *, char *);
int initializeDBExecutionPool();

DBExecution_pool_info* findIdleDBExecution();
int freeDBExecution(DBExecution_pool_info *);

//DBExecution_pool_info* findIdleDBExecution(HANDLE *);
//int freeDBExecution(DBExecution_pool_info *, HANDLE *);

void write_delivery_log(T_delivery_data *pdata, int id);
void initDelLog(int);
void endDelLog(int);


/*******************************************************************
****************************
* global variables
*
********************************************************************
***************************/

HANDLE waitIdle;
HANDLE *DBExecution_lock;
DWORD TlsPtr;
DBExecution_pool_info *DBExecution_pool;
char DllPath[MAXLEN];
char LogFile[MAXLEN];
char InitFile[MAXLEN];
char DelLogFile[MAXLEN];
int TotalLoop=0;
int findDBExecutionCall=0;
int findDBExecutionWait=0;
int DBConnections;
int ready=0;
FILE **DelFiles;


/*******************************************************************
****************************
* DBExecution
*
********************************************************************
***************************/

class DBExecution
{
  public:
    DBExecution();
    ~DBExecution();

    int TPCinit(int, char *, char *);
    int TPCnew(struct newstruct *);
    int TPCpay(struct paystruct *);
    int TPCdel(struct delstruct *);
    int TPCord(struct ordstruct *);
    int TPCsto(struct stostruct *);
    void TPCexit();

#ifndef AVOID_DEADLOCK
    void swap(struct newstruct *, int, int);
        void q_sort(int *, struct newstruct *, int, int);
#endif

    int ocierror(char *, int, OCIError *, sword);
    void shiftdata(int);
    int sqlfile(char *, text *);

    int tkvcninit();
    int tkvcn();
    void tkvcndone();

    int tkvcpinit();
    int tkvcp();
    void tkvcpdone();

    int tkvcoinit();
    int tkvco();
    void tkvcodone();

    int tkvcdinit(int);
    int tkvcd(int);
    void tkvcddone(int);

    int tkvcsinit();
    int tkvcs();
    void tkvcsdone();

    delctx *dctx;
    int execstatus;
    int status;
    int del_o_id[10];


  private:
    int proc_no;
    int logon;
    int new_init;
    int pay_init;
    int ord_init;
    int del_init_oci;
    int del_init_plsql;
    int sto_init;
    int errcode;
    int indx[NITEMS];
    int ordl_cnt;

      /* for stock-level transaction */

    int w_id;
      int d_id;
      int c_id;
#ifdef USE_IEEE_NUMBER
      float threshold;
#else
      int threshold;
#endif /* USE_IEEE_NUMBER */
    int low_stock;

/* for delivery transaction */

    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];
#ifdef USE_IEEE_NUMBER
    float ol_quantity[15];
    float ol_amount[15];
#else
    int ol_quantity[15];
    int ol_amount[15];
#endif /* USE_IEEE_NUMBER */
    ub4  ol_del_len[15];
    text ol_delivery_d[15][11];
    OCIRowid *o_rowid;

/* for payment transaction */

    int c_w_id;
    int c_d_id;
#ifdef USE_IEEE_NUMBER
    float h_amount;
#else
    int h_amount;
#endif /* USE_IEEE_NUMBER */
    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[201];
    ub4 hlen;
    text h_date[20];

/* for new order transaction */

    int nol_i_id[15];
    int nol_supply_w_id[15];
#ifdef USE_IEEE_NUMBER
    float nol_quantity[15];
    float nol_amount[15];
    float s_quantity[15];
    float i_price[15];
#else
    int nol_quantity[15];
    int nol_amount[15];
    int s_quantity[15];
    int i_price[15];
#endif /* USE_IEEE_NUMBER */
    int nol_quanti10[15];
    int nol_quanti91[15];
    int nol_ytdqty[15];
    int o_all_local;
    float w_tax;
    float d_tax;
    float total_amount;
    char i_name[15][25];
    char brand_gen[15];
    char brand_generic[15][1];
    int tracelevel;

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

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


    newctx *nctx;
    ordctx *octx;
    defctx cbctx;
    pldelctx *pldctx;
    amtctx *actx;
    payctx *pctx;
    stoctx *sctx;
};
```

```
---------------------------------------------------------
loopback.cpp
---------------------------------------------------------
#include "stdafx.h"
#include "DBConnection.h"
```

```
---------------------------------------------------------
modtpcc.cpp
---------------------------------------------------------
// modtpcc.cpp : Defines the entry point for the DLL application.
//

#include "stdafx.h"
#include "modtpcc.h"
#include <httpext.h>

//#define DEBUG
//#define DELIVERY_MUTEX
#define NEW_ALLOCATE_FORM

BOOL APIENTRY DllMain( HANDLE hModule,
                       DWORD  ul_reason_for_call,
                       LPVOID lpReserved
           )
{
  char string[MAXLEN];

  if (ul_reason_for_call == DLL_PROCESS_ATTACH) {
    GetModuleFileName((HMODULE)hModule, DllPath, MAXLEN-1);

    strcpy(origin, DllPath);
    if (DllPath[0]=='\\' && DllPath[1]=='\\' && DllPath[2]=='?' &&
DllPath[3]=='\\')
      strcpy(DllPath, DllPath+4);
    for (int i=strlen(DllPath); DllPath[i]!='\\' && i; i--);
    DllPath[i]='\0';
    sprintf(InitFile, "%s\\%s", DllPath, InitName);
    sprintf(DllFile, "%s\\%s", DllPath, DllName);
    sprintf(LogFile, "%s\\%s", DllPath, LogName);
        OCIInitialize(OCI_THREADED|OCI_OBJECT,(dvoid *)0,0,0,0);
    //    sprintf(LogFile, "d:\\%s", LogName);

    /* load DBConnection.dll */

    if ((dllinstance = LoadLibrary(DllFile)) == NULL)
      return FALSE;

    if ((mod_tpcc_neworder=(int (FAR*)(T_neworder_data *))
GetProcAddress((HMODULE)dllinstance, "mod_tpcc_neworder"))==NULL)
      return FALSE;

    if ((mod_tpcc_payment=(int (FAR*)(T_payment_data *))
GetProcAddress((HMODULE)dllinstance, "mod_tpcc_payment"))==NULL)
      return FALSE;

    if ((mod_tpcc_delivery=(int (FAR*)(T_delivery_data *, int))
GetProcAddress((HMODULE)dllinstance, "mod_tpcc_delivery"))==NULL)
      return FALSE;

    if ((mod_tpcc_orderstatus=(int (FAR*)(T_orderstatus_data *))
GetProcAddress((HMODULE)dllinstance,
"mod_tpcc_orderstatus"))==NULL)
      FALSE;

    if ((mod_tpcc_stocklevel=(int (FAR*)(T_stocklevel_data *))
GetProcAddress((HMODULE)dllinstance, "mod_tpcc_stocklevel"))==NULL)
      return FALSE;

    if ((userlog=(void (FAR*)(char * str, ...))
GetProcAddress((HMODULE)dllinstance, "userlog"))==NULL)
      return FALSE;

    if ((initDelLog=(void (FAR*)(int))
GetProcAddress((HMODULE)dllinstance, "initDelLog"))==NULL)
      return FALSE;

    if ((endDelLog=(void (FAR*)(int))
GetProcAddress((HMODULE)dllinstance, "endDelLog"))==NULL)
      return FALSE;

    userlog("load modtpcc.dll, DllPath: %s\n", DllPath);


    if ((TlsPointer = TlsAlloc()) == 0xFFFFFFFF) {
      userlog("Error during TlsAlloc\n");
      return FALSE;
    }
    InitializeCriticalSection(&critical_initDelQueue);
    InitializeCriticalSection(&critical_memory);
    InitializeCriticalSection(&critical_DelQueue_free);
    InitializeCriticalSection(&critical_DelQueue_work);

    /* read ini parameters */
    readInit(string, "DBConnections", Default_DBConnections);
    DBConnections = atoi(string);
    userlog("number of DBConnections is %d\n", DBConnections);

#ifdef NEW_ALLOCATE_FORM
    readInit(string, "StartTerm", Default_StartTerm);
    userlog("number of Start Term is %s\n", string);
    /* StartTerm starts from 1 */
    if ((StartTerm = atoi(string) ) < 0) {
      userlog("error: Start Term is %d\n", StartTerm);
      return FALSE;
    }

    /* w_id starts from 1, d_id starts from 1 */
    StartTerm+=10;
#endif

    readInit(string, "KMaxterms", Default_Maxterms);
    userlog("number of Max Terms is %s00\n", string);
    /* add one more form for special characters */
    if ((Maxterms = atoi(string) * 100 + 1) <= 1) {
      userlog("number of Max Terms is %d\n", Maxterms - 1);
      return FALSE;
    }
    readInit(string, "DeliveryQueues", Default_DeliveryQueues);
    userlog("number of Delivery Queues is %s\n", string);
    if ((DeliveryQueues = atoi(string)) <= 0) {
      userlog("number of Delivery Queues is %d\n", DeliveryQueues);
      return FALSE;
    }

    readInit(string, "DeliveryThreads", Default_DeliveryThreads);
    userlog("number of Delivery Threads is %s\n", string);
    if ((DeliveryThreads = atoi(string)) <= 0) {
      userlog("number of Delivery Threads is %d\n",
DeliveryThreads);
      return FALSE;
    }
#ifdef USE_DELIVERY_LOG
    initDelLog(DeliveryThreads);
#endif

    modtpcc_ready=1;
  }
  else if (ul_reason_for_call == DLL_PROCESS_DETACH) {
#ifdef USE_DELIVERY_LOG
    endDelLog(DeliveryThreads);
#endif

    if ((TlsFree(TlsPointer)) == NULL) {
      userlog("Error during TlsFree\n");
        return FALSE;
    }
    if (!deleteDelQueue())
    {
      userlog("Error during deleteDelQueue\n");
      return FALSE;
    }
    DeleteCriticalSection(&critical_initDelQueue);
    DeleteCriticalSection(&critical_memory);
    DeleteCriticalSection(&critical_DelQueue_free);
    DeleteCriticalSection(&critical_DelQueue_work);

  DeleteCriticalSection(&(resp_global_pool.form_template_spinlock))
;

DeleteCriticalSection(&(txn_data_pool.form_template_spinlock));

    int i_type, i_pool;
#define GPOOL txn_global_pool[i_type][i_pool]
    for (i_type = 0; i_type < POOL_TYPE_TXN_MAX; i_type++)
      for (i_pool = 0; i_pool < TXN_TYPE_MAX; i_pool++)

DeleteCriticalSection(&(GPOOL.form_template_spinlock));
#undef GPOOL
  }

    return TRUE;
}



BOOL WINAPI GetExtensionVersion(HSE_VERSION_INFO *pVer)
{
   pVer->dwExtensionVersion = HSE_VERSION;
   strncpy(pVer->lpszExtensionDesc,
      "IIS ISAPI Extension", HSE_MAX_EXT_DLL_NAME_LEN);
   return TRUE;
}



DWORD WINAPI HttpExtensionProc(EXTENSION_CONTROL_BLOCK *pECB)
{

  if (!modtpcc_ready)
    return FALSE;

  if (!memory_ready) {
    EnterCriticalSection(&critical_memory);
    if (!memory_ready) {
      allocateMemoryPool();
      memory_ready=1;
    }
    LeaveCriticalSection(&critical_memory);
  }

  if (!queue_ready) {
    EnterCriticalSection(&critical_initDelQueue);
    if (!queue_ready) {
      if (!initDelQueue()) {
        userlog("init Delivery Queue failed\n");
        LeaveCriticalSection(&critical_initDelQueue);
        return FALSE;
      }
      queue_ready=1;
    }
    LeaveCriticalSection(&critical_initDelQueue);
  }

  return process_query(pECB)==TRUE ? HSE_STATUS_SUCCESS :
HSE_STATUS_ERROR;

/*

   HSE_SEND_HEADER_EX_INFO info = { 0 };

   char szOut[256];
   DWORD nOut;


   nOut = sprintf(szOut, "%s is the input, LogFile:%s, DllPath:%s,
DllFile:%s, origin:%s", pECB->lpszQueryString,LogFile, DllPath,
DllFile, origin);

   char szHeader[256];
   DWORD nHeader = sprintf(szHeader, "Content-Type: text/html\r\n"
"Contest-Length: %d\r\n\r\n", nOut);

   info.pszStatus = "200 OK";
   info.cchStatus = strlen(info.pszStatus);
   info.pszHeader = szHeader;
   info.cchHeader = nHeader;
   info.fKeepConn = false;

   if (!pECB->ServerSupportFunction(pECB->ConnID,
HSE_REQ_SEND_RESPONSE_HEADER_EX, &info, 0, 0))
   return HSE_STATUS_ERROR;

   if (!pECB->WriteClient(pECB->ConnID, szOut, &nOut, HSE_IO_SYNC))
   return HSE_STATUS_ERROR;

   return HSE_STATUS_SUCCESS;
*/
}



/*******************************************************************
****************************
* initialize / delete Delivery Queue
*
********************************************************************
**************************/

int deleteDelQueue()
{
  DelQueue_info *ptr = DelQueue_begin, *next;

  DeliveryThreadstop = 1;

  for (int i=0; i<DeliveryThreads; i++) {

    if (!SetEvent(waitDelWork)) {
      userlog("Error on SetEvent(waitDelWork) on
deleteDelQueue\n");
    }

    if (WaitForSingleObject(DelThreadRunning, 100000) !=
WAIT_OBJECT_0) {
      userlog("Delivery Thread is not loaded after 100 seconds\n");
    }
  }

  if (waitAvailableDelQueue != 0) {
    if (!CloseHandle(waitAvailableDelQueue))
      userlog("error on CloseHandle(waitAvailableDelQueue)\n");
    waitAvailableDelQueue = 0;
  }

  if (waitDelWork != 0) {
    if (!CloseHandle(waitDelWork))
      userlog("error on CloseHandle(waitDelWork)\n");
    waitDelWork = 0;
  }

  if (DelThreadRunning != 0) {
    if (!CloseHandle(DelThreadRunning))
      userlog("error on CloseHandle(DelThreadRunning)\n");
    DelThreadRunning = 0;
  }


  while (ptr != NULL) {
    next=ptr->Next;

#ifdef DELIVERY_MUTEX
    CloseHandle(ptr->queue_lock);
#endif

    free(ptr->pdata);
    free(ptr);
    ptr=next;
  }

  ptr = DelQueue_free;
  while (ptr != NULL) {
    next=ptr->Next;

#ifdef DELIVERY_MUTEX
    CloseHandle(ptr->queue_lock);
#endif

    free(ptr->pdata);
    free(ptr);
    ptr=next;
  }
  bufclose (deliveryoutput);
  return TRUE;
}



int initDelQueue()
{
  DelQueue_info *ptr, *curr;
  size_t deliverybufsize;

  userlog("execute initDelQueue\n");

  for (int i=0; i<DeliveryQueues; i++) {
    if ((ptr = (DelQueue_info *) malloc(sizeof(DelQueue_info))) ==
NULL) {
      userlog("malloc error in initDelQueue\n");
      return FALSE;
    }

    ptr->pdata=(T_delivery_data *)malloc(sizeof(T_delivery_data));

#ifdef DELIVERY_MUTEX
    if ((ptr->queue_lock=CreateMutex(NULL, FALSE, NULL))==NULL) {
      userlog("Cannot create mutex on queue lock\n");
      return FALSE;
    }
#endif

    if (!i)
      DelQueue_free=curr=ptr;
    else {
      curr->Next = ptr;
      curr = ptr;
    }
  }

  DelQueue_begin = DelQueue_end = curr->Next = NULL;

  if ((waitAvailableDelQueue = CreateEvent(NULL, FALSE, FALSE,
"Wait Empty Delivery Queue")) == NULL) {
    userlog("Cannot create event : waitAvailableDelQueue\n");
    return FALSE;
  }

  if ((waitDelWork = CreateEvent(NULL, FALSE, FALSE, "Wait Delivery
Work")) == NULL) {
    userlog("Cannot create event : waitDelWork\n");
    return FALSE;
  }

  if ((DelThreadRunning = CreateEvent(NULL, FALSE, FALSE, "Delivery
Thread Running")) == NULL) {
    userlog("Cannot create event : DelThreadRunning\n");
    return FALSE;
  }

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

    if (_beginthread(initDeliveryThread, 0, (void *) &i) == -1) {
      userlog("Error on initDeliveryThread %d\n", i);
      return FALSE;
    }

    /* wait for 100 seconds */
    if (WaitForSingleObject(DelThreadRunning, 100000) !=
WAIT_OBJECT_0) {
      userlog("Delivery Thread (%d) hasn't initialized after 100
seconds\n", i);
      return FALSE;
    }
```

```
    userlog("receive Delivery Thread %d confirmation\n", i);
  }
  deliverybufsize=(DeliveryQueues+DeliveryThreads)*sizeof(pT_delive
ry_data);
  if (BUF_SUCCESS != bufopen(deliverybufsize, &deliveryoutput)){
    userlog ("Error opening delivery output buffer pipe\n");
    return FALSE;
  }

  return TRUE;
}



void initDeliveryThread(void *thread_no)
{
  int thread_number=*((int *)thread_no);
  DelQueue_info *queue_info;
  int buf_status;
  size_t bw;


  if (!SetEvent(DelThreadRunning))
    userlog("SetEvent Error on initDeliveryThread(%d)\n",
thread_number);
  else {

    userlog("Delivery Thread %d is created\n", thread_number);

    while (!DeliveryThreadstop) {
      queue_info = NULL;
      while (!DeliveryThreadstop && queue_info == NULL) {
        queue_info=DequeueDel();
        if (queue_info == NULL) {
          if (WaitForSingleObject(waitDelWork, INFINITE) !=
WAIT_OBJECT_0) {
            userlog("Error on WaitForSingleObject(waitDelQueueWork)
in initDeliveryThread\n");
            endDeliveryThread(thread_number);
            return;
          }
        }
      }

      if (!DeliveryThreadstop) {
        (void)mod_tpcc_delivery(queue_info->pdata, thread_number);

  buf_status=bufwrite(&queue_info,sizeof(pDelQueue_info),&bw,INFINI
TE,deliveryoutput);
        if (BUF_SUCCESS != buf_status)
          userlog ("Error writing the delivery information to
delivery output buffer\n");

//        addFreeDelQueue(queue_info);
      }
    }
  }

  endDeliveryThread(thread_number);
}



void endDeliveryThread(int thread_number)
{
  if (!SetEvent(DelThreadRunning)) {
    userlog("SetEvent Error on endDeliveryThread(%d)\n",
thread_number);
  }
  _endthread();
}



/*****************************************************************
****************************
* Delivery Queue dequeue/enqueue
*
*****************************************************************
**************************/

DelQueue_info *DequeueDel()
{
  DelQueue_info *ptr;

  if (DelQueue_begin == NULL) return NULL;

  EnterCriticalSection(&critical_DelQueue_work);

  if (DelQueue_begin == NULL) {
    LeaveCriticalSection(&critical_DelQueue_work);
    return NULL;
  }

  if (DelQueue_begin == DelQueue_end) {
    ptr = DelQueue_begin;
    DelQueue_begin = DelQueue_end = NULL;
  }
  else {
    ptr = DelQueue_begin;
    DelQueue_begin = DelQueue_begin->Next;
  }

  LeaveCriticalSection(&critical_DelQueue_work);

  return ptr;
}



void EnqueueDel(DelQueue_info *queue_info)
{
  EnterCriticalSection(&critical_DelQueue_work);
  if (DelQueue_begin == NULL)
    DelQueue_begin=DelQueue_end=queue_info;
  else {
    DelQueue_end->Next = queue_info;
    queue_info->Next = NULL;
    DelQueue_end = queue_info;
  }

  LeaveCriticalSection(&critical_DelQueue_work);
}



void addFreeDelQueue(DelQueue_info *ptr)
{
  EnterCriticalSection(&critical_DelQueue_free);

  if (DelQueue_free==NULL) {
    DelQueue_free = ptr;
    ptr->Next = NULL;
  }
  else {
    ptr->Next = DelQueue_free;
    DelQueue_free = ptr;
  }
#ifdef DEBUG
  useddel--;
  if (useddel != 0 && useddel % 300 == 0)
    userlog("free a del queue: current: %d\n", useddel);
#endif
  LeaveCriticalSection(&critical_DelQueue_free);
  if (!SetEvent(waitAvailableDelQueue))
    userlog("SetEvent Error on addFreeDelQueue\n");
}



DelQueue_info *findFreeDelQueue()
{
  DelQueue_info *ptr=NULL;

  EnterCriticalSection(&critical_DelQueue_free);

  while (ptr==NULL) {
    if (DelQueue_free==NULL) {
      LeaveCriticalSection(&critical_DelQueue_free);
      if (WaitForSingleObject(waitAvailableDelQueue, INFINITE) !=
WAIT_OBJECT_0) {
        userlog("WaitForSingleObject(waitAvailableDelQueue) in
findFreeDelQueue\n");
      }
      userlog("Delivery queue is full, sleep for 10 seconds\n");
#ifdef DEBUG
      userlog("used del queue: %d\n", useddel);
#endif
      /* sleep for 10 seconds */
      Sleep(10000);
      EnterCriticalSection(&critical_DelQueue_free);
    }
    else {
      ptr = DelQueue_free;
      DelQueue_free = DelQueue_free->Next;
#ifdef DEBUG
      useddel++;
      if (useddel % 300 == 0)
        userlog("allocate a del queue current used: %d\n",
useddel);
#endif
    }
  }

  LeaveCriticalSection(&critical_DelQueue_free);

  return ptr;
}



/*****************************************************************
****************************
* process query
*
******************************************************************
*************************/

int process_query(EXTENSION_CONTROL_BLOCK *pECB)
{
    int w_id, ld_id, form;
```

```
    char *ptr, *cmd;

    form = w_id = ld_id = 0;

    /*
       This process the request_rec http:server/tpcc
    */

    if (strlen(pECB->lpszQueryString) == 0)
    return sendform_welcome(pECB, "Welcome!");

    if (getcharvalue(pECB->lpszQueryString, '3', &ptr)) {
        form = *ptr++;
        if (get_wid_did(ptr, &w_id, &ld_id, &ptr) == FALSE) {
      return send_error_message(pECB, 0, INVALID_TERMID, "", w_id,
ld_id, 0);
        }
    } else {
        form = '\0';
    }

    if (getcharvalue(ptr, '0', &cmd) == FALSE)
        return send_error_message(pECB, 0, COMMAND_UNDEFINED, "",
w_id, ld_id, 0);

    if ((form == '\0') && !(CMD_BEGIN(cmd)))
        return send_error_message(pECB, 0,
INVALID_FORM_AND_CMD_NOT_BEGIN, "", w_id, ld_id, 0);

    if (CMD_PROCESS(cmd)) {   /* cmd = Process */

        if (form == 'N') {
      /* New Order transaction */
            return mod_neworder_query(pECB, w_id, ld_id, ptr);
        } else if (form == 'P') {
      /* Payment order transaction */
            return mod_payment_query(pECB, w_id, ld_id, ptr);
        } else if (form == 'D') {
      /* Delivery order transaction */
            return mod_delivery_query(pECB, w_id, ld_id, ptr);
        } else if (form == 'O') {
      /* Order Status order transaction */
            return mod_orderstatus_query(pECB, w_id, ld_id, ptr);
        } else if (form == 'S') {
      /* Stock Level order transaction */
            return mod_stocklevel_query(pECB, w_id, ld_id, ptr);
        } else
      return send_error_message(pECB, 0, INVALID_FORM, "", w_id,
ld_id, 0);
  }
  else if (CMD_BEGIN(cmd))     return mod_begin_cmd(pECB);
  else if (CMD_NEWORDER(cmd))    return mod_neworder_cmd(pECB,
w_id, ld_id);
  else if (CMD_PAYMENT(cmd))     return mod_payment_cmd(pECB, w_id,
ld_id);
    else if (CMD_DELIVERY(cmd))    return mod_delivery_cmd(pECB,
w_id, ld_id);
    else if (CMD_ORDERSTATUS(cmd)) return mod_orderstatus_cmd(pECB,
w_id, ld_id);
    else if (CMD_STOCKLEVEL(cmd))  return mod_stocklevel_cmd(pECB,
w_id, ld_id);
    else if (CMD_EXIT(cmd))        return mod_exit_cmd(pECB);
    else if (CMD_MENU(cmd))        return mod_menu_cmd(pECB, w_id,
ld_id);
  else
      return send_error_message(pECB, 0, COMMAND_UNDEFINED, "",
w_id, ld_id, 0);

    return TRUE;
}



int getcharvalue(char *iptr, char key, char **optr)
{
    *optr = iptr;

    while (iptr) {
       if ((key == *iptr) && ('=' == *++iptr)) {
           *optr = ++iptr;
           return TRUE;
       }
       while (iptr) {
           if ('&' == *iptr) {
              iptr++; break;
          }
          iptr++;
       }
    }
    return FALSE;
}



void readInit(char *output, char *parameter, char *default_value)
{
  if (_access(InitFile, 0x00) != NULL) {
    userlog("Cannot access init file: %s\n", InitFile);
    strcpy(output, default_value);
  }
  else
```

```
      GetPrivateProfileString("TPCC", parameter, default_value,
output, MAXLEN, InitFile);
}


void allocateMemoryPool()
{
  userlog("Allocate Memory Pool\n");
  allocate_template_pool();
  allocate_response_pool();
  allocate_transaction_pool();
}


void allocate_response_pool()
{
   int i;


InitializeCriticalSection(&(resp_global_pool.form_template_spinlock
));
   resp_global_pool.form_template_length = BUF_SIZE;
   resp_global_pool.form_template_size =
resp_global_pool.form_template_length * Maxterms;
   resp_global_pool.form_template_storage = (char
*)malloc(resp_global_pool.form_template_size);
   resp_global_pool.free_slot = 0;
   resp_global_pool.free_list = (int *)malloc((Maxterms - 1) *
sizeof(int));
   for (i = 0; i < (Maxterms - 2); i++) {
       resp_global_pool.free_list[i] = i + 1;
   }
   resp_global_pool.free_list[Maxterms - 2] = -1;
}



void make_txn_form_template(char *input_form, char
*input_form_template,
     char *response_form, char *response_form_template, int
txn_type)
{
     int length;
     /*
         For input form.
      */
     length = sprintf(input_form, FormHeader, mod_name);
     length = build_form_index(input_form, input_form_template,
                    form_index[POOL_TYPE_TXN_INPUT][txn_type],
length);
     length = (length + 16) & (~((int)7));

txn_global_pool[POOL_TYPE_TXN_INPUT][txn_type].form_template_length
= length;

     /*
         For output form.
      */
     length = sprintf(response_form, FormHeader, mod_name);
     length = build_form_index(response_form,
response_form_template,
                    form_index[POOL_TYPE_TXN_OUTPUT][txn_type],
length);
     length = (length + 128) & (~((int)7));

txn_global_pool[POOL_TYPE_TXN_OUTPUT][txn_type].form_template_lengt
h = length + 100;
     return;
}



int build_form_index(char *form, char *form_template,
                     form_index_entry *f_index, int length)
{
    int current_index = 0;
    int i = 0;
    int j = 0;
    int current_length = length;

    while (form_template[i]) {
       if (form_template[i] != '#') {
           form[current_length] = form_template[i];
           i++; current_length++;
       } else {
           j = 0;
           f_index->index = current_length;
           while (form_template[i] == '#') {
              j++;
              form[current_length] = form_template[i];
              i++; current_length++;
           }
           f_index->length = j;
           f_index++; current_index++;
       }
    }
    form[current_length] = '\0'; current_length++;
    return current_length;
}
```

```

void allocate_template_pool()
{
#define FORM_PAD 64
#define GPOOL txn_global_pool[i_type][i_pool]

   char DeliveryInput[sizeof(DeliveryFormInput_Template)+FORM_PAD];
   char
OrderStatusInput[sizeof(OrderStatusInput_Template)+FORM_PAD];
   char PaymentInput[sizeof(PaymentInput_Template)+FORM_PAD];
   char NewOrderInput[sizeof(NewOrderInput_Template)+FORM_PAD];
   char StockLevelInput[sizeof(StockLevelInput_Template)+FORM_PAD];

   char
DeliveryOutput[sizeof(DeliveryFormOutput_Template)+FORM_PAD];
   char
OrderStatusOutput[sizeof(OrderStatusOutput_Template)+FORM_PAD];
   char PaymentOutput[sizeof(PaymentOutput_Template)+FORM_PAD];
   char NewOrderOutput[sizeof(NewOrderOutput_Template)+FORM_PAD];
   char
StockLevelOutput[sizeof(StockLevelOutput_Template)+FORM_PAD];
   int  i_type, i_pool, i;

   make_txn_form_template(DeliveryInput,
DeliveryFormInput_Template,
       DeliveryOutput, DeliveryFormOutput_Template,
TXN_TYPE_DELIVERY);

   make_txn_form_template(OrderStatusInput,
OrderStatusInput_Template,
       OrderStatusOutput, OrderStatusOutput_Template,
TXN_TYPE_ORDERSTATUS);

   make_txn_form_template(PaymentInput, PaymentInput_Template,
       PaymentOutput, PaymentOutput_Template, TXN_TYPE_PAYMENT);

   make_txn_form_template(NewOrderInput, NewOrderInput_Template,
       NewOrderOutput, NewOrderOutput_Template, TXN_TYPE_NEWORDER);

   make_txn_form_template(StockLevelInput,
StockLevelInput_Template,
       StockLevelOutput, StockLevelOutput_Template,
TXN_TYPE_STOCKLEVEL);

   for (i_type = 0; i_type < POOL_TYPE_TXN_MAX; i_type++) {
       for (i_pool = 0; i_pool < TXN_TYPE_MAX; i_pool++) {
          int  i, form_length;
      InitializeCriticalSection(&(GPOOL.form_template_spinlock));

