# Bull Escala PL3200R c/s

***using***

**Oracle9i Database Enterprise Edition Release 2 (9.2.0.1.0)**
**for AIX 5.L V5.2**
**IBM Websphere Application Server Enterprise Edition Version 3.0**

# TPC Benchmark™ C

# Full Disclosure Report

Submitted For Review
June 14, 2002

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**Second Edition June 14, 2002**

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# Bull Escala PL3200R

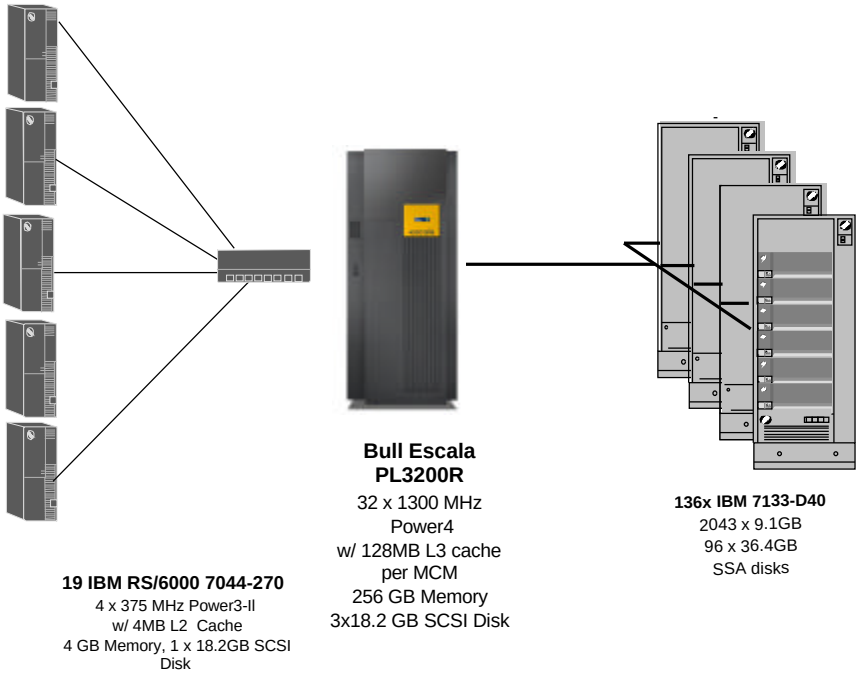
TPC-C Rev. 5.0

Report Date

June 14, 2002

| Total System Cost | TPC-C Throughput | Price/Performance | Availability Date |
|---|---|---|---|
| $7 245 205 | 403,255.46 tpmC | $17.96/tpmC | Nov 22, 2002 |

| Processors | Database Manager | Operating System | Other Software | No. Users |
|---|---|---|---|---|
| 32 x database<br>76 x clients | Oracle9i Database Enterprise Edition Release 2 (9.2.0.1.0) for AIX 5L V5.2 | AIX 5L V5.2 | Websphere Application Server Enterprise Edition Version 3.0 | 324 000 |




| System Components | Clients | | Server | |
|---|---|---|---|---|
| | Quantity | Description | Quantity | Description |
| Processor | 19 | 4 x 375 MHz Power3-II W/4MB L2 cache each | 1 | 32 x 1300 MHz POWER4 w/ 128 MB L3 cache per MCM, 4 MCM in the SUT |
| Memory | 4 GB | | 256 GB | |
| Disk Controllers | 1 | SCSI-2 (Integrated) | 1<br>34 | SCSI-2 (Integrated)<br>SSA Adapters |
| Disk Drives | 1 | 18.2 GB SCSI each client | 2043<br>96<br>3 | 9.1GB SSA Disk<br>36.4GB SSA disk<br>18 .2GB SCSI Disk |
| Total Storage | 16.93 GB each client | | 19,959.99 GB | |
| Terminals | 3 | System Console | 1 | System Console |

# BULL
# Escala PL3200R

TPC-C Rev. 5.0

Report Date: June 14, 2002

| Description | Part Number | Brand | Pricing | Unit Price | Quantity | Extended Price | 3-year Maint. Price |
|---|---|---|---|---|---|---|---|
| **Server Hardware** | | | | | | | |
| ESCALA PL3200R SYSTEM | CPXG258-1000 | Bull | 1 | 152 070 | 1 | 152 070 | 33 984 |
| 32X (Max) SCSI-2 Internal CD ROM drive | CDRG016-0000 | Bull | 1 | 375 | 1 | 375 | 0 |
| 8-WAY POWER4 TURBO PROCESSOR OPTION ( | CPUG077-0000 | Bull | 1 | 275 000 | 4 | 1 100 000 | 475 776 |
| PROCESSOR KIT from One to Four MCM Processor | CKTG174-0000 | Bull | 1 | 14 850 | 1 | 14 850 | 0 |
| I/O DRAWER 4 EIA (ADDITIONAL) | DRWG030-0000 | Bull | 1 | 30 510 | 3 | 91 530 | 14 443 |
| KIT FIRST ADD'L I/O DRAWER IN FIRST RACK | CKTG178-0000 | Bull | 1 | 400 | 1 | 400 | 0 |
| KIT FIRST ADD'L I/O DRAWER IN EXP RACK | CKTG181-0000 | Bull | 1 | 750 | 1 | 750 | 0 |
| KIT SECOND ADD'L I/O DRAWER IN FIRST RACK | CKTG179-0000 | Bull | 1 | 8 750 | 1 | 8 750 | 0 |
| Bulk Power Regulator | REFG004-0000 | Bull | 1 | 4 000 | 2 | 8 000 | 0 |
| Power Distribution Assembly, 10 DC Power Converte | PSKG007-0000 | Bull | 1 | 3 500 | 2 | 7 000 | 0 |
| KIT BUS SCSI FOR MEDIA DRAWER | CKTG188-0000 | Bull | 1 | 970 | 1 | 970 | 0 |
| SLIM LINE REAR DOOR (PRIM&SECOND RACK) | CKTG186-0000 | Bull | 1 | 750 | 2 | 1 500 | 0 |
| 18,2 GB Ultra3 SCSI Disk Drive (1"/10krpm) | MSUG186-0000 | Bull | 1 | 1 500 | 3 | 4 500 | 0 |
| ETHERNET 10/100Mb/s PCI ADAPTER | DCCG137-0000 | Bull | 1 | 275 | 5 | 1 375 | 0 |
| 128MB LEVEL 3 CACHE, 433MHz | CCMG002-0000 | Bull | 1 | 25 000 | 4 | 100 000 | 0 |
| 32GB MEMORY CARD, INWARD FACING | CMMG181-0000 | Bull | 1 | 163 840 | 8 | 1 310 720 | 0 |
| EXPANSION RACK, 24", 42U | RCKG012-0000 | Bull | 1 | 8 700 | 1 | 8 700 | 0 |
| HARDWARE MANAGEMENT CONSOLE w/o keybo | CSKG006-0000 | Bull | 1 | 5 435 | 1 | 5 435 | 0 |
| QUIET TOUCH KEYBOARD - STEALTH BLACK, US | KBUG005-000E | Bull | 1 | 100 | 1 | 100 | 0 |
| Rack 42U : Black with one PDU | RCKG013-0000 | Bull | 1 | 5 000 | 14 | 70 000 | 14 670 |
| ADDITIONAL POWER DISTRIBUTION UNIT- SING | PSSG028-0000 | Bull | 1 | 1 000 | 41 | 41 000 | 0 |
| Integrated Battery Backup, redundant, cables | 6200 | IBM | 1 | 4 600 | 4 | 18 400 | 0 |
| Advanced SerialRAID Adapter | 6230 | IBM | 1 | 3 000 | 34 | 102 000 | 0 |
| 32 MB Fast_Write Cache option card | 6235 | IBM | 1 | 575 | 6 | 3 450 | 0 |
| SSA Disk Subsystem, pwr supply, Drawer cover | 7133-D40 | IBM | 1 | 15 000 | 136 | 2 040 000 | 600 576 |
| Dummy Drive | 8399 | IBM | 1 | 30 | 2 | 60 | 0 |
| 10K/9.1 GB Advanced Disk Drive Module | 8509 | IBM | 1 | 2 760 | 2043 | 5 638 680 | 0 |
| 10K/36.4 GB Advanced Disk Drive Module | 8536 | IBM | 1 | 5 900 | 96 | 566 400 | 0 |
| SSA Cables (8801, 8802) | 8801 | IBM | 1 | 125 | 136 | 17 000 | 0 |
| | | | | | **Subtotal** | 11 314 015 | 1 139 449 |
| **Server Software** | | | | | | | |
| AIX 5.1 (media only) | CPXG258-1000 | Bull | 1 | | 1 | 0 | 7 363 |
| IBM Websphere Applicaton Server | D5ALCLL | IBM | 1 | 29 305 | 32 | 937 760 | 173 664 |
| IBM C for AIX V5 | CLGG023-WA0A | Bull | 1 | 799 | 1 | 799 | 283 |
| Oracle9i Enterprise Edition Release 2 (9.2.0.1.0) | for AIX 5.L V5.2 | Oracle | 2 | 527360 | 1 | 527 360 | |
| Server Support Package: Database | | Oracle | 2 | | 1 | | 6 000 |
| | | | | | **Subtotal** | 1 465 919 | 187 310 |
| **Client Hardware & Software** | | | | | | | |
| RS/6000 Model 44P-270 w/ CD-ROM | 7044-270 | IBM | 1 | 4405 | 19 | 83 695 | 31 920 |
| 18.2 GB 10K RPM Ultra SCSI Enhanced Disk | 3110 | IBM | 1 | 1260 | 19 | 23 940 | |
| Memory Expansion Feature | 4098 | IBM | 1 | 1038 | 19 | 19 722 | |
| 512MB SDRAM DIMM Memory | 4120 | IBM | 1 | 2048 | 152 | 311 296 | |
| 2-way 375 MHz Power3 , 4MB L2 | 4362 | IBM | 1 | 11000 | 38 | 418 000 | 63 840 |
| 4-port 10/100 Mbps Ethernet adapter | 4961 | IBM | 1 | 1500 | 57 | 85 500 | |
| IBM ASCII Terminal, Keyboard w/ 2934,3925 | 3153-BG3 | IBM | 1 | 647 | 19 | 12 293 | 5 776 |
| AIX 4. Unlimited Users | 5765-C34 | IBM | 1 | 50 | 19 | 950 | 57 780 |
| | | | | | **Subtotal** | 955 396 | 159 316 |
| **Third Party Hardware** | | | | | | | |
| 8-port 10/100 Ethernet switch | FS108NA | Netgear | 3 | 85 | 4 | 340 | 0 |
| | | | | | **Subtotal** | 340 | 0 |
| | | | | | **Discounts** | -7 660 623 | -315 917 |
| | | | | | **TOTAL** | 6 075 047 | 1 170 158 |

**Notes:**

**Pricing: 1-Bull 2-Oracle 3-Netgear**

**Three-Year Cost of Ownership: $7 245 205**

**tpmC Rating: 403255,46**

**$ / tpmC: 17,96**

**Audited by Francois Raab of InfoSizing**

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 reflects standard pricing policies for the listed components. For complete details, see the pricing sections of the TPC benchmark specifications.If you find that the stated prices are not available according to these terms, please inform the TPC at pricing@tpc.org. Thank you.

**Numerical Quantities Summary for the BULL ESCALA PL3200R**

**MQTH**, computed Maximum Qualified Throughput: 403 255.46 tpmC

| Response Times (in seconds) | 90th % | Average | Maximum |
|---|---|---|---|
| New Order | 1.36 | 0.70 | 6.97 |
| Payment | 1.29 | 0.65 | 6.66 |
| Order-Status | 1.32 | 0.68 | 5.80 |
| Delivery (interactive ) | 0.19 | 0.10 | 2.17 |
| Delivery (deferred ) | 0.11 | 0.07 | 2.70 |
| Stock-Level | 1.29 | 0.65 | 5.99 |
| Menu | 0.00 | 0.00 | 2.54 |

| Transaction Mix, in percent of total transactions | Percent |
|---|---|
| New Order | 44.91% |
| Payment | 43.02% |
| Order-Status | 4.02% |
| Delivery | 4.01% |
| Stock-Level | 4.01% |

| Keying/Think Times (in seconds) | Min. | Average | Max. |
|---|---|---|---|
| New Order | 18.00/0.01 | 18.01/12.02 | 18.15/120.21 |
| Payment | 3.00/0.01 | 3.01/12.02 | 3.09/120.21 |
| Order-Status | 2.00/0.01 | 2.01/10.01 | 2.08/100.10 |
| Delivery | 2.00/0.01 | 2.01/5.02 | 2.08/50.20 |
| Stock-Level | 2.00/0.01 | 2.01/5.02 | 2.09/50.20 |

| Test Duration | |
|---|---|
| Ramp-up Time | 41 min 11 sec |
| Measurement interval | 2 hours |
| Transactions during measurement interval (all types) | 107,744,315 |
| Ramp-down time | 17 minutes |

| Checkpointing | |
|---|---|
| Number of checkpoints | 4 |
| Checkpoint interval | 29 min 41 sec |

***Abstract***

This report documents the full disclosure information required by the TPC Benchmark™ C Standard Specification Revision 5.0 dated February 26, 2001 for measurements on the BULL ESCALA PL3200R.

The software used on the BULL ESCALA PL3200R includes AIX 5L Version 5.2 operating system, Oracle9i Server database manager, and Websphere Application Server Enterprise Edition Version 3.0 for AIX transaction manager.

## BULL ESCALA PL3200R

| Company Name | System Name | Data Base Software | Operating System Software |
|---|---|---|---|
| Bull SA<br><br>Oracle Corporation | BULL ESCALA PL3200R | Oracle9i Database Enterprise Edition Release 2 (9.2.0.1.0) for AIX 5L V5.2 | AIX 5L Version 5.2 |

| Total System Cost | TPC-C Throughput | Price/Performance |
|---|---|---|
| • Hardware<br>• Software<br>• 3 Years Maintenance | Sustained maximum throughput of system running TPC-C expressed in transactions per minute | Total system cost/tpmC |
| **$7 245 205** | **403,255.46 tpmC** | **$17.96/tpmC** |

# Preface

TPC Benchmark™ C Standard Specification was developed by the Transaction Processing Performance Council (TPC). It was released on August 13, 1992 and updated with revision 5.0 on February 26, 2001.

This is the full disclosure report for benchmark testing of the BULL ESCALA PL3200R according to the TPC Benchmark™ C Standard Specification.

TPC Benchmark™ C exercises the system components necessary to perform tasks associated with that class of on-line transaction processing (OLTP) environments emphasizing a mixture of read-only and update intensive transactions. This is a complex OLTP application environment exercising a breadth of system components associated by such environments 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
- Data bases consisting of many tables with a wide variety of sizes, attributes, and relationships
- Contention on data access and update

This benchmark defines four on-line transactions and one deferred transaction, intended to emulate functions that are common to many OLTP applications. However, this benchmark does not reflect the entire range of OLTP requirements. 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 any other environment 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 benchmarks when critical capacity planning and/or product evaluation decisions are contemplated.

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.

# 1. General Items

## 1.1 Application Code Disclosure

*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 and output functions.*

Appendix A contains the application code for the five TPC Benchmark™ C transactions. Appendix D contains the terminal functions and layouts.

## 1.2 Benchmark Sponsor

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

This benchmark was sponsored by **Bull SA** and **Oracle Corporation.**

## 1.3 Parameter Settings

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

- *Data Base tuning options*
- *Recovery/commit options*
- *Consistency/locking options*
- *Operating system and application configuration parameters.*

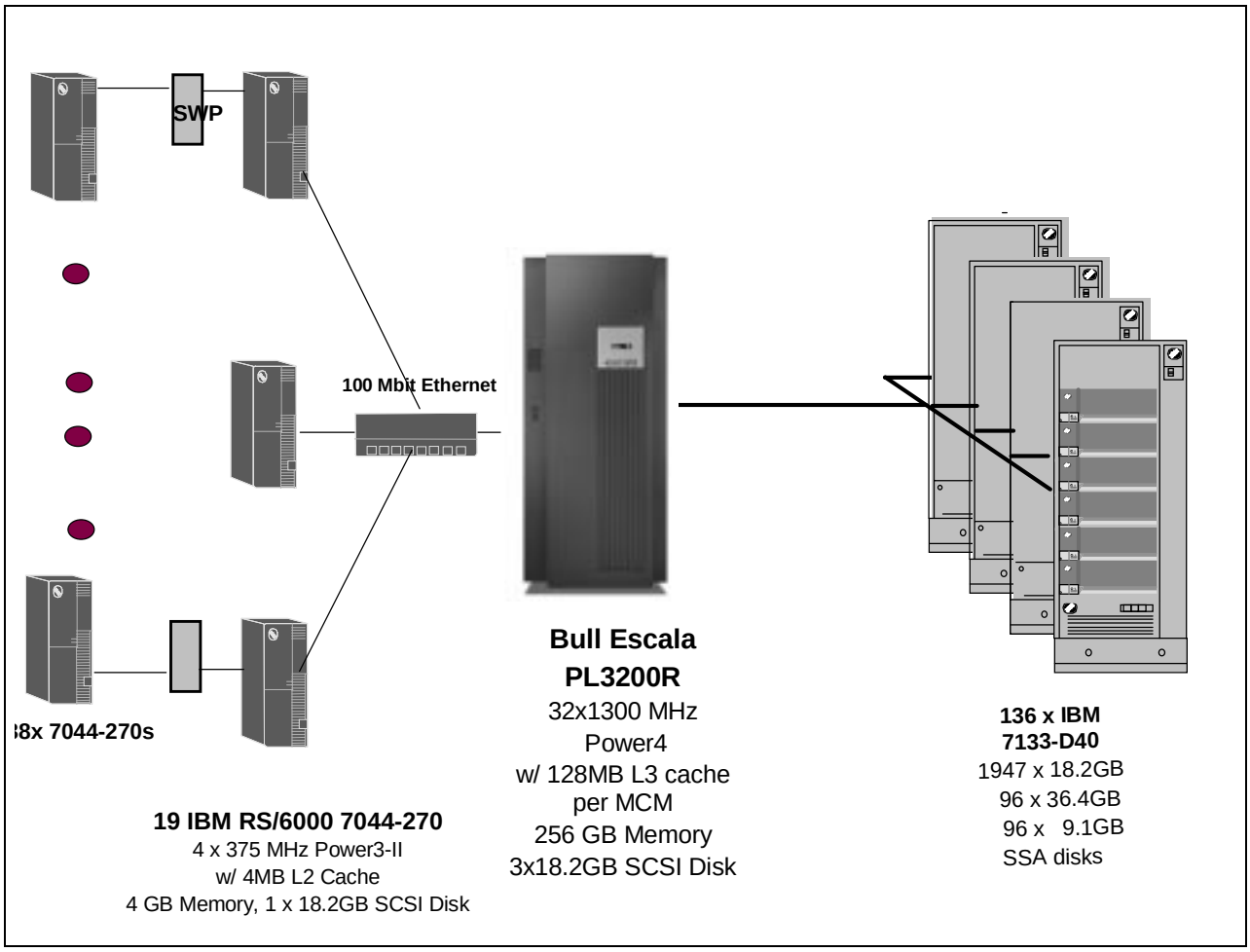
Appendix B contains the system, data base, and application parameters changed from their default values used in these TPC Benchmark™ C tests.

## 1.4 Configuration Diagrams

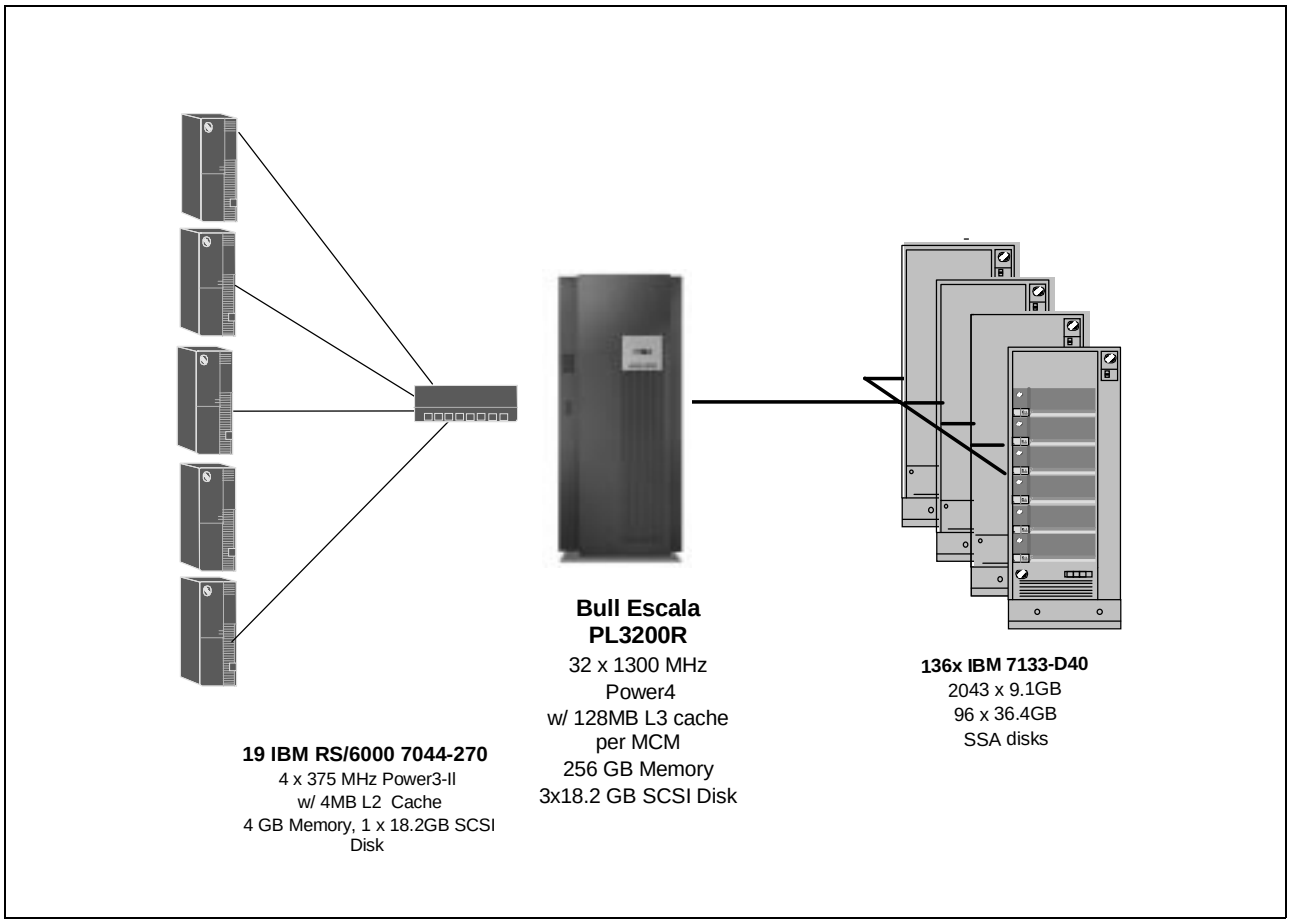
*Diagrams of both measured and priced configurations must be provided, accompanied by a description of the differences. This includes, but is not limited to:*

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

# BULL ESCALA PL3200R Benchmark Configuration



# BULL ESCALA PL3200R Priced Configuration



# 2. Clause 1: Logical Data Base Design Related Items

## 2.1 Table Definitions

*Listings must be provided for all table definition statements and all other statements used to setup the data base.*

Appendix C contains the table definitions and the database load programs used to build the data base.

## 2.2 Database Organization

*The physical organization of tables and indices, within the data base, must be disclosed.*

Physical space was allocated to Oracle9i Server on the server disks according to the details provided in Appendix C. The size of the space segments on each disk was calculated to provide even distribution of data across the disk subsystem.

## 2.3 Insert and/or 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 restriction in the SUT data base implementation that precludes inserts beyond the limits defined in Clause 1.4.11 must be disclosed. This includes the maximum number of rows that can be inserted and the maximum key value for these new rows.*

There were no restrictions on insert and/or delete operations to any of the tables. The space required for an additional five percent of the initial table cardinality was allocated to Oracle9i Server and priced as static space.

## 2.4 Horizontal or Vertical Partitioning

*While there are few restrictions placed upon horizontal or vertical partitioning of tables and rows in the TPC-C benchmark, any such partitioning must be disclosed.*

Partitioning was not used for any of the measurement reported in this full disclosure.

# 3. Clause 2: Transaction and Terminal Profiles Related Items

## 3.1 Verification for the Random Number Generator

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

The srandom(), getpid() and gettimeofday() functions are used to produce unique random seeds for each driver. The drivers use these seeds to seed the srand(), srandom() and srand48() functions. Random numbers are produced using wrappers around the standard system random number generators.

The negative exponential distribution uses the following function to generate the distribution. This function has the property of producing a negative exponential curve with a specified average and a maximum value 4 times the average.

```
        const double RANDOM_4_Z = 0.89837799236185
        const double RANDOM_4_K = 0.97249842407114

        double neg_exp_4(double average {
                return - average * (1/RANDOM_4_Z * log (1 - RANDOM_4_K * drand48())));
}
```

The random functions used by the driver system and the data base generation program were verified. The C_LAST column was queried to verify the random values produced by the database generation program. After a measurement, the HISTORY, ORDER, and ORDER_LINE tables were queried to verify the randomness of values generated by the driver. The rows were counted and grouped by customer and item numbers.

Here is an example of one SQL query used to verify the random number generation functions:

- create table TEMP (W_ID int, D_ID, C_LAST char(16), CNTR int);
- insert into TEMP select C_W_ID, C_D_ID, C_LAST, COUNT(*) from CUSTOMER group by C_W_ID, C_D_ID, C_LAST;
- select CNTR, COUNT(*) from TEMP group by CNTR order by 1;

## 3.2 Input/Output Screens

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

The screen layouts corresponds exactly to the layout corresponding in clauses 2.4.3, 2.5.3, 2.6.3, 2.7.3 and 2.8.3 of the TPC-C specifications.

## 3.3 Priced Terminal Features

*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 emulated workstations, IBM RS/6000 Model 44P-170, are commercially available and support all of the requirements in Clause 2.2.2.4.

## 3.4 Presentation Managers

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

The RS/6000 Model 44P-170 workstations did not involve screen presentations, message bundling or local storage of TPC-C rows. All screen processing was handled by the client system. All data manipulation was handled by the server system.

## 3.5 Home and Remote Order-lines

*The percentage of home and remote order-lines in the New-Order transactions must be disclosed.*

Table 3-1 show the percentage of home and remote transactions that occurred during the measurement period for the New-Order transactions.

## 3.6 New-Order Rollback Transactions

*The percentage of New-Order transactions that were rolled back as a result of an illegal item number must be disclosed.*

Table 3-1 show the percentage of New-Order transactions that were rolled back due to an illegal item being entered.

## 3.7 Number of Items per Order

*The number of items per order entered by New-Order transactions must be disclosed.*

Table 3-1 show the average number of items ordered per New-Order transaction.

## 3.8 Home and Remote Payment Transactions

*The percentage of home and remote Payment transactions must be disclosed.*

Table 3-1 show the percentage of home and remote transactions that occurred during the measurement period for the Payment transactions.

## 3.9 Non-Primary Key Transactions

*The percentage of Payment and Order-Status transactions that used non-primary key (C_LAST) access to the data base must be disclosed.*

Table 3-1 show the percentage of non-primary key accesses to the data base by the Payment and Order-Status transactions.

## 3.10 Skipped Delivery Transactions

*The percentage of Delivery transactions that were skipped as a result of an insufficient number of rows in the NEW-ORDER table must be disclosed.*

Table 3-1 show the percentage of Delivery transactions missed due to a shortage of supply of rows in the NEW-ORDER table.

## 3.11 Mix of Transaction Types

*The mix (i.e. percentages) of transaction types seen by the SUT must be disclosed.*

Table 3-1 show the mix percentage for each of the transaction types executed by the SUT.

## 3.12 Queueing Mechanism of Delivery

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

The Delivery transaction was submitted using an RPC call to an IBM Websphere Application Server Enterprise Edition Version 3.0, Encina interface transaction manager (TM). Websphere returns an immediate response to the calling program and schedules the work to be performed. This allows the Delivery transaction to be submitted, obtain an interactive response and queue the actual data base transaction for deferred execution. Please see the application code in Appendix A for details.

**Table 3-1 Numerical Quantities for Transaction and Terminal Profiles**

| New Order | BULL ESCALA PL3200R |
|---|---|
| Percentage of Home order lines | 99.0% |
| Percentage of Remote order lines | 1.00% |
| Percentage of Rolled Back Transactions | 1.00% |
| Average Number of Items per order | 10 |
| **Payment** | |
| Percentage of Home transactions | 85.02% |
| Percentage of Remote transactions | 14.98% |
| **Non-Primary Key Access** | |
| Percentage of Payment using C_LAST | 60.00% |
| Percentage of Order-Status using C_LAST | 59.97% |
| **Delivery** | |
| Delivery transactions skipped | 0 |
| **Transaction Mix** | |
| New-Order | 44.91% |
| Payment | 43.02% |
| Order-Status | 4.02% |
| Delivery | 4.01% |
| Stock-Level | 4.01% |

# 4. Clause 3: Transaction and System Properties

*The results of the ACID test must be disclosed along with a description of how the ACID requirements were met.*

All ACID tests were conducted according to specification.

## 4.1 Atomicity Requirements

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

### 4.1.1 Atomicity of Completed Transaction

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

The following steps were performed to verify the Atomicity of completed transactions.

1. The balance was retrieved from the CUSTOMER table for a random Customer, District and Warehouse giving BALANCE_1.
2. The Payment transaction was executed for the Customer, District and Warehouse used in step 1.
3. The balance was retrieved again for the Customer used in step 1 and step 2 giving BALANCE_2. It was verified that BALANCE_1 was greater than BALANCE_2 by AMT.

### 4.1.2 Atomicity of Aborted Transactions

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

The following steps were performed to verify the Atomicity of the aborted Payment transaction:

1. The Payment application code was changed to execute a rollback of the transaction instead of performing the commit.
2. Using the balance, BALANCE_2, from the CUSTOMER table retrieved for the completed transaction, the Payment transaction was executed for the Customer, District, and Warehouse used in step 1 of the section 4.1.1, using a payment amount (AMT) of 410.00. The transaction rolled back due to the change in the application code from step 1.
3. The balance was retrieved again for the Customer used for step 2 giving BALANCE_3. It was verified that BALANCE_2 was equal to BALANCE_3.

## 4.2 Consistency Requirements

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

*Verify that the data base is initially consistent by verifying that it meets the consistency conditions defined in Clauses 3.3.2.1 to 3.3.2.4. Describe the steps used to do this in sufficient detail so that the steps are independently repeatable.*

### 4.2.1 Consistency Condition 1

*Entries in the WAREHOUSE and DISTRICT tables must satisfy the relationship:*

- *W_YTD = sum(D_YTD)*

*for each warehouse defined by (W_ID = D_W_ID)*

### 4.2.2 Consistency Condition 2

*Entries in the DISTRICT, ORDER, and NEW-ORDER tables must satisfy the relationship:*

- *D_NEXT_O_ID - 1 = max(O_ID) = max(NO_O_ID)*

*for each district defined by (D_W_ID = O_W_ID = NO_W_ID) and (D_ID = O_D_ID = NO_D_ID). This condition does not apply to the NEW-ORDER table for any districts which have no outstanding new orders.*

### 4.2.3 Consistency Condition 3

*Entries in the New-Order table must satisfy the relationship:*

- *max(NO_O_ID) - min(NO_O_ID) + 1 = [number of rows in the New-Order table for this district]*

*for each district defined by NO_W_ID and NO_D_ID. This condition does not apply to any districts which have no outstanding new orders.*

### 4.2.4 Consistency Condition 4

*Entries in the ORDER and ORDER-LINE tables must satisfy the relationship:*

- *sum(O_OL_CNT) = [number of rows in the ORDER-LINE table for this district]*

*for each district defined by (O_W_ID = OL_W_ID) and (O_D_ID = OL_D_ID).*

### 4.2.5 Consistency Tests

*Verify that the data base is initially consistent by verifying that it meets the consistency conditions defined in Clauses 3.3.2.1 to 3.3.2.4. Describe the steps used to do this in sufficient detail so that the steps are independently repeatable.*

The consistency conditions defined in 4.2.1 through 4.2.4 were tested using a shell script to issue queries to the database. All queries showed that the data base was in a consistent state.

After executing transactions at full load for approximately sixty minutes the shell script was executed again. All queries show that the database was still in a consistent state.

## 4.3 Isolation Requirements

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

### 4.3.1 Isolation Test 1

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

1. An Order status transaction T0 was executed for a randomly selected customer, and the order returned was as recorded. Transaction T0 was committed.

2. A new-order transaction T1 was started for the same customer used in T0. T1 was stopped immediately prior to commit.

3. An order-status transaction T2 was started for the same customer used in T1. Transaction T2 completed and was committed without being blocked by T1. T2 returned the same order that T0 had returned.

4. T1 completed and was committed.

5. An order-status transaction T3 was started for the same customer used in T1. T3 returned the order inserted by T1.

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

### 4.3.2 Isolation Test 2

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

The following steps were performed to satisfy the test of isolation for Order-Status and a rolled back New-Order transactions:

1. An Order status transaction T0 was executed for a randomly selected customer, and the order returned was recorded. Transaction T0 was committed.
2. A new-order transaction T1 with an invalid item was started for the same customer used in T0. Transaction T1 was stopped prior to rollback.
3. An order-status transaction T2 was started for the same customer used in T1. T2 completed and was committed without being blocked by T1. Transaction T2 returned the same order that T0 had returned.
4. T1 was rollback.
5. An order-status transaction T3 was started for the same customer used in T1. T3 returned the same order that T0 returned.

### 4.3.3 Isolation Test 3

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

The following steps were performed to verify isolation of two New-Order transactions:

1. The D_NEXT_O_ID of a randomly selected district was retrieved.
2. A new-order transaction T1 was started for a randomly selected customer within the district used in step1. T1 was stopped immediately prior to commit.
3. Another new-order transaction was started for the same customer used in T1. Transaction T2 waited.
4. T1 completed. T2 completed and was committed.
5. The order number returned by T1 was the same as the D_NEXT_O_ID retrieved in step 1. The order number returned by T2 was one greater that the order number returned by T1.
6. The D_NEXT_O_ID of the same district was retrieved again. It had been incremented by two (it was one greater that the order number returned by T2).

### 4.3.4 Isolation Test 4

*This test demonstrates isolation for write-write conflicts of two New-Order transactions when one transaction is rolled back.*

The following steps were performed to verify the isolation of two New-Order transactions after one is rolled back:

1. The D_NEXT_O_ID of a randomly selected district was retrieved.
2. A new-order transaction T1 with an invalid item was started for a randomly selected customer with the district used in step1. T1 was stopped immediately prior to rollback.
3. Another new-order transaction was started for the same customer used in T1. T2 waited.
4. T1 was allowed to rollback. T2 completed and was committed.
5. The order number returned by T2 was the same as the D_NEXT_O_ID retrieved in step 1.
6. The D_NEXT_O_ID of the same district was retrieved again. It had been incremented by one (it was one greater that the order number returned by T2).

### 4.3.5 Isolation Test 5

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

The following steps were performed to successfully conduct this test:

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

### 4.3.6 Isolation Test 6

*This test demonstrates isolation for write-write conflicts of Payment and Delivery transactions when the Delivery transaction is rolled back.*

The following steps were performed to successfully conduct this test:

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

### 4.3.7 Isolation Test 7

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

The following steps were performed to successfully conduct this test:

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

### 4.3.8 Isolation Test 8

*This test demonstrates isolation for phantom protection between a Delivery and a New-Order transaction.*

The following steps were performed to successfully conduct this test:

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

### 4.3.9 Isolation Test 9

*This test demonstrates isolation for phantom protection between an Order-Status and a New-Order transaction.*

The following steps were performed to successfully conduct this test:

1. An order status transaction T1 was started for a randomly selected customer.
2. T1 was stopped immediately after reading the order table for the selected customer The most recent order for that customer was found.
3. A new order transaction T2 was started for the same customer. T2 completed and was committed without being blocked by T1.
4. T1 was resumed and the order table was read again to determine the most recent order for the same customer. The order found was the same as the one found in step 2.
5. T1 completed and was committed.

## 4.4 Durability Requirements

*The tested system must guarantee durability: the ability to preserve the effects of committed transactions and insure data base consistency after recovery from any one of the failures listed in Clause 3.5.3*

### 4.4.1 Permanent Unrecoverable Failure of any Single Durable Medium

*Permanent irrecoverable failure of any single durable medium containing TPC-C data base tables or recovery log data.*

***Failure of Durable Medium containing recovery log data and Instantaneous Interruption and Memory Failure.***

This test was conducted on a fully scaled database. The following steps were performed successfully.

1. The current count of the total number of orders was determined by the sum of D_NEXT_O_ID of all rows in the DISTRICT table giving SUM_1.
2. A test was started and allowed to run for twelve minutes.
3. One of the disks containing the transaction log data was powered off. Since the log was on a raid disk, Oracle9i continued to process the transactions successfully.
4. The test continued for another 1 1/2 minutes.
5. The system was immediately shut down by switching the Emergency Power Off , thereby removing system

power.

6. The disk from step 3 was powered back on.
7. The system was powered back on and rebooted.
8. Step 1 is performed returning the value for SUM_2. It was verified that SUM_2 was equal to SUM_1 plus the completed New_Order transactions recorded by the RTE and that no entries existed for rolled-back transactions.
9. Consistency condition 3 was verified.

***Failure of Durable Medium containing TPC-C data base tables.***

The following steps were successfully performed to pass the Durability test of failure of a disk unit with data base tables:

1. The contents of a disk containing a TPCC table was backed up by copying it to another disk.
2. The current count of the total number of orders was determined by the sum of D_NEXT_O_ID of all rows in the DISTRICT table giving SUM_1.
3. A scaled-down test was started and allowed to run until steady state.
4. The disk containing the TPCC table was powered off.
5. The run was stopped.
6. The disk from step 4 was powered back on and was restored from the backup copy in step 1.
7. Oracle9i was restarted and its transaction log was used to roll forward through the transactions that had completed since the run had started.
8. Step 2 was performed returning SUM_2. It was verified that SUM_2 was equal to SUM_1 plus the completed New_Order transactions recorded by the RTE and that no entries existed for rolled-back transactions.
9. Consistency condition 3 was verified.

***Failure of Durable Fast Write Cache on SSA Adapter for Redo Logs***

The following steps were successfully performed to pass the Durability test for failure of a durable medium that contains transient redo log transactions:

1. The SSA adapter for the Redo logs contains a cache that is powered by an onboard battery which will retain its contents if the adapter fails, or system power goes off. This test was performed in two parts:

   A) failure of the adapter/system power

   B) failure of the onboard battery
2. Test (A) was performed with the power-off test of the log above. After the system was powered off, the cache was removed from its current adapter and re-inserted into the system before rebooting.
3. Data on the cache was recovered successfully by meeting the requirements listed in the power-off test of the logs above.
4. Test (B). The current count of the total number of orders was determined by the sum of D_NEXT_O_ID of all rows in the DISTRICT table, giving SUM_1.
5. Test (B) was conducted by inducing a battery failure during a test run. Once the system had reached steady state, the battery was failed using a toggle switch. The system recorded the failure, flushed out its vram contents and quit using the cache. Error notices were posted into the system error log.
6. The run continued without the cache.
7. Step 4 was performed returning SUM_2. It was verified that SUM_2 was equal to SUM_1 plus the completed New_Order transactions recorded by the RTE and that no entries existed for rolled-back transactions.
8. Consistency condition 3 was verified..

# 5. Clause 4: Scaling and Data Base Population Related Items

## 5.1 Cardinality of Tables

*The cardinality (e.g., the number of rows) of each table, as it existed at the start of the benchmark run, must be disclosed.*

Table 5-1 portrays the TPC Benchmark™ C defined tables and the number of rows for each table as they were built initially. While 34,000 warehouses were built only 32,400 were used during the tests. The unused warehouses were deleted.

| Table Name | Number of Rows |
|---|---|
| Warehouse | 32 400 |
| District | 340 000 |
| Customer | 1 020 000 000 |
| History | 1 020 000 000 |
| Order | 1 020 000 000 |
| New Order | 306 000 000 |
| Order Line | 10 200 000 000 |
| Stock | 3 400 000 000 |
| Item | 100 000 |

## 5.2 Distribution of Tables and Logs

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

The following table depicts the data base configuration of the system tested.

**Table 5-2. BULL ESCALA PL3200R Data Distribution Benchmark Configuration**

| SSA | HDISKS | LV'S | DISK SIZE |
|---|---|---|---|
| ssa0 | 10 ,14 ,15 ,19,28 ,53,63 ,65,84 ,85 | lvstk1 lvstk99 lvstk197 lvstk295 lvstk393 | 18GB |
| ssa0 | 100 ,17 ,40 ,43 ,51 ,59 ,66 ,68,75 ,81 | lvstk47 lvstk145 lvstk243 lvstk341 lvstk439 | 18GB |
| ssa0 | 11 ,23 ,24 ,26 ,31 ,35 ,37 ,9 ,90 ,98 | lvstk93 lvstk191 lvstk289 lvstk387 lvstk485 | 18GB |
| ssa0 | 12 ,27 ,39 ,41 ,44 ,46 ,62,77,91 ,95 | lvstk70 lvstk168 lvstk266 lvstk364 lvstk462 | 18GB |
| ssa0 | 13 ,18 ,22 ,47 ,54,71 ,78 ,83 ,92 ,97 | lvordl150 lvordl164 lvordl178 lvordl192 lvordl206 lvordl220 lvordl234 lvordl248 lvordl262 lvordl276 lvordl10 lvordl24 | 18GB |
| ssa0 | 16 ,25 ,49 ,50 ,61 ,67 ,80 ,86 | lvhist2 lvhist3 lvhist16 | 18GB |
| ssa0 | 20 ,32 ,34 ,36 ,58 ,88 ,89 ,99 | lvcust18 lvcust71 lvcust124 lvcust177 lvcust230 lvcust283 lvcust336 lvcust389 lvcust442 lvcust495 lvtemp18 | 18GB |
| ssa0 | 27 ,39 ,41 ,44 ,46 ,62 ,77 ,91 ,95 | lvstk70 lvstk168 lvstk266 lvstk364 lvstk462 | 18GB |
| ssa0 | 29 | lvhist2 lvhist3 lvhist16 lvitems1 | 18GB |
| ssa0 | 30 | lvhist11 lvord8 lvhist18 | 18GB |
| ssa0 | 33 ,45 ,48 ,55 ,56 ,60,64,72,79 ,8 | lvstk24 lvstk122 lvstk220 lvstk318 lvstk416 | 18GB |
| ssa0 | 38 ,42 ,52 ,57 ,69 ,70 ,73 ,74 ,93 ,96 | lvcust41 lvcust94 lvcust147 lvcust200 lvcust253 lvcust306 lvcust359 lvcust412 lvcust465 lvcust518 lvtemp41 | 18GB |
| ssa0 | 7 | lvcust18 lvcust71 lvcust124 lvcust177 lvcust230 lvcust283 lvcust336 lvcust389 lvcust442 lvcust495 lvtemp18 | 18GB |
| ssa0 | 76 | lvhist2 lvhist3 lvitems1 lvhist16 | 18GB |
| ssa1 | 108 ,115 ,128 ,155 ,196 | lvcust42 lvcust95 lvcust148 lvcust201 lvcust254 lvcust307 lvcust360 lvcust413 lvcust466 lvcust519 lvtemp42 | 18GB |
| ssa1 | 109 ,133 ,138 ,140 ,160 | lvstk94 lvstk192 lvstk290 lvstk388 lvstk486 | 18GB |
| ssa1 | 111 ,125 ,162 ,167 ,183 | lvord4 lvordl154 lvordl168 lvordl182 lvordl196 lvordl210 lvordl224 lvordl238 lvordl252 lvordl266 lvordl280 lvordl14 | 18GB |
| ssa1 | 116 ,139 ,157 ,159 ,182 | lvstk25 lvstk123 lvstk221 lvstk319 lvstk417 | 18GB |
| ssa1 | 118 ,119 ,124 ,179 ,181 | lvstk2 lvstk100 lvstk198 lvstk296 lvstk394 | 18GB |
| ssa1 | 122 ,123 ,156 ,165 ,168 ,1976 | lvnord2 lvord15 lvhist1 | 18GB |
| ssa1 | 130 ,158 ,163 ,193 ,195 | lvstk48 lvstk146 lvstk244 lvstk342 lvstk440 | 18GB |
| ssa1 | 134 ,135 ,148 ,161 ,184 | lvstk71 lvstk169 lvstk267 lvstk365 lvstk463 | 18GB |
| ssa1 | 145 ,153 ,166 ,194 ,197 | lvcust19 lvcust72 lvcust125 lvcust178 lvcust231 lvcust284 lvcust337 lvcust390 lvcust443 lvcust496 lvtemp19 | 18GB |
| ssa2 | 198 ,203 ,210 ,227 ,240 ,255 ,261 ,262 ,282 ,285 | lvi1ord10 lvi1ord3 lvi2ord28 lvi2ord41 lvi2ord10 | 18GB |
| ssa2 | 199 ,202 ,211 ,226 ,237 ,245 ,246 ,247 ,252 ,290 | lvstk5 lvstk103 lvstk201 lvstk299 lvstk397 | 18GB |
| ssa2 | 200 ,204 ,205 ,216 ,221 ,225 ,269 ,271 ,277 ,291 | lvcust45 lvcust98 lvcust151 lvcust204 lvcust257 lvcust310 lvcust363 lvcust416 lvcust469 lvcust522 lvtemp45 | 18GB |
| ssa2 | 201 ,208 ,213 ,222 ,238 ,253 ,260 ,272 ,274 ,289 | lvcust22 lvcust75 lvcust128 lvcust181 lvcust234 lvcust287 lvcust340 lvcust393 lvcust446 lvcust499 lvtemp22 | 18GB |
| ssa2 | 206 ,207 ,209 ,218 ,228 ,235 ,248 ,256 ,268 ,293 | lvstk97 lvstk195 lvstk293 lvstk391 lvstk489 | 18GB |
| ssa2 | 212 ,214 ,219 ,231 ,234 ,243 ,257 ,258 ,264 ,276 | lvstk74 lvstk172 lvstk270 lvstk368 lvstk466 | 18GB |
| ssa2 | 215 ,236 ,239 ,242 ,267 ,270 ,275 ,278 ,283 ,287 | lvstk28 lvstk126 lvstk224 lvstk322 lvstk420 | 18GB |
| ssa2 | 217 ,241 ,249 ,250 ,263 ,266 ,279 ,281 ,284 ,286 | lvroll1 lvroll5 lvroll9 lvroll13 | 18GB |
| ssa2 | 220 ,224 ,229 ,230 ,251 ,265 ,273 ,280 ,288 ,292 | lvstk51 lvstk149 lvstk247 lvstk345 lvstk443 | 18GB |
| ssa3 | 1793 ,310 ,311 ,337 ,342 ,344 ,360 ,362 ,374 ,385 | lvstk95 lvstk193 lvstk291 lvstk389 lvstk487 | 18GB |
| ssa3 | 2257 ,303 ,313 ,324 ,341 ,352,358 ,364 ,365 ,388 | lvstk26 lvstk124 lvstk222 lvstk320 lvstk418 | 18GB |
| ssa3 | 294 ,304 ,315 ,318 ,349 ,351 ,366 ,370 ,380 ,386 ,887 | lvhist11 lvord8 lvhist18 | 18GB |
| ssa3 | 295 ,299 ,346 ,347 ,359 ,367 ,372,376 ,378 ,384 | lvstk72 lvstk170 lvstk268 lvstk366 lvstk464 | 18GB |
| ssa3 | 296 ,301 ,309 ,312 ,317 ,321 ,339 ,353 ,363 ,373 | lvcust43 lvcust96 lvcust149 lvcust202 lvcust255 lvcust308 lvcust361 lvcust414 lvcust467 lvcust520 lvtemp43 | 18GB |
| ssa3 | 297 ,302 ,305 ,306 ,331 ,333 ,335 ,348 ,375 ,377 | lvord12 lvordl166 lvordl180 lvordl194 lvordl208 lvordl222 lvordl236 lvordl250 lvordl264 lvordl278 lvordl12 lvordl26 | 18GB |
| ssa3 | 298 ,319 ,322 ,325 ,327 ,336,338 ,357 ,382 ,383 | lvstk3 lvstk101 lvstk199 lvstk297 lvstk395 | 18GB |
| ssa3 | 300 ,307 ,330 ,350 ,354 ,355 ,356 ,368 ,387 | lvcust20 lvcust73 lvcust126 lvcust179 lvcust232 lvcust285 lvcust338 lvcust391 lvcust444 lvcust497 lvtemp20 | 18GB |
| ssa3 | 308 ,314 ,316 ,320 ,323 ,328 ,340 ,343 ,345 ,371 | lvstk49 lvstk147 lvstk245 lvstk343 lvstk441 | 18GB |
| ssa4 | 389 ,391 ,397 ,402 ,410 ,420 ,466 ,471 ,481,484 | lvhist9 lvordl153 lvordl167 lvordl181 lvordl195 lvordl209 lvordl223 lvordl237 lvordl251 lvordl265 lvordl279 lvordl13 | 18GB |
| ssa4 | 390 ,399 ,403 ,407 ,409 ,419 ,432 ,438 ,439 ,479 | lvhist10 lvhist19 | 18GB |
| ssa4 | 393 ,394 ,396 ,405 ,412 ,424 ,451 ,465 ,474 ,475 | lvcust44 lvcust97 lvcust150 lvcust203 lvcust256 lvcust309 lvcust362 lvcust415 lvcust468 lvcust521 lvtemp44 | 18GB |
| ssa4 | 395 ,401 ,418 ,428 ,435 ,437 ,440 ,443 ,478 ,482 | lvcust21 lvcust74 lvcust127 lvcust180 lvcust233 lvcust286 | 18GB |