          GPOOL.form_template_size = Maxterms;
          GPOOL.form_template_storage = (char *)malloc(Maxterms *
GPOOL.form_template_length);
          GPOOL.free_list = (int *)malloc((Maxterms - 1)*
sizeof(int));

          GPOOL.free_slot = 0;
          form_length = GPOOL.form_template_length;

          for (i = 0; i < (Maxterms - 2); i++) {
             GPOOL.free_list[i] = i+1;
          }
          GPOOL.free_list[Maxterms-2] = -1;
       }
   }

   i_type = POOL_TYPE_TXN_INPUT; i_pool = TXN_TYPE_DELIVERY;
   strcpy((char *)(GPOOL.form_template_storage),
          DeliveryInput);

   i_type = POOL_TYPE_TXN_OUTPUT; i_pool = TXN_TYPE_DELIVERY;
   strcpy((char *)(GPOOL.form_template_storage),
          DeliveryOutput);

   i_type = POOL_TYPE_TXN_INPUT; i_pool = TXN_TYPE_STOCKLEVEL;
   strcpy((char *)(GPOOL.form_template_storage),
          StockLevelInput);

   i_type = POOL_TYPE_TXN_OUTPUT; i_pool = TXN_TYPE_STOCKLEVEL;
   strcpy((char *)(GPOOL.form_template_storage),
          StockLevelOutput);

   i_type = POOL_TYPE_TXN_INPUT; i_pool = TXN_TYPE_NEWORDER;
   strcpy((char *)(GPOOL.form_template_storage),
          NewOrderInput);

   i_type = POOL_TYPE_TXN_OUTPUT; i_pool = TXN_TYPE_NEWORDER;
   strcpy((char *)(GPOOL.form_template_storage),
          NewOrderOutput);

   i_type = POOL_TYPE_TXN_INPUT; i_pool = TXN_TYPE_ORDERSTATUS;
   strcpy((char *)(GPOOL.form_template_storage),
          OrderStatusInput);

   i_type = POOL_TYPE_TXN_OUTPUT; i_pool = TXN_TYPE_ORDERSTATUS;
   strcpy((char *)(GPOOL.form_template_storage),
          OrderStatusOutput);

   i_type = POOL_TYPE_TXN_INPUT; i_pool = TXN_TYPE_PAYMENT;
   strcpy((char *)(GPOOL.form_template_storage),
          PaymentInput);
   i_type = POOL_TYPE_TXN_OUTPUT; i_pool = TXN_TYPE_PAYMENT;
   strcpy((char *)(GPOOL.form_template_storage),
          PaymentOutput);

   for (i_type = 0; i_type < POOL_TYPE_TXN_MAX; i_type++) {
       for (i_pool = 0; i_pool < TXN_TYPE_MAX; i_pool++) {
           for (i = 1; i < GPOOL.form_template_size; i++) {
              memcpy((char *)(GPOOL.form_template_storage + i *
GPOOL.form_template_length),
                  (char *)(GPOOL.form_template_storage),
                  GPOOL.form_template_length);
           }
       }
   }

#undef FORM_PAD
#undef GPOOL
}



void allocate_transaction_pool()
{
   int i, pool_size;

   pool_size = 0;
   pool_size = MAX(pool_size, sizeof(T_connect_data));
   pool_size = MAX(pool_size, sizeof(T_delivery_data));
   pool_size = MAX(pool_size, sizeof(T_neworder_data));
   pool_size = MAX(pool_size, sizeof(T_stocklevel_data));
   pool_size = MAX(pool_size, sizeof(T_orderstatus_data));
   pool_size = MAX(pool_size, sizeof(T_payment_data));
   pool_size = MAX(pool_size, sizeof(T_login_data));


InitializeCriticalSection(&(txn_data_pool.form_template_spinlock));
   txn_data_pool.form_template_length = pool_size;
   txn_data_pool.form_template_size =
txn_data_pool.form_template_length * Maxterms;
   txn_data_pool.form_template_storage = (char
*)malloc(txn_data_pool.form_template_size);
   txn_data_pool.free_slot = 0;
   txn_data_pool.free_list = (int *)malloc((Maxterms - 1) *
sizeof(int));
   for (i = 0; i < (Maxterms - 2); i++) {
       txn_data_pool.free_list[i] = i + 1;
   }
   txn_data_pool.free_list[Maxterms - 2] = -1;
}



/*
   This processes the form that provides the w_id and d_id of a
terminal.
*/
int mod_begin_cmd(EXTENSION_CONTROL_BLOCK *pECB)
{
   char *ptr;
   int  w_id, ld_id;

   if ((getcharvalue(pECB->lpszQueryString, '4', &ptr) == FALSE) ||
((w_id = atoi(ptr)) <= 0))
       return sendform_welcome(pECB, "Error: Invalid Warehouse
ID");

   if ((getcharvalue(ptr, '5', &ptr) == FALSE) || ((ld_id =
atoi(ptr)) <= 0) ||  (ld_id > 10))
       return sendform_welcome(pECB, "Error: Invalid District
DID");

   /*
      Perform activities related to database logon etc.
   */

   return sendform_mainmenu(pECB, w_id, ld_id);
}


int mod_exit_cmd(EXTENSION_CONTROL_BLOCK *pECB)
{
   return sendform_welcome(pECB, "Goodbye!");
}


int mod_menu_cmd(EXTENSION_CONTROL_BLOCK *pECB, int w_id, int
ld_id)
{
  return sendform_mainmenu(pECB, w_id, ld_id);
}



int get_wid_did(char *ptr, int *wid, int *did, char **optr)
{
    int total = 0;
    int c, pc;
    int provided = FALSE;
```

```
    *wid = *did = 0;
    *optr = ptr;
    pc = (int)(unsigned char) *ptr++;
    if ((pc < '0') || (pc > '9'))
       return FALSE;
    c = (int)(unsigned char) *ptr++;
    while ((c >= '0') && (c <= '9')) {
       total = 10 * total + (pc - '0');
       pc = c;
       c = (int)(unsigned char) *ptr++;
       provided = TRUE;
    }
    if (provided) {
       *wid = total;
       *did = (int) (pc - '0') + 1;
       *optr = ptr;
       return TRUE;
    }
    return FALSE;
}



int sendform_welcome(EXTENSION_CONTROL_BLOCK *pECB, char *mesg)
{
   char *response;
   int index = -1, ret;

   response = allocate_form(&resp_global_pool, &index);
   sprintf(response, WelcomeForm, mod_name, mesg);
   ret=send_response(pECB, response, strlen(response));
   free_form(&resp_global_pool, response, index);
   return ret;
}



int send_response(EXTENSION_CONTROL_BLOCK *pECB, char *form, int
size)
{
   HSE_SEND_HEADER_EX_INFO info = { 0 };
   char szHeader[256];
   DWORD nOut=size;
   DWORD nHeader = sprintf(szHeader, "Content-Type: text/html\n"
"Content-Length: %d\n" "charset= ISO-8859-1\n\n" , size);

   info.pszStatus = "200 OK";
   info.cchStatus = strlen(info.pszStatus);
   info.pszHeader = szHeader;
   info.cchHeader = nHeader;
   info.fKeepConn = true;

   if (!pECB->ServerSupportFunction(pECB->ConnID,
HSE_REQ_SEND_RESPONSE_HEADER_EX, &info, 0, 0))
   {
     userlog("ServerSupportFunction() returns false");
     return FALSE;
   }


   if (!pECB->WriteClient(pECB->ConnID, form, &nOut, HSE_IO_SYNC))
   {
     userlog("WriteClient returns false");
     return FALSE;
   }

/*
char temp[1000];
strncpy(temp,form,size);
temp[strlen(temp)]='\0';
userlog("send: from >>>%s<<<\n",temp);
*/

   return TRUE;

}


char *allocate_form_new(form_template_pool *pool, int index)
{
  int pool_index=index-StartTerm;
  if (pool_index <= Maxterms)
    return (char *)(pool->form_template_storage + pool_index *
pool->form_template_length);
  else
    userlog("allocate_form_new failed max_threads = %d", Maxterms);
  return (char *)0;
}


char *allocate_form(form_template_pool *pool, int *pool_index)
{
   int current;

   EnterCriticalSection(&(pool->form_template_spinlock));
   current = pool->free_slot;
   if (current >= 0) {
      pool->free_slot = pool->free_list[current];
      LeaveCriticalSection(&(pool->form_template_spinlock));
      *pool_index = current;
      return (char *)(pool->form_template_storage + current * pool-
>form_template_length);
   }
   LeaveCriticalSection(&(pool->form_template_spinlock));
   userlog("allocate_form failed max_threads = %d", Maxterms);
   *pool_index = -1;
   return (char *)0;
}


void free_form(form_template_pool *pool, char *form_template, int
pool_index)
{
   if (! form_template || pool_index < 0 ) return;

   EnterCriticalSection(&(pool->form_template_spinlock));
   pool->free_list[pool_index] = pool->free_slot;
   pool->free_slot = pool_index;
   LeaveCriticalSection(&(pool->form_template_spinlock));
}


int send_error_message(EXTENSION_CONTROL_BLOCK *pECB, int
error_type, int error,
                       char *error_msg, int w_id, int ld_id, void
*context)
{
   char *response;
   char *mesg = "";
   int index = -1, ret;
   T_error_message *err = error_message;

   while (err->error_code) {
       if (err->error_code == error) {
           mesg = err->error_mesg; break;
       }
       err++;
   }
   response = allocate_form(&resp_global_pool, &index);
   sprintf(response, ErrorForm, mod_name, WDID(w_id, ld_id),
error_type, error, mesg, error_msg);
   ret=send_response(pECB, response, strlen(response));
   free_form(&resp_global_pool, response, index);
   return ret;
}



int sendform_mainmenu(EXTENSION_CONTROL_BLOCK *pECB, int w_id, int
ld_id)
{
   char *response;
   int index = -1, ret;

   response = allocate_form(&resp_global_pool, &index);
   sprintf(response, MainForm, mod_name, WDID(w_id, ld_id), "");
   ret=send_response(pECB, response, strlen(response));
   free_form(&resp_global_pool, response, index);
   return ret;
}



int sendform_neworderinput(EXTENSION_CONTROL_BLOCK *pECB, int w_id,
int ld_id)
{
   char *form;
   int index = w_id*10+ld_id, ret;
   form_template_pool *pool;
#define SUBI POOL_TYPE_TXN_INPUT][TXN_TYPE_NEWORDER

   pool = &txn_global_pool[SUBI];

#ifdef NEW_ALLOCATE_FORM
   form  = allocate_form_new(pool, index);
#else
   form  = allocate_form(pool, &index);
#endif

   fill_number(form, WDID(w_id, ld_id),
form_index[SUBI][NO_TERMID].index,
               form_index[SUBI][NO_TERMID].length);
   fill_number(form, w_id, form_index[SUBI][NO_WID].index,
               form_index[SUBI][NO_WID].length);
   ret=send_response(pECB, form, strlen(form));

#ifndef NEW_ALLOCATE_FORM
  free_form(pool, form, index);
#endif

   return ret;
#undef SUBI
}



int sendform_deliveryinput(EXTENSION_CONTROL_BLOCK *pECB, int w_id,
int ld_id)
{
   char *form;
   int index = w_id*10+ld_id, ret;
   form_template_pool *pool;
#define SUBI POOL_TYPE_TXN_INPUT][TXN_TYPE_DELIVERY

   pool = &txn_global_pool[SUBI];

#ifdef NEW_ALLOCATE_FORM
   form  = allocate_form_new(pool, index);
#else
   form  = allocate_form(pool, &index);
#endif

   fill_number(form, WDID(w_id, ld_id),
form_index[SUBI][DE_TERMID].index,
               form_index[SUBI][DE_TERMID].length);
   fill_number(form, w_id, form_index[SUBI][DE_WID].index,
               form_index[SUBI][DE_WID].length);
   ret=send_response(pECB, form, strlen(form));

#ifndef NEW_ALLOCATE_FORM
   free_form(pool, form, index);
#endif

   return ret;
#undef SUBI
}



int sendform_stocklevelinput(EXTENSION_CONTROL_BLOCK *pECB, int
w_id, int ld_id)
{
   char *form;
   int index = w_id*10+ld_id, ret;
   form_template_pool *pool;
#define SUBI POOL_TYPE_TXN_INPUT][TXN_TYPE_STOCKLEVEL

   pool = &txn_global_pool[SUBI];

#ifdef NEW_ALLOCATE_FORM
   form  = allocate_form_new(pool, index);
#else
   form  = allocate_form(pool, &index);
#endif

   fill_number(form, WDID(w_id, ld_id),
form_index[SUBI][SL_TERMID].index,
               form_index[SUBI][SL_TERMID].length);
   fill_number(form, w_id, form_index[SUBI][SL_WID].index,
               form_index[SUBI][SL_WID].length);
   fill_number(form, ld_id, form_index[SUBI][SL_DID].index,
               form_index[SUBI][SL_DID].length);
   ret=send_response(pECB, form, strlen(form));

#ifndef NEW_ALLOCATE_FORM
   free_form(pool, form, index);
#endif

   return ret;
#undef SUBI
}



int sendform_paymentinput(EXTENSION_CONTROL_BLOCK *pECB, int w_id,
int ld_id)
{
   char *form;
   int index = w_id*10+ld_id, ret;
   form_template_pool *pool;
#define SUBI POOL_TYPE_TXN_INPUT][TXN_TYPE_PAYMENT

   pool = &txn_global_pool[SUBI];

#ifdef NEW_ALLOCATE_FORM
   form  = allocate_form_new(pool, index);
#else
   form  = allocate_form(pool, &index);
#endif

   fill_number(form, WDID(w_id, ld_id),
form_index[SUBI][PA_INPUT_TERMID].index,
               form_index[SUBI][PA_INPUT_TERMID].length);
   fill_number(form, w_id, form_index[SUBI][PA_INPUT_WID].index,
               form_index[SUBI][PA_INPUT_WID].length);
   ret=send_response(pECB, form, strlen(form));

#ifndef NEW_ALLOCATE_FORM
   free_form(pool, form, index);
#endif

   return ret;
#undef SUBI
}

int sendform_orderstatusinput(EXTENSION_CONTROL_BLOCK *pECB, int
w_id, int ld_id)
{
   char *form;
   int index = w_id*10+ld_id, ret;
   form_template_pool *pool;
```

```
#define SUBI POOL_TYPE_TXN_INPUT][TXN_TYPE_ORDERSTATUS

   pool = &txn_global_pool[SUBI];

#ifdef NEW_ALLOCATE_FORM
   form  = allocate_form_new(pool, index);
#else
   form  = allocate_form(pool, &index);
#endif

   fill_number(form, WDID(w_id, ld_id),
form_index[SUBI][OS_TERMID].index,
               form_index[SUBI][OS_TERMID].length);
   fill_number(form, w_id, form_index[SUBI][OS_WID].index,
               form_index[SUBI][OS_WID].length);
   ret=send_response(pECB, form, strlen(form));

#ifndef NEW_ALLOCATE_FORM
   free_form(pool, form, index);
#endif

   return ret;
#undef SUBI
}



void fill_string(char *form, char *string, int index, int length,
int *shift)
{
  char *ptr;
  int i;

  for (i=0, ptr=string; i<length && (*ptr)!='\0'; i++, ptr++) {
    form[index+i]=(char)(*ptr);
    switch (*ptr) {
      case '\"' : (*shift)+=5;
                  break;
      case '&'  : (*shift)+=4;
                  break;
      case '>'  : (*shift)+=3;
                  break;
      case '<'  : (*shift)+=3;
                  break;
    }
  }

  for (; i<length; i++)
    form[index+i]=' ';
}

void adjust_form(char *form, int *indexes, int *length, int size,
int formlen, int totalshift)
{
  int ptr, ptr2, ind;

  for (ptr=formlen, ptr2=formlen+totalshift, ind=size-1; ptr>=0;
ptr--) {
    if (ind>=0 && ptr<indexes[ind])
      ind--;
    if (ind<0 || ptr>=indexes[ind]+length[ind])
      form[ptr2--]=form[ptr];
    else if (ptr>=indexes[ind] && ptr<indexes[ind]+length[ind])
      switch (form[ptr]) {
        case '\"' : form[ptr2--]=';'; form[ptr2--]='t'; form[ptr2--
]='o';
                    form[ptr2--]='u'; form[ptr2--]='q'; form[ptr2--
]='&';
                    break;
        case '&'  : form[ptr2--]=';'; form[ptr2--]='p'; form[ptr2--
]='m';
                    form[ptr2--]='a'; form[ptr2--]='&';
                    break;
        case '>'  : form[ptr2--]=';'; form[ptr2--]='t';
                    form[ptr2--]='l'; form[ptr2--]='&';
                    break;
        case '<'  : form[ptr2--]=';'; form[ptr2--]='t';
                    form[ptr2--]='g'; form[ptr2--]='&';
                    break;
        default : form[ptr2--]=form[ptr];
                  break;
      }
  }
}

void fill_float(char *form, double value, int index, int length)
{
  int ptr = index + length - 1, DecPtr = ptr - 2;
  int avalue=abs((int)(value*100.0));
  int is_neg=(value<0.0);
  char asterick[] = "*******************";

  if (avalue==0)
    form[ptr--]='0';

  while ((avalue!=0 && ptr>=index) || ptr > DecPtr) {
    form[ptr--]='0' + avalue % 10;
    avalue/=10;
    if (ptr == DecPtr)
      form[ptr--]='.';
  }
  if (ptr < index && (is_neg || avalue!=0 ))
    memcpy(form+index, asterick, length);
  else {
    if (is_neg)
      form[ptr--]='-';
    while (ptr>=index)
      form[ptr--]=' ';
  }
}

void fill_number(char *form, int value, int index, int length)
{
   char *pstart = (char *)form + index;
   char *pend = pstart + length - 1;
   char asterick[] = "*******************";
   int  slen = length;
   int  is_neg, avalue;

   is_neg = (value < 0);
   avalue = abs(value);

   do {
     *pend = (avalue % 10) + '0';
     avalue = avalue / 10;
     if (--length) pend--;
   } while (length);
/*
   if (avalue==0 && length >0) {
     do {
       *pend=' ';
       if (--length) pend--;
     } while (length);
   }
*/
   if (avalue) {
      memcpy(pstart, asterick, slen);
      return;
   }

   if (is_neg) {
     if (*pend == '0') {
        *pend = '-';
     } else {
        memcpy(pstart, asterick, slen);
        return;
     }
   }
}

int parse_query_string(char *iptr, int max_cnt,
                       char *txn_chars, value_index_entry
*txn_vals)
{
   char *ptr = iptr;
   int  key, i;

   for (i = 0; i < max_cnt; i++) {
       key = txn_chars[i];
       txn_vals[i].value = NULL;
       txn_vals[i].length = 0;
       if ((key == *ptr) && ('=' == *++ptr)) {
          txn_vals[i].value = ++ptr;
       }
       while (ptr && ptr[0]!='\0') {
          if ('&' == *ptr) {
             ptr++; break;
          }
          ptr++; txn_vals[i].length++;
       }
   }

   return TRUE;
}

int get_number(char *ptr, int *value)
{
   int c, total;
   int has_value = FALSE;
   int is_neg = FALSE;

   if (*ptr == '-') {
       is_neg = TRUE; ptr++;
   }
   c = (int) (unsigned char) *ptr++;

   total = 0;
   while (( c >= '0') && (c <= '9')) {
       total = 10 * total + (c - '0');
       c = (int) (unsigned char) *ptr++;
       has_value = TRUE;
   }
   if ((c == '\0') || (('&' == c) && has_value)) {
       *value = is_neg?(0-total):total;
       return TRUE;
   }
   *value = 0;
   return FALSE;
}
```

```
/******************************************************************
***************************
* mod transaction output
*
*******************************************************************
**************************/

int mod_neworder_query(EXTENSION_CONTROL_BLOCK *pECB, int w_id, int
ld_id, char *ptr)
{
   T_neworder_data *pdata;
   int index = w_id*10+ld_id, ret;
   int status = SUCCESS;

#ifdef NEW_ALLOCATE_FORM
   pdata = (T_neworder_data *)allocate_form_new(&txn_data_pool,
index);
#else
   pdata = (T_neworder_data *)allocate_form(&txn_data_pool,
&index);
#endif

   pdata->w_id = w_id; pdata->ld_id = ld_id; pdata->context = (void
*)pECB;

   status = parse_neworder_query(ptr, pdata);
   if (status != SUCCESS) {
      ret=send_error_message(pECB, 0, status, "", w_id, ld_id, 0);

#ifndef NEW_ALLOCATE_FORM
      free_form(&txn_data_pool, (char *) pdata, index);
#endif

      return ret;
   }

   status = mod_tpcc_neworder(pdata);
   ret=sendform_neworderoutput(status, pdata);

#ifndef NEW_ALLOCATE_FORM
   free_form(&txn_data_pool, (char *) pdata, index);
#endif

   return ret;
}



int mod_delivery_query(EXTENSION_CONTROL_BLOCK *pECB, int w_id, int
ld_id, char *ptr)
{
   DelQueue_info *queue_info;
   int index=-1, ret;
   int status = SUCCESS;
   int ii, buf_status;
   size_t br;
   pDelQueue_info CompletedDeliveries[DELIVERY_RESPONSE_COUNT];


   queue_info = findFreeDelQueue();
   queue_info->pdata->w_id = w_id;
   queue_info->pdata->ld_id = ld_id;
   queue_info->pdata->context = (void *)pECB;

   status = parse_delivery_query(ptr, queue_info->pdata);
   if (status != SUCCESS) {
      ret=send_error_message(pECB, 0, status, "", w_id, ld_id, 0);
      return ret;
   }

   EnqueueDel(queue_info);
   for (ii=0;ii<DELIVERY_RESPONSE_COUNT;ii++) {

buf_status=bufread(&CompletedDeliveries[ii],sizeof(pDelQueue_info),
&br,0,deliveryoutput);
     if (BUF_READTIMEOUT == buf_status)
       CompletedDeliveries[ii]=NULL;
     else if (BUF_SUCCESS != buf_status)
       userlog ("Error reading delivery response buffer:
%d\n",status);
   }
   if (!SetEvent(waitDelWork)) {
     userlog("Error on SetEvent(waitDelWork)\n");
     ret=sendform_deliveryoutput(status, queue_info->pdata,
CompletedDeliveries);
     ret=FALSE;
   }
   else ret=sendform_deliveryoutput(status, queue_info->pdata,
CompletedDeliveries);
   return ret;
}



int mod_payment_query(EXTENSION_CONTROL_BLOCK *pECB, int w_id, int
ld_id, char *ptr)
{
   T_payment_data *pdata;
   int index = w_id*10+ld_id, ret;
   int status = SUCCESS;
```

```
#ifdef NEW_ALLOCATE_FORM
   pdata = (T_payment_data *)allocate_form_new(&txn_data_pool,
index);
#else
   pdata = (T_payment_data *)allocate_form(&txn_data_pool, &index);
#endif

   pdata->w_id = w_id; pdata->ld_id = ld_id; pdata->context = (void
*)pECB;

   status = parse_payment_query(ptr, pdata);
   if (status != SUCCESS) {
      ret=send_error_message(pECB, 0, status, "", w_id, ld_id, 0);

#ifndef NEW_ALLOCATE_FORM
      free_form(&txn_data_pool, (char *) pdata, index);
#endif

      return ret;
   }

   status = mod_tpcc_payment(pdata);
   ret=sendform_paymentoutput(status, pdata);

#ifndef NEW_ALLOCATE_FORM
   free_form(&txn_data_pool, (char *) pdata, index);
#endif

   return ret;
}


int mod_orderstatus_query(EXTENSION_CONTROL_BLOCK *pECB, int w_id,
int ld_id, char *ptr)
{
   T_orderstatus_data *pdata;
   int index = w_id*10+ld_id, ret;
   int status = SUCCESS;

#ifdef NEW_ALLOCATE_FORM
   pdata = (T_orderstatus_data *)allocate_form_new(&txn_data_pool,
index);
#else
   pdata = (T_orderstatus_data *)allocate_form(&txn_data_pool,
&index);
#endif

   pdata->w_id = w_id; pdata->ld_id = ld_id; pdata->context = (void
*)pECB;

   status = parse_orderstatus_query(ptr, pdata);
   if (status != SUCCESS) {
      ret=send_error_message(pECB, 0, status, "", w_id, ld_id, 0);

#ifndef NEW_ALLOCATE_FORM
      free_form(&txn_data_pool, (char *) pdata, index);
#endif

      return ret;
   }

   status = mod_tpcc_orderstatus(pdata);
   ret=sendform_orderstatusoutput(status, pdata);

#ifndef NEW_ALLOCATE_FORM
   free_form(&txn_data_pool, (char *) pdata, index);
#endif

   return ret;
}


int mod_stocklevel_query(EXTENSION_CONTROL_BLOCK *pECB, int w_id,
int ld_id, char *ptr)
{
   T_stocklevel_data *pdata;
   int index = w_id*10+ld_id, ret;
   int status = SUCCESS;

#ifdef NEW_ALLOCATE_FORM
   pdata = (T_stocklevel_data *)allocate_form_new(&txn_data_pool,
index);
#else
   pdata = (T_stocklevel_data *)allocate_form(&txn_data_pool,
&index);
#endif

   pdata->w_id = w_id; pdata->ld_id = ld_id; pdata->context = (void
*)pECB;

   status =  parse_stocklevel_query(ptr, pdata);
   if (status != SUCCESS) {
      ret=send_error_message(pECB, 0, status, "", w_id, ld_id, 0);

#ifndef NEW_ALLOCATE_FORM
      free_form(&txn_data_pool, (char *) pdata, index);
#endif

      return ret;
   }
   status = mod_tpcc_stocklevel(pdata);

   ret=sendform_stockleveloutput(status, pdata);