| | | | |
|---|---|---|---|
| | | lvcust339 lvcust392 lvcust445 lvcust498 lvtemp21 | |
| ssa4 | 398 ,404 ,413 ,417 ,421 ,459 ,462 ,469 ,473 ,476 | lvstk4 lvstk102 lvstk200 lvstk298 lvstk396 | 18GB |
| ssa4 | 400 ,423 ,426 ,427 ,430 ,441 ,444 ,447 ,455 ,468 | lvstk96 lvstk194 lvstk292 lvstk390 lvstk488 | 18GB |
| ssa4 | 406 ,408 ,414 ,433 ,436 ,446 ,454 ,470 ,477 ,480 | lvstk50 lvstk148 lvstk246 lvstk344 lvstk442 | 18GB |
| ssa4 | 411 ,416 ,422 ,431 ,445 ,448 ,450 ,452 ,458 ,463 | lvstk27 lvstk125 lvstk223 lvstk321 lvstk419 | 18GB |
| ssa4 | 429 ,434 ,449 ,453 ,456 ,460 ,461 ,464 ,467 ,472 | lvstk73 lvstk171 lvstk269 lvstk367 lvstk465 | 18GB |
| ssa5 | 489 ,491 ,493 ,499 ,501 ,502 ,505 ,511 ,551 ,576 | lvhist20 lvordl152 lvordl165 lvordl179 lvordl193 lvordl207 lvordl221 lvordl235 lvordl249 lvordl263 lvordl277 lvordl11 | 18GB |
| ssa5 | 492 | lvstk66 lvstk164 lvstk262 lvstk360 lvstk458 | 18GB |
| ssa5 | 495 ,516 ,536 ,537 ,571 | lvstk89 lvstk187 lvstk285 lvstk383 lvstk481 | 18GB |
| ssa5 | 496 ,500 ,515 ,544 ,575 | lvcust14 lvcust67 lvcust120 lvcust173 lvcust226 lvcust279 lvcust332 lvcust385 lvcust438 lvcust491 lvtemp14 | 18GB |
| ssa5 | 497 ,514 ,531 ,540 ,549 | lvcust37 lvcust90 lvcust143 lvcust196 lvcust249 lvcust302 lvcust355 lvcust408 lvcust461 lvcust514 lvtemp37 | 18GB |
| ssa5 | 503 ,517 ,522 ,527 ,557 | lvware3 lvhist6 lvhist12 lvord1 | 18GB |
| ssa5 | 504 ,512 ,550 ,577 ,578 | lvstk20 lvstk118 lvstk216 lvstk314 lvstk412 | 18GB |
| ssa5 | 507 ,519 ,547 ,573 ,574 | lvstk43 lvstk141 lvstk239 lvstk337 lvstk435 | 18GB |
| ssa5 | 532 ,533 ,538 ,552 | lvstk66 lvstk164 lvstk262 lvstk360 lvstk458 | 18GB |
| ssa6 | 581 ,596 ,601 ,602 ,622 ,623 ,627 ,632 ,658 ,662 | lvcust11 lvcust64 lvcust117 lvcust170 lvcust223 lvcust276 lvcust329 lvcust382 lvcust435 lvcust488 lvtemp11 | 18GB |
| ssa6 | 582 ,587 ,600 ,619 ,625 ,629 ,634 ,637 ,655 ,661 | lvstk63 lvstk161 lvstk259 lvstk357 lvstk455 | 18GB |
| ssa6 | 583 ,584 ,621 ,631 ,648 ,652 ,656 ,657 ,663 ,667 | lvstk40 lvstk138 lvstk236 lvstk334 lvstk432 | 18GB |
| ssa6 | 585 ,592 ,603 ,604 ,605 ,606 ,610 ,626 ,633 ,660 | lvcust34 lvcust87 lvcust140 lvcust193 lvcust246 lvcust299 lvcust352 lvcust405 lvcust458 lvcust511 lvtemp34 | 18GB |
| ssa6 | 586 ,591 ,599 ,608 ,609 ,612 ,615 ,617 ,618 ,630 ,649 ,650 ,670 ,671 ,672 | lvord7 lvordl157 lvordl171 lvordl185 lvordl199 lvordl213 lvordl227 lvordl241 lvordl255 lvordl269 lvordl3 lvordl17 | 18GB |
| ssa6 | 588 ,616 ,635 ,636 ,638 ,639 ,643 ,664 ,665 ,675 | lvstk17 lvstk115 lvstk213 lvstk311 lvstk409 | 18GB |
| ssa6 | 589 ,613 ,640 ,642 ,654 | lvhist9 lvordl153 lvordl167 lvordl181 lvordl195 lvordl209 lvordl223 lvordl237 lvordl251 lvordl265 lvordl279 lvordl13 | 18GB |
| ssa6 | 590 ,611 ,620 ,641 ,645 ,653 ,659 ,668,673 ,676 | lvi1ord2 lvi2ord27 lvi2ord40 lvi2ord9 | 18GB |
| ssa6 | 594 ,595 ,597 ,598 ,614 ,628 ,646 ,647 ,651 ,669 | lvstk86 lvstk184 lvstk282 lvstk380 lvstk478 | 18GB |
| ssa7 | 677 ,690 ,699 ,701 ,705 ,713 ,716 ,717 ,735 ,753 | lvcust48 lvcust101 lvcust154 lvcust207 lvcust260 lvcust313 lvcust366 lvcust419 lvcust472 lvcust525 lvtemp48 | 18GB |
| ssa7 | 678 ,691 ,692 ,693 ,698 ,703 ,730 ,733 ,739 ,751 | lvi1ord13 lvi1ord6 lvi2ord31 lvi2ord44 lvi2ord13 | 18GB |
| ssa7 | 679 ,682 ,685 ,686 ,700 ,704 ,712 ,725 ,763 ,771 | lvstk77 lvstk175 lvstk273 lvstk371 lvstk469 | 18GB |
| ssa7 | 680 ,681 ,696 ,710 ,714 ,723 ,727 ,741 ,746 ,754 | lvstk31 lvstk129 lvstk227 lvstk325 lvstk423 | 18GB |
| ssa7 | 683 ,684 ,687 ,688 ,689 ,736 ,764 ,765 ,767 ,768 | lvcust2 lvcust55 lvcust108 lvcust161 lvcust214 lvcust267 lvcust320 lvcust373 lvcust426 lvcust479 lvtemp2 | 18GB |
| ssa7 | 694 ,708 ,711 ,718 ,722 ,728 ,731 ,732,738 ,755 | lvroll4 lvroll8 lvroll12 lvroll16 | 18GB |
| ssa7 | 697 ,709 ,719 ,720 ,721,740,743 ,750 ,752 ,757 | lvstk8 lvstk106 lvstk204 lvstk302 lvstk400 | 18GB |
| ssa7 | 702 ,707 ,742 ,747 ,748 ,749 ,759 ,762 ,769 ,770 | lvstk54 lvstk152 lvstk250 lvstk348 lvstk446 | 18GB |
| ssa7 | 715 ,724 ,734 ,737 ,744 ,745 ,756 ,758 ,761 ,772 | lvcust25 lvcust78 lvcust131 lvcust184 lvcust237 lvcust290 lvcust343 lvcust396 lvcust449 lvcust502 lvtemp25 | 18GB |
| ssa8 | 983, 2269 | log(RAID5) | 2x218.7GB |
| ssa9 | 774 , 1051 | log(RAID5) | 2x218.7GB |
| ssa10 | 783 ,798 ,799 ,801 ,816 ,829 ,837 ,855,871 ,873 | lvstk68 lvstk166 lvstk264 lvstk362 lvstk460 | 18GB |
| ssa10 | 784 ,789 ,807 ,811 ,819 ,823 ,827,839,846 ,870 | lvstk22 lvstk120 lvstk218 lvstk316 lvstk414 | 18GB |
| ssa10 | 785 ,794 ,800 ,802 ,810 ,813 ,814 ,820 ,821 ,836 | lvstk45 lvstk143 lvstk241 lvstk339 lvstk437 | 18GB |
| ssa10 | 787 ,804 ,812 ,833 ,838 ,848 ,854 ,858 ,863 ,864 | lvstk91 lvstk189 lvstk287 lvstk385 lvstk483 | 18GB |
| ssa10 | 790 ,809 ,817 ,830 ,831 ,850 ,865 ,874 ,875 | lvcust39 lvcust92 lvcust145 lvcust198 lvcust251 lvcust304 lvcust357 lvcust410 lvcust463 lvcust516 lvtemp39 | 18GB |
| ssa10 | 796 ,797 ,805 ,808 ,840 ,861 ,862 ,866 ,867 ,872 | lvware5 lvhist4 lvnord4 lvhist14 | 18GB |
| ssa10 | 806 ,815 ,818 ,832 ,834 ,847 ,851 ,856 ,860 ,869 | lvordl148 lvordl162 lvordl176 lvordl190 lvordl204 lvordl218 lvordl232 lvordl246 lvordl260 lvordl274 lvordl8 lvordl22 | 18GB |
| ssa10 | 822 ,825 ,826 ,828 ,841 ,852 ,853 ,857 ,859 ,868 | lvcust16 lvcust69 lvcust122 lvcust175 lvcust228 lvcust281 lvcust334 lvcust387 lvcust440 lvcust493 lvtemp16 | 18GB |
| ssa11 | 876 ,903 ,904,921 ,933,935 ,936 ,943 ,951 ,959 | lvstk90 lvstk188 lvstk286 lvstk384 lvstk482 | 18GB |
| ssa11 | 878 ,879 ,880 ,883 ,897 ,929 ,954 ,955 ,966 ,967 | lvstk44 lvstk142 lvstk240 lvstk338 lvstk436 | 18GB |
| ssa11 | 881 ,882 ,906 ,912 ,918 ,949 ,950 ,952 ,956 ,970 | lvware4 lvhist5 lvnord3 lvhist13 lvord11 | 18GB |
| ssa11 | 884 ,892 ,893 ,895 ,902,923 ,927 ,932 ,940 ,964 | lvstk67 lvstk165 lvstk263 lvstk361 lvstk459 | 18GB |
| ssa11 | 885 ,891 ,901 ,908 ,930 ,931 ,934 ,939 ,969 ,971 | lvcust15 lvcust68 lvcust121 lvcust174 lvcust227 lvcust280 | 18GB |

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|---|---|---|---|
| | | lvcust333 lvcust386 lvcust439 lvcust492 lvtemp15 | |
| ssa11 | 887 ,888 ,890 ,894 ,898 ,913 ,917 ,920 ,925 ,928 ,938 ,944 ,945 ,958 ,968 | lvhist17 lvordl147 lvordl161 lvordl175 lvordl189 lvordl203 lvordl217 lvordl231 lvordl245 lvordl259 lvordl273 lvordl7 | 18GB |
| ssa11 | 896 ,900 ,905 ,907 ,909 ,911 ,914 ,916 ,924 ,960 | lvcust38 lvcust91 lvcust144 lvcust197 lvcust250 lvcust303 lvcust356 lvcust409 lvcust462 lvcust515 lvtemp38 | 18GB |
| ssa11 | 910 ,915 ,922 ,937 ,941,94 ,947 ,962 ,963 ,965 | lvstk21 lvstk119 lvstk217 lvstk315 lvstk413 | 18GB |
| ssa11 | 919 ,926 ,953 ,957 | lvord12 lvordl166 lvordl180 lvordl194 lvordl208 lvordl222 lvordl236 lvordl250 lvordl264 lvordl278 lvordl12 lvordl26 | 18GB |
| ssa12 | 1000 ,1002 ,1010 ,1011 ,1012 ,1013 ,1015 ,1025 ,1030 ,974 | lvstk75 lvstk173 lvstk271 lvstk369 lvstk467 | 18GB |
| ssa12 | 1001 ,1003 ,1021 ,1029 ,1042,1043,1048 ,1062,973 ,978 | lvstk98 lvstk196 lvstk294 lvstk392 lvstk490 | 18GB |
| ssa12 | 1005 ,1028 ,1033 ,1035 ,1039 ,1053 ,986 ,991 ,994 ,997 | lvstk29 lvstk127 lvstk225 lvstk323 lvstk421 | 18GB |
| ssa12 | 1006 ,1008 ,1027 ,1049 ,1052 ,1067,979 ,981 ,988 ,989 | lvstk6 lvstk104 lvstk202 lvstk300 lvstk398 | 18GB |
| ssa12 | 1007 ,1026 ,1034 ,1040 ,1041 ,1044 ,972 ,980 ,984 ,992 | lvstk52 lvstk150 lvstk248 lvstk346 lvstk444 | 18GB |
| ssa12 | 1014 ,1016 ,1018 ,1054 ,1055 ,1056 ,1061 ,985 ,990 ,998 | lvcust23 lvcust76 lvcust129 lvcust182 lvcust235 lvcust288 lvcust341 lvcust394 lvcust447 lvcust500 lvtemp23 | 18GB |
| ssa12 | 1017 ,1019 ,1022 ,1038 ,1183 ,2047 ,976 ,977 ,982 ,993 | lvi1ord11 lvi1ord4 lvi2ord29 lvi2ord42 lvi2ord11 | 18GB |
| ssa12 | 1024 ,1031 ,1045 ,1047 ,1050 ,1057 ,1065 ,1820 ,2052 ,975 | lvroll2 lvroll6 lvroll10 lvroll14 | 18GB |
| ssa12 | 1032 ,1036 ,1037 ,1064 ,1066 ,2255 ,773 ,987 ,995 ,996 | lvcust46 lvcust99 lvcust152 lvcust205 lvcust258 lvcust311 lvcust364 lvcust417 lvcust470 lvcust523 lvtemp46 | 18GB |
| ssa13 | 1068 ,1070 ,1071 ,1105 ,1112 ,1125 ,1129 ,1138 ,1139 ,1155 | lvcust26 lvcust79 lvcust132 lvcust185 lvcust238 lvcust291 lvcust344 lvcust397 lvcust450 lvcust503 lvtemp26 | 18GB |
| ssa13 | 1069 ,1085 ,1087 ,1090 ,1110 ,1111 ,1117 ,1118 ,1131 ,1135 | lvstk32 lvstk130 lvstk228 lvstk326 lvstk424 | 18GB |
| ssa13 | 1072 ,1083 ,1091 ,1100 ,1109 ,1113 ,1115 ,1121 ,1126 ,1130 | lvstk55 lvstk153 lvstk251 lvstk349 lvstk447 | 18GB |
| ssa13 | 1073 ,1078 ,1082 ,1098 ,1123 ,1136 ,1137 ,1146 ,1147 ,1162 | lvi1ord14 lvi1ord7 lvi2ord32 lvi2ord1 lvi2ord14 | 18GB |
| ssa13 | 1074 ,1080 ,1099 ,1102 ,1103 ,1132 ,1133 ,1140 ,1145 ,1153 | lvstk78 lvstk176 lvstk274 lvstk372 lvstk470 | 18GB |
| ssa13 | 1076 ,1077 ,1084 ,1101 ,1114 ,1127 ,1143 ,1154 ,1156 ,1158 | lvi1cust1 lvi1cust4 lvi1cust7 lvi1cust10 lvi2cust3 lvi2cust6 lvi2cust9 lvi2cust12 lvi2cust15 lvi2cust18 | 18GB |
| ssa13 | 1079 ,1092 ,1097 ,1104 ,1107 ,1108 ,1116 ,1120 ,1142 ,1149 | lvcust3 lvcust56 lvcust109 lvcust162 lvcust215 lvcust268 lvcust321 lvcust374 lvcust427 lvcust480 lvtemp3 | 18GB |
| ssa13 | 1081 ,1086 ,1088 ,1124 ,1141 ,1148 ,1150 ,1151 ,1160 ,1161 | lvstk9 lvstk107 lvstk205 lvstk303 lvstk401 | 18GB |
| ssa13 | 1089 ,1093 ,1095 ,1096 ,1106 ,1119 ,1122 ,1128 ,1144 ,1157 | lvcust49 lvcust102 lvcust155 lvcust208 lvcust261 lvcust314 lvcust367 lvcust420 lvcust473 lvcust526 lvtemp49 | 18GB |
| ssa14 | 1004 ,1165 ,1179 ,1191 ,1220 ,1221 ,1223 ,1240 ,1244 ,1249 | lvcust1 lvcust54 lvcust107 lvcust160 lvcust213 lvcust266 lvcust319 lvcust372 lvcust425 lvcust478 lvtemp1 | 18GB |
| ssa14 | 1023 ,1169 ,1171 ,1172 ,1196 ,1212 ,1228 ,1237 ,1242 ,1251 | lvstk7 lvstk105 lvstk203 lvstk301 lvstk399 | 18GB |
| ssa14 | 1164 ,1168 ,1176 ,1187 ,1189 ,1190 ,1202 ,1210 ,1217 ,1229 ,1418 | lvi1ord12 lvi1ord5 lvi2ord30 lvi2ord43 lvi2ord12 | 18GB |
| ssa14 | 1166 ,1167 ,1199 ,1203 ,1224 ,1225 ,1239 ,1243 ,1253 ,1254 | lvstk53 lvstk151 lvstk249 lvstk347 lvstk445 | 18GB |
| ssa14 | 1170 ,1182 ,1186 ,1200 ,1204 ,1208 ,1211 ,1234 ,1241 ,1256 ,1256 | lvstk76 lvstk174 lvstk272 lvstk370 lvstk468 | 18GB |
| ssa14 | 1173 ,1209 ,1255 | lvsystem1 lvroll3 lvroll7 lvroll11 lvroll15 | 18GB |
| ssa14 | 1174 ,1188 ,1201 ,1219 ,1233 ,1245 ,1246 ,1248 ,1257 ,775 | lvcust24 lvcust77 lvcust130 lvcust183 lvcust236 lvcust289 lvcust342 lvcust395 lvcust448 lvcust501 lvtemp24 | 18GB |
| ssa14 | 1175 ,1185 ,1205 ,1227 ,1231,1238 ,1258 | lvroll3 lvroll7 lvroll11 lvroll15 lvsystem1 | 18GB |
| ssa14 | 1177 ,1178 ,1184 ,1192 ,1193 ,1194 ,1214 ,1218 ,1226 ,1236 | lvcust47 lvcust100 lvcust153 lvcust206 lvcust259 lvcust312 lvcust365 lvcust418 lvcust471 lvcust524 lvtemp47 | 18GB |
| ssa14 | 1180 ,1195 ,1197 ,1198 ,1216 ,1247 ,1250 ,1252 ,1259 ,2051 | lvstk30 lvstk128 lvstk226 lvstk324 lvstk422 | 18GB |
| ssa15 | 1260 ,1287 ,1288 ,1299 ,1311 ,1315 ,1317 ,1318 | lvcust6 lvcust59 lvcust112 lvcust165 lvcust218 lvcust271 | 18GB |

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|---|---|---|---|
| | ,1322 ,1324 | lvcust324 lvcust377 lvcust430 lvcust483 lvtemp6 | |
| ssa15 | 1261 ,1274 ,1278,1281 ,1305 ,1307 ,1312 ,1325 ,1328 ,2256 | lvstk58 lvstk156 lvstk254 lvstk352 lvstk450 | 18GB |
| ssa15 | 1263 ,1277 ,1282 ,1283 ,1294 ,1308 ,1320 ,1349 ,1350 ,1351 | lvcust29 lvcust82 lvcust135 lvcust188 lvcust241 lvcust294 lvcust347 lvcust400 lvcust453 lvcust506 lvtemp29 | 18GB |
| ssa15 | 1264 ,1265 ,1266 ,1295 ,1300 ,1314 ,1316 ,1332,1338 ,1345 | lvstk12 lvstk110 lvstk208 lvstk306 lvstk404 | 18GB |
| ssa15 | 1267 ,1268 ,1269 ,1290 ,1296 ,1298 ,1331 ,1333 ,1336 ,1343 | lvistk1 lvistk2 lvistk3 lvistk4 lvtools | 18GB |
| ssa15 | 1270 ,1273 ,1301 ,1303 ,1313 ,1330 ,1342 ,1346 ,1347 ,1353 | lvi1ord17 lvi2ord22 lvi2ord35 lvi2ord17 lvi2ord4 | 18GB |
| ssa15 | 1271 ,1284 ,1285 ,1286 ,1289 ,1306 ,1309 ,1310 ,1321 ,1323 | lvstk81 lvstk179 lvstk277 lvstk375 lvstk473 | 18GB |
| ssa15 | 1272 ,1276 ,1276 ,1279 ,1280 ,1292 ,1293 ,1302 ,1304 ,1339 | lvcust52 lvcust105 lvcust158 lvcust211 lvcust264 lvcust317 lvcust370 lvcust423 lvcust476 lvcust529 lvtemp52 | 18GB |
| ssa15 | 1275 ,1297 ,1327 ,1329 ,1334 ,1340 ,1341 ,1344,1348 ,1352 | lvstk35 lvstk133 lvstk231 lvstk329 lvstk427 | 18GB |
| ssa16 | 1355 ,1363 ,1368 ,1400,1402 ,1404,1413 ,1417 ,1437 ,1440 | lvstk36 lvstk134 lvstk232 lvstk330 lvstk428 | 18GB |
| ssa16 | 1356 ,1362 ,1396 ,1403 ,1406 ,1407 ,1416 ,1426 ,1442 ,1449 | lvcust53 lvcust106 lvcust159 lvcust212 lvcust265 lvcust318 lvcust371 lvcust424 lvcust477 lvcust530 lvtemp53 | 18GB |
| ssa16 | 1357 ,1360 ,1371 ,1375 ,1389 ,1390 ,1398 ,1409 ,1410 ,1422 | lvcust30 lvcust83 lvcust136 lvcust189 lvcust242 lvcust295 lvcust348 lvcust401 lvcust454 lvcust507 lvtemp30 | 18GB |
| ssa16 | 1358 ,1372 ,1374 ,1378 ,1380 ,1382 ,1384 ,1387 ,1408 ,1448 | lvcust7 lvcust60 lvcust113 lvcust166 lvcust219 lvcust272 lvcust325 lvcust378 lvcust431 lvcust484 lvtemp7 | 18GB |
| ssa16 | 1361 ,1370 ,1373 ,1376 ,1383 ,1399 ,1412 ,1414 ,1415 ,1428 | lvstk82 lvstk180 lvstk278 lvstk376 lvstk474 | 18GB |
| ssa16 | 1364 ,1369 ,1385 ,1393 ,1395 ,1401 ,1421 ,1432 ,1441 ,1447 | lvi1ord18 lvi2ord23 lvi2ord36 lvi2ord5 lvi2ord18 | 18GB |
| ssa16 | 1365 ,1366 ,1419 ,1420 ,1423 ,1430,1435 ,1439 ,1443 ,1450 | lvstk13 lvstk111 lvstk209 lvstk307 lvstk405 | 18GB |
| ssa16 | 1379 ,1386 ,1392 ,1405 ,1411 ,1427,1434 ,1436 ,1444 ,1446 ,1446 | lvstk59 lvstk157 lvstk255 lvstk353 lvstk451 | 18GB |
| ssa17 | 1451 ,1461 ,1464 ,1465 ,1481 ,1506 ,1511 ,1522 ,1523 ,1540 | lvi1ord15 lvi1ord8 lvi2ord33 lvi2ord2 lvi2ord15 | 18GB |
| ssa17 | 1452 ,1470 ,1472 ,1479 ,1489,1490 ,1498,1513,1520 ,1543 | lvstk79 lvstk177 lvstk275 lvstk373 lvstk471 | 18GB |
| ssa17 | 1453 ,1454 ,1467 ,1478 ,1492 ,1496 ,1497 ,1507 ,1525 | lvstk56 lvstk154 lvstk252 lvstk350 lvstk448 | 18GB |
| ssa17 | 1455 ,1458 ,1494 ,1499 ,1512,1526 ,1531 ,1538 ,1542 ,1546 | lvstk33 lvstk131 lvstk229 lvstk327 lvstk425 | 18GB |
| ssa17 | 1456 ,1457 ,1460 ,1486 ,1487 ,1517 ,1518 ,1519 ,1521 ,1541 | lvstk10 lvstk108 lvstk206 lvstk304 lvstk402 | 18GB |
| ssa17 | 1459 ,1468 ,1477 ,1509 ,1524 ,1530 ,1534 ,1537 ,1539 | lvi1cust2 lvi1cust5 lvi1cust8 lvi2cust1 lvi2cust4 lvi2cust7 lvi2cust10 lvi2cust13 lvi2cust16 lvi2cust19 | 18GB |
| ssa17 | 1462 ,1474 ,1475 ,1495 ,1500 ,1504 ,1508 ,1529 ,1535 ,1545 | lvcust50 lvcust103 lvcust156 lvcust209 lvcust262 lvcust315 lvcust368 lvcust421 lvcust474 lvcust527 lvtemp50 | 18GB |
| ssa17 | 1463 ,1469 ,1476 ,1484 ,1485 ,1503 ,1510 ,1515 ,1528 ,1532 | lvcust27 lvcust80 lvcust133 lvcust186 lvcust239 lvcust292 lvcust345 lvcust398 lvcust451 lvcust504 lvtemp27 | 18GB |
| ssa17 | 1471 ,1473 ,1480 ,1483 ,1493 ,1501 ,1502 ,1527 ,1533 ,1544 | lvcust4 lvcust57 lvcust110 lvcust163 lvcust216 lvcust269 lvcust322 lvcust375 lvcust428 lvcust481 lvtemp4 | 18GB |
| ssa18 | 776 , 777 | log(RAID5) | 2x218.7GB |
| ssa19 | 778 , 1235 | log(RAID5) | 2x218.7GB |
| ssa20 | 1548 ,1575 ,1587 ,1589 ,1590 ,1597 ,1612 ,1633 ,1637 ,1643 | lvcust5 lvcust58 lvcust111 lvcust164 lvcust217 lvcust270 lvcust323 lvcust376 lvcust429 lvcust482 lvtemp5 | 18GB |
| ssa20 | 1549 ,1558 ,1571 ,1573 ,1583 ,1586 ,1638 ,1640 ,1641 ,1642 | lvstk11 lvstk109 lvstk207 lvstk305 lvstk403 | 18GB |
| ssa20 | 1550 ,1551 ,1555 ,1563 ,1579 ,1588 ,1591 ,1594 ,1615 ,1621 | lvcust28 lvcust81 lvcust134 lvcust187 lvcust240 lvcust293 lvcust346 lvcust399 lvcust452 lvcust505 lvtemp28 | 18GB |
| ssa20 | 1552 ,1570 ,1580 ,1598 ,1611 ,1625 ,1626 ,1628 ,1629 ,1636 | lvstk80 lvstk178 lvstk276 lvstk374 lvstk472 | 18GB |
| ssa20 | 1553 ,1557 ,1562 ,1566 ,1567 ,1576 ,1617,1630 ,1634 ,1635 | lvstk34 lvstk132 lvstk230 lvstk328 lvstk426 | 18GB |

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|---|---|---|---|
| ssa20 | 1556 ,1565 ,1568 ,1600 ,1620 ,1622 ,1623 ,1627 ,1631 ,1632 | lvi1cust3 lvi1cust6 lvi1cust9 lvi2cust2 lvi2cust5 lvi2cust8 lvi2cust11 lvi2cust14 lvi2cust17 lvi2cust20 | 18GB |
| ssa20 | 1559 ,1560 ,1564 ,1592 ,1593 ,1599 ,1602,1608 ,1609,1610 | lvstk57 lvstk155 lvstk253 lvstk351 lvstk449 | 18GB |
| ssa20 | 1561 ,1569 ,1572 ,1584 ,1596 ,1601 ,1607 ,1618 ,1619 ,1639 | lvi1ord16 lvi1ord9 lvi2ord34 lvi2ord3 lvi2ord16 | 18GB |
| ssa20 | 1574 ,1577 ,1582 ,1585 ,1603 ,1605 ,1613 ,1614 ,1616 ,1624 | lvcust51 lvcust104 lvcust157 lvcust210 lvcust263 lvcust316 lvcust369 lvcust422 lvcust475 lvcust528 lvtemp51 | 18GB |
| ssa21 | 1644 ,1651 ,1681 ,1690 ,1700 ,1702 ,1718 ,1726 ,1728 ,1734 | lvi1ord1 lvi2ord26 lvi2ord39 lvi2ord8 lvi2ord21 | 18GB |
| ssa21 | 1646 ,1671 ,1673 ,1676 ,1682 ,1684 ,1693 ,1704 ,1719 ,1723 | lvstk85 lvstk183 lvstk281 lvstk379 lvstk477 | 18GB |
| ssa21 | 1647 ,1686 ,1689 ,1692 ,1712 ,1729 ,1730 ,1731 ,1732 ,1733 | lvstk16 lvstk114 lvstk212 lvstk310 lvstk408 | 18GB |
| ssa21 | 1649 ,1650 ,1653 ,1655 ,1658 ,1679 ,1688 ,1708 ,1714 ,1715 | lvstk39 lvstk137 lvstk235 lvstk333 lvstk431 | 18GB |
| ssa21 | 1654 ,1663 ,1667 ,1691 ,1694 ,1696 ,1710 ,1717 ,1722 ,1739 | lvcust33 lvcust86 lvcust139 lvcust192 lvcust245 lvcust298 lvcust351 lvcust404 lvcust457 lvcust510 lvtemp33 | 18GB |
| ssa21 | 1656 ,1668 ,1674 ,1675 ,1683 ,1698 ,1698 ,1703 ,1705 ,1707 ,1721 | lvcust10 lvcust63 lvcust116 lvcust169 lvcust222 lvcust275 lvcust328 lvcust381 lvcust434 lvcust487 lvtemp10 | 18GB |
| ssa21 | 1657 ,1662 ,1666 ,1670 ,1677 ,1678 ,1685 ,1687 ,1695 ,1697 ,1699 ,1701 ,1706 ,1711 ,1727 ,1645 ,1648 ,1652 ,1735 ,1736 ,1738 | lvordl142 lvordl156 lvordl170 lvordl184 lvordl198 lvordl212 lvordl226 lvordl240 lvordl254 lvordl268 lvordl2 lvordl16 | 18GB |
| ssa21 | 1659 ,1660 ,1661 ,1664 ,1669 ,1672 ,1680 ,1720 ,1724 ,1725 | lvstk62 lvstk160 lvstk258 lvstk356 lvstk454 | 18GB |
| ssa22 | 1740 ,1741 ,1744 ,1749 ,1767 ,1770,1771 ,1776 ,1789 ,1817 | lvi1ord19 lvi2ord24 lvi2ord37 lvi2ord6 lvi2ord19 | 18GB |
| ssa22 | 1742 ,1743 ,1753 ,1754 ,1768 ,1769 ,1773 ,1783 ,1784 ,1795 | lvstk14 lvstk112 lvstk210 lvstk308 lvstk406 | 18GB |
| ssa22 | 1745 ,1748 ,1751 ,1785 ,1790 ,1794 ,1807 ,1812 ,1831 ,2254 | lvcust8 lvcust61 lvcust114 lvcust167 lvcust220 lvcust273 lvcust326 lvcust379 lvcust432 lvcust485 lvtemp8 | 18GB |
| ssa22 | 1746 ,1747 ,1755 ,1772 ,1775 ,1777 ,1806 ,1833 ,1835 ,2086 ,2137 | lvistk5 lvistk6 lvistk7 lvistk8 lvistk9 lvistk10 | 18GB |
| ssa22 | 1750 ,1759 ,1761 ,1764 ,1765 ,1787,1801 ,1803,1826 ,1830 | lvstk60 lvstk158 lvstk256 lvstk354 lvstk452 | 18GB |
| ssa22 | 1752 ,1757 ,1758 ,1779 ,1782 ,1791,1797 ,1810 ,1832 ,369 | lvstk37 lvstk135 lvstk233 lvstk331 lvstk429 | 18GB |
| ssa22 | 1760 ,1762 ,1786 ,1792 ,1809 ,1813 ,1819 ,1822 ,1823 ,2271 | lvord7_n lvordl146 lvordl160 lvordl174 lvordl188 lvordl202 lvordl216 lvordl230 lvordl244 lvordl258 lvordl272 lvordl6 | 18GB |
| ssa22 | 1766 ,1798 ,1800 ,1802 ,1805 ,1814 ,1821 ,1824 ,1827 ,1829 | lvstk83 lvstk181 lvstk279 lvstk377 lvstk475 | 18GB |
| ssa22 | 1774 ,1780 ,1781 ,1799 ,1804 ,1811 ,1815 ,1818 ,1825 ,1828 | lvcust31 lvcust84 lvcust137 lvcust190 lvcust243 lvcust296 lvcust349 lvcust402 lvcust455 lvcust508 lvtemp31 | 18GB |
| ssa23 | 1836 ,1839 ,1851 ,1859 ,1862 ,1866 ,1888 ,1891 ,1903,1924 | lvstk15 lvstk113 lvstk211 lvstk309 lvstk407 | 18GB |
| ssa23 | 1837 ,1842 ,1847 ,1854 ,1880 ,1892 ,1904 ,1908 ,1914 ,1922 | lvcust32 lvcust85 lvcust138 lvcust191 lvcust244 lvcust297 lvcust350 lvcust403 lvcust456 lvcust509 lvtemp32 | 18GB |
| ssa23 | 1838 ,1863 ,1864 ,1870 ,1874 ,1879 ,1896 ,1919 ,1920 ,1927 | lvcust9 lvcust62 lvcust115 lvcust168 lvcust221 lvcust274 lvcust327 lvcust380 lvcust433 lvcust486 lvtemp9 | 18GB |
| ssa23 | 1840 ,1841 ,1844 ,1852 ,1858 ,1867 ,1875 ,1876 ,1884 ,1895 ,1907 ,1909 ,1912 ,1917 ,1923 | lvord14 lvordl155 lvordl169 lvordl183 lvordl197 lvordl211 lvordl225 lvordl239 lvordl253 lvordl267 lvordl1 lvordl15 | 18GB |
| ssa23 | 1845 ,1868 ,1873 ,1887 ,1899 ,1901 ,1906 ,1916 ,1926 ,1928 | lvstk61 lvstk159 lvstk257 lvstk355 lvstk453 | 18GB |
| ssa23 | 1846 ,1855 ,1872 ,1877 ,1883 ,1893 ,1894 ,1900 ,1911 ,1913 | lvstk38 lvstk136 lvstk234 lvstk332 lvstk430 | 18GB |
| ssa23 | 1849 ,1853 ,1861 ,1865 ,1871 ,1878 ,1889 ,1905 ,1910 ,1921 | lvi1ord20 lvi2ord25 lvi2ord38 lvi2ord7 lvi2ord20 | 18GB |
| ssa23 | 1850 ,1860 ,1881 ,1885 ,1915 ,1918 ,1925 ,1929 ,1930 ,1931 | lvstk84 lvstk182 lvstk280 lvstk378 lvstk476 | 18GB |
| ssa23 | 1856 ,1857 ,1890 ,1897 ,1902 | lvord4 lvordl154 lvordl168 lvordl182 lvordl196 lvordl210 lvordl224 lvordl238 lvordl252 lvordl266 lvordl280 lvordl14 | 18GB |
| ssa24 | 1935 ,1959 ,1973 ,197 ,1994 | lvstk92 lvstk190 lvstk288 lvstk386 lvstk484 | 18GB |
| ssa24 | 1938 ,1945 ,1946 ,1971 ,1972 | lvcust17 lvcust70 lvcust123 lvcust176 lvcust229 lvcust282 | 18GB |

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|---|---|---|---|
| | | lvcust335 lvcust388 lvcust441 lvcust494 lvtemp17 | |
| ssa24 | ,1951 ,1981 ,1996 ,2007 ,2020 | lvstk69 lvstk167 lvstk265 lvstk363 lvstk461 | 18GB |
| ssa24 | ,1958 ,1966 ,1975 ,1998 ,2004 | lvstk23 lvstk121 lvstk219 lvstk317 lvstk415 | 18GB |
| ssa24 | ,1974 ,1997 ,2005 ,2023 ,2027 ,1963 ,1965 ,1982 ,1984 ,2002 | lvcust40 lvcust93 lvcust146 lvcust199 lvcust252 lvcust305 lvcust358 lvcust411 lvcust464 lvcust517 lvtemp40 | 18GB |
| ssa24 | ,1976 ,1999 ,2008 ,2012,2014 | lvord10 lvordl163 lvordl177 lvordl191 lvordl205 lvordl219 lvordl233 lvordl247 lvordl261 lvordl275 lvordl9 lvordl23 | 18GB |
| ssa24 | 1987 ,1992 ,2000 ,2024 ,2025 | lvstk46 lvstk144 lvstk242 lvstk340 lvstk438 | 18GB |
| ssa24 | 1989 ,2013 ,2018 ,2021 ,2026 | lvware6 lvhist15 lvord13 | 18GB |
| ssa25 | 1207 ,2037 ,2084 ,2262 ,779 | lvstk88 lvstk186 lvstk284 lvstk382 lvstk480 | 18GB |
| ssa25 | 2028 ,2029 ,2030 ,2069 ,2280 | lvstk42 lvstk140 lvstk238 lvstk336 lvstk434 | 18GB |
| ssa25 | 2033 ,2045 ,2066 ,2067 ,2094 | lvord10 lvordl163 lvordl177 lvordl191 lvordl205 lvordl219 lvordl233 lvordl247 lvordl261 lvordl275 lvordl9 lvordl23 | 18GB |
| ssa25 | 2034 ,2048 ,2062 ,2074 ,2082 | lvstk19 lvstk117 lvstk215 lvstk313 lvstk411 | 18GB |
| ssa25 | 2035 ,2112 ,2113 ,2118 ,2119 | lvcust36 lvcust89 lvcust142 lvcust195 lvcust248 lvcust301 lvcust354 lvcust407 lvcust460 lvcust513 lvtemp36 | 18GB |
| ssa25 | 2039 ,2040 ,2058 ,2108 | lvstk65 lvstk163 lvstk261 lvstk359 lvstk457 | 18GB |
| ssa25 | 2046 ,2055 ,2070 ,2090 ,2116 | lvware2 lvhist7 lvord5 lvord2 lvord9 | 18GB |
| ssa25 | 2080 ,2087 ,2100 ,2122 | lvordl145 lvordl159 lvordl173 lvordl187 lvordl201 lvordl215 lvordl229 lvordl243 lvordl257 lvordl271 lvordl5 lvordl19 | 18GB |
| ssa25 | 2083 ,2085 ,2107 ,2117 ,2272 ,1788 ,2064 ,2076 ,2105 ,2115 | lvcust13 lvcust66 lvcust119 lvcust172 lvcust225 lvcust278 lvcust331 lvcust384 lvcust437 lvcust490 lvtemp13 | 18GB |
| ssa26 | 2124 ,2125 ,2130 ,2142 ,2150 ,2155 ,2156 ,2157 ,2201 ,2203 | lvstk87 lvstk185 lvstk283 lvstk381 lvstk479 | 18GB |
| ssa26 | 2126 ,2133 ,2139 ,2141 ,2186 ,2200 ,2202,2206 ,2209 ,2214 | lvstk18 lvstk116 lvstk214 lvstk312 lvstk410 | 18GB |
| ssa26 | 2129 ,2131 ,2135 ,2136 ,2159 ,2164 ,2172 ,2188 ,2215 ,2216 | lvstk41 lvstk139 lvstk237 lvstk335 lvstk433 | 18GB |
| ssa26 | 2132 ,2140 ,2148 ,2149 ,2178 ,2182 ,2211 ,2217 ,2218 ,2219 | lvstk64 lvstk162 lvstk260 lvstk358 lvstk456 | 18GB |
| ssa26 | 2134 ,2146 ,2166 ,2174 ,2175 ,2179 ,2187 ,2189 ,2198 ,2199 | lvware1 lvhist8 lvord3 | 18GB |
| ssa26 | 2137 ,2138 ,2143 ,2154 ,2162 ,2163 ,2165 ,2170 ,2171 ,2173 ,2180 ,2190 ,2192 ,2197 ,2204 | lvnord1 lvordl144 lvordl158 lvordl172 lvordl186 lvordl200 lvordl214 lvordl228 lvordl242 lvordl256 lvordl270 lvordl4 | 18GB |
| ssa26 | 2144 ,2153 ,2160 ,2167 ,2168 ,2169 ,2176 ,2183 ,2184 ,2210 | lvcust35 lvcust88 lvcust141 lvcust194 lvcust247 lvcust300 lvcust353 lvcust406 lvcust459 lvcust512 lvtemp35 | 18GB |
| ssa26 | 2145 ,2185 ,2191 ,2205,2212 | lvordl148 lvordl162 lvordl176 lvordl190 lvordl204 lvordl218 lvordl232 lvordl246 lvordl260 lvordl274 lvordl8 lvordl22 | 18GB |
| ssa26 | 2147 ,2151 ,2152 ,2158 ,2161 ,2177 ,2193 ,2195 ,2196 ,2208 | lvcust12 lvcust65 lvcust118 lvcust171 lvcust224 lvcust277 lvcust330 lvcust383 lvcust436 lvcust489 lvtemp12 | 18GB |
| ssa28 | 1359 ,1547 | log(RAID5) | 2x218.7GB |
| ssa29 | 1796 , 2253 | log(RAID5) | 2x218.7GB |
| ssa30 | 1933 ,1934 ,1978 ,1991 ,2015 | lvware6 lvhist15 lvord13 | 18GB |
| ssa30 | 1939 ,1940 ,1941 ,1947 ,1957 | lvstk23 lvstk121 lvstk219 lvstk317 lvstk415 | 18GB |
| ssa30 | 1942 ,1948 ,1949 ,1964 ,1985 | lvstk46 lvstk144 lvstk242 lvstk340 lvstk438 | 18GB |
| ssa30 | 1944 ,1956 ,1961 ,1977 ,1986 | lvord10 lvordl163 lvordl177 lvordl191 lvordl205 lvordl219 lvordl233 lvordl247 lvordl261 lvordl275 lvordl9 lvordl23 | 18GB |
| ssa30 | 1952 ,1955 ,1960 ,1962 ,2009 | lvstk69 lvstk167 lvstk265 lvstk363 lvstk461 | 18GB |
| ssa30 | 1953 ,1954 ,2003 ,2006 ,2016 | lvstk92 lvstk190 lvstk288 lvstk386 lvstk484 | 18GB |
| ssa30 | 1968 ,1969 ,1980 ,1983 ,2010 | lvcust17 lvcust70 lvcust123 lvcust176 lvcust229 lvcust282 lvcust335 lvcust388 lvcust441 lvcust494 lvtemp17 | 18GB |
| ssa31 | 1206 ,2044 ,2092 ,2096 ,2097 | lvordl145 lvordl159 lvordl173 lvordl187 lvordl201 lvordl215 lvordl229 lvordl243 lvordl257 lvordl271 lvordl5 lvordl19 | 18GB |
| ssa31 | 1215 ,2050 ,2104 ,2109 ,2110 | lvstk19 lvstk117 lvstk215 lvstk313 lvstk411 | 18GB |
| ssa31 | 1763 ,2036 ,2053 ,2065 ,2075 | lvstk65 lvstk163 lvstk261 lvstk359 lvstk457 | 18GB |
| ssa31 | 2032 ,2056 ,2057 ,2073 ,2114 | lvstk88 lvstk186 lvstk284 lvstk382 lvstk480 | 18GB |
| ssa31 | 2038 ,2054 ,2078 ,2088 ,2120 | lvord7_n lvordl146 lvordl160 lvordl174 lvordl188 lvordl202 lvordl216 lvordl230 lvordl244 lvordl258 lvordl272 lvordl6 | 18GB |
| ssa31 | 2043 ,2049 ,2089 ,2091 ,2095 | lvware2 lvhist7 lvord5 lvord2 lvord9 | 18GB |
| ssa31 | 2063 ,2068 ,2072 ,2101 ,2102 | lvcust36 lvcust89 lvcust142 lvcust195 lvcust248 lvcust301 lvcust354 lvcust407 lvcust460 lvcust513 lvtemp36 | 18GB |

| | | | |
|---|---|---|---|
| ssa31 | 2077 ,2081 ,2093 ,2111 ,2121 | lvstk42 lvstk140 lvstk238 lvstk336 lvstk434 | 18GB |
| ssa32 | 485 ,554 ,562 ,565 ,570 | lvware3 lvhist6 lvhist12 lvord1 | 18GB |
| ssa32 | 486 ,524 ,546 ,561 ,568 | lvstk66 lvstk164 lvstk262 lvstk360 lvstk458 | 18GB |
| ssa32 | 487 ,508 ,509 ,528 ,529 | lvstk89 lvstk187 lvstk285 lvstk383 lvstk481 | 18GB |
| ssa32 | 488 ,526 ,545 ,569 | lvhist20 lvordl152 lvordl165 lvordl179 lvordl193 lvordl207 lvordl221 lvordl235 lvordl249 lvordl263 lvordl277 lvordl11 | 18GB |
| ssa32 | 498 ,548 ,553 ,556,572 | lvordl150 lvordl164 lvordl178 lvordl192 lvordl206 lvordl220 lvordl234 lvordl248 lvordl262 lvordl276 lvordl10 lvordl24 | 18GB |
| ssa32 | 506 ,510 ,518 ,521 ,539 | lvcust14 lvcust67 lvcust120 lvcust173 lvcust226 lvcust279 lvcust332 lvcust385 lvcust438 lvcust491 lvtemp14 | 18GB |
| ssa32 | 513 ,530 ,543 ,566 ,567 | lvstk20 lvstk118 lvstk216 lvstk314 lvstk412 | 18GB |
| ssa32 | 520 ,523 ,525 ,535 ,580 | lvcust37 lvcust90 lvcust143 lvcust196 lvcust249 lvcust302 lvcust355 lvcust408 lvcust461 lvcust514 lvtemp37 | 18GB |
| ssa32 | 541 ,542 ,558 ,560 ,563 | lvstk43 lvstk141 lvstk239 lvstk337 lvstk435 | 18GB |
| ssa34 | 147 ,142 ,154 ,188 ,187 | stkvg2 | 18GB |
| ssa34 | 169 ,150 | stkvg25 | 18GB |
| ssa34 | 104 ,185 ,106 | stkvg25 | 18GB |
| ssa34 | 107 ,189 ,103 ,173 | stkvg48 | 18GB |
| ssa34 | 176 | ustvg19 | 18GB |
| ssa34 | 105 ,141 ,191 ,131 ,132 | custvg4 | 18GB |
| ssa34 | 170 ,192 ,144 ,164 ,113 | ordlnvg | 18GB |
| ssa34 | 175 ,172 ,126 ,174 ,127 | tblvg8 | 18GB |
| ssa34 | 114 | stkvg48 | 18GB |
| ssa34 | 180 ,143 ,152 ,151 ,146 | stkvg71 | 18GB |
| ssa34 | 120 ,121 ,137 ,110 ,178 | stkvg94 | 18GB |
| ssa34 | 190 ,112 ,102 ,186 | custvg19 | 18GB |
| | | | |

## 5.3 Data Base Model Implemented

*A statement must be provided that describes the data base model implemented by the DBMS used.*

The database manager used for this testing was Oracle9i Database Enterprise Edition Release 2 for AIX based System from Oracle Corp. Oracle9i Database Enterprise Edition Release 2 is a relational DBMS.

## 5.4 Partitions/Replications Mapping

*The mapping of data base partitions/replications must be explictly described.*

No horizontal nor vertical partitioning were implemented for this TPC-C test.

## 5.5 60 day space calculations

# BULL ESCALA PL3200R

| | |
|---|---|
| TPM | 403255 |
| Warehouses | 34000 |

| SEGMENT | TYPE | TSPACE | BLOCKS | BLOCK SIZE | KBYTES | FIVE_PCT(BYTES) | DAILY_GROW | TOTAL |
|---|---|---|---|---|---|---|---|---|
| CUSTOMER | TABLE | CUST | 255000003 | 4096 | 1020000012 | 51000001 | 0 | 1071000012,60 |
| DISTRICT | TABLE | WARE | 170004 | 4096 | 680016 | 34001 | 0 | 714016,80 |
| HISTORY | TABLE | HIST | 14936120 | 4096 | 59744480 | 0 | 11337534 | 71082014,25 |
| ICUSTOMER | INDEX | ICUST1 | 6346481 | 4096 | 25385924 | 1269296 | 0 | 26655220,20 |
| ICUSTOMER2 | INDEX | ICUST2 | 12091256 | 4096 | 48365024 | 2418251 | 0 | 50783275,20 |
| IDISTRICT | INDEX | WARE | 1642 | 4096 | 6568 | 328 | 0 | 6896,40 |
| IITEM | INDEX | ITEMS | 411 | 4096 | 1644 | 82 | 0 | 1726,20 |
| INORD | INDEX | NORD | 1250765 | 4096 | 5003060 | 250153 | 0 | 5253213,00 |
| IORDERS | INDEX | IORD1 | 6503076 | 4096 | 26012304 | 1300615 | 0 | 27312919,20 |
| IORDERS2 | INDEX | IORD2 | 10114447 | 4096 | 40457788 | 2022889 | 0 | 42480677,40 |
| IORDL | INDEX | ORDL | 44624561 | 16384 | 713992976 | 0 | 135492347 | 849485323,08 |
| ISTOCK | INDEX | ISTR | 18921379 | 4096 | 75685516 | 3784276 | 0 | 79469791,80 |
| ITEM | TABLE | ITEMS | 3031 | 4096 | 12124 | 606 | 0 | 12730,20 |
| IWAREHOUSE | INDEX | WARE | 131 | 4096 | 524 | 26 | 0 | 550,20 |
| ORDERS | TABLE | ORD | 10327908 | 4096 | 41311632 | 0 | 7839587 | 49151218,90 |
| ROLL_SEG | SYS | ROLL | 3275776 | 16384 | 52412416 | 0 | 0 | 52412416,00 |
| STOCK | TABLE | STOCKS | 309090911 | 4096 | 1236363644 | 61818182 | 0 | 1298181826,20 |
| SYSTEM | SYS | SYSTEM | 1064704 | 4096 | 4258816 | 0 | 0 | 4258816,00 |
| WAREHOUSE | TABLE | WARE | 17010 | 4096 | 68040 | 3402 | 0 | 71442,00 |
| Total | | | 693 739 616 | | 3 349 762 508 | 123 902 109 | 154 669 468 | 3 628 334 085,63 |

| | | |
|---|---|---|
| Bytes | | |
| Dynamic space in Kbytes | 815 049 088 | |
| Static space in Kbytes | 2 658 615 529 | |
| Free space in Kbytes | 154 669 468 | |
| Daily growth in Kbytes | 154 669 468 | |
| Daily spread | 0 | Oracle may be configured such that daily spread is 0 |
| 60-day space (in Kbytes) | 11 938 783 623 | |
| 60-day (GB) | 11 385,71 | |
| | | new_order 66371934 |
| Log block size | 512 | Redo blocks written 1662770342 |
| Log blocks /tpmC | 25,05 | Number of log blocks used in one tpmC |
| 8-hour log (GB) | 2 312,27 | |

| Disk Type | Disk Formatted Capacity | SUT # of disks | SUT Capacity(GB) | Priced # of disks | Priced Capacity(GB) | Space usage (GB) | |
|---|---|---|---|---|---|---|---|
| | | | | | | DB | 17301,66 |
| | | | | | | RAID | 2624,40 |
| | | | | | | OS | 33,94 |
| 9,1 | 8672 | 96 | 813,00 | 2043 | 17 301,66 | | |
| 18,2 | 17376 | 1947 | 33038,16 | 0 | 0,00 | Total Space | 19959,99 |
| RAID(6-36.4GB) | 223948,8 | 12 | 2 624,40 | 12 | 2 624,40 | | |

# 6. Clause 5: Performance Metrics and Response Time Related Items

## 6.1 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 6-1 list the response times and the ninetieth percentiles for each of the transaction types for the measured system.