#ifndef NEW_ALLOCATE_FORM
   free_form(&txn_data_pool, (char *) pdata, index);
#endif

   return ret;
}


/*******************************************************************
****************************
* parse transaction query
*
*******************************************************************
**************************/

int parse_neworder_query(char *iptr, T_neworder_data *pdata)
{
   int status, i, items;
   value_index_entry value_ptr[NO_INPUT_MAX];
   char *ptr;

   status = parse_query_string(iptr, NO_INPUT_MAX, neworder_chars,
value_ptr);

   if ((ptr = value_ptr[NO_INPUT_DID].value) == NULL) {
       return NEWORDER_MISSING_DID;
   }
   if ((status = get_number(ptr, &pdata->d_id)) == FALSE) {
       return NEWORDER_DISTRICT_INVALID;
   }
   if ((pdata->d_id > 10) || (pdata->d_id < 1)) {
       return NEWORDER_DISTRICT_RANGE;
   }

   if ((ptr = value_ptr[NO_INPUT_CID].value) == NULL) {
       return NEWORDER_CUSTOMER_KEY;
   }
   if ((status = get_number(ptr, &pdata->c_id)) == FALSE) {
       return NEWORDER_CUSTOMER_INVALID;
   }
   if ((pdata->c_id > 3000) || (pdata->c_id <= 0)) {
       return NEWORDER_CUSTOMER_RANGE;
   }

   pdata->o_all_local = 1;

   for (i = 0, items = 0; i < 15; i++) {
       if ((ptr = value_ptr[i*3 + NO_INPUT_IID00].value) == NULL) {
           return NEWORDER_MISSING_IID_KEY;
       }
       if (value_ptr[i*3 + NO_INPUT_IID00].length > 0) {
           if ((status = get_number(ptr, &pdata-
>o_orderline[items].ol_i_id)) == FALSE) {
              return NEWORDER_ITEMID_INVALID;
           }
           if ((ptr = value_ptr[i*3 + NO_INPUT_SPW00].value) ==
NULL) {
               return NEWORDER_MISSING_SUPPW_KEY;
           }
           if ((status = get_number(ptr, &pdata-
>o_orderline[items].ol_supply_w_id)) == FALSE) {
              return NEWORDER_SUPPW_INVALID;
           }
           if ((ptr = value_ptr[i*3 + NO_INPUT_QTY00].value) ==
NULL) {
               return NEWORDER_MISSING_QTY_KEY;
           }
           if ((status = get_number(ptr, &pdata-
>o_orderline[items].ol_quantity)) == FALSE) {
              return NEWORDER_QTY_INVALID;
           }
           /*
              We use item number 111111 as the bad one.
           */
           if ((pdata->o_orderline[items].ol_i_id > 999999) ||
               (pdata->o_orderline[items].ol_i_id < 1)) {
              return NEWORDER_ITEMID_RANGE;
           }
           if ((pdata->o_orderline[items].ol_quantity >= 100) ||
               (pdata->o_orderline[items].ol_quantity < 1)) {
              return NEWORDER_QTY_RANGE;
           }
           if (pdata->o_all_local && pdata-
>o_orderline[items].ol_supply_w_id != pdata->w_id) {
              pdata->o_all_local = 0;
           }
           items++;
       } else {
           if (value_ptr[i*3 + NO_INPUT_SPW00].value == NULL) {
               return NEWORDER_MISSING_SUPPW_KEY;
           }
           if (value_ptr[i*3 + NO_INPUT_SPW00].length > 0) {
               return NEWORDER_SUPPW_WITHOUT_ITEMID;
           }
           if (value_ptr[i*3 + NO_INPUT_QTY00].value == NULL) {
               return NEWORDER_MISSING_QTY_KEY;
           }
           if (value_ptr[i*3 + NO_INPUT_QTY00].length > 0) {
               return NEWORDER_QTY_WITHOUT_ITEMID;
           }
       }
   }
   if (items ==  0) {
       return NEWORDER_NOITEMS_ENTERED;
   }
   pdata->o_ol_cnt = items;
   return SUCCESS;
}

int parse_payment_query(char *iptr, T_payment_data *pdata)
{
   int status, see_dot, i;
   value_index_entry value_ptr[PA_INPUT_MAX];
   char *ptr;

   status = parse_query_string(iptr, PA_INPUT_MAX, payment_chars,
value_ptr);

   if ((ptr = value_ptr[PA_INPUT_DID].value) == NULL) {
       return PAYMENT_MISSING_DID_KEY;
   }
   if ((status = get_number(ptr, &pdata->d_id)) == FALSE) {
       return PAYMENT_DISTRICT_INVALID;
   }
   if ((pdata->d_id > 10) || (pdata->d_id < 1)) {
       return PAYMENT_DISTRICT_RANGE;
   }

   if ((ptr = value_ptr[PA_INPUT_CID].value) == NULL) {
       return PAYMENT_MISSING_CID_KEY;
   }

   if (value_ptr[PA_INPUT_CID].length == 0) {           /* c_id ==
0 */
      pdata->c_id = 0;
      pdata->by_last_name = 1;
      if ((ptr = value_ptr[PA_INPUT_NAME].value) == NULL) {
          return PAYMENT_MISSING_CLASTNAME_KEY;
      }
      if (value_ptr[PA_INPUT_NAME].length == 0) {
          return PAYMENT_MISSING_CLASTNAME;
      }
      memcpy(pdata->c_last, ptr, value_ptr[PA_INPUT_NAME].length);
      pdata->c_last[value_ptr[PA_INPUT_NAME].length] = '\0';
      STRING_UPPERCASE(pdata->c_last);
      if (value_ptr[PA_INPUT_NAME].length > 16) {
          return PAYMENT_LAST_NAME_TO_LONG;
      }
   } else {                                             /* c_id !=
0 */
      pdata->by_last_name = 0;
      if ((status = get_number(ptr, &pdata->c_id)) == FALSE) {
          return PAYMENT_CUSTOMER_INVALID;
      }
      if ((pdata->c_id > 3000) || (pdata->c_id <= 0)) {
          return PAYMENT_CID_RANGE;
      }
      if ((ptr = value_ptr[PA_INPUT_NAME].value) == NULL) {
          return PAYMENT_MISSING_CLASTNAME_KEY;
      }
      if (value_ptr[PA_INPUT_NAME].length > 0) {
          return PAYMENT_CID_AND_CLASTNAME;
      }
   }

   if ((ptr = value_ptr[PA_INPUT_CDID].value) == NULL) {
       return PAYMENT_MISSING_CDI_KEY;
   }
   if ((status = get_number(ptr, &pdata->c_d_id)) == FALSE) {
       return PAYMENT_CDI_INVALID;
   }
   if ((pdata->c_d_id > 10) || (pdata->c_d_id < 1)) {
       return PAYMENT_CDI_RANGE;
   }
   if ((ptr = value_ptr[PA_INPUT_CWID].value) == NULL) {
       return PAYMENT_MISSING_CWI_KEY;
   }
   if ((status = get_number(ptr, &pdata->c_w_id)) == FALSE) {
       return PAYMENT_CWI_INVALID;
   }
   if ((ptr = value_ptr[PA_INPUT_AMT].value) == NULL) {
       return PAYMENT_MISSING_HAM_KEY;
   }

   see_dot = FALSE;

   for (i = 0; i < value_ptr[PA_INPUT_AMT].length; i++) {
       if (ptr[i] == '\0') {
          return PAYMENT_HAM_INVALID;
       }
       if (ptr[i] == '.') {
           if (see_dot) {
              return PAYMENT_HAM_INVALID;
           } else {
             see_dot = TRUE;
           }
       } else {
          if ((ptr[i] > '9') || (ptr[i] < '0')) {
             return PAYMENT_HAM_INVALID;
          }
       }
   }
   pdata->h_amount = atof(ptr);

   if ((pdata->h_amount < 0) || (pdata->h_amount >= 10000.0)) {
       return PAYMENT_HAM_RANGE;
   }
   return SUCCESS;
}

int parse_delivery_query(char *iptr, T_delivery_data *pdata)
{
   int status = SUCCESS;
   value_index_entry value_ptr[DE_INPUT_MAX];
   int i, see_dot;
   char *ptr;

   status = parse_query_string(iptr, DE_INPUT_MAX, delivery_chars,
value_ptr);

   if ((ptr = value_ptr[DE_INPUT_DID].value) == NULL) {
       return DELIVERY_MISSING_OCD_KEY;
   }
   if ((status = get_number(ptr, &pdata->o_carrier_id)) == FALSE) {
       return DELIVERY_CARRIER_INVALID;
   }
   if ((pdata->o_carrier_id > 10) || (pdata->o_carrier_id < 1)) {
       return DELIVERY_CARRIER_ID_RANGE;
   }

   if ((ptr = value_ptr[DE_INPUT_QTIME].value) == NULL) {
       time (&pdata->enqueue_time);
       return SUCCESS;
   }

   if (value_ptr[DE_INPUT_QTIME].length == 0) {
       return DELIVERY_MISSING_QUEUETIME_KEY;
   }

   see_dot = FALSE;

   for (i = 0; i < value_ptr[DE_INPUT_QTIME].length; i++) {
       if (ptr[i] == '\0') {
          return DELIVERY_MISSING_QUEUETIME_KEY;
       }
       if (ptr[i] == '.') {
           if (see_dot) {
              return DELIVERY_MISSING_QUEUETIME_KEY;
           } else {
             see_dot = TRUE;
           }
       } else {
          if ((ptr[i] > '9') || (ptr[i] < '0')) {
             return DELIVERY_MISSING_QUEUETIME_KEY;
          }
       }
   }


   return SUCCESS;
}

int parse_orderstatus_query(char *iptr, T_orderstatus_data *pdata)
{
   int status = SUCCESS;
   value_index_entry value_ptr[OS_INPUT_MAX];
   char *ptr;

   status = parse_query_string(iptr, OS_INPUT_MAX,
orderstatus_chars, value_ptr);

   if ((ptr = value_ptr[OS_INPUT_DID].value) == NULL) {
       return ORDERSTATUS_MISSING_DID_KEY;
   }
   if ((status = get_number(ptr, &pdata->d_id)) == FALSE) {
       return ORDERSTATUS_DID_INVALID;
   }
   if ((pdata->d_id > 10) || (pdata->d_id < 1)) {
       return ORDERSTATUS_DID_RANGE;
   }

   if ((ptr = value_ptr[OS_INPUT_CID].value) == NULL) {
       return ORDERSTATUS_MISSING_CID_KEY;
   }

   if (value_ptr[OS_INPUT_CID].length == 0) {
      pdata->c_id = 0;
      pdata->by_last_name = 1;
      if ((ptr = value_ptr[OS_INPUT_NAME].value) == NULL) {
          return ORDERSTATUS_MISSING_CLASTNAME_KEY;
      }
      memcpy(pdata->c_last, ptr, value_ptr[OS_INPUT_NAME].length);
      pdata->c_last[value_ptr[OS_INPUT_NAME].length] = '\0';
      STRING_UPPERCASE(pdata->c_last);
      if (value_ptr[OS_INPUT_NAME].length > 16) {
          return ORDERSTATUS_CLASTNAME_RANGE;
      }
   } else {                                             /* c_id !=
0 */
```

```
      pdata->by_last_name = 0;
      if ((status = get_number(ptr, &pdata->c_id)) == FALSE) {
          return ORDERSTATUS_CID_INVALID;
      }
      if ((pdata->c_id > 3000) || (pdata->c_id <= 0)) {
          return ORDERSTATUS_CID_RANGE;
      }
      if ((ptr = value_ptr[OS_INPUT_NAME].value) == NULL) {
          return ORDERSTATUS_MISSING_CLASTNAME_KEY;
      }
      if (value_ptr[OS_INPUT_NAME].length > 0) {
          return ORDERSTATUS_CID_AND_CLASTNAME;
      }
   }
   return SUCCESS;
}

int parse_stocklevel_query(char *iptr, T_stocklevel_data *pdata)
{

   value_index_entry value_ptr[SL_INPUT_MAX];
   char *ptr;
   int status = SUCCESS;

   status = parse_query_string(iptr, SL_INPUT_MAX,
stocklevel_chars, value_ptr);

   if ((ptr = value_ptr[SL_INPUT_THRESHOLD].value) == NULL) {
       return STOCKLEVEL_MISSING_THRESHOLD_KEY;
   }
   if ((status = get_number(ptr, &pdata->threshold)) == FALSE) {
       return STOCKLEVEL_THRESHOLD_INVALID;
   }
   if ((pdata->threshold >= 100) || (pdata->threshold < 0)) {
       return STOCKLEVEL_THRESHOLD_RANGE;
   }

   return SUCCESS;
}


/*******************************************************************
****************************
* sendform output
*
********************************************************************
***************************/

int sendform_neworderoutput(int status, T_neworder_data *pdata)
{
    EXTENSION_CONTROL_BLOCK *pECB;
    int w_id, ld_id, ret;
    char *form, *form2;
    char blank[] = "
";
    int index = -1, formlen, strcount=0, shift=0, i, j,
lineStart=15;
    int indexes[NO_FORMINDEX_SIZE], indLen[NO_FORMINDEX_SIZE],
index2=-1;
    form_template_pool *pool;

#define SUBI POOL_TYPE_TXN_OUTPUT][TXN_TYPE_NEWORDER

    w_id = pdata->w_id; ld_id = pdata->ld_id;
  pECB = (EXTENSION_CONTROL_BLOCK *) pdata->context;

    if (status != SUCCESS && status != DB_SUCCESS) {
      return send_error_message(pECB, 0, status, "", w_id, ld_id,
0);
    }

    if (pdata->txn_status != DB_RETURN_OCI_SUCCESS) {
    return send_error_message(pECB, 0, pdata->txn_status, "   ---
DATABASE ERROR ", w_id, ld_id, 0);
    }

    pool = &txn_global_pool[SUBI];
  index=w_id*10+ld_id;

#ifdef NEW_ALLOCATE_FORM
    form  = allocate_form_new(pool, index);
#else
    form  = allocate_form(pool, &index);
#endif

    formlen=strlen(form);

    fill_number(form, WDID(w_id, ld_id),
form_index[SUBI][NO_TERMID].index,
               form_index[SUBI][NO_TERMID].length);
    fill_number(form, w_id, form_index[SUBI][NO_WID].index,
               form_index[SUBI][NO_WID].length);

    fill_number(form, pdata->d_id, form_index[SUBI][NO_DID].index,
                form_index[SUBI][NO_DID].length);

    if (!pdata->status) {
      fill_string(form, pdata->o_entry_d.DateString,
form_index[SUBI][NO_DATE].index,
                  form_index[SUBI][NO_DATE].length, &shift);
      indexes[strcount]=form_index[SUBI][NO_DATE].index;
      indLen[strcount++]=form_index[SUBI][NO_DATE].length;
    } else {
      memcpy(form+form_index[SUBI][NO_DATE].index, blank,
             form_index[SUBI][NO_DATE].length);
    }

    fill_number(form, pdata->c_id, form_index[SUBI][NO_CID].index,
                form_index[SUBI][NO_CID].length);

    fill_string(form, pdata->c_last,
form_index[SUBI][NO_NAME].index,
                form_index[SUBI][NO_NAME].length, &shift);
    indexes[strcount]=form_index[SUBI][NO_NAME].index;
    indLen[strcount++]=form_index[SUBI][NO_NAME].length;

    fill_string(form, pdata->c_credit,
form_index[SUBI][NO_CREDIT].index,
                form_index[SUBI][NO_CREDIT].length, &shift);
    indexes[strcount]=form_index[SUBI][NO_CREDIT].index;
    indLen[strcount++]=form_index[SUBI][NO_CREDIT].length;


    fill_float(form, pdata->c_discount,
form_index[SUBI][NO_DISC].index,
               form_index[SUBI][NO_DISC].length);

    fill_number(form, pdata->o_id, form_index[SUBI][NO_OID].index,
                form_index[SUBI][NO_OID].length);

    fill_number(form, pdata->o_ol_cnt,
form_index[SUBI][NO_LINES].index,
                form_index[SUBI][NO_LINES].length);

    fill_float(form, pdata->w_tax, form_index[SUBI][NO_WTAX].index,
               form_index[SUBI][NO_WTAX].length);

    fill_float(form, pdata->d_tax, form_index[SUBI][NO_DTAX].index,
               form_index[SUBI][NO_DTAX].length);

    if (!pdata->status) {

      for (i=0; i<pdata->o_ol_cnt; i++) {
        fill_number(form, pdata->o_orderline[i].ol_supply_w_id,
                    form_index[SUBI][NO_SUPPW+i*8].index,
                    form_index[SUBI][NO_SUPPW+i*8].length);

        fill_number(form, pdata->o_orderline[i].ol_i_id,
                    form_index[SUBI][NO_ITEMID+i*8].index,
                    form_index[SUBI][NO_ITEMID+i*8].length);

        fill_string(form, pdata->o_orderline[i].i_name,
                    form_index[SUBI][NO_INAME+i*8].index,
                    form_index[SUBI][NO_INAME+i*8].length, &shift);
        indexes[strcount]=form_index[SUBI][NO_INAME+i*8].index;
        indLen[strcount++]=form_index[SUBI][NO_INAME+i*8].length;

        fill_number(form, pdata->o_orderline[i].ol_quantity,
                    form_index[SUBI][NO_QTY+i*8].index,
                    form_index[SUBI][NO_QTY+i*8].length);

        fill_number(form, pdata->o_orderline[i].s_quantity,
                    form_index[SUBI][NO_STOCK+i*8].index,
                    form_index[SUBI][NO_STOCK+i*8].length);

        fill_string(form, pdata->o_orderline[i].b_g,
                    form_index[SUBI][NO_BRAND+i*8].index,
                    form_index[SUBI][NO_BRAND+i*8].length, &shift);
        indexes[strcount]=form_index[SUBI][NO_BRAND+i*8].index;
        indLen[strcount++]=form_index[SUBI][NO_BRAND+i*8].length;

        fill_float(form, pdata->o_orderline[i].i_price,
                   form_index[SUBI][NO_PRICE+i*8].index,
                   form_index[SUBI][NO_PRICE+i*8].length);

        fill_float(form, pdata->o_orderline[i].ol_amount,
                   form_index[SUBI][NO_AMOUNT+i*8].index,
                   form_index[SUBI][NO_AMOUNT+i*8].length);
      }

      for (j=NO_SUPPW+i*8; j<NO_SUPPW+15*8; j++)

memcpy(form+form_index[SUBI][j].index,blank,form_index[SUBI][j].len
gth);

      for (lineStart=j=i; j<15; j++) {
        form[form_index[SUBI][NO_PRICE+j*8].index-1]=' ';
        form[form_index[SUBI][NO_AMOUNT+j*8].index-1]=' ';
      }

    } else {
/*
      for (j=NO_DISC; j<=NO_DTAX; j++)

memcpy(form+form_index[SUBI][j].index,blank,form_index[SUBI][j].len
gth);
*/

      for (j=NO_SUPPW; j<NO_SUPPW+15*8; j++)

memcpy(form+form_index[SUBI][j].index,blank,form_index[SUBI][j].len
gth);
```

```
      for (lineStart=j=0; j<15; j++) {
        form[form_index[SUBI][NO_PRICE+j*8].index-1]=' ';
        form[form_index[SUBI][NO_AMOUNT+j*8].index-1]=' ';
      }
    }

    if (!pdata->status) {
      fill_string(form, "Transaction committed",
                  form_index[SUBI][NO_STATUS].index,
                  form_index[SUBI][NO_STATUS].length, &shift);
      indexes[strcount]=form_index[SUBI][NO_STATUS].index;
      indLen[strcount++]=form_index[SUBI][NO_STATUS].length;

      fill_float(form, pdata->total_amount,
form_index[SUBI][NO_TOTAL].index,
                 form_index[SUBI][NO_TOTAL].length);
    } else {
      fill_string(form, "Item number is not valid",
                  form_index[SUBI][NO_STATUS].index,
                  form_index[SUBI][NO_STATUS].length, &shift);
      indexes[strcount]=form_index[SUBI][NO_STATUS].index;
      indLen[strcount++]=form_index[SUBI][NO_STATUS].length;

      memcpy(form+form_index[SUBI][NO_TOTAL].index-1, blank,
             form_index[SUBI][NO_TOTAL].length+1);
    }

    if (shift)
      adjust_form(form, indexes, indLen, strcount, formlen, shift);

    ret=send_response(pECB, form, strlen(form));

    if (shift) {
      allocate_last_form(form2,pool);
      memcpy(form, form2, formlen+1);
    }
    for (j=lineStart; j<15; j++) {
      form[form_index[SUBI][NO_PRICE+j*8].index-1]='$';
      form[form_index[SUBI][NO_AMOUNT+j*8].index-1]='$';
    }

#ifndef NEW_ALLOCATE_FORM
    free_form(pool, form, index);
#endif

    return ret;
#undef SUBI
}

int sendform_paymentoutput(int status, T_payment_data *pdata)
{
  EXTENSION_CONTROL_BLOCK *pECB;
    int w_id, ld_id, ret;
    char *form, *form2;
    char blank[] = "
";
    int index = -1, formlen, strcount=0, shift=0, i=0, j,datalen;
    int indexes[PA_FORMINDEX_SIZE], indLen[PA_FORMINDEX_SIZE],
index2=-1;
    form_template_pool *pool;

    w_id = pdata->w_id; ld_id = pdata->ld_id;
  pECB = (EXTENSION_CONTROL_BLOCK *) pdata->context;

    if (status != SUCCESS && status != DB_SUCCESS) {
      return send_error_message(pECB, 0, status, "", w_id, ld_id,
0);
    }

    if (pdata->txn_status != DB_RETURN_OCI_SUCCESS) {
      return send_error_message(pECB, 0, pdata->txn_status, "   ---
DATABASE ERROR ", w_id, ld_id, 0);
    }

#define SUBI POOL_TYPE_TXN_OUTPUT][TXN_TYPE_PAYMENT

    pool = &txn_global_pool[SUBI];
  index=w_id*10+ld_id;

#ifdef NEW_ALLOCATE_FORM
    form  = allocate_form_new(pool, index);
#else
    form  = allocate_form(pool, &index);
#endif

    formlen=strlen(form);

    fill_number(form, WDID(w_id, ld_id),
form_index[SUBI][PA_TERMID].index,
               form_index[SUBI][PA_TERMID].length);

    fill_string(form, pdata->h_date.DateString,
form_index[SUBI][PA_DATE].index,
                form_index[SUBI][PA_DATE].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_DATE].index;
    indLen[strcount++]=form_index[SUBI][PA_DATE].length;

    fill_number(form, w_id, form_index[SUBI][PA_WID].index,
               form_index[SUBI][PA_WID].length);
    fill_number(form, pdata->d_id, form_index[SUBI][PA_DID].index,
                form_index[SUBI][PA_DID].length);

    fill_string(form, pdata->w_street_1,
form_index[SUBI][PA_WST1].index,
                form_index[SUBI][PA_WST1].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_WST1].index;
    indLen[strcount++]=form_index[SUBI][PA_WST1].length;

    fill_string(form, pdata->d_street_1,
form_index[SUBI][PA_DST1].index,
                form_index[SUBI][PA_DST1].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_DST1].index;
    indLen[strcount++]=form_index[SUBI][PA_DST1].length;

    fill_string(form, pdata->w_street_2,
form_index[SUBI][PA_WST2].index,
                form_index[SUBI][PA_WST2].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_WST2].index;
    indLen[strcount++]=form_index[SUBI][PA_WST2].length;

    fill_string(form, pdata->d_street_2,
form_index[SUBI][PA_DST2].index,
                form_index[SUBI][PA_DST2].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_DST2].index;
    indLen[strcount++]=form_index[SUBI][PA_WST2].length;

    fill_string(form, pdata->w_city,
form_index[SUBI][PA_WCITY].index,
                form_index[SUBI][PA_WCITY].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_WCITY].index;
    indLen[strcount++]=form_index[SUBI][PA_WCITY].length;

    fill_string(form, pdata->w_state,
form_index[SUBI][PA_WSTATE].index,
                form_index[SUBI][PA_WSTATE].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_WSTATE].index;
    indLen[strcount++]=form_index[SUBI][PA_WSTATE].length;

    fill_string(form, pdata->w_zip,
form_index[SUBI][PA_WZIP].index,
                form_index[SUBI][PA_WZIP].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_WZIP].index;
    indLen[strcount++]=form_index[SUBI][PA_WZIP].length;

    fill_string(form, pdata->d_city,
form_index[SUBI][PA_DCITY].index,
                form_index[SUBI][PA_DCITY].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_DCITY].index;
    indLen[strcount++]=form_index[SUBI][PA_DCITY].length;

    fill_string(form, pdata->d_state,
form_index[SUBI][PA_DSTATE].index,
                form_index[SUBI][PA_DSTATE].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_DSTATE].index;
    indLen[strcount++]=form_index[SUBI][PA_DSTATE].length;

    fill_string(form, pdata->d_zip,
form_index[SUBI][PA_DZIP].index,
                form_index[SUBI][PA_DZIP].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_DZIP].index;
    indLen[strcount++]=form_index[SUBI][PA_DZIP].length;

    fill_number(form, pdata->c_id, form_index[SUBI][PA_CID].index,
                form_index[SUBI][PA_CID].length);

    fill_number(form, pdata->c_w_id,
form_index[SUBI][PA_CWARE].index,
                form_index[SUBI][PA_CWARE].length);

    fill_number(form, pdata->c_d_id,
form_index[SUBI][PA_CDIST].index,
                form_index[SUBI][PA_CDIST].length);

    fill_string(form, pdata->c_first,
form_index[SUBI][PA_CFIRST].index,
                form_index[SUBI][PA_CFIRST].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_CFIRST].index;
    indLen[strcount++]=form_index[SUBI][PA_CFIRST].length;

    fill_string(form, pdata->c_middle,
form_index[SUBI][PA_CMIDDLE].index,
                form_index[SUBI][PA_CMIDDLE].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_CMIDDLE].index;
    indLen[strcount++]=form_index[SUBI][PA_CMIDDLE].length;

    fill_string(form, pdata->c_last,
form_index[SUBI][PA_CLAST].index,
                form_index[SUBI][PA_CLAST].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_CLAST].index;
    indLen[strcount++]=form_index[SUBI][PA_CLAST].length;

    fill_string(form, pdata->c_since.DateString,
form_index[SUBI][PA_SINCE].index,
                form_index[SUBI][PA_SINCE].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_SINCE].index;
    indLen[strcount++]=form_index[SUBI][PA_SINCE].length;

    fill_string(form, pdata->c_street_1,
form_index[SUBI][PA_CST1].index,
                form_index[SUBI][PA_CST1].length, &shift);
```

```
    indexes[strcount]=form_index[SUBI][PA_CST1].index;
    indLen[strcount++]=form_index[SUBI][PA_CST1].length;

    fill_string(form, pdata->c_credit,
form_index[SUBI][PA_CREDIT].index,
                form_index[SUBI][PA_CREDIT].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_CREDIT].index;
    indLen[strcount++]=form_index[SUBI][PA_CREDIT].length;

    fill_string(form, pdata->c_street_2,
form_index[SUBI][PA_CST2].index,
                form_index[SUBI][PA_CST2].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_CST2].index;
    indLen[strcount++]=form_index[SUBI][PA_CST2].length;

    fill_float(form, pdata->c_discount,
form_index[SUBI][PA_DISC].index,
               form_index[SUBI][PA_DISC].length);

    fill_string(form, pdata->c_city,
form_index[SUBI][PA_CCITY].index,
                form_index[SUBI][PA_CCITY].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_CCITY].index;
    indLen[strcount++]=form_index[SUBI][PA_CCITY].length;

    fill_string(form, pdata->c_state,
form_index[SUBI][PA_CSTATE].index,
                form_index[SUBI][PA_CSTATE].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_CSTATE].index;
    indLen[strcount++]=form_index[SUBI][PA_CSTATE].length;

    fill_string(form, pdata->c_zip,
form_index[SUBI][PA_CZIP].index,
                form_index[SUBI][PA_CZIP].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_CZIP].index;
    indLen[strcount++]=form_index[SUBI][PA_CZIP].length;

    fill_string(form, pdata->c_phone,
form_index[SUBI][PA_CPHONE].index,
                form_index[SUBI][PA_CPHONE].length, &shift);
    indexes[strcount]=form_index[SUBI][PA_CPHONE].index;
    indLen[strcount++]=form_index[SUBI][PA_CPHONE].length;

    fill_float(form, pdata->h_amount,
form_index[SUBI][PA_AMOUNT].index,
               form_index[SUBI][PA_AMOUNT].length);

    fill_float(form, pdata->c_balance,
form_index[SUBI][PA_CBAL].index,
               form_index[SUBI][PA_CBAL].length);

    fill_float(form, pdata->c_credit_lim,
form_index[SUBI][PA_LIMIT].index,
               form_index[SUBI][PA_LIMIT].length);

    if (pdata->c_credit[0]=='B' && pdata->c_credit[1]=='C') {
      datalen=strlen(pdata->c_data);
      for (i=0; i<4; i++) {
        if (i * form_index[SUBI][PA_CUSTDATA+i].length >= datalen)
break;
        fill_string(form, pdata-
>c_data+(i*form_index[SUBI][PA_CUSTDATA+i].length),
                    form_index[SUBI][PA_CUSTDATA+i].index,
                    form_index[SUBI][PA_CUSTDATA+i].length,
&shift);
        indexes[strcount]=form_index[SUBI][PA_CUSTDATA+i].index;
        indLen[strcount++]=form_index[SUBI][PA_CUSTDATA+i].length;
      }
    }

    for (j=i; j<4; j++)
      memcpy(form+form_index[SUBI][PA_CUSTDATA+j].index, blank,
             form_index[SUBI][PA_CUSTDATA+j].length);

    if (shift)
      adjust_form(form, indexes, indLen, strcount, formlen, shift);

    ret=send_response(pECB, form, strlen(form));

    if (shift) {
      allocate_last_form(form2, pool);
      memcpy(form, form2, formlen+1);
    }

#ifndef NEW_ALLOCATE_FORM
    free_form(pool, form, index);
#endif

    return ret;
#undef SUBI
}



int sendform_orderstatusoutput(int status, T_orderstatus_data
*pdata)
{
  EXTENSION_CONTROL_BLOCK *pECB;
    int w_id, ld_id, indexes[OS_FORMINDEX_SIZE],
indLen[OS_FORMINDEX_SIZE];
    char *form, *form2;
    int index = -1, strcount=0, formlen, shift=0, i, j, index2=-1,
lineStart=15, ret;
    form_template_pool *pool;
    char blank[] = "                    ";

    w_id = pdata->w_id; ld_id = pdata->ld_id;
  pECB = (EXTENSION_CONTROL_BLOCK *) pdata->context;

    if (status != SUCCESS && status != DB_SUCCESS) {
      return send_error_message(pECB, 0, status, "", w_id, ld_id,
0);
    }

    if (pdata->txn_status != DB_RETURN_OCI_SUCCESS) {
      return send_error_message(pECB, 0, pdata->txn_status, "   ---
DATABASE ERROR ", w_id, ld_id, 0);
    }

#define SUBI POOL_TYPE_TXN_OUTPUT][TXN_TYPE_ORDERSTATUS

    pool = &txn_global_pool[SUBI];
  index=w_id*10+ld_id;

#ifdef NEW_ALLOCATE_FORM
    form  = allocate_form_new(pool, index);
#else
  form  = allocate_form(pool, &index);
#endif

    formlen = strlen(form);

    fill_number(form, WDID(w_id, ld_id),
form_index[SUBI][OS_TERMID].index,
               form_index[SUBI][OS_TERMID].length);
    fill_number(form, w_id, form_index[SUBI][OS_WID].index,
               form_index[SUBI][OS_WID].length);
    fill_number(form, pdata->d_id, form_index[SUBI][OS_DID].index,
                form_index[SUBI][OS_DID].length);
    fill_number(form, pdata->c_id, form_index[SUBI][OS_CID].index,
                form_index[SUBI][OS_CID].length);
    fill_string(form, pdata->c_first,
form_index[SUBI][OS_FIRST].index,
                form_index[SUBI][OS_FIRST].length, &shift);
    indexes[strcount]=form_index[SUBI][OS_FIRST].index;
    indLen[strcount++]=form_index[SUBI][OS_FIRST].length;

    fill_string(form, pdata->c_middle,
form_index[SUBI][OS_MIDDLE].index,
                form_index[SUBI][OS_MIDDLE].length, &shift);
    indexes[strcount]=form_index[SUBI][OS_MIDDLE].index;
    indLen[strcount++]=form_index[SUBI][OS_MIDDLE].length;

    fill_string(form, pdata->c_last,
form_index[SUBI][OS_LAST].index,
                form_index[SUBI][OS_LAST].length, &shift);
    indexes[strcount]=form_index[SUBI][OS_LAST].index;
    indLen[strcount++]=form_index[SUBI][OS_LAST].length;

    fill_float(form, pdata->c_balance,
form_index[SUBI][OS_CBALANCE].index,
                form_index[SUBI][OS_CBALANCE].length);

    fill_number(form, pdata->o_id, form_index[SUBI][OS_OID].index,
                form_index[SUBI][OS_OID].length);

    fill_string(form, pdata->o_entry_d.DateString,
form_index[SUBI][OS_ENTRY_DATE].index,
                form_index[SUBI][OS_ENTRY_DATE].length, &shift);
    indexes[strcount]=form_index[SUBI][OS_ENTRY_DATE].index;
    indLen[strcount++]=form_index[SUBI][OS_ENTRY_DATE].length;

    fill_number(form, pdata->o_carrier_id,
form_index[SUBI][OS_CARID].index,
                form_index[SUBI][OS_CARID].length);

    for (i=0; i < pdata->o_ol_cnt; i++) {
      fill_number(form, pdata->o_orderline[i].ol_supply_w_id,
                  form_index[SUBI][OS_SUPW+i*5].index,
                  form_index[SUBI][OS_SUPW+i*5].length);

      fill_number(form, pdata->o_orderline[i].ol_i_id,
                  form_index[SUBI][OS_ITEMID+i*5].index,
                  form_index[SUBI][OS_ITEMID+i*5].length);

      fill_number(form, pdata->o_orderline[i].ol_quantity,
                  form_index[SUBI][OS_QTY+i*5].index,
                  form_index[SUBI][OS_QTY+i*5].length);

      fill_float(form, pdata->o_orderline[i].ol_amount,
                 form_index[SUBI][OS_AMOUNT+i*5].index,
                 form_index[SUBI][OS_AMOUNT+i*5].length);

      fill_string(form, pdata-
>o_orderline[i].ol_delivery_d.DateString,
                  form_index[SUBI][OS_DELDATE+i*5].index,
                  form_index[SUBI][OS_DELDATE+i*5].length, &shift);
      indexes[strcount]=form_index[SUBI][OS_DELDATE+i*5].index;
      indLen[strcount++]=form_index[SUBI][OS_DELDATE+i*5].length;
    }

    for (lineStart=j=i; j<15;j++) {
```

```
      memcpy(form+form_index[SUBI][OS_SUPW+j*5].index, blank,
             form_index[SUBI][OS_SUPW+j*5].length);
      memcpy(form+form_index[SUBI][OS_ITEMID+j*5].index, blank,
             form_index[SUBI][OS_ITEMID+j*5].length);
      memcpy(form+form_index[SUBI][OS_QTY+j*5].index, blank,
             form_index[SUBI][OS_QTY+j*5].length);
      memcpy(form+form_index[SUBI][OS_AMOUNT+j*5].index-1, blank,
             form_index[SUBI][OS_AMOUNT+j*5].length+1);
      memcpy(form+form_index[SUBI][OS_DELDATE+j*5].index, blank,
             form_index[SUBI][OS_DELDATE+j*5].length);
    }

    if (shift)
      adjust_form(form, indexes, indLen, strcount, formlen, shift);

    ret=send_response(pECB, form, strlen(form));

    if (shift) {
      allocate_last_form(form2, pool);
      memcpy(form, form2, formlen+1);
    }

    for (j=lineStart; j<15; j++)
      form[form_index[SUBI][OS_AMOUNT+j*5].index-1]='$';

#ifndef NEW_ALLOCATE_FORM
    free_form(pool, form, index);
#endif

    return ret;
#undef SUBI
}



int sendform_deliveryoutput(int status, T_delivery_data *pdata,
pDelQueue_info CompletedDeliveries[DELIVERY_RESPONSE_COUNT])
{
  EXTENSION_CONTROL_BLOCK *pECB;
    int w_id, ld_id;
    char *form;
    int index = -1, ret;
    form_template_pool *pool;

  int ii, index2, jj;
  pT_delivery_data pCompletedDelivery;
  T_delivery_data blankDelivery = { 0 };

    w_id = pdata->w_id; ld_id = pdata->ld_id;
  pECB = (EXTENSION_CONTROL_BLOCK *) pdata->context;
    if (status != SUCCESS && status != DB_SUCCESS) {
      return send_error_message(pECB, 0, status, "", w_id, ld_id,
0);
    }

#define SUBI POOL_TYPE_TXN_OUTPUT][TXN_TYPE_DELIVERY

    pool = &txn_global_pool[SUBI];
  index=w_id*10+ld_id;

#ifdef NEW_ALLOCATE_FORM
    form  = allocate_form_new(pool, index);
#else
    form  = allocate_form(pool, &index);
#endif

    fill_number(form, WDID(w_id, ld_id),
form_index[SUBI][DE_TERMID].index,
               form_index[SUBI][DE_TERMID].length);
    fill_number(form, w_id, form_index[SUBI][DE_WID].index,
               form_index[SUBI][DE_WID].length);
    fill_number(form, pdata->o_carrier_id,
form_index[SUBI][DE_CARID].index,
               form_index[SUBI][DE_CARID].length);


  index2 = D_QUEUE1;
  for( jj = 0; jj < DELIVERY_RESPONSE_COUNT; jj++ ) {
    if( NULL == CompletedDeliveries[jj] )
      pCompletedDelivery = &blankDelivery;
    else
      pCompletedDelivery = CompletedDeliveries[jj]->pdata;
    fill_number(form, pCompletedDelivery->enqueue_time,
form_index[SUBI][index2].index,
               form_index[SUBI][index2].length);
    index2++;
    fill_number(form,pCompletedDelivery-
>delta_time,form_index[SUBI][index2].index,
      form_index[SUBI][index2].length);
    index2++;
    fill_number(form,pCompletedDelivery-
>w_id,form_index[SUBI][index2].index,
      form_index[SUBI][index2].length);
    index2++;
    fill_number(form,pCompletedDelivery-
>o_carrier_id,form_index[SUBI][index2].index,
      form_index[SUBI][index2].length);
    index2++;
    for( ii = 0; ii < 10; ii++ ) {
      fill_number(form,pCompletedDelivery-
>o_id[ii],form_index[SUBI][index2].index,
      form_index[SUBI][index2].length);
      index2++;
    }
    if ( NULL != CompletedDeliveries[jj]){
//      free_form(&txn_data_pool,(char *)CompletedDeliveries[jj]-
>pdata,CompletedDeliveries->form_index);
      addFreeDelQueue(CompletedDeliveries[jj]);
    }
  }

    ret=send_response(pECB, form, strlen(form));

#ifndef NEW_ALLOCATE_FORM
    free_form(pool, form, index);
#endif

    return ret;
#undef SUBI
}



int sendform_stocklevelooutput(int status, T_stocklevel_data *pdata)
{
  EXTENSION_CONTROL_BLOCK *pECB;
    int w_id, ld_id;
    char *form;
    int index = -1, ret;
    form_template_pool *pool;

    w_id = pdata->w_id; ld_id = pdata->ld_id;
  pECB = (EXTENSION_CONTROL_BLOCK *) pdata->context;

    if (status != SUCCESS && status != DB_SUCCESS) {
      return send_error_message(pECB, 0, status, "", w_id, ld_id,
0);
    }


    if (pdata->txn_status != DB_RETURN_OCI_SUCCESS) {
      return send_error_message(pECB, 0, pdata->txn_status, "   ---
DATABASE ERROR ", w_id, ld_id, 0);
    }

#define SUBI POOL_TYPE_TXN_OUTPUT][TXN_TYPE_STOCKLEVEL

    pool = &txn_global_pool[SUBI];
  index=w_id*10+ld_id;

#ifdef NEW_ALLOCATE_FORM
    form  = allocate_form_new(pool, index);
#else
    form  = allocate_form(pool, &index);
#endif


    fill_number(form, WDID(w_id, ld_id),
form_index[SUBI][SL_TERMID].index,
               form_index[SUBI][SL_TERMID].length);
    fill_number(form, w_id, form_index[SUBI][SL_WID].index,
               form_index[SUBI][SL_WID].length);
    fill_number(form, ld_id, form_index[SUBI][SL_DID].index,
               form_index[SUBI][SL_DID].length);
    fill_number(form, pdata->threshold,
form_index[SUBI][SL_THRESHOLD].index,
               form_index[SUBI][SL_THRESHOLD].length);
    fill_number(form, pdata->low_stock,
form_index[SUBI][SL_LOWSTOCK].index,
               form_index[SUBI][SL_LOWSTOCK].length);

    ret=send_response(pECB, form, strlen(form));

#ifndef NEW_ALLOCATE_FORM
    free_form(pool, form, index);
#endif

    return ret;
#undef SUBI
}


int (FAR * mod_tpcc_neworder)(T_neworder_data *);
int (FAR * mod_tpcc_payment)(T_payment_data *);
int (FAR * mod_tpcc_delivery)(T_delivery_data *, int);
int (FAR * mod_tpcc_orderstatus)(T_orderstatus_data *);
int (FAR * mod_tpcc_stocklevel)(T_stocklevel_data *);
void (FAR * userlog)(char * str, ...);
void (FAR * initDelLog)(int);
void (FAR * endDelLog)(int);


----------------------------------------------------------
mod_tpcc_error.h
----------------------------------------------------------
/* Copyright (c) 2004, Oracle Corporation.  All rights reserved.
*/

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

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

   RELATED DOCUMENTS
     <note any documents related to this facility>

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

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

   EXAMPLES

   NOTES
     <other useful comments, qualifications, etc.>

   MODIFIED   (MM/DD/YY)
   xnie        02/09/04 - to make it work with tuxedo
   shuang      01/22/04 - shuang_rte
   shuang      01/21/04 - Creation

*/

#define DB_SUCCESS            0
#define DB_ERROR              1
#define TRANSPORT_ERROR       2
#define DB_INTERFACE          3
#define DB_DEADLOCK_LIMIT     4
#define DB_NOT_COMMITED       5
#define DB_DEAD               6
#define DB_PENDING            7
#define DB_NOT_LOGGED_IN      8
#define DB_LOGIN_FAILED       9
#define DB_USE_FAILED         10
#define DB_LOGOUT_FAILED      11
#define DB_TUXEDO_TPALLOC_ERROR       12
#define DB_TUXEDO_TPCALL_ERROR       13
#define DB_MAX_ERR            13
#define VALID_DB_ERR(err) (((err) >= DB_SUCCESS)&&((err) <=
DB_MAX_ERR))

#define SUCCESS                           1000
#define COMMAND_UNDEFINED                 1001
#define NOT_IMPLEMENTED_YET               1002
#define CANNOT_INIT_TERMINAL              1003
#define OUT_OF_MEMORY                     1004
#define NEW_ORDER_NOT_PROCESSED           1005
#define PAYMENT_NOT_PROCESSED             1006
#define NO_SERVER_SPECIFIED               1007
#define ORDER_STATUS_NOT_PROCESSED        1008
#define W_ID_INVALID                      1009
#define CAN_NOT_SET_MAX_CONNECTIONS       1010
#define UNKNOW_TRANSACTION_TYPE           1011
#define D_ID_INVALID                      1012
#define MAX_CONNECT_PARAM                 1013
#define INVALID_SYNC_CONNECTION           1014
#define INVALID_TERMID                    1015
#define PAYMENT_INVALID_CUSTOMER          1016
#define SQL_OPEN_CONNECTION               1017

#define STOCKLEVEL_MISSING_THRESHOLD_KEY 1018
#define STOCKLEVEL_THRESHOLD_INVALID 1019
#define STOCKLEVEL_THRESHOLD_RANGE 1020
#define STOCKLEVEL_NOT_PROCESSED 1021
#define NEWORDER_MISSING_DID 1022
#define NEWORDER_DISTRICT_INVALID 1023
#define NEWORDER_DISTRICT_RANGE 1024
#define NEWORDER_CUSTOMER_KEY 1025
#define NEWORDER_CUSTOMER_INVALID 1026
#define NEWORDER_CUSTOMER_RANGE 1027
#define NEWORDER_MISSING_IID_KEY 1028
#define NEWORDER_ITEM_BLANK_LINES 1029
#define NEWORDER_ITEMID_INVALID 1030
#define NEWORDER_MISSING_SUPPW_KEY 1031
#define NEWORDER_SUPPW_INVALID 1032
#define NEWORDER_MISSING_QTY_KEY 1033
#define NEWORDER_QTY_INVALID 1034
#define NEWORDER_SUPPW_RANGE 1035
#define NEWORDER_ITEMID_RANGE 1036
#define NEWORDER_QTY_RANGE 1037
#define NEWORDER_SUPPW_WITHOUT_ITEMID 1039
#define NEWORDER_QTY_WITHOUT_ITEMID 1040
#define NEWORDER_NOITEMS_ENTERED 1041
#define PAYMENT_MISSING_DID_KEY 1042
#define PAYMENT_DISTRICT_INVALID 1038
#define PAYMENT_DISTRICT_RANGE 1043
#define PAYMENT_MISSING_CID_KEY 1044
#define PAYMENT_CUSTOMER_INVALID 1045
#define PAYMENT_MISSING_CLASTNAME 1046
#define PAYMENT_LAST_NAME_TO_LONG 1047
#define PAYMENT_CID_RANGE  1048
#define PAYMENT_CID_AND_CLASTNAME 1049
#define PAYMENT_MISSING_CDI_KEY 1050
#define PAYMENT_CDI_INVALID 1051
#define PAYMENT_CDI_RANGE 1052
#define PAYMENT_MISSING_CWI_KEY 1053
#define PAYMENT_CWI_INVALID 1054
#define PAYMENT_CWI_RANGE 1055
#define PAYMENT_MISSING_HAM_KEY 1056
```

```
#define PAYMENT_HAM_INVALID 1057
#define PAYMENT_HAM_RANGE 1058
#define ORDERSTATUS_MISSING_DID_KEY 1059
#define ORDERSTATUS_DID_INVALID 1060
#define ORDERSTATUS_DID_RANGE 1061
#define ORDERSTATUS_MISSING_CID_KEY 1062
#define ORDERSTATUS_MISSING_CLASTNAME_KEY 1063
#define ORDERSTATUS_CLASTNAME_RANGE 1064
#define ORDERSTATUS_CID_INVALID 1065
#define ORDERSTATUS_CID_RANGE 1066
#define ORDERSTATUS_CID_AND_CLASTNAME 1067
#define DELIVERY_MISSING_OCD_KEY 1068
#define DELIVERY_CARRIER_INVALID 1069
#define DELIVERY_CARRIER_ID_RANGE 1070

#define PAYMENT_MISSING_CLASTNAME_KEY 1071
#define CANT_FIND_TPCC_KEY 1072
#define CANT_FIND_INETINFO_KEY 1073
#define CANT_FIND_POOLTHREADLIMIT 1074
#define DB_DELIVERY_NOT_QUEUED 1075
#define DELIVERY_NOT_PROCESSED 1076
#define TERM_ALLOCATE_FAILED 1077
#define PENDING 1078
#define CANT_START_FRCDINIT_THREAD 1079
#define CANT_START_DELIVERY_THREAD 1080
#define GOVERNOR_VALUE_NOT_FOUND 1081
#define SERVER_MISMATCH 1082
#define DATABASE_MISMATCH 1083
#define USER_MISMATCH 1084
#define PASSWORD_MISMATCH 1085
#define CANT_CREATE_ALL_THREADS_EVENT 1086
#define CANT_CREATE_FORCE_THRED_STRT_EVENT 1087
#define CANT_ALLOCATE_THREAD_LOCAL_STORAGE 1088
#define CANT_SET_THREAD_LOCAL_STORAGE 1089
#define FORCE_CONNECT_THREAD_FAILED 1090
#define CANT_FIND_SERVER_VALUE 1091
#define NO_MESSAGE 1092
#define CANT_FIND_PATH_VALUE 1093
#define CANNOT_CREATE_RESULTS_FILE 1094
#define DELIVERY_PIPE_SECURITY 1095
#define DELIVERY_PIPE_CREATE 1096
#define DELIVERY_PIPE_OPEN 1097
#define DELIVERY_PIPE_READ 1098
#define DELIVERY_PIPE_DISCONNECT 1099
#define CANT_FIND_DATABASE_VALUE 1100
#define CANT_FIND_USER_VALUE 1101
#define CANT_FIND_PASSWORD_VALUE 1102
#define DELIVERY_OUTPUT_PIPE_WRITE 1103
#define DELIVERY_OUTPUT_PIPE_READ 1104
#define DELIVERY_MISSING_QUEUETIME_KEY 1105
#define DELIVERY_QUEUETIME_INVALID 1106
#define ALREADY_LOGGED_IN 1107
#define INVALID_FORM 1109
#define DELIVERY_MUST_CONNECTDB 1110
#define INVALID_FORM_AND_CMD_NOT_BEGIN 1111
#define MAX_CONNECTIONS_EXCEEDED 1112
#define CANNOT_FIND_CONNECTION 1113
#define CKPT_NOT_INITIALIZED 1114
#define PAYMENT_MISSING_CID_CLASTNAME 1115
#define CANT_FIND_MAXDBCONNECTIONS_VALUE 1116
#define PAYMENT_CUSTOMER_RANGE 1117

/* OCI return status */

#define DB_RETURN_OCI_SUCCESS 1118
#define DB_RETURN_OCI_SUCCESS_WITH_INFO 1119
#define DB_RETURN_OCI_NEED_DATA 1120
#define DB_RETURN_OCI_NO_DATA 1121
#define DB_RETURN_OCI_ERROR 1122
#define DB_RETURN_OCI_INVALID_HANDLE 1123
#define DB_RETURN_OCI_STILL_EXECUTING 1124
#define DB_RETURN_OCI_CONTINUE 1125

struct T_error_message
{
    int error_code;
    char error_mesg[80];
};
typedef struct T_error_message T_error_message;

T_error_message error_message [] =
{
  { SUCCESS, "Success, no error." },
  { NO_MESSAGE, "No message string available for the specified
error code." },
  { COMMAND_UNDEFINED, "Command undefined." },
  { NOT_IMPLEMENTED_YET, "Not Implemented Yet." },
  { CANNOT_INIT_TERMINAL, "Cannot initialize client connection." },
  { OUT_OF_MEMORY, "Insufficient memory." },
  { NEW_ORDER_NOT_PROCESSED, "Cannot process new Order form." },
  { PAYMENT_NOT_PROCESSED, "Cannot process payment form." },
  { NO_SERVER_SPECIFIED, "No Server name specified." },
  { ORDER_STATUS_NOT_PROCESSED, "Cannot process order status form."
},
  { W_ID_INVALID, "Invalid Warehouse ID." },
  { CAN_NOT_SET_MAX_CONNECTIONS, "Insufficient memory to allocate #
connections." },
  { D_ID_INVALID, "Invalid District ID Must be 1 to 10." },
  { MAX_CONNECT_PARAM, "Max client connections exceeded, run
install to increase." },
  { INVALID_SYNC_CONNECTION, "Invalid Terminal Sync ID." },
  { INVALID_TERMID, "Invalid Terminal ID." },
  { PAYMENT_INVALID_CUSTOMER, "Payment Form, No such Customer." },
  { SQL_OPEN_CONNECTION, "SQLOpenConnection API Failed." },
  { STOCKLEVEL_MISSING_THRESHOLD_KEY, "Stock Level missing
Threshold key \"TT*\"." },
  { STOCKLEVEL_THRESHOLD_INVALID, "Stock Level Threshold invalid
data type range = 1 - 99." },
  { STOCKLEVEL_THRESHOLD_RANGE, "Stock Level Threshold out of
range, range must be 1 - 99." },
  { STOCKLEVEL_NOT_PROCESSED, "Stock Level not processed." },
  { NEWORDER_MISSING_DID, "New Order missing District key
\"DID*\"." },
  { NEWORDER_DISTRICT_INVALID, "New Order District ID Invalid range
1 - 10." },
  { NEWORDER_DISTRICT_RANGE, "New Order District ID out of Range.
Range = 1 - 10." },
  { NEWORDER_CUSTOMER_KEY, "New Order missing Customer key
\"CID*\"." },
  { NEWORDER_CUSTOMER_INVALID, "New Order customer id invalid data
type, range = 1 to 3000." },
  { NEWORDER_CUSTOMER_RANGE, "New Order customer id out of range,
range = 1 to 3000." },
  { NEWORDER_MISSING_IID_KEY, "New Order missing Item Id key
\"IID*\"." },
  { NEWORDER_ITEM_BLANK_LINES, "New Order blank order lines all
orders must be continuous." },
  { NEWORDER_ITEMID_INVALID, "New Order Item Id is wrong data type,
must be numeric." },
  { NEWORDER_MISSING_SUPPW_KEY, "New Order missing Supp_W key
\"SP##*\"." },
  { NEWORDER_SUPPW_INVALID, "New Order Supp_W invalid data type
must be numeric." },
  { NEWORDER_MISSING_QTY_KEY, "New Order Missing Qty key
\"Qty##*\"." },
  { NEWORDER_QTY_INVALID, "New Order Qty invalid must be numeric
range 1 - 99." },
  { NEWORDER_SUPPW_RANGE, "New Order Supp_W value out of range
range = 1 - Max Warehouses." },
  { NEWORDER_ITEMID_RANGE, "New Order Item Id is out of range.
Range = 1 to 999999." },
  { NEWORDER_QTY_RANGE, "New Order Qty is out of range. Range = 1
to 99." },
  { PAYMENT_DISTRICT_INVALID, "Payment District ID is invalid must
be 1 - 10." },
  { NEWORDER_SUPPW_WITHOUT_ITEMID, "New Order Supp_W field entered
without a corrisponding Item_Id." },
  { NEWORDER_QTY_WITHOUT_ITEMID, "New Order Qty entered without a
corrisponding Item_Id." },
  { NEWORDER_NOITEMS_ENTERED, "New Order Blank Items between items,
items must be continuous." },
  { PAYMENT_MISSING_DID_KEY, "Payment missing District Key
\"DID*\"." },
  { PAYMENT_DISTRICT_RANGE, "Payment District Out of range, range =
1 - 10." },
  { PAYMENT_MISSING_CID_KEY, "Payment missing Customer Key
\"CID*\"." },
  { PAYMENT_CUSTOMER_INVALID, "Payment Customer data type invalid,
must be numeric." },
  { PAYMENT_MISSING_CLASTNAME, "Payment missing Customer Last Name
Key \"CLASTNAME*\"." },
  { PAYMENT_MISSING_CID_CLASTNAME, "Payment entered without
Customer ID or last Name. " },
  { PAYMENT_LAST_NAME_TO_LONG, "Payment Customer last name longer
than 16 characters." },
  { PAYMENT_CUSTOMER_RANGE, "Payment Customer ID out of range, must
be 1 to 3000." },
  { PAYMENT_CID_AND_CLASTNAME, "Payment Customer ID and Last Name
entered must be one or other." },
  { PAYMENT_MISSING_CDI_KEY, "Payment missing Customer district key
\"CDI*\"." },
  { PAYMENT_CDI_INVALID, "Payment Customer district invalid must be
numeric." },
  { PAYMENT_CDI_RANGE, "Payment Customer district out of range must
be 1 - 10." },
  { PAYMENT_MISSING_CWI_KEY, "Payment missing Customer Warehouse
key \"CWI*\"." },
  { PAYMENT_CWI_INVALID, "Payment Customer Warehouse invalid must
be numeric." },
  { PAYMENT_CWI_RANGE, "Payment Customer Warehouse out of range, 1
to Max Warehouses." },
  { PAYMENT_MISSING_HAM_KEY, "Payment missing Amount key \"HAM*\"."
},
  { PAYMENT_HAM_INVALID, "Payment Amount invalid data type must be
numeric." },
  { PAYMENT_HAM_RANGE, "Payment Amount out of range, 0 - 9999.99."
},
  { ORDERSTATUS_MISSING_DID_KEY, "Order Status missing District key
\"DID*\"." },
  { ORDERSTATUS_DID_INVALID, "Order Status District invalid, value
must be numeric 1 - 10." },
  { ORDERSTATUS_DID_RANGE, "Order Status District out of range must
be 1 - 10." },
  { ORDERSTATUS_MISSING_CID_KEY, "Order Status missing Customer key
\"CID*\"." },
  { ORDERSTATUS_MISSING_CLASTNAME_KEY, "Order Status missing
Customer Last Name key \"CLASTNAME*\"." },
  { ORDERSTATUS_CLASTNAME_RANGE, "Order Status Customer last name
longer than 16 characters." },
  { ORDERSTATUS_CID_INVALID, "Order Status Customer ID invalid,
range must be numeric 1 - 3000." },
  { ORDERSTATUS_CID_RANGE, "Order Status Customer ID out of range
must be 1 - 3000." },
  { ORDERSTATUS_CID_AND_CLASTNAME, "Order Status Customer ID and
LastName entered must be only one." },
  { DELIVERY_MISSING_OCD_KEY, "Delivery missing Carrier ID key
\"OCD*\"." },
  { DELIVERY_CARRIER_INVALID, "Delivery Carrier ID invalid must be
numeric 1 - 10." },
  { DELIVERY_CARRIER_ID_RANGE, "Delivery Carrier ID out of range
must be 1 - 10." },
  { PAYMENT_MISSING_CLASTNAME_KEY, "Payment missing Customer Last
Name key \"CLASTNAME*\"." },
  { DB_ERROR, "A Database error has occurred." },
  { DB_TUXEDO_TPALLOC_ERROR, "Tuxedo call tpalloc has failed." },
  { DB_TUXEDO_TPCALL_ERROR, "Tuxedo call tpcall has failed." },
  { DELIVERY_NOT_PROCESSED, "Delivery not processed." },
  { DB_DELIVERY_NOT_QUEUED, "Delivery not queued." },
  { CANT_FIND_TPCC_KEY, "TPCC key not found in registry." },
  { CANT_FIND_INETINFO_KEY, "inetinfo key not found in registry."
},
  { CANT_FIND_POOLTHREADLIMIT, "PoolThreadLimit value not set in
inetinfo\\Parameters key." },
  { TERM_ALLOCATE_FAILED, "Failed to allocate terminal data
structure." },
  { DELIVERY_PIPE_SECURITY, "Failed to initialize delivery pipe
security." },
  { DELIVERY_PIPE_CREATE, "Failed to create delivery pipe." },
  { DELIVERY_PIPE_OPEN, "Failed to open delivery pipe." },
  { DELIVERY_PIPE_READ, "Failed to read delivery pipe." },
  { DELIVERY_PIPE_DISCONNECT, "Failed to start delivery pipe
disconnect thread."},
  { PENDING, "Transaction pending."},
  { CANT_START_FRCDINIT_THREAD, "Can't start Forced Initialization
thread." },
  { CANT_START_DELIVERY_THREAD, "Can't start delivery thread." },
  { GOVERNOR_VALUE_NOT_FOUND, "Governor value not found in
Registry." },
  { SERVER_MISMATCH, "Server does not match registry value." },
  { DATABASE_MISMATCH, "Database name does not match registry
value." },
  { USER_MISMATCH, "User name does not match registry value." },
  { PASSWORD_MISMATCH, "Password does not match registry value." },
  { CANT_CREATE_ALL_THREADS_EVENT, "Can't create All Threads
Event." },
  { CANT_CREATE_FORCE_THRED_STRT_EVENT, "Can't create Force Thread
Start Event." },
  { CANT_ALLOCATE_THREAD_LOCAL_STORAGE, "Can't allocate thread
local storage" },
  { CANT_SET_THREAD_LOCAL_STORAGE, "Can't set thread local
storage." },
  { FORCE_CONNECT_THREAD_FAILED, "At least one database connect
call failed, check log files for specific error." },
  { CANT_FIND_SERVER_VALUE, "Server value not set in TPCC key." },
  { CANT_FIND_PATH_VALUE, "PATH value not set in TPCC key." },
  { CANNOT_CREATE_RESULTS_FILE, "Cannot create results file." },
  { CANT_FIND_DATABASE_VALUE, "Database value not set in TPCC key."
},
  { CANT_FIND_USER_VALUE, "User value not set in TPCC key." },
  { CANT_FIND_PASSWORD_VALUE, "Password value not set in TPCC key."
},
  { DELIVERY_OUTPUT_PIPE_WRITE, "Failed to write output delivery
pipe." },
  { DELIVERY_OUTPUT_PIPE_READ, "Failed to read output delivery
pipe." },
  { DELIVERY_MISSING_QUEUETIME_KEY, "Delivery queue time missing
from query." },
  { DELIVERY_QUEUETIME_INVALID, "Delivery queue time is invalid."
},
  { ALREADY_LOGGED_IN, "TPCCConnectDB has already been called." },
  { DB_NOT_LOGGED_IN, "TPCCConnectDB has not yet been called." },
  { INVALID_FORM, "The FORM field is missing or invalid." },
  { DELIVERY_MUST_CONNECTDB, "Synchronous transport requires
delivery server connect to database." },
  { INVALID_FORM_AND_CMD_NOT_BEGIN, "The FORM field is missing and
CMD is not Begin." },
  { MAX_CONNECTIONS_EXCEEDED, "The maximum number of connections
has been exceeded." },
  { CANT_FIND_MAXDBCONNECTIONS_VALUE, "MaxDBConnections value not
set in TPCC key." },
  { CANNOT_FIND_CONNECTION, "Transport layer unable to find a
DBContext coresponding to the CallersContext." },
  { CKPT_NOT_INITIALIZED, "The checkpoint subsystem has not been
started." },
  { DB_RETURN_OCI_SUCCESS, "OCI SUCCESS" },
  { DB_RETURN_OCI_SUCCESS_WITH_INFO, "OCI SUCCESS WITH INFO"},
  { DB_RETURN_OCI_NEED_DATA, "OCI NEED DATA"},
  { DB_RETURN_OCI_NO_DATA, "OCI NO DATA"},
  { DB_RETURN_OCI_ERROR, "OCI ERROR"},
  { DB_RETURN_OCI_INVALID_HANDLE, "OCI INVALID HANDLE"},
  { DB_RETURN_OCI_STILL_EXECUTING, "OCI STILL EXECUTING"},
  { DB_RETURN_OCI_CONTINUE, "OCI CONTINUE"},
  { 0, "" }
};