## 6.2 Keying and Think Times

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

Table 6-1 list the TPC-C keying and think times for the measured system.

**Table 6-1. BULL ESCALA PL3200R Response, Think and Keying Times**

| Response Times | New Order | Payment | Order Status | Delivery (int./def.) | Stock Level | Menus |
|---|---|---|---|---|---|---|
| **90 %** | 1,36 | 1,29 | 1,32 | 0.19/0.11 | 1,29 | 0 |
| **Average** | 0,7 | 0,65 | 0,68 | 0.10/0.07 | 0,65 | 0.00 |
| **Maximum** | 6,97 | 6,66 | 5,8 | 2.17/2.7 | 5,99 | 2,54 |
| | | | **Think Times** | | | |
| **Minimum** | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | N/A |
| **Average** | 12,02 | 12.02 | 10.01 | 5,02 | 5,02 | N/A |
| **Maximum** | 120,21 | 120,21 | 100,10 | 50,20 | 50,20 | N/A |
| | | | **Keying Times** | | | |
| **Minimum** | 18,00 | 3,00 | 2,00 | 2,00 | 2,00 | N/A |
| **Average** | 18,01 | 3,01 | 2,01 | 2,01 | 2,01 | N/A |
| **Maximum** | 18,15 | 3,09 | 2,08 | 2,08 | 2,09 | N/A |

## 6.3 Response Time Frequency Distribution

*Response time frequency distribution curves must be reported for each transaction type.*

**Figure 6-3-1. BULL ESCALA PL3200R New-Order Response Time Distribution**

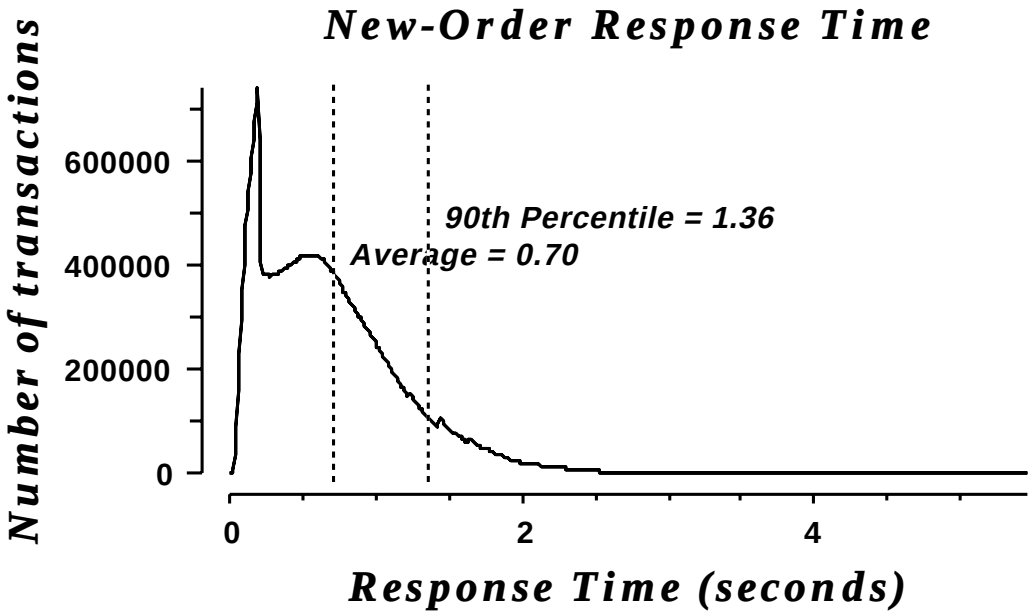



**Figure 6-3-2. BULL ESCALA PL3200R Payment Response Time Distribution**

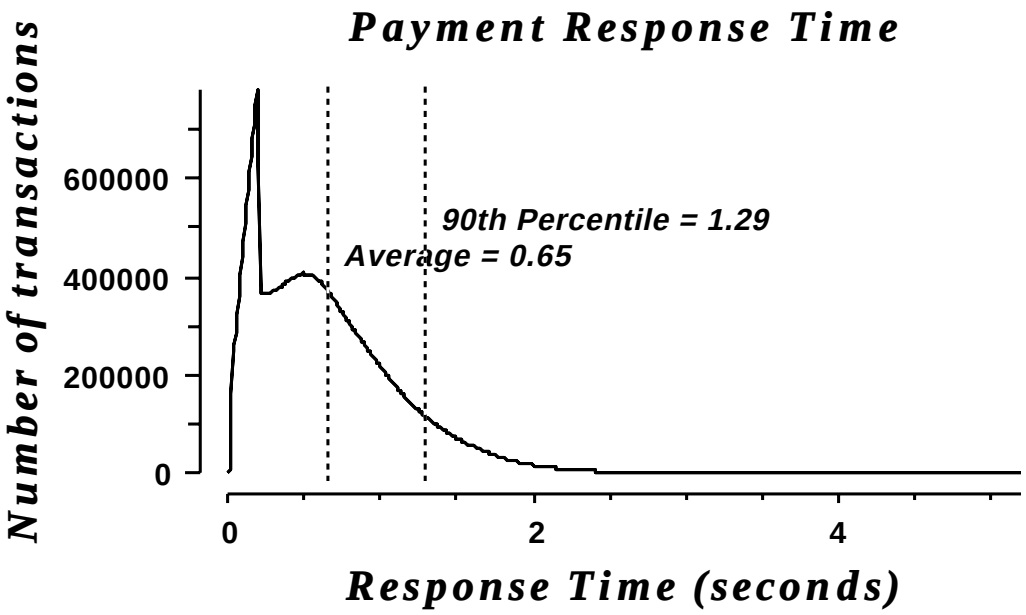

Payment Response Time
Number of transactions
600000
400000
200000
0
90th Percentile = 1.29
Average = 0.65
0
2
4
Response Time (seconds)

**Figure 6-3-3. BULL ESCALA PL3200R Order-Status Response Time Distribution**

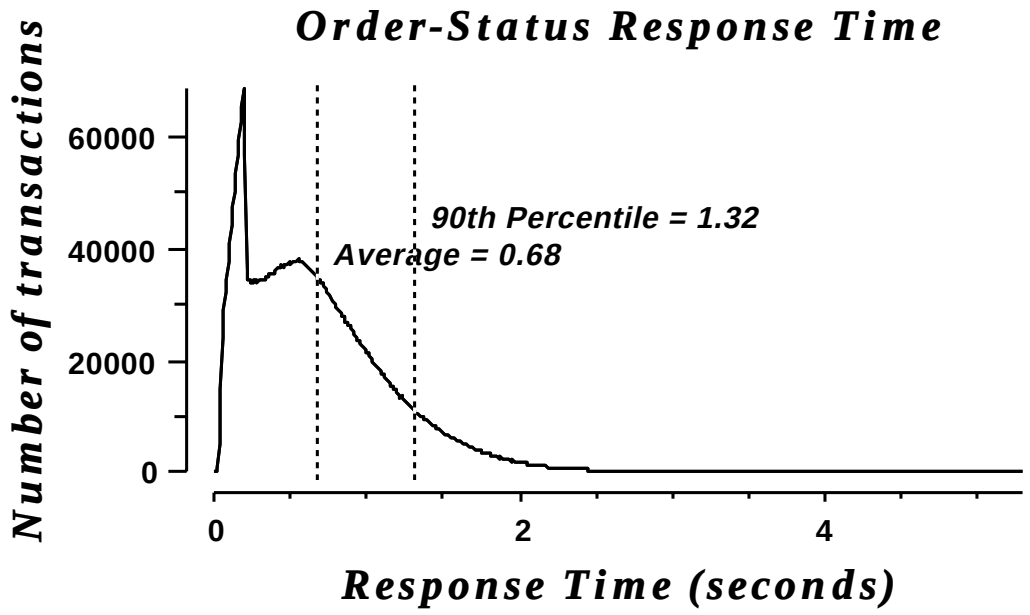



**Figure 6-3-4. BULL ESCALA PL3200R Delivery (Interactive) Response Time Distribution**

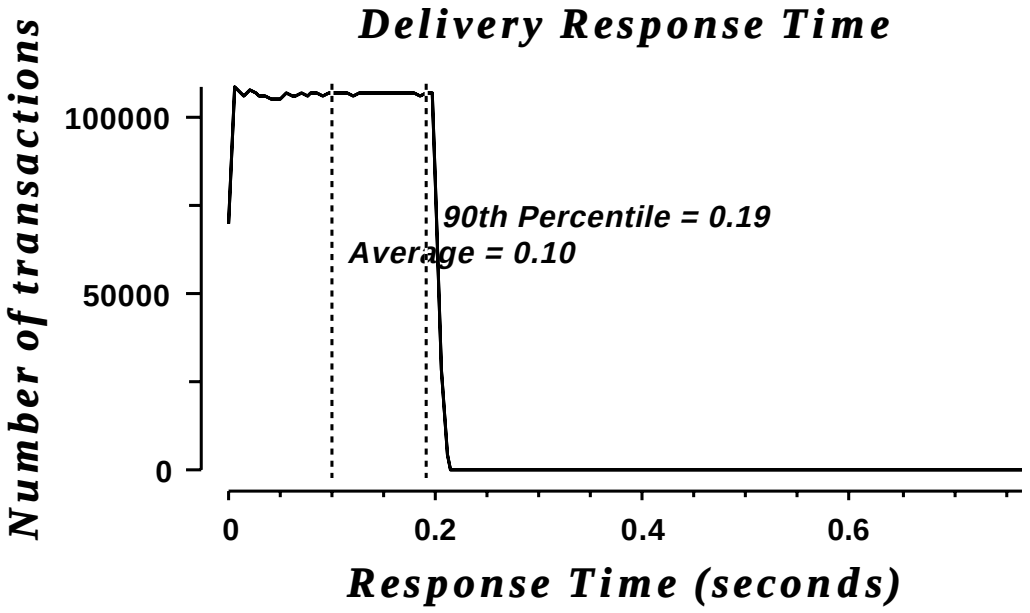


**Figure 6-3-5. BULL ESCALA PL3200R Delivery (Deferred) Response Time Distribution**

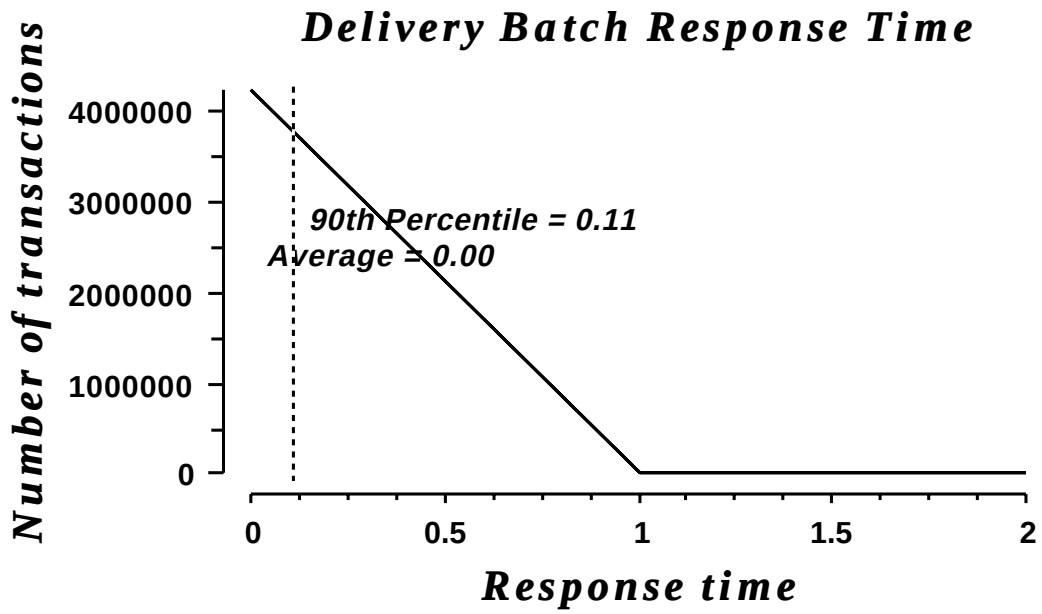
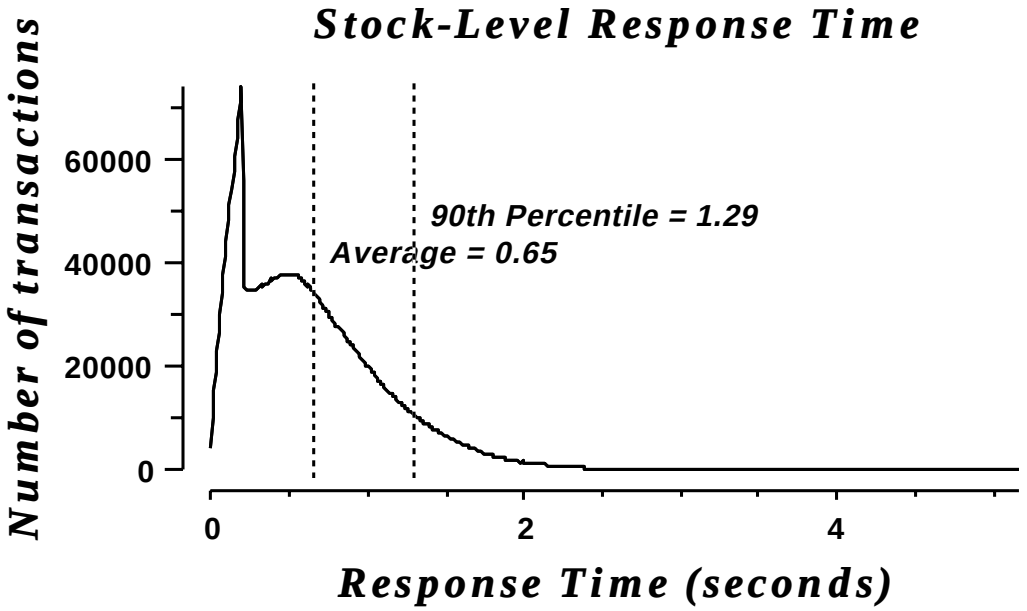


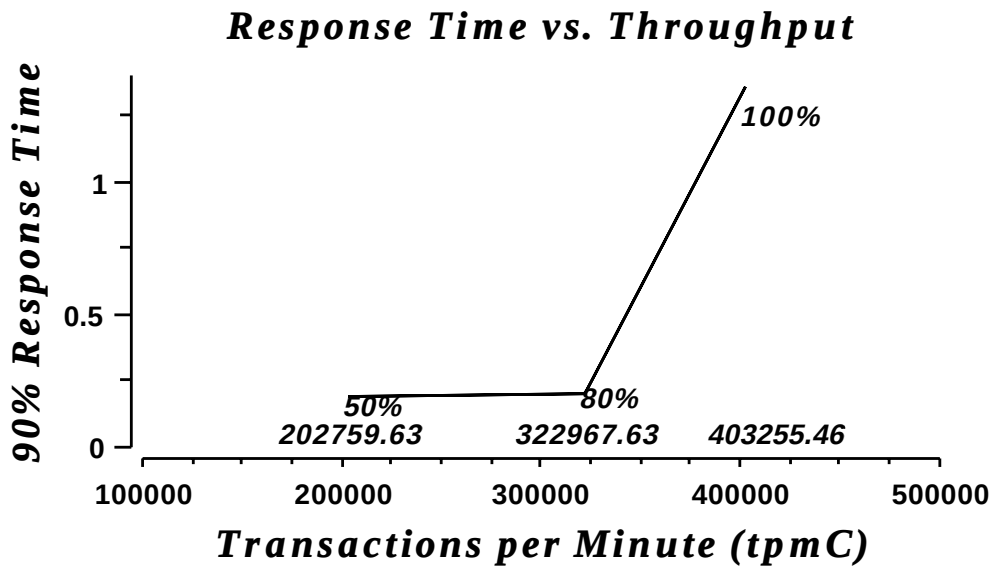

**Figure 6-3-6. BULL ESCALA PL3200R Stock Level Response Time Distribution**



## 6.4 Performance Curve for Response Time versus Throughput

*The performance curve for response times versus throughput must be reported for the New-Order transaction.*

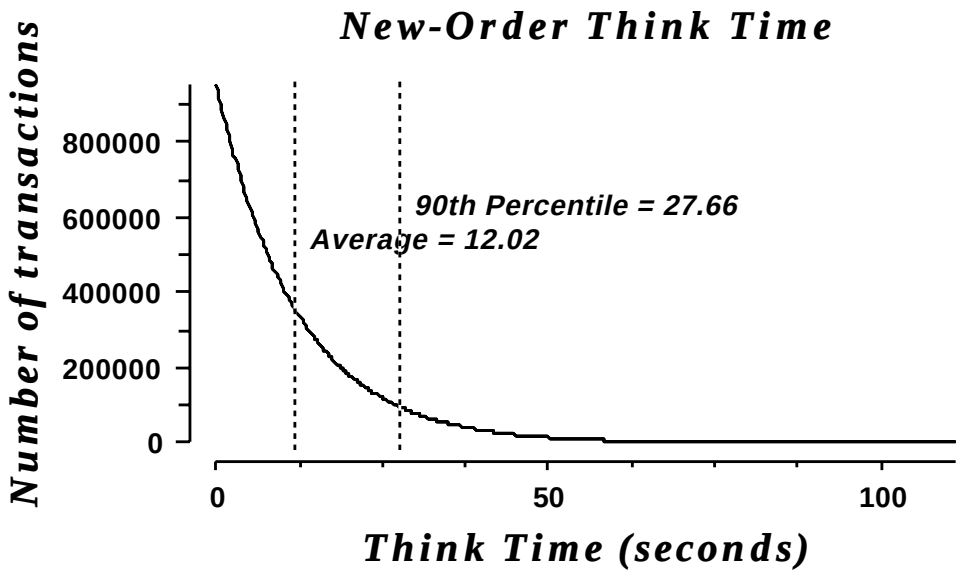
**Figure 6-4-1. BULL ESCALA PL3200R New-Order Response Time vs. Throughput**




## 6.5 Think Time Frequency Distribution

*A graph of the think time frequency distribution must be reported for the New-Order transaction.*

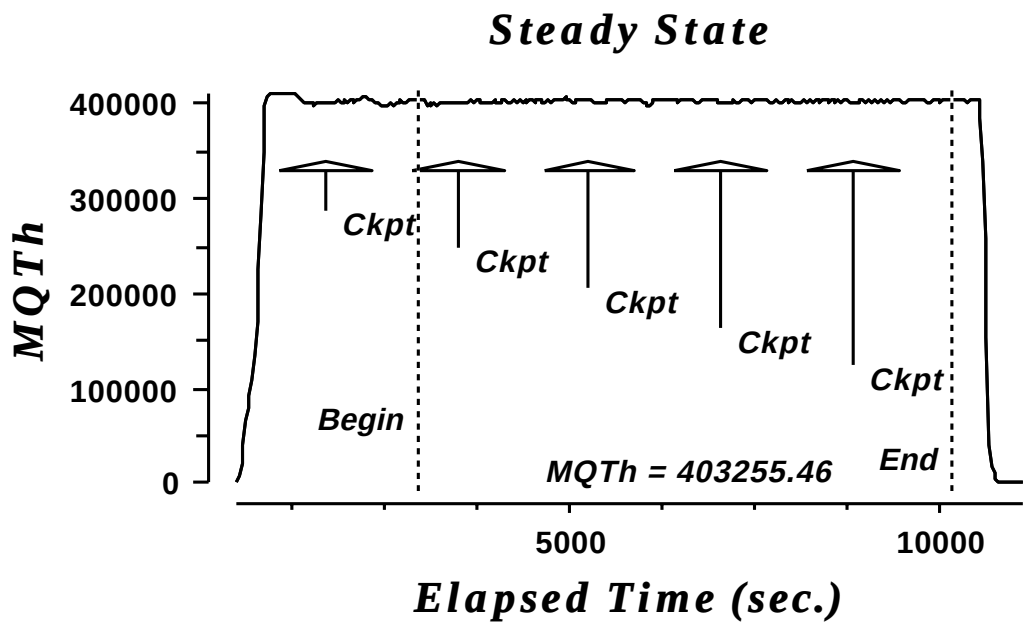
**Figure 6-5-1. BULL ESCALA PL3200R New-Order Think Time Distribution**



## 6.6 Throughput versus Elapsed Time

*A graph of throughput versus elapsed time must be reported for the New-Order transaction.*

**Figure 6-6-1. New-Order Throughput vs. Elapsed Time**




## 6.7 Steady State Determination

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

All the emulated users were allowed to logon and do transactions. The time stamping interval was set to start after several minutes of rampup. Refer to the Numerical Quantities Summary pages for the rampup time. Figure 6.6.1 New-Order throughput versus Elapsed Time graph shows that the system was in steady state at the beginning of the Measurement Interval.

# 6.8 Work Performed During Steady State

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

## 6.8.1 Transaction Flow

For each of the TPC Benchmark™C transaction types, the following steps are executed:

IBM Websphere Application Server Enterprise Edition Version 3.0, Encina interface, was used as a transaction manager (TM). Each transaction was divided into three programs. The front end program handled all screen I/O, a database client program which connected to the database and served as a Websphere Server (a back end program), and a database server program which handled all database operations at the SUT. Both the front end and back end programs ran on the client system. The front end program communicates with the database client program through DCE RPCs. The database client program communicates with the Server system over Ethernet using SQL*Net calls.

Besides calling Websphere Application Server Enterprise Edition Encina initialization code during startup, all other functions are transparent to the application code. Encina routes the transaction and balances the load according to the options defined in the configuration file in appendix B.2, The transaction flow is described below.

- Each client machine is a node in an Encina Cell.
- Two servers are configured in each.node: one processes the delivery transactions and one all other transaction.
- The delivery server is configured with one processing agent with 2 server manager DCE threads, and 2 background threads to process deferred deliveries. Each background thread has one connection to the database.
- The other server is configured with 38 processing agents. Each processing agent has 1 server manager DCE threads. Each thread has one connection to the database.
- When the Encina clients are started, they connect to Encina cell.
- When terminals are started, each terminal connects to the Encina client. The client spawns a thread for each connection to handle that connection. The thread executes the 'process_terminal' routine. The process_terminal displays the TPC-C transaction menu on the user terminal.
- The TPC-C user chooses the transaction type and proceeds to fill the screen fields required for transaction.
- The process_terminal accepts all values entered by the user and transmits those values to one of the TPC_C backend programs. The transaction is performed through a DCE RPC. There is an interface for each TPC-C transaction type and each TPC-C backend program exports one or more of these interfaces. (The delivery servers export only the delivery interface, the other servers export the other four interfaces, and only those). Encina transparently routes the RPC to one of the servers exporting the corresponding interface.
- A TPC-C backend server program receives an RPC and proceeds to execute all database operations related to the request. All information entered on the user terminal is contained in the RPC.
- Once the transaction is committed, the server program fills in the output parameters. The RPC is then sent back to the client program.
- When the RPC returns to the client, the process_terminal routine writes the transaction out on the user terminal.

## 6.8.2 Database Transaction

All database operations are performed by the TPC-C back-end programs. The process is described below:

Using SQL*Net calls, the TPC-C back-end program interacts with Oracle9i Server to perform SQL data manipulations such as update, select, delete and insert, as required by the transaction. After all database operations are performed for a transaction, the transaction is committed.

Oracle9i Server proceeds to update the database as follows:

When Oracle9i Server changes a database table with an update, insert, or delete operation, the change is initially made in memory, not on disk. When there is not enough space in the memory buffer to read in or write additional data pages, Oracle9i Server will make space by flushing some modified pages to disk. Modified pages are also written to disk when a checkpoint occurs. Before a change is made to the database,

it is first recorded in the transaction log. This ensures that the database can be recovered completely in the event of a failure. Using the transaction log, transactions that started but did not complete prior to a failure can be undone, and transactions recorded as complete in the transaction log but not yet written to disk can be redone.

### 6.8.3 Checkpoints

A checkpoint is the process of writing all modified data pages to disk. The TPC-C benchmark was setup to automatically checkpoint every 30 minutes. One checkpoint occurs during the rampup period, with four other occurring during the measurement interval. The checkpoints duration were 13min 13sec, 12min 52sec, 12min 52sec, 12min 49 sec, 12min 51sec.

## 6.9 Measurement Interval

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

A two hour Measurement Interval was used. Further, the measurement interval is a multiple of the checkpoint interval. This demonstrates that a different measurement interval over the eight hour period would yield similar throughput results. No connections were lost during the run.

# 7. Clause 6: SUT, Driver, and Communication Definition Related Items

## 7.1 RTE Availability

*If the RTE is commercially available, then its inputs must be specified. Otherwise, a description must be supplied of what inputs to the RTE had been used.*

An internally developed RTE was used for these tests. Appendix D contains the scripts used in the testing.

## 7.2 Functionality and Performance of Emulated Components

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

In the benchmark configuration the Remote Terminal Emulator (RTE) communicates with the client system over Ethernet. The 38 RS/6000 Model 7044-270 emulates a network of 324,000 RS/6000 Model 44P-170 workstations. The communications mechanism used in the benchmark and priced configurations are the same. In the benchmark configuration a separate Ethernet LAN was used to connect two driver systems to a 7044-270 client system. In other words, there were several separtate LAN segments between every one driver to one client. Each LAN segment in the priced configuration is used to connect 947 workstations.

## 7.3 Network Bandwidth

*The bandwidth of the network(s) used in the tested/priced configuration must be disclosed.*

The Ethernet used in the LAN complies with the IEEE 802.3 standard and has a bandwidth of 10 Megabits per second Half Duplex. Each LAN segment in the BULL ESCALA PL3200R configuration connected 947 workstations.

## 7.4 Operator Intervention

*If the configuration requires operator intervention, the mechanism and the frequency of this intervention must be disclosed.*

No operator intervention is required to sustain the reported throughput during the eight hour period.

# 8. Clause 7: Pricing Related Items

## 8.1 Hardware and Programs Used

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

The detailed list of hardware and programs for the priced configuration is listed in the pricing sheet (refer to the executive summary statement). Prices for all Bull S.A. products are US list prices. Each priced configuration consists of an integrated system package, additional components and third party components. The prices for all products and features that are provided by Bull are available the same day as product or feature availability.

For items quoted Bull, there are two cases:

- Standard Bull items (as Escala PL3200R); normal Bull quotation
- IBM items: Bull is IBM partner solution. That means Bull may sell IBM products, making his own quotation

Pricing for IBM Websphere Application Server Enterprise Edition Version 3.0 is for Txseries License only.

## 8.2 Three Year Cost of System Configuration

*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 price sheets for the Escala PL3200R are contained on the first pages.

The price sheets for the IBM RS/6000 and SSA disks are also contained on the first pages.

Bull provides complete hardware and software solutions to end-users and offers customers dollar volume discounts based on the total system price (total 3 year system cost, including all hardware, all software and maintenance charges).

**Volume Revenue Discount**

The Bull-supplied hardware and software is discounted by 58% from list price, based on the dollar value of this configuration only.

**MAINTENANCE**

The threee years support pricing for Bull S.A.consists of one year warranty included in the system package price and two years support price, defined as silver care in the "global care" Bull maintainance offer.
The 24hours/day, 7days/week coverage extension is included in the maintenance price.

If the customer wants to commit for a **3 year hardware maintenance** service starting at delivery time (therefore, including the warranty period), he can pay a One time Fee and will benefit of 15% discount.

For IBM products, the basis for the discounts used are:

**3-year Term Maintenance Contract Discount**

This discount is available for customers who sign a 3-year maintenance agreement on the hardware. A discount of 3% is available for customers when they sign a 3-year maintenance agreement

**Scope incentive**

A 2% discount is applied for a ServiceElect contract that combines hardware maintenance with one or more services, which in this pricing report the selected service is Support Line.

**3-year Maintenance Prepay Discount**

This is a discount for prepayment of miantenance costs. A discount of 10.36% is available for this configuration based on payment for 3 years maintenance at time of purchase. This discount is applied to the balance after the 3-year term maintenance contract discount and Scope discount is applied

## 8.3 Availability Dates

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

All products are generally available today except the following:

| Product | Availability Date |
|---|---|
| AIX 5L Version 5.2 | November 22, 2002 |

## 8.4 Statement of tpmC and Price/Performance

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

.

| System | tpmC | 3-year System Cost | $/tpmC | Availability Date |
|---|---|---|---|---|
| BULL ESCALA PL3200R | 403,255.46 | $7 245 205 | 17.96 | All HS/SW available as shown in Section 8.3 |

# 9. Clause 9: Audit Related Items

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

The auditor's attestation letter is included in this section of this report

INFO SIZING

TPC TRANSACTION PROCESSING PERFORMANCE COUNCIL CERTIFIED AUDITOR

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May 31, 2002

I remotely verified the TPC Benchmark™ C performance of the following Client/Server configuration:

Platform: **Bull Escala PL3200R**

Operating system: **AIX 5L V5.2**
Database Manager: **Oracle9i Release 2 Enterprise Edition for AIX – Based System**

Transaction Manager: **Websphere Application Server Enterprise Edition 3.0**

The results were:

| CPU's Speed | Memory | Disks | NewOrder 90% Response Time | **tpmC** |
|---|---|---|---|---|
| **Server: Bull Escala PL3200R** | | | | |
| 32 x POWER4 (1300 MHz) | 256 GB Main (128MB L3 Cache per processor) | 2043 x 9.1 GB<br>96 x 36.4 GB | 1.36 Seconds | **403,255.46** |
| Nineteen (19) Clients: RS/6000 44P-270 (Specification for each) | | | | |
| 4 x Power3-II (375 MHz) | 4 GB Main (4 MB L2 Cache per processor) | 1 x 18.2 GB | n/a | n/a |

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

- The database records were the proper size
- The database was properly scaled and populated

- The required ACID properties were met
- The transactions were correctly implemented
- Input data was generated according to the specified percentages
- The transaction cycle times included the required keying and think times
- The reported response times were correctly measured.
- All 90% response times were under the specified maximums
- At least 90% of all delivery transactions met the 80 Second completion time limit
- The reported measurement interval was 120 minutes (7200 seconds)
- The reported measurement interval was representative of steady state conditions
- Four checkpoints were taken during the reported measurement interval
- The 60 day storage requirement was correctly computed
- The system pricing was verified for major components and maintenance

Additional Audit Notes:

The measured system included 1947 IBM 10K rpm drives (18.2GB disks) that were substituted by 1947 IBM 10K rpm drives (9.1 GB disks) in the priced configuration. Based on the specifications of these disks and on additional performance data collected on these disks, it is my opinion that this substitution does not have a material effect on the reported performance.

Respectfully Yours,

François Raab, President

Bradley J. Askins, Auditor

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# Appendix A: TPC-C Application Source

## A.1 Client/Terminal Handler code

### callora.c

```
/*
 * callora.c
 *
 * $Revision: 1.3 $
 * $Date: 1999/05/06 21:28:29 $
 * $Log:          callora.c,v $
 *
 * $TALog: callora.c,v $
 * Revision 1.3  1999/05/06  21:28:29  oz
 * - Removed all the .. from the includes
 * - Added -I.. to the makefiles instead
 * - Moved all the thread related code and connection
 *   selection to serverMon.c
 *
 * - get_db_ready now does not take the number of connections
 * - Export create_connection() and clean_connection(void *)
 * - All the transactions take a connection pointer as a first param
 * [from r1.2 by delta oz-24309-TPCC-add-oracle8.1-code, r1.5]
 *
 * Revision 1.2  1999/04/19  20:14:48  oz
 * - Moved all the simulated code to server.c
 * - Created nulldb.c for compilation with no DB
 * [from r1.1 by delta oz-24331-TPCC-move-sim-code-to-common-file, r1.1]
 *
 * Revision 1.1  1999/04/19  14:37:27  oz
 * [added by delta wenjian-23742-TPCC-update-with-Raliegh-code, r1.3]
 *
 * Revision 1.15  1998/10/22  20:51:00  wenjian
 * [merge of changes from 1.6 to 1.14 into 1.12]
 *
 * Revision 1.14  1998/10/08  14:17:57  dongfeng
 * Add codes for doing web-based tpcc.
 * [from r1.6 by delta dongfeng-23067-TPCC-add-web-based-tpcc-client, r1.1]
 *
 * Revision 1.12  1998/09/04  19:17:54  wenjian
 * Add new variables: more_srv_work, period_to_add_rt, and
 * period_to_check_tran to replace the original constants in
 * order to control the increment of server RT.
 * [from r1.11 by delta wenjian-23183-TPCC-sync-AIX-code-with-Austin, r1.5]
 *
 * Revision 1.11  1998/08/28  18:29:56  wenjian
 * This delta sync the TPCC code with Austin.
 *
 * Modify get_wait_time():
 *  - add rt_increment so that the wait time is increased in a certain time;
 *  - rt_increment is reset to 0 at the beginning of each run
 *  - the waiting time is different for different tran type.
 * [from r1.8 by delta wenjian-23183-TPCC-sync-AIX-code-with-Austin, r1.1]
 *
 * Revision 1.8  1998/08/18  14:38:37  wenjian
 * Change the wait time for NewOrder to 0.23 second
 * [from r1.6 by delta wenjian-21750-TPCC-changes-for-porting-on-NT, r1.4]
 *
 * Revision 1.6  1998/06/17  15:28:50  wenjian
 * - Reduce matrix size
 * - In get_wait_time(), the waiting time is decided by transaction type.
 * [from r1.5 by delta wenjian-22495-TPCC-add-new-feature-to-monitor-tpcc-clients, r1.2]
 *
 * Revision 1.5  1998/02/17  22:06:58  wenjian
 * Define macro RANDOM as rand on NT and random on other platforms
 * [from r1.4 by delta wenjian-21750-TPCC-changes-for-porting-on-NT, r1.1]
 *
 * Revision 1.4  1998/01/23  15:07:42  oz
 * - Updated the SP TPCC directory to the latest files used
 *   during the SP tpcc audit.
 * [from r1.3 by delta oz-20774-TPCC-update-to-latest-SP-version-11-27, r1.1]
 *
 * Revision 1.1  1997/07/22  21:17:14  radha
 * [added by delta radha-20360-TPCC-integrate-with-Oracle-7322-drivers, r1.1]
 *
 *
 */


#include <stdio.h>
#include <time.h>
#include <string.h>
#include "serverDebug.h"

#ifdef MULTIPLE_INTERFACE
#include "common/neworder.h"
#include "common/payment.h"
#include "common/stocklevel.h"
#include "common/orderstatus.h"
#else
#include "common/tpcc_trans.h"
#endif
#include "common/databuf.h"
#include "server.h"

#ifdef WIN32
#include <winsock.h>
#endif


#include "tpcc_info.h"

#ifdef WIN32
#define RANDOM rand
#else
#define RANDOM random
#endif

extern int server_null_test;
extern void *create_ora_connection();

#ifdef DEBUG_SERVER
#define PRINT_NEW_IN(a, b) fprintf(stderr, "%s\n", b); print_new_in(a)
#define PRINT_NEW_ORDER(a, b) fprintf(stderr, "%s\n", b); print_new_order(a)
#define PRINT_NEW_RES(rc, a) \
   fprintf(stderr, "<R do_new_order, rc=%d, transtatus=%d, duplicates=%d, all_local=%d\n", \
         rc, (a)->s_transtatus, (a)->s_all_local, (a)->duplicate_items)

#else
#define PRINT_NEW_RES(rc, a)
#define PRINT_NEW_ORDER(a, b)
#define PRINT_NEW_IN(a, b)
#define PRINT_DIST_NEW_ORDER(a, b)
#endif


#define TPCC_RET_SCP(a,b,len) \
    strncpy((char *)dataP->b, (char *)oraStruct.a, len); \
    (char *)dataP->b[(len)-1] = '\0'
#define TPCC_CP(a,b) oraStruct.a = dataP->b
#define TPCC_SCP(a,b,len) strncpy((char *)oraStruct.a, (char *)dataP->b, len)
#define TPCC_RET_CP(a,b) dataP->b = oraStruct.a

#define TPCCP_RET_SCP(a,b,len)  \
    strncpy((char *)dataP->b, (char *)oraStructP->a, len);  \
    dataP->b[(len)-1] = '\0'
#define TPCCP_CP(a,b) oraStructP->a = dataP->b
#define TPCCP_SCP(a,b,len) strncpy((char *)oraStructP->a, (char *)dataP->b, len)
#define TPCCP_RET_CP(a,b) dataP->b = oraStructP->a

/*
 * Talk to Oracle
 */
int get_db_ready(char *dbName, int flag)
{
   int rc;
   char dvryFileName[100];
   extern char *tpcc_serverName;

   AUDITLOG(("> get_db_ready to %s flag %d\n", dbName, flag));
   if (server_null_test) return(0);

   fprintf(stderr, ">> get_db_ready, db: %s, flag %d\n", dbName, flag);

   sprintf (dvryFileName, "/home/encina/runs/deliveries/%s",
         tpcc_serverName);
   rc = TPCinit (serverIdNumber, "tpcc", "tpcc", dvryFileName);
   err_printf("TPCinit(%d, tpcc, tpcc, %s) returned %d\n",
                              serverIdNumber, dvryFileName, rc);
   if (rc) {
      fprintf(stderr, "TPCinit(%d, tpcc, tpcc, %s) returned %d\n",
                              serverIdNumber, dvryFileName, rc);
   }

   AUDITLOG(("< get_db_ready rc %d\n", rc));
   return(rc);
}

void *create_connection() {
   return create_ora_connection();
}


void do_delivery(cnP, dataP)
    void *cnP;
    delivery_data_t *dataP;
{
   struct delstruct oraStruct;
   int rc;

   AUDITLOG(("> do_delivery\n"));

   TPCC_CP(delin.w_id, w_id);
   TPCC_CP(delin.o_carrier_id, o_carrier_id);
   TPCC_CP(delin.qtime, start_queue);
   TPCC_CP(delin.in_timing_int, queued_time);
```

```
  DPRINT((("Calling TPCdel: w_id %d, o_carrier_id %d, %f qtime, %d in_timing_int\n",
                oraStruct.delin.w_id, oraStruct.delin.o_carrier_id,
                oraStruct.delin.qtime, oraStruct.delin.in_timing_int));

  rc = TPCdel(cnP, &oraStruct);
  if ((rc != 0) && (rc != -666)) {
     err_printf("Error TPCdel: terror %d, rc %d, retry %d, w_id %d, o_carrier_id %d, %f qtime,
%din_timing_int\n",
                oraStruct.delout.terror, rc, oraStruct.delout.retry,
                oraStruct.delin.w_id, oraStruct.delin.o_carrier_id,
                oraStruct.delin.qtime, oraStruct.delin.in_timing_int);
  }
  dataP->header.returncode = rc == 0 ? TPCC_SUCCESS : oraStruct.delout.terror;
  AUDITLOG((("< do_delivery rc %d\n", rc));
}

void copyout_order_status(orderStatus_data_t *dataP,
                                                struct ordstruct *oraStructP)
{
  int i;
  TPCCP_RET_CP(ordout.c_balance, c_balance);
  TPCCP_RET_CP(ordout.o_id, o_id);
  TPCCP_RET_CP(ordout.o_carrier_id, o_carrier_id);
  TPCCP_RET_CP(ordout.o_ol_cnt, o_ol_cnt);
  TPCCP_RET_CP(ordout.c_id, c_id);
#define I_CP(ind, a,b) dataP->item[ind].b = oraStructP->ordout.a[ind]
#define I_SCP(ind, a, b, len) \
 strncpy((char *)dataP->item[ind].b, (char *)oraStructP->ordout.a[ind], len); \
 dataP->item[ind].b[(len) - 1] = '\0'
  for (i=0; i<oraStructP->ordout.o_ol_cnt && i < 15; i++) {
     I_CP(i, ol_amount, ol_amount);
     I_CP(i, ol_i_id, ol_i_id);
     I_CP(i, ol_supply_w_id, ol_supply_w_id);
     I_CP(i, ol_quantity, ol_quantity);
     I_SCP(i, ol_delivery_d, delivery_date, 11);
  }
#undef I_CP
#undef I_SCP
  TPCCP_RET_SCP(ordout.c_first, c_first, 17);
  TPCCP_RET_SCP(ordout.c_middle, c_middle, 3);
  TPCCP_RET_SCP(ordout.c_last, c_last, 17);
  TPCCP_RET_SCP(ordout.o_entry_d, entry_date, 20);
}

void do_order_status(cnP, dataP)
    void *cnP;
    orderStatus_data_t *dataP;
{
  struct ordstruct oraStruct;
  int i, rc;

  AUDITLOG((("> do_order_status\n"));

  TPCC_CP(ordin.w_id, w_id);
  TPCC_CP(ordin.d_id, d_id);
  TPCC_CP(ordin.c_id, c_id);
  oraStruct.ordin.bylastname = ((dataP->c_id == 0) ? 1 : 0);
  TPCC_SCP(ordin.c_last, c_last, 17);

  DEBUGP((("Calling TPCord: w_id %d, d_id %d, c_id %d, bylastname %d, c_last %s\n",
oraStruct.ordin.w_id, oraStruct.ordin.d_id, oraStruct.ordin.c_id, oraStruct.ordin.bylastname,
oraStruct.ordin.c_last));

  rc = TPCord(cnP, &oraStruct);
  if ( rc != 0 ) {
     err_printf("Error TPCord: terror %d, rc %d, retry %d, w_id %d, d_id %d, c_id %d, bylastname %d,
c_last %s\n ",
                oraStruct.ordout.terror, rc, oraStruct.ordout.retry,
                oraStruct.ordin.w_id, oraStruct.ordin.d_id, oraStruct.ordin.c_id,
                oraStruct.ordin.bylastname, oraStruct.ordin.c_last);
  }

  copyout_order_status(dataP, &oraStruct);

  dataP->header.returncode = rc == 0 ? TPCC_SUCCESS : oraStruct.ordout.terror;
  AUDITLOG((("< do_order_stats rc %d\n", dataP->header.returncode));
}

void do_stock_level(cnP, dataP)
    void *cnP;
    stockLevel_data_t *dataP;
{
  struct stostruct oraStruct;
  /* What's this comment?? -- srs: i only did this one to check the links */
  int rc;

  AUDITLOG((("> do_stock_level\n"));

  TPCC_CP(stoin.w_id, w_id);
  TPCC_CP(stoin.d_id, d_id);
  TPCC_CP(stoin.threshold, threshold);

  DEBUGP((("Calling TPCsto: w_id %d, d_id %d, threashold %d\n",
                oraStruct.stoin.w_id, oraStruct.stoin.d_id,
                oraStruct.stoin.threshold));

  rc = TPCsto(cnP, &oraStruct );
  if ( rc != 0 ) {
     err_printf("Error TPCsto : terror %d, rc %d, retry %d, w_id %d, d_id %d, threashold %d\n",
                oraStruct.stoout.terror, rc, oraStruct.stoout.retry,
                oraStruct.stoin.w_id, oraStruct.stoin.d_id,
                oraStruct.stoin.threshold);
  }

  TPCC_RET_CP(stoout.low_stock, stock_count);

  dataP->header.returncode = rc == 0 ? TPCC_SUCCESS : oraStruct.stoout.terror;

  DEBUGP((("do_stock_lev returning %d\n", dataP->header.returncode));
  AUDITLOG((("< do_stock_level rc %d\n", dataP->header.returncode));

}

void copyin_payment(dataP, oraStructP)
    payment_data_t *dataP;
    struct paystruct *oraStructP;
{
  TPCCP_CP(payin.w_id, w_id);
  TPCCP_CP(payin.d_id, d_id);
  TPCCP_CP(payin.c_w_id, c_w_id);
  TPCCP_CP(payin.c_d_id, c_d_id);
  TPCCP_CP(payin.c_id, c_id);
  oraStructP->payin.bylastname = ((dataP->c_id == 0) ? 1 : 0);
  TPCCP_CP(payin.h_amount, h_amount);
  TPCCP_SCP(payin.c_last, c_last, 17);
}

void copyout_payment(dataP, oraStructP)
    payment_data_t *dataP;
    struct paystruct *oraStructP;
{
  TPCCP_RET_SCP(payout.w_street_1, w_street_1, 21);
  TPCCP_RET_SCP(payout.w_street_2, w_street_2, 21);
  TPCCP_RET_SCP(payout.w_city, w_city, 21);
  TPCCP_RET_SCP(payout.w_state, w_state, 3);
  TPCCP_RET_SCP(payout.w_zip, w_zip, 10);
  TPCCP_RET_SCP(payout.d_street_1, d_street_1, 21);
  TPCCP_RET_SCP(payout.d_street_2, d_street_2, 21);
  TPCCP_RET_SCP(payout.d_city, d_city, 21);
  TPCCP_RET_SCP(payout.d_state, d_state, 3);
  TPCCP_RET_SCP(payout.d_zip, d_zip, 10);
  TPCCP_RET_CP(payout.c_id, c_id);
  TPCCP_RET_SCP(payout.c_first, c_first, 17);
  TPCCP_RET_SCP(payout.c_middle, c_middle, 3);
  TPCCP_RET_SCP(payout.c_last, c_last, 17);
  TPCCP_RET_SCP(payout.c_street_1, c_street_1, 21);
  TPCCP_RET_SCP(payout.c_street_2, c_street_2, 21);
  TPCCP_RET_SCP(payout.c_city, c_city, 21);
  TPCCP_RET_SCP(payout.c_state, c_state, 3);
  TPCCP_RET_SCP(payout.c_zip, c_zip, 10);
  TPCCP_RET_SCP(payout.c_phone, c_phone, 17);
  TPCCP_RET_SCP(payout.c_since, c_date, 11);
  TPCCP_RET_SCP(payout.c_credit, c_credit, 3);
  TPCCP_RET_CP(payout.c_credit_lim, c_credit_lim);
  TPCCP_RET_CP(payout.c_discount, c_discount);
  TPCCP_RET_CP(payout.c_balance, c_balance);
  TPCCP_RET_SCP(payout.c_data, c_data, 201);
  TPCCP_RET_SCP(payout.h_date, pay_date, 20);
  strcpy((char *)dataP->w_name, "W_NAME");
  strcpy((char *)dataP->d_name, "D_NAME");
  /* Ignore c_ytd_payment, c_payment_cnt */
}

void do_payment(cnP, dataP)
    void *cnP;
    payment_data_t *dataP;
{

  struct paystruct oraStruct;
  int firstWh, secondWh;
  int rc;

  AUDITLOG((("> do_payment\n"));

  copyin_payment(dataP, &oraStruct);

#if 0
     err_printf("TPCpay: w_id %d, D_id %d, C_w_id %d, c_id %d, bylastname %d, amount %.2f, c_last %s
(%s)\n",
                oraStruct.payin.w_id,
                oraStruct.payin.d_id,
                oraStruct.payin.c_w_id,
                oraStruct.payin.c_id,
                oraStruct.payin.bylastname,
                oraStruct.payin.h_amount,
                oraStruct.payin.c_last,
                dataP->c_last);
#endif


  rc = TPCpay(cnP, &oraStruct);

#if 0
  err_printf("< TPCpay terror %d, rc %d, retry %d\n",
                oraStruct.payout.terror, rc, oraStruct.payout.retry);
#endif
```

```
  dataP->header.num_rms = 1;
  if (rc != 0 ) {
      err_printf("Error TPCpay: terror %d, rc %d, retry %d, w_id %d, D_id %d, C_w_id %d, c_id %d,
bylastname %d, amount %.2f, c_last %s (%s)\n",
                oraStruct.payout.terror, rc, oraStruct.payout.retry,
                                oraStruct.payin.w_id,
                oraStruct.payin.d_id,
                oraStruct.payin.c_w_id,
                oraStruct.payin.c_id,
                oraStruct.payin.bylastname,
                oraStruct.payin.h_amount,
                oraStruct.payin.c_last ? oraStruct.payin.c_last : "-NULL-",
                                (char *)dataP->c_last ? (char *)dataP->c_last : "-NULL-");
  }

  copyout_payment(dataP, &oraStruct);

  dataP->header.returncode = rc == 0 ? TPCC_SUCCESS : oraStruct.payout.terror;
  AUDITLOG(("< do_payment rc %d\n", dataP->header.returncode));
}

static void copyin_new_order(dataP, oraStructP)
    newOrder_data_t *dataP;
    struct newstruct *oraStructP;
{
   int i;

   TPCCP_CP(newin.w_id, w_id);
   TPCCP_CP(newin.d_id, d_id);
   TPCCP_CP(newin.c_id, c_id);

#define NO_I_CP(ind,a,b) oraStructP->a[ind] = dataP->item[ind].b
#define NO_I_SCP(ind,a,b,len) strncpy((char *)oraStructP->a[ind], (char *)dataP->item[ind].b, len)

   /* tpccpl.c loops over 15 items, we do the same */
   for (i=0; i<15; i++) {
       NO_I_CP(i, newin.ol_i_id, ol_i_id);
       NO_I_CP(i, newin.ol_supply_w_id, ol_supply_w_id);
       NO_I_CP(i, newin.ol_quantity, ol_quantity);
#ifdef DEBUG_SERVER
       fprintf(stderr, "NewOrder: Item %d, supplyWh %d (local %d)\n",
               i,
               oraStructP->newin.ol_supply_w_id[i],
               oraStructP->newin.w_id);
#endif
   }
   /* Ignore all_local field, total_items,
    * tpccpl.c doesnt use them
    */
#undef NO_I_CP
#undef NO_I_SCP
}

void copyout_new_order(dataP, oraStructP)
    newOrder_data_t *dataP;
    struct newstruct *oraStructP;
{
   int i;

   TPCCP_RET_CP(newout.o_id, o_id);
   TPCCP_RET_CP(newout.o_ol_cnt, o_ol_cnt);
   TPCCP_RET_SCP(newout.c_last, c_last, 17);
   TPCCP_RET_SCP(newout.c_credit, c_credit, 3);
   TPCCP_RET_CP(newout.c_discount, c_discount);
   TPCCP_RET_CP(newout.w_tax, w_tax);
   TPCCP_RET_CP(newout.d_tax, d_tax);
   TPCCP_RET_SCP(newout.o_entry_d, entry_date, 20);
   TPCCP_RET_CP(newout.total_amount, total);
   TPCCP_RET_SCP(newout.status, statusline, 26);

#define NO_RET_CP(ind,a,b) dataP->item[ind].b = oraStructP->newout.a[ind]
#define NO_RET_SCP(ind,a,b,len) strncpy((char *)dataP->item[ind].b, (char *)oraStructP->newout.a[ind],
len)

   for (i=0; i<oraStructP->newout.o_ol_cnt && i<15; i++) {
       NO_RET_SCP(i, i_name, name_i, 25);
       NO_RET_CP(i, s_quantity, s_quantity);
                dataP->item[i].brand_generic[0] = oraStructP->newout.brand_generic[i];
                dataP->item[i].brand_generic[1] = '\0';
       NO_RET_CP(i, i_price, price);
       NO_RET_CP(i, ol_amount, ol_amount);
                /* Ignore s_idx and s_dist */
   }
   if (oraStructP->newout.status[0] != '\0') {
                DEBUGP(("TPCnew: status -- %s\n", oraStructP->newout.status));
                dataP->items_valid = 0;
   } else {
                dataP->items_valid = 1;
   }

#undef NO_RET_CP
#undef NO_RET_SCP
}

void do_new_order(cnP, dataP)
 void *cnP;
 newOrder_data_t *dataP;
{
    static int num_calls = 0;
    int i;
    struct newstruct oraStruct;
    int rc;

    AUDITLOG(("> do_new_order\n"));

    /*  Copy the structure into the TPCC structure. */
    copyin_new_order(dataP, &oraStruct);

    DEBUGP(("-> TPCnew %d items to wh %d\n",
                    dataP->o_ol_cnt, dataP->w_id));
    dataP->header.num_rms = 1;

#if 0
       err_printf("Error TPCnew : w_id %d, d_id %d, c_id %d, o_ol_cnt %d (out cnt %d)\n",
           oraStruct.newin.w_id, oraStruct.newin.d_id,
           oraStruct.newin.c_id, dataP->o_ol_cnt, oraStruct.newout.o_ol_cnt);
       for (i=0; i<15; i++) {
           err_printf("ol_i_id %d, ol_supply_w_id %d, ol_quantity %d\n",
               oraStruct.newin.ol_i_id[i], oraStruct.newin.ol_supply_w_id[i],
               oraStruct.newin.ol_quantity[i]);
       }
#endif

    rc = TPCnew(cnP, &oraStruct);

#if 0
   err_printf("< TPCnew terror %d, rc %d, retry %d\n",
            oraStruct.newout.terror, rc, oraStruct.newout.retry);
#endif

   if (rc != 0) {
       err_printf("Error TPCnew : terror %d, rc %d, retry %d, w_id %d, d_id %d, c_id %d, o_ol_cnt %d (out
cnt %d)\n",
                    oraStruct.newout.terror, rc, oraStruct.newout.retry,
                    oraStruct.newin.w_id, oraStruct.newin.d_id,
                    oraStruct.newin.c_id, dataP->o_ol_cnt, oraStruct.newout.o_ol_cnt);
                for (i=0; i<15; i++) {
                    err_printf("ol_i_id %d, ol_supply_w_id %d, ol_quantity %d\n",
                                oraStruct.newin.ol_i_id[i], oraStruct.newin.ol_supply_w_id[i],
                                oraStruct.newin.ol_quantity[i]);
                }
    }
    DEBUGP(("-< TPCnew %d\n", rc));

    /* copy out results */
    copyout_new_order(dataP, &oraStruct);

    if (rc == 0) {
                dataP->header.returncode =
                                dataP->items_valid ? TPCC_SUCCESS : INVALID_NEWO;
#if 0
                if (dataP->items_valid && (++num_calls % 500) == 0) {
                    int i;
                    err_printf("TPCnew Success: w_id %d, d_id %d, c_id %d, o_ol_cnt %d, Oid %d\n",
                                    oraStruct.newin.w_id, oraStruct.newin.d_id,
                                    oraStruct.newin.c_id, oraStruct.newout.o_ol_cnt,
                oraStruct.newout.o_id);
                    for (i=0; i<15 && i<oraStruct.newout.o_ol_cnt; i++) {
                                err_printf("   %2d: i_id %i5d, sw_id %4d, qty %d, price %.2f amt %.2f\n",
                                                i, oraStruct.newin.ol_i_id[i],
                                                oraStruct.newin.ol_supply_w_id[i],
                                                oraStruct.newin.ol_quantity[i],
                    oraStruct.newout.i_price[i],
                    oraStruct.newout.ol_amount[i]);
                    }
                }
#endif
    } else {
                dataP->header.returncode = oraStruct.newout.terror;
    }

    AUDITLOG(("< do_new_order rc %d\n", dataP->header.returncode));
}
```