-----------------------------------------------------------
mod_tpcc.h
-----------------------------------------------------------
/* Copyright (c) 2004, Oracle Corporation.  All rights reserved.
*/
```

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

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

   RELATED DOCUMENTS
     <note any documents related to this facility>

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

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

   EXAMPLES

   NOTES
     <other useful comments, qualifications, etc.>

   MODIFIED   (MM/DD/YY)
   xnie        01/30/04 - the real mod_tpcc.h
   shuang      01/22/04 - shuang_rte
   shuang      01/21/04 - Creation

*/

#include <httpext.h>

#define CMD_PROCESS(p)       (p[0] == 'P') && (p[1] == 'r')
#define CMD_NEWORDER(p)      (p[0] == 'N')
#define CMD_PAYMENT(p)       (p[0] == 'P') && (p[1] == 'a')
#define CMD_DELIVERY(p)      (p[0] == 'D')
#define CMD_ORDERSTATUS(p)   (p[0] == 'O')
#define CMD_STOCKLEVEL(p)    (p[0] == 'S')
#define CMD_EXIT(p)          (p[0] == 'E')
#define CMD_MENU(p)          (p[0] == 'M')
#define CMD_BEGIN(p)         (p[0] == 'B')

#define TXN_TYPE_DELIVERY     0
#define TXN_TYPE_STOCKLEVEL   1
#define TXN_TYPE_NEWORDER     2
#define TXN_TYPE_ORDERSTATUS  3
#define TXN_TYPE_PAYMENT      4
#define TXN_TYPE_MAX          5

#define POOL_TYPE_TXN_INPUT   0
#define POOL_TYPE_TXN_OUTPUT  1
#define POOL_TYPE_TXN_MAX     2

#define MAX_FORM_INDEX        164
#define BUF_SIZE              4096
#define FILENAMESIZE          128
#define MYLOGFILE             "/tmp/mod_tpcc.log"
#define WDID(w_id,d_id)       (10 * w_id + (d_id - 1))

#define MAX(a, b)             ((a > b) ? a : b)
#define MIN(a, b)             ((a > b) ? b : a)
#define STRING_UPPERCASE(x) \
        { \
           int str_pos; \
           int len = strlen(x); \
           for (str_pos=0; str_pos < len; str_pos++) \
               x[str_pos] = toupper(x[str_pos]); \
        }

struct value_index_entry
{
    char *value;
    int length;
};
typedef struct value_index_entry value_index_entry;

struct form_index_entry
{
    int index;
    int length;
};
typedef struct form_index_entry form_index_entry;

struct form_template_pool
{
    CRITICAL_SECTION form_template_spinlock;
                                                      /* mutex for
serialization */
    int form_template_length;                          /* Length of
each form  */
    int form_template_size;                      /* Number of form
in the pool */
    char *form_template_storage;
                                       /* The space allocated for the
whole pool */
    int free_slot;
    int *free_list;
};
typedef struct form_template_pool form_template_pool;

//static int tpcc_handler(request_rec *r);
```

```
//static int tpcc_post_config(apr_pool_t *p, apr_pool_t *pl,
//                         apr_pool_t *pt, server_rec *s);
//static void tpcc_child_init(apr_pool_t *p, server_rec *s);
//static void tpcc_register_hooks(apr_pool_t *p);

void allocate_response_pool();
void allocate_transaction_pool();
void allocate_template_pool();

int sendform_mainmenu(EXTENSION_CONTROL_BLOCK *pECB, int w_id, int
ld_id);
int sendform_welcome(EXTENSION_CONTROL_BLOCK *, char *);
int sendform_neworderinput(EXTENSION_CONTROL_BLOCK *pECB, int w_id,
int ld_id);
int sendform_paymentinput(EXTENSION_CONTROL_BLOCK *pECB, int w_id,
int ld_id);
int sendform_orderstatusinput(EXTENSION_CONTROL_BLOCK *pECB, int
w_id, int ld_id);
int sendform_deliveryinput(EXTENSION_CONTROL_BLOCK *pECB, int w_id,
int ld_id);
int sendform_stocklevelinput(EXTENSION_CONTROL_BLOCK *pECB, int
w_id, int ld_id);

int mod_neworder_query(EXTENSION_CONTROL_BLOCK *pECB, int w_id, int
ld_id, char *ptr);
int mod_delivery_query(EXTENSION_CONTROL_BLOCK *pECB, int w_id, int
ld_id, char *ptr);
int mod_payment_query(EXTENSION_CONTROL_BLOCK *pECB, int w_id, int
ld_id, char *ptr);
int mod_orderstatus_query(EXTENSION_CONTROL_BLOCK *pECB, int w_id,
int ld_id, char *ptr);
int mod_stocklevel_query(EXTENSION_CONTROL_BLOCK *pECB, int w_id,
int ld_id, char *ptr);
int process_query(EXTENSION_CONTROL_BLOCK *);
int mod_begin_cmd(EXTENSION_CONTROL_BLOCK *);
int mod_menu_cmd(EXTENSION_CONTROL_BLOCK *, int, int);
int mod_exit_cmd(EXTENSION_CONTROL_BLOCK *);
int send_error_message(EXTENSION_CONTROL_BLOCK *, int, int,char
*,int,int,void *);

int get_wid_did(char *iptr, int *wid, int *did, char **optr);
int getcharvalue(char *iptr, char key, char **optr);
char *allocate_form(form_template_pool *pool, int *index);
char *allocate_form_new(form_template_pool *pool, int index);
void free_form(form_template_pool *pool, char *form_template, int
index);
void make_txn_form_template(char *, char *, char *, char *, int);
int build_form_index(char *form, char *form_template,
form_index_entry *f_index, int length);
int send_response(EXTENSION_CONTROL_BLOCK *, char *, int);
void fill_number(char *form, int value, int index, int length);
void fill_float(char *form, double value, int index, int length);
void fill_string(char *form, char *string, int index, int length,
int *shift);
void adjust_form(char *form, int *indexes, int *length, int size,
int formlen, int totalshift);
int get_number(char *ptr, int *value);
int parse_query_string(char *iptr, int max_cnt, char *txn_chars,
value_index_entry *txn_vals);

#define mod_neworder_cmd(rec, w_id, ld_id)
sendform_neworderinput(rec, w_id, ld_id)
#define mod_delivery_cmd(rec, w_id, ld_id)
sendform_deliveryinput(rec, w_id, ld_id)
#define mod_payment_cmd(rec, w_id, ld_id)
sendform_paymentinput(rec, w_id, ld_id)
#define mod_orderstatus_cmd(rec, w_id, ld_id)
sendform_orderstatusinput(rec, w_id, ld_id)
#define mod_stocklevel_cmd(rec, w_id, ld_id)
sendform_stocklevelinput(rec, w_id, ld_id)

/*  ---------------------------------------------------------------
----------------
    The following defines the form layout of the different screens
(forms).

    NAME=1 - Command.

     VALUE = NewOrder      - neworder bring out new order input
form
            Delivery      - delivery bring out delivery input form
            OrderStatus   - order status bring out order status
input form
            Payment       - payment bring out payment input form
            StockLevel    - stock level bring out stock level
input form
            Menu          - display main menu
            Process       - perform the specified transaction
after providing input
            Begin         - send wid and did

    NAME=2 - Form Type.

      VALUE = d,n,p,s,o [D,N,P,S,O] output/input. Plus terminal ID.
            = W logon
            = M main menu

    Delivery
        3 - district number.

    Order Status
        3 - district number.
        4 - customer id.
        5 - customer last name.


    Payment
        3 - district number.
        4 - customer id.
        5 - customer warehouse.
        6 - customer district.
        7 - name
        8 - amount paid

    Stock Level
        3 - stock level threshould

    New Order
        3 - district number.
        4 - customer number.
 ------------------------------------------------------------------
-------------------- */

#define TRANSACTION_MENU \
"<HR>"\
"<INPUT TYPE=submit NAME=0 VALUE=NewOrder>"\
"<INPUT TYPE=submit NAME=0 VALUE=Payment>"\
"<INPUT TYPE=submit NAME=0 VALUE=Delivery>"\
"<INPUT TYPE=submit NAME=0 VALUE=StockLevel>"\
"<INPUT TYPE=submit NAME=0 VALUE=OrderStatus>"\
"<INPUT TYPE=submit NAME=0 VALUE=Exit>"


/* static char WelcomeForm [] =
"<BODY><FORM ACTION=%s METHOD=GET>"
"<INPUT TYPE=hidden NAME=2 VALUE=B000>"
"%s. Please provide your warehouse ID and district ID.<BR>"
"Warehouse ID <INPUT NAME=3 SIZE=7><BR>"
"District  ID <INPUT NAME=4 SIZE=2><BR>"
"<HR>"
"<INPUT TYPE=submit NAME=1 VALUE=Begin>"
"</FORM></BODY>"; */
static char WelcomeForm [] =
"<BODY><FORM ACTION=%s METHOD=GET>"
"<INPUT TYPE=hidden NAME=3 VALUE=W000>"
"%s. Please provide your warehouse ID and district ID.<BR>"
"Warehouse ID <INPUT NAME=4 SIZE=7><BR>"
"District  ID <INPUT NAME=5 SIZE=2><BR>"
"<HR>"
"<INPUT TYPE=submit NAME=0 VALUE=Begin>"
"</FORM></BODY>";


static char FormHeader [] =
"<BODY><FORM ACTION=%s METHOD=GET>";

#define FORM_BEGIN   "<BODY><FORM ACTION=%s METHOD=GET>"
#define FORM_END     "</FORM></BODY>"
#define FORM_SUBMIT  "<INPUT TYPE=submit NAME=0 VALUE=Process>"
#define FORM_MENU    "<INPUT TYPE=submit NAME=0 VALUE=Menu>"

static char MainForm [] =
FORM_BEGIN
"<INPUT TYPE=hidden NAME=3 VALUE=M%07d>"
"%60s<BR>"
"Please Select the Next Transaction.<BR>"
TRANSACTION_MENU
FORM_END;

static char ErrorForm [] =
FORM_BEGIN
"<INPUT TYPE=hidden NAME=3 VALUE=e%06d>"
"Error: %d %d %40s %s<BR>"
TRANSACTION_MENU
FORM_END;

/*
static char ErrorForm [] =
FORM_BEGIN
"<INPUT TYPE=hidden NAME=3 VALUE=e%06d>"
"Error: %d (%s): %s<BR>"
TRANSACTION_MENU
FORM_END;
*/
#define DE_EXTRA_ID      0
#define DE_INPUT_DID         DE_EXTRA_ID + 1
#define DE_INPUT_QTIME       DE_INPUT_DID + 1
#define DE_INPUT_MAX         DE_INPUT_QTIME + 1

#define OS_INPUT_DID         0
#define OS_INPUT_CID         OS_INPUT_DID + 1
#define OS_INPUT_NAME        OS_INPUT_CID + 1
#define OS_INPUT_MAX         OS_INPUT_NAME + 1

#define PA_INPUT_DID         0
#define PA_INPUT_CID         PA_INPUT_DID + 1
#define PA_INPUT_CWID        PA_INPUT_CID + 1
#define PA_INPUT_CDID        PA_INPUT_CWID + 1
#define PA_INPUT_NAME        PA_INPUT_CDID + 1
#define PA_INPUT_AMT         PA_INPUT_NAME + 1
#define PA_INPUT_MAX         PA_INPUT_AMT + 1
```

```
#define SL_INPUT_THRESHOLD   0
#define SL_INPUT_MAX         SL_INPUT_THRESHOLD + 1

#define NO_INPUT_DID         0
#define NO_INPUT_CID         NO_INPUT_DID + 1
#define NO_INPUT_SPW00       NO_INPUT_CID + 1
#define NO_INPUT_IID00       NO_INPUT_SPW00 + 1
#define NO_INPUT_QTY00       NO_INPUT_IID00 + 1
#define NO_INPUT_SPW01       NO_INPUT_QTY00 + 1
#define NO_INPUT_IID01       NO_INPUT_SPW01 + 1
#define NO_INPUT_QTY01       NO_INPUT_IID01 + 1
#define NO_INPUT_SPW02       NO_INPUT_QTY01 + 1
#define NO_INPUT_IID02       NO_INPUT_SPW02 + 1
#define NO_INPUT_QTY02       NO_INPUT_IID02 + 1
#define NO_INPUT_SPW03       NO_INPUT_QTY02 + 1
#define NO_INPUT_IID03       NO_INPUT_SPW03 + 1
#define NO_INPUT_QTY03       NO_INPUT_IID03 + 1
#define NO_INPUT_SPW04       NO_INPUT_QTY03 + 1
#define NO_INPUT_IID04       NO_INPUT_SPW04 + 1
#define NO_INPUT_QTY04       NO_INPUT_IID04 + 1
#define NO_INPUT_SPW05       NO_INPUT_QTY04 + 1
#define NO_INPUT_IID05       NO_INPUT_SPW05 + 1
#define NO_INPUT_QTY05       NO_INPUT_IID05 + 1
#define NO_INPUT_SPW06       NO_INPUT_QTY05 + 1
#define NO_INPUT_IID06       NO_INPUT_SPW06 + 1
#define NO_INPUT_QTY06       NO_INPUT_IID06 + 1
#define NO_INPUT_SPW07       NO_INPUT_QTY06 + 1
#define NO_INPUT_IID07       NO_INPUT_SPW07 + 1
#define NO_INPUT_QTY07       NO_INPUT_IID07 + 1
#define NO_INPUT_SPW08       NO_INPUT_QTY07 + 1
#define NO_INPUT_IID08       NO_INPUT_SPW08 + 1
#define NO_INPUT_QTY08       NO_INPUT_IID08 + 1
#define NO_INPUT_SPW09       NO_INPUT_QTY08 + 1
#define NO_INPUT_IID09       NO_INPUT_SPW09 + 1
#define NO_INPUT_QTY09       NO_INPUT_IID09 + 1
#define NO_INPUT_SPW10       NO_INPUT_QTY09 + 1
#define NO_INPUT_IID10       NO_INPUT_SPW10 + 1
#define NO_INPUT_QTY10       NO_INPUT_IID10 + 1
#define NO_INPUT_SPW11       NO_INPUT_QTY10 + 1
#define NO_INPUT_IID11       NO_INPUT_SPW11 + 1
#define NO_INPUT_QTY11       NO_INPUT_IID11 + 1
#define NO_INPUT_SPW12       NO_INPUT_QTY11 + 1
#define NO_INPUT_IID12       NO_INPUT_SPW12 + 1
#define NO_INPUT_QTY12       NO_INPUT_IID12 + 1
#define NO_INPUT_SPW13       NO_INPUT_QTY12 + 1
#define NO_INPUT_IID13       NO_INPUT_SPW13 + 1
#define NO_INPUT_QTY13       NO_INPUT_IID13 + 1
#define NO_INPUT_SPW14       NO_INPUT_QTY13 + 1
#define NO_INPUT_IID14       NO_INPUT_SPW14 + 1
#define NO_INPUT_QTY14       NO_INPUT_IID14 + 1
#define NO_INPUT_MAX         NO_INPUT_QTY14 + 1

#define DE_TERMID            0
#define DE_WID               DE_TERMID+1
#define DE_CARID             DE_WID+1
#define DE_FORMINDEX_SIZE    DE_CARID+1

static char DeliveryFormInput_Template [] =
"<INPUT TYPE=hidden NAME=3 VALUE=D#######>"
"<INPUT TYPE=hidden NAME=6 VALUE=0>"
"<PRE>                                   Delivery <BR>"
"Warehouse: ####### <BR><BR>"
"Carrier Number: <INPUT NAME=7 SIZE=2><BR><BR>"
"Execution Status: <BR></PRE>"
FORM_MENU
FORM_SUBMIT
FORM_END;

static char DeliveryFormOutput_Template [] =
"<INPUT TYPE=hidden NAME=3 VALUE=d#######>"
"<PRE>                                   Delivery <BR>"
"Warehouse: ####### <BR><BR>"
"Carrier Number: ##<BR><BR>"
"Execution Status: Delivery has been queued. <BR></PRE>"
TRANSACTION_MENU
FORM_END;

#define OS_TERMID            0
#define OS_WID               OS_TERMID+1
#define OS_DID               OS_WID+1
#define OS_CID               OS_DID+1
#define OS_FIRST             OS_CID+1
#define OS_MIDDLE            OS_FIRST+1
#define OS_LAST              OS_MIDDLE+1
#define OS_CBALANCE          OS_LAST+1
#define OS_OID               OS_CBALANCE+1
#define OS_ENTRY_DATE        OS_OID+1
#define OS_CARID             OS_ENTRY_DATE+1
#define OS_SUPW              OS_CARID+1
#define OS_ITEMID            OS_SUPW+1
#define OS_QTY               OS_ITEMID+1
#define OS_AMOUNT            OS_QTY+1
#define OS_DELDATE           OS_AMOUNT+1
#define OS_FORMINDEX_SIZE    OS_DELDATE+(14*5)+1


static char OrderStatusInput_Template [] =
"<INPUT TYPE=hidden NAME=3 VALUE=O#######>"
"<PRE>                                   Order-Status <BR>"
"Warehouse: #######  District: <INPUT NAME=8 SIZE=2><BR>"
"Customer: <INPUT NAME=9 SIZE=4> Name: <INPUT NAME=Y SIZE=23> <BR>"
"Cust-Balance:<BR><BR>"
"Order-Number:             Entry-Data:
Carrier-Number:<BR>"
"Supply-W     Item-ID    QTY     Amount       Delivery-
Data<BR></PRE><HR>"
FORM_MENU
FORM_SUBMIT
FORM_END;

static char OrderStatusOutput_Template [] =
"<INPUT TYPE=hidden NAME=3 VALUE=o#######>"
"<PRE>                                   Order Status <BR>"
"Warehouse: #######  District: ##<BR>"
"Customer: ####    Name: ################ ## ################<BR>"
"Cust-Balance: $#########<BR><BR>"
"Order-Number: ########    Entry-Date: ###################
Carrier-Number: ##<BR>"
"Supply-W     Item-ID    QTY     Amount       Delivery-Data<BR>"
"  ######       ######     ##     $#########      ##########<BR>"
"  ######       ######     ##     $#########      ##########<BR>"
"  ######       ######     ##     $#########      ##########<BR>"
"  ######       ######     ##     $#########      ##########<BR>"
"  ######       ######     ##     $#########      ##########<BR>"
"  ######       ######     ##     $#########      ##########<BR>"
"  ######       ######     ##     $#########      ##########<BR>"
"  ######       ######     ##     $#########      ##########<BR>"
"  ######       ######     ##     $#########      ##########<BR>"
"  ######       ######     ##     $#########      ##########<BR>"
"  ######       ######     ##     $#########      ##########<BR>"
"  ######       ######     ##     $#########      ##########<BR>"
"  ######       ######     ##     $#########      ##########<BR>"
"  ######       ######     ##     $#########      ##########<BR>"
"  ######       ######     ##     $#########      ##########<BR>"
"</PRE>"
TRANSACTION_MENU
FORM_END;

#define PA_INPUT_TERMID          0
#define PA_INPUT_WID             PA_TERMID+1
#define PA_INPUT_FORMINDEX_SIZE  PA_INPUT_WID+1

#define PA_TERMID                0
#define PA_DATE                  PA_TERMID+1
#define PA_WID                   PA_DATE+1
#define PA_DID                   PA_WID+1
#define PA_WST1                  PA_DID+1
#define PA_DST1                  PA_WST1+1
#define PA_WST2                  PA_DST1+1
#define PA_DST2                  PA_WST2+1
#define PA_WCITY                 PA_DST2+1
#define PA_WSTATE                PA_WCITY+1
#define PA_WZIP                  PA_WSTATE+1
#define PA_DCITY                 PA_WZIP+1
#define PA_DSTATE                PA_DCITY+1
#define PA_DZIP                  PA_DSTATE+1
#define PA_CID                   PA_DZIP+1
#define PA_CWARE                 PA_CID+1
#define PA_CDIST                 PA_CWARE+1
#define PA_CFIRST                PA_CDIST+1
#define PA_CMIDDLE               PA_CFIRST+1
#define PA_CLAST                 PA_CMIDDLE+1
#define PA_SINCE           PA_CLAST+1
#define PA_CST1                  PA_SINCE+1
#define PA_CREDIT                PA_CST1+1
#define PA_CST2                  PA_CREDIT+1
#define PA_DISC                  PA_CST2+1
#define PA_CCITY                 PA_DISC+1
#define PA_CSTATE                PA_CCITY+1
#define PA_CZIP                  PA_CSTATE+1
#define PA_CPHONE                PA_CZIP+1
#define PA_AMOUNT                PA_CPHONE+1
#define PA_CBAL                  PA_AMOUNT+1
#define PA_LIMIT                 PA_CBAL+1
#define PA_CUSTDATA              PA_LIMIT+1
#define PA_FORMINDEX_SIZE        PA_CUSTDATA+3+1

static char PaymentInput_Template [] =
"<INPUT TYPE=hidden NAME=3 VALUE=P#######>"
"<PRE>                                   Payment<BR>"
"Date: <BR><BR>"
"Warehouse: #######                           District: <INPUT
NAME=8 SIZE=2><BR>"
"<BR><BR><BR><BR>"
"Customer: <INPUT NAME=9 SIZE=4>"
"Cust-Warehouse: <INPUT NAME=Z SIZE=7>"
"Cust-District: <INPUT NAME=v SIZE=2><BR>"
"Name: <INPUT NAME=Y SIZE=16>                           Since:
<BR>"
"                                                   Credit: <BR>"
"                                                   Disc: <BR>"
"                                                   Phone:
<BR><BR>"
"Amount Paid:          $<INPUT NAME=w SIZE=7>        New Cust
Balance: <BR>"
"Credit limit:<BR><BR>Cust-Data: <BR><BR><BR><BR></PRE><HR>"
FORM_MENU
FORM_SUBMIT
FORM_END;

static char PaymentOutput_Template [] =
"<INPUT TYPE=hidden NAME=3 VALUE=p#######>"
```

```
"<PRE>                                   Payment<BR>"
"Date: ###################<BR><BR>"
"Warehouse: #######                           District: ##<BR>"
"####################
####################<BR>"
"####################
####################<BR>"
"#################### ## #########            ####################
## #########<BR>"
"<BR><BR>"
"Customer: #### Cust-Warehouse: ####### Cust-District: ##<BR>"
"Name:  ############### ## ################       Since:
##########<BR>"
"       ####################                      Credit: ##<BR>"
"       ####################                      %Disc:  ####<BR>"
"       #################### ## #########         Phone:
###################<BR>"
"<BR><BR>"
"Amount Paid:      $######     New Cust Balance:
$##############<BR>"
"Credit Limit:   $##############<BR><BR>"
"Cust-Data: ##################################################<BR>"
"           ##################################################<BR>"
"           ##################################################<BR>"
"           ##################################################<BR>"
"</PRE>"
TRANSACTION_MENU
FORM_END;

#define SL_TERMID                0
#define SL_WID                   SL_TERMID+1
#define SL_DID                   SL_WID+1
#define SL_THRESHOLD             SL_DID+1
#define SL_LOWSTOCK              SL_THRESHOLD+1
#define SL_FORMINDXE_SIZE        SL_LOWSTOCK

static char StockLevelInput_Template [] =
"<INPUT TYPE=hidden NAME=3 VALUE=S#######>"
"<PRE>                                   Stock-Level<BR>"
"Warehouse: #######  District ##<BR><BR>"
"Stock Level Threshold: <INPUT NAME=x SIZE=2><BR><BR>"
"low stock:     <BR></PRE><HR>"
FORM_MENU
FORM_SUBMIT
FORM_END;

static char StockLevelOutput_Template [] =
"<INPUT TYPE=hidden NAME=3 VALUE=s#######>"
"<PRE>                                   Stock Level<BR>"
"Warehouse: #######  District ##<BR><BR>"
"Stock Level Threshold: ##<BR><BR>"
"low stock:  ### <BR></PRE><HR>"
TRANSACTION_MENU
FORM_END;

#define NO_TERMID               0
#define NO_WID                  NO_TERMID+1
#define NO_DID                  NO_WID+1
#define NO_DATE                 NO_DID+1
#define NO_CID                  NO_DATE+1
#define NO_NAME                 NO_CID+1
#define NO_CREDIT               NO_NAME+1
#define NO_DISC                 NO_CREDIT+1
#define NO_OID                  NO_DISC+1
#define NO_LINES                NO_OID+1
#define NO_WTAX                 NO_LINES+1
#define NO_DTAX                 NO_WTAX+1
#define NO_SUPPW                NO_DTAX+1
#define NO_ITEMID               NO_SUPPW+1
#define NO_INAME                NO_ITEMID+1
#define NO_QTY                  NO_INAME+1
#define NO_STOCK                NO_QTY+1
#define NO_BRAND                NO_STOCK+1
#define NO_PRICE                NO_BRAND+1
#define NO_AMOUNT               NO_PRICE+1
#define NO_STATUS               NO_AMOUNT + 14*8 + 1
#define NO_TOTAL                NO_STATUS+1
#define NO_FORMINDEX_SIZE       NO_TOTAL+1

static char NewOrderInput_Template [] =
"<INPUT TYPE=hidden NAME=3 VALUE=N#######>"
"<PRE>                                  New Order<BR>"
"Warehouse: #######   District: <INPUT NAME=8 SIZE=2>
Date:<BR>"
"Customer: <INPUT NAME=9 size=4>  Name:               Credit:
%Disc:<BR>"
"Order Number:          Number of Lines:            W_tax:
D_tax:<BR><BR>"
" Supp_W   Item-Id  Item Name                Qty   Stock  B/G
Price   Amount<BR>"
"<INPUT NAME=A SIZE=6> <INPUT NAME=B SIZE=7><INPUT NAME=C
SIZE=2><BR>"
"<INPUT NAME=D SIZE=6> <INPUT NAME=E SIZE=7><INPUT NAME=F
SIZE=2><BR>"
"<INPUT NAME=G SIZE=6> <INPUT NAME=H SIZE=7><INPUT NAME=I
SIZE=2><BR>"
"<INPUT NAME=J SIZE=6> <INPUT NAME=K SIZE=7><INPUT NAME=L
SIZE=2><BR>"
"<INPUT NAME=M SIZE=6> <INPUT NAME=N SIZE=7><INPUT NAME=O
SIZE=2><BR>"
"<INPUT NAME=P SIZE=6> <INPUT NAME=Q SIZE=7><INPUT NAME=R
SIZE=2><BR>"
"<INPUT NAME=S SIZE=6> <INPUT NAME=T SIZE=7><INPUT NAME=U
SIZE=2><BR>"
"<INPUT NAME=V SIZE=6> <INPUT NAME=W SIZE=7><INPUT NAME=X
SIZE=2><BR>"
"<INPUT NAME=a SIZE=6> <INPUT NAME=b SIZE=7><INPUT NAME=c
SIZE=2><BR>"
"<INPUT NAME=d SIZE=6> <INPUT NAME=e SIZE=7><INPUT NAME=f
SIZE=2><BR>"
"<INPUT NAME=g SIZE=6> <INPUT NAME=h SIZE=7><INPUT NAME=i
SIZE=2><BR>"
"<INPUT NAME=j SIZE=6> <INPUT NAME=k SIZE=7><INPUT NAME=l
SIZE=2><BR>"
"<INPUT NAME=m SIZE=6> <INPUT NAME=n SIZE=7><INPUT NAME=o
SIZE=2><BR>"
"<INPUT NAME=p SIZE=6> <INPUT NAME=q SIZE=7><INPUT NAME=r
SIZE=2><BR>"
"<INPUT NAME=s SIZE=6> <INPUT NAME=t SIZE=7><INPUT NAME=u
SIZE=2><BR>"
"Execution Status:
Total:<BR></PRE><HR>"
FORM_MENU
FORM_SUBMIT
FORM_END;

static char NewOrderOutput_Template [] =
"<INPUT TYPE=hidden NAME=3 VALUE=n#######>"
"<PRE>                                   New Order<BR>"
"Warehouse: #######   District: ##                       Date:
###################<BR>"
"Customer:     ####   Name: ################   Credit: ##  %Disc:
##### <BR>"
"Order Number:  ########    Number of Lines: ##        W_tax: #####
D_tax: ##### <BR>"
"<BR>"
" Supp_W   Item-Id   Item Name                  Qty  Stock  B/G
Price   Amount<BR>"
" #######   ######   ########################   ##     ##    #
$###### $#######<BR>"
" #######   ######   ########################   ##     ##    #
$###### $#######<BR>"
" #######   ######   ########################   ##     ##    #
$###### $#######<BR>"
" #######   ######   ########################   ##     ##    #
$###### $#######<BR>"
" #######   ######   ########################   ##     ##    #
$###### $#######<BR>"
" #######   ######   ########################   ##     ##    #
$###### $#######<BR>"
" #######   ######   ########################   ##     ##    #
$###### $#######<BR>"
" #######   ######   ########################   ##     ##    #
$###### $#######<BR>"
" #######   ######   ########################   ##     ##    #
$###### $#######<BR>"
" #######   ######   ########################   ##     ##    #
$###### $#######<BR>"
" #######   ######   ########################   ##     ##    #