## client.C

```
/* (C)1997 IBM Corporation */
#include <unistd.h>
#include <stdlib.h>
#include <stdio.h>
#include <sys/types.h>
#include <ctype.h>
#include <string.h>
#include <math.h>

#include "screen.h"
#include "encina.h"

extern "C" void set_client_debug_state(void *contextP, int state, int tran);

Encina encina;

extern "C" int client_login(int infd, int outfd, int *w_idP, int *d_idP)
{
```

```
   Thread_data thread(infd, outfd, NULL);
   User_data user_data;
   Login log(&user_data, &thread);
   log.handle();
   *w_idP = user_data.warehouse;
   *d_idP = user_data.district;
   return 0;
}

extern "C" int client_init (int infd, int outfd, int w_id, int d_id,
                                                    void *contextP) {
   int rc = 0;
   Thread_data *threadP = new Thread_data(infd, outfd, contextP);
   Field *menuField = new IntField(threadP, 8);
   User_data user_data;
   Menu  menu(&user_data, threadP);

   user_data.warehouse = w_id;
   user_data.district = d_id;
   menu.present();

   Payment pay(&user_data, threadP);
   Delivery del(&user_data, threadP);
   OrderStatus os(&user_data, threadP);
   StockLevel sl(&user_data, threadP);
   NewOrder no(&user_data, threadP);

   while (rc == 0) {
                int key = menuField->get_key();
                set_client_debug_state(contextP, 1, key - '0');
                switch (key) {
                   case EOF: rc = -1; break;
                   case '1': case 'N': case 'n': rc = no.handle();  break;
                   case '2': case 'P': case 'p': rc = pay.handle(); break;
                   case '3': case 'O': case 'o': rc = os.handle();  break;
                   case '4': case 'D': case 'd': rc = del.handle(); break;
                   case '5': case 'S': case 's': rc = sl.handle();  break;
                   case '\030':
                     position(threadP, 1, 1);
                     threadP->flush(); break;
                   case '9': case 'Q': case 'q': case 'E': case 'e':
                                 return(0);
                   default: threadP->write("\a", 1); break;
                }
                set_client_debug_state(contextP, 4, key - '0');
    }
   return 0;
}
```

## client.h

```
/*
*                client.h
*
* $Revision: 1.6 $
* $Date: 1998/11/24 21:45:58 $
* $Log:            $
*
*
* $TALog: client.h,v $
* Revision 1.6  1998/11/24  21:45:58  wenjian
* - Add MULTIPLE_INTERFACE compile flag
* [from r1.5 by delta wenjian-23742-TPCC-update-with-Raliegh-code, r1.1]
*
* Revision 1.5  1998/11/09  14:48:13  wenjian
* In an effort to make a new directory structure for TPCC, this delta
* creates two directories: tpcc/client and tpcc/server. All the files
* for this revision are copied from tpcc/sp-tpcc without any change.
* Further change may be needed for some files due to the change of
* the directory structure.
* [added by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.1]
*
* Revision 1.10  1998/10/26  14:41:34  dongfeng
* Add Init command in web client so when something bad happens during
* initialization web client sends back error information and allows
* reinitialization instead of killing IIS server.
*
* Define values of initialization errors.
* [from r1.9 by delta dongfeng-23067-TPCC-add-web-based-tpcc-client, r1.3]
*
* Revision 1.9  1998/10/22  20:55:53  wenjian
* [merge of changes from 1.5 to 1.8 into 1.6]
*
* Revision 1.8  1998/10/22  19:18:31  dongfeng
* [from r1.7 by delta dongfeng-23067-TPCC-add-web-based-tpcc-client, r1.2]
*
* Revision 1.7  1998/10/08  14:17:59  dongfeng
* Add codes for doing web-based tpcc.
* [from r1.5 by delta dongfeng-23067-TPCC-add-web-based-tpcc-client, r1.1]
*
* Revision 1.6  1998/09/26  10:56:25  oz
* - renamed thread_init and thread_done to clnt_thread_init and
*   clnt_thread_done respectively because of name conflicts on AIX4.3
* [from r1.5 by delta oz-23339-TPCC-update-for-NT, r1.2]
*
* Revision 1.5  1998/01/26  16:19:22  oz
* - moved all the code pertaining to the background
*   thread to its own file and all the data structures
*   to client_utils.h
* [from r1.4 by delta oz-21689-TPCC-move-client-bg-thread-to-separate-file, r1.1]
*
* Revision 1.4  1998/01/23  15:07:43  oz
* - Updated the SP TPCC directory to the latest files used
*   during the SP tpcc audit.
* [from r1.3 by delta oz-20774-TPCC-update-to-latest-SP-version-11-27, r1.1]
*
*
*
*/

#ifndef TPCC_CLIENT_H
#define TPCC_CLIENT_H

#if defined (solaris)
#include <dce/pthread.h>
#else   /* solaris */
#include <pthread.h>
#endif  /* solaris */



#ifdef WEB_TPCC_CLIENT
#include <windows.h>

#define MUTEX_T CRITICAL_SECTION
#define MUTEX_LOCK(a) EnterCriticalSection(a)
#define MUTEX_UNLOCK(a) LeaveCriticalSection(a)
#define MUTEX_INIT(mut)   InitializeCriticalSection(mut)
#define MUTEX_DESTROY(mut) DeleteCriticalSection(mut)
#define ERROUT errtpcc

/*initialization status */
#define INIT_SUCCESS 0
#define INIT_FAILED  1
#define CELL_NAME_UNAVAILABLE 2
#define MON_RETRIEVEENABLE_FAILED 3
#define MON_INITCLIENT_FAILED 4
#define MON_SECURITYSET_FAILED 5
#define MON_SETREFRESHINTERVAL_FAILED 6
#define NOINFO_TRPC_ERROR 7
#define ENROLL_CLIENT_EXCEPTION 8
#define ERROUT_FILE_NOT_FOUND 9
#define LOG_FILE_NOT_FOUND 10
#define TPCC_KEY_NOT_FOUND 11
#define TERM_ALLOC_FAILED 12

#else
#define MUTEX_T pthread_mutex_t
#define COND_T  pthread_cond_t
#define MUTEX_LOCK(a) pthread_mutex_lock(a)
#define MUTEX_UNLOCK(a) pthread_mutex_unlock(a)
#define COND_WAIT(cond,mut) pthread_cond_wait(cond,mut)
#define COND_SIGNAL(cond) pthread_cond_signal(cond)
#define COND_BROADCAST(cond) pthread_cond_broadcast(cond)
#define MUTEX_INIT(mut)   pthread_mutex_init(mut, pthread_mutexattr_default)
#define COND_INIT(cond)   pthread_cond_init(cond, pthread_condattr_default)
#define MUTEX_DESTROY(mut) pthread_mutex_destroy(mut)
#define COND_DESTROY(cond) pthread_cond_destroy(cond)
#define ERROUT stderr
#endif
/*
 *  Routines and declarations that are common to all clients
 */
void *clnt_thread_init(void);

void clnt_thread_done(void *);

void *terminal_context_init(int);

void send_new_order(void *, newOrder_data_t *);

void send_payment(void *, payment_data_t *);

void send_order_status(void *, orderStatus_data_t *);

void send_delivery(void *, delivery_data_t *);

void send_stock_level(void *, stockLevel_data_t *);

void send_batch_request(void *contextP, int num, tpcc_data_t *dataP);

void send_unmarshalled(void *contextP,
                                    int tran_type,
                                    int size,
                                    ndr_byte *dataP);

void enroll_client(int id);

#endif  /*  TPCC_CLIENT_H  */
```

## client_bg_thread.c

```
/*
*                    client_bg_thread.c
*
* $Revision: 1.17 $
* $Date: 1999/05/06 21:28:25 $
* $Log:              $
*
*
* $TALog: client_bg_thread.c,v $
* Revision 1.17  1999/05/06  21:28:25  oz
* - Removed all the .. from the includes
* - Added -I.. to the makefiles instead
* - Moved all the thread related code and connection
*   selection to serverMon.c
* [from r1.13 by delta oz-24309-TPCC-add-oracle8.1-code, r1.5]
*
* Revision 1.13  1999/01/29  20:16:31  wenjian
* Small changes to make check_threads more robust
* [from r1.12 by delta wenjian-23787-TPCC-integrate-code-for-AIX-and-NT, r1.7]
*
* Revision 1.12  1998/12/28  20:07:11  wenjian
* - Change client_info to a pointer pClientInfo for flexibility.
* [from r1.11 by delta wenjian-23788-TPCC-use-single-stats-var-for-each-client-and-server, r1.5]
*
* Revision 1.11  1998/12/14  20:27:53  wenjian
* Made corresponding changes due to data structure change of tran_info_t.
* [from r1.10 by delta wenjian-23788-TPCC-use-single-stats-var-for-each-client-and-server, r1.3]
*
* Revision 1.10  1998/12/11  16:14:18  wenjian
* Add code for checking statistic data in a single variable and collecting
* statistic data based on iStatsFrequency.
*
* - Add new check_threads() in order to use the single statistic var.
* [from r1.9 by delta wenjian-23788-TPCC-use-single-stats-var-for-each-client-and-server, r1.1]
*
* Revision 1.9  1998/12/08  23:03:48  wenjian
* Add (or rename) Makefile for each platform (AIX and NT). Reorganize the
* files a little bit.
*
* - Change path for tran_stat.h
* - Add ifdef before getStatsForm since it is only used by NT
* [from r1.8 by delta wenjian-23787-TPCC-integrate-code-for-AIX-and-NT, r1.1]
*
* Revision 1.8  1998/12/07  20:04:11  wenjian
* Clean up
* [from r1.7 by delta wenjian-23742-TPCC-update-with-Raliegh-code, r1.2]
*
* Revision 1.7  1998/11/24  21:45:58  wenjian
* - Add #ifdef MULTIPLE_INTERFACE
* - Take care special case for check_threads
* [from r1.6 by delta wenjian-23742-TPCC-update-with-Raliegh-code, r1.1]
*
* Revision 1.6  1998/11/09  16:59:35  wenjian
* In this revision, most of the changes are related to the directory of header
* files after directory reorganization. Other changes include adding or removing
* files to put them in the right directories. Makefiles are written for NT
* platform so that nmake is working on NT now. Need a top level Makefile for all
* the directories.
* [from r1.5 by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.2]
*
* Revision 1.5  1998/11/09  14:48:14  wenjian
* In an effort to make a new directory structure for TPCC, this delta
* creates two directories: tpcc/client and tpcc/server. All the files
* for this revision are copied from tpcc/sp-tpcc without any change.
* Further change may be needed for some files due to the change of
* the directory structure.
* [added by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.1]
*
* Revision 1.29  1998/11/06  16:10:54  wenjian
* - Move gettimeofday() in check_threads out of the for loop
* - Minor change for cleanup
* [from r1.28 by delta wenjian-23646-TPCC-clean-up-source-code, r1.1]
*
* Revision 1.28  1998/10/26  15:17:53  dongfeng
* remove #include <sys/times.h> from NT tests
* [from r1.27 by delta dongfeng-23067-TPCC-add-web-based-tpcc-client, r1.4]
*
* Revision 1.27  1998/10/22  21:05:37  wenjian
* [merge of changes from 1.12 to 1.26 into 1.25]
*
* Revision 1.26  1998/10/22  19:18:31  dongfeng
* [from r1.24 by delta dongfeng-23067-TPCC-add-web-based-tpcc-client, r1.2]
*
* Revision 1.24  1998/10/08  14:17:59  dongfeng
* Add codes for doing web-based tpcc.
* [from r1.12 by delta dongfeng-23067-TPCC-add-web-based-tpcc-client, r1.1]
*
* Revision 1.25  1998/10/08  18:03:00  gerstl
* Changes to allow configurations where some servers only service
* specific transaction types. Split transaction interfaces by type.
* [from r1.23 by delta gerstl-23515-TPCC-allow-separate-online-transaction-interfaces, r1.1]
*
* Revision 1.23  1998/09/03  16:07:11  wenjian
* Change GET_USER_SYS_TIME to GET_CLIENT_USAGE
* [from r1.19 by delta wenjian-23183-TPCC-sync-AIX-code-with-Austin, r1.3]
*
* Revision 1.19  1998/08/18  13:35:41  wenjian
* - Clean up including header files
* - Remove client_report() and socket_print_rt_avg()
* - Use #ifdef for the call of getUserSysTime()
* [from r1.16 by delta wenjian-22495-TPCC-add-new-feature-to-monitor-tpcc-clients, r1.7]
*
* Revision 1.16  1998/07/08  18:15:42  wenjian
* Add getUserSysTime().
* [from r1.15 by delta wenjian-22495-TPCC-add-new-feature-to-monitor-tpcc-clients, r1.6]
*
* Revision 1.15  1998/07/02  18:28:51  wenjian
* Change client_status_report to send more information of the
* client process. These changes are matched with changes in
* tpcc_monitor.c.
* [from r1.9 by delta wenjian-22495-TPCC-add-new-feature-to-monitor-tpcc-clients, r1.5]
*
* Revision 1.7  1998/04/29  19:47:40  wenjian
* - Add client_status_report to comunnicate with tpcc_monitor
* - Add socket_print_rt_avg
* [from r1.6 by delta wenjian-22495-TPCC-add-new-feature-to-monitor-tpcc-clients, r1.1]
*
* Revision 1.6  1998/02/17  22:12:40  wenjian
* [merge of changes from 1.3 to 1.4 into 1.5]
*
* Revision 1.4  1998/02/17  16:04:40  oz
* - Split the login into two parts to allow for special logins
* - If the warehouse ID is 0, this is a special login to
*   query the client for status
*
* - check_threads: Return the number of threads
* - New function: client_report
* [from r1.3 by delta oz-21864-TPCC-split-client-login-screen, r1.1]
*
* Revision 1.5  1998/02/17  22:06:59  wenjian
* Add necessary head files for win32
* [from r1.3 by delta wenjian-21750-TPCC-changes-for-porting-on-NT, r1.1]
*
* Revision 1.3  1998/01/29  22:53:34  oz
* - Use pthread delay instead of sleep
* [from r1.2 by delta oz-21749-TPCC-use-pthread-delay-for-bg-thread, r1.1]
*
* Revision 1.2  1998/01/26  20:37:34  oz
* - Remove all the code associated with explicit binding
*
* - Removed include of mon_client_utils.h
* [from r1.1 by delta oz-21697-TPCC-remove-explicit-binding-code, r1.1]
*
* Revision 1.1  1998/01/26  16:19:22  oz
* - moved all the code pertaining to the background
*   thread to its own file and all the data structures
*   to client_utils.h
* [added by delta oz-21689-TPCC-move-client-bg-thread-to-separate-file, r1.1]
*
*
*/

/*
 *  client_bg_thread
 *                    A file used for debug purposes only.
 *
 *  It implements a background thread that once a minute checks the
 *  state of all the threads and reports the state of the client.
 *
 */


#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <stdarg.h>
#include <time.h>
#ifndef WIN32
#include <sys/times.h>  /* for getUserSysTime */
#endif
#if defined (solaris)
#include <dce/pthread.h>
#else
#include <pthread.h>
#endif  /* solaris */
#include <tpm/mon/mon.h>
#include <utils/trace.h>
#include "common/delivery.h"
#ifdef MULTIPLE_INTERFACE
#include "common/neworder.h"
#include "common/payment.h"
#include "common/stocklevel.h"
#include "common/orderstatus.h"
#else
#include "common/tpcc_trans.h"
#endif
#include "common/utilities.h"
#include "client_utils.h"
#include "common/do_tpcc.h"
#include "client.h"
#include "encina_client.h"
#include "tools/tran_stat.h"
#include "common/get_local_time.h"

#ifdef WIN32
#define    read(A,B,C)      recv(A,B,C,0)
#define    write(A,B,C)     send(A,B,C,0)
```

```
#endif

#if 1
#define PRINT_AV(total, num, str)                    \
{                                                    \
   if ((num) > 0) {                                  \
      fprintf(ERROUT, " %s %.0f,", str, (double)(total)/(num));      \
   }                                                 \
}
#else
#define PRINT_AV(a,b,c)
#endif

static void check_threads(total_tran_count_t *tran_ctP, int *numP, int *numInitP);
static struct timeval *client_last_time(thread_descr_t *descrP);
void getUserSysTime(struct timeval *user_time, struct timeval *sys_time);

/*
 *  client_last_time
 *
 *  Each thread maintains the current state it is in and the time
 *  it entered this state.
 *  This routined returns a pointer to the structure in the thread
 *  data that contains the time corresponding to the threads current
 *  state.
 *  Typical use:
 *                - Set the state, then call gettime on the pointer
 *                  returned by this function.
 */
static struct timeval *client_last_time(thread_descr_t *descrP)
{
   struct timeval *lastTimeP = &descrP->done;
   switch (descrP->state) {
                  case thread_state_init:              /*  Thread is initializing - no trans yet */
                     lastTimeP = &descrP->init;
                     break;
      case thread_state_called:  /*  Tran type was sent by the RTE  */
         lastTimeP = &descrP->called;
         break;
      case thread_state_returned:  /*  Final screen sent to RTE  */
         lastTimeP = &descrP->returned;
         break;
      case thread_state_sent:  /*  Sent to server  */
         lastTimeP = &descrP->sent;
         break;
      case thread_state_received:  /*  Received reply from server  */
         lastTimeP = &descrP->received;
         break;
      case thread_state_done:  /*  The thread exited  */
         lastTimeP = &descrP->done;
         break;
      default:
                     err_printf("client_last_time: bad state: %d\n", descrP->state);
         lastTimeP = &descrP->done;
         break;
   }
   return(lastTimeP);
}

void set_client_debug_state(void *contextP, int state, int tran)
{
   thread_info_t *thread_context = (thread_info_t *)contextP;
   struct timezone tz;
   thread_descr_t *descrP = &thread_context->descr;

   descrP->state = state;

   gettimeofday(client_last_time(descrP), &tz);
   if (state == thread_state_called) descrP->tran = tran;
}



/*  How often to report the state of a thread:
 *  If it is in the thread_state_init phase: report if it has been in
 *  that state for more than 5 minutes.
 *  Report if it takes the terminal more thatn 3 minutes to generate the next
 *  transaction.  Otherwise, report if anything takes longer than 60 seconds.
 */
#define THREAD_STATE_REPORT_DELTA(state) \
  ((state) == thread_state_init ? 300 : \
   (state) == thread_state_returned ? 180 : 60)

static char *thread_state_to_str(int state)
{
   char *ret_val = "-Unknown-";
   switch(state) {
                  case thread_state_init:     ret_val = "state_init"; break;
                  case thread_state_called:   ret_val = "state_called"; break;
                  case thread_state_sent:     ret_val = "state_sent"; break;
                  case thread_state_received: ret_val = "state_received"; break;
                  case thread_state_done:     ret_val = "state_done"; break;
                  case thread_state_returned: ret_val = "state_returned"; break;
   }
   return(ret_val);
}

static void print_rt_avg(total_tran_count_t *curP,
                                                   total_tran_count_t *prevP,
                                                   int type)
{
   int i;
   static char *names[] = {"0", "no", "pa", "os", "dl", "sl"};
   err_printf("%s RT avg: ", type ? "server" : "client");

   for (i=1; i<=MAX_TRAN_TYPE; i++) {
                  int num_trans = curP->tran[i].RTcount - prevP->tran[i].RTcount;
                  double rt_diff = curP->tran[i].RTtotal[type] - prevP->tran[i].RTtotal[type];
                  PRINT_AV(rt_diff, num_trans, names[i]);
   }
   fprintf(ERROUT, "\n");
}


/*
 *  A background thread that keeps tabs on the state of all the
 *  threads of the client.  (For Debug)
 */
static void *bg_thread(void *argP)
{
   static int sleep_time = 60000; /*  in ms  */
   static struct timespec time_wait = {60, 0};
   struct timespec sleep_end;

   total_tran_count_t tran_ct, tran_reported[2];
   int total_newo, total_tran_err;
   struct timeval cur_time;
   struct timezone tz;
   struct timeval time_reported[2];

   gettimeofday(&time_reported[0], &tz);
   time_reported[1] = time_reported[0];

   memset(&tran_reported[0], '\0', 2 * sizeof(tran_reported[0]));

   while (1) {
                  double time_diff1, time_diff2;
                  double tran_diff1, tran_diff2;
      double prev_newo1, prev_newo2;
                  double err_diff1, err_diff2;

                  check_threads(&tran_ct, NULL, NULL);

                  total_tran_err = tran_ct.errors;
      total_newo = tran_ct.tran[NEWO_TRANS].num-tran_ct.tran[NEWO_TRANS].errs;

                  gettimeofday(&cur_time, &tz);
                  time_diff1 = time_diff_ms(&cur_time, &time_reported[0]);
                  prev_newo1 = tran_reported[0].tran[NEWO_TRANS].num -
tran_reported[0].tran[NEWO_TRANS].errs;
                  tran_diff1 = total_newo - prev_newo1;
                  err_diff1 = total_tran_err - tran_reported[0].errors;

                  time_diff2 = time_diff_ms(&cur_time, &time_reported[1]);
                  prev_newo2 = tran_reported[1].tran[NEWO_TRANS].num -
tran_reported[1].tran[NEWO_TRANS].errs;
                  tran_diff2 = total_newo - prev_newo2;
                  err_diff2 = total_tran_err - tran_reported[1].errors;
                  if (total_newo != 0 && tran_diff2 > 0) {
                     err_printf("bg_thread: TPM: %.0f (last %.0f sec), %.0f (last %.0f sec)\n",
                                    tran_diff1 / time_diff1 * 60000, time_diff1 / 1000.,
                                    tran_diff2 / time_diff2 * 60000, time_diff2 / 1000.);
         /* print av server response time for all transactions */
                     print_rt_avg(&tran_ct, &tran_reported[1], 0);
                     print_rt_avg(&tran_ct, &tran_reported[1], 1);
      }

                  if (err_diff2 != 0) {
                     err_printf("bg_thread: errPM %.1f (last %.0f sec)\n",
                                          err_diff2 / time_diff2 * 60000, time_diff2 / 1000.);
                  }
                  tran_reported[0] = tran_reported[1];
                  tran_reported[1] = tran_ct;
                  time_reported[0] = time_reported[1];
                  time_reported[1] = cur_time;
      pthread_delay_np(&time_wait);
   }
}

#ifdef KEEP_TERMINAL_INFO
static void check_threads(total_tran_count_t *tran_ctP, int *num_threadsP, int *num_threadsInitP)
{
   struct timezone tz;
   int num_per_state[NUM_STATES];
   int total_stuck = 0;
   static int init_printed = 0;
   int total_tran_err;
   int num_active = 0;


   MUTEX_LOCK(&init_lock);

   if (info_list == NULL || (info_list_len < 1)) {
      if (num_threadsP)
                  *num_threadsP = 0;
      if (num_threadsInitP)
                  *num_threadsInitP = 0;
      memset(tran_ctP, '\0', sizeof(*tran_ctP));
```

```
  } else {
    int i,j;
    struct timeval cur_time;
                int num_init = 0, num_done = 0;

                for (i=0; i<NUM_STATES; i++) num_per_state[i] = 0;

    gettimeofday(&cur_time, &tz);
    memset(tran_ctP, '\0', sizeof(*tran_ctP));
    for (i=0; i<info_list_len; i++) {
                  struct timeval *client_timeP;
                  int time_diff;
                  thread_descr_t *descrP;
                  int delta;
      if (info_list[i] == NULL || !info_list[i]->initialized) {
                            continue;
                  }
                  if (!info_list[i]->done) num_active++;
                  descrP = &info_list[i]->descr;
                  delta = THREAD_STATE_REPORT_DELTA(descrP->state);
                  client_timeP = client_last_time(descrP);

                  for (j=1; j<=MAX_TRAN_TYPE; j++) {
              tran_ctP->tran[j].num += info_list[i]->tran[j].num;
              tran_ctP->tran[j].errs += info_list[i]->tran[j].errs;
              tran_ctP->tran[j].RTcount += info_list[i]->tran[j].RTcount;
              tran_ctP->tran[j].RTtotal[0] += info_list[i]->tran[j].RTtotal[0];
              tran_ctP->tran[j].RTtotal[1] += info_list[i]->tran[j].RTtotal[1];
                            tran_ctP->errors += info_list[i]->tran[j].errs;
                  }

                  time_diff = cur_time.tv_sec - client_timeP->tv_sec;
                  DPRINT(("bg_thread: thread %d (index %d) state %s tran %d for %d sec\n",
            info_list[i]->thread_id, i,
            thread_state_to_str(descrP->state),
            descrP->tran,
            time_diff));
                  if (descrP->state == thread_state_init) {
                            num_init++;
                  } else if (descrP->state == thread_state_done) {
                            num_done++;
                  } else if (time_diff > delta) {
          num_per_state[descrP->state] ++;
                            total_stuck++;
                            if (!descrP->printed) {
                                err_printf("bg_thread: thread %d (index %d) state %s tran %d stuck for %d
sec\n",
                      info_list[i]->thread_id, i,
                      thread_state_to_str(descrP->state),
                      descrP->tran,
                      time_diff);

                                descrP->printed = 1;
                            }
                  } else if (descrP->printed) {
                            err_printf("bg_thread: thread %d (index %d) state %s tran %d unstuck.\n",
                      info_list[i]->thread_id, i,
                      thread_state_to_str(descrP->state),
                      descrP->tran);

                            descrP->printed = 0;
      }
    }
              if (num_threadsP)
                *num_threadsP = num_active;
              if (num_threadsInitP)
                *num_threadsInitP = num_init;

              if (num_init > 0) {
                err_printf("bg_thread: %d threads still in the init state\n",
                                        num_init);
              } else if (!init_printed) {
                err_printf("bg_thread: All %d threads are running\n",
                                  info_list_len);
                init_printed = 1;
              }
              if (num_active != info_list_len)
                err_printf("%d threads of %d are still active\n",
                                  num_active, info_list_len);

              if (num_done > 0) {
                err_printf("bg_thread: %d threads done so far.\n", num_done);
              }
              if (total_stuck > 0) {
                err_printf("bg_thread: Summary %d stuck: ", total_stuck);
                for (i=0; i<NUM_STATES; i++) {
                  if (num_per_state[i] > 0) {
                              fprintf(ERROUT, "%d %s, ",
                                          num_per_state[i], thread_state_to_str(i));
                  }
                }
                fprintf(ERROUT, "\n");
              }
              total_tran_err = 0;
    for (i=0; i<=MAX_TRAN_TYPE; i++)
                total_tran_err += tran_ctP->tran[i].errs;
    if (total_tran_err > 0) {
                err_printf("bg_thread: %d errs: %d no, %d pa, %d os, %d sl\n",
                              total_tran_err,
                                          tran_ctP->tran[NEWO_TRANS].errs,
                                          tran_ctP->tran[PAYMENT_TRANS].errs,
                                          tran_ctP->tran[ORDER_STAT_TRANS].errs,
                                          tran_ctP->tran[STOCK_TRANS].errs);
      }
    }
    MUTEX_UNLOCK(&init_lock);
}

#else
static void check_threads(total_tran_count_t *tran_ctP, int *num_threadsP, int *num_threadsInitP)
{
    int i;
    extern total_tran_count_t *pClientInfo;

    if (num_threadsP != NULL)
                  *num_threadsP = 0;
    if (num_threadsInitP != NULL)
                  *num_threadsInitP = 0;

    memcpy(tran_ctP, pClientInfo, sizeof(total_tran_count_t));

    /* report error info */
    if (pClientInfo->errors > 0) {
      err_printf("bg_thread: %d errs: %d no, %d pa, %d os, %d sl\n",
                pClientInfo->errors,
                pClientInfo->tran[NEWO_TRANS].errs,
                pClientInfo->tran[PAYMENT_TRANS].errs,
                pClientInfo->tran[ORDER_STAT_TRANS].errs,
                pClientInfo->tran[STOCK_TRANS].errs);
    }

}

#endif

void start_bg_debug_thread()
{
    int rc;
    pthread_attr_t attr;
    pthread_t thread;

    if (rc = pthread_attr_create(&attr)) {
      err_printf("start_bg_debug_thread: pthread_attr_create failed: %d\n", rc);
                return;
    }
    if ((rc = pthread_create(&thread,
                      attr,
                      bg_thread,
                      (pthread_addr_t)NULL)) != 0) {
      err_printf("start_bg_debug_thread: pthread_create failed: %d\n", rc);
                return;
    }
    if ( rc = pthread_detach(&thread) != 0) {
                err_printf("start_bd_debug_thread: pthread_detach failed %d\n", rc);
                return;
    }
}



/* client_status_report:
 * mainly copied from bg_thread
 */
void *client_status_report(int fileno)
{
    static struct timespec time_wait = {60, 0};

    total_tran_count_t tran_ct;
    tran_info_t  *curP;
    struct timeval cur_time;
    struct timezone tz;
    char   buf[1024], cmd='\0';
    int    i, cnt=0;

    /* a loop for communication with tpcc_monitor */
    while ( cmd != 'q' ) {
      struct timeval cur_time;
      struct timeval user_time={0,0}, sys_time={0,0};
      struct timezone tz;
                int num_threads, num_threadsInit;

      memset(&tran_ct, 0, sizeof(tran_ct));

        /* read next cmd from the socket */
                  read(fileno, buf, 1);
                  cmd = buf[0];
                  /* DPRINT(("%c\n",cmd));  */
                  if (cmd=='q') {
                            break;
                  }

                  check_threads(&tran_ct, &num_threads, &num_threadsInit);
                  gettimeofday(&cur_time, &tz);
#ifdef GET_CLIENT_USAGE
          getUserSysTime(&user_time, &sys_time);
#endif

                  /* The tpcc_monitor has to read the data in the same order
```

```
        * to get the correct data.
        */
                prix_sprintf(buf,"\n");
                write(fileno,buf,strlen(buf));
                sprintf(buf, "%d %d %d %d %d\n",
                        cur_time.tv_sec, cur_time.tv_usec,
                        tran_ct.tran[NEWO_TRANS].num-tran_ct.tran[NEWO_TRANS].errs,
                        tran_ct.errors, num_threads, num_threadsInit);
                write(fileno, buf, strlen(buf));
                sprintf(buf, "%d %d %d %d\n", user_time.tv_sec,user_time.tv_usec,
                                sys_time.tv_sec, sys_time.tv_usec);
                write(fileno, buf, strlen(buf));
        for (i=0, curP=tran_ct.tran; i<=MAX_TRAN_TYPE; i++, curP++) {
                        if (i==0) continue;
            sprintf(buf, "%d %d %d %.3f %.3f\n",
              i, curP->RTtotal, curP->errs, curP->RTtotal[0],
              curP->RTtotal[1]);
            write(fileno, buf, strlen(buf));
                }
                write(fileno, ENDMSG, strlen(ENDMSG));

  }
}

/* for AIX only */
void getUserSysTime(struct timeval *user_time, struct timeval *sys_time)
{
#if defined(AIX)
  struct rusage rubuff;

  if (getrusage(RUSAGE_SELF,&rubuff) == 0) {
                user_time->tv_sec = rubuff.ru_utime.tv_sec;
      user_time->tv_usec = rubuff.ru_utime.tv_usec;

      sys_time->tv_sec = rubuff.ru_stime.tv_sec;
      sys_time->tv_usec = rubuff.ru_stime.tv_usec;

  } else {
      user_time->tv_sec = user_time->tv_usec = 0;
      sys_time->tv_sec = sys_time->tv_usec = 0;
  }
#elif defined(solaris)
  /* WARNING: not test it yet */
  struct tms t;
  static long ticks = 0;
  register long n;

  if (ticks == 0) ticks = sysconf(_SC_CLK_TCK);

  (void)times(&t);

  user_time->tv_sec = t.tms_utime / ticks;
  user_time->tv_usec = (t.tms_utime % ticks) * 1000000 / ticks;

  sys_time->tv_sec = t.tms_stime / ticks;
  sys_time->tv_usec = (t.tms_stime % ticks) * 1000000 / ticks;
#else
  user_time->tv_sec = 0;
  user_time->tv_usec = 1000;

  sys_time->tv_sec = 0;
  sys_time->tv_usec = 1000;
#endif

}

#ifdef WEB_TPCC_CLIENT
extern void getStatsForm(char* outBufP, char* rawStatsP, int interval);

int web_client_status(char* szFormP, int cmd, int interval)
{
  total_tran_count_t tran_ct;
  tran_info_t *curP;
  struct timeval cur_time;
  struct timezone tz;
  int i, cnt=0;
  int num_threads, num_threadsInit;
  char *statusP;
  char tempP[512];

  if(cmd==1)
              statusP = szFormP;
  else
              statusP = tempP;

  *statusP = '\0';
  memset(&tran_ct, 0, sizeof(tran_ct));

  if(cmd == 2) /* quit */
     return 1;

  check_threads(&tran_ct, &num_threads, &num_threadsInit);
  gettimeofday(&cur_time, &tz);

  prefix_sprintf(statusP,"\n");
  sprintf(statusP+strlen(statusP), "%d %d %d %d %d %d\n", cur_time.tv_sec,
        cur_time.tv_usec,
        tran_ct.tran[NEWO_TRANS].num-tran_ct.tran[NEWO_TRANS].errs,
              tran_ct.errors,
              num_threads, num_threadsInit);
  sprintf(statusP+strlen(statusP), "0 0 0 0\n");
  for (i=0, curP=tran_ct.tran; i<=MAX_TRAN_TYPE; i++, curP++) {
     if (i==0) continue;
     sprintf(statusP+strlen(statusP), "%d %d %d %.3f %.3f\n",
              i, curP->RTcount, curP->errs, curP->RTtotal[0],
              curP->RTtotal[1]);
  }

  if(cmd != 1)
              getStatsForm(szFormP, statusP, interval);
  return 0;
}
#endif
```

## client_listen.c

```
/*
 *                  client_listen.c
 *
 * $Revision: 1.8 $
 * $Date: 1999/05/06 21:28:26 $
 * $Lo:              $
 *
 *
 * $TALog: client_listen.c,v $
 * Revision 1.8  1999/05/06  21:28:26  oz
 * - Removed all the .. from the includes
 * - Added -I.. to the makefiles instead
 * - Moved all the thread related code and connection
 *   selection to serverMon.c
 * [from r1.7 by delta oz-24309-TPCC-add-oracle8.1-code, r1.5]
 *
 * Revision 1.7  1999/01/29  20:16:32  wenjian
 * Change logprintf to err_printf
 * [from r1.6 by delta wenjian-23787-TPCC-integrate-code-for-AIX-and-NT, r1.7]
 *
 * Revision 1.6  1998/11/09  16:59:36  wenjian
 * In this revision, most of the changes are related to the directory of header
 * files after directory reorganization. Other changes include adding or removing
 * files to put them in the right directories. Makefiles are written for NT
 * platform so that nmake is working on NT now. Need a top level Makefile for all
 * the directories.
 * [from r1.5 by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.2]
 *
 * Revision 1.5  1998/11/09  14:48:14  wenjian
 * In an effort to make a new directory structure for TPCC, this delta
 * creates two directories: tpcc/client and tpcc/server. All the files
 * for this revision are copied from tpcc/sp-tpcc without any change.
 * Further change may be needed for some files due to the change of
 * the directory structure.
 * [added by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.1]
 *
 * Revision 1.30  1998/09/26  10:56:25  oz
 * - renamed thread_init and thread_done to clnt_thread_init and
 *   clnt_thread_done respectively because of name conflicts on AIX4.3
 * [from r1.22 by delta oz-23339-TPCC-update-for-NT, r1.2]
 *
 * Revision 1.22  1998/08/18  14:38:38  wenjian
 * Minor change
 * [from r1.18 by delta wenjian-21750-TPCC-changes-for-porting-on-NT, r1.4]
 *
 * Revision 1.18  1998/04/29  19:47:41  wenjian
 * - Use fd instead of stream on NT
 * - Add code to consider tpcc_monitor as a special client login
 * - Use TRY and CATCH_ALL to deal with exceptions
 * [from r1.17 by delta wenjian-22495-TPCC-add-new-feature-to-monitor-tpcc-clients, r1.1]
 *
 * Revision 1.17  1998/02/17  22:13:28  wenjian
 * [merge of changes from 1.14 to 1.15 into 1.16]
 *
 * Revision 1.15  1998/02/17  16:04:41  oz
 * - Split the login into two parts to allow for special logins
 * - If the warehouse ID is 0, this is a special login to
 *   query the client for status
 *
 * - First, login
 *   If the w_id is bigger than 0: normal thread.
 *   Otherwise, call client_report.
 * [from r1.14 by delta oz-21864-TPCC-split-client-login-screen, r1.1]
 *
 * Revision 1.16  1998/02/17  22:06:59  wenjian
 * Add head files and define macros for win32
 * [from r1.14 by delta wenjian-21750-TPCC-changes-for-porting-on-NT, r1.1]
 *
 * Revision 1.14  1998/01/28  22:24:48  oz
 * [from r1.13 by delta oz-20774-TPCC-update-to-latest-SP-version-11-27, r1.4]
 *
 * Revision 1.13  1998/01/26  16:19:22  oz
 * - moved all the code pertaining to the background
 *   thread to its own file and all the data structures
 *   to client_utils.h
 * [from r1.12 by delta oz-21689-TPCC-move-client-bg-thread-to-separate-file, r1.1]
 *
 * Revision 1.12  1998/01/24  14:17:04  oz
 * - User server name to identify server and name delivery file
 * - Use env variable HOME instead of /home/encina if HOME is set
 *
```

```
* - Print the thread ID on thread exit as well
* [from r1.11 by delta oz-21687-TPCC-use-server-name-to-identify-process, r1.1]
*
* Revision 1.11  1998/01/23  15:07:44  oz
* - Updated the SP TPCC directory to the latest files used
*   during the SP tpcc audit.
* [from r1.10 by delta oz-20774-TPCC-update-to-latest-SP-version-11-27, r1.1]
*
*
*  Exported functions:
*                make_connections
*
*  Private functions:
*                process_terminal
*
*
*/

/*   client_listen.c
*                Code in the client that listens for requests from the
*                terminal processes and submits them for processing.
*
*                There is one listening function: make_connection.
*                That function calls cnm_ManageConnection which never returns
*                and so it is best to call it in its own independent thread.
*
*                As soon as cnm_ManageConnections receives a connection it
*  starts a new thread and calls process_terminal in that
*  thread passing in the file descriptor for the new connection.
*
*                Note that the client does not need to know in advance how many
*                terminals it will talk to.
*
*                The function process_terminal reads initializes the thread
*  and then calls client_init to process all the requests from
*  that terminal.
*/


#include <stdlib.h>
#ifdef WIN32
#include <io.h>
#endif
#include <stdio.h>
#include <sys/types.h>
#include <tc/tc.h>
#include "common/do_tpcc.h"
#include "common/tpcc_type.h"

#if defined (solaris)
#include <dce/pthread.h>
#else   /* solaris */
#include <pthread.h>
#endif  /* solaris */

#include "client_utils.h"
#ifdef WIN32
#include "cnm.h"
#else
#include <cnm/cnm.h>
#endif

#ifdef WIN32
#define         close           _close
#define         fileno          _fileno
#endif
/*
*  State about the terminal stored by the terminal thread
*  work_entry: The work entry to be used by this terminal thread.
*/
typedef struct {
   int profiling;
   int terminal_id;
   void *handle_contextP;
} terminal_context_t;

/**
**  Function Prototypes
**/
static void process_terminal(cnm_arg_t *argP);

extern void client_init(int, int, int, int, void *);
extern void client_login(int, int, int *, int *);

/*
*  process_terminal
*
*                The argument we get is a file descriptor for a terminal
*                process.  We read from that file to receive input and send
*                output back to that file.
*/
static void process_terminal(cnm_arg_t *argP)
{
   int w_id, d_id;
   terminal_context_t terminal_context;
   tpcc_data_t tran_data;
   int fdIn;
   pthread_t thread = pthread_self();
   int thread_id = pthread_getunique_np(&thread);
   struct timespec rand_sleep;
#if defined(_AIX)
   tid_t tid = thread_self();
#else
   int tid = thread_id;
#endif

#ifdef WIN32
   fdIn = argP->fd;
#else
   fdIn = fileno(argP->stream);
#endif /* WIN32 */

   /*
    *  Default terminal context
    *  This may be updated later by the terminal
    */
   terminal_context.terminal_id = -1;
   terminal_context.profiling = 0;

   TRY {
      client_login(fdIn, fdIn, &w_id, &d_id);
      if (w_id > 0) {
         /*  Initialize the server handle and other thread structures  */
         terminal_context.handle_contextP = (void *)clnt_thread_init();

         err_printf("Tid: %d (0x%x) w_id %d, d_id %d\n", tid, tid, w_id, d_id);
                  client_init(fdIn, fdIn, w_id, d_id, terminal_context.handle_contextP);
                  err_printf("Thread done - Tid %d (0x%x)\n", tid, tid);
                  clnt_thread_done(terminal_context.handle_contextP);
      } else {
                  err_printf("Starting Auxiliary Thread, Tid %d (0x%x)\n", tid, tid);
                  client_status_report(fdIn);
                  err_printf("End of Auxiliary Thread, Tid %d (0x%x)\n", tid, tid);
      }
   } CATCH_ALL {
                err_printf("An exception happened\n");
                logprintf("End of Auxiliary Thread, Tid %d (0x%x)\n", tid, tid);
   }
   ENDTRY

   close(fdIn);
}

/*
 *  make_connections
 *
 *   Listen for connections on a socket.
 *   Whenever a connection is made, start a thread to talk
 *   to the terminal.
 *                This functions is spawned on its own thread.
 */
void make_connections(argP)
  void *argP;
{
   int port = (int)argP;
   char port_descr[28];
   int rc;

   DPRINT((("Using socket %d\n", port));
   err_printf("Using thread stack size default\n");
   sprintf(port_descr, "ncacn_ip_tcp[%d]", port);
   rc = cnm_ManageConnections(port_descr,
                                                (cnm_userRountine_t)process_terminal,
                                                NULL,
                                                0,          /*  Max Connections  */
                                                1);   /*  Spawn threads   */
   err_printf("cnm_ManageConnections returned %d\n", rc);
}
```

## client_listen.h

```
/*
*                client_listen.h
*
* $Revision: 1.5 $
* $Date: 1998/11/09 14:48:14 $
* $Log:           $
*
*
* $TALog: client_listen.h,v $
* Revision 1.5  1998/11/09  14:48:14  wenjian
* In an effort to make a new directory structure for TPCC, this delta
* creates two directories: tpcc/client and tpcc/server. All the files
* for this revision are copied from tpcc/sp-tpcc without any change.
* Further change may be needed for some files due to the change of
* the directory structure.
* [added by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.1]
*
* Revision 1.1  1997/04/20  11:57:55  oz
* - This is the code base modified at IBM Poughkeepsie
*   by Ofer Zajicek and Radha Sivaramakrishnan for the
*   SP scaling test for TPCC.
* [added by delta oz-19782-TPCC-add-ibm-sp-code, r1.1]
*
* Revision 1.1  1995/07/09  18:12:10  oz
* - Modified the client side of the TPCC benchmark to have multithreaded
*   clients.  There is a terminal process for each terminal -- when
*   not using the terminal emulator each terminal process emulates one
```

```
 *   terminal.  The terminal processes communication with the client
 *   process using a unix socket.
 *
 *   On the client side there is a thread for each terminal process.
 *   That thread receives the request from the terminal and puts it on
 *   a queue.  There is one processing thread that dequeues the requests
 *   and sends them to the server for processing.
 * [added by delta oz-15875-TPCC-reduce-the-number-of-clients, r1.1]
 *
 *
 *
 */

/*   client_listen.h
 */

#ifndef TPCC_CLIENT_LISTEN_H
#define TPCC_CLIENT_LISTEN_H


void make_connections(void *argP);

#endif /* TPCC_CLIENT_LISTEN_H */
```