$###### $#######<BR>"
" #######   ######   ########################   ##     ##    #
$###### $#######<BR>"
" #######   ######   ########################   ##     ##    #
$###### $#######<BR>"
" #######   ######   ########################   ##     ##    #
$###### $#######<BR>"
" #######   ######   ########################   ##     ##    #
$###### $#######<BR>"
"Execution Status:   ########################
Total:  $#######<BR>"
"</PRE>"
TRANSACTION_MENU
FORM_END;




----------------------------------------------------------
modtpcc.h
----------------------------------------------------------
#include "..\DBConnection\mod_tpcc.h"
#include "..\DBConnection\tpcc_struct.h"
#include "..\DBConnection\mod_tpcc_error.h"
#include <oratypes.h>
#include <oci.h>
#include <ocidfn.h>

#define allocate_last_form(form, pool) \
(form)=(char *)((pool)->form_template_storage + \
 (Maxterms - 1) * (pool)->form_template_length)


#define MAXLEN 100
#define Default_DBConnections "20"
#define Default_Maxterms "100"
#define Default_DeliveryQueues "500"
#define Default_DeliveryThreads "50"
#define Default_StartTerm "1"
#define LogName "log\\modtpcc.log"
#define InitName "DBInit.ini"
#define DllName "DBConnection.dll"
```

```
#define mod_name "/tpcc/modtpcc.dll"


typedef struct _DelQueue_info {
  _DelQueue_info *Next;
  T_delivery_data *pdata;
  HANDLE queue_lock;
} DelQueue_info;


/******************************************************************
***************************
* global functions
*
*******************************************************************
**************************/

//void userlog (char *, ...);
void readInit(char *, char *, char *);
void allocateMemoryPool();
int initDelQueue();
int deleteDelQueue();
void endDeliveryThread(int);
void initDeliveryThread(void *);
DelQueue_info *DequeueDel();
void EnqueueDel(DelQueue_info *);
void addFreeDelQueue(DelQueue_info *);
DelQueue_info *findFreeDelQueue();

int parse_neworder_query(char *ptr, T_neworder_data *pdata);
int parse_payment_query(char *ptr, T_payment_data *pdata);
int parse_delivery_query(char *ptr, T_delivery_data *pdata);
int parse_orderstatus_query(char *ptr, T_orderstatus_data *pdata);
int parse_stocklevel_query(char *ptr, T_stocklevel_data *pdata);

int sendform_neworderoutput(int status, T_neworder_data *pdata);
int sendform_paymentoutput(int status, T_payment_data *pdata);
int sendform_orderstatusoutput(int status, T_orderstatus_data
*pdata);
int sendform_deliveryoutput(int status, T_delivery_data *pdata);
int sendform_stockleveloutput(int status, T_stocklevel_data
*pdata);

extern int (FAR * mod_tpcc_neworder)(T_neworder_data *);
extern int (FAR * mod_tpcc_payment)(T_payment_data *);
extern int (FAR * mod_tpcc_delivery)(T_delivery_data *, int);
extern int (FAR * mod_tpcc_orderstatus)(T_orderstatus_data *);
extern int (FAR * mod_tpcc_stocklevel)(T_stocklevel_data *);
extern void (FAR *userlog)(char * str, ...);
extern void (FAR *initDelLog)(int);
extern void (FAR *endDelLog)(int);


/******************************************************************
***************************
* global variables
*
*******************************************************************
**************************/

DWORD TlsPointer;
char DllPath[MAXLEN];
char LogFile[MAXLEN];
char InitFile[MAXLEN];
char DllFile[MAXLEN];
char origin[MAXLEN];
CRITICAL_SECTION critical_initDelQueue;
CRITICAL_SECTION critical_memory;
CRITICAL_SECTION critical_DelQueue_free;
CRITICAL_SECTION critical_DelQueue_work;
HANDLE waitAvailableDelQueue;
HANDLE waitDelWork;
HANDLE DelThreadRunning;
HINSTANCE dllinstance;
int useddel=0;
int DBConnections;
int Maxterms;
int DeliveryQueues;
int DeliveryThreads;
int modtpcc_ready=0;
int memory_ready=0;
int queue_ready=0;
int DeliveryThreadstop=0;
int StartTerm=1;
DelQueue_info *DelQueue_begin = NULL;
DelQueue_info *DelQueue_end = NULL;
DelQueue_info *DelQueue_free = NULL;

static form_index_entry
form_index[POOL_TYPE_TXN_MAX][TXN_TYPE_MAX][MAX_FORM_INDEX];
static form_template_pool
txn_global_pool[POOL_TYPE_TXN_MAX][TXN_TYPE_MAX];
static form_template_pool txn_data_pool;
static form_template_pool resp_global_pool;


char delivery_chars [] = {'6', '7'};
char orderstatus_chars [] = {'8', '9', 'Y'};
char payment_chars [] = {'8', '9', 'Z', 'v', 'Y', 'w'};
char stocklevel_chars [] = {'x'};
char neworder_chars [] = {'8', '9',
'A', 'B', 'C', 'D', 'E', 'F', 'G', 'H', 'I',
'J', 'K', 'L', 'M', 'N', 'O', 'P', 'Q', 'R',
'S', 'T', 'U', 'V', 'W', 'X', 'a', 'b', 'c',
'd', 'e', 'f', 'g', 'h', 'i', 'j', 'k', 'l',
'm', 'n', 'o', 'p', 'q', 'r', 's', 't', 'u'};
```

```
----------------------------------------------------------
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 inittpcc.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 inittpcc.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 = inittpcc.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
inittpcc.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, inittpcc.ware_name || '    ' ||
inittpcc.dist_name);
         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 inittpcc.ware_name,
                   :w_street_1, :w_street_2, :w_city, :w_state,
:w_zip;


         SELECT rowid
         BULK COLLECT INTO inittpcc.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;

       inittpcc.c_num := sql%rowcount;
       inittpcc.cust_rowid := inittpcc.row_id((inittpcc.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 = inittpcc.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 = inittpcc.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 inittpcc.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, inittpcc.ware_name || '    ' ||
inittpcc.dist_name);

         EXIT;

         EXCEPTION
            WHEN not_serializable OR deadlock OR snapshot_too_old
THEN
               ROLLBACK;
               :retry := :retry + 1;
         END;

      END LOOP;
   END;


---------------------------------------------------------
StdAfx.cpp
---------------------------------------------------------
// stdafx.cpp : source file that includes just the standard
includes
//  DBConnection.pch will be the pre-compiled header
//  stdafx.obj will contain the pre-compiled type information

#include "stdafx.h"

// TODO: reference any additional headers you need in STDAFX.H
// and not in this file



---------------------------------------------------------
StdAfx.h
---------------------------------------------------------
// stdafx.h : include file for standard system include files,
//  or project specific include files that are used frequently, but
//      are changed infrequently
//

#if
!defined(AFX_STDAFX_H__1D53560F_AAD5_4CEE_A8CC_651C9688A6DF__INCLUD
ED_)
#define
AFX_STDAFX_H__1D53560F_AAD5_4CEE_A8CC_651C9688A6DF__INCLUDED_

#if _MSC_VER > 1000
#pragma once
#endif // _MSC_VER > 1000


// Insert your headers here
#define WIN32_LEAN_AND_MEAN   // Exclude rarely-used stuff from
Windows headers

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


// TODO: reference additional headers your program requires here

//{{AFX_INSERT_LOCATION}}
// Microsoft Visual C++ will insert additional declarations
immediately before the previous line.

#endif //
!defined(AFX_STDAFX_H__1D53560F_AAD5_4CEE_A8CC_651C9688A6DF__INCLUD
ED_)



---------------------------------------------------------
tkvcinin.sql
---------------------------------------------------------
-- The initnew package for storing variables used in the
-- New Order anonymous block

CREATE OR REPLACE PACKAGE inittpcc
AS
 TYPE intarray IS TABLE OF INTEGER INDEX BY BINARY_INTEGER;
 TYPE distarray IS TABLE OF VARCHAR(24) INDEX BY BINARY_INTEGER;
 nulldate       DATE;
 TYPE rowidarray IS TABLE OF ROWID INDEX BY PLS_INTEGER;
 s_dist     distarray;
 idx1arr    intarray;
 s_remote   intarray;
 dist                   intarray;
 row_id                 rowidarray;
 cust_rowid             rowid;
 dist_name              VARCHAR2(11);
 ware_name              VARCHAR2(11);
 c_num                  PLS_INTEGER;

 PROCEDURE init_no(idxarr intarray);
 PROCEDURE init_del;
 PROCEDURE init_pay;
END inittpcc;
/
show errors;

CREATE OR REPLACE PACKAGE BODY inittpcc AS
  PROCEDURE init_no (idxarr  intarray)
  IS
  BEGIN
        -- initialize null date
   nulldate := TO_DATE('01-01-1811', 'MM-DD-YYYY');
    idx1arr := idxarr;
  END init_no;

  PROCEDURE init_del
  IS
  BEGIN
```

```
    FOR i IN 1 .. 10 LOOP
      dist(i) := i;
    END LOOP;
  END init_del;

  PROCEDURE init_pay IS
  BEGIN
    NULL;
  END init_pay;

END inittpcc;
/
show errors
exit



----------------------------------------------------------
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 = inittpcc.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 ordr 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 ordl 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,
inittpcc.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,
inittpcc.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,
inittpcc.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
        BULK COLLECT INTO :i_price, :i_name, :s_quantity,
inittpcc.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
        BULK COLLECT INTO :i_price, :i_name, :s_quantity,
inittpcc.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
        BULK COLLECT INTO :i_price, :i_name, :s_quantity,
inittpcc.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
        BULK COLLECT INTO :i_price, :i_name, :s_quantity,
inittpcc.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
        BULK COLLECT INTO :i_price, :i_name, :s_quantity,
inittpcc.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
        BULK COLLECT INTO :i_price, :i_name, :s_quantity,
inittpcc.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
        BULK COLLECT INTO :i_price, :i_name, :s_quantity,
inittpcc.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);
         inittpcc.s_dist(temp_index + 1) :=
inittpcc.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;
        inittpcc.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 ordr  (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, inittpcc.idx1arr(idx),
inittpcc.nulldate,
                 :ol_i_id(idx), :ol_supply_w_id(idx),
                 :ol_quantity(idx), :ol_amount(idx),
inittpcc.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;



---------------------------------------------------------
tpccflags.h
---------------------------------------------------------
//#define USE_IEEE_NUMBER





---------------------------------------------------------
tpccpl.h
---------------------------------------------------------
#ifndef TPCCPL_H
#define TPCCPL_H

//#include "tpcc.h"

#include <oratypes.h>
#include <oci.h>
#include <ocidfn.h>
#include <time.h>
#include <io.h>
#include "tpccflags.h"

#ifdef TUX
#define DELRT 5.0
#else
#define DELRT 80.0
#endif


#ifndef DISCARD
# define DISCARD (void)
#endif

#ifndef 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 */

/* 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"


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

#define ADR(object) ((ub1 *)&(object))
#define SIZ(object) ((sword)sizeof(object))

typedef char date[24+NLT];
typedef char varchar2;

#define OCIERROR(errp,function)\
  ocierror(__FILE__,__LINE__,(errp),(function));

#define OCIBND(stmp, bndp, errp, sqlvar, progv, 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)),\
         (progv), (progvl), (ftype),0,0,0,0,0,OCI_DEFAULT));

#define
OCIBNDRA(stmp,bndp,errp,sqlvar,progv,progvl,ftype,indp,alen,arcode)
\
       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)),\

(progv),(progvl),(ftype),(indp),(alen),(arcode),0,0,OCI_DEFAULT));
#define
OCIBNDRAD(stmp,bndp,errp,sqlvar,progvl,ftype,indp,ctxp,cbf_nodata,c
bf_data) \
       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)),0,(progvl),(ftype), \
        indp,0,0,0,0,OCI_DATA_AT_EXEC)); \
       ocierror(__FILE__,__LINE__,(errp), \

OCIBindDynamic((bndp),(errp),(ctxp),(cbf_nodata),(ctxp),(cbf_data))
);


#define
OCIBNDR(stmp,bndp,errp,sqlvar,progv,progvl,ftype,indp,alen,arcode)
\
       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)),\

(progv),(progvl),(ftype),(indp),(alen),(arcode),0,0,OCI_DEFAULT));

#define
OCIBNDRAA(stmp,bndp,errp,sqlvar,progv,progvl,ftype,indp,alen,arcode
,ms,cu) \
       ocierror(__FILE__,__LINE__, (errp), \
    OCIHandleAlloc((stmp),&(bndp),OCI_HTYPE_BIND,0,(dvoid**)0)); \
       ocierror(__FILE__,__LINE__,(errp),\
   OCIBindByName((stmp),&(bndp),(errp),(text
*)(sqlvar),strlen((sqlvar)),\

(progv),(progvl),(ftype),(indp),(alen),(arcode),(ms),(cu),OCI_DEFAU
LT));


#define OCIDEFINE(stmp,dfnp,errp,pos,progv,progvl,ftype)\

OCIDefineByPos((stmp),&(dfnp),(errp),(pos),(progv),(progvl),(ftype)
,\
          0,0,0,OCI_DEFAULT);


#define OCIDEF(stmp,dfnp,errp,pos,progv,progvl,ftype) \
       OCIHandleAlloc((stmp),(dvoid**)&(dfnp),OCI_HTYPE_DEFINE,0,\
              (dvoid**)0);\

OCIDefineByPos((stmp),&(dfnp),(errp),(pos),(progv),(progvl),\
         (ftype),NULL,NULL,NULL,OCI_DEFAULT); \

#define
OCIDFNRA(stmp,dfnp,errp,pos,progv,progvl,ftype,indp,alen,arcode) \
       OCIHandleAlloc((stmp),(dvoid**)&(dfnp),OCI_HTYPE_DEFINE,0,\
              (dvoid**)0);\
       OCIDefineByPos((stmp),&(dfnp),(errp),(pos),(progv),\
              (progvl),(ftype),(indp),(alen),\
              (arcode),OCI_DEFAULT);\

#define OBNDRV(lda,cursor,sqlvar,progv,progvl,ftype)\
    if
(obndrv((cursor),(text*)(sqlvar),NA,(ub1*)(progv),(progvl),(ftype),
NA,\
       (sb2 *)0, (text *)0, NA, NA))\
       {errrpt(lda,cursor);return(-1);}\
    else\
       DISCARD 0

#define
OBNDRA(lda,cursor,sqlvar,progv,progvl,ftype,indp,alen,arcode)\
    if
(obndra((cursor),(text*)(sqlvar),NA,(ub1*)(progv),(progvl),(ftype),
NA,\
       (indp),(alen),(arcode),(ub4)0,(ub4*)0,(text*)0,NA,NA))\
       {errrpt(lda,cursor);return(-1);}\
    else\
       DISCARD 0
```

```
#define
OBNDRAA(lda,cursor,sqlvar,progv,progvl,ftype,indp,alen,arcode,ms,cs
)\
    if
(obndra((cursor),(text*)(sqlvar),NA,(ub1*)(progv),(progvl),(ftype),
NA,\

(indp),(alen),(arcode),(ub4)(ms),(ub4*)(cs),(text*)0,NA,NA))\
       {errrpt(lda,cursor);return(-1);}\
    else\
       DISCARD 0

#define
ODEFIN(lda,cursor,pos,buf,bufl,ftype,scale,indp,fmt,fmtl,fmtt,rlen,
rcode)\
    if
(odefin((cursor),(pos),(ub1*)(buf),(bufl),(ftype),(scale),(indp),\
       (text*)(fmt),(fmtl),(fmtt),(rlen),(rcode)))\
       {errrpt(lda,cursor);return(-1);}\
    else\
       DISCARD 0

#define OEXFET(lda,cursor,nrows,cancel,exact)\
    if (oexfet((cursor),(nrows),(cancel),(exact)))\
       {if ((cursor)->rc == 1403) \
  {i=errrpt(lda,cursor); orol(lda); return(-1);} \
  else if (errrpt(lda,cursor)==RECOVERR) \
     {orol(lda);return(RECOVERR);} \
  else{orol(lda);return(-1);}}\
    else\
       DISCARD 0

#define OOPEN(lda,cursor)\
    if (oopen((cursor),(lda),(text*)0,NA,NA,(text*)0,NA))\
       {errrpt(lda,cursor);return(-1);}\
    else\
       DISCARD 0

#define OPARSE(lda,cursor,sqlstm,sqll,defflg,lngflg)\
    if
(oparse((cursor),(sqlstm),(sb4)(sqll),(defflg),(ub4)(lngflg)))\
       {errrpt(lda,cursor);return(-1);}\
    else\
       DISCARD 0

#define OFEN(lda,cursor,nrows)\
    if (ofen((cursor),(nrows)))\
       {if (errrpt(lda,cursor)==RECOVERR) \
     {orol(lda);return(RECOVERR);} \
  else{orol(lda);return(-1);}}\
    else\
       DISCARD 0

#define OEXEC(lda,cursor)\
    if (oexec((cursor)))\
       {if (errrpt(lda,cursor)==RECOVERR) \
     {orol(lda);return(RECOVERR);} \
  else{orol(lda);return(-1);}}\
    else\
       DISCARD 0


#define OCOM(lda,cursor)\
    if (ocom((lda))) \
       {errrpt(lda,cursor);orol(lda);return(-1);}\
    else\
       DISCARD 0


#define OEXN(lda,cursor,iters,rowoff)\
    if (oexn((cursor),(iters),(rowoff))) \
       {if (errrpt(lda,cursor)==RECOVERR) \
     {orol(lda);return(RECOVERR);} \
  else{orol(lda);return(-1);}}\
    else\
       DISCARD 0

/* bind in/out for plsql without indicator and rcode */
#define OCIBNDPL(stmp,bndp,errp,sqlvar,progv,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*)(progv),(progvl),(ftype),\
              NULLP(dvoid),(alen), NULLP(ub2),
0,NULLP(ub4),OCI_DEFAULT));


/* bind in/out for plsql arrays witout indicator and rcode */
#define
OCIBNDPLA(stmp,bndp,errp,sqlvar,progv,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
*)(progv), \

(progvl),(ftype),NULL,(alen),NULL,(ms),(cu),OCI_DEFAULT));

#define OCIDEFINE(stmp,dfnp,errp,pos,progv,progvl,ftype)\

OCIDefineByPos((stmp),&(dfnp),(errp),(pos),(progv),(progvl),(ftype)
,\
          0,0,0,OCI_DEFAULT);


#define OCIDEF(stmp,dfnp,errp,pos,progv,progvl,ftype) \
       OCIHandleAlloc((stmp),(dvoid**)&(dfnp),OCI_HTYPE_DEFINE,0,\
              (dvoid**)0);\

OCIDefineByPos((stmp),&(dfnp),(errp),(pos),(progv),(progvl),\
                           (ftype),NULL,NULL,NULL,OCI_DEFAULT); \


#define
OCIDFNRA(stmp,dfnp,errp,pos,progv,progvl,ftype,indp,alen,arcode) \
       OCIHandleAlloc((stmp),(dvoid**)&(dfnp),OCI_HTYPE_DEFINE,0,\
              (dvoid**)0);\
       OCIDefineByPos((stmp),&(dfnp),(errp),(pos),(progv),\
              (progvl),(ftype),(indp),(alen),\
              (arcode),OCI_DEFAULT);

#define
OCIDFNDYN(stmp,dfnp,errp,pos,progv,progvl,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),
(progvl),(ftype),\
                                      (indp),NULL,NULL,
OCI_DYNAMIC_FETCH));\
       ocierror(__FILE__,__LINE__,(errp), \
       OCIDefineDynamic((dfnp),(errp),(ctxp),(cbf_data)));


#endif



----------------------------------------------------------
tpcc_struct.h
----------------------------------------------------------
/* Copyright (c) 2004, Oracle Corporation.  All rights reserved.
*/

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

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

   RELATED DOCUMENTS
     <note any documents related to this facility>

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

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

   EXAMPLES

   NOTES
     <other useful comments, qualifications, etc.>

   MODIFIED   (MM/DD/YY)
   xnie        02/09/04 - add status field to carry error status
   shuang      01/22/04 - shuang_rte
   shuang      01/21/04 - Creation

*/

#define MAX_ORDERLINE  15
#define SMALL_BUF_SIZE 32

#define TXN_COMMON_DATA \
   int w_id; \
   int ld_id; \
   int txn_status; \
   int db_status; \
   void *context


struct T_connect_data
{
   TXN_COMMON_DATA;
};
typedef struct T_connect_data T_connect_data;

struct T_date
{
```

```
   char DateString[20];
};
typedef struct T_date T_date;

struct T_delivery_data
{
   TXN_COMMON_DATA;
   double          enqueue_time;
   double          dequeue_time;
   double          complete_time;
   int             o_carrier_id;
   int             o_id[10];
};
typedef struct T_delivery_data T_delivery_data;

struct T_orderline
{
   int    ol_i_id;
   int    ol_supply_w_id;
   int    ol_quantity;
   char   i_name[25];
   int    s_quantity;
   char   b_g[2];
   double i_price;
   double ol_amount;
};
typedef struct T_orderline T_orderline;

struct T_neworder_data
{
   TXN_COMMON_DATA;
   int     d_id;
   int     c_id;
   int     o_ol_cnt;
   int     o_all_local;
   T_orderline o_orderline[MAX_ORDERLINE];
   T_date  o_entry_d;
   char    c_last[17];
   char    c_credit[3];
   double  c_discount;
   double  w_tax;
   double  d_tax;
   int     o_id;
   double  total_amount;
   int     status;
};
typedef struct T_neworder_data T_neworder_data;

struct T_stocklevel_data
{
   TXN_COMMON_DATA;
   int    threshold;
   int    low_stock;
};
typedef struct T_stocklevel_data T_stocklevel_data;

struct T_orderline_status
{
   int    ol_supply_w_id;
   int    ol_i_id;
   int    ol_quantity;
   double ol_amount;
   T_date ol_delivery_d;
};
typedef struct T_orderline_status T_orderline_status;

struct T_orderstatus_data
{
   TXN_COMMON_DATA;
   int     by_last_name;
   int     d_id;
   int     c_id;
   char    c_last[17];
   char    c_first[17];
   char    c_middle[3];
   double  c_balance;
   int     o_id;
   T_date  o_entry_d;
   int     o_carrier_id;
   int     o_ol_cnt;
   T_orderline_status  o_orderline[MAX_ORDERLINE];
};
typedef struct T_orderstatus_data T_orderstatus_data;

struct T_payment_data
{
   TXN_COMMON_DATA;
   int     by_last_name;
   int     d_id;
   int     c_id;
   char    c_last[17];
   int     c_w_id;
   int     c_d_id;
   double  h_amount;
   T_date  h_date;
   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_first[17];
   char    c_middle[3];
   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];
   T_date  c_since;
   char    c_credit[3];
   double  c_credit_lim;
   double  c_discount;
   double  c_balance;
   char    c_data[201];
};
typedef struct T_payment_data T_payment_data;


struct T_transaction_data
{
   int txn_type;
   union {
      T_delivery_data delivery_data;
      T_payment_data payment_data;
      T_neworder_data neworder_data;
      T_stocklevel_data stocklevel_data;
      T_orderstatus_data orderstatus_data;
   } txn_data;

};
typedef struct T_transaction_data T_transaction_data;


struct T_login_data
{
   TXN_COMMON_DATA;
   char   server[SMALL_BUF_SIZE];
   char   database[SMALL_BUF_SIZE];
   char   user[SMALL_BUF_SIZE];
   char   password[SMALL_BUF_SIZE];
   char   application[SMALL_BUF_SIZE];
};
typedef struct T_login_data T_login_data;





----------------------------------------------------------
tpccstruct.h
----------------------------------------------------------


#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];

#ifdef USE_IEEE_NUMBER
  float s_remote[NITEMS];
#else
  int s_remote[NITEMS];
#endif
  char s_dist_info[NITEMS][25];
  OCIStmt *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;
  OCIStmt *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;

  ub2 w_id_len;
  ub2 d_id_len;
  ub2 c_id_len;
  ub2 o_all_local_len;
  ub2 o_ol_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;



#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];
   OCIStmt *curd0;
   OCIStmt *curd1;
   OCIStmt *curd2;
   OCIStmt *curd3;
   OCIStmt *curd4;
   OCIStmt *curd5;
   OCIStmt *curd6;
   OCIStmt *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];
#ifdef USE_IEEE_NUMBER
   float sums[NDISTS];
#else
   int sums[NDISTS];
#endif
   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;
   OCIStmt *curp1;
   OCIStmt *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 pldelctx pldelctx;

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;


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;

   OCIStmt *curo0;
   OCIStmt *curo1;
   OCIStmt *curo2;
   OCIStmt *curo3;
   OCIStmt *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;
   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_id_dp[2];
   OCIDefine *o_entry_d_dp[2];
   OCIDefine *o_cr_id_dp[2];
   OCIDefine *o_ol_cnt_dp[2];
   OCIDefine *ol_d_d_dp;
   OCIDefine *ol_i_id_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;
   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;


struct payctx {
  OCIStmt *curpi;
  OCIStmt *curp0;
  OCIStmt *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;



struct stoctx {
  OCIStmt *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;


/* 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;
   int 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 plsqlflag;
};

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;
};



----------------------------------------------------------
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;
```

```
# PRTE COMMAND FILE
# C_LAST        is the constant value used for customer last names.
database.set network_variable C_LAST      87
```