## client_main.c

```
#include "string.h"
#include "tpcc.h"

extern void client_init(int infd, int outfd, int w_id, int d_id, void *conP);
extern void client_login(int infd, int outfd, int *w_idP, int *d_idP);

main()
{
    int w_id, d_id;
    client_login(0, 1, &w_id, &d_id);
    client_init(0, 1, w_id, d_id, (void *)0);
}


int send_new_order(void *contextP, NewOrder_data *data) {
    int             i;

    data->s_W_ID = 11;
    data->s_D_ID = 22;
    data->s_C_ID = 3333;
    strcpy((char *)data->s_C_LAST, "1234567890123456");
    strcpy((char *)data->s_C_CREDIT, "BC");
    data->s_C_DISCOUNT = 0.1556;
    data->s_O_ID = 4444;
    strcpy((char *)data->s_O_ENTRY_D, "1992-10-2 12:33:11");
    strcpy((char *)data->s_status_line, "1234567890123456789012 34");
    data->s_total_amount = 12.98;
    data->s_transtatus = 0;
    data->s_W_TAX = 0.1234;
    data->s_D_TAX = 0.5678;

    for (i=0; i < data->s_O_OL_CNT; i++) {
                strcpy((char *)data->item[i].s_I_NAME, "1234567890123456789012 34");
                data->item[i].s_S_QUANTITY = i + 1;
                data->item[i].s_brand_generic[0] = 'B';
                data->item[i].s_I_PRICE = i + 1;
                data->item[i].s_OL_AMOUNT = i + 1;
    }
    return 0;
}

int send_payment(void *contextP, Payment_data *data) {
    data->s_W_ID = 11;
    data->s_D_ID = 22;
    data->s_C_ID = 3333;
    data->s_C_W_ID = 44;
    data->s_C_D_ID = 55;
    data->s_H_AMOUNT = 9.55;
    strcpy((char *)data->s_W_STREET_1, "12345678901234567890");
    strcpy((char *)data->s_W_STREET_2, "12345678901234567890");
    strcpy((char *)data->s_W_CITY, "12345678901234567890");
    strcpy((char *)data->s_W_STATE, "PR");
    strcpy((char *)data->s_W_ZIP, "123456789");
    strcpy((char *)data->s_D_STREET_1, "12345678901234567890");
    strcpy((char *)data->s_D_STREET_2, "12345678901234567890");
    strcpy((char *)data->s_D_CITY, "12345678901234567890");
    strcpy((char *)data->s_D_STATE, "PR");
    strcpy((char *)data->s_D_ZIP, "123456789");
    strcpy((char *)data->s_C_FIRST, "1234567890123456");
    strcpy((char *)data->s_C_MIDDLE, "12");
    strcpy((char *)data->s_C_LAST, "1234567890123456");
    strcpy((char *)data->s_C_STREET_1, "12345678901234567890");
    strcpy((char *)data->s_C_STREET_2, "12345678901234567890");
    strcpy((char *)data->s_C_CITY, "12345678901234567890");
    strcpy((char *)data->s_C_STATE, "PR");
    strcpy((char *)data->s_C_ZIP, "123456789");
    strcpy((char *)data->s_C_PHONE, "1234567890123456");
    strcpy((char *)data->s_C_SINCE, "1992-23-22 21:11:11");
    strcpy((char *)data->s_H_DATE, "1992-10-2 12:33:11");
    strcpy((char *)data->s_C_CREDIT, "BC");
    data->s_C_CREDIT_LIM = 5000;
    data->s_C_DISCOUNT = 0.10;
    data->s_C_BALANCE = 122.10;
    strcpy((char *)data->s_C_DATA,
"1234567890123456789012345678901234567890123456789012345678901234567890");
    return 0;
}

int send_order_status(void *contextP, OrderStatus_data *data) {
    int             i;

    data->s_W_ID = 11;
    data->s_D_ID = 22;
    data->s_C_ID = 3333;
    strcpy((char *)data->s_C_FIRST, "1234567890123456");
    strcpy((char *)data->s_C_MIDDLE, "12");
    strcpy((char *)data->s_C_LAST, "1234567890123456");
    data->s_C_BALANCE = 122.10;
    data->s_O_ID = 44;
    strcpy((char *)data->s_O_ENTRY_D,"1992-10-2 12:33:11");
    data->s_O_CARRIER_ID = 55;
    data->s_ol_cnt = 10;

    for (i=0; i < data->s_ol_cnt; i++) {
                data->item[i].s_OL_SUPPLY_W_ID = i + 1;
                data->item[i].s_OL_I_ID = i + 1;
                data->item[i].s_OL_QUANTITY = i + 1;
                data->item[i].s_OL_AMOUNT = i + 1;
                strcpy((char *)data->item[i].s_OL_DELIVERY_D, "1992-10-2 12:33:11");
    }
    return 0;
}

int send_delivery(void *contextP, Delivery_data *data) {
    strcpy((char *)data->s_exec_status, "Delivery has been queued");
    return 0;
}

int send_stock_level(void *contextP, StockLevel_data *data) {
    data->s_low_stock = 22;
    return 0;
}
```

## client_utils.c

```
/*
 *
 *                  client_utils.c
 *
 * $Revision: 1.9 $
 * $Date: 1999/05/06 21:28:26 $
 * $Log:          $
 *
 *
 *
 *
 * $TALog: client_utils.c,v $
 * Revision 1.9  1999/05/06  21:28:26  oz
 * - Removed all the .. from the includes
 * - Added -I.. to the makefiles instead
 * - Moved all the thread related code and connection
 *   selection to serverMon.c
 * [from r1.7 by delta oz-24309-TPCC-add-oracle8.1-code, r1.5]
 *
 * Revision 1.7  1998/12/11  16:37:57  wenjian
 * Move some common functions from client/client_utils.c to common/tpcc_utils.c.
 * In this version, we only move time_diff_ms(). Need some work in order to
 * move other functions like ERROUT.
 *
 * - Move time_diff_ms() to common/tpcc_utils.c
 * [from r1.6 by delta wenjian-23788-TPCC-use-single-stats-var-for-each-client-and-server, r1.2]
 *
 * Revision 1.6  1998/11/09  16:59:36  wenjian
 * In this revision, most of the changes are related to the directory of header
 * files after directory reorganization. Other changes include adding or removing
 * files to put them in the right directories. Makefiles are written for NT
 * platform so that nmake is working on NT now. Need a top level Makefile for all
 * the directories.
 * [from r1.5 by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.2]
 *
 * Revision 1.5  1998/11/09  14:48:14  wenjian
 * In an effort to make a new directory structure for TPCC, this delta
 * creates two directories: tpcc/client and tpcc/server. All the files
 * for this revision are copied from tpcc/sp-tpcc without any change.
 * Further change may be needed for some files due to the change of
 * the directory structure.
 * [added by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.1]
 *
 * Revision 1.9  1998/10/08  14:18:00  dongfeng
 * Add codes for doing web-based tpcc.
 * [from r1.7 by delta dongfeng-23067-TPCC-add-web-based-tpcc-client, r1.1]
 *
 * Revision 1.7  1998/04/29  19:47:42  wenjian
 * - Add prefix_sprintf
 * - Remove ENCINA_C_CALLING_CONVENTION from err_printf
 * [from r1.6 by delta wenjian-22495-TPCC-add-new-feature-to-monitor-tpcc-clients, r1.1]
 *
 * Revision 1.6  1998/02/17  22:07:00  wenjian
 * Minor changes for NT
```

```
* [from r1.5 by delta wenjian-21750-TPCC-changes-for-porting-on-NT, r1.1]
*
* Revision 1.5  1998/01/24  14:17:04  oz
* - User server name to identify server and name delivery file
* - Use env variable HOME instead of /home/encina if HOME is set
*
* - Flush the logfile after each write
* [from r1.4 by delta oz-21687-TPCC-use-server-name-to-identify-process, r1.1]
*
* Revision 1.4  1998/01/23  15:07:46  oz
* - Updated the SP TPCC directory to the latest files used
*   during the SP tpcc audit.
* [from r1.3 by delta oz-20774-TPCC-update-to-latest-SP-version-11-27, r1.1]
*
*
*    client_utils.c
*                Generic utilities used by the client processes
*/

#include <stdio.h>
#include <time.h>
#include <string.h>
#include <stdarg.h>

#if defined (solaris)
#include <dce/pthread.h>
#else   /* solaris */
#include <pthread.h>
#endif

#include "common/databuf.h"
#include "client_utils.h"
#include "common/do_tpcc.h"
#include "common/tpcc_type.h"


#define CASE(a) case a: retVal = #a; break

int print_thread_id = 1;
extern int user_id;
extern char *user_code;
/*
 *  Translate the tpcc return code to a string value
 */
static char *TpccRcToStr(rc)
  tpcc_rc_t rc;
{
   char *retVal;
   switch (rc) {
                CASE(INVALID_NEWO);
                CASE(INVALID_HANDLE);
                CASE(SQL_ERROR);
                CASE(TRPC_ERROR);
                CASE(DCE_ERROR);
                CASE(NO_SUCH_LAST_NAME);
                CASE(INVALID_TRAN_TYPE);
                CASE(TPCC_ERROR_BEGIN_NEWO);
                CASE(TPCC_ERROR_DECL_NEWO_SEL_ITEM);
                CASE(TPCC_ERROR_OPEN_NEWO_SEL_ITEM);
                CASE(TPCC_ERROR_OPEN_DIST_NEWO_SEL_ITEM);
                CASE(TPCC_ERROR_FETCH_NEWO_SEL_ITEM);
                CASE(TPCC_ERROR_FETCH_DIST_NEWO_SEL_ITEM);
                CASE(TPCC_ERROR_PREP_NEWO_SEL_STCK);
                CASE(TPCC_ERROR_DECL_NEWO_SEL_STCK);
                CASE(TPCC_ERROR_OPEN_NEWO_SEL_STCK);
                CASE(TPCC_ERROR_OPEN_DIST_NEWO_SEL_STCK);
                CASE(TPCC_ERROR_FETCH_NEWO_SEL_STCK);
                CASE(TPCC_ERROR_FETCH_DIST_NEWO_SEL_STCK);
                CASE(TPCC_ERROR_NEWO_SELECT);
                CASE(TPCC_ERROR_NEWO_UPD_STCK);
                CASE(TPCC_ERROR_DIST_NEWO_UPD_STCK);
                CASE(TPCC_ERROR_NEWO_SELECT_2);
                CASE(TPCC_ERROR_DECL_NEWO_SEL_CUST);
                CASE(TPCC_ERROR_OPEN_NEWO_SEL_CUST);
                CASE(TPCC_ERROR_OPEN_DIST_NEWO_SEL_CUST);
                CASE(TPCC_ERROR_FETCH_NEWO_SEL_CUST);
                CASE(TPCC_ERROR_FETCH_DIST_NEWO_SEL_CUST);
                CASE(TPCC_ERROR_DECL_NEWO_SEL_DIST);
                CASE(TPCC_ERROR_OPEN_NEWO_SEL_DIST);
                CASE(TPCC_ERROR_OPEN_DIST_NEWO_SEL_DIST);
                CASE(TPCC_ERROR_FETCH_NEWO_SEL_DIST);
                CASE(TPCC_ERROR_FETCH_DIST_NEWO_SEL_DIST);
                CASE(TPCC_ERROR_PREP_NEWO_INS_OL);
                CASE(TPCC_ERROR_DECL_NEWO_INS_OL);
                CASE(TPCC_ERROR_OPEN_NEWO_INS_OL);
                CASE(TPCC_ERROR_OPEN_DIST_NEWO_INS_OL);
                CASE(TPCC_ERROR_PUT_NEWO_INS_OL);
                CASE(TPCC_ERROR_PUT_DIST_NEWO_INS_OL);
                CASE(TPCC_ERROR_DECL_NEWO_SEL_WARE);
                CASE(TPCC_ERROR_OPEN_NEWO_SEL_WARE);
                CASE(TPCC_ERROR_OPEN_DIST_NEWO_SEL_WARE);
                CASE(TPCC_ERROR_FETCH_NEWO_SEL_WARE);
                CASE(TPCC_ERROR_FETCH_DIST_NEWO_SEL_WARE);
                CASE(TPCC_ERROR_EXECUTE_NEWO_UPD_INS);
                CASE(TPCC_ERROR_UPDATE_NEWO_NEXT_OID);
                CASE(TPCC_ERROR_PREP_NEWO_INS);
                CASE(TPCC_ERROR_EXECUTE_DIST_NEWO_INS);
                CASE(TPCC_ERROR_EXECUTE_NEWO_COMMIT);
                CASE(TPCC_ERROR_ROLLBACK_NEWO);
                CASE(TPCC_ERROR_REMOTE_OL_SELECT);
                CASE(TPCC_ERROR_REMOTE_OL_UPDATE);
                CASE(TPCC_ERROR_OPEN_ORDS_CNT_CID);
                CASE(TPCC_ERROR_FETCH_ORDS_CNT_CID);
                CASE(TPCC_ERROR_OPEN_ORDS_SEL_CLAST);
                CASE(TPCC_ERROR_FETCH_ORDS_SEL_CLAST);
                CASE(TPCC_ERROR_OPEN_ORDS_SEL_CID);
                CASE(TPCC_ERROR_FETCH_ORDS_SEL_CID);
                CASE(TPCC_ERROR_OPEN_ORDS_SEL_OLDORD);
                CASE(TPCC_ERROR_FETCH_ORDS_OLDORD);
                CASE(TPCC_ERROR_OPEN_ORDS_SEL_OL);
                CASE(TPCC_ERROR_FETCH_ORDS_SEL_OL);
                CASE(TPCC_ERROR_EXECUTE_ORDS_COMMIT);
                CASE(TPCC_ERROR_OPEN_DELIVERY_OLDEST_OID);
                CASE(TPCC_ERROR_FETCH_DELIVERY_OLDEST_OID);
                CASE(TPCC_ERROR_EXECUTE_DELIVERY_COMMIT);
                CASE(TPCC_ERROR_OPEN_DELIVERY_SEL_ORD);
                CASE(TPCC_ERROR_FETCH_DELIVERY_SEL_ORD);
                CASE(TPCC_ERROR_OPEN_DELIVERY_SEL_SUM_OL);
                CASE(TPCC_ERROR_FETCH_DELIVERY_SEL_SUM_OL);
                CASE(TPCC_ERROR_EXECUTE_DELIVERY_EXEC_DVRY);
                CASE(TPCC_ERROR_SELECT_DELIVERY_ORDER_ID);
                CASE(TPCC_ERROR_SELECT_DELIVERY_CARRIER_ID);
                CASE(TPCC_ERROR_SELECT_DELIVERY_BALANCE);
                CASE(TPCC_ERROR_OPEN_STOCKLEVEL_SEL_OID);
                CASE(TPCC_ERROR_FETCH_STOCKLEVEL_SEL_OID);
                CASE(TPCC_ERROR_OPEN_STOCKLEVEL_CNT_SID);
                CASE(TPCC_ERROR_FETCH_STOCKLEVEL_CNT_SID);
                CASE(TPCC_ERROR_OPEN_STOCKLEVEL_FIND);
                CASE(TPCC_ERROR_FETCH_STOCKLEVEL_FIND);
                CASE(TPCC_ERROR_EXECUTE_STOCKLEVEL_COMMIT);
                CASE(TPCC_ERROR_OPEN_PAYMENT_CNT_CID);
                CASE(TPCC_ERROR_FETCH_PAYMENT_CNT_CID);
                CASE(TPCC_ERROR_OPEN_PAYMENT_SEL_CLAST);
                CASE(TPCC_ERROR_FETCH_PAYMENT_SEL_CLAST);
                CASE(TPCC_ERROR_OPEN_PAYMENT_SEL_CID);
                CASE(TPCC_ERROR_FETCH_PAYMENT_SEL_CID);
                CASE(TPCC_ERROR_DECL_PAYMENT_SEL_DIST);
                CASE(TPCC_ERROR_OPEN_PAYMENT_SEL_DIST);
                CASE(TPCC_ERROR_OPEN_DIST_PAYMENT_SEL_DIST);
                CASE(TPCC_ERROR_FETCH_PAYMENT_SEL_DIST);
                CASE(TPCC_ERROR_FETCH_DIST_PAYMENT_SEL_DIST);
                CASE(TPCC_ERROR_DECL_PAYMENT_SEL_WARE);
                CASE(TPCC_ERROR_OPEN_PAYMENT_SEL_WARE);
                CASE(TPCC_ERROR_OPEN_DIST_PAYMENT_SEL_WARE);
                CASE(TPCC_ERROR_FETCH_PAYMENT_SEL_WARE);
                CASE(TPCC_ERROR_FETCH_DIST_PAYMENT_SEL_WARE);
                CASE(TPCC_ERROR_EXECUTE_PAYMENT_UPD_CUST_LAST);
                CASE(TPCC_ERROR_EXECUTE_PAYMENT_UPD_CUST_ID);
                CASE(TPCC_ERROR_COMMIT_PAYMENT_UPD_CUST);
                CASE(TPCC_ERROR_SELECT_PAYMENT_W_YTD);
                CASE(TPCC_ERROR_SELECT_PAYMENT_D_YTD);
                CASE(TPCC_ERROR_BEGIN_PAYMENT);
                CASE(TPCC_ERROR_EXECUTE_PAYMENT_COMMIT);
    default: retVal = "-Unknown-"; break;
   }
   return(retVal);
}

/*
 *  get_thread_id
 *      A function that returns the thread ID of the current thread
 */
int get_thread_id()
{
#ifdef WEB_TPCC_CLIENT
   return(GetCurrentThreadId());
#else
   pthread_t thread = pthread_self();
   int thread_id = pthread_getunique_np(&thread);
   return(thread_id);
#endif
}

#define A_CASE(a,b)  case a: retVal = b; break
/*
 *  Translate the transaction code to its name - for formatting
 */
char *clientUtils_TranCodeToName(type)
  int type;
{
   char *retVal = "-Unknown-";
   switch (type) {
                A_CASE(NEWO_TRANS,       "NEWOR");
                A_CASE(PAYMENT_TRANS,    "PAYMN");
                A_CASE(ORDER_STAT_TRANS, "ORDER");
                A_CASE(DELIVERY_TRANS,   "DELIV");
                A_CASE(STOCK_TRANS,      "STOCK");
   }
   return(retVal);
}

/*
 *  Print the return status of a TPCC transaction
 *  and the corresponding SQL codes and ISAM codes
 */
void clientUtils_ReportReturn(msg, statusP)
  char *msg;
  data_header *statusP;
```

```
{
  switch (statusP->returncode) {
   case SUCCESS_CODE:
                err_printf( "After %s, rc = %d\n", msg, statusP->returncode);
                break;
   case SQL_ERROR:
                err_printf("ERROR: After %s, rc = SQL_ERROR, SQL=%d, ISAM=%d\n", msg,
                                statusP->sql_code,
                                statusP->isam_code);
                break;
   case INVALID_NEWO:
                err_printf("After %s, rc = INVALID_NEWO\n", msg);
                break;
   case DCE_ERROR:
                err_printf("ERROR: After %s, rc = DCE_ERROR\n", msg);
                break;
   case TRPC_ERROR:
                err_printf("ERROR: After %s, rc = TRPC_ERROR\n", msg);
                break;
   case NO_SUCH_LAST_NAME:
                err_printf("After %s, rc = NO_SUCH_LAST_NAME.\n", msg);
                break;
   case DISTRIBUTED_TRAN_FAILED:
                err_printf("After %s, rc = DISTRIBUTED_TRAN_FAILED.\n", msg);
                break;
   default:
                err_printf("ERROR: After %s, rc = %s (%d), SQL=%d, ISAM=%d\n", msg,
                                TpccRcToStr(statusP->returncode),
                                statusP->returncode,
                                statusP->sql_code, statusP->isam_code);
                break;
  }
}



/*
 *  clientUtils_SetReturnCode
 *
 *  Set the return code in the dataP union.
 *  dataP is a pointer to a union of all the transaction types.
 *  Each member of the union has a header field that contains
 *  a return code.  Set the returncode value of the header field
 *  for dataP to be code.
 */
void clientUtils_SetReturnCode(dataP, code)
   tpcc_data_t *dataP;
   tpcc_rc_t code;
{
  switch (dataP->tran_type) {
   case NEWO_TRANS: {
                newOrder_data_t *ptr = &dataP->data.new_order;
                ptr->header.returncode = code;
                break;
   }
   case PAYMENT_TRANS: {
                payment_data_t *ptr = &dataP->data.payment;
                ptr->header.returncode = code;
                break;
   }
   case ORDER_STAT_TRANS: {
                orderStatus_data_t *ptr = &dataP->data.order_status;
                ptr->header.returncode = code;
                break;
   }
   case DELIVERY_TRANS: {
                delivery_data_t *ptr = &dataP->data.delivery;
                ptr->header.returncode = code;
                break;
   }
   case STOCK_TRANS: {
                stockLevel_data_t *ptr = &dataP->data.stock_level;
                ptr->header.returncode = code;
                break;
   }
  }
}

/*
 *  get_prefix
 *              Format the output prefix for printing:
 *              It contains the user_id, 'C' or 'T' depending on whether it
 *              is a terminal or a client and optional a thread identifier
 *              The prefix is written in the buffer passed in by the caller.
 */
void get_prefix(buffer)
 char *buffer;
{
  if (print_thread_id) {
                int thread_id = get_thread_id();
                sprintf(buffer,  "%s(%d-%s-%d)%s",
                                user_id < 10 ? "  " : user_id < 100 ? " " : "",
                                user_id,
                                user_code,
                                thread_id,
                                thread_id < 10 ? " " : "");
  } else {
                sprintf(buffer,  "%s(%2d-%s)",
                                user_id < 10 ? " " : "", user_id, user_code);
  }
  }

/*
 * err_printf
 *      A var-arg function that appends the current time and
 *      other data to the print request and sends it to stderr
 *      if it is not a web client, to a file if it is
 */
void err_printf(char *format, ...)
{
   time_t cur_timet;
   char time_str[30];
   char line_prefix[50];
   va_list ap;

   va_start(ap, format);

   cur_timet = time(&cur_timet);
   strftime(time_str, 29, "%X", localtime(&cur_timet));

   get_prefix(line_prefix);

   fprintf(ERROUT, "%s %s - ", line_prefix, time_str);
   vfprintf(ERROUT, format, ap);
#ifdef WEB_TPCC_CLIENT
   fflush(ERROUT);
#endif

   va_end(ap);
}

/*
 * logprintf
 *      A var-arg function that prints both to standard error to to
 *      the log file.  It prepends every line with the current time
 *      and the user id.
 */
void logprintf( char *format, ...)
{
   time_t cur_timet;
   char time_str[30];
   char line_prefix[50];
   va_list ap;

   va_start(ap, format);

   cur_timet = time(&cur_timet);
   strftime(time_str, 29, "%X", localtime(&cur_timet));

   get_prefix(line_prefix);

   fprintf(logtpcc ? logtpcc : ERROUT, "%s %s - ", line_prefix, time_str);
   vfprintf(logtpcc ? logtpcc : ERROUT, format, ap);
   if (logtpcc)
      fflush(logtpcc);

   if (debug && logtpcc) {
      fprintf(ERROUT, "%s %s - ", line_prefix, time_str);
      vfprintf(ERROUT, format, ap);
   }

   va_end(ap);
}

void prefix_sprintf(char *buf, char *format, ...)
{
   time_t cur_timet;
   char time_str[30];
   char line_prefix[50];
   char info[256];
   va_list ap;

   va_start(ap, format);

   cur_timet = time(&cur_timet);
   strftime(time_str, 29, "%X", localtime(&cur_timet));

   get_prefix(line_prefix);

   sprintf(buf, "%s %s - ", line_prefix, time_str);
   vsprintf(info, format, ap);
   strcat(buf,info);

   va_end(ap);
}
```

## client_utils.h

```
/*
 *
 *                  client_utils.h
 *
 * $Revision: 1.11 $
 * $Date: 1999/05/06 21:28:26 $
 * $Log:        $
 *
 *
```

```
*
*
* $TALog: client_utils.h,v $
* Revision 1.11  1999/05/06  21:28:26  oz
* - Removed all the .. from the includes
* - Added -I.. to the makefiles instead
* - Moved all the thread related code and connection
*   selection to serverMon.c
* [from r1.8 by delta oz-24309-TPCC-add-oracle8.1-code, r1.5]
*
* Revision 1.8  1998/12/14  20:27:54  wenjian
* Made corresponding changes due to data structure change of tran_info_t.
*
* - Change data structure tran_info_t
* [from r1.7 by delta wenjian-23788-TPCC-use-single-stats-var-for-each-client-and-server, r1.3]
*
* Revision 1.7  1998/12/11  16:14:19  wenjian
* Add code for checking statistic data in a single variable and collecting
* statistic data based on iStatsFrequency.
*
* - Add total_num_trans to tran_info_t;
* [from r1.6 by delta wenjian-23788-TPCC-use-single-stats-var-for-each-client-and-server, r1.1]
*
* Revision 1.6  1998/11/09  16:59:37  wenjian
* In this revision, most of the changes are related to the directory of header
* files after directory reorganization. Other changes include adding or removing
* files to put them in the right directories. Makefiles are written for NT
* platform so that nmake is working on NT now. Need a top level Makefile for all
* the directories.
* [from r1.5 by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.2]
*
* Revision 1.5  1998/11/09  14:48:15  wenjian
* In an effort to make a new directory structure for TPCC, this delta
* creates two directories: tpcc/client and tpcc/server. All the files
* for this revision are copied from tpcc/sp-tpcc without any change.
* Further change may be needed for some files due to the change of
* the directory structure.
* [added by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.1]
*
* Revision 1.4  1998/11/09  14:26:51  wenjian
* Change enc_status to a data structure that has fields:
*   - Status code
*   - Line Number
*   - File Name
*   - Encina Error Code
*   - Error Msg
* Remove statusMsgs in web_tpcc.c
*
* Add definition of enc_status_t
* [from r1.19 by delta dongfeng-23067-TPCC-add-web-based-tpcc-client, r1.6]
*
* Revision 1.19  1998/10/22  21:13:07  wenjian
* [merge of changes from 1.11 to 1.18 into 1.14]
*
* Revision 1.18  1998/10/22  19:18:32  dongfeng
* [from r1.17 by delta dongfeng-23067-TPCC-add-web-based-tpcc-client, r1.2]
*
* Revision 1.17  1998/10/08  14:18:00  dongfeng
* Add codes for doing web-based tpcc.
* [from r1.11 by delta dongfeng-23067-TPCC-add-web-based-tpcc-client, r1.1]
*
* Revision 1.14  1998/08/18  14:38:39  wenjian
* Minor change
* [from r1.13 by delta wenjian-21750-TPCC-changes-for-porting-on-NT, r1.4]
*
* Revision 1.13  1998/08/18  13:35:42  wenjian
* Remove NUM_NEXT_REPORTS since it is no use.
* [from r1.11 by delta wenjian-22495-TPCC-add-new-feature-to-monitor-tpcc-clients, r1.7]
*
* Revision 1.11  1998/06/17  15:28:51  wenjian
* Add 'double time' in struct total_tran_count_t.
* [from r1.10 by delta wenjian-22495-TPCC-add-new-feature-to-monitor-tpcc-clients, r1.2]
*
* Revision 1.10  1998/04/29  19:47:43  wenjian
* - Define ENDMSG marking the end of socket message between tpcc_client
*   and tpcc_monitor
* - Remove ENCINA_C_CALLING_CONVENTION from err_printf
* [from r1.9 by delta wenjian-22495-TPCC-add-new-feature-to-monitor-tpcc-clients, r1.1]
*
* Revision 1.9  1998/02/17  22:13:41  wenjian
* [merge of changes from 1.6 to 1.7 into 1.8]
*
* Revision 1.7  1998/02/17  16:04:41  oz
* - Split the login into two parts to allow for special logins
* - If the warehouse ID is 0, this is a special login to
*   query the client for status
* [from r1.6 by delta oz-21864-TPCC-split-client-login-screen, r1.1]
*
* Revision 1.8  1998/02/17  22:07:00  wenjian
* Minor changes for NT
* [from r1.6 by delta wenjian-21750-TPCC-changes-for-porting-on-NT, r1.1]
*
* Revision 1.6  1998/01/26  16:43:32  oz
* - Removed the code for collecting stats in the client
*   and dumping them before exit.
*
* - Removed timeP and time_allocated from thread_info_t
* [from r1.5 by delta oz-21691-TPCC-remove-client-stats-code, r1.1]
*
* Revision 1.5  1998/01/26  16:19:23  oz
* - moved all the code pertaining to the background
*   thread to its own file and all the data structures
*   to client_utils.h
* [from r1.4 by delta oz-21689-TPCC-move-client-bg-thread-to-separate-file, r1.1]
*
* Revision 1.4  1998/01/23  15:07:47  oz
* - Updated the SP TPCC directory to the latest files used
*   during the SP tpcc audit.
* [from r1.3 by delta oz-20774-TPCC-update-to-latest-SP-version-11-27, r1.1]
*
*
*    client_utils.h
*                Generic utilities used by the client processes
*/

#ifndef TPCC_CLIENT_UTILS_H
#define TPCC_CLIENT_UTILS_H

#include "common/tpcc_type.h"
#include <stdio.h>
#include <time.h>
#include <encina/encina.h>
#include "client.h"
#ifdef WIN32
#include <winsock.h>
#endif


/*
 *  err_printf
 *                Print a string to stderr after prefixing it with the client
 *                info and the current time.
 *  logprintf
 *                Prints as above to the log file.
 */
#ifdef WEB_TPCC_CLIENT
extern FILE * errtpcc;
#endif
extern FILE *logtpcc;
extern char log_file_name[];
extern void logprintf( char *format, ...);
extern void err_printf( char *format, ...);
extern void prefix_sprintf( char *buf, char *format, ...);

/*  tran_timing_t: for debug:
 *  Keep track of the timestamps of all the transactions
 *  and dump it out upon exit.  There is an array of timestamps
 *  per thread and each thread dumps it when it exits.
 */
typedef struct {
  int server;
  int terminal;
  int tran;
  int sub_tran;  /*  Subclass: for NewOrder and payment: 1=>hasRemote  */
  struct timeval start;                    /*  Time received from terminal  */
  struct timeval send;                     /*  Time the RPC was made (explicit only) */
  struct timeval srvr_start;      /*  Time received by server      */
  struct timeval srvr_done;       /*  Time sent by server          */
  struct timeval end;                      /*  Time sent to terminal        */
  int num_rms;                             /*  Number of RMs the tran involved */
  int tran_failed;
} tran_timing_t;

typedef enum {
   thread_state_init = 0,
   thread_state_called,
   thread_state_sent,
   thread_state_received,
   thread_state_returned,
   thread_state_done
} thread_state_t;

#define NUM_STATES thread_state_done
#define ENDMSG "...."  /* a special string to mark the end of a message */

typedef struct {
   thread_state_t state;
   int tran;
   struct timeval init, called, sent, received, returned, done;
   int printed, done_printed;
} thread_descr_t;

typedef struct {
    int num;
    int errs;
    double RTtotal[2];
    int RTcount;
} tran_info_t;
/*
 * total_tran_count_t
 *
 * structure that holds the total count of transaction of each type
 * as well as the reposne times.
 *
 */
typedef struct {
    tran_info_t tran[MAX_TRAN_TYPE + 1];
    int errors;
```

```
   double time;   /* used for tools/tpcc_monitor.c */
} total_tran_count_t;

/* enc_status_t
 * structure that holds error information
 */
typedef struct {
   int status;
   int line;
   char file[268];
   unsigned long encinaError;
   char errorMsg[ENCINA_MAX_STATUS_STRING_SIZE];
} enc_status_t;

/*
 *  thread_info_t
 *
 *  per thread information kept by this module
 */
typedef struct {
   int thread_index;
   int thread_id;
   int initialized;
   tran_timing_t last_tran;
   int num_trans;
   int consecutive_errors;
   thread_descr_t descr;
   tran_info_t tran[MAX_TRAN_TYPE + 1];
   int done;
} thread_info_t;

int  time_diff_ms(struct timeval *t2, struct timeval *t1);

extern int debug;
#define DPRINT(args)  if (debug) err_printf args

extern MUTEX_T init_lock;
extern int info_list_len;
extern thread_info_t **info_list;  /*  List of all the thread info */

/*
 *  A global variable by which the process would like to
 *  identify itself in the prefix to output
 */
extern int user_id;

/*
 *  clientUtils_ReportReturn
 *                  Called when a transaction is returned in order to error codes
 */
extern void clientUtils_ReportReturn(char *msg, data_header *statusP);

#define CHECK_ENVIRON(str,var)  if (str == NULL) { fprintf(ERROUT, \
                                    "%s environment variable is not defined.\n",var);  }

char *clientUtils_TranCodeToName(int type);

#endif /*  TPCC_CLIENT_UTILS_H  */
```

## databuf.h

```
/*
 *     databuf.h
 *
 * $Revision: 1.1 $
 * $Date: 1998/11/06 21:10:11 $
 * $Log:          databuf.h,v $
 * Revision 4.2  95/05/16  10:55:31  10:55:31  tpcc (TPCC Benchmark)
 * Added necessary RCS ident strings
 *
 * Revision 4.1  95/05/09  15:21:02  15:21:02  strue (Scott Truesdale)
 * New code from Transarc - initial version
 *
 * Revision 3.2  95/04/03  17:43:09  17:43:09  strue (Scott Truesdale)
 * Changes from Transarc - added sql error handling in client; cleaned up debug handling with macros; added
check on db paramters via call to server.
 *
 * Revision 3.1  95/04/03  15:10:30  15:10:30  strue (Scott Truesdale)
 * Base of rev 3 - shipped to transarc
 *
 *
 *
 *
 *  $TALog: databuf.h,v $
 * Revision 1.1  1998/11/06  21:10:11  dongfeng
 * - Move all files common to client and server to tpcc/common
 *   directory
 * [added by delta dongfeng-23677-TPCC-new-directory-structures, r1.1]
 *
 * Revision 1.3  1998/10/22  15:33:04  wenjian
 * Make changes to Encina server code to connect with SQL server and add
 * callsql.c and sql directory.
 *
 * Add ERR_BAD_ITEM_ID, which is returned by SLQnew and same as INVALID_NEWO
 * [from r1.2 by delta wenjian-23529-TPCC-integrate-with-SQL-server, r1.1]
 *
 * Revision 1.2  1998/01/23  15:07:47  oz
 * - Updated the SP TPCC directory to the latest files used
 *   during the SP tpcc audit.
 * [from r1.1 by delta oz-20774-TPCC-update-to-latest-SP-version-11-27, r1.1]
 *
 * Revision 1.1  1997/04/20  11:57:57  oz
 * - This is the code base modified at IBM Poughkeepsie
 *   by Ofer Zajicek and Radha Sivaramakrishnan for the
 *   SP scaling test for TPCC.
 * [added by delta oz-19782-TPCC-add-ibm-sp-code, r1.1]
 *
 * Revision 1.31  1995/10/30  19:10:54  oz
 * [merge of changes from 1.29 to 1.30 into 1.27]
 *
 * Revision 1.30  1995/10/27  15:41:30  oz
 * - Modified the tpc-c code to work with the new informix
 *   sql code that is in ex_trans.ec
 * [from r1.29 by delta oz-16761-TPCC-modify-code-to-work-with-oracle, r1.1]
 *
 * Revision 1.27  1995/10/20  18:44:30  ctipper
 * [merge of changes from 1.17 to 1.25 into 1.22]
 *
 * Revision 1.25  1995/10/20  18:15:34  ctipper
 * Incorporate changes per code review.
 *
 * - add DISTRIBUTED_TRAN_FAILED, TPCC_DB_INFO_PARTIAL, and
 * TPCC_DB_INFO_FAILED error codes to tpcc_rc_t
 * - got rid of MAX_NUM_SERVERS variables
 * [from r1.23 by delta ctipper-16547-TPCC-more-distributed-trans, r1.2]
 *
 * Revision 1.23  1995/10/13  17:00:26  ctipper
 * This delta encompasses all changes necessary to do distributed, XA
 * transactions with the TPCC benchmark. This includes the changes
 * necessary to build with Informix version 6.
 *
 * Each client still talks to only one server, however, if a distributed
 * transaction is necessary, the client sends the request to a different
 * interface of that server which then forwards all or part of the
 * request on to the appropriate remote server.
 *
 * - added new error codes to the tpcc_rc_t enumeration.
 * - defined MAX_NUM_SERVERS to be 10
 * [from r1.19 by delta ctipper-16547-TPCC-more-distributed-trans, r1.1]
 *
 * Revision 1.19  1995/09/20  21:02:39  oz
 * -Corrected code for the payment transaction
 * - The distributed case now no longer uses
 *   stored procedures
 * [from r1.18 by delta oz-16547-TPCC-add-distributed-transactions, r1.2]
 *
 * Revision 1.18  1995/09/20  17:51:10  oz
 * - Added distributed transactions for the new order and
 *   payment transaction
 *
 * - Added new error codes
 * [from r1.17 by delta oz-16547-TPCC-add-distributed-transactions, r1.1]
 *
 * Revision 1.22  1995/10/02  20:31:07  oz
 * - Corrected definition of ERROR()
 * [from r1.21 by delta oz-16638-tpcc-modify-terminal-for-RTE, r1.3]
 *
 * Revision 1.21  1995/10/02  18:51:45  oz
 * - Added definitions needed for utils.c and liberty.c
 * [from r1.20 by delta oz-16638-tpcc-modify-terminal-for-RTE, r1.2]
 *
 * Revision 1.20  1995/10/02  15:52:35  oz
 * - Modified the TPC-C benchmark to be compatible with the RTE.
 * - There are now 3 terminal processes:
 *     emulator: the old terminal process with a built in
 *                    simple emulator
 *     curses: An interactive terminal process using curses
 *     liberty: An interactive terminal process to be used with
 *                    the RTE compatible with the liberty freedom terminal.
 *
 * - Define TRUE and FALSE only if they are not already defined.
 *   (curses.h defines TRUE)
 * - Removed READ_TO_DATE and YEAR_TO_SECOND
 * - Added term_type_t
 * - Added
 *                GOOD_INPUT (0)
 *                WRONG_INPUT (10)
 * [from r1.17 by delta oz-16638-tpcc-modify-terminal-for-RTE, r1.1]
 *
 * Revision 1.17  1995/07/28  15:28:23  oz
 * - Added a -null and -no_marshalling option to TPCC
 *
 * - Added INVALID_TRAN_TYPE return code
 * [from r1.16 by delta oz-16070-TPCC-add-null-and-marshalling-test, r1.1]
 *
 * Revision 1.16  1995/07/18  17:02:38  oz
 * - Added a DCE_ERROR error code
 * [from r1.15 by delta oz-15938-TPCC-add-dce-only-client, r1.1]
 *
 * Revision 1.15  1995/05/22  19:50:48  shl
 * [merge of changes from 1.12 to 1.13 into 1.14]
 *
 * Revision 1.13  1995/05/18  15:11:27  oz
 * [from r1.12 by delta oz-15290-TPCC-incorporate-hp-drop-of-05-16-95, r1.1]
 *
 * Revision 1.14  1995/05/22  17:26:35  ctipper
 * [merge of changes from 1.5 to 1.9 into 1.11]
```

```
*
* [*** log entries omitted ***]
*
*/

#ifndef __TPCC_DATABUF_H__
#define __TPCC_DATABUF_H__

#define I_NAME_LEN      24
#define I_DATA          50
#define W_NAME_LEN      10
#define ADDR_LEN        20
#define STATE_LEN       2
#define ZIP_LEN         9
#define DIST_INFO_LEN   24
#define S_DATA_LEN      50
#define D_NAME_LEN      10
#define H_DATA_LEN      24
#define CARRIER_LEN     2
#define C_LAST_LEN          17
#define C_MID_LEN       2
#define PHONE_LEN       16
#define CREDIT_LEN      2
#define C_DATA_LEN      500
#define BC_DTA_LEN          23

#define YEAR_TO_DATE   1
#define YEAR_TO_SECOND 2

#define ERROR(x) fprintf(stderr,"Error: %s\n",#x),exit(11)

#define MAX_STR_LEN     255
#define MAX_OL                                  15

#ifndef TRUE
#define TRUE    1
#endif
#ifndef FALSE
#define FALSE   0
#endif

#define CANCEL                          -1

#define DATETIME_LEN    19

#define D_PER_W         10

#define COLLECTOR           1                                   /* ctipper 5/3/95 */

#define ERR_BAD_ITEM_ID  1  /* copied from sql/tpcc.h */
#define RPC_ERROR                               -2
#define SUCCESS_CODE                            0

#define CHAR_NULL       '\0'                    /* strue 1/23/95 */

typedef enum {
   liberty_term,
   curses_term,
   emulator_term
} term_type_t;

typedef enum {
   TPCC_SUCCESS = 0,
   GOOD_INPUT = 0,

   INVALID_NEWO = 100,
   SQL_ERROR = 2,
   TRPC_ERROR = 3,
   DCE_ERROR = 4,
   NO_SUCH_LAST_NAME = 5,
   INVALID_TRAN_TYPE = 6,
   INVALID_HANDLE = 7,

   WRONG_INPUT = 10,

   DISTRIBUTED_TRAN_FAILED = 15,

   TPCC_DB_INFO_PARTIAL = 20,
   TPCC_DB_INFO_FAILED,

   TPCC_ERROR_BEGIN_NEWO = 110,

   TPCC_ERROR_DECL_NEWO_SEL_ITEM,
   TPCC_ERROR_OPEN_NEWO_SEL_ITEM,
   TPCC_ERROR_OPEN_DIST_NEWO_SEL_ITEM,
   TPCC_ERROR_FETCH_NEWO_SEL_ITEM,
   TPCC_ERROR_FETCH_DIST_NEWO_SEL_ITEM,
   TPCC_ERROR_PREP_NEWO_SEL_STCK,
   TPCC_ERROR_DECL_NEWO_SEL_STCK,
   TPCC_ERROR_OPEN_NEWO_SEL_STCK,
   TPCC_ERROR_OPEN_DIST_NEWO_SEL_STCK,
   TPCC_ERROR_FETCH_NEWO_SEL_STCK,
   TPCC_ERROR_FETCH_DIST_NEWO_SEL_STCK,
   TPCC_ERROR_NEWO_SELECT,
   TPCC_ERROR_NEWO_UPD_STCK,
   TPCC_ERROR_DIST_NEWO_UPD_STCK,
   TPCC_ERROR_NEWO_SELECT_2,
   TPCC_ERROR_DECL_NEWO_SEL_CUST,
   TPCC_ERROR_OPEN_NEWO_SEL_CUST,
   TPCC_ERROR_OPEN_DIST_NEWO_SEL_CUST,
   TPCC_ERROR_FETCH_NEWO_SEL_CUST,
   TPCC_ERROR_FETCH_DIST_NEWO_SEL_CUST,
   TPCC_ERROR_DECL_NEWO_SEL_DIST,
   TPCC_ERROR_OPEN_NEWO_SEL_DIST,
   TPCC_ERROR_OPEN_DIST_NEWO_SEL_DIST,
   TPCC_ERROR_FETCH_NEWO_SEL_DIST,
   TPCC_ERROR_FETCH_DIST_NEWO_SEL_DIST,
   TPCC_ERROR_PREP_NEWO_INS_OL,
   TPCC_ERROR_DECL_NEWO_INS_OL,
   TPCC_ERROR_OPEN_NEWO_INS_OL,
   TPCC_ERROR_OPEN_DIST_NEWO_INS_OL,
   TPCC_ERROR_PUT_NEWO_INS_OL,
   TPCC_ERROR_PUT_DIST_NEWO_INS_OL,
   TPCC_ERROR_DECL_NEWO_SEL_WARE,
   TPCC_ERROR_OPEN_NEWO_SEL_WARE,
   TPCC_ERROR_OPEN_DIST_NEWO_SEL_WARE,
   TPCC_ERROR_FETCH_NEWO_SEL_WARE,
   TPCC_ERROR_FETCH_DIST_NEWO_SEL_WARE,
   TPCC_ERROR_EXECUTE_NEWO_UPD_INS,
   TPCC_ERROR_UPDATE_NEWO_NEXT_OID,
   TPCC_ERROR_PREP_NEWO_INS,
   TPCC_ERROR_EXECUTE_DIST_NEWO_INS,
   TPCC_ERROR_EXECUTE_NEWO_COMMIT,
   TPCC_ERROR_ROLLBACK_NEWO,
   TPCC_ERROR_REMOTE_OL_SELECT,
   TPCC_ERROR_REMOTE_OL_UPDATE,

   TPCC_ERROR_OPEN_ORDS_CNT_CID = 200,
   TPCC_ERROR_FETCH_ORDS_CNT_CID,
   TPCC_ERROR_OPEN_ORDS_SEL_CLAST,
   TPCC_ERROR_FETCH_ORDS_SEL_CLAST,
   TPCC_ERROR_OPEN_ORDS_SEL_CID,
   TPCC_ERROR_FETCH_ORDS_SEL_CID,
   TPCC_ERROR_OPEN_ORDS_SEL_OLDORD,
   TPCC_ERROR_FETCH_ORDS_OLDORD,
   TPCC_ERROR_OPEN_ORDS_SEL_OL,
   TPCC_ERROR_FETCH_ORDS_SEL_OL,
   TPCC_ERROR_EXECUTE_ORDS_COMMIT,

   TPCC_ERROR_OPEN_DELIVERY_OLDEST_OID = 300,
   TPCC_ERROR_FETCH_DELIVERY_OLDEST_OID,
   TPCC_ERROR_EXECUTE_DELIVERY_COMMIT,
   TPCC_ERROR_OPEN_DELIVERY_SEL_ORD,
   TPCC_ERROR_FETCH_DELIVERY_SEL_ORD,
   TPCC_ERROR_OPEN_DELIVERY_SEL_SUM_OL,
   TPCC_ERROR_FETCH_DELIVERY_SEL_SUM_OL,
   TPCC_ERROR_EXECUTE_DELIVERY_EXEC_DVRY,
   TPCC_ERROR_SELECT_DELIVERY_ORDER_ID,
   TPCC_ERROR_SELECT_DELIVERY_CARRIER_ID,
   TPCC_ERROR_SELECT_DELIVERY_BALANCE,

   TPCC_ERROR_OPEN_STOCKLEVEL_SEL_OID = 400,
   TPCC_ERROR_FETCH_STOCKLEVEL_SEL_OID,
   TPCC_ERROR_OPEN_STOCKLEVEL_CNT_SID,
   TPCC_ERROR_FETCH_STOCKLEVEL_CNT_SID,
   TPCC_ERROR_OPEN_STOCKLEVEL_FIND,
   TPCC_ERROR_FETCH_STOCKLEVEL_FIND,
   TPCC_ERROR_EXECUTE_STOCKLEVEL_COMMIT,

   TPCC_ERROR_OPEN_PAYMENT_CNT_CID = 500,
   TPCC_ERROR_FETCH_PAYMENT_CNT_CID,
   TPCC_ERROR_OPEN_PAYMENT_SEL_CLAST,
   TPCC_ERROR_FETCH_PAYMENT_SEL_CLAST,
   TPCC_ERROR_OPEN_PAYMENT_SEL_CID,
   TPCC_ERROR_FETCH_PAYMENT_SEL_CID,
   TPCC_ERROR_DECL_PAYMENT_SEL_DIST,
   TPCC_ERROR_OPEN_PAYMENT_SEL_DIST,
   TPCC_ERROR_OPEN_DIST_PAYMENT_SEL_DIST,
   TPCC_ERROR_FETCH_PAYMENT_SEL_DIST,
   TPCC_ERROR_FETCH_DIST_PAYMENT_SEL_DIST,
   TPCC_ERROR_DECL_PAYMENT_SEL_WARE,
   TPCC_ERROR_OPEN_PAYMENT_SEL_WARE,
   TPCC_ERROR_OPEN_DIST_PAYMENT_SEL_WARE,
   TPCC_ERROR_FETCH_PAYMENT_SEL_WARE,
   TPCC_ERROR_FETCH_DIST_PAYMENT_SEL_WARE,
   TPCC_ERROR_EXECUTE_PAYMENT_UPD_CUST_LAST,
   TPCC_ERROR_EXECUTE_PAYMENT_UPD_CUST_ID,
   TPCC_ERROR_COMMIT_PAYMENT_UPD_CUST,
   TPCC_ERROR_SELECT_PAYMENT_W_YTD,
   TPCC_ERROR_SELECT_PAYMENT_D_YTD,
   TPCC_ERROR_BEGIN_PAYMENT,
   TPCC_ERROR_EXECUTE_PAYMENT_COMMIT,
   TPCC_ERROR_PAYMENT_UPD_CUST_BY_NAME,
   TPCC_ERROR_PAYMENT_UPD_CUST_BY_ID,
   TPCC_ERROR_PAYMENT_UPDATE_DIST,
   TPCC_ERROR_PAYMENT_UPDATE_WH,
   TPCC_ERROR_PAYMENT_INSERT_HISTORY,
   TPCC_ERROR_EXECUTE_PAYMENT_WH_DIST

} tpcc_rc_t;

typedef enum {
   TPCC_DEADLOCK_MSG = 10,
   TPCC_RETRY_MSG
} tpcc_msg_t;

#endif /* __TPCC_DATABUF_H__ */
```

## debug.c

```
#include <stdio.h>
#include <string.h>
#include <stdarg.h>
#include <sys/stat.h>
#include <errno.h>
#include <math.h>
#include <time.h>
#include <fcntl.h>
#include <unistd.h>
#ifdef WIN32
#include <process.h>
#else
#include <termio.h>
#endif

int print_thread_id = 0;
int user_id = 1;
char *user_code = "C";

int get_thread_id()
{
   return(0);
}

/*
 *  get_prefix
 *                Format the output prefix for printing:
 *                It contains the user_id, 'C' or 'T' depending on whether it
 *                is a terminal or a client and optional a thread identifier
 *                The prefix is written in the buffer passed in by the caller.
 */
void get_prefix(buffer)
 char *buffer;
{
   if (print_thread_id) {
                int thread_id = get_thread_id();
                sprintf(buffer,  "%s(%d-%s-%d)%s",
                                user_id < 10 ? "  " : user_id < 100 ? " " : "",
                                user_id,
                                user_code,
                                thread_id,
                                thread_id < 10 ? " " : "");
   } else {
                sprintf(buffer,  "%s(%2d-%s)",
                                user_id < 10 ? " " : "", user_id, user_code);
   }
}


/*
 * err_printf
 *                A var-arg function that appends the current time and
 *                other data to the print request and sends it to stderr
 */
void err_printf(char *format, ...)
{
   static int initialized = 0;
   static FILE *debug_f = NULL;
   time_t cur_timet;
   char time_str[30];
   char line_prefix[50];
   va_list ap;

   va_start(ap, format);

   if (!initialized) {
                char fileName[45];
                initialized = 1;
                sprintf(fileName, "DebugFile.%d", getpid());
                debug_f = fopen(fileName, "w");
   }

   cur_timet = time(&cur_timet);
   strftime(time_str, 29, "%X", localtime(&cur_timet));

   get_prefix(line_prefix);

   if (debug_f) {
                fprintf(debug_f, "%s %s - ", line_prefix, time_str);
                vfprintf(debug_f, format, ap);
                fflush(debug_f);
   }

   va_end(ap);
}

void set_client_debug_state(void *contextP, int state, int tran)
{
}
```

## delivery.tacf

```
/*
 * Copyright (C) 1991, 1990 Transarc Corporation
 * All Rights Reserved
 */
/*
 *  neworder.tacf -- attribute configuration file for tpcc server.
 * used for transparent binding
 *
 * $Revision: 1.1 $
 * $Date: 1998/11/06 21:10:11 $
 * $Log:          tpcc.tacf,v $
 *
 * $TALog: delivery.tacf,v $
 * Revision 1.1  1998/11/06  21:10:11  dongfeng
 * - Move all files common to client and server to tpcc/common
 *   directory
 * [added by delta dongfeng-23677-TPCC-new-directory-structures, r1.1]
 *
 * Revision 1.1  1997/04/20  11:57:57  oz
 * - This is the code base modified at IBM Poughkeepsie
 *   by Ofer Zajicek and Radha Sivaramakrishnan for the
 *   SP scaling test for TPCC.
 * [added by delta oz-19782-TPCC-add-ibm-sp-code, r1.1]
 *
 * Revision 1.3  1996/01/12  16:06:44  oz
 * - Added transaction specific servers:  there are 5 different interfacese
 *   one for each transaction type.
 * [added by delta oz-16955-TPCC-add-transaction-specific-servers, r1.1]
 *
 */

[implicit_handle (mon_handle_t handle)]
interface delivery
{
}
```