# *Appendix B: Database Design*

```
--------------------------

---- createdb.sql

--------------------------



/* created automatically by
/home/oracle/tpcc13530/scripts/buildcreatedb.sh Tue Aug 24 10:55:23
CDT 2004 */
spool createdb.log

set echo on

shutdown abort

startup pfile=p_create.ora nomount
create database tpcc
  controlfile reuse
  maxinstances 1
  datafile
   '/home/oracle/dev/system_1' size 400M reuse
  logfile '/home/oracle/dev/log_1_1' size 24774M reuse,
          '/home/oracle/dev/log_1_2' size 24774M reuse
  sysaux datafile '/home/oracle/dev/tpccaux' size 120M reuse ;



create undo tablespace undo_1 datafile
  '/home/oracle/dev/roll1' size 8096M reuse blocksize 8K;

set echo off
exit sql.sqlcode
--------------------------

---- createindex_icust1.sql

--------------------------



/* created automatically by
/home/oracle/tpcc13530/scripts/buildcreateindex.sh Tue Aug 24
10:55:34 CDT 2004 */
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  initrans 3
  storage ( buffer_pool default )
  parallel 16
  compute statistics
  tablespace icust1_0 ;
    set echo off
    spool off
    exit sql.sqlcode;
--------------------------

---- createindex_icust2.sql

--------------------------



/* created automatically by
/home/oracle/tpcc13530/scripts/buildcreateindex.sh Tue Aug 24
10:55:35 CDT 2004 */
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  initrans 3
  storage ( buffer_pool default )
  compute statistics
  tablespace icust2_0 ;
    set echo off
    spool off
    exit sql.sqlcode;
--------------------------

---- createindex_idist.sql

--------------------------



/* created automatically by
/home/oracle/tpcc13530/scripts/buildcreateindex.sh Tue Aug 24
10:55:35 CDT 2004 */
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  initrans 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
/home/oracle/tpcc13530/scripts/buildcreateindex.sh Tue Aug 24
10:55:37 CDT 2004 */
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  initrans 4
  storage ( buffer_pool default )

  compute statistics
  tablespace iitem_0 ;
    set echo off
    spool off
    exit sql.sqlcode;
--------------------------

---- createindex_inord.sql

--------------------------



/* created automatically by
/home/oracle/tpcc13530/scripts/buildcreateindex.sh Tue Aug 24
10:55:39 CDT 2004 */
set timing on
  exit 0;
--------------------------

---- createindex_iordl.sql

--------------------------



/* created automatically by
/home/oracle/tpcc13530/scripts/buildcreateindex.sh Tue Aug 24
10:55:38 CDT 2004 */
set timing on
  exit 0;
--------------------------

---- createindex_iordr1.sql

--------------------------



/* created automatically by
/home/oracle/tpcc13530/scripts/buildcreateindex.sh Tue Aug 24
10:55:37 CDT 2004 */
set timing on
  exit 0;
--------------------------

---- createindex_iordr2.sql
```

```
---------------------------



/* created automatically by
/home/oracle/tpcc13530/scripts/buildcreateindex.sh Tue Aug 24
10:55:38 CDT 2004 */
set timing on
    set sqlblanklines on
    spool createindex_iordr2.log ;
    set echo on ;
    drop index iordr2 ;
      create unique index iordr2 on ordr ( o_c_id
, o_d_id
, o_w_id
, o_id )
  pctfree 25  initrans 4
  storage ( buffer_pool default )
  parallel 1
  compute statistics
  tablespace iordr2_0 ;
    set echo off
    spool off
    exit sql.sqlcode;
---------------------------

---- createindex_istok.sql

---------------------------



/* created automatically by
/home/oracle/tpcc13530/scripts/buildcreateindex.sh Tue Aug 24
10:55:36 CDT 2004 */
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 1
  compute statistics
  tablespace istok_0 ;
    set echo off
    spool off
    exit sql.sqlcode;
---------------------------

---- createindex_iware.sql

---------------------------



/* created automatically by
/home/oracle/tpcc13530/scripts/buildcreateindex.sh Tue Aug 24
10:55:34 CDT 2004 */
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;
---------------------------

---- createspacestats.sql

---------------------------



@space_init
@space_get 12 10
@space_rpt
spool off
exit sql.sqlcode;
---------------------------

---- createstoredprocs.sql

---------------------------



spool createstoreprocs.log
@tkvcinin.sql
spool off
exit sql.sqlcode;
```

```
---------------------------

---- createtable_cust.sql

---------------------------



/* created automatically by
/home/oracle/tpcc13530/scripts/buildcreatetable.sh Tue Aug 24
10:55:25 CDT 2004 */
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 405900000
  hash is ( (c_id * ( 13530 * 10 ) + c_w_id * 10 + c_d_id) )
  size 180
  pctfree 0  initrans 3
  storage ( buffer_pool recycle ) parallel ( degree 4 )
  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
/home/oracle/tpcc13530/scripts/buildcreatetable.sh Tue Aug 24
10:55:27 CDT 2004 */
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 135300
  hash is ( ((d_w_id * 10) + d_id) )
  size 1448
    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
/home/oracle/tpcc13530/scripts/buildcreatetable.sh Tue Aug 24
10:55:28 CDT 2004 */
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
/home/oracle/tpcc13530/scripts/buildcreatetable.sh Tue Aug 24
10:55:30 CDT 2004 */
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
/home/oracle/tpcc13530/scripts/buildcreatetable.sh Tue Aug 24
10:55:32 CDT 2004 */
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 135300
    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
/home/oracle/tpcc13530/scripts/buildcreatetable.sh Tue Aug 24
10:55:32 CDT 2004 */
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
/home/oracle/tpcc13530/scripts/buildcreatetable.sh Tue Aug 24
10:55:31 CDT 2004 */
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 135300
    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
/home/oracle/tpcc13530/scripts/buildcreatetable.sh Tue Aug 24
10:55:28 CDT 2004 */
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 1353000000
  hash is ( (s_i_id * 13530 + s_w_id) )
  size 256
  pctfree 0  initrans 2 maxtrans 2
  storage ( buffer_pool keep ) parallel ( degree 4 )
  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 varchar2(24)
, s_dist_02 varchar2(24)
, s_dist_03 varchar2(24)
, s_dist_04 varchar2(24)
, s_dist_05 varchar2(24)
, s_dist_06 varchar2(24)
, s_dist_07 varchar2(24)
, s_dist_08 varchar2(24)
, s_dist_09 varchar2(24)
, s_dist_10 varchar2(24)
)
cluster stokcluster (
  s_i_id
, s_w_id
);
    set echo off
    spool off
    exit sql.sqlcode;
---------------------------

---- createtable_ware.sql

---------------------------



/* created automatically by
/home/oracle/tpcc13530/scripts/buildcreatetable.sh Tue Aug 24
10:55:24 CDT 2004 */
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 13530
  hash is ( (w_id - 1) )
  size 1448
    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
/home/oracle/tpcc13530/scripts/buildcreatets.sh Tue Aug 24 10:55:13
CDT 2004

# Tablespace ware, ts size 40M (40960K)
# each file 40M (40960K)
# extents 29166K (29166K)
# 1 files

$tpcc_createts ware 1 1       40M 29166K unix 0       0 4 auto t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for ware failed.  Exiting.
      exit 0
    fi

# Tablespace cust, ts size 353400M (361881600K)
# each file 5890M (6031360K)
# extents 103948K (103948K)
# 60 files

$tpcc_createts cust 60 1       5890M 103948K unix 0       1 4 auto
t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for cust failed.  Exiting.
      exit 0
    fi

# Tablespace dist, ts size 280M (286720K)
# each file 280M (286720K)
# extents 282448K (282448K)
# 1 files

$tpcc_createts dist 1 1       280M 282448K unix 0       61 4 auto t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for dist failed.  Exiting.
      exit 0
    fi

# Tablespace hist, ts size 42800M (43827200K)
# each file 2140M (2191360K)
# extents 99224K (99224K)
# 20 files

$tpcc_createts hist 20 1       2140M 99224K unix 0       62 4 auto
t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for hist failed.  Exiting.
      exit 0
    fi

# Tablespace stok, ts size 397200M (406732800K)
# each file 6620M (6778880K)
# extents 104110K (104110K)
# 60 files

$tpcc_createts stok 60 1       6620M 104110K unix 0       82 4 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_createts item 1 1       20M 16892K unix 0       142 4 auto t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for item failed.  Exiting.
      exit 0
    fi

# Tablespace ordr, ts size 617200M (632012800K)
# each file 30860M (31600640K)
# extents 103232K (103232K)
# 20 files

$tpcc_createts ordr 20 1       30860M 103232K unix 0       143 4
16K t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for ordr failed.  Exiting.
      exit 0
    fi

# Tablespace nord, ts size 4600M (4710400K)
# each file 4600M (4710400K)
# extents 470064K (470064K)
# 1 files

$tpcc_createts nord 1 1       4600M 470064K unix 0       163 4 auto
t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for nord failed.  Exiting.
      exit 0
    fi

# Tablespace iware, ts size 20M (20480K)
# each file 20M (20480K)
# extents 17936K (17936K)
# 1 files

$tpcc_createts iware 1 1       20M 17936K unix 0       164 4 auto t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for iware failed.  Exiting.
      exit 0
    fi

# Tablespace icust1, ts size 9550M (9779200K)
# each file 9550M (9779200K)
# extents 305456K (305456K)
# 1 files

$tpcc_createts icust1 1 1       9550M 305456K unix 0       165 4
16K t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for icust1 failed.  Exiting.
      exit 0
    fi

# Tablespace icust2, ts size 24600M (25190400K)
# each file 1230M (1259520K)
# extents 39078K (39078K)
# 20 files

$tpcc_createts icust2 20 1       1230M 39078K unix 0       166 4
auto t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for icust2 failed.  Exiting.
      exit 0
    fi

# Tablespace idist, ts size 70M (71680K)
# each file 70M (71680K)
# extents 68674K (68674K)
# 1 files

$tpcc_createts idist 1 1       70M 68674K unix 0       186 4 auto t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for idist failed.  Exiting.
      exit 0
    fi

# Tablespace istok, ts size 28230M (28907520K)
# each file 28230M (28907520K)
# extents 903024K (903024K)
# 1 files

$tpcc_createts istok 1 1       28230M 903024K unix 0       187 4
16K t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for istok failed.  Exiting.
      exit 0
    fi

# Tablespace iitem, ts size 20M (20480K)
# each file 20M (20480K)
# extents 11264K (11264K)
# 1 files

$tpcc_createts iitem 1 1       20M 11264K unix 0       188 4 auto t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for iitem failed.  Exiting.
      exit 0
    fi

# Tablespace iordr2, ts size 24400M (24985600K)
# each file 1220M (1249280K)
# extents 38932K (38932K)
# 20 files

$tpcc_createts iordr2 20 1       1220M 38932K unix 0       189 4
auto t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for iordr2 failed.  Exiting.
      exit 0
    fi

# Tablespace temp, ts size 71000M (72704000K)
# each file 3550M (3635200K)
# extents 201468K (201468K)
# 20 files

$tpcc_createts temp 20 1       3550M 201468K unix 1       209 4
auto t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for temp failed.  Exiting.
      exit 0
```

```
    fi
---------------------------

---- loadcust.sh

---------------------------



#created automatically by
/home/oracle/tpcc13530/scripts/evenload.sh Tue Aug 24 10:55:33 CDT
2004
rm -f loadcust*.log
cd $tpcc_bench
allprocs=
$tpcc_load -M 13530 -C  -l 1 -m 375 >> loadcust0.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -C  -l 376 -m 750 >> loadcust1.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -C  -l 751 -m 1125 >> loadcust2.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -C  -l 1126 -m 1500 >> loadcust3.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -C  -l 1501 -m 1875 >> loadcust4.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -C  -l 1876 -m 2250 >> loadcust5.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -C  -l 2251 -m 2625 >> loadcust6.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -C  -l 2626 -m 3000 >> loadcust7.log 2>&1 &
allprocs="$allprocs ${!}"
error=0
for curproc in $allprocs; do
  wait $curproc
  error=`expr $? + $error`
done
exit `expr $error != 0`
---------------------------

---- loaddist.sh

---------------------------



cd $tpcc_bench
$tpcc_load -M $tpcc_scale -d > loaddist.log 2>&1
---------------------------

---- loadhist.sh

---------------------------



#created automatically by
/home/oracle/tpcc13530/scripts/evenload.sh Tue Aug 24 10:55:33 CDT
2004
rm -f loadhist*.log
cd $tpcc_bench
allprocs=
$tpcc_load -M 13530 -h  -b 1 -e 1691 >> loadhist0.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -h  -b 1692 -e 3382 >> loadhist1.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -h  -b 3383 -e 5073 >> loadhist2.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -h  -b 5074 -e 6764 >> loadhist3.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -h  -b 6765 -e 8455 >> loadhist4.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -h  -b 8456 -e 10146 >> loadhist5.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -h  -b 10147 -e 11838 >> loadhist6.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -h  -b 11839 -e 13530 >> loadhist7.log 2>&1 &
allprocs="$allprocs ${!}"
error=0
for curproc in $allprocs; do
  wait $curproc
  error=`expr $? + $error`
done
exit `expr $error != 0`
---------------------------

---- loaditem.sh

---------------------------



cd $tpcc_bench
$tpcc_load -M $tpcc_scale -i > loaditem.log 2>&1
---------------------------

---- loadnord.sh

---------------------------
```

```
#created automatically by
/home/oracle/tpcc13530/scripts/evenload.sh Tue Aug 24 10:55:33 CDT
2004
rm -f loadnord*.log
cd $tpcc_bench
allprocs=
$tpcc_load -M 13530 -n  -b 1 -e 13530  >> loadnord0.log 2>&1 &
allprocs="$allprocs ${!}"
error=0
for curproc in $allprocs; do
  wait $curproc
  error=`expr $? + $error`
done
exit `expr $error != 0`
---------------------------

---- loadordrordl.sh

---------------------------



#created automatically by
/home/oracle/tpcc13530/scripts/evenload.sh Tue Aug 24 10:55:33 CDT
2004
rm -f loadordrordl*.log
cd $tpcc_bench
allprocs=
$tpcc_load -M 13530 -o ${tpcc_disks_location}dummy0.dat -b 1 -e
1691 >> loadordrordl0.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -o ${tpcc_disks_location}dummy1.dat -b 1692 -e
3382 >> loadordrordl1.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -o ${tpcc_disks_location}dummy2.dat -b 3383 -e
5073 >> loadordrordl2.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -o ${tpcc_disks_location}dummy3.dat -b 5074 -e
6764 >> loadordrordl3.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -o ${tpcc_disks_location}dummy4.dat -b 6765 -e
8455 >> loadordrordl4.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -o ${tpcc_disks_location}dummy5.dat -b 8456 -e
10146 >> loadordrordl5.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -o ${tpcc_disks_location}dummy6.dat -b 10147 -e
11838 >> loadordrordl6.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -o ${tpcc_disks_location}dummy7.dat -b 11839 -e
13530 >> loadordrordl7.log 2>&1 &
allprocs="$allprocs ${!}"
error=0
for curproc in $allprocs; do
  wait $curproc
  error=`expr $? + $error`
done
exit `expr $error != 0`
---------------------------

---- loadstok.sh

---------------------------



#created automatically by
/home/oracle/tpcc13530/scripts/evenload.sh Tue Aug 24 10:55:33 CDT
2004
rm -f loadstok*.log
cd $tpcc_bench
allprocs=
$tpcc_load -M 13530 -S  -j 1 -k 12500 >> loadstok0.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -S  -j 12501 -k 25000 >> loadstok1.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -S  -j 25001 -k 37500 >> loadstok2.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -S  -j 37501 -k 50000 >> loadstok3.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -S  -j 50001 -k 62500 >> loadstok4.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -S  -j 62501 -k 75000 >> loadstok5.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -S  -j 75001 -k 87500 >> loadstok6.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 13530 -S  -j 87501 -k 100000 >> loadstok7.log 2>&1 &
allprocs="$allprocs ${!}"
error=0
for curproc in $allprocs; do
  wait $curproc
  error=`expr $? + $error`
done
exit `expr $error != 0`
---------------------------

---- loadware.sh

---------------------------
```

```

cd $tpcc_bench
$tpcc_load -M $tpcc_scale -w > loadware.log 2>&1
---------------------------

---- 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', 'IORDL');

   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;

--------------------------

---- tkvcinin.sql

--------------------------



-- The initnew package for storing variables used in the
-- New Order anonymous block

CREATE OR REPLACE PACKAGE inittpcc
AS
 TYPE intarray IS TABLE OF INTEGER INDEX BY BINARY_INTEGER;
 TYPE distarray IS TABLE OF VARCHAR(24) INDEX BY BINARY_INTEGER;
 nulldate       DATE;
 TYPE rowidarray IS TABLE OF ROWID INDEX BY PLS_INTEGER;
 s_dist     distarray;
 idx1arr    intarray;
 s_remote   intarray;
 dist                   intarray;
 row_id                 rowidarray;
 cust_rowid             rowid;
 dist_name              VARCHAR2(11);
 ware_name              VARCHAR2(11);
 c_num                  PLS_INTEGER;

 PROCEDURE init_no(idxarr intarray);
 PROCEDURE init_del;
 PROCEDURE init_pay;
END inittpcc;
/
show errors;

CREATE OR REPLACE PACKAGE BODY inittpcc AS
  PROCEDURE init_no (idxarr  intarray)
  IS
  BEGIN
        -- initialize null date
   nulldate := TO_DATE('01-01-1811', 'MM-DD-YYYY');
    idx1arr := idxarr;
  END init_no;

  PROCEDURE init_del
  IS
  BEGIN
    FOR i IN 1 .. 10 LOOP
      dist(i) := i;
    END LOOP;
  END init_del;

  PROCEDURE init_pay IS
  BEGIN
    NULL;
  END init_pay;

END inittpcc;
/
show errors
exit
```