## delivery.tidl

```
/*
 * id: $id: $
 *
 * component_name: encina benchmarks
 *
 * the following functions list may not be complete.
 * functions defined by/via macros may not be included.
 *
 * functions:
 *    <fill_me_in>
 *
 * origins: transarc corp.
 *
 * (c) copyright transarc corp. 1995, 1993
 * all rights reserved
 * licensed materials - property of transarc
 *
 * us government users restricted rights - use, duplication or
 * disclosure restricted by gsa adp schedule contract with transarc corp
 */
/*
 * history
 * $talog: $
 */

/*
 * delivery.tidl -- interface definition file for tpccserver.
 *
 * $revision: 1.11 $
 * $date: 1995/10/20 21:55:05 $
 * $log:          tpcc.tidl,v $
 */

[uuid(d714d8f8-2105-11cf-830f-0800093b9834), version(1.0)]

interface delivery
{
import "tpm/mon/mon_handle.idl";
import "tpcc_type.idl";

[nontransactional] void
                impTPCCDelivery([in,out] delivery_data_t *dataP,
                                [out] trpc_status_t  * trpcStatus);

}
```

## do_tpcc.c

```
/*
 *      do_tpcc.c
 *
 * $Revision: 1.12 $
 * $Date: 1999/05/06 21:28:26 $
 * $Log:          do_tpcc.c,v $
 *
 * $TALog: do_tpcc.c,v $
 * Revision 1.12  1999/05/06  21:28:26  oz
 * - Removed all the .. from the includes
 * - Added -I.. to the makefiles instead
 * - Moved all the thread related code and connection
 *   selection to serverMon.c
 * [from r1.8 by delta oz-24309-TPCC-add-oracle8.1-code, r1.5]
```

```
*
* Revision 1.8  1999/01/29  20:16:32  wenjian
* Call init_encina_client since client_init has been renamed to
* init_encina_client
* [from r1.7 by delta wenjian-23787-TPCC-integrate-code-for-AIX-and-NT, r1.7]
*
* Revision 1.7  1998/12/09  14:44:53  wenjian
* Add a call to client_init() in main
* [from r1.6 by delta wenjian-23787-TPCC-integrate-code-for-AIX-and-NT, r1.3]
*
* Revision 1.6  1998/11/09  16:59:37  wenjian
* In this revision, most of the changes are related to the directory of header
* files after directory reorganization. Other changes include adding or removing
* files to put them in the right directories. Makefiles are written for NT
* platform so that nmake is working on NT now. Need a top level Makefile for all
* the directories.
* [from r1.5 by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.2]
*
* Revision 1.5  1998/11/09  14:48:15  wenjian
* In an effort to make a new directory structure for TPCC, this delta
* creates two directories: tpcc/client and tpcc/server. All the files
* for this revision are copied from tpcc/sp-tpcc without any change.
* Further change may be needed for some files due to the change of
* the directory structure.
* [added by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.1]
*
* Revision 1.15  1998/02/17  22:07:01  wenjian
* Define macros to deal with the different function names on NT
* [from r1.14 by delta wenjian-21750-TPCC-changes-for-porting-on-NT, r1.1]
*
* Revision 1.14  1998/01/26  20:37:34  oz
* - Remove all the code associated with explicit binding
*
* - Removed bindingType
* - Removed client_first_wh and client_last_wh
* - Removed command line args: binding, offset, ware
* [from r1.13 by delta oz-21697-TPCC-remove-explicit-binding-code, r1.1]
*
* Revision 1.13  1998/01/26  15:33:31  oz
* - Changed default binding to transparent
* [from r1.12 by delta oz-21671-TPCC-merge-online-transaction-interfaces, r1.2]
*
* Revision 1.12  1998/01/24  14:17:05  oz
* - User server name to identify server and name delivery file
* - Use env variable HOME instead of /home/encina if HOME is set
* [from r1.11 by delta oz-21687-TPCC-use-server-name-to-identify-process, r1.1]
*
* Revision 1.11  1998/01/23  15:07:48  oz
* - Updated the SP TPCC directory to the latest files used
*   during the SP tpcc audit.
* [from r1.10 by delta oz-20774-TPCC-update-to-latest-SP-version-11-27, r1.1]
*
* Revision 1.8  1997/08/04  19:50:41  oz
* [from r1.7 by delta oz-20506-TPCC-convert-to-new-format-of-connection-manager, r1.2]
*
*
*
*/
/*==========================================================================
* do_tpcc.c
*
*
*  This is the main client program for the TPCC benchmark using Encina.
*
*  The client program is multi-threaded: there is one thread for each
*  terminal and one thread to process incoming connections.
*
*  When the client starts up it starts a listening thread.  That thread
*  calls the encina function cnm_ManageConnections and provides it a
*  port number.  The client spawns a thread (through cnm_ManageConnections)
*  for each terminal that connects to it.  That thread receives the input
*  from the terminal and translates it to a transaction data structure
*  (such as payment_data_t or newOrder_data_t).  The terminal thread
*  (in the client) then sends an RPC over to the server to process the request.
*

            ____________________________
            |       Client            |
            |       Process           |              ----------
------   RPC  |                        |   socket      | Terminal |
     |<------|-------------------Terminal-----~~~~~~-------|         |
     |      |                  Thread  |              ----------
Server|      |                        |
     |      |                        |              ----------
     |  RPC  |                        |   socket      | Terminal |
------ <------|-------------------Terminal-----~~~~~-------|         |
            |                  Thread  |              ----------
            |                        |
            |____________________________|

*
*
*==========================================================================
*/



#include <stdio.h>
#include <string.h>
#include <stdarg.h>
#include <sys/stat.h>
#include <errno.h>
#include <math.h>
#include <time.h>
#include <fcntl.h>
#ifndef WIN32
#include <termio.h>
#endif
#include <unistd.h>
#include <sys/ipc.h>
#include <tpm/mon/mon_client.h>
#include <tc/tc.h>
#include <dce/rpc.h>

#if defined (solaris)
#include <dce/pthread.h>
#else   /* solaris */
#include <pthread.h>
#endif

#include "common/tpcc_type.h"
#include "common/utilities.h"
#include "client_utils.h"
#include "common/do_tpcc.h"
#include "client_listen.h"
#include "client.h"

extern char *sys_errlist[];  /*  Translations of errno file errors */

#ifdef WIN32
#define STRCMP _stricmp
#else
#define STRCMP strcasecmp
#endif

/*
 *  ENTERING
 *              A macro that is called before processing a TPCC transaction.
 *              If debug mode is enabled it prints a message containing the name
 *              of the transaction being executed.
 */
#define ENTERING(msg) if (debug) err_printf("Entering %s\n", msg)

#define MAX_CONSECUTIVE_ERRS 3000
/*
 *  RETURNED
 *              A macro that is called after a transaction has been processed.
 *              If the transaction failed it reports an error.
 *              In debug mode it also emits a message indicating the processing
 *              has been completed.
 */
#define RETURNED(msg, hdrP)                                     \
{                                                               \
  if (((hdrP)->returncode == TPCC_SUCCESS) ||                   \
      ((hdrP)->returncode == INVALID_NEWO)) {                   \
    consecutiveErrors = 0;                                      \
  } else {                                                      \
    consecutiveErrors++;                                        \
  }                                                             \
  if (debug ||                                                  \
      (((hdrP)->returncode != SUCCESS_CODE) &&                  \
       ((hdrP)->returncode != INVALID_NEWO))) {                 \
    clientUtils_ReportReturn(msg, hdrP);                        \
    if (consecutiveErrors > MAX_CONSECUTIVE_ERRS) {             \
      err_printf("Too many consecutive errors (%d)\n",          \
                                        consecutiveErrors);     \
      exit_program(1);                                          \
    }                                                           \
  }                                                             \
}


int                     useSecurity = FALSE;
int                     null_test = 0;
int                     client_lock_handles = 0;

/* The following are global to the client */
char *LOG_FILE_DIR = "runs/threads";
int             user_id;
int             user_port = 4011;
char    *user_code = "C";       /*  Prefix for output to identify this
                                                                        *  process as a client or a terminal
                                                                        */
int             consecutiveErrors = 0;
char    *result_dir;

int debug = 0;
char log_file_name[100];
int logtrans = 0;
FILE *logtpcc = NULL;

static void check_parms(int argc, char *argv[]);
static void print_header(int argc, char *argv[]);


/*=========================================================*/

main(argc, argv)
```

```
int argc;
char *argv[];
{
   check_parms(argc,argv);  /*  Read and parse the command line parameters */

   err_printf("Client %d starting.\n", user_id);

   init_encina_client(user_id);
   enroll_client(user_id);  /* enroll as a client */

   /*
    *  Open log file
    */
   logtpcc = fopen(log_file_name, "w");
   print_header(argc, argv);   /** Print a test header to the logfile  **/

   /*
    *    Start the listening thread:
    *    This call will not return
    */
   make_connections((void *)user_port);

   exit_program( 0 );
   return (0);                    /* to statisfy lint */

}      /****************        end of main      **************/

/*==========================================================*/

/*
 * User must supply user_id as a parm and all other parameters
 * as environment variables.
 */

/*-----------------------------------------------------------
 *       Check Parameters
 *  Check the parameters passed in.
 *
 *  Not all the parameters are relevant for this executable.
 *  This code is shared between the regular Encina Monitor
 *  based TPC-C client and other test clients that do not
 *  use the Encina Monitor.  The type of this executable is
 *  in client_type and is set to mon_client for the TPCC
 *  Monitor based client (the audited client).
 *-----------------------------------------------------------
 */
static void check_parms (argc,argv)
  int argc;
  char *argv[];

{
   char *host_name = getenv("HOST");
   char *home_dir = getenv("HOME");
   int              next_arg = 1;
   int errors = 0;
   char             *progName;
   int print_help = 0;

   user_id = -1;
   result_dir = ".";

   while (next_arg < argc) {
                    if (!STRCMP("-debug", argv[next_arg])) {
                       /*  Enable debug mode (for testing)  */
                       debug = 1;
                    } else if (!STRCMP("-dir", argv[next_arg])) {
                       /*  The directory for the client output  */
                       result_dir = argv[++next_arg];
                    } else if (!STRCMP("-log", argv[next_arg])) {
                       /*  A less intrusive form of debug mode  */
                       logtrans = 1;
                    } else if (!STRCMP("-id", argv[next_arg])) {
                       /*  The id of this client  */
                       user_id = atol(argv[++next_arg]);
                    } else if (!STRCMP("-port", argv[next_arg])) {
                       /*  The id of this client  */
                       user_port = atol(argv[++next_arg]);
                       if (user_id < 0) user_id = user_port;
                    } else if (!STRCMP("-security", argv[next_arg])) {
                       /*  Enable security between the client and the server.
                        *  This is enabled by default
                        */
                       useSecurity = TRUE;
                    } else if (!STRCMP("-noSecurity", argv[next_arg])) {
                       /*  Disable security between the client and the server.
                        *  This is enabled by default
                        */
                       useSecurity = FALSE;
                    } else if (!STRCMP("-null", argv[next_arg])) {
                       /*  For testing: do not access the data in the DB  */
                       logprintf("Performing NULL test\n");
                       null_test = 1;
                    } else if (!STRCMP("-lock", argv[next_arg])) {
                       logprintf("Locking longterm handles\n");
                       client_lock_handles = atol(argv[++next_arg]);
                    } else {
                       printf("invalid parameter: %s\n", argv[next_arg]);
                       print_help = 1;
                       break;
                    }
                next_arg++;
   }

   if (user_id < 0) {
     printf("  Missing User Id\n");
     print_help = 1;
   }

   if (print_help) {
                    progName = strrchr(argv[0], '/');
                    progName = (progName ? progName + 1 : argv[0]);

                    printf("\nusage:\n You can specify the following in any order\n");
                    printf(" You must specify the Id\n");

                    printf("   -id <num>       The user ID for this client\n");
                    printf("   -dir <dir>      Directory for output (default \".\")\n");
                    printf("   -debug          enable debugging\n");
                    printf("   -log            log all activity to a file\n");
                    printf("   -security       enable secure communications between the client and PA\n");
                    printf("   -null           NULL test: the server immediately returns\n");

                    exit(-1);
   }

   sprintf(log_file_name, "%s/%s/C.%s.%d",
                       home_dir ? home_dir : "/home/encina",
                       LOG_FILE_DIR,
                       host_name ? host_name : "host", user_id);
}

/*
 *  print_header:
 *                  Print some feedback to the user on the client configuration
 */
static void print_header(int argc, char *argv[])
{
   int i;
   if (!logtpcc)
                    return;

   logprintf("Client %d starting a %s test.\n",
                       user_id,
                       null_test ? "NULL" : "DB");

   logprintf("Params: ");

   for (i=0; i<argc; i++) {
                    fprintf(logtpcc, "%s ", argv[i]);
   }
   fprintf(logtpcc, "\n");
   fflush(logtpcc);
}
```

## do_tpcc.h

```
/*
 * do_tpcc.h
 *
 *  $Revision: 1.1 $
 *  $Date: 1998/11/09 16:00:05 $
 *  $Log:        do_tpcc.h,v $
 *
 *  $TALog: do_tpcc.h,v $
 * Revision 1.1  1998/11/09  16:00:05  dongfeng
 * Move do_tpcc.h to common directory
 * [added by delta dongfeng-23677-TPCC-new-directory-structures, r1.4]
 *
 * Revision 1.7  1998/01/23  15:07:49  oz
 * - Updated the SP TPCC directory to the latest files used
 *   during the SP tpcc audit.
 * [from r1.6 by delta oz-20774-TPCC-update-to-latest-SP-version-11-27, r1.1]
 *
 *
 */

#ifndef _DO_TPCC_H_INCLUDED_
#define _DO_TPCC_H_INCLUDED_

#include <dce/rpc.h>
#include <trpc/trpc.h>
#include "databuf.h"

#define WRONG_INPUT      0
#define NEW_ORDER        1
#define PAYMENT                          2
#define ORDER_STATUS     3
#define DELIVERY         4
#define STOCK_LEVEL      5
#define QUIT             9
#define MIN_OL                           5
#define MAX_FLDS       200      /* Maximum fields in a TPC-C form */

#define THRESHOLD_LEN   2

#define ON               1
#define OFF              0
```

```
#define YES    1
#define NO     0

#define INSIZE  1024

#define DO_ROLLBACK     1
#define DONT_ROLLBACK   0

/**  The response time requirements for the transactions in seconds.
 **  90% of the transactions are required to have a response time less
 **  than or equal to the value below.
 **/
#define NEWORD_90RT      5
#define PAYMENT_90RT     5
#define ORDSTAT_90RT     5
#define DELIVERY_90RT    5  /* 5 for interactive or 80 for background */
#define STOCKLEV_90RT   20

/*
 *  What type of client is this?
 */
typedef enum {
   tk_client,
   dce_client,
   mon_client,
   db_client
} client_type_t;

extern client_type_t client_type;

typedef enum {
   transparent, explicit, longTerm, noReservation
} binding_t;

/* Handle from client to PA is now described using both the paHandle
and the mondHandle. */

#define NUM_TRANS        5
#define NEWO_ERR         6
#define PAYMENT_ERR      7
#define ORD_STAT_ERR     8
#define DELIVERY_ERR     9
#define STOCK_ERR       10
#define NEWO_ROLLBACK   11
#define END_OF_WINDOW  0xff
#define BEGIN_WINDOW   0xaa
#ifndef SHORT_WAITS
#define NEWO_MEAN_THINK_TIME                122
#define PAYMENT_MEAN_THINK_TIME             122
#define ORDER_STAT_MEAN_THINK_TIME          102
#define DELIVERY_MEAN_THINK_TIME            51
#define STOCK_MEAN_THINK_TIME               51
#define NEWO_MIN_KEY_TIME                   185
#define PAYMENT_MIN_KEY_TIME                31
#define ORDER_STAT_MIN_KEY_TIME             21
#define DELIVERY_MIN_KEY_TIME               21
#define STOCK_MIN_KEY_TIME                  21
#else
#define NEWO_MEAN_THINK_TIME                61
#define PAYMENT_MEAN_THINK_TIME             61
#define ORDER_STAT_MEAN_THINK_TIME          51
#define DELIVERY_MEAN_THINK_TIME            26
#define STOCK_MEAN_THINK_TIME               26
#define NEWO_MIN_KEY_TIME                   93
#define PAYMENT_MIN_KEY_TIME                16
#define ORDER_STAT_MIN_KEY_TIME             11
#define DELIVERY_MIN_KEY_TIME               11
#define STOCK_MIN_KEY_TIME                  11
#endif


#endif /* _DO_TPCC_H_INCLUDED_ */
```

## encina.C

```
/* (C)1997 IBM Corporation */
/*****************************************************************/
/*
*/
/*                File: tuxclient.h                                  */
/*
*/
/*****************************************************************/

#include <stdlib.h>
#include "inout.h"
#include "encina.h"

extern "C" {
}

extern "C" send_new_order(void *contextP, NewOrder_data *dataP);
extern "C" send_payment(void *contextP, Payment_data *dataP);
extern "C" send_stock_level(void *contextP, StockLevel_data *dataP);
extern "C" send_order_status(void *contextP, OrderStatus_data *dataP);
extern "C" send_delivery(void *contextP, Delivery_data *dataP);

void Encina::cleanup() {
}

Encina::Encina() {
   return;
}

Encina::~Encina() {
   return;
}

int Encina::tran (NewOrder_data *dataP, void *contextP, char *servname) {
   send_new_order(contextP, dataP);
   return 0;
}


int Encina::tran (Payment_data *dataP, void *contextP, char *servname) {
   send_payment(contextP, dataP);
   return 0;
}


int Encina::tran (OrderStatus_data *dataP, void *contextP, char *servname) {
   send_order_status(contextP, dataP);
   return 0;
}


int Encina::tran (StockLevel_data *dataP, void *contextP, char *servname) {
   send_stock_level(contextP, dataP);
   return 0;
}

int Encina::tran (Delivery_data *dataP, void *contextP, char *servname) {
   send_delivery(contextP, dataP);
   return 0;
}

int Encina::tran (char *servname) {
   return -1;
}

int Encina::atran (char *servname) {

   return 0;
}
```

## encina.h

```
/* (C)1997 IBM Corporation */
/*****************************************************************/
/*
*/
/*                File: tuxclient.h                                  */
/*
*/
/*****************************************************************/

#ifndef ENCINA_H
#define ENCINA_H

const int TMINBUFSIZE = 1536;

class Encina {
public:
   static void cleanup();
   int tran(char *servname);
   int tran(NewOrder_data *dataP, void *contextP, char *servname);
   int tran(Payment_data *dataP, void *contextP, char *servname);
   int tran(StockLevel_data *dataP, void *contextP, char *servname);
   int tran(OrderStatus_data *dataP, void *contextP, char *servname);
   int tran(Delivery_data *dataP, void *contextP, char *servname);
   int atran(char *servname);
   Encina();
   ~Encina();
};

extern Encina encina;

#endif
```

## encina_client.c

```
/*
 *                encina_client.c
 *
 * $Revision: 1.7 $
 * $Date: 1999/05/06 21:28:26 $
 * $Log:          $
 *
 *
 * $TALog: encina_client.c,v $
 * Revision 1.7  1999/05/06  21:28:26  oz
 * - Removed all the .. from the includes
 * - Added -I.. to the makefiles instead
```

```
* - Moved all the thread related code and connection
*   selection to serverMon.c
* [from r1.6 by delta oz-24309-TPCC-add-oracle8.1-code, r1.5]
*
* Revision 1.6  1998/11/09  16:59:37  wenjian
* In this revision, most of the changes are related to the directory of header
* files after directory reorganization. Other changes include adding or removing
* files to put them in the right directories. Makefiles are written for NT
* platform so that nmake is working on NT now. Need a top level Makefile for all
* the directories.
* [from r1.5 by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.2]
*
* Revision 1.5  1998/11/09  14:48:16  wenjian
* In an effort to make a new directory structure for TPCC, this delta
* creates two directories: tpcc/client and tpcc/server. All the files
* for this revision are copied from tpcc/sp-tpcc without any change.
* Further change may be needed for some files due to the change of
* the directory structure.
* [added by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.1]
*
* Revision 1.5  1998/01/23  15:07:51  oz
* - Updated the SP TPCC directory to the latest files used
*   during the SP tpcc audit.
* [from r1.4 by delta oz-20774-TPCC-update-to-latest-SP-version-11-27, r1.1]
*
*
*
*/

/*
*  encina_client.c
*
*                The Encina related code in the client that is common to both
*                the monitor client and the toolkit client.
*
*/

#include <stdio.h>
#include <string.h>
#include <stdarg.h>
#include <trpc/trpc.h>
#include <encina/encina.h>
#include "common/utilities.h"
#include "client_utils.h"
#include "encina_client.h"


static trpc_handle_t bind_to_server(char *name);

/*
*  encina_error_message
*
*  Report an encina error message by interpreting it and writing
*  it to both the logfile (if any) and to standard error
*/
void encina_error_message(msg, n)
 char *msg;
 unsigned long n;
{
   char errorMsg[ENCINA_MAX_STATUS_STRING_SIZE];
   encina_StatusToString(n, ENCINA_MAX_STATUS_STRING_SIZE, errorMsg);
   err_printf("ERROR: %s.  Error code = %s (%d 0x%x) \n", msg, errorMsg, n, n);
}

/*
*  encina_error
*
*  This is called for FATAL errors.  It reports the error and exits.
*/
void encina_error(funcName, n)
 char *funcName;
 unsigned long n;
{
   char msg[128];
   sprintf("%s failed", funcName);
   encina_error_message(msg, n);
   exit_program(1);
}

/*
*   secure_handle
*
*                Secure a handle to an encina server.
*                This can be called with either a PA handle or with
*                a trpc handle to a toolkit server.
*/
void secure_handle(trpc_handle_t handle, int use_security)
{
   rpc_binding_handle_t       rpcHandle;
   unsigned long              status = 0;
   unsigned char              *serverPrincipal;

   ENCINA_CALL("trpc_GetRpcHandleFromBinding",
            trpc_GetRpcHandleFromBinding(handle,&rpcHandle));

   rpc_mgmt_inq_server_princ_name(rpcHandle, rpc_c_authn_default,
                        &serverPrincipal, &status);

   if (use_security) {
                DPRINT(("rpc_binding_set_auth_info -> principal %s, protect %d, authn %d authz %d\n",
                        serverPrincipal, rpc_c_protect_level_connect,
                        rpc_c_authn_default, rpc_c_authz_dce));

                rpc_binding_set_auth_info(rpcHandle, serverPrincipal,
                                                        rpc_c_protect_level_connect,
                                                        rpc_c_authn_default,
                                                        NULL,
                                                        rpc_c_authz_dce,
                                                        &status);
   } else {
                DPRINT(("rpc_binding_set_auth_info -> principal %s, protect %d, authn %d authz %d\n",
                        serverPrincipal, rpc_c_protect_level_none,
                        rpc_c_authn_default, rpc_c_authz_dce));

                rpc_binding_set_auth_info(rpcHandle, serverPrincipal,
                                                        rpc_c_protect_level_none,
                                                        rpc_c_authn_default,
                                                        NULL,
                                                        rpc_c_authz_dce,
                                                        &status);
   }


   if (status != rpc_s_ok) {
      switch (status) {
         case rpc_s_invalid_binding :
            printf("rpc binding invalid ****** \n");
            break;
         case rpc_s_wrong_kind_of_binding :
            printf("rpc binding is the wrong kind \n");
            break;
         case rpc_s_unknown_authn_service :
            printf("rpc authn service unknown \n");
            break;
      } /* switch */
      bde_Exit(1);
   }
}
```

## encina_client.h

```
/*
*                encina_client.h
*
* $Revision: 1.5 $
* $Date: 1998/11/09 14:48:16 $
* $Log:            $
*
*
* $TALog: encina_client.h,v $
* Revision 1.5  1998/11/09  14:48:16  wenjian
* In an effort to make a new directory structure for TPCC, this delta
* creates two directories: tpcc/client and tpcc/server. All the files
* for this revision are copied from tpcc/sp-tpcc without any change.
* Further change may be needed for some files due to the change of
* the directory structure.
* [added by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.1]
*
* Revision 1.5  1998/01/23  15:07:52  oz
* - Updated the SP TPCC directory to the latest files used
*   during the SP tpcc audit.
* [from r1.4 by delta oz-20774-TPCC-update-to-latest-SP-version-11-27, r1.1]
*
*
*     Declarations common to monitor version and toolkit version
*
*/

#ifndef ENCINA_CLIENT_H
#define ENCINA_CLIENT_H

#include <trpc/trpc.h>

void encina_error_message(char *msg, unsigned long n);
void encina_error(char *funcName, unsigned long n);
void secure_handle(trpc_handle_t handle, int use_security);


#endif  /*  ENCINA_CLIENT_H  */
```

## field.C

```
/* (C)1997 IBM Corporation */
#include <stdio.h>
#include "field.h"
#include "inout.h"
#include "format.h"
#if 0
#if USE_ALLOCA
#include <alloca.h>
#endif
#endif

extern char const * const blanks;
```

```
extern char const * const underscores;
extern char const * const backspaces;
extern int position(InOut *ioP, int x, int y);

Field *genfield(InOut *ioP, int x, int y, int len, int *ptr) {
   return new IntField(ioP, x, y, len, ptr);
}
Field *genfield(InOut *ioP, int x, int y, int len, short *ptr) {
   return new ShortField(ioP, x, y, len, ptr);
}
Field *genfield(InOut *ioP, int x, int y, int len, long *ptr) {
   return new LongField(ioP, x, y, len, ptr);
}
Field *genfield(InOut *ioP, int x, int y, int len, char *ptr) {
   return new TextField(ioP, x, y, len, ptr);
}
Field *genfield(InOut *ioP, int x, int y, int len, double *ptr) {
   return new MoneyField(ioP, x, y, len, ptr);
}
Field *genfield(InOut *ioP, int x, int y, int len, unsigned char *ptr) {
   return new Int8Field(ioP, x, y, len, ptr);
}

/*****************************************************************************
Field
*****************************************************************************/
Field::Field(InOut *inoutP, int size, char *str)
   : ioP(inoutP), len(size), pos(0), changed(0), need_redisplay(0)
{
   need_free_string = need_free = 0;
   if (str == NULL) {
                string = new char[len+1];
                need_free_string = 1;
   } else {
                string = str;
   }
   ok_func = NULL;
   ok_data = NULL;
   string[0] = 0;
}

Field::Field(InOut *ioP, int inx, int iny, int size, char *str)
   : ioP(ioP), x(inx), y(iny), len(size), pos(0), changed(0), need_redisplay(0)
{
   need_free_string = need_free = 0;
   if (str == NULL) {
                string = new char[len+1];
                need_free_string = 1;
   } else {
                string = str;
   }
   ok_func = NULL;
   ok_data = NULL;
   string[0] = 0;
}

int Field::reset() {
   pos=0;
   changed=0;
   return 0;
}
Field::~Field() {
   if (need_free_string)
                delete [] string;
}
int Field::finalize_field() {
   changed = 0;
   string[pos] = 0;
   return 0;
}
int Field::display_field(int use_underscores) {
   position(ioP, x,y);
   ioP->write(string);
   if (use_underscores) {
                ioP->write(underscores, len-pos);
   } else {
                ioP->write(blanks, len-pos);
   }
   return 0;
}
int Field::get_key() {
   char key;
   int cc;
   cc = ioP->read(&key, 1);

   return (cc == 0)  ? EOF : key ;
}
int Field::add_char(int key) {
   if (pos >= len || (!isprint(key) && key != ' ')) {
                ioP->write("\a", 1);
                return 1;
   }
   changed = 1;
   string[pos] = key;
   ioP->write(&string[pos++], 1);
   return 0;
}
int Field::backspace() {
   ioP->write("\b_\b", 3);
   changed = 1;
   pos--;
   return 0;
}
int Field::start_position () {
   position(ioP, x, y);
   return 0;
}
int Field::get_field (int need_pos) {
   int key;

   if (need_pos)
                position(ioP, x, y);
   if (pos != 0) {
                need_redisplay = 1;
                ioP->write(string, pos);
                ioP->write(underscores, len-pos);
                if (len-pos < 6)
                   ioP->write(backspaces, len-pos);
                else
                   position(ioP, x+pos, y);
   }

   ioP->mark();
   while (1) {
                key = get_key();
                switch(key) {
                case EOF:
                   return EOF;

                case '\r':   /* Carriage Return */
                case '\n':   /* Newline */
                   ioP->hold();
                   if (changed) {
                                finalize_field();
                   }
                   ioP->pop();
                   display_field(1);
                   return ENTER;
                   break;

                case '\t':   /* Tab */
                case '\006': /* Ctrl-F */
                case '\016': /* Ctrl-N */
                   if (changed) {
                                finalize_field();
                   }
                   ioP->pop();
                   display_field(1);
                   return NEXT_FIELD;
                   break;

                case '\002': /* Ctrl-B */
                case '\020': /* Ctrl-P */
                   if (changed) {
                                finalize_field();
                   }
                   ioP->pop();
                   display_field(1);
                   return PREV_FIELD;

                case '\b':   /* Backspace */
                case '\177': /* Del */
                   if (pos > 0) {
                                backspace();
                   } else
                                ioP->write("\a", 1);
                   break;

                case '\014': /* Ctrl-L */
                   ioP->pop();
                   return REDISPLAY;

                case '\030': /* Ctrl-X */
                case '\003': /* Ctrl-C */
                   ioP->unmark();
                   return ABORT;

                default:
                   add_char(key);
                }
   }
}

/*****************************************************************************
IntField
*****************************************************************************/
IntField::IntField(InOut *ioP, int inx, int iny, int size, int *val) : Field(ioP, inx, iny, size), value(val) {
   if (value==NULL) {
                value = new int;
                need_free=1;
   }
}
IntField::IntField(InOut *ioP, int size, int *val) : Field(ioP, size), value(val) {
   if (value==NULL) {
                value = new int;
                need_free=1;
   }
}
```

```
IntField::~IntField() {
   if (need_free)
                delete value;
}

int IntField::add_char(int key) {
   if (pos < len && isdigit(key)) {
                changed = 1;
                string[pos] = key;
                ioP->write(&string[pos++], 1);
                return 0;
   }
   ioP->write("\a", 1);
   return 1;
}
int IntField::display_field(int use_underscores) {
   int firstchar;
#if USE_ALLOCA
   char *buf = (char *)alloca(len+1);
#else
   char *buf = new char[len+1];
#endif
   memset(buf, 'x', len);
   if (pos)
                firstchar = format_int(buf, len+1, *value);
   else
                firstchar = len;
   position(ioP, x, y);
   if (use_underscores) {
                ioP->write(underscores, firstchar);
                ioP->write(buf+firstchar, len-firstchar);
   } else {
                ioP->write(buf, len);
   }
   return 0;
}
int IntField::finalize_field() {
   changed = 0;
   string[pos] = 0;
   if (value != NULL)
                *value = atoi(string);
   return 0;
}

/*****************************************************************************
ShortField
*****************************************************************************/
ShortField::ShortField(InOut *ioP, int inx, int iny, int size, short *val) : Field(ioP, inx, iny, size), value(val) {
   if (value==NULL) {
                value = new short;
                need_free=1;
   }
}
ShortField::ShortField(InOut *ioP, int size, short *val) : Field(ioP, size), value(val) {
   if (value==NULL) {
                value = new short;
                need_free=1;
   }
}
ShortField::~ShortField() {
   if (need_free)
                delete value;
}

int ShortField::add_char(int key) {
   if (pos < len && isdigit(key)) {
                changed = 1;
                string[pos] = key;
                ioP->write(&string[pos++], 1);
                return 0;
   }
   ioP->write("\a", 1);
   return 1;
}
int ShortField::display_field(int use_underscores) {
   int firstchar;
#if USE_ALLOCA
   char *buf = (char *)alloca(len+1);
#else
   char *buf = new char[len+1];
#endif
   if (pos)
                firstchar = format_short(buf, len+1, *value);
   else
                firstchar = len;
   position(ioP, x, y);
   if (use_underscores) {
                ioP->write(underscores, firstchar);
                ioP->write(buf+firstchar, len-firstchar);
   } else {
                ioP->write(buf, len);
   }
   return 0;
}
int ShortField::finalize_field() {
   changed = 0;
   string[pos] = 0;
   if (value != NULL)
                *value = atoi(string);
   return 0;
}

/*****************************************************************************
ShortField
*****************************************************************************/
Int8Field::Int8Field(InOut *ioP, int inx, int iny, int size, unsigned char *val) : Field(ioP, inx, iny, size),
value(val) {
   if (value==NULL) {
                value = new unsigned char;
                need_free=1;
   }
}
Int8Field::Int8Field(InOut *ioP, int size, unsigned char *val) : Field(ioP, size), value(val) {
   if (value==NULL) {
                value = new unsigned char;
                need_free=1;
   }
}
Int8Field::~Int8Field() {
   if (need_free)
                delete value;
}

int Int8Field::add_char(int key) {
   if (pos < len && isdigit(key)) {
                changed = 1;
                string[pos] = key;
                ioP->write(&string[pos++], 1);
                return 0;
   }
   ioP->write("\a", 1);
   return 1;
}
int Int8Field::display_field(int use_underscores) {
   int firstchar;
#if USE_ALLOCA
   char *buf = (char *)alloca(len+1);
#else
   char *buf = new char[len+1];
#endif
   if (pos)
                firstchar = format_char(buf, len+1, *value);
   else
                firstchar = len;
   position(ioP, x, y);
   if (use_underscores) {
                ioP->write(underscores, firstchar);
                ioP->write(buf+firstchar, len-firstchar);
   } else {
                ioP->write(buf, len);
   }
   return 0;
}
int Int8Field::finalize_field() {
   changed = 0;
   string[pos] = 0;
   if (value != NULL)
                *value = atoi(string);
   return 0;
}

/*****************************************************************************
LongField
*****************************************************************************/
LongField::LongField(InOut *ioP, int inx, int iny, int size, long *val) : Field(ioP, inx, iny, size), value(val) {
   if (value==NULL) {
                value = new long;
                need_free=1;
   }
}
LongField::LongField(InOut *ioP, int size, long *val) : Field(ioP, size), value(val) {
   if (value==NULL) {
                value = new long;
                need_free=1;
   }
}
LongField::~LongField() {
   if (need_free)
                delete value;
}
int LongField::add_char(int key) {
   if (pos < len && isdigit(key)) {
                changed = 1;
                string[pos] = key;
                ioP->write(&string[pos++], 1);
                return 0;
   }
   ioP->write("\a", 1);
   return 1;
}
int LongField::display_field(int use_underscores) {
   int firstchar;
#if USE_ALLOCA
   char *buf = (char *)alloca(len+1);
#else
   char *buf = new char[len+1];
#endif
   if (pos)
```

```
                firstchar = format_long(buf, len+1, *value);
   else
                firstchar = len;
   position(ioP, x, y);
   if (use_underscores) {
                ioP->write(underscores, firstchar);
                ioP->write(buf+firstchar, len-firstchar);
   } else {
                ioP->write(buf, len);
   }
   return 0;
}
int LongField::finalize_field() {
   changed = 0;
   string[pos] = 0;
   if (value != NULL)
                *value = atoi(string);
   return 0;
}

/*****************************************************************************
MoneyField
*****************************************************************************/
MoneyField::MoneyField(InOut *ioP, int inx, int iny, int size, double *val) : Field(ioP, inx, iny, size),
value(val) {
   seen_dollar = seen_sign = seen_dot = seen_digit = 0;
   if (value==NULL) {
                value = new double;
                need_free=1;
   }
}
MoneyField::MoneyField(InOut *ioP, int size, double *val) : Field(ioP, size), value(val) {
   seen_dollar = seen_sign = seen_dot = seen_digit = 0;
   if (value==NULL) {
                value = new double;
                need_free=1;
   }
}
MoneyField::~MoneyField() {
   if (need_free)
                delete value;
}
int MoneyField::add_char(int key) {
   do {
                if (pos >= len)
                   break;
                if (key == '$') {
                   if (!(pos == 0 || (pos == 1 && seen_sign))) break;
                   seen_dollar = 1;
                } else if (key == '-') {
                   if (!(pos == 0 || (pos == 1 && seen_dollar))) break;
                   seen_sign = 1;
                } else if (key == '.') {
                   if (seen_dot) break;
                   seen_dot = 1;
                } else if (!isdigit(key))
                   break;
                if (seen_dot) {
                   if (seen_dot >= 4)
                                break;
                   seen_dot++;
                }
                changed = 1;
                string[pos] = key;
                ioP->write(&string[pos++], 1);
                return 0;
   } while (0);
   ioP->write("\a", 1);
   return 1;
}
int MoneyField::backspace() {
   ioP->write("\b_\b", 3);
   changed = 1;
   pos--;
   if (seen_dot)
                seen_dot--;
   if (string[pos] == '-')
                seen_sign = 0;
   if (string[pos] == '$')
                seen_dollar = 0;
   if (string[pos] == '.')
                seen_dot = 0;
   return 0;
}
int MoneyField::display_field(int use_underscores) {
   int firstchar;
#if USE_ALLOCA
   char *buf = (char *)alloca(len+1);
#else
   char *buf = new char[len+1];
#endif
   if (pos)
                firstchar = format_money(buf, len+1, *value);
   else
                firstchar = len;
   position(ioP, x, y);
   if (use_underscores) {
                ioP->write(underscores, firstchar);
                ioP->write(buf+firstchar, len-firstchar);
   } else {
                ioP->write(buf, len);
   }
   return 0;
}
int MoneyField::finalize_field() {
   changed = 0;
   string[pos] = 0;
   if (value != NULL) {
                *value = atof(string + seen_dollar + seen_sign);
                if (seen_sign)
                   *value = -*value;
   }
   return 0;
}
int MoneyField::reset() {
   Field::reset();
   seen_dollar = seen_sign = seen_dot = seen_digit = 0;
   return 0;
}

/*****************************************************************************
TextField
*****************************************************************************/
TextField::TextField(InOut *ioP, int inx, int iny, int size, char *str) : Field(ioP, inx, iny, size, str) {
   value=TextField::string;
}
TextField::TextField(InOut *ioP, int size, char *str) : Field(ioP, size, str) {
   value=TextField::string;
}
int TextField::add_char(int key) {
   if (pos >= len || (!isalnum(key) && key != ' ' && key != '.')) {
                ioP->write("\a", 1);
                return 1;
   }
   changed = 1;
   string[pos] = key;
   ioP->write(&string[pos++], 1);
   return 0;
}
```

## field.h

```
/* (C)1997 IBM Corporation */
#if !defined(INCLUDE_FIELD_H)
#define INCLUDE_FIELD_H

#include "inout.h"

class Field {
public:
   enum return_codes { INVALID, ENTER, NEXT_FIELD, PREV_FIELD, ABORT, REDISPLAY };
   InOut *ioP;
   int x, y;
   const int len;
   int pos;
   int changed;
   int need_redisplay;
   char *string;
   int (*ok_func)(void *data);
   int need_free;
   int need_free_string;
   void *ok_data;
   Field(InOut *ioP, int size, char *string=NULL);
   Field(InOut *ioP, int x, int y, int size, char *string=NULL);
   virtual ~Field();
   virtual int get_field (int need_pos=1);
   int get_key ();
   virtual int backspace();
   virtual int reset();
   virtual int start_position();
   virtual int add_char(int key);
   virtual int display_field(int use_underscores=0);
   virtual int finalize_field();

   class Error {
                enum { USER_ABORT };
   };
};

class Int8Field : public Field {
public:
   unsigned char *value;
   int add_char(int key);
   int display_field(int use_underscores=0);
   int finalize_field();

   Int8Field(InOut *ioP, int x, int y, int size, unsigned char *value=NULL);
   Int8Field(InOut *ioP, int size, unsigned char *value=NULL);
   virtual ~Int8Field();
};

class ShortField : public Field {
public:
   short *value;
   int add_char(int key);
```

```
   int display_field(int use_underscores=0);
   int finalize_field();

   ShortField(InOut *ioP, int x, int y, int size, short *value=NULL);
   ShortField(InOut *ioP, int size, short *value=NULL);
   virtual ~ShortField();
};


class IntField : public Field {
public:
   int *value;
   int add_char(int key);
   int display_field(int use_underscores=0);
   int finalize_field();

   IntField(InOut *ioP, int x, int y, int size, int *value=NULL);
   IntField(InOut *ioP, int size, int *value=NULL);
   virtual ~IntField();
};

class LongField : public Field {
public:
   long *value;
   int add_char(int key);
   int display_field(int use_underscores=0);
   int finalize_field();

   LongField(InOut *ioP, int x, int y, int size, long *value=NULL);
   LongField(InOut *ioP, int size, long *value=NULL);
   virtual ~LongField();
};

class MoneyField : public Field {
public:
   int seen_dollar, seen_sign, seen_dot, seen_digit;
   double *value;
   int add_char(int key);
   int reset();
   int backspace();
   int display_field(int use_underscores=0);
   int finalize_field();
   MoneyField(InOut *ioP, int x, int y, int size, double *value=NULL);
   MoneyField(InOut *ioP, int size, double *value=NULL);
   virtual ~MoneyField();
};

class TextField : public Field {
public:
   char *value;
   int add_char(int key);
   TextField(InOut *ioP, int x, int y, int size, char *value=NULL);
   TextField(InOut *ioP, int size, char *value=NULL);
};

Field *genfield(InOut *ioP, int x, int y, int len, int *ptr);
Field *genfield(InOut *ioP, int x, int y, int len, short *ptr);
Field *genfield(InOut *ioP, int x, int y, int len, long *ptr);
Field *genfield(InOut *ioP, int x, int y, int len, char *ptr);
Field *genfield(InOut *ioP, int x, int y, int len, unsigned char *ptr);
Field *genfield(InOut *ioP, int x, int y, int len, double *ptr);

#endif /* INCLUDE_FIELD_H */
```

## format.C

```
/* (C)1997 IBM Corporation */
#include <string.h>
#include <math.h>

int format_char(char *buf, int size, char val) {
   int neg, pos;
   pos = size;
   buf[--pos] = 0;
   if (val == 0 && pos > 0) {
                buf[--pos] = '0';
                neg = 0;
   } else {
                neg = (val < 0) ? 1 : 0;
                if (neg) val = -val;
                while (val && pos > 0) {
                   buf[--pos] = (val % 10) + '0';
                   val /= 10;
                }
   }
   /* Too long */
   if (!pos && (val || neg)) {
                memset (buf, '*', size);
                return -1;
   }
   if (neg)
                buf[--pos] = '-';
   if (pos)
                memset(buf, ' ', pos);
   return pos;
}
int format_short(char *buf, int size, short val) {
   int neg, pos;
   pos = size;
   buf[--pos] = 0;
   if (val == 0 && pos > 0) {
                buf[--pos] = '0';
                neg = 0;
   } else {
                neg = (val < 0) ? 1 : 0;
                if (neg) val = -val;
                while (val && pos > 0) {
                   buf[--pos] = (val % 10) + '0';
                   val /= 10;
                }
   }
   /* Too long */
   if (!pos && (val || neg)) {
                memset (buf, '*', size);
                return -1;
   }
   if (neg)
                buf[--pos] = '-';
   if (pos)
                memset(buf, ' ', pos);
   return pos;
}
int format_int(char *buf, int size, int val) {
   int neg, pos;
   pos = size;
   buf[--pos] = 0;
   if (val == 0 && pos > 0) {
                buf[--pos] = '0';
                neg = 0;
   } else {
                neg = (val < 0) ? 1 : 0;
                if (neg) val = -val;
                while (val && pos > 0) {
                   buf[--pos] = (val % 10) + '0';
                   val /= 10;
                }
   }
   /* Too long */
   if (!pos && (val || neg)) {
                memset (buf, '*', size);
                return -1;
   }
   if (neg)
                buf[--pos] = '-';
   if (pos)
                memset(buf, ' ', pos);
   return pos;
}
int format_long(char *buf, int size, long val) {
   int neg, pos;
   pos = size;
   buf[--pos] = 0;
   if (val == 0 && pos > 0) {
                buf[--pos] = '0';
                neg = 0;
   } else {
                neg = (val < 0) ? 1 : 0;
                if (neg) val = -val;
                while (val && pos > 0) {
                   buf[--pos] = (val % 10) + '0';
                   val /= 10;
                }
   }
   /* Too long */
   if (!pos && (val || neg)) {
                memset (buf, '*', size);
                return -1;
   }
   if (neg)
                buf[--pos] = '-';
   if (pos)
                memset(buf, ' ', pos);
   return pos;
}

int format_float(char *buf, int size, int dec, double val) {
   static double pow10[] = { 1, 10, 100, 1000, 10000, 100000, 1000000 };
   int neg, pos;
   pos = size;
   buf[--pos] = 0;
#ifndef WIN32
   val = rint(val * pow10[dec]);
#else /* there is no rint on NT. Use floor instead */
   val = floor(val * pow10[dec]+0.5);
#endif
   neg = (val < 0) ? 1 : 0;
   if (neg) val = -val;

   while (val >= 1 && pos > 0) {
                if (!dec--) {
                   buf[--pos] = '.';
                   continue;
                }
                buf[--pos] = (int)fmod(val, 10) + '0';
                val /= 10;
   }
```

```
    if (dec >= 0) {
                while (dec >= 0 && pos > 0) {
                    if (!dec--) {
                            buf[--pos] = '.';
                    } else {
                            buf[--pos] = '0';
                    }
                }
                if (pos > 0)
                    buf[--pos] = '0';
    }
    /* Too long */
    if (!pos && (val >= 1 || neg)) {
                memset (buf, '*', size);
                return -1;
    }
    if (neg)
                buf[--pos] = '-';
    if (pos)
                memset(buf, ' ', pos);
    return pos;
}

int format_money(char *buf, int size, double val) {
    int pos;
    pos = format_float(buf, size, 2, val);
    if (pos > 0)
                buf[--pos] = '$';
    return pos;
}

int format_date(char *buf, int size, unsigned char* val) {
    memcpy(buf, val, size);
    buf[size]=0;
    return 0;
}

int format_phone(char *buf, int size, unsigned char *phone) {
    buf[0] = phone[0];
    buf[1] = phone[1];
    buf[2] = phone[2];
    buf[3] = phone[3];
    buf[4] = phone[4];
    buf[5] = phone[5];
    buf[6] = '-';
    buf[7] = phone[6];
    buf[8] = phone[7];
    buf[9] = phone[8];
    buf[10] = '-';
    buf[11] = phone[9];
    buf[12] = phone[10];
    buf[13] = phone[11];
    buf[14] = '-';
    buf[15] = phone[12];
    buf[16] = phone[13];
    buf[17] = phone[14];
    buf[18] = phone[15];
    buf[19] = '\0';
    return size;
}

int format_zip(char *buf, int size, unsigned char *zip) {
    buf[0] = zip[0];
    buf[1] = zip[1];
    buf[2] = zip[2];
    buf[3] = zip[3];
    buf[4] = zip[4];
    buf[5] = '-';
    buf[6] = zip[5];
    buf[7] = zip[6];
    buf[8] = zip[7];
    buf[9] = zip[8];
    buf[10] = '\0';
    return size;
}
```

## format.h

```
/* (C)1997 IBM Corporation */
#if !defined(INCLUDE_FORMAT_H)
#define INCLUDE_FORMAT_H

int format_char (char *buf, int size, char   val);
int format_int  (char *buf, int size, int    val);
int format_long (char *buf, int size, long   val);
int format_short(char *buf, int size, short  val);
int format_float(char *buf, int size, int    dec, double val);
int format_money(char *buf, int size, double val);
int format_date (char *buf, int size, unsigned char  *val);
int format_phone(char *buf, int size, unsigned char  *phone);
int format_zip  (char *buf, int size, unsigned char  *zip);

#endif /* INCLUDE_FORMAT_H */
```

## get_local_time.c

```
/*
 *                    get_local_time.c
 *
 * $Revision: 1.2 $
 * $Date: 1998/11/06 21:42:02 $
 * $Log:              $
 *
 *
 * $TALog: get_local_time.c,v $
 * Revision 1.2  1998/11/06  21:42:02  dongfeng
 * - Add makefile-nt
 *
 * - cast cur_t from double to long to get rid of some warnings.
 * [from r1.1 by delta dongfeng-23677-TPCC-new-directory-structures, r1.2]
 *
 * Revision 1.1  1998/11/06  21:10:12  dongfeng
 * - Move all files common to client and server to tpcc/common
 *   directory
 * [added by delta dongfeng-23677-TPCC-new-directory-structures, r1.1]
 *
 * Revision 1.2  1998/10/22  19:18:33  dongfeng
 * [added by delta dongfeng-23067-TPCC-add-web-based-tpcc-client, r1.2]
 *
 */

#ifdef WIN32
#include "get_local_time.h"
#else
#include <sys/time.h>
#endif
#include <stdio.h>

#define Li2Double(x) ((double)((x).HighPart) * 4.294967296E9 + (double)((x).LowPart))

#ifdef WIN32
LARGE_INTEGER pFreq;
double sFreq;

get_time_init()
{
    QueryPerformanceFrequency(&pFreq);
    sFreq=Li2Double(pFreq);
}

get_local_time(struct timeval *timeP)
{
   double cur_t;
   LARGE_INTEGER counter;

   QueryPerformanceCounter(&counter);
   cur_t = Li2Double(counter) / sFreq;
   timeP->tv_sec = (long)cur_t;
   timeP->tv_usec = ((long)cur_t - timeP->tv_sec) * 1000000;
}

int gettimeofday(struct timeval *curTimeP, struct timezone *timezoneP)
{
   get_local_time(curTimeP);
   return 1;
}

#else
get_time_init()
{
}


get_local_time(struct timeval *timeP)
{
  struct timezone tz;

  gettimeofday(timeP, &tz);
}

#endif
```

## get_local_time.h

```
#ifndef _GET_LOCAL_TIME_H_
#define _GET_LOCAL_TIME_H_

#ifdef WIN32
#include <windows.h>
#include <winsock.h>

/*
 * gettimeofday is not available in the Microsoft C/C++ Run Time
 * and the Win32 API.
 */

*
 * It is not used and just for unix compatibility.
 */
struct timezone {
                char a;
};

get_time_init();
```

```
int gettimeofday(struct timeval *curTimeP, struct timezone *timezoneP);

#endif

#endif
```

## inout.C

```
/* (C)1997 IBM Corporation */
#include <string.h>
#ifndef WIN32
#include <strings.h>
#endif
#include <unistd.h>
#include <stdlib.h>
#ifdef WIN32
#include <io.h>
#include <winsock.h>
#endif
#include <stdio.h>
#include <ctype.h>
#include <errno.h>

#include "screen.h"

extern char *sys_errlist[];

#if 1
void InOut::write(const void *buf, size_t size) {
   if (IOError) return;
   debug("write('%*.*s', %d);\n", size, size, buf, size);
   output.queue(buf, size);
   if (!Hold && input.len() == 0) { /* Don't write anything until there is no input */
                flush();
   }
}

ssize_t InOut::read(void *buf, size_t size) {
   int rc;
   if (IOError) return(0);
   while (input.len() < size) {
#ifdef WIN32
                rc = recv(in_fd, (char *)input.ptr(), input.free(), 0);
#else
                rc = ::read(in_fd, input.ptr(), input.free());
#endif
      debug("::read('%*.*s', %d) = %d;\n", rc, rc, input.ptr(), input.free(), rc);
      if (inlog) {
                    fwrite(input.ptr(), rc, 1, inlog);
                    fflush(inlog);
      }
                if (rc > 0) {
                    input.queue(rc);
                } else if (rc <= 0) {
                    IOError = 1;
                    return(0);
                }
   }
   memcpy(buf, input.ptr(), size);
   input.dequeue(size);
   debug("read('%*.*s', %d) = %d;\n", size, size, buf, size, size);
   return size;
}
#else
void InOut::write(const void *buf, size_t size) {
   debug("write('%s', %d);\n", buf, size);
#ifdef WIN32
   send(out_fd, (char *)buf, size,0);
#else
   ::write(out_fd, buf, size);
#endif
}

ssize_t InOut::read(void *buf, size_t size) {
   int rc;
   rc = ::read(in_fd, buf, size);
   debug("read('%s', %d) = %d;\n", buf, size, rc);
   return rc;
}
#endif

void InOut::flush() {
   debug("flush();\n");
   Hold = 0;
   if (IOError) return;
   while (output.len()) {
      debug("::write('%*.*s', %d);\n", output.len(), output.len(), output.ptr(), output.len());
#ifdef WIN32
                int rc = send(out_fd, (char *)output.ptr(), output.len(),0);
#else
                int rc = ::write(out_fd, output.ptr(), output.len());
#endif
      if (outlog) {
                    fwrite(output.ptr(), rc, 1, outlog);
                    fflush(outlog);
      }
                if (rc > 0) {
                    output.dequeue(rc);
                } else if (rc < 0) {
                    err_printf("Error writing data!\n");
                    IOError = 1;
                    return;
                }
   }
}

void InOut::write(const void *buf) {
   write(buf, strlen((const char *)buf));
}

InOut::InOut(int in, int out) : input(256), output(2048) {
#ifndef WIN32
   struct termios buf;
#endif

#ifdef DEBUG
   {
                char buf[256];
                sprintf(buf, "logs/debug.%d", getpid());
                debugfile = fopen(buf, "w");
                sprintf(buf, "logs/in.%d", getpid());
                inlog     = fopen(buf, "w");
                sprintf(buf, "logs/out.%d", getpid());
                outlog    = fopen(buf, "w");
   }
#endif

   int rc;
   Hold = 0;
   debugfile = inlog = outlog = (FILE *)0;
   IOError = 0;

   in_fd = in;
   if (out < 0)
                out_fd = in;
   else
      out_fd = out;
#ifndef WIN32
   if ((rc = tcgetattr(in_fd, &save_term)) < 0) {
                return;
   }

   buf = save_term;

   buf.c_lflag &= ~(ECHO | ICANON); /* echo off, canonical mode off */

   buf.c_cc[VMIN] = 1;     /* Case B: 1 byte at a time, no timer */
   buf.c_cc[VTIME] = 0;

   err_printf("echo off - tcsetattr on %d\n", in_fd);
   if (tcsetattr(in_fd, TCSAFLUSH, &buf) < 0)
                return;
#endif
}

InOut::~InOut() {
#ifdef WIN32
   return;
#else
   if (tcsetattr(in_fd, TCSAFLUSH, &save_term) < 0)
                return;
#endif
}
```

## inout.h

```
/* (C)1997 IBM Corporation */

#ifndef INOUT_H
#define INOUT_H
#include <unistd.h>
#include <stdlib.h>
#include <stdio.h>
#include <ctype.h>
#ifndef WIN32
#include <termios.h>
#endif
#include <stdarg.h>
#include <string.h>

#include "tpcc.h"

/* This is for a VT100 */
#if 1
#define ESC "\033"
#define ESCc '\033'
#else
#define ESCc '^'
#define ESC "^"
#endif

#define TRIGGER "\021"
#define TRIGGERc '\021'

extern "C" err_printf(...);
```

```
#define POS(x,y) ESC "[" #y ";" #x "H"
#define CLEAR_EOS ESC "[J"

#ifdef WIN32
typedef int ssize_t;
#endif

class InOut {
private:
   class Buffer {
   private:
                int BufSize;
                enum { NUMMARKS=8 };
                char *buffer;
                int marks[NUMMARKS];
   public:
                int Pos;
                int Start;
      int num_marks;
                Buffer(int size) {
                   BufSize = size;
                   buffer = new char [BufSize];
                   Pos = Start = 0;
                   num_marks = 0;
                }
                int  pos()        { return Pos; };
                void pos(int P)   { Pos = P; };
                int  start()      { return Start; };
                void start(int S) { Start = S; };
                int  len()        { return Pos-Start; };
                int  free()       { return BufSize-Pos-1; };
                void *ptr()       { return &buffer[Start]; };
                int  lastmark()   { if (num_marks) return marks[num_marks-1]; return 999; };

                void  mark()      {
                   if (num_marks < NUMMARKS)
                                marks[num_marks++] = Pos;
                   else {
                                fprintf(stderr, "Buffer mark overflow\n");
                                exit (1);
                   }
                }
                void unmark() {
                   if (num_marks <= 0)
                                return;
                   num_marks--;
                }
                void pop() {
                   if (num_marks <= 0)
                                return;
                   if (marks[num_marks-1] >= Start) {
                                Pos=marks[--num_marks];
                   } else {
                                num_marks=0;
                   }
                }
                void queue(int size) {
                   Pos += size;
                }
                void queue(const void *buf, int size) {
                   /* If this is too big see if we can move what we have over */
                   if (size+Pos >= BufSize) {
                                if (size + len() >= BufSize) {
                                   fprintf(stderr, "Buffer overflow\n");
                                   exit (1);
                                }
                                /* This requires memcpy to be "safe" */
                                if (Start + len() >= BufSize) {
                                   fprintf(stderr, "Strange Error: Start %d + len %d >= size %d\n",
                                                Start , len(), BufSize);
                                   exit(1);
                                }
                                memcpy(buffer, &buffer[Start], len());
                                Pos -= Start;

                                /* Fix up our marks*/
                                int count = 0;
                                for (int i = 0; i < num_marks; i++) {
                                   if (marks[i] - Start >= 0)
                                                marks[count++] = marks[i] - Start;
                                }
                                num_marks = count;
                                Start = 0;
                   }
                   memcpy(&buffer[Pos], buf, size);
                   Pos += size;
                }
                void dequeue(int size) {
                   Start += size;
                   if (Start >= Pos) {
                                /* Fix up our marks*/
                                int count = 0;
                                for (int i = 0; i < num_marks; i++) {
                                   if (marks[i] - Start >= 0)
                                                marks[count++] = marks[i] - Start;
                                }
                                num_marks = count;
                                Start = Pos = 0;
                   }
                }
   };
   int in_fd, out_fd;
   int Hold;
#ifndef WIN32
   struct termios save_term;
#endif
   Buffer input;
   Buffer output;
   FILE *debugfile;
   FILE *inlog, *outlog;
public:
   int IOError;
   ssize_t read(void *buf, size_t size);
   void write(const void *buf, size_t size);
   void write(const void *buf);
   void flush();
   void mark() { debug("mark()\n"); output.mark(); };
   void unmark() { debug("unmark()\n"); output.unmark(); };
   void pop()  { debug("pop()\n\n"); output.pop(); };
   void hold() { debug("hold()\n");  Hold = 1; };
#ifdef DEBUG
   void debug(char *fmt, ...) {
                va_list args;

      fprintf(debugfile, "Start=%2d, Pos=%2d, Marks=%2d(%03d): ", output.Start, output.Pos,
output.num_marks, output.lastmark());
                va_start(args,fmt);
                vfprintf (debugfile, fmt, args);
                va_end (args);
                ::fflush(debugfile);
   }
#else
   void debug(char *fmt, ...) {};
#endif
   InOut(int in=0, int out=1);
   ~InOut();
};

extern char const * const blanks;
extern char const * const underscores;
extern char const * const backspaces;

int format_int(char *buf, int size, int val);
int format_float(char *buf, int size, int dec, double val);
int format_money(char *buf, int size, double val);

#endif /*  INOUT_H */
```

## mon_client.c

```
/*
 *              mon_client.c
 *
 * $Revision: 1.27 $
 * $Date: 1999/05/26 16:29:52 $
 * $Log:          $
 *
 *
 * $TALog: mon_client.c,v $
 * Revision 1.27  1999/05/26  16:29:52  wenjian
 * Sync with Austin code, and sync code for Oracle DB and SQL server.
 * [from r1.26 by delta wenjian-24433-TPCC-clean-up-and-update, r1.2]
 *
 * Revision 1.26  1999/05/06  21:28:26  oz
 * - Removed all the .. from the includes
 * - Added -I.. to the makefiles instead
 * - Moved all the thread related code and connection
 *   selection to serverMon.c
 * [from r1.16 by delta oz-24309-TPCC-add-oracle8.1-code, r1.5]
 *
 * Revision 1.16  1999/01/29  20:16:33  wenjian
 * - Rename client_init to init_encina_client because we have another
 *   client_init in screen/client.C
 * - Add code to read StatsFrequency from .tpccrc (UNIX only)
 * [from r1.15 by delta wenjian-23787-TPCC-integrate-code-for-AIX-and-NT, r1.7]
 *
 * Revision 1.15  1999/01/12  20:52:55  wenjian
 * Call initialization function to create the shared file mapping between
 * it and the corresponding dll.
 * [from r1.14 by delta wenjian-23856-TPCC-integrate-with-NT-performance-monitor, r1.1]
 *
 * Revision 1.14  1998/12/28  20:07:12  wenjian
 * - Change client_info to a pointer pClientInfo for flexibility.
 * [from r1.13 by delta wenjian-23788-TPCC-use-single-stats-var-for-each-client-and-server, r1.5]
 *
 * Revision 1.13  1998/12/16  17:17:41  wenjian
 * - Change (iStatsFrequency <= 1) to (iStatsFrequency < 1) in pre_rpc.
 * [from r1.12 by delta wenjian-23788-TPCC-use-single-stats-var-for-each-client-and-server, r1.4]
 *
 * Revision 1.12  1998/12/14  20:27:54  wenjian
 * Made corresponding changes due to data structure change of tran_info_t.
 * [from r1.11 by delta wenjian-23788-TPCC-use-single-stats-var-for-each-client-and-server, r1.3]
 *
 * Revision 1.11  1998/12/11  16:14:19  wenjian
```

```
* Add code for checking statistic data in a single variable and collecting
* statistic data based on iStatsFrequency.
*
* - Add code to store statistic data in a single var
* - Collect statistic data once every iStatsFreqency transactions
* [from r1.10 by delta wenjian-23788-TPCC-use-single-stats-var-for-each-client-and-server, r1.1]
*
* Revision 1.10  1998/12/08  23:03:49  wenjian
* Add (or rename) Makefile for each platform (AIX and NT). Reorganize the
* files a little bit.
*
* - Define variable iStatsFrequency for AIX
* [from r1.9 by delta wenjian-23787-TPCC-integrate-code-for-AIX-and-NT, r1.1]
*
* Revision 1.9  1998/12/08  18:55:19  wenjian
* In pre_rpc, set headerP->stats to iStatsFrequency
* [from r1.8 by delta wenjian-23785-TPCC-pass-statsFrequency-from-client-to-server, r1.1]
*
* Revision 1.8  1998/12/07  20:04:12  wenjian
* Clean up
* [from r1.7 by delta wenjian-23742-TPCC-update-with-Raliegh-code, r1.2]
*
* Revision 1.7  1998/11/24  21:45:59  wenjian
* - Add #ifdef MULTIPLE_INTERFACE
* - Check if we need to collect statistics for response time
* - Do mutex_lock for terminal_context_init
* [from r1.6 by delta wenjian-23742-TPCC-update-with-Raliegh-code, r1.1]
*
* Revision 1.6  1998/11/09  16:59:38  wenjian
* In this revision, most of the changes are related to the directory of header
* files after directory reorganization. Other changes include adding or removing
* files to put them in the right directories. Makefiles are written for NT
* platform so that nmake is working on NT now. Need a top level Makefile for all
* the directories.
* [from r1.5 by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.2]
*
* Revision 1.5  1998/11/09  14:48:16  wenjian
* In an effort to make a new directory structure for TPCC, this delta
* creates two directories: tpcc/client and tpcc/server. All the files
* for this revision are copied from tpcc/sp-tpcc without any change.
* Further change may be needed for some files due to the change of
* the directory structure.
* [added by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.1]
*
* Revision 1.43  1998/11/06  16:10:55  wenjian
* - Minor change to reduce the print statement
* [from r1.42 by delta wenjian-23646-TPCC-clean-up-source-code, r1.1]
*
* Revision 1.42  1998/10/27  14:57:51  dongfeng
* Change enc_status to a data structure that has fields:
*   - Status code
*   - Line Number
*   - File Name
*   - Encina Error Code
*   - Error Msg
* Remove statusMsgs in web_tpcc.c
* [from r1.41 by delta dongfeng-23067-TPCC-add-web-based-tpcc-client, r1.6]
*
* Revision 1.41  1998/10/26  14:41:34  dongfeng
* Add Init command in web client so when something bad happens during
* initialization web client sends back error information and allows
* reinitialization instead of killing IIS server.
*
* Define Macro CHK_STATUS instead of using #ifdef
* [from r1.40 by delta dongfeng-23067-TPCC-add-web-based-tpcc-client, r1.3]
*
* Revision 1.40  1998/10/22  21:24:11  wenjian
* [merge of changes from 1.23 to 1.39 into 1.38]
*
* Revision 1.39  1998/10/22  19:18:34  dongfeng
* [from r1.37 by delta dongfeng-23067-TPCC-add-web-based-tpcc-client, r1.2]
*
* Revision 1.37  1998/10/08  14:18:01  dongfeng
* Add codes for doing web-based tpcc.
* [from r1.23 by delta dongfeng-23067-TPCC-add-web-based-tpcc-client, r1.1]
*
* Revision 1.38  1998/10/08  18:03:01  gerstl
* Changes to allow configurations where some servers only service
* specific transaction types. Split transaction interfaces by type.
* [from r1.36 by delta gerstl-23515-TPCC-allow-separate-online-transaction-interfaces, r1.1]
*
* Revision 1.36  1998/10/07  15:14:22  gerstl
* [merge of changes from 1.26 to 1.31 into 1.34]
*
* Revision 1.31  1998/09/04  19:17:56  wenjian
* Remove log_file_handle and related code.
* [from r1.29 by delta wenjian-23183-TPCC-sync-AIX-code-with-Austin, r1.5]
*
* Revision 1.29  1998/08/28  18:30:00  wenjian
* This delta sync the TPCC code with Austin.
*
* Remove UNCOND_EVENT in CALLTPCC, pre_rpc and post_rpc.
* [from r1.26 by delta wenjian-23183-TPCC-sync-AIX-code-with-Austin, r1.1]
*
* Revision 1.34  1998/09/26  10:56:26  oz
* - renamed thread_init and thread_done to clnt_thread_init and
*   clnt_thread_done respectively because of name conflicts on AIX4.3
* [from r1.26 by delta oz-23339-TPCC-update-for-NT, r1.2]
*
* Revision 1.26  1998/08/18  14:38:41  wenjian
* Remove adl.h from this file since it is not ported on NT. Use corresponding
* rpc protect levels and authz levels to replace ADL_.... macros defined in
* adl.h
* [from r1.23 by delta wenjian-21750-TPCC-changes-for-porting-on-NT, r1.4]
*
* Revision 1.23  1998/06/17  15:05:45  wenjian
* Somehow, read and write didn't work for socket on NT, although they
* are supposed to work. As a work-around way, use recv and send for
* NT in this revision. We may change them back if the problem is gone.
*
* Define SKIP_RPC and add code to do tests without calling DCE.
* This addition is for test purpose only.
* [from r1.22 by delta wenjian-21750-TPCC-changes-for-porting-on-NT, r1.2]
*
* Revision 1.22  1998/02/17  22:13:49  wenjian
* [merge of changes from 1.19 to 1.20 into 1.21]
*
* Revision 1.20  1998/02/17  16:04:42  oz
* - Split the login into two parts to allow for special logins
* - If the warehouse ID is 0, this is a special login to
*   query the client for status
*
* - Keep track of threads that have been initialized and also
*   threads that are done.
* [from r1.19 by delta oz-21864-TPCC-split-client-login-screen, r1.1]
*
* Revision 1.21  1998/02/17  22:07:03  wenjian
* Minor changes for NT
* [from r1.19 by delta wenjian-21750-TPCC-changes-for-porting-on-NT, r1.1]
*
* Revision 1.19  1998/01/26  20:37:35  oz
* - Remove all the code associated with explicit binding
*
* - Removed GET_SERVER_INDEX
* - Removed bindingType
* - Removed explicit binding from CALLTPCC
* - Removed calls to cancel_all_reservations and to init_handles
* [from r1.18 by delta oz-21697-TPCC-remove-explicit-binding-code, r1.1]
*
* Revision 1.18  1998/01/26  16:43:32  oz
* - Removed the code for collecting stats in the client
*   and dumping them before exit.
*
* - Removed pre_rpc_stats and post_rpc_stats
* - Removed code to write the stats out
* [from r1.17 by delta oz-21691-TPCC-remove-client-stats-code, r1.1]
*
* Revision 1.17  1998/01/26  16:19:23  oz
* - moved all the code pertaining to the background
*   thread to its own file and all the data structures
*   to client_utils.h
* [from r1.16 by delta oz-21689-TPCC-move-client-bg-thread-to-separate-file, r1.1]
*
* Revision 1.16  1998/01/26  15:33:32  oz
* - call impTPCCNOInfo to make sure there is a server out there
* [from r1.15 by delta oz-21671-TPCC-merge-online-transaction-interfaces, r1.2]
*
* Revision 1.15  1998/01/23  21:58:51  oz
* - In order to simplify the Encina TPCC code: Merge the four
*   online transactions into 1 interface
* - Moved all the scripts to a scripts subdirectory
* - Removed unused files
* [from r1.14 by delta oz-21671-TPCC-merge-online-transaction-interfaces, r1.1]
*
* Revision 1.14  1998/01/23  15:07:53  oz
* - Updated the SP TPCC directory to the latest files used
*   during the SP tpcc audit.
* [from r1.13 by delta oz-20774-TPCC-update-to-latest-SP-version-11-27, r1.1]
*
*
*
*/

#include "common/get_local_time.h"
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <stdarg.h>
#include <time.h>
#if defined (solaris)
#include <dce/pthread.h>
#else   /* solaris */
#include <pthread.h>
#endif  /* solaris */
#include <tpm/mon/mon.h>
#include <utils/trace.h>
#include "common/delivery.h"
#ifdef MULTIPLE_INTERFACE
#include "common/neworder.h"
#include "common/payment.h"
#include "common/stocklevel.h"
#include "common/orderstatus.h"
#else
#include "common/tpcc_trans.h"
#endif
#include "common/utilities.h"
#include "client_utils.h"
#include "common/do_tpcc.h"
```

```
#include "client.h"
#include "encina_client.h"

#if 0
#define SKIP_RPC
#endif

extern void start_bg_debug_thread(void);
extern total_tran_count_t  *perfClntDataInit();

#define MAX_CONSECUTIVE_ERRORS 20

static void read_mon_environment(void);
static void client_trace(char *comp, int value, int add);
static void dump_pa_ring_buffer(trpc_handle_t pa_handle);

extern int warehouse_offset;

unsigned32      client_authnLevel;
unsigned32      client_authzSvc;

char *cellName;
int envRetrieval = 0;

static total_tran_count_t total_counts;  /* counts of transactions over
                                                                    * the entire test
                                                                    */

#ifndef WEB_TPCC_CLIENT
#undef CHK_STATUS
#define CHK_STATUS(status, val, a) if(status) {exit_program(status);}
MUTEX_T init_lock;
static int iStatsFrequency = 1;
#else
extern enc_status_t enc_status;
CRITICAL_SECTION    init_lock;
extern int iStatsFrequency;
#endif
int info_list_len = 0;
thread_info_t **info_list = NULL;  /*  List of all the thread info
                                                          *  structures.  This can be used
                                                          *  upon exit to cancel all the
                                                          *  reservations
                                                          */
total_tran_count_t  *pClientInfo=NULL;  /* keep stats for the client process */
static num_active_threads = 0;

#define NewOrder_code    NEWO_TRANS
#define Payment_code     PAYMENT_TRANS
#define OrderStatus_code ORDER_STAT_TRANS
#define Delivery_code    DELIVERY_TRANS
#define StockLevel_code  STOCK_TRANS

extern int useSecurity;

#define INT_ENV_VALUE(var, default) \
  (var = getenv(#var) ? atoi(getenv(#var)) : default)

#define PRE_RPC_WORK(contextP, dataP, tran, sub_tran) \
        if (contextP != NULL) \
                                    pre_rpc(contextP, &(dataP)->header, tran, sub_tran)
#define POST_RPC_WORK(contextP, dataP, tran) \
        if (contextP != NULL) \
                                    post_rpc(contextP, &(dataP)->header, tran)
#define TIME_STR_P(infoP)  (&((infoP)->last_tran))

/*                  CALTPCC
 *  Macro to sends 1 RPC and then handles any errors.
 *
 *  The macro takes the name of the RPC (e.g., NewOrder)
 *  and makes the RPC by calling the appropriate function
 *  (e.g., impTPCCNewOrder).
 */
#ifdef SKIP_RPC
#define CALLTPCC(name,infoP,data,trpcStatusP)               \
{                                                \
  struct timezone tz;                                                                          \
  struct timespec timeP;                                                          \
  char   tran_type[30];                                                                        \
  strcpy(tran_type,UTIL_STRING(name));                                            \
  timeP.tv_sec = 0;                                                                            \
  timeP.tv_nsec = 190000000;                                                      \
  if ( strcmp(tran_type,"NewOrder")==0 )                          \
      timeP.tv_nsec = 450000000;                                                  \
  if ( strcmp(tran_type,"Payment")==0 )                           \
      timeP.tv_nsec = 90000000;                                                   \
  pthread_delay_np(&timeP);                                                       \
  gettimeofday(&TIME_STR_P(infoP)->send, &tz);                          \
}
#else
#define CALLTPCC(name,infoP,data,trpcStatusP)                    \
{                                                    \
  struct timezone tz;
\
  if (infoP) gettimeofday(&TIME_STR_P(infoP)->send, &tz);                         \
  UTIL_CONCAT(impTPCC,name)(data,trpcStatusP);                       \
  if (*(trpcStatusP)) {                                    \
    char msg[100];                                        \
    sprintf(msg, "TRPC error during impTPCC%s", UTIL_STRING(name));    \
    (data)->header.returncode = TRPC_ERROR;                          \
    encina_error_message(msg, *(trpcStatusP));                       \
  } else if (((data)->header.returncode != TPCC_SUCCESS) &&            \
            ((data)->header.returncode != INVALID_NEWO)) {            \
    char msg[100];                                              \
    sprintf(msg, "App error during impTPCC%s: ", UTIL_STRING(name));   \
    encina_error_message(msg, (data)->header.returncode);             \
  }
      \
}
#endif

/*
 *  pre_rpc --   For debug purposes
 *
 *  Called before an RPC is made.
 *  Set the state of the thread and keep track of the time the RPC is sent.
 *  This is used by the Background thread to report the state of the client.
 */
static void pre_rpc(thread_info_t *thread_infoP,
                    data_header *headerP,
                    int tran_type,
                    int sub_tran_type)
{
    tran_timing_t *curP;
    struct timezone tz;

    curP = &thread_infoP->last_tran;
    curP->terminal = thread_infoP->thread_index;
    curP->tran = tran_type;
    curP->sub_tran = sub_tran_type;

    if (iStatsFrequency < 1) {
                    headerP->stats = 0;
    } else {
        int num;
        num = ++ (pClientInfo->tran[tran_type].num);
        headerP->stats = (num % iStatsFrequency==0) ? 1 : 0;
    }
    if (headerP->stats) { /* measure the time for RT */
                    gettimeofday(&curP->start, &tz);
                    headerP->start_time.sec = 0;
                    headerP->start_time.usec = 0;
                    headerP->end_time.sec = 0;
                    headerP->end_time.usec = 0;
#ifdef KEEP_TERMINAL_INFO
        set_client_debug_state((void *)thread_infoP, thread_state_sent, tran_type);
#endif
    }
}

/*
 *  post_rpc
 *
 *  Called when the RPC returns from the server
 *
 *  Keeps track of the client response time and the server response time
 *  as well as the state of the thread.  This is used by the background
 *  debug thread to report the state of the client
 */
static void post_rpc(thread_info_t *thread_infoP,
                                  data_header *headerP,
                                  int tran_type)
{
    double time_diff_s, time_diff_c;
    tran_timing_t *curP;
    struct timezone tz;

    if (!thread_infoP) return;

    curP = &thread_infoP->last_tran;

    curP->server = headerP->dtype;  /*  The server sets this by convention */
    if (headerP->stats) {
                    curP->srvr_start.tv_sec = headerP->start_time.sec;
                    curP->srvr_start.tv_usec = headerP->start_time.usec;
                    curP->srvr_done.tv_sec = headerP->end_time.sec;
                    curP->srvr_done.tv_usec = headerP->end_time.usec;

        gettimeofday(&curP->end, &tz);
    }

#ifdef KEEP_TERMINAL_INFO
    /* Store the info for each terminal */
    thread_infoP->num_trans++;
    thread_infoP->tran[tran_type].num ++;
    if ((headerP->returncode == TPCC_SUCCESS) ||
        (headerP->returncode == INVALID_NEWO)) {
      thread_infoP->consecutive_errors = 0;
      curP->tran_failed = 0;
      if (headerP->returncode == INVALID_NEWO) {
          curP->sub_tran |= 0x100;
      }
    } else {
      thread_infoP->tran[tran_type].errs ++;
      thread_infoP->consecutive_errors++;
      curP->tran_failed = 1;
    }
```

```
  if (headerP->stats && tran_type <= MAX_TRAN_TYPE && tran_type > 0
      && !curP->tran_failed) {
      set_client_debug_state((void *)thread_infoP, thread_state_received, 0);

      /* update total server round trip response time */
      time_diff_s = time_diff_ms(&(curP->srvr_done), &(curP->srvr_start));
      thread_infoP->tran[tran_type].RTtotal[1] += time_diff_s;

      /* update total client round trip response time */
      time_diff_c = time_diff_ms(&(curP->end), &(curP->start));
      thread_infoP->tran[tran_type].RTtotal[0] += time_diff_c;

                  /* update num for the number of trans which have RT measured */
      thread_infoP->tran[tran_type].RTcount ++;
  }

#else
  /* Store the info for each client.
   * Note: since we don't use mutex for performance reason, pClientInfo
         may not be accurate if more than one thread work on the same
         data at a same time. But this can reduce the overhead caused
         by scanning info_list for each terminal.
   */
  if ((headerP->returncode == TPCC_SUCCESS) ||
      (headerP->returncode == INVALID_NEWO)) {
    curP->tran_failed = 0;
    if (headerP->returncode == INVALID_NEWO) {
        curP->sub_tran |= 0x100;
    }
  } else {
    pClientInfo->tran[tran_type].errs ++;
    pClientInfo->errors ++;
    curP->tran_failed = 1;
  }
  if (headerP->stats && tran_type <= MAX_TRAN_TYPE && tran_type > 0
      && !curP->tran_failed) {
        /* update total server round trip response time */
        time_diff_s = time_diff_ms(&(curP->srvr_done), &(curP->srvr_start));
        pClientInfo->tran[tran_type].RTtotal[1] += time_diff_s;

        /* update total client round trip response time */
        time_diff_c = time_diff_ms(&(curP->end), &(curP->start));
        pClientInfo->tran[tran_type].RTtotal[0] += time_diff_c;

                  /* update num for the number of trans which have RT measured */
        pClientInfo->tran[tran_type].RTcount ++;
  }
#endif
}

/*
 * exit_program - restores original terminal attributes before leaving the
 *                program.
 */

void exit_program( err )
 short int err;
{
  if ( err )
                  fprintf(ERROUT , "exit_program: Error Code = %d\n", err );

  MUTEX_LOCK(&init_lock);
  /**  Cancel all the longterm reservations (if any)
   **              and write out the time-stamps
   **/
  if (info_list && (info_list_len > 0)) {
    int i;

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

                  if (info_list[i] && info_list[i]->initialized) {
                    info_list[i]->initialized = 0;
                  }
    }
  }

  MUTEX_UNLOCK(&init_lock);

  if (logtpcc) {
    fclose(logtpcc);
  } else {
    if (logtpcc = fopen(log_file_name, "w")) {
                  fprintf(logtpcc, "ERROR: Client exiting before SYNC with error %d\n",
                                  err);
                  fclose(logtpcc);
    }
  }

  mon_ExitClient( err );

#ifndef WEB_TPCC_CLIENT
  exit( err );
#endif
}

/*
 *  clnt_thread_init
 *
 *  This function must be called by each work thread
 *  It returns a pointer to a context that must be passed
 *  on calls back to this module.
 *  There is 1 threadInfo entry in an array for each executor thread.
 *  When an executor thread is started the first thing it does is call
 *  this clnt_thread_init function.  This function creates a context for the
 *  thread and if longterm reservations are used this function
 *  initializes the pa handle.
 */
void *clnt_thread_init(void)
{
    int thread_index;
    struct timezone tz;
    thread_info_t *thread_infoP;

    if (iStatsFrequency < 1)
                  return(NULL);

    thread_infoP = (thread_info_t *)calloc(1, sizeof(thread_info_t));

    thread_infoP->descr.state = thread_state_init;
    gettimeofday(&thread_infoP->descr.init, &tz);
    thread_infoP->initialized = 1;

    MUTEX_LOCK(&init_lock);
    thread_index = info_list_len++;
    thread_infoP->thread_index = thread_index;
    thread_infoP->thread_id = get_thread_id();

    num_active_threads++;
    info_list =
                  (thread_info_t **)realloc((void *)info_list,
                                                          sizeof(thread_info_t *) * info_list_len);
    info_list[thread_index] = thread_infoP;

    MUTEX_UNLOCK(&init_lock);

    if (num_active_threads % 200 == 0)
        err_printf("Thread %d Initialized (currently %d are active).\n",
                          thread_index, num_active_threads);


    return(thread_infoP);
}

/*
 *  clnt_thread_done
 *
 *  Called before a thread exits.
 *  Perform some cleanup.
 *
 */
void clnt_thread_done(contextP)
  void *contextP;
{
    int all_done = 0;
    int j;
    thread_info_t *infoP = (thread_info_t *)contextP;

    if (!infoP) return;


    MUTEX_LOCK(&init_lock);

    num_active_threads--;

#if 0
    err_printf("> thread_done, %d active\n", num_active_threads);
#endif

    set_client_debug_state((void *)infoP, thread_state_done, 0);
    infoP->done = 1;

    if (num_active_threads == 0) {
      all_done = 1;
    }

    if (info_list[infoP->thread_index] != infoP) {
      fprintf(ERROUT, "Strange error: expected to find %d in info_list[%d] and found %d instead\n",
                        infoP, infoP->thread_index,
                        info_list[infoP->thread_index]);
    }

    MUTEX_UNLOCK(&init_lock);
    if (all_done) {
                  int i;
                  thread_info_t **curP;
#if 0
                  fprintf(ERROUT, "All Done - exiting\n");
#endif
                  MUTEX_LOCK(&init_lock);
                  for (i=0, curP=info_list; i<info_list_len; i++, curP++) {
                      free(*curP);
                  }
                  free(info_list);
                  info_list = NULL;
                  info_list_len = 0;
                  MUTEX_UNLOCK(&init_lock);
#if 0
```

```
                exit(0);
#endif
    }
}

/*
 *  The following send_*** functions are called from the screen
 *  module after the transaction data is received in order to
 *  send the data to the server for processing.
 *
 */

/*
 *  send_new_order
 *              Send a new order request to the server
 */
void send_new_order(contextP, dataP)
  void *contextP;
  newOrder_data_t *dataP;
{
    thread_info_t *thread_context = (thread_info_t *)contextP;
    trpc_status_t trpcStatus;

    DPRINT(("New Order, w_id %d, %d orders\n", dataP->w_id, dataP->o_ol_cnt));
    PRE_RPC_WORK(thread_context, dataP, NEWO_TRANS, dataP->o_all_local == 0);
    CALLTPCC(NewOrder,thread_context,dataP,&trpcStatus)
    POST_RPC_WORK(thread_context, dataP, NEWO_TRANS);
}

/*
 *  send_payment
 *              Send a payment request to the server
 */
void send_payment(contextP, dataP)
  void *contextP;
  payment_data_t *dataP;
{
    trpc_status_t trpcStatus;
    thread_info_t *thread_context = (thread_info_t *)contextP;

    PRE_RPC_WORK(thread_context, dataP, PAYMENT_TRANS,
                                dataP->w_id != dataP->c_w_id);
    CALLTPCC(Payment,thread_context,dataP,&trpcStatus);
    POST_RPC_WORK(thread_context, dataP, PAYMENT_TRANS);
}

/*
 *  send_order_status
 *              Send a order status request to the server
 */
void send_order_status(contextP, dataP)
  void *contextP;
  orderStatus_data_t *dataP;
{
    trpc_status_t trpcStatus;
    thread_info_t *thread_context = (thread_info_t *)contextP;

    PRE_RPC_WORK(thread_context, dataP, ORDER_STAT_TRANS, 0);
    CALLTPCC(OrderStatus,thread_context,dataP,&trpcStatus);
    POST_RPC_WORK(thread_context, dataP, ORDER_STAT_TRANS);
}

/*
 *  send_delivery
 *              Send a delivery request to the server
 */
void send_delivery(contextP, dataP)
  void *contextP;
  delivery_data_t *dataP;
{
    trpc_status_t trpcStatus;
    thread_info_t *thread_context = (thread_info_t *)contextP;

    PRE_RPC_WORK(thread_context, dataP, DELIVERY_TRANS, 0);
    CALLTPCC(Delivery,thread_context,dataP,&trpcStatus);
    POST_RPC_WORK(thread_context, dataP, DELIVERY_TRANS);
}

/*
 *  send_stock_level
 *              Send a stock level request to the server
 */
void send_stock_level(contextP, dataP)
  void *contextP;
  stockLevel_data_t *dataP;
{
    trpc_status_t trpcStatus;
    thread_info_t *thread_context = (thread_info_t *)contextP;

    PRE_RPC_WORK(thread_context, dataP, STOCK_TRANS, 0);
    CALLTPCC(StockLevel,thread_context,dataP,&trpcStatus);
    POST_RPC_WORK(thread_context, dataP, STOCK_TRANS);
}

int too_many_errors(contextP)
  void *contextP;
{
  thread_info_t *thread_context = (thread_info_t *)contextP;
  return (thread_context->consecutive_errors > MAX_CONSECUTIVE_ERRORS);
}
/*
 *  Enroll the client:
 *              Perform the needed initialization
 */
void init_encina_client(user_id)
  int user_id;
{
    int i;
    mon_status_t                monStatus;
    char *env_str;
    char serverName[48];
    struct timezone tz;
    struct timeval a_time;
    unsigned long status ;
    FILE  *rcFile;

#ifdef WIN32
    get_time_init();
    pClientInfo = perfClntDataInit();
#endif
    if (pClientInfo == NULL)
                pClientInfo = malloc(sizeof(total_tran_count_t));
    memset(pClientInfo, 0, sizeof(total_tran_count_t));

    read_mon_environment();

    if(!cellName)
                CHK_STATUS(30, CELL_NAME_UNAVAILABLE,
              "ENCINA_TPM_CELL is not set!");

    MUTEX_INIT(&init_lock);

    info_list = NULL;
    info_list_len = 0;

#ifndef WEB_TPCC_CLIENT
    /* initialize iStatsFrequency */
    iStatsFrequency = 1;
    rcFile = fopen("~/.tpccrc", "r");
    if (rcFile!=NULL) {
       char buf[100];
                int num = 1;
                while (1) { /* read the whole rcFile */
          num = fscanf(rcFile,"%s",buf);
          if (num<=0) break;
                  if (strcasecmp(buf,"StatsFrequency")==0) {
                      fscanf(rcFile,"%d", &iStatsFrequency);
             break;
          }
       }
    }
    err_printf("iStatsFrequency=%d\n", iStatsFrequency);
#endif

    gettimeofday(&a_time, &tz);
#ifdef WIN32
    srand(a_time.tv_sec ^ a_time.tv_usec);
#else
    srand48(a_time.tv_sec ^ a_time.tv_usec);
#endif
}


/*
 *  Enroll the client:
 *              get the necessary handles.
 */
void enroll_client(user_id)
  int user_id;
{
    int i;
    mon_status_t                monStatus;
    char *env_str;
    char serverName[48];
    static  char  *clientName="tpcc_client";
    unsigned long status ;
    static  int   client_enrolled = 0;

    MUTEX_LOCK(&init_lock);
    if (client_enrolled) {
                MUTEX_UNLOCK(&init_lock);
                return;
    }
    if (useSecurity) {
                client_authnLevel = rpc_c_protect_level_connect;
                client_authzSvc = rpc_c_authz_dce;
    } else {
                client_authnLevel = rpc_c_protect_level_none;
                client_authzSvc = rpc_c_authz_none;
    }

    if (envRetrieval == 0) {
       ENCINA_CALL_RC("mon_RetrieveEnable",mon_RetrieveEnable(FALSE),status);
       CHK_STATUS(status, MON_RETRIEVEENABLE_FAILED,
              "mon_RetrieveEnable failed");
    }
```

```
   DPRINT(("Cell name: %s\n", cellName));

   ENCINA_CALL_RC("mon_InitClient",mon_InitClient(clientName,cellName),
status);
   CHK_STATUS(status, MON_INITCLIENT_FAILED,
              "mon_InitClient failed");

   DPRINT(("mon_SecuritySetDefaults-> authn %d, authz %d\n",
                     client_authnLevel, client_authzSvc));
   ENCINA_CALL_RC("mon_SecuritySetDefaults",
                                 mon_SecuritySetDefaults(client_authnLevel,client_authzSvc),
              status);
   CHK_STATUS(status, MON_SECURITYSET_FAILED,
             "mon_SecuritySetDefaults failed");

   ENCINA_CALL_RC("mon_SetHandleCacheRefreshInterval",
                                 mon_SetHandleCacheRefreshInterval(300), status);
   CHK_STATUS(status, MON_SETREFRESHINTERVAL_FAILED,
             "mon_SetHandleCacheRefreshInterval failed");

   {
      dbInfo_data_t data;
      trpc_status_t trpcStatus;
      /* Get DB Info -- currently id does not do anything
        but it will tell us if there is a server out there.
        Better to know instead of when all the terminals
        are up and ready
       */
      impTPCCNOInfo(&data, &trpcStatus);
      if (trpcStatus) {
         char msg[100];
         sprintf(msg, "TRPC error during db info at init.");
         encina_error_message(msg, trpcStatus);
         CHK_STATUS(33,NOINFO_TRPC_ERROR,
                    "TRPC error during db info at init");
      }
   }

   /* Start bg_thread for debug purpose and performance tuning.
    * In the final test, we do not start it in order to get the
    * best performance.
    * On NT, bg_thread may use lots of CPU. But we need to verify it.
    */
   if (1)
                  start_bg_debug_thread();

   client_enrolled = 1;
   MUTEX_UNLOCK(&init_lock);

}

/*-----------------------------------------------------------------*/
/*       Read environment paramaters                               */
/*-----------------------------------------------------------------*/
static void read_mon_environment()
{
   char *env_str;


   cellName = getenv("ENCINA_TPM_CELL");
   CHECK_ENVIRON(cellName, "ENCINA_TPM_CELL");

   if (env_str = getenv("TPCC_ENV_RETRIEVE")) {
                  envRetrieval = atoi(env_str);
   }
}

/*
 *  dump_pa_ring_buffer() -- For Debugging --
 *      Dump the ring buffer in the PA we are talking to
 *      Only works if we are using long term reservation
 */
static void dump_pa_ring_buffer(pa_handle)
 trpc_handle_t pa_handle;
{
 err_printf("Dumping Ring Buffer of server\n");
 admin_trace_DumpRingBuffer((handle_t)pa_handle, "stderr");
}


/* terminal_context_init:
 *    The same function as thread_init in the thread-pool version.
 *
 *  This function must be called by each terminal when using
 *  thread pool. After a terminal is logged on, the first thing
 *  it does is to call this function.
 *  This function creates a context for the terminal.
 *  It returns a pointer to a context that must be passed
 *  on calls back to this module.
 */
void *terminal_context_init(int fdIn)
{
   int thread_index;
   struct timezone tz;
   thread_info_t *thread_infoP;

   if (iStatsFrequency < 1)
                  return(NULL);

   thread_infoP = (thread_info_t *)calloc(1, sizeof(thread_info_t));

   thread_infoP->descr.state = thread_state_init;
   gettimeofday(&thread_infoP->descr.init, &tz);
   thread_infoP->initialized = 1;

   MUTEX_LOCK(&init_lock);
   thread_index = info_list_len++;
   thread_infoP->thread_index = thread_index;
   thread_infoP->thread_id = fdIn;

   num_active_threads++;
   info_list =
      (thread_info_t **)realloc((void *)info_list, \
                              sizeof(thread_info_t *) *\
                               info_list_len);
   info_list[thread_index] = thread_infoP;

   MUTEX_UNLOCK(&init_lock);

   if (num_active_threads % 200 == 0)
      err_printf("Terminal %d Initialized (currently %d are\
active).\n",\
                 thread_index, num_active_threads);



   return(thread_infoP);
}
```

## neworder.tacf

```
/*
 * Copyright (C) 1991, 1990 Transarc Corporation
 * All Rights Reserved
 */
/*
 * neworder.tacf -- attribute configuration file for tpcc server.
 * used for transparent binding
 *
 * $Revision: 1.1 $
 * $Date: 1998/11/06 21:10:13 $
 * $Log:          neworder.tacf,v $
 *
 * $TALog: neworder.tacf,v $
 * Revision 1.1  1998/11/06  21:10:13  dongfeng
 * - Move all files common to client and server to tpcc/common
 *   directory
 * [added by delta dongfeng-23677-TPCC-new-directory-structures, r1.1]
 *
 * Revision 1.2  1998/10/08  18:03:01  gerstl
 * Changes to allow configurations where some servers only service
 * specific transaction types. Split transaction interfaces by type.
 * [added by delta gerstl-23515-TPCC-allow-separate-online-transaction-interfaces, r1.1]
 *
 *
 *
 */

[implicit_handle (mon_handle_t handle)]
interface neworder
{
}
```

## neworder.tidl

```
/*
 * id: $id: $
 *
 * component_name: encina benchmarks
 *
 * the following functions list may not be complete.
 * functions defined by/via macros may not be included.
 *
 * functions:
 *    <fill_me_in>
 *
 * origins: transarc corp.
 *
 * (c) copyright transarc corp. 1995, 1993
 * all rights reserved
 * licensed materials - property of transarc
 *
 * us government users restricted rights - use, duplication or
 * disclosure restricted by gsa adp schedule contract with transarc corp
 */
/*
 * history
 * $talog: $
 */

/*
 * neworder.tidl -- interface definition file for tpccserver.
 *
```

```
 * $revision: 1.0 $
 * $date: 1995/10/20 21:55:05 $
 * $log:          tpcc.tidl,v $
 */

[
   uuid(f7065094-5e04-11d2-b351-9e621208aa77),
   version(1.0)
]
interface neworder
{
import "tpm/mon/mon_handle.idl";
import "tpcc_type.idl";

[nontransactional] void
                    impTPCCNewOrder([in,out] newOrder_data_t *dataP,
                                                    [out] trpc_status_t  * trpcStatus);
[nontransactional] void
        impTPCCNOInfo([out] dbInfo_data_t *dataP,
                    [out] trpc_status_t  * trpcStatus);
}
```

## orderstatus.tacf

```
/*
 * Copyright (C) 1991, 1990 Transarc Corporation
 * All Rights Reserved
 */
/*
 * orderstatus.tacf -- attribute configuration file for tpcc server.
 * used for transparent binding
 *
 * $Revision: 1.1 $
 * $Date: 1998/11/06 21:10:14 $
 * $Log:          $
 *
 * $TALog: orderstatus.tacf,v $
 * Revision 1.1  1998/11/06  21:10:14  dongfeng
 * - Move all files common to client and server to tpcc/common
 *   directory
 * [added by delta dongfeng-23677-TPCC-new-directory-structures, r1.1]
 *
 * Revision 1.2  1998/10/08  18:03:02  gerstl
 * Changes to allow configurations where some servers only service
 * specific transaction types. Split transaction interfaces by type.
 * [added by delta gerstl-23515-TPCC-allow-separate-online-transaction-interfaces, r1.1]
 *
 *
 */

[implicit_handle (mon_handle_t handle)]
interface orderstatus
{
}
```

## orderstatus.tidl

```
/*
 * id: $id: $
 *
 * component_name: encina benchmarks
 *
 * the following functions list may not be complete.
 * functions defined by/via macros may not be included.
 *
 * functions:
 *    <fill_me_in>
 *
 * origins: transarc corp.
 *
 * (c) copyright transarc corp. 1995, 1993
 * all rights reserved
 * licensed materials - property of transarc
 *
 * us government users restricted rights - use, duplication or
 * disclosure restricted by gsa adp schedule contract with transarc corp
 */
/*
 * history
 * $talog: $
 */

/*
 * orderstatus.tidl -- interface definition file for tpccserver.
 *
 * $revision: 1.0 $
 * $date: 1995/10/20 21:55:05 $
 * $log:          tpcc.tidl,v $
 */
[
   uuid(06287200-5e05-11d2-8984-9e621208aa77),
   version(1.0)
]
interface orderstatus
{
import "tpm/mon/mon_handle.idl";
import "tpcc_type.idl";

[nontransactional] void
                    impTPCCOrderStatus([in,out] orderStatus_data_t *dataP,
                                                    [out] trpc_status_t  * trpcStatus);
}
```

## payment.tacf

```
/*
 * Copyright (C) 1991, 1990 Transarc Corporation
 * All Rights Reserved
 */
/*
 * payment.tacf -- attribute configuration file for tpcc server.
 * used for transparent binding
 *
 * $Revision: 1.1 $
 *
 */

[implicit_handle (mon_handle_t handle)]
interface payment
{
}
```

## payment.tidl

```
/*
 * payment.tidl -- interface definition file for tpccserver.
 *
 * $revision: 1.0 $
 * $date: 1995/10/20 21:55:05 $
 * $log:          tpcc.tidl,v $
 */
[
   uuid(1341a902-5e05-11d2-bb70-9e621208aa77),
   version(1.0)
]
interface payment
{
import "tpm/mon/mon_handle.idl";
import "tpcc_type.idl";

[nontransactional] void
                    impTPCCPayment([in,out] payment_data_t *dataP,
                                                    [out] trpc_status_t  * trpcStatus);
}
```