# *Appendix C: Tunable Parameters*

## SEQUENCE OF EVENTS FOR PERFORMANCE RUN

```
     1.   Boot up systems clients, servers, & RTEs).
     2.   Change timerdelay setting on qlogic driver.
     3.   Startup the database on the server using linux.ora.
     4.   Start the RTE.
     5.   Adjust RTE throttle.
```

```
----------------------

--- 4640_4.pr

----------------------

echo

##################################################################
#############
#
#
#                        PRTE COMMAND FILE FOR v6-1-0
#
#
#
##################################################################
#############

noecho

##################################################################
####
#
#
# PRTE internal variables.
#
#
#
#   set {var} {val}
#
#
#
##################################################################
####
#
# startup_interval must be set (before connects).  It controls the
rate at
#                  which prte user processes are forked off
initially.
#
# start_interval   controls the rate at which prte users are
started when the
#                  "start" command is issued at the console level.
#
# resume_interval  controls how fast resumes are done when the
"resume"
#                  command is issued at the console level.  (NOTE:
resumes
#                  done on the tester's behalf by the master user
are
#                  controlled by the network variable RESUME_DELAY
set below).
#
# stop_interval    controls how fast stops are done when the "stop"
#                  command is issued at the console level.  (NOTE:
stops done
#                  on the tester's behalf by the master user are
controlled by
#                  the network variable STOP_DELAY set below).
#
# type_rate        is the typing delay between each character???

# .0001 .0002 .001 .001 ko
set startup_interval  0.0001
set start_interval  0.001
set resume_interval 0.001
set stop_interval 0.001
set type_rate   0.0

echo

##################################################################
#############
#
#
# Initializing connections.
#
#
#
##################################################################
#############

noecho

##################################################################
####
#
#
# Connect commands.
#
#
#
#   connect {exe} {prte to run on} {# users} {machine to connect
to}  #
#
#
##################################################################
####
#
# delay between the fork for each user process is startup_interval,
# defined above in the "PRTE internal variables" section.
#
# NOTE: The order of the connect statements is relevant since it
determines
#       the order in which prte user id's get assigned.  All
connect statements
#       for tpcc users (web_user, unix_user) should come first,
followed by
#       the connect statement for reduce, followed by the connect
#       statement for tpcc_master.
#

disable init

!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 1000  cr160
!n200 connect ~tpcc/bin/web_user  n69 500 cr160

!n200 connect ~tpcc/bin/web_user  n69 1000  cr162
!n200 connect ~tpcc/bin/web_user  n69 1000  cr162
!n200 connect ~tpcc/bin/web_user  n69 1000  cr162
!n200 connect ~tpcc/bin/web_user  n69 1000  cr162
!n200 connect ~tpcc/bin/web_user  n69 1000  cr162
!n200 connect ~tpcc/bin/web_user  n69 1000  cr162
!n200 connect ~tpcc/bin/web_user  n69 1000  cr162
!n200 connect ~tpcc/bin/web_user  n69 1000  cr162
!n200 connect ~tpcc/bin/web_user  n69 1000  cr162
!n200 connect ~tpcc/bin/web_user  n69 1000  cr162
!n200 connect ~tpcc/bin/web_user  n69  750  cr162
!n200 connect ~tpcc/bin/web_user  n70 1000  cr162
!n200 connect ~tpcc/bin/web_user  n70 1000  cr162
!n200 connect ~tpcc/bin/web_user  n70 1000  cr162
!n200 connect ~tpcc/bin/web_user  n70 1000  cr162
!n200 connect ~tpcc/bin/web_user  n70 1000  cr162
!n200 connect ~tpcc/bin/web_user  n70 1000  cr162
!n200 connect ~tpcc/bin/web_user  n70 1000  cr162
!n200 connect ~tpcc/bin/web_user  n70 1000  cr162
!n200 connect ~tpcc/bin/web_user  n70 1000  cr162
!n200 connect ~tpcc/bin/web_user  n70 1000  cr162
!n200 connect ~tpcc/bin/web_user  n70  750  cr162

!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 1000  cr163
!n200 connect ~tpcc/bin/web_user  n70 500 cr163

!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
```

```
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 1000  cr165
!n200 connect ~tpcc/bin/web_user  n71 500 cr165

!n200 connect ~tpcc/bin/web_user  n71 1000  cr167
!n200 connect ~tpcc/bin/web_user  n71 1000  cr167
!n200 connect ~tpcc/bin/web_user  n71 1000  cr167
!n200 connect ~tpcc/bin/web_user  n71 1000  cr167
!n200 connect ~tpcc/bin/web_user  n71 1000  cr167
!n200 connect ~tpcc/bin/web_user  n71 1000  cr167
!n200 connect ~tpcc/bin/web_user  n71 1000  cr167
!n200 connect ~tpcc/bin/web_user  n71 1000  cr167
!n200 connect ~tpcc/bin/web_user  n71 1000  cr167
!n200 connect ~tpcc/bin/web_user  n71 1000  cr167
!n200 connect ~tpcc/bin/web_user  n71  750  cr167
!n200 connect ~tpcc/bin/web_user  n72 1000  cr167
!n200 connect ~tpcc/bin/web_user  n72 1000  cr167
!n200 connect ~tpcc/bin/web_user  n72 1000  cr167
!n200 connect ~tpcc/bin/web_user  n72 1000  cr167
!n200 connect ~tpcc/bin/web_user  n72 1000  cr167
!n200 connect ~tpcc/bin/web_user  n72 1000  cr167
!n200 connect ~tpcc/bin/web_user  n72 1000  cr167
!n200 connect ~tpcc/bin/web_user  n72 1000  cr167
!n200 connect ~tpcc/bin/web_user  n72 1000  cr167
!n200 connect ~tpcc/bin/web_user  n72 1000  cr167
!n200 connect ~tpcc/bin/web_user  n72  750  cr167

!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 1000  cr169
!n200 connect ~tpcc/bin/web_user  n72 500 cr169

connect ~tpcc/bin/reduce  localhost 1 localhost
#connect ~tpcc/bin/aide   localhost 1 fe_21
connect ~tpcc/bin/tpcc_master localhost 1 localhost

# NOTE:   timeout MUST be set after the connect statements for it
to
#   take effect.
#
# timeout          is how long prte will wait for an outstanding
command to
#                  return its expected prompt before timing out.
#

set timeout 3600

echo

###################################################################
#############
#
#
# Setting PRTE network variables.
#
#
#
###################################################################
#############

noecho

###################################################################
####
#
#
# PRTE network variables.
#
#
#
#   set network_variable {name} {val}
#
#
#
###################################################################
####

#################################
#                               #
#  FRONT END NETWORK VARIABLES  #
#                               #
#################################
#
# FE_NAMES       A comma seperated list of the front end network
node names.
#
# FE_USER_COUNTS A comma seperated list of the users to run on each
front end.
#                NOTE: The order of counts in this list should
match the order
#          of names in FE_NAMES.
# ADMIN_USER_COUNT is the number of aides to run.
#
# ADMIN_FE_NAMES is a comma seperated list of FEs on which the
aides will
#    operated.

!n200 set network_variable FE_NAMES
cl160,cl162,cl163,cl165,cl167,cl169

set network_variable FE_USER_COUNTS
21500,21500,21500,21500,21500,21500

set network_variable ADMIN_USER_COUNT 0
set network_variable ADMIN_FE_NAMES c1

!n200 set network_variable BASE_W_ID    1

set network_variable MAX_W_ID     12900

###############################
#                             #
#  REDUCER NETWORK VARIABLES  #
#                             #
###############################
#
# REDUCER_UPDATE_INTERVAL       The interval, in seconds, between
updates
#                               displayed on the console.
#
# REDUCER_HEADER_INTERVAL       Every REDUCER_HEADER_INTERVAL
updates the
#                               column headers will be displayed on
the
#                               console.
#

set network_variable REDUCER_UPDATE_INTERVAL 30
set network_variable REDUCER_HEADER_INTERVAL 6

#################################
#                               #
#  TPCC USER NETWORK VARIABLES  #
#                               #
#################################
#
# TPCC_USER_LOG_TYPE controls what information the prte users log
to thier
#                    respective files. This is a bit mask.
#
#                    0 - no logging
#                    1 - timer logging (required for asci data
reduction)
#                    2 - sut data logging (required for durability)
#                    4 - script logging (required by the tpcc user
script)
#                    8 - user sut data logging (required by web
users for
#                        error checking)
#
#                    In general, leave this at 12 for web clients
doing binary
#                    data reduction, and 13 for web clients doing
asci data
#                    reduction.
#
# TPCC_USER_FLUSH_LOG is whether or not to flush every write to the
log.
#
# DURABILITY_LOGGING is whether or not to parse new order response
pages for
#                    durability data (to be sent to reducer). This
variable
#        is a boolean so legal values are 0,f,F and 1,t,T.
#
# C_LAST  is the constant value used for customer last names.
#   This value must be chosen with care.  It must be based on
#   the value you used when populating your database.

set network_variable TPCC_USER_LOG_TYPE   12
set network_variable TPCC_USER_FLUSH_LOG  1
set network_variable DURABILITY_LOGGING   0
set network_variable C_LAST     87

#####################################
#                                   #
#  CONFIGURATION NETWORK VARIABLES  #
#                                   #
#####################################
#
# CGI_SCRIPT_NAME is the name of the application to run on the
front ends.
#
# LOAD_DLL_TIMEOUT is how long master should wait (in seconds) for
the dll
#      to initially load before timing out.
```

```
#

#set network_variable CGI_SCRIPT_NAME /webacmsxploop.dll
#set network_variable CGI_SCRIPT_NAME /webacmsxploop1500.dll
#set network_variable CGI_SCRIPT_NAME /webacmsxpora84.dll
#set network_variable CGI_SCRIPT_NAME /webacmsxpora8.dll
set network_variable CGI_SCRIPT_NAME  /tpcc/modtpcc.dll
set network_variable LOAD_DLL_TIMEOUT 180

###################################
#                                 #
#  TEST CONTROL NETWORK VARIABLES  #
#                                 #
###################################
#
# LOOPBACK_MODE
#   0 - Full end-to-end runs.
#   1 - Back end loopback runs (not implemented yet)
#   2 - Front end loopback runs
#   3 - RTE loopback runs
#
# RUN_NUMBER          is used to tag all output files with the run
number.  #
#                 1 - the primary measurement run.
#                 2 - the repeatability run.
#                 5 - the 50% run.
#                 8 - the 80% run.
#
#                     If you are unsure which run this really will
end up being,
#                     just leave it at 1, and you can rename files
later if you
#                     need to.
#
# VERSION_NUMBER      is used to tag all output files with the
version number.
#                     This is used if you submit files to the
auditor, and then
#                     need to rerun the test, and resubmit files to
the auditor,
#                     for some reason.  For example, you submit a
repeatability
#                     run (RUN_NUMBER 2, VERSION_NUMBER 1) and the
auditor finds
#                     a problem and asks you to re-run the test
(RUN_NUMBER 1,
#                     VERSION_NUMBER 2).
#                     Under normal circumstances, this can just be
left at 1.
#
# TEST_RESULTS_DIR    is the full directory path where the test's
run directory
#                     will be created.  All files (data, log, etc)
will be
#                     put into the run directory.
#
# WARMUP_TIME         is the time in seconds to warm up.  This is
the period
#                     of time after all users have started doing
transactions
#                     and before the measurement interval begins.
#
# STEADY_STATE_TIME is the time for which the test is considered to
be
#     in a steady running state.  It is during this time
#     that all data for measurement intervals will be
#     collected.
#
# MEASUREMENT_INTERVAL  defines the length of a test period within
the
#     STEADY_STATE_TIME. The steady state time may have 1
#     or more measurement intervals. Each measurement
#     interval can be thought of as a seperate measurement
#     run.
#
# COOLDOWN_TIME       is the length of time the test will continue
to run
#                     after the measurement interval is over.  This
time can
#                     be used for doing various types of data
collection by
#                     hand if desired that might otherwise have a
negative
#                     impact on the measured test results. Even if
you are
#                     not collecting any extra data by hand, it is
recommended
#                     that you keep this value at something like
300 or 600
#                     to avoid "clipping" effects at the end of the
measurement
#                     interval.
#
# CHECKPOINT_INTERVAL is the total time between the start of each
#     checkpoint command.
#
# CKPT_PROXIMITY_ADDITIONAL_OFFSET  This value will be added to any
#     required proximity time to give the actual start
#     time of the first checkpoint in the measurement
#     interval.
#
# LOGIN_DELAY         is the delay between logins on a per front
end basis.
#                     NOTE: This is similar to the prte internal
variable
#                     resume_interval (tpcc users start, then
immediately
#                     pause, so the act of logging in is just a
resume) but
#                     not exactly the same.
#
# RESUME_DELAY        is the delay between resumes on a per front
end basis.
#                     NOTE: This is similar to the prte internal
variable
#                     resume_interval but not exactly the same.
#
# STOP_DELAY          is the delay between stops on a per front end
basis.
#                     NOTE: This is similar to the prte internal
variable
#                     stop_interval but not exactly the same.
#
# SYNC_OFFSET   how many users we'll allow to have outstanding
#     when doing crowd control.
#
# SYNC_UPDATE   how often user login/resume/stop progress is
printed
#     out to the console (heartbeat of user synchronization
#     effectively).
#
# MSG_TIMEOUT   how long we'll wait for status and sync messages.
#

set network_variable LOOPBACK_MODE   0

set network_variable RUN_NUMBER          1
set network_variable VERSION_NUMBER      1
set network_variable TEST_RESULTS_DIR   /results/
#set network_variable LOG_DIR      /results/logs/
#set network_variable RUN_DIR      /results/logs/

# -- Short Test Run --
set network_variable WARMUP_TIME    3600.0
set network_variable STEADY_STATE_TIME    10800.0
set network_variable MEASUREMENT_INTERVAL 7200.0
set network_variable COOLDOWN_TIME    120.0

# -- Run Compliant Run --
# -- .5 hr warmup, 3hr runtime --
#set network_variable WARMUP_TIME   4000.0
#set network_variable STEADY_STATE_TIME   10800.0
#set network_variable MEASUREMENT_INTERVAL  7200.0
#set network_variable COOLDOWN_TIME   600.0

set network_variable CHECKPOINT_INTERVAL 0
set network_variable CKPT_PROXIMITY_ADDITIONAL_OFFSET 0
# -- .05 .08 .04 ko --
set network_variable LOGIN_DELAY         0.001
set network_variable RESUME_DELAY        0.10 # .10 w2k lnx 10i
set network_variable STOP_DELAY          0.02
#
set network_variable SYNC_OFFSET    128
set network_variable SYNC_UPDATE    1000

set network_variable MSG_TIMEOUT    3600.0

set network_variable NO_THINK_TIME 14.00
#set network_variable NO_THINK_TIME 12.02
set network_variable NO_THINK_TIME_UPDATE_INTERVAL 15.0



# In general, the SEED network variable should not be set. A random
value
# based on process id and the current time will be used.  This
varaible is
# really only exposed in case you want to exactly reproduce a
previous run
# using that previous run's seed.
#  NOTE: When using multiple masters this must be set and be > 1
#set network_variable SEED    123127777
set network_variable  SEED    777712312

################################################################
####
#
# AUDIT UTILITIES -- these are the replacement for the audit
# shell scripts -- they currently only work for Oracle on DUNIX.
# They do the following:
#     Collect logspace info
#     Write data to audit table for later use in runcheck
#     Collect checkpoint info
#     Run optional custom scripts on back-end before or after the
test
#     For Oracle, collect bstat/estat (optional)
#
################################################################
####
#
# GET_ALL_AUDIT_FILES if True (or 1) will create the following:
#     Audit table for doing runcheck later
#     mllog.vl -- a before & after snapshot of the logsize
#
# BE_NAMES           Comma-separated list of back-ends
#
# BE_USERNAME        Username to use when logging into back-ends
#                    NOTE: you must have .rhosts configured so no
password
#                    is needed.
#
# DATABASE_TYPE      Oracle, Sybase or MsSql
#
# DATABASE_USERNAME  Username and password for database.
# DATABASE_PASSWORD  Defaults are: tpcc/tpcc for Oracle and sa/<no-
passwd>
#                    for Sybase and MsSql
#
# Optional variables -- if you don't want them, comment them out or
set to ""
#
# ORACLE_STATS_SCRIPT_PATH
#                    Path to directory on back-end containing
Oracle's
#                    orst_<xxx>.sql files.
#                    For example: $ORACLE_HOME/bench/gen/sql
#
# CUSTOM_BEFORE_TEST_SCRIPT
# CUSTOM_AFTER_TEST_SCRIPT
#                    Path of executable file on back-end to be run
before/after
#                    the test.  For example, if you wanted to run
processor
#                    affinity and load some stored procedures
before a test,
#                    you could put the commands in a shell script
on the BE
#                    and call put the path to that shell script
into the
#                    CUSTOM_BEFORE_TEST_SCRIPT variable
#
####################################################################
####

set network_variable GET_ALL_AUDIT_FILES FALSE

set network_variable BE_NAMES         cheap64
set network_variable BE_USERNAME  tpcc

set network_variable DATABASE_TYPE  Oracle
set network_variable DATABASE_USERNAME  tpcc
set network_variable DATABASE_PASSWORD  tpcc

set network_variable ORACLE_STATS_SCRIPT_PATH   ""
set network_variable CUSTOM_BEFORE_TEST_SCRIPT  ""
set network_variable CUSTOM_AFTER_TEST_SCRIPT   ""

####################################################################
####

# now start all the users.  delay between each user being started
is controled
# by start_interval defined above in the "PRTE internal variables"
section.
#

echo

####################################################################
#############
#
#
# Starting all PRTE users (may take a while, depending on the
number of users) #
#
#
####################################################################
#############

noecho

disable stop

#start
----------------------

--- chkconfig.out

----------------------

arptables_jf    0:off 1:off 2:on  3:off 4:on  5:on  6:off
gpm             0:off 1:off 2:on  3:off 4:on  5:on  6:off
kudzu           0:off 1:off 2:off 3:on  4:on  5:on  6:off
syslog          0:off 1:off 2:on  3:on  4:on  5:on  6:off
netfs           0:off 1:off 2:off 3:off 4:on  5:on  6:off
network         0:off 1:off 2:on  3:on  4:on  5:on  6:off
random          0:off 1:off 2:on  3:on  4:on  5:on  6:off
rawdevices      0:off 1:off 2:off 3:on  4:on  5:on  6:off
saslauthd       0:off 1:off 2:off 3:off 4:off 5:off 6:off
atd             0:off 1:off 2:off 3:off 4:on  5:on  6:off
audit           0:off 1:off 2:on  3:off 4:off 5:on  6:off
irda            0:off 1:off 2:off 3:off 4:off 5:off 6:off
psacct          0:off 1:off 2:off 3:off 4:off 5:off 6:off
acpid           0:off 1:off 2:off 3:off 4:on  5:on  6:off
diskdump        0:off 1:off 2:off 3:off 4:off 5:off 6:off
isdn            0:off 1:off 2:on  3:off 4:on  5:on  6:off
iptables        0:off 1:off 2:on  3:off 4:on  5:on  6:off
ip6tables       0:off 1:off 2:on  3:off 4:on  5:on  6:off
salinfod        0:off 1:off 2:off 3:off 4:on  5:on  6:off
smartd          0:off 1:off 2:off 3:off 4:off 5:off 6:off
autofs          0:off 1:off 2:off 3:off 4:on  5:on  6:off
netdump         0:off 1:off 2:off 3:off 4:off 5:off 6:off
sshd            0:off 1:off 2:on  3:on  4:on  5:on  6:off
portmap         0:off 1:off 2:off 3:on  4:on  5:on  6:off
nfs             0:off 1:off 2:off 3:off 4:off 5:off 6:off
nfslock         0:off 1:off 2:off 3:off 4:on  5:on  6:off
sendmail        0:off 1:off 2:on  3:off 4:on  5:on  6:off
mdmonitor       0:off 1:off 2:on  3:off 4:on  5:on  6:off
mdmpd           0:off 1:off 2:off 3:off 4:off 5:off 6:off
crond           0:off 1:off 2:on  3:off 4:on  5:on  6:off
xinetd          0:off 1:off 2:off 3:on  4:on  5:on  6:off
cups            0:off 1:off 2:on  3:off 4:on  5:on  6:off
```

```
rhnsd           0:off 1:off 2:off 3:off 4:on  5:on  6:off
snmpd           0:off 1:off 2:off 3:off 4:off 5:off 6:off
snmptrapd       0:off 1:off 2:off 3:off 4:off 5:off 6:off
hpoj            0:off 1:off 2:on  3:off 4:on  5:on  6:off
xfs             0:off 1:off 2:on  3:off 4:on  5:on  6:off
ntpd            0:off 1:off 2:off 3:off 4:off 5:off 6:off
vncserver       0:off 1:off 2:off 3:off 4:off 5:off 6:off
winbind         0:off 1:off 2:off 3:off 4:off 5:off 6:off
smb             0:off 1:off 2:off 3:off 4:off 5:off 6:off
httpd           0:off 1:off 2:off 3:off 4:off 5:off 6:off
named           0:off 1:off 2:off 3:off 4:off 5:off 6:off
xinetd based services:
  krb5-telnet:  off
  rsync:  off
  eklogin:  off
  gssftp: off
  klogin: off
  chargen-udp:  off
  kshell: off
  auth: on
  chargen:  off
  daytime-udp:  off
  daytime:  off
  echo-udp: off
  echo: off
  services: off
  time: off
  time-udp: off
  cups-lpd: off
  sgi_fam:  on
  swat: off
  rexec:  on
  rlogin: on
  rsh:  on
  telnet: on
----------------------

--- elvtune.sh

----------------------

#!/bin/bash
set -x
for x in c d g h k l o p s t w x aa ab ae af ai aj am an aq ar
do
 /sbin/elvtune -r 1 -w 1 -b 1 /dev/sd${x}
done
----------------------

--- linux.ora

----------------------

#########################

# General Database

#########################


control_files       = /home/oracle/dev/control_001

processes       = 300

sessions      = 300

transactions      = 300

db_name       = tpcc

db_files      = 300

compatible      = 10.1.0.0.0

dml_locks     = 500

db_block_size     = 2048

#utl_file_dir     = *

aq_tm_processes     = 0

max_dump_file_size    = 1M


#########################

# Buffer Cache / SGA

#########################


_enable_NUMA_optimization = false

_db_block_numa      = 1



db_cache_size   = 17000M

db_keep_cache_size = 79000M

db_recycle_cache_size= 19168M
```

```
db_8k_cache_size  = 500M

db_16k_cache_size  = 7060M


shared_pool_size      = 3500M

java_pool_size      = 0

_ksmg_granule_size    = 67108864

#pre_page_sga     = true

#lock_sga     = true


#########################

# I/O

#########################


db_writer_processes     = 1

disk_asynch_io      = true

#dbwr_io_slaves     = 50

_lgwr_async_io      = false

db_block_checking     = false

db_block_checksum     = false

_check_block_after_checksum = false

_db_writer_coalesce_area_size = 0

_db_writer_coalesce_write_limit = 0

#_db_block_known_clean_pct  = 0

#_db_aging_hot_criteria   = 2

#_db_aging_stay_count   = 0

_db_writer_max_writes   = 512

#_db_writer_chunk_writes  = 200


#########################

# Undo Management

#########################


undo_management     = auto

undo_retention      = 1

undo_tablespace     = undo_1

_imu_pools      = 150

transactions_per_rollback_segment = 1

_in_memory_undo     = true

_undo_autotune      = false


#########################

# Optimizations

#########################


cursor_space_for_time   = true

plsql_optimize_level    = 2

#_optimizer_cache_stats   = false

#_optimizer_cost_model    = io

_cursor_cache_frame_bind_memory = true

replication_dependency_tracking = false

db_file_multiblock_read_count = 32

_db_cache_pre_warm    = false

_array_update_vector_read_enabled = true

#pga_aggregate_target   = 0
```

```
fast_start_mttr_target    = 0

parallel_max_servers    = 0

#_gc_element_percent    = 0

_two_pass     = false

#_table_lookup_prefetch_thresh  = 999

#_column_compression_factor = 175

#spare param are rebuild hacks

#_first_spare_parameter=100

#_second_spare_parameter=0


#########################

# Recovery

#########################


# db_cache_size     = 13000M - for recovery only

# recovery_parallelism    = 50


#########################

# Log / Checkpointing

#########################


log_buffer = 8688608

log_checkpoint_interval = 0

log_checkpoint_timeout = 0

log_checkpoints_to_alert  = true


remote_os_authent=true


#########################

# Statistics

#########################


timed_statistics    = false

statistics_level    = basic

#event="8177 trace name errorstack level 10"


query_rewrite_enabled = false


_collect_undo_stats = false

_db_writer_flush_imu = false

_lightweight_hdrs = true

----------------------

--- modules.conf

----------------------

alias eth0 e1000
alias eth1 e1000
alias scsi_hostadapter sym53c8xx
alias usb-controller usb-ohci
alias usb-controller1 ehci-hcd
alias scsi_hostadapter1 qla2300_conf
alias scsi_hostadapter2 qla2300
alias scsi_hostadapter3 sg
options qla2300  ql2xmaxqdepth=128 qlport_down_retry=64
qlogin_retry_count=16 ql2xfailover=0
post-remove qla2300 rmmod qla2300_conf
----------------------

--- rc.local

----------------------

#!/bin/sh
#
# This script will be executed *after* all the other init scripts.
# You can put your own initialization stuff in here if you don't
# want to do the full Sys V style init stuff.

touch /var/lock/subsys/local
rdate -s dbgate


rmmod qla2300
insmod -f /root/qla2300.o ql2xintrdelaytimer=5 ql2xmaxqdepth=128
echo 0x40000000 > /proc/sys/kernel/shmall
echo 0x1880000000 > /proc/sys/kernel/shmmax
echo 1048576 > /proc/sys/fs/aio-max-nr
echo kiobuf 60 10 > /proc/slabinfo

sh /root/4650/run_links.sh
mount -t hugetlbfs none /mnt/htlb
chown oracle:dba /mnt/htlb

----------------------

--- rr.sh

----------------------

#!/bin/sh

if [ $# -ne 1 ]
then
        echo "usage: $0 <sleep>"
        exit 1
fi

sleep $1

lgwr=`grep LGWR /home/oracle/OraHome1/rdbms/log/alert_tpcc.log |
tail -1 | awk '{print substr($6,4)}'`
echo lgwr_pid=${lgwr}
./rr -p 48 $(ps aux | grep oracle_bin | grep -v grep | awk '{print
$2}')
./rr -p 49 ${lgwr}

/usr/bin/taskset 0x00000002 -p ${lgwr}

echo 2 > /proc/irq/69/smp_affinity
echo 2 > /proc/irq/70/smp_affinity
echo 2 > /proc/irq/57/smp_affinity
echo 1 > /proc/irq/59/smp_affinity
echo 1 > /proc/irq/60/smp_affinity
echo 1 > /proc/irq/61/smp_affinity
echo 1 > /proc/irq/62/smp_affinity
echo 1 > /proc/irq/63/smp_affinity
echo 1 > /proc/irq/64/smp_affinity
echo 1 > /proc/irq/65/smp_affinity
echo 1 > /proc/irq/66/smp_affinity
echo 1 > /proc/irq/67/smp_affinity
echo 1 > /proc/irq/68/smp_affinity

sh elvtune.sh
date >> rrsh.log
----------------------

--- run_links.sh

----------------------

#run links
raw /home/oracle/dev/stok_0_0 /dev/sdc1
raw /home/oracle/dev/stok_0_1 /dev/sdc2
raw /home/oracle/dev/stok_0_2 /dev/sdc3
raw /home/oracle/dev/stok_0_3 /dev/sdd1
raw /home/oracle/dev/stok_0_4 /dev/sdd2
raw /home/oracle/dev/stok_0_5 /dev/sdd3
raw /home/oracle/dev/stok_0_6 /dev/sdg1
raw /home/oracle/dev/stok_0_7 /dev/sdg2
raw /home/oracle/dev/stok_0_8 /dev/sdg3
raw /home/oracle/dev/stok_0_9 /dev/sdh1
raw /home/oracle/dev/stok_0_10 /dev/sdh2
raw /home/oracle/dev/stok_0_11 /dev/sdh3
raw /home/oracle/dev/stok_0_12 /dev/sdk1
raw /home/oracle/dev/stok_0_13 /dev/sdk2
raw /home/oracle/dev/stok_0_14 /dev/sdk3
raw /home/oracle/dev/stok_0_15 /dev/sdl1
raw /home/oracle/dev/stok_0_16 /dev/sdl2
raw /home/oracle/dev/stok_0_17 /dev/sdl3
raw /home/oracle/dev/stok_0_18 /dev/sdo1
raw /home/oracle/dev/stok_0_19 /dev/sdo2
raw /home/oracle/dev/stok_0_20 /dev/sdo3
raw /home/oracle/dev/stok_0_21 /dev/sdp1
raw /home/oracle/dev/stok_0_22 /dev/sdp2
raw /home/oracle/dev/stok_0_23 /dev/sdp3
raw /home/oracle/dev/stok_0_24 /dev/sds1
raw /home/oracle/dev/stok_0_25 /dev/sds2
raw /home/oracle/dev/stok_0_26 /dev/sds3
raw /home/oracle/dev/stok_0_27 /dev/sdt1
raw /home/oracle/dev/stok_0_28 /dev/sdt2
raw /home/oracle/dev/stok_0_29 /dev/sdt3
raw /home/oracle/dev/stok_0_30 /dev/sdw1
raw /home/oracle/dev/stok_0_31 /dev/sdw2
raw /home/oracle/dev/stok_0_32 /dev/sdw3
raw /home/oracle/dev/stok_0_33 /dev/sdx1
raw /home/oracle/dev/stok_0_34 /dev/sdx2
raw /home/oracle/dev/stok_0_35 /dev/sdx3
raw /home/oracle/dev/stok_0_36 /dev/sdaa1
raw /home/oracle/dev/stok_0_37 /dev/sdaa2
raw /home/oracle/dev/stok_0_38 /dev/sdaa3
raw /home/oracle/dev/stok_0_39 /dev/sdab1
raw /home/oracle/dev/stok_0_40 /dev/sdab2
raw /home/oracle/dev/stok_0_41 /dev/sdab3
raw /home/oracle/dev/stok_0_42 /dev/sdae1
raw /home/oracle/dev/stok_0_43 /dev/sdae2
raw /home/oracle/dev/stok_0_44 /dev/sdae3
raw /home/oracle/dev/stok_0_45 /dev/sdaf1
raw /home/oracle/dev/stok_0_46 /dev/sdaf2
raw /home/oracle/dev/stok_0_47 /dev/sdaf3
raw /home/oracle/dev/stok_0_48 /dev/sdai1
raw /home/oracle/dev/stok_0_49 /dev/sdai2
raw /home/oracle/dev/stok_0_50 /dev/sdai3
raw /home/oracle/dev/stok_0_51 /dev/sdaj1
raw /home/oracle/dev/stok_0_52 /dev/sdaj2
raw /home/oracle/dev/stok_0_53 /dev/sdaj3
raw /home/oracle/dev/stok_0_54 /dev/sdam1
raw /home/oracle/dev/stok_0_55 /dev/sdam2
raw /home/oracle/dev/stok_0_56 /dev/sdam3
raw /home/oracle/dev/stok_0_57 /dev/sdan1
raw /home/oracle/dev/stok_0_58 /dev/sdan2
raw /home/oracle/dev/stok_0_59 /dev/sdan3
raw /home/oracle/dev/ordr_0_0 /dev/sdc5
raw /home/oracle/dev/ordr_0_1 /dev/sdd5
raw /home/oracle/dev/ordr_0_2 /dev/sdg5
raw /home/oracle/dev/ordr_0_3 /dev/sdh5
raw /home/oracle/dev/ordr_0_4 /dev/sdk5
raw /home/oracle/dev/ordr_0_5 /dev/sdl5
raw /home/oracle/dev/ordr_0_6 /dev/sdo5
raw /home/oracle/dev/ordr_0_7 /dev/sdp5
raw /home/oracle/dev/ordr_0_8 /dev/sds5
raw /home/oracle/dev/ordr_0_9 /dev/sdt5
raw /home/oracle/dev/ordr_0_10 /dev/sdw5
raw /home/oracle/dev/ordr_0_11 /dev/sdx5
raw /home/oracle/dev/ordr_0_12 /dev/sdaa5
raw /home/oracle/dev/ordr_0_13 /dev/sdab5
raw /home/oracle/dev/ordr_0_14 /dev/sdae5
raw /home/oracle/dev/ordr_0_15 /dev/sdaf5
raw /home/oracle/dev/ordr_0_16 /dev/sdai5
raw /home/oracle/dev/ordr_0_17 /dev/sdaj5
raw /home/oracle/dev/ordr_0_18 /dev/sdam5
raw /home/oracle/dev/ordr_0_19 /dev/sdan5
raw /home/oracle/dev/cust_0_0 /dev/sdc6
raw /home/oracle/dev/cust_0_1 /dev/sdc7
raw /home/oracle/dev/cust_0_2 /dev/sdc8
raw /home/oracle/dev/cust_0_3 /dev/sdd6
raw /home/oracle/dev/cust_0_4 /dev/sdd7
raw /home/oracle/dev/cust_0_5 /dev/sdd8
raw /home/oracle/dev/cust_0_6 /dev/sdg6
raw /home/oracle/dev/cust_0_7 /dev/sdg7
raw /home/oracle/dev/cust_0_8 /dev/sdg8
raw /home/oracle/dev/cust_0_9 /dev/sdh6
raw /home/oracle/dev/cust_0_10 /dev/sdh7
raw /home/oracle/dev/cust_0_11 /dev/sdh8
raw /home/oracle/dev/cust_0_12 /dev/sdk6
raw /home/oracle/dev/cust_0_13 /dev/sdk7
raw /home/oracle/dev/cust_0_14 /dev/sdk8
raw /home/oracle/dev/cust_0_15 /dev/sdl6
raw /home/oracle/dev/cust_0_16 /dev/sdl7
raw /home/oracle/dev/cust_0_17 /dev/sdl8
raw /home/oracle/dev/cust_0_18 /dev/sdo6
raw /home/oracle/dev/cust_0_19 /dev/sdo7
raw /home/oracle/dev/cust_0_20 /dev/sdo8
raw /home/oracle/dev/cust_0_21 /dev/sdp6
raw /home/oracle/dev/cust_0_22 /dev/sdp7
raw /home/oracle/dev/cust_0_23 /dev/sdp8
raw /home/oracle/dev/cust_0_24 /dev/sds6
raw /home/oracle/dev/cust_0_25 /dev/sds7
raw /home/oracle/dev/cust_0_26 /dev/sds8
raw /home/oracle/dev/cust_0_27 /dev/sdt6
raw /home/oracle/dev/cust_0_28 /dev/sdt7
raw /home/oracle/dev/cust_0_29 /dev/sdt8
raw /home/oracle/dev/cust_0_30 /dev/sdw6
raw /home/oracle/dev/cust_0_31 /dev/sdw7
raw /home/oracle/dev/cust_0_32 /dev/sdw8
raw /home/oracle/dev/cust_0_33 /dev/sdx6
raw /home/oracle/dev/cust_0_34 /dev/sdx7
raw /home/oracle/dev/cust_0_35 /dev/sdx8
raw /home/oracle/dev/cust_0_36 /dev/sdaa6
raw /home/oracle/dev/cust_0_37 /dev/sdaa7
raw /home/oracle/dev/cust_0_38 /dev/sdaa8
raw /home/oracle/dev/cust_0_39 /dev/sdab6
raw /home/oracle/dev/cust_0_40 /dev/sdab7
raw /home/oracle/dev/cust_0_41 /dev/sdab8
raw /home/oracle/dev/cust_0_42 /dev/sdae6
raw /home/oracle/dev/cust_0_43 /dev/sdae7
raw /home/oracle/dev/cust_0_44 /dev/sdae8
raw /home/oracle/dev/cust_0_45 /dev/sdaf6
raw /home/oracle/dev/cust_0_46 /dev/sdaf7
raw /home/oracle/dev/cust_0_47 /dev/sdaf8
raw /home/oracle/dev/cust_0_48 /dev/sdai6
raw /home/oracle/dev/cust_0_49 /dev/sdai7
raw /home/oracle/dev/cust_0_50 /dev/sdai8
raw /home/oracle/dev/cust_0_51 /dev/sdaj6
raw /home/oracle/dev/cust_0_52 /dev/sdaj7
raw /home/oracle/dev/cust_0_53 /dev/sdaj8
raw /home/oracle/dev/cust_0_54 /dev/sdam6
raw /home/oracle/dev/cust_0_55 /dev/sdam7
raw /home/oracle/dev/cust_0_56 /dev/sdam8
raw /home/oracle/dev/cust_0_57 /dev/sdan6
raw /home/oracle/dev/cust_0_58 /dev/sdan7
raw /home/oracle/dev/cust_0_59 /dev/sdan8
raw /home/oracle/dev/hist_0_0 /dev/sdc9
raw /home/oracle/dev/hist_0_1 /dev/sdd9
raw /home/oracle/dev/hist_0_2 /dev/sdg9
raw /home/oracle/dev/hist_0_3 /dev/sdh9
raw /home/oracle/dev/hist_0_4 /dev/sdk9
raw /home/oracle/dev/hist_0_5 /dev/sdl9
raw /home/oracle/dev/hist_0_6 /dev/sdo9
raw /home/oracle/dev/hist_0_7 /dev/sdp9
raw /home/oracle/dev/hist_0_8 /dev/sds9
raw /home/oracle/dev/hist_0_9 /dev/sdt9
raw /home/oracle/dev/hist_0_10 /dev/sdw9
raw /home/oracle/dev/hist_0_11 /dev/sdx9
raw /home/oracle/dev/hist_0_12 /dev/sdaa9
raw /home/oracle/dev/hist_0_13 /dev/sdab9
raw /home/oracle/dev/hist_0_14 /dev/sdae9
raw /home/oracle/dev/hist_0_15 /dev/sdaf9
raw /home/oracle/dev/hist_0_16 /dev/sdai9
raw /home/oracle/dev/hist_0_17 /dev/sdaj9
raw /home/oracle/dev/hist_0_18 /dev/sdam9
raw /home/oracle/dev/hist_0_19 /dev/sdan9
raw /home/oracle/dev/icust2_0_0 /dev/sdc10
raw /home/oracle/dev/icust2_0_1 /dev/sdd10
raw /home/oracle/dev/icust2_0_2 /dev/sdg10
raw /home/oracle/dev/icust2_0_3 /dev/sdh10
raw /home/oracle/dev/icust2_0_4 /dev/sdk10
raw /home/oracle/dev/icust2_0_5 /dev/sdl10
raw /home/oracle/dev/icust2_0_6 /dev/sdo10
raw /home/oracle/dev/icust2_0_7 /dev/sdp10
raw /home/oracle/dev/icust2_0_8 /dev/sds10
raw /home/oracle/dev/icust2_0_9 /dev/sdt10
raw /home/oracle/dev/icust2_0_10 /dev/sdw10
raw /home/oracle/dev/icust2_0_11 /dev/sdx10
raw /home/oracle/dev/icust2_0_12 /dev/sdaa10
raw /home/oracle/dev/icust2_0_13 /dev/sdab10
raw /home/oracle/dev/icust2_0_14 /dev/sdae10
raw /home/oracle/dev/icust2_0_15 /dev/sdaf10
raw /home/oracle/dev/icust2_0_16 /dev/sdai10
raw /home/oracle/dev/icust2_0_17 /dev/sdaj10
raw /home/oracle/dev/icust2_0_18 /dev/sdam10
raw /home/oracle/dev/icust2_0_19 /dev/sdan10
raw /home/oracle/dev/iordr2_0_0 /dev/sdc11
raw /home/oracle/dev/iordr2_0_1 /dev/sdd11
raw /home/oracle/dev/iordr2_0_2 /dev/sdg11
raw /home/oracle/dev/iordr2_0_3 /dev/sdh11
raw /home/oracle/dev/iordr2_0_4 /dev/sdk11
raw /home/oracle/dev/iordr2_0_5 /dev/sdl11
raw /home/oracle/dev/iordr2_0_6 /dev/sdo11
raw /home/oracle/dev/iordr2_0_7 /dev/sdp11
raw /home/oracle/dev/iordr2_0_8 /dev/sds11
raw /home/oracle/dev/iordr2_0_9 /dev/sdt11
raw /home/oracle/dev/iordr2_0_10 /dev/sdw11
raw /home/oracle/dev/iordr2_0_11 /dev/sdx11
raw /home/oracle/dev/iordr2_0_12 /dev/sdaa11
raw /home/oracle/dev/iordr2_0_13 /dev/sdab11
raw /home/oracle/dev/iordr2_0_14 /dev/sdae11
raw /home/oracle/dev/iordr2_0_15 /dev/sdaf11
raw /home/oracle/dev/iordr2_0_16 /dev/sdai11
raw /home/oracle/dev/iordr2_0_17 /dev/sdaj11
raw /home/oracle/dev/iordr2_0_18 /dev/sdam11
raw /home/oracle/dev/iordr2_0_19 /dev/sdan11
raw /home/oracle/dev/temp_0_0 /dev/sdc12
raw /home/oracle/dev/temp_0_1 /dev/sdd12
raw /home/oracle/dev/temp_0_2 /dev/sdg12
raw /home/oracle/dev/temp_0_3 /dev/sdh12
raw /home/oracle/dev/temp_0_4 /dev/sdk12
raw /home/oracle/dev/temp_0_5 /dev/sdl12
raw /home/oracle/dev/temp_0_6 /dev/sdo12
raw /home/oracle/dev/temp_0_7 /dev/sdp12
raw /home/oracle/dev/temp_0_8 /dev/sds12
raw /home/oracle/dev/temp_0_9 /dev/sdt12
raw /home/oracle/dev/temp_0_10 /dev/sdw12
raw /home/oracle/dev/temp_0_11 /dev/sdx12
raw /home/oracle/dev/temp_0_12 /dev/sdaa12
raw /home/oracle/dev/temp_0_13 /dev/sdab12
raw /home/oracle/dev/temp_0_14 /dev/sdae12
raw /home/oracle/dev/temp_0_15 /dev/sdaf12
raw /home/oracle/dev/temp_0_16 /dev/sdai12
raw /home/oracle/dev/temp_0_17 /dev/sdaj12
raw /home/oracle/dev/temp_0_18 /dev/sdam12
raw /home/oracle/dev/temp_0_19 /dev/sdan12
raw /home/oracle/dev/item_0_0 /dev/sdc13
raw /home/oracle/dev/iitem_0_0 /dev/sdd13
raw /home/oracle/dev/iware_0_0 /dev/sdg13
raw /home/oracle/dev/ware_0_0 /dev/sdh13
raw /home/oracle/dev/idist_0_0 /dev/sdk13
raw /home/oracle/dev/dist_0_0 /dev/sdl13
raw /home/oracle/dev/control_001 /dev/sdo13
raw /home/oracle/dev/control_002 /dev/sdp13
raw /home/oracle/dev/tpccaux /dev/sds13
raw /home/oracle/dev/system_1 /dev/sdt13
raw /home/oracle/dev/nord_0_0 /dev/sdl14
raw /home/oracle/dev/sp_0 /dev/sds14
raw /home/oracle/dev/roll1 /dev/sdo14
raw /home/oracle/dev/istok_0_0 /dev/sdk14
raw /home/oracle/dev/icust1_0_0 /dev/sdaf14
raw /home/oracle/dev/log_1_1 /dev/sdaq1
raw /home/oracle/dev/log_1_2 /dev/sdar1
raw /home/oracle/dev/log_2_1 /dev/sdaq2
raw /home/oracle/dev/log_2_2 /dev/sdar2
----------------------

--- sysctl.conf

----------------------

# Kernel sysctl configuration file for Red Hat Linux
#
# For binary values, 0 is disabled, 1 is enabled.  See sysctl(8)
and
# sysctl.conf(5) for more details.

# Controls IP packet forwarding
net.ipv4.ip_forward = 0

# Controls source route verification
net.ipv4.conf.default.rp_filter = 1

# Controls the System Request debugging functionality of the kernel
kernel.sysrq = 1

# Controls whether core dumps will append the PID to the core
filename.
# Useful for debugging multi-threaded applications.
kernel.core_uses_pid = 1


vm.hugetlb_pool = 126976
kernel.shmmax = 137438953472
kernel.sem = 512 32000 512 128
# UDP Raghu

net.core.rmem_max = 10000000
net.core.rmem_default = 10000000
net.core.wmem_max = 10000000
net.core.wmem_default = 10000000

#
#kernel.sysreq-key = 84
```

## Client Configuration

```
------------------------
--- dbinit.ini
------------------------
[TPCC]
DBConnections=17
StartTerm=1
KMaxterms=221
DeliveryQueues=400
DeliveryThreads=40
------------------------
--- oracle-local.txt
------------------------
Windows Registry Editor Version 5.00

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\KEY_OraClient10g_home1]
"LOCAL"="TPCC"
```

# *Appendix D: Third Party Letters*

**From:** MaryBeth Pierantoni [mailto:mary.beth.pierantoni@oracle.com]
**Sent:** Friday, November 05, 2004 2:42 PM
**To:** Nikolaiev, Mike
**Cc:** vineet.buch@oracle.com;
**Subject:** Re: Rx4640 - TPC-C Run at 161,217 has passed Audit!

Hi Mike,

To follow is the pricing:

| **Product** | **Price** | **Quantity** | **Extended Price** |
|---|---|---|---|
| Oracle Database 10g Standard Edition for 3 years, Per Processor, Unlimited Users | $7,500 | 4 | $30,000 |
| Oracle Database Server Support Package for 3 years | $2,000 | 3 yrs. | $6,000 |
| Oracle E-Business Suite Mandatory Discount | | | <$1,800> |
| Total | | | $34,200 |

Regards,
MaryBeth

Microsoft Corporation
One Microsoft Way
Redmond, WA 98052-6399

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

***Microsoft***

September 15, 2004

Hewlett-Packard
Company
paul cao
22555 SH 249
Houston, TK 77070

Mr. cao:

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

All pricing shown is in US Dollars ($).

| Part Number | Description | Unit Price | Quantity | Price |
|---|---|---|---|---|
| C11-00821 | **Windows 2000 Server**<br>*Server License Only - No CALs*<br>*Discount Schedule: No Level*<br>*Unit Price reflects a 8% discount from the retail unit price of $799.* | $738 | 6 | $4,428 |

All products are currently orderable through Microsoft's normal distribution channels.

This quote is valid for the next 90 days.

If we can be of any further assistance, please contact Jamie Reding at (425) 703-0510 or jamiere@microsoft.com.

Reference ID: PCpaca0415092282
Please include this Reference ID in any correspondence regarding this price quote.