## screen.C

```
/* (C)1997 IBM Corporation */
#include <unistd.h>
#include <stdlib.h>
#include <stdio.h>
#include <sys/types.h>
#include <ctype.h>
#include <string.h>
#include <math.h>

#include "screen.h"
#include "format.h"
#include "encina.h"

#define USE_INSULTS
#define LOCAL_SESSION_DATA

extern "C" err_printf(...);

extern char const * const blanks;
extern char const * const underscores;
extern char const * const backspaces;

static int clear_eos(InOut *ioP);
static int clear_eos(char *buf);
static int string_empty(char const *text);
static int pos_zero(int const *val);
static int pos_nonzeros(int const **val);

/*****************************************************************************
Screen
*****************************************************************************/
int Screen::reset() {
   has_data=0;
   pos=0;
   if (dataptr) memset(dataptr, 0, data_len);
   for (int i = 0; fields && fields[i] != NULL; i++) {
                    fields[i]->reset();
   }
   return 0;
};
```

```
int Screen::present_empty_fields() {
   if (empty_fields)
                  threadP->write(empty_fields, empty_fields_len);
//    threadP->write(end_str, end_str_len);
   return 0;
}
int Screen::present() {
   threadP->write(screen, screen_len);
   threadP->write(session_data, session_data_len);
   if (has_data) {
                  for (int i = 0; fields[i] != NULL; i++) {
                     fields[i]->display_field(1);
                  }
//                threadP->write(end_str, end_str_len);
   } else {
                  present_empty_fields();
   }
   return 0;
};
int Screen::user_input() {
   int key;
   has_data = 1;
   fields[pos]->start_position();
   threadP->flush();
//    threadP->mark();
   key = fields[pos]->get_field(0);
   do {
                  switch (key) {
                  case EOF:
                     return 0;
                     break;
                  case Field::NEXT_FIELD:
                     if (fields[++pos] == NULL) {
                                    pos = 0;
                     }
                     break;
                  case Field::PREV_FIELD:
                     if (--pos < 0) {
                                    while (fields[++pos] != NULL);
                                    pos--;
                     }
                     break;
                  case Field::REDISPLAY:
                     present();
                     break;
                  case Field::ABORT:
//                   position(1, 2);
                     threadP->write(end_str, end_str_len);
                     return 0;
                  case Field::ENTER:
                     if (validate()) {
//                                  threadP->pop();
                                    return 1;
                     }
                     break;
                  }
                  key = fields[pos]->get_field();
   } while (1);
   return 0;
}
Screen::~Screen() {
   if (fields != NULL) {
                  for (int lpos = 0; fields[lpos] != NULL; lpos++) {
                     delete fields[lpos];
                  }
                  delete [] fields;
   }
   fields=NULL;
}

int Screen::display_status(int status) {
   position(threadP, status_x, status_y);
   threadP->write("Execution Status: ");
   if (status == TRAN_OK) {
                  threadP->write("Transaction Committed");
   } else if (status == INVALID_ITEM) {
                  threadP->write("Item number is not valid");
   } else {
                  threadP->write("ERROR: Rollback -- ");
//                threadP->write("Rollback -- ");
                  char buf[6];
                  format_int(buf, 6, status);
                  threadP->write(buf, 5);
   }
   return 0;
}

int Screen::handle() {
   threadP->debug("%s - reset\n", tran_type);
   reset();

   threadP->debug("%s - present\n", tran_type);
   threadP->hold();
   present();
   threadP->write(TRIGGER, 1);
   threadP->debug("%s - user_input\n", tran_type);
   if (!user_input()) {
                  threadP->write(end_str, end_str_len);
                  threadP->write(TRIGGER, 1);
                  return -1;
   }
   threadP->flush();
   threadP->hold();
   threadP->debug("%s - process\n", tran_type);
   if (process()) {
                  threadP->write(end_str, end_str_len);
                  threadP->write(TRIGGER, 1);
                  return -1;
   }
   threadP->debug("%s - respond\n", tran_type);
   respond();
   //    position(threadP, 1, 2);
   threadP->write(end_str, end_str_len);
   threadP->write(TRIGGER, 1);
   threadP->flush();
   return 0;
}

/*****************************************************************************
NewOrder
*****************************************************************************/
int NewOrder::reset() {
   Screen::reset();
   pos=start_field;
   memset(dataptr, 0, sizeof(*data));
   return 0;
};
NewOrder::NewOrder(User_data *udP, Thread_data *threadP) : Screen(udP, threadP) {
   tran_type = NEWORDER_SERVICE;
   dataptr = data = new NewOrder_data;
   data_len = sizeof(NewOrder_data);


   status_x = 1;
   status_y = 24;

   screen          = static_screen;
   empty_fields    = static_empty_fields;
#ifdef LOCAL_SESSION_DATA
   session_data = new char[static_session_data_len+1];
   sprintf(session_data, "%s%5d", POS(12,4), user_dataP->warehouse);
#else
   session_data    = static_session_data;
   sprintf(session_data, "%s%5d", POS(12,4), user_dataP->warehouse);
#endif
   screen_len      = static_screen_len;
   empty_fields_len = static_empty_fields_len;
   session_data_len = static_session_data_len;

   int lpos = 0;
   fields = new Field *[2+MAX_ITEMS*3+1];
   for (int i = 0; i < MAX_ITEMS; i++) {
                  fields[lpos++] = genfield(threadP,  3, 9+i, 5, &data->item[i].s_OL_SUPPLY_W_ID);
                  fields[lpos++] = genfield(threadP, 10, 9+i, 6, &data->item[i].s_OL_I_ID);
                  fields[lpos++] = genfield(threadP, 45, 9+i, 2, &data->item[i].s_OL_QUANTITY);
#if defined(USE_SMART_FIELDS)
                  if (i > 0) {
                     int **tmp = new int *[4];
                     tmp[0] = &fields[lpos-6]->pos;
                     tmp[1] = &fields[lpos-5]->pos;
                     tmp[2] = &fields[lpos-4]->pos;
                     tmp[3] = NULL;
                     fields[pos-3]->ok_func = (int(*)(void*))pos_nonzeros;
                     fields[pos-3]->ok_data = tmp;
                     fields[pos-2]->ok_func = (int(*)(void*))pos_nonzeros;
                     fields[pos-2]->ok_data = tmp;
                     fields[pos-1]->ok_func = (int(*)(void*))pos_nonzeros;
                     fields[pos-1]->ok_data = tmp;
                  }
#endif
   }
   start_field = lpos;
   fields[lpos++] = genfield(threadP, 29, 4, 4, &data->s_D_ID); /* District */
   fields[lpos++] = genfield(threadP, 12, 5, 4, &data->s_C_ID); /* Customer */
   fields[lpos++] = NULL;
   reset();
};

int NewOrder::validate() {
   if (!fields[start_field]->pos) {
                  pos=start_field;
                  message(threadP, "District ID is a required field");
                  return 0;
   }
   if (!fields[start_field+1]->pos) {
                  pos=start_field+1;
                  message(threadP, "Customer ID is a required field");
                  return 0;
   }

   int last=-1;
   data->s_O_OL_CNT = 0;
   data->s_all_local = 1;
   data->s_W_ID = user_dataP->warehouse;
   for (int i = 0; i < MAX_ITEMS*3; i+=3 ) {
                  if (fields[i]->pos || fields[i+1]->pos || fields[i+2]->pos){
                     if (!fields[i]->pos) {
                                    pos=i;
```

```
#if defined(USE_INSULTS)
                        message(threadP, "Yeah, I think this is a bogus field too.");
#else
                        message(threadP, "Warehouse ID is a required field");
#endif
                        return 0;
                }
                if (!fields[i+1]->pos) {
                        pos=i+1;
#if defined(USE_INSULTS)
                        message(threadP, "Umm, WHAT did you want?");
#else
                        message(threadP, "Item ID is a required field");
#endif
                        return 0;
                }
                if (data->item[i/3].s_OL_QUANTITY <= 0) {
                        pos=i+2;
#if defined(USE_INSULTS)
                        message(threadP, "So something plus nothing is...");
#else
                        message(threadP, "Please enter a quantity greater than 0");
#endif
                        return 0;
                }
                if (data->item[i/3].s_OL_SUPPLY_W_ID != data->s_W_ID) {
                        data->s_all_local=0;
                }
                data->s_O_OL_CNT++;
            } else if (last < 0) {
                last = i;
            }
    }
    if (data->s_O_OL_CNT <= 0) {
            pos=0;
#if defined(USE_INSULTS)
            message(threadP, "It's kind of pointless without ordering something isn't it?");
#else
            message(threadP, "Please enter an item to order");
#endif
            return 0;

    }
    //  Compress the order lines:  some of them may be empty
    int ind;
    for (i=0, ind=0; ind<data->s_O_OL_CNT ; i++ ) {
       if (fields[i*3]->pos) {
          if (i > ind) {
             data->item[ind] = data->item[i];
          }
          ind ++;
       }
    }
    if (i > ind) {
            int j;
            for (j=ind; j<i; j++) {
                /*  At least one empty line was skipped  */
                data->item[j].s_OL_SUPPLY_W_ID = 0;
                data->item[j].s_OL_I_ID = 0;
                data->item[j].s_OL_QUANTITY = 0;
            }
    }

    return 1;
}

int NewOrder::respond() {
    int i;
    double amount, total_amount, cost;
    char buf[32];
    position(threadP,  1, 9); clear_eos(threadP);
    position(threadP, 25, 5); threadP->write(data->s_C_LAST);
    position(threadP, 52, 5); threadP->write(data->s_C_CREDIT);
    position(threadP, 15, 6); format_int(buf,10, data->s_O_ID); threadP->write(buf, 9);

    display_status(data->s_transtatus);
    if (data->s_transtatus != TRAN_OK) {
            return -1;
    }

    position(threadP, 25, 5); threadP->write( data->s_C_LAST);
    position(threadP, 52, 5); threadP->write( data->s_C_CREDIT);
    position(threadP, 15, 6); format_int( buf, 10, data->s_O_ID); threadP->write(buf, 9);
    position(threadP, 48, 6); format_int( buf, 3, data->s_O_OL_CNT); threadP->write(buf, 2);
    position(threadP, 61, 4); format_date(buf, 20, data->s_O_ENTRY_D); threadP->write(buf, 19);
    position(threadP, 64, 5); format_float(buf, 6, 2, data->s_C_DISCOUNT/100); threadP->write(buf, 5);
    position(threadP, 59, 6); format_float(buf, 6, 2, data->s_W_TAX/100); threadP->write(buf, 5);
    position(threadP, 74, 6); format_float(buf, 6, 2, data->s_D_TAX/100); threadP->write(buf, 5);
    total_amount = 0;
    for (i=0; i < data->s_O_OL_CNT; i++) {
                position(threadP,  3, 9+i); format_int(buf, 6, data->item[i].s_OL_SUPPLY_W_ID);
threadP->write( buf, 5 );
                position(threadP, 10, 9+i); format_int(buf, 7, data->item[i].s_OL_I_ID); threadP->write(
buf, 6 );
                position(threadP, 19, 9+i); threadP->write( data->item[i].s_I_NAME);
                position(threadP, 45, 9+i); format_int(buf, 3, data->item[i].s_OL_QUANTITY);
threadP->write(buf, 2);
                position(threadP, 51, 9+i); format_int(buf, 4, data->item[i].s_S_QUANTITY);
threadP->write(buf, 3);
                position(threadP, 58, 9+i); threadP->write(&data->item[i].s_brand_generic, 1);
                position(threadP, 62, 9+i); format_money(buf, 8, data->item[i].s_I_PRICE);
threadP->write(buf, 7);
                position(threadP, 71, 9+i); format_money(buf, 10, data->item[i].s_OL_AMOUNT);
threadP->write(buf, 9);
    }
    /* Clear the screen of any empty input fields */
    position(threadP, 63, 24); threadP->write( "Total:");
    position(threadP, 70, 24); format_money( buf, 10, data->s_total_amount ); threadP->write( buf, 9 );

    return 0;
}

/*****************************************************************************
Payment
*****************************************************************************/
Payment::Payment(User_data *udP, Thread_data *threadP)  : Screen(udP, threadP) {
    tran_type = PAYMENT_SERVICE;
    dataptr = data = new Payment_data;
    data_len = sizeof(Payment_data);

    int lpos = 0;
    screen          = static_screen;
    empty_fields     = static_empty_fields;
#ifdef LOCAL_SESSION_DATA
    session_data = new char[static_session_data_len+1];
    sprintf(session_data, "%s%5d", POS(12,6), user_dataP->warehouse);
#else
    session_data     = static_session_data;
    sprintf(session_data, "%s%5d", POS(12,6), user_dataP->warehouse);
#endif
    screen_len       = static_screen_len;
    empty_fields_len = static_empty_fields_len;
    session_data_len = static_session_data_len;

    fields = new Field *[7];
    fields[lpos++] = genfield(threadP,  52,  6,  2, &data->s_D_ID); /* District */
    fields[lpos++] = genfield(threadP,  11, 11,  4, &data->s_C_ID); /* Customer # */
    fields[lpos++] = genfield(threadP,  29, 12, 16, (char *)data->s_C_LAST); /* Name */
    fields[lpos++] = genfield(threadP,  33, 11,  5, &data->s_C_W_ID); /* Cust-Warehouse */
    fields[lpos++] = genfield(threadP,  54, 11,  2, &data->s_C_D_ID); /* Cust-District */
    fields[lpos++] = genfield(threadP,  23, 17,  8, &data->s_H_AMOUNT); /* Amount Paid */
    fields[lpos++] = NULL;
#if defined(USE_SMART_FIELDS)
    fields[1]->ok_func = (int(*)(void*))pos_zero;
    fields[1]->ok_data = &fields[2]->pos;
    fields[2]->ok_func = (int(*)(void*))pos_zero;
    fields[2]->ok_data = &fields[1]->pos;
#endif
};

int Payment::validate() {
    if (!fields[0]->pos) {
                pos=0;
                message(threadP, "District ID is a required field");
                return 0;
    }
    if (fields[1]->pos) {
#if defined(USE_BYNAME)
                data->s_byname = 0;
#endif
    } else if (fields[2]->pos) {
#if defined(USE_BYNAME)
                data->s_byname = 1;
#endif
    } else {
                pos=1;
                message(threadP, "Customer ID or Name is required");
                return 0;
    }

    if (!fields[3]->pos) {
                pos=3;
                message(threadP, "Customer Warehouse is a required field");
                return 0;
    }

    if (!fields[4]->pos) {
                pos=4;
                message(threadP, "Customer District is a required field");
                return 0;
    }

    if (data->s_H_AMOUNT <= 0) {
                pos=5;
                message(threadP, "Enter a positive amount");
                return 0;
    }

    data->s_W_ID = user_dataP->warehouse;

    return 1;
}

int Payment::respond() {
    if (data->s_transtatus != TRAN_OK) {
                display_status(data->s_transtatus);
                return -1;
    }
```

```
   char buf[32];
   position(threadP,  52, 6); format_int(buf, 3, data->s_D_ID);   threadP->write(buf, 2);
   position(threadP,  33,11); format_int(buf, 6, data->s_C_W_ID); threadP->write(buf, 4);
   position(threadP,  54,11); format_int(buf, 3, data->s_C_D_ID); threadP->write(buf, 2);
   position(threadP,   7, 4); threadP->write( data->s_H_DATE );
   position(threadP,   1, 7); threadP->write( data->s_W_STREET_1);
   position(threadP,  42, 7); threadP->write( data->s_D_STREET_1);
   position(threadP,   1, 8); threadP->write( data->s_W_STREET_2);
   position(threadP,  42, 8); threadP->write( data->s_D_STREET_2);
   position(threadP,   1, 9); threadP->write( data->s_W_CITY);
   position(threadP,  22, 9); threadP->write( data->s_W_STATE);
   position(threadP,  25, 9); format_zip(buf, 10, data->s_W_ZIP); threadP->write(buf, 10);
   position(threadP,  42, 9); threadP->write( data->s_D_CITY);
   position(threadP,  63, 9); threadP->write( data->s_D_STATE);
   position(threadP,  66, 9); format_zip(buf, 10, data->s_D_ZIP); threadP->write(buf, 10);
   position(threadP,  11,11); format_int( buf, 6, data->s_C_ID); threadP->write(buf, 4);
   position(threadP,   9,12); threadP->write( data->s_C_FIRST);
   position(threadP,  26,12); threadP->write( data->s_C_MIDDLE);
   position(threadP,  29,12); threadP->write( data->s_C_LAST);
   position(threadP,  58,12); format_date(buf, 10, data->s_C_SINCE); threadP->write( buf, 10);
   position(threadP,   9,13); threadP->write( data->s_C_STREET_1);
   position(threadP,  58,13); threadP->write( data->s_C_CREDIT);
   position(threadP,   9,14); threadP->write( data->s_C_STREET_2);
   position(threadP,  58,14); format_float(buf, 6, 2, data->s_C_DISCOUNT/100); threadP->write(buf, 6);
   position(threadP,   9,15); threadP->write( data->s_C_CITY);
   position(threadP,  30,15); threadP->write( data->s_C_STATE);
   position(threadP,  33,15); format_zip(buf, 10, data->s_C_ZIP); threadP->write(buf, 10);
   position(threadP,  58,15); format_phone(buf, 18, data->s_C_PHONE ); threadP->write(buf, 18);
   position(threadP,  17,17); format_money( buf, 15, data->s_H_AMOUNT); threadP->write(buf, 14);
   position(threadP,  55,17); format_money( buf, 16, data->s_C_BALANCE); threadP->write(buf, 15);
   position(threadP,  17,18); format_money( buf, 15, data->s_C_CREDIT_LIM); threadP->write(buf, 14);

   if (data->s_C_CREDIT[0] == 'B' && data->s_C_CREDIT[1] == 'C') {
                int i, size = strlen((char *)data->s_C_DATA);
                for (i = 0; i < 4; i++) {
                   position(threadP, 12,20+i);
                   threadP->write(data->s_C_DATA, (size > 50)?50:size);
                   size -= 50;
                   if (size <= 0) break;

                }
   }

   return 0;
}

/*****************************************************************************
OrderStatus
*****************************************************************************/
OrderStatus::OrderStatus(User_data *udP, Thread_data *threadP) : Screen(udP, threadP) {
   tran_type = ORDERSTATUS_SERVICE;
   dataptr = data = new OrderStatus_data;
   data_len = sizeof(OrderStatus_data);

   status_x=1;
   status_y=25;

   int pos = 0;
   screen          = static_screen;
   empty_fields    = static_empty_fields;
#ifdef LOCAL_SESSION_DATA
   session_data = new char[static_session_data_len+1];
   sprintf(session_data, "%s%5d", POS(12,4), user_dataP->warehouse);
#else
   session_data    = static_session_data;
   sprintf(session_data, "%s%5d", POS(12,4), user_dataP->warehouse);
#endif
   screen_len      = static_screen_len;
   empty_fields_len = static_empty_fields_len;
   session_data_len = static_session_data_len;

   fields = new Field *[4];
   fields[pos++] = genfield(threadP,  29,  4,  2, &data->s_D_ID ); /* District */
   fields[pos++] = genfield(threadP,  11,  5,  4, &data->s_C_ID ); /* Customer ID */
   fields[pos++] = genfield(threadP,  44,  5, 16, (char *)data->s_C_LAST ); /* Customer Name */
   fields[pos++] = NULL;
#if defined(USE_SMART_FIELDS)
   fields[1]->ok_func = (int(*)(void*))pos_zero;
   fields[1]->ok_data = &fields[2]->pos;
   fields[2]->ok_func = (int(*)(void*))pos_zero;
   fields[2]->ok_data = &fields[1]->pos;
#endif
};

int OrderStatus::validate() {
   if (!fields[0]->pos) {
                pos=0;
                message(threadP, "District ID is a required field");
                return 0;
   }
   if (fields[1]->pos) {
#if defined(USE_BYNAME)
                data->s_byname = 0;
#endif
   } else if (fields[2]->pos) {
#if defined(USE_BYNAME)
                data->s_byname = 1;
#endif
   } else {
                pos=1;
                message(threadP, "Customer ID or Name is required");
                return 0;
   }

   data->s_W_ID = user_dataP->warehouse;

   return 1;
}

int OrderStatus::respond() {
   display_status(data->s_transtatus);
   if (data->s_transtatus != TRAN_OK)
                return -1;

   char buf[32];

   position(threadP, 11, 5); format_int(buf, 6, data->s_C_ID); threadP->write(buf, 4);
   position(threadP, 24, 5); threadP->write(data->s_C_FIRST);
   position(threadP, 41, 5); threadP->write(data->s_C_MIDDLE);
   position(threadP, 44, 5); threadP->write(data->s_C_LAST);
   position(threadP, 15, 6); format_money(buf, 11, data->s_C_BALANCE); threadP->write(buf, 10);
   position(threadP, 15, 8); format_int(buf, 10, data->s_O_ID); threadP->write(buf, 9);
   position(threadP, 38, 8); format_date(buf, 19, data->s_O_ENTRY_D); threadP->write(buf);
   if (data->s_O_CARRIER_ID > 0) {
                position(threadP, 76, 8);
                format_int(buf, 3, data->s_O_CARRIER_ID);
                threadP->write(buf, 2);
   }

   for (int i=0; i < data->s_ol_cnt; i++) {
                position(threadP,  3, i+10);
                format_int(buf, 6, data->item[i].s_OL_SUPPLY_W_ID);
                threadP->write(buf, 5);

                position(threadP, 14, i+10);
                format_int(buf, 7, data->item[i].s_OL_I_ID);
                threadP->write(buf, 6);

                position(threadP, 25, i+10);
                format_int(buf, 3, data->item[i].s_OL_QUANTITY);
                threadP->write(buf, 2);

                position (threadP, 32, i+10);
                format_money(buf, 10, data->item[i].s_OL_AMOUNT);
                threadP->write(buf, 9);

                position (threadP, 47, i+10);
                format_date(buf, 20, data->item[i].s_OL_DELIVERY_D);
                threadP->write(buf, 19);
   }

   return 0;
}

/*****************************************************************************
Delivery
*****************************************************************************/
Delivery::Delivery(User_data *udP, Thread_data *threadP) : Screen(udP, threadP) {
   tran_type = DELIVERY_SERVICE;
   dataptr = data = new Delivery_data;
   data_len = sizeof(Delivery_data);

   status_x = 1;
   status_y = 8;

   int pos = 0;
   screen          = static_screen;
   empty_fields    = static_empty_fields;
#ifdef LOCAL_SESSION_DATA
   session_data = new char[static_session_data_len+1];
   sprintf(session_data, "%s%5d", POS(12,4), user_dataP->warehouse);
#else
   session_data    = static_session_data;
   sprintf(session_data, "%s%5d", POS(12,4), user_dataP->warehouse);
#endif
   screen_len      = static_screen_len;
   empty_fields_len = static_empty_fields_len;
   session_data_len = static_session_data_len;

   fields = new Field *[2];
   fields[pos++] = genfield(threadP,  17,  6,  2, &data->s_O_CARRIER_ID ); /* Carrier Number */

   fields[pos++] = NULL;
};

int Delivery::validate() {
   if (!fields[0]->pos) {
                pos=0;
                message(threadP, "Carrier ID is a required field");
                return 0;
   }
   time((time_t *)&(data->s_queued_time));

   data->s_W_ID = user_dataP->warehouse;

   return 1;
}
```

```
int Delivery::respond() {
   if (data->s_transtatus == TRAN_OK) {
                  position(threadP, status_x, status_y);
                  threadP->write("Execution Status: Delivery has been queued");
   } else {
                  display_status(data->s_transtatus);
                  return -1;
   }
   return 0;
}

/*****************************************************************************
StockLevel
*****************************************************************************/
StockLevel::StockLevel(User_data *udP, Thread_data *threadP) : Screen(udP, threadP) {
   tran_type = STOCKLEVEL_SERVICE;
   dataptr = data = new StockLevel_data;
   data_len = sizeof(StockLevel_data);

   status_x = 1;
   status_y = 10;

   int pos = 0;
   screen          = static_screen;
   empty_fields    = static_empty_fields;
   session_data    = static_session_data;
#ifdef LOCAL_SESSION_DATA
   session_data = new char[static_session_data_len+1];
   sprintf(session_data, "%s%5d%s%2d", POS(12,4), user_dataP->warehouse,
                                                                    POS(29,4),
user_dataP->district);
#else
   session_data    = static_session_data;
   sprintf(session_data, "%s%5d%s%2d", POS(12,4), user_dataP->warehouse,
                                                                    POS(29,4),
user_dataP->district);
#endif
   screen_len      = static_screen_len;
   empty_fields_len = static_empty_fields_len;
   session_data_len = static_session_data_len;

   fields = new Field *[2];
   fields[pos++] = genfield(threadP,  24,  6,  2, &data->s_threshold ); /* Threshold */
   fields[pos++] = NULL;
};

int StockLevel::validate() {
   if (data->s_threshold <= 0) {
                  pos=0;
                  message(threadP, "A positive non-zero threshold is required");
                  return 0;
   }
   data->s_W_ID = user_dataP->warehouse;
   data->s_D_ID = user_dataP->district;

   return 1;
}

int StockLevel::respond() {
   display_status(data->s_transtatus);
   if (data->s_transtatus != TRAN_OK)
                  return -1;

   position(threadP, 12, 8);
   char buf[5];
   format_int(buf, 4, data->s_low_stock);
   threadP->write(buf, 4);

   return 0;
}

/*****************************************************************************
 perform
*****************************************************************************/
int NewOrder::process() {
   if (tran_type == NULL)
                  return 0;

   if (encina.tran(data, threadP->contextP, tran_type) < 0) {
                  return -1;
   }
   return 0;
}

int Payment::process() {
   if (tran_type == NULL)
                  return 0;

   if (encina.tran(data, threadP->contextP, tran_type) < 0) {
                  return -1;
   }
   return 0;
}

int StockLevel::process() {
   if (tran_type == NULL)
                  return 0;

   if (encina.tran(data, threadP->contextP, tran_type) < 0) {
                  return -1;
   }
   return 0;
}

int OrderStatus::process() {
   if (tran_type == NULL)
                  return 0;

   if (encina.tran(data, threadP->contextP, tran_type) < 0) {
                  return -1;
   }
   return 0;
}

int Delivery::process() {
   if (tran_type == NULL)
      return 0;

   if (encina.tran(data, threadP->contextP, tran_type) < 0) {
      return -1;
   }
   return 0;
}


int Screen::process() {
   if (tran_type == NULL)
                  return 0;
   return 0;
}


/*****************************************************************************
Login
*****************************************************************************/
Login::Login(User_data *udP, Thread_data *threadP) : Screen(udP, threadP) {
   tran_type = NULL;
   status_x=1;
   status_y=24;

   dataptr = NULL;
   data_len = 0;

   int pos = 0;
   screen          = static_screen;
   screen_len      = static_screen_len;
   empty_fields    = static_empty_fields;
   empty_fields_len = static_empty_fields_len;

   fields = new Field *[3];
   fields[pos++] = genfield(threadP,  16,  5,  5, &(udP->warehouse) ); //Warehouse
   fields[pos++] = genfield(threadP,  34,  5,  2, &(udP->district)  ); //District
   fields[pos++] = NULL;
};
int Login::validate() {
   if (!fields[0]->pos) {
                  pos=0;
                  message(threadP, "Warehouse ID is a required field");
                  return 0;
   }
   if (!fields[1]->pos) {
                  pos=1;
                  message(threadP, "District ID is a required field");
                  return 0;
   }

   return 1;
}


/*****************************************************************************
Menu
*****************************************************************************/
Menu::Menu(User_data *udP, Thread_data *threadP) : Screen(udP, threadP) {
   tran_type = NULL;
   status_x=1;
   status_y=24;

   int pos = 0;
   screen          = static_screen;
   screen_len      = static_screen_len;
   empty_fields    = NULL;
   empty_fields_len = 0;


   fields = NULL;
};

/*****************************************************************************
Static data
*****************************************************************************/
char const * const blanks      = "                                        ";
char const * const underscores = "________________________________________";
char const * const backspaces  = "\b\b\b\b\b\b\b\b\b\b";

/*****************************************************************************
Utility Functions
```

```
*****************************************************************************/
static int string_empty(char const *data) {
   return data[0] == 0;
}
static int pos_zero(int const *val) {
   return *val == 0;
}
static int pos_nonzeros(int const **val) {
   int const **ptr;
   for (ptr = val; *ptr; ptr++) {
                  if (**ptr == 0)
                     return 0;
   }
   return 1;
}

int position(int x, int y, char *buf) {
   int pos = 0;
   buf[pos++] = ESCc;
   buf[pos++] = '[';
   if (y >= 10) buf[pos++] = (y / 10) + '0';
   buf[pos++] = (y % 10) + '0';
   buf[pos++] = ';';
   if (x >= 10) buf[pos++] = (x / 10) + '0';
   buf[pos++] = (x % 10) + '0';
   buf[pos++] = 'H';
   buf[pos++] = 0;
   return 0;
}

int position(InOut *threadP, int x, int y) {
   char buf[16];
   position(x, y, buf);
   threadP->write(buf);
   return 0;
}

static int clear_eos(InOut *threadP) {
   threadP->write (ESC "[J");
   return 0;
}


int message(InOut *threadP, char const *text, int need_flush) {
   position(threadP, 1,25);
   threadP->write(text);
   clear_eos(threadP);
   if (need_flush)
     threadP->flush();
   return 0;
}

static int clear_eos(char *buf) {
   buf[0] = ESCc;
   buf[1] = '[';
   buf[2] = 'J';
   return 0;
}
```

## screen.h

```
/* (C)1997 IBM Corporation */
#include <unistd.h>
#include <stdlib.h>
#include <stdio.h>
#include <ctype.h>
#ifndef WIN32
#include <termios.h>
#endif
#include <time.h>

#include "field.h"
#include "inout.h"
#include "tpcc.h"

extern int position(int x, int y, char *buf);
extern int position(InOut *ioP, int x, int y);
extern int message(InOut *ioP, char const *text, int need_flush=1);


class User_data {
public:
   int warehouse;
   int district;
};

class Thread_data : public InOut {
 public:
   void          *contextP;
   Thread_data(int infd, int outfd, void *conP) : InOut(infd, outfd), contextP(conP) {};
};

class Screen {
protected:
   static char const end_str[];
   static int       end_str_len;
         int       has_data;
   void      *dataptr;
   char      *tran_type;
   char const *screen;
   char const *empty_fields;
   char      *session_data;
   int       screen_len;
   int       session_data_len;
   int       empty_fields_len;
   int       pos;
   int       status_x, status_y;
   int       data_len;
   Thread_data                  *threadP;

public:
   User_data  *user_dataP;
   Field **fields;
   virtual char const *isa() { return "Screen"; };
   virtual int reset();
   virtual int present();
   virtual int present_empty_fields();
   virtual int process();
   virtual int user_input();
   virtual int validate()          { return 1; };
   virtual int respond()           { return 0; };
   int handle();
   int display_status(int status);
   Screen(User_data *udP, Thread_data *thrP) {
                  user_dataP = udP;
                  threadP = thrP;
                  has_data = 0;
                  pos = 0;
                  fields = NULL;
                  screen = empty_fields = session_data = NULL;
                  screen_len = session_data_len = empty_fields_len = 0;
   };
   virtual ~Screen();
};

class Login : public Screen {
protected:
   static char const static_screen[];
   static char const static_empty_fields[];
   static char static_session_data[];
   static int  static_screen_len;
   static int  static_empty_fields_len;
   static int  static_session_data_len;
public:
   int validate();
   Login::Login(User_data *udP, Thread_data *thrP);
};

class NewOrder : public Screen {
protected:
   static char const static_screen[];
   static char const static_empty_fields[];
   static char static_session_data[];
   static int  static_screen_len;
   static int  static_empty_fields_len;
   static int  static_session_data_len;
   int start_field;
   void swap_fields(int i, int j);
public:
   NewOrder_data *data;

   int reset();
   NewOrder::NewOrder(User_data *udP, Thread_data *thrP);
   int validate();
   int process();
   int respond();
};

class Payment : public Screen {
protected:
   static char const static_screen[];
   static char const static_empty_fields[];
   static char static_session_data[];
   static int  static_screen_len;
   static int  static_empty_fields_len;
   static int  static_session_data_len;
public:
   Payment_data *data;
   int validate();
   int process();
   int respond();
   Payment(User_data *udP, Thread_data *thrP);
};

class OrderStatus : public Screen {
protected:
   static char const static_screen[];
   static char const static_empty_fields[];
   static char static_session_data[];
   static int  static_screen_len;
   static int  static_empty_fields_len;
   static int  static_session_data_len;
public:
   OrderStatus_data *data;
   int validate();
   int process();
   int respond();
```

```
    OrderStatus(User_data *udP, Thread_data *thrP);
};

class Delivery : public Screen {
protected:
    static char const static_screen[];
    static char const static_empty_fields[];
    static char static_session_data[];
    static int  static_screen_len;
    static int  static_empty_fields_len;
    static int  static_session_data_len;
public:
    Delivery_data *data;
    int validate();
    int process();
    int respond();

    Delivery(User_data *udP, Thread_data *thrP);
};

class StockLevel : public Screen {
protected:
    static char const static_screen[];
    static char const static_empty_fields[];
    static char static_session_data[];
    static int  static_screen_len;
    static int  static_empty_fields_len;
    static int  static_session_data_len;
public:
    StockLevel_data *data;
    int validate();
    int process();
    int respond();

    StockLevel(User_data *udP, Thread_data *thrP);
};

class Menu : public Screen {
protected:
    static char const static_screen[];
    static char const static_empty_fields[];
    static char static_session_data[];
    static int  static_screen_len;
    static int  static_empty_fields_len;
    static int  static_session_data_len;
public:
    Menu(User_data *udP, Thread_data *thrP);
};
```

## screen_data.C

```
/* (C)1997 IBM Corporation */
#include "screen.h"


char const NewOrder::static_screen[] =
    POS( 1, 3) CLEAR_EOS
    POS(36, 3) "New Order"
    POS( 1, 4) "Warehouse"
    POS(19, 4) "District:"
    POS(55, 4) "Date:"
    POS( 1, 5) "Customer:"

    POS(19, 5) "Name:"
    POS(44, 5) "Credit:"
    POS(57, 5) "Disc.:"
    POS( 1, 6) "Order Number:"
    POS(25, 6) "Number of Lines:"
    POS(52, 6) "W_Tax:"
    POS(67, 6) "D_Tax:"
    POS( 2, 8) "Supp_W Item_Num Item_Name"
    POS(44, 8) "Qty  Stock   B/G    Price   Amount"
;

char const NewOrder::static_empty_fields[] =
    POS(29, 4) "____" /* District */
    POS(12, 5) "____" /* Customer */

    POS( 3, 9) "_____"
    POS(10, 9) "______"
    POS(45, 9) "__"
    POS( 3,10) "_____"
    POS(10,10) "______"
    POS(45,10) "__"
    POS( 3,11) "_____"
    POS(10,11) "______"
    POS(45,11) "__"
    POS( 3,12) "_____"
    POS(10,12) "______"
    POS(45,12) "__"
    POS( 3,13) "_____"
    POS(10,13) "______"
    POS(45,13) "__"
    POS( 3,14) "_____"
    POS(10,14) "______"
    POS(45,14) "__"
    POS( 3,15) "_____"
    POS(10,15) "______"
    POS(45,15) "__"
    POS( 3,16) "_____"
    POS(10,16) "______"
    POS(45,16) "__"
    POS( 3,17) "_____"
    POS(10,17) "______"
    POS(45,17) "__"
    POS( 3,18) "_____"
    POS(10,18) "______"
    POS(45,18) "__"
    POS( 3,19) "_____"
    POS(10,19) "______"
    POS(45,19) "__"
    POS( 3,20) "_____"
    POS(10,20) "______"
    POS(45,20) "__"
    POS( 3,21) "_____"
    POS(10,21) "______"
    POS(45,21) "__"
    POS( 3,22) "_____"
    POS(10,22) "______"
    POS(45,22) "__"
    POS( 3,23) "_____"
    POS(10,23) "______"
    POS(45,23) "__"
;

char NewOrder::static_session_data[] =
    POS(12,4) "#####" /* Warehouse Id */
;

int NewOrder::static_screen_len = sizeof(NewOrder::static_screen) - 1;
int NewOrder::static_empty_fields_len = sizeof(NewOrder::static_empty_fields) - 1;
int NewOrder::static_session_data_len = sizeof(NewOrder::static_session_data) - 1;

/* Payment */
char const Payment::static_screen[] =
    POS( 1, 3) CLEAR_EOS
    POS( 38,3) "Payment"
    POS( 1,4) "Date:"
    POS( 1,6) "Warehouse:"
    POS( 42,6) "District:"
    POS( 1,11) "Customer:"
    POS( 17,11) "Cust-Warehouse:"
    POS( 39,11) "Cust-District:"
    POS( 1,12) "Name:"
    POS( 50,12) "Since:"
    POS( 50,13) "Credit:"
    POS( 50,14) "%Disc:"
    POS( 50,15) "Phone:"
    POS( 1,17) "Amount Paid:"
    POS( 37,17) "New Cust-Balance:"
    POS( 1,18) "Credit Limit:"
    POS( 1,20) "Cust-Data:"
;
char const Payment::static_empty_fields[] =
    POS( 52, 6) "__" /* District */
    POS( 11,11) "____" /* Customer # */
    POS( 33,11) "_____" /* Cust-Warehouse */
    POS( 54,11) "__" /* Cust-District */
    POS( 29,12) "________________" /* Name */
    POS( 23,17) "________" /* Amount Paid */
;

char Payment::static_session_data[] =
    POS( 12,6) "#####" /* Warehouse */
;

int Payment::static_screen_len = sizeof(Payment::static_screen) - 1;
int Payment::static_empty_fields_len = sizeof(Payment::static_empty_fields) - 1;
int Payment::static_session_data_len = sizeof(Payment::static_session_data) - 1;

/* Order Status */
char const OrderStatus::static_screen[] =
    POS( 1, 3) CLEAR_EOS
    POS(35, 3) "Order-Status"
    POS( 1, 4) "Warehouse:"
    POS(19, 4) "District:"
    POS( 1, 5) "Customer:"
    POS(18, 5) "Name:"
    POS( 1, 6) "Cust-Balance:"
    POS( 1, 8) "Order-Number"
    POS(26, 8) "Entry-Date:"
    POS(60, 8) "Carrier-Number:"
    POS( 1, 9) "Supply-W"
    POS(14, 9) "Item-Num"
    POS(25, 9) "Qty"
    POS(33, 9)"Amount"
    POS(45, 9) "Delivery-Date"
;
char const OrderStatus::static_empty_fields[] =
    POS(29, 4) "__" /* District */
    POS(11, 5) "____" /* Customer ID */
    POS(44, 5) "________________" /* Customer Name */
;

char OrderStatus::static_session_data[] =
```

```
   POS(12, 4) "#####" /* Warehouse */
;
int OrderStatus::static_screen_len = sizeof(OrderStatus::static_screen) - 1;
int OrderStatus::static_empty_fields_len = sizeof(OrderStatus::static_empty_fields) - 1;
int OrderStatus::static_session_data_len = sizeof(OrderStatus::static_session_data) - 1;

/* Delivery */
char const Delivery::static_screen[] =
   POS(1,3) CLEAR_EOS
   POS( 38,3) "Delivery"
   POS( 1,4) "Warehouse:"
   POS( 1,6) "Carrier Number:"
;
char const Delivery::static_empty_fields[] =
   POS( 17,6) "__" /* Carrier Number */
;
char Delivery::static_session_data[] =
   POS( 12, 4) "#####" /* Warehouse */
;
int Delivery::static_screen_len = sizeof(Delivery::static_screen) - 1;
int Delivery::static_empty_fields_len = sizeof(Delivery::static_empty_fields) - 1;
int Delivery::static_session_data_len = sizeof(Delivery::static_session_data) - 1;

/* Stock level */
char const StockLevel::static_screen[] =
   POS( 1, 3) CLEAR_EOS
   POS(35, 3) "Stock-Level"
   POS( 1, 4) "Warehouse:"
   POS(19, 4) "District:"
   POS( 1, 6) "Stock Level Threshold:"
   POS( 1, 8) "Low Stock:"
;

char const StockLevel::static_empty_fields[] =
   POS( 24,6) "__" /* Threshold */
;

char StockLevel::static_session_data[] =
   POS( 12,4) "#####" /* Warehouse */
   POS( 29,4) "##"   /* District */
;
int StockLevel::static_screen_len = sizeof(StockLevel::static_screen) - 1;
int StockLevel::static_empty_fields_len = sizeof(StockLevel::static_empty_fields) - 1;
int StockLevel::static_session_data_len = sizeof(StockLevel::static_session_data) - 1;

/* Login */
char const Login::static_screen[] =
   POS( 1, 1) CLEAR_EOS
   POS(30, 3) "Please login."
   POS( 5, 5) "Warehouse:"
   POS(24, 5) "District:"
;
char const Login::static_empty_fields[] =
   POS( 16,5) "_____" /* Warehouse */
   POS( 34,5) "__" /* District */
;
int Login::static_screen_len = sizeof(Login::static_screen) - 1;
int Login::static_empty_fields_len = sizeof(Login::static_empty_fields) - 1;

/* Menu */
char const Menu::static_screen[] =
   POS(1, 1) CLEAR_EOS
   "(1)New-Order (2)Payment (3)Order-Status (4)Delivery (5)StockLevel (9)Exit"
;

int Menu::static_screen_len = sizeof(Menu::static_screen) - 1;

/* end string */
char const Screen::end_str[] = "\033[H\n";
int Screen::end_str_len = sizeof(Screen::end_str) - 1;
```

## server.c

```
/*
 * server.c
 *
 * $Revision: 1.11 $
 * $Date: 1999/05/06 21:28:30 $
 * $Log:          server.c,v $
 *
 * $TALog: server.c,v $
 * Revision 1.11  1999/05/06  21:28:30  oz
 * - Removed all the .. from the includes
 * - Added -I.. to the makefiles instead
 * - Moved all the thread related code and connection
 *   selection to serverMon.c
 * [from r1.10 by delta oz-24309-TPCC-add-oracle8.1-code, r1.5]
 *
 * Revision 1.10  1999/04/19  20:14:48  oz
 * - Moved all the simulated code to server.c
 * - Created nulldb.c for compilation with no DB
 * [from r1.8 by delta oz-24331-TPCC-move-sim-code-to-common-file, r1.1]
 *
 * Revision 1.9  1999/04/14  18:11:56  wenjian
 * Make changes so that the web client data structures for transactions
 * are same as the data structures used in SQL server. It is an important
 * change to integrate with MS TPCC kit. It will also avoid copyin/copyout
 * for each transaction.
 * [from r1.8 by delta wenjian-24134-TPCC-make-client-data-structure-same-as-server, r1.1]
 *
 * Revision 1.8  1998/12/11  16:37:58  wenjian
 * Move some common functions from client/client_utils.c to common/tpcc_utils.c.
 * In this version, we only move time_diff_ms(). Need some work in order to
 * move other functions like ERROUT.
 *
 * - Move time_diff_ms() to common/tpcc_utils.c
 * [from r1.7 by delta wenjian-23788-TPCC-use-single-stats-var-for-each-client-and-server, r1.2]
 *
 * Revision 1.7  1998/12/11  16:14:20  wenjian
 * Add code for checking statistic data in a single variable and collecting
 * statistic data based on iStatsFrequency.
 *
 * - Add time_diff_ms()
 * [from r1.6 by delta wenjian-23788-TPCC-use-single-stats-var-for-each-client-and-server, r1.1]
 *
 * Revision 1.6  1998/11/09  16:59:47  wenjian
 * In this revision, most of the changes are related to the directory of header
 * files after directory reorganization. Other changes include adding or removing
 * files to put them in the right directories. Makefiles are written for NT
 * platform so that nmake is working on NT now. Need a top level Makefile for all
 * the directories.
 * [from r1.5 by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.2]
 *
 * Revision 1.5  1998/11/09  14:48:24  wenjian
 * In an effort to make a new directory structure for TPCC, this delta
 * creates two directories: tpcc/client and tpcc/server. All the files
 * for this revision are copied from tpcc/sp-tpcc without any change.
 * Further change may be needed for some files due to the change of
 * the directory structure.
 * [added by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.1]
 *
 * Revision 1.13  1998/11/06  16:10:56  wenjian
 * - Change num_mults from 5 to 20
 * [from r1.12 by delta wenjian-23646-TPCC-clean-up-source-code, r1.1]
 *
 * Revision 1.12  1998/10/22  16:25:12  wenjian
 * Multi-threaded version.
 *
 * - Define deliLog for the output of delivery server
 * - Stop printing to stderr in err_printf() since it seems to be too
 *   expensive on NT. Print to file instead.
 * [from r1.11 by delta wenjian-23529-TPCC-integrate-with-SQL-server, r1.2]
 *
 * Revision 1.11  1998/06/17  15:05:48  wenjian
 * Somehow, read and write didn't work for socket on NT, although they
 * are supposed to work. As a work-around way, use recv and send for
 * NT in this revision. We may change them back if the problem is gone.
 *
 * Use recv and send for socket read and write.
 * [from r1.10 by delta wenjian-21750-TPCC-changes-for-porting-on-NT, r1.2]
 *
 * Revision 1.10  1998/02/17  22:07:06  wenjian
 * Define macros to deal with the different function names on NT
 * [from r1.9 by delta wenjian-21750-TPCC-changes-for-porting-on-NT, r1.1]
 *
 * Revision 1.9  1998/01/23  15:08:48  oz
 * - Updated the SP TPCC directory to the latest files used
 *   during the SP tpcc audit.
 * [from r1.8 by delta oz-20774-TPCC-update-to-latest-SP-version-11-27, r1.1]
 *
 *
 */
/*
 *
 *      TPCC Server
 *
 *  There are currently three versions of the TPCC benchmark
 *  implemented here: An Encina monitor based benchmark,
 *  an Encina Toolkit based benchmark and a DCE only benchmark.
 *
 *  This file, server.c, contains all the code that is common to
 *  all the versions.  Each server has its own main file:
 *  serverMon.c for the monitor server, serverTK.c for the toolkit
 *  server and serverDce.c for the dce server.
 *
 *  Each server is comprised of three main modules: the server specifc
 *  one (mentioned above), the common one, in this file, and the
 *  server part, which is in the SQL files DBInfo.ec, dbInit.ec,
 *  delivery.ec, newOrder.ec, orderStatus.ec, payment.ec, stockLevel.ec.
 */
#include <sys/types.h>
#ifndef WIN32
#include <sys/socket.h>
#include <sys/errno.h>
#else
#include <winsock.h>
#include <io.h>
#endif
#include <fcntl.h>
#include <stdio.h>
#include <stdarg.h>
#include <stdlib.h>
#include <string.h>
#if defined (solaris)
#include <dce/pthread.h>
#else  /* solaris */
#include <pthread.h>
```

```
#endif
#include <utils/trace.h>
#include <tpm/mon.h>

#include "common/utilities.h"
#include "server.h"
#include "common/tpcc_type.h"
#include "common/do_tpcc.h"
#include <time.h>

#define DEFINE_SERVER_DEBUG
#include "serverDebug.h"

#if defined(solaris)
extern int errno;
#endif

#ifdef WIN32
#define O_RDONLY _O_RDONLY
#define  read(A,B,C)    recv(A,B,C,0)
#define open     _open
#define close    _close
#endif

#define SIM_ERROR_CODE TPCC_SUCCESS

#ifdef WIN32
#define RANDOM rand
#else
#define RANDOM random
#endif

#define TPCC_HOME   "/tmp"
#define TIME_PREFIX_LEN 50
extern char sys_errlist[];
extern time_diff_ms(struct timeval *, struct timeval *);

void dprint(char *format, ...);
/*
 *  Global variables common to all types of servers
 */
FILE *server_logtrans = NULL;
FILE *deliLog = NULL;
int logtrans = -1;
FILE *dvry_log = NULL;      /*  FILE structure for delivery log */
int dvry_log_fd = -1;       /*  File descriptor for delivery log */
int status_log = -1;        /*  File descriptor for status log   */
FILE *deliveryLog = NULL;
FILE *deliveryOut = NULL;
int serverIdNumber = 0;     /*  The ID of the server
                                 *  This is used to identify output
                                 */
int serverPid = 0;
int num_mults = 80;         /*  The number of times the matrices are
                                 *  multiplied (in order to spend some time)
                                 */

int server_null_test = 0;
int server_init = 0;        /*  The time (in seconds) the test started
                                 *  This is used by the deferred delivery
                                 *  which reports its times as elapsed time
                                 *  since start time
                                 */
int null_with_sleep = 1;  /*  Sleep for some time when simulating trans */

void err_printf(char *format, ...);
void logprintf(char *format, ...);

void open_log_files()
{
   /* open DVRY_LOG to keep delivery transactions logs*/
   char logname[MAX_STR_LEN], fname[MAX_STR_LEN];
   char buffer[MAX_STR_LEN];
   char *tpcc_home;
   char *log_dir;
   int  bytes;
   int  current_fp;
   int  current;

   log_dir = getenv("DELIVERY_LOGS");
   if (log_dir == NULL) {
            fprintf(stderr, "DELIVERY_LOGS not specified, using %s\n",
                        TPCC_HOME);
            log_dir = TPCC_HOME;
   }

/*
   sprintf(buffer, "%s/status.%d", log_dir, getpid());
   status_log = creat(buffer, 0666 );
 */

   tpcc_home = getenv("TPCC_HOME");
   if (tpcc_home == NULL) {
            fprintf(stderr, "TPCC_HOME not specified, using /tmp\n");
            tpcc_home = "/tmp";
   }

   sprintf(fname, "%s/CURRENT", tpcc_home );
   current_fp = open(fname, O_RDONLY);
   bytes = read(current_fp, buffer, MAX_STR_LEN);

   if (bytes == -1) {
            fprintf(stderr, "Could not read CURRENT file.\n");
            exit(1);
   }
   buffer[bytes] = '\0';
   current = atoi(buffer);
   close(current_fp);

   dvry_log = NULL;
}

/*
 * logprintf() -- variable argument function used to print error
 *                    and debug statements. Function is called when
 *                    any of the debug macros (defined in serverDebug.h)
 *                    are used.
 */


/*
 *  get_thread_id
 *     A function that returns the thread ID of the current thread
 */
int get_thread_id()
{
   pthread_t thread = pthread_self();
   int thread_id = pthread_getunique_np(&thread);
   return(thread_id);
}

void print_time_prefix(FILE *file)
{
   time_t cur_timet;
   char time_str[30];

   cur_timet = time(&cur_timet);
   strftime(time_str, 29, "%X", localtime(&cur_timet));

   fprintf(file, "%4d %5d %4d %s - ",
            serverIdNumber, serverPid, get_thread_id(), time_str);
}


char *get_time_prefix(char *buffer)
{
   time_t cur_timet;
   char time_str[30];
   int len;

   cur_timet = time(&cur_timet);
   strftime(time_str, 29, "%X", localtime(&cur_timet));

   len = sprintf(buffer, "%4d %5d %4d %s - ",
                    serverIdNumber, serverPid, get_thread_id(), time_str);
   if (len >= TIME_PREFIX_LEN) {
      fprintf(stderr, "TIME_PREFIX_LEN (%d) too small: %d\n",
                    TIME_PREFIX_LEN, len);
      exit(12);
   }
   return(buffer);
}


void logprintf(char *format, ...)
{
   char formatBuffer[200];
   char *fmt = formatBuffer;
   int fmtLen;
   va_list ap;
   va_start(ap, format);

   fmtLen = TIME_PREFIX_LEN + strlen(format) + 2;
   if (fmtLen > sizeof(formatBuffer)) {
      fmt = (char *)malloc(fmtLen);
   }
   get_time_prefix(fmt);
   strcat(fmt, format);
   if (server_logtrans) {
            vfprintf(server_logtrans, fmt, ap);
            fflush(server_logtrans);
   } else {
            vfprintf(stderr, fmt, ap);
   }
   if (fmt != formatBuffer) free(fmt);
   va_end(ap);
}

void err_printf(char *format, ...)
{
   char formatBuffer[200];
   char *fmt = formatBuffer;
   int fmtLen;
   char timeBuffer[128];
   va_list ap;
   va_start(ap, format);

   fmtLen = TIME_PREFIX_LEN + strlen(format) + 2;
```

```
  if (fmtLen > sizeof(formatBuffer)) {
      fmt = (char *)malloc(fmtLen);
  }
  get_time_prefix(fmt);
  strcat(fmt, format);
  if (server_logtrans) {
      vfprintf(server_logtrans, fmt, ap);
      fflush(server_logtrans);
  } else {
                vfprintf(stderr, fmt, ap);
  }

  if (fmt != formatBuffer) free(fmt);
  va_end(ap);
}


/*
 * dprint() -- variable argument function used to print debug
 *                statements; for use with DPRINT macro.
 */

void dprint(char *format, ...)
{
  va_list ap;
  va_start(ap, format);

  print_time_prefix(stderr);
  vfprintf(stderr, format, ap);

  va_end(ap);
}

/***  Code that has to do with null servers and simulated DBs  ***/

void mat_mult(int);

#define ROWS 5
#define COLS 5

double matrix_a[ROWS][COLS] = {
 {1.2, 3.4, 2.3, 4.6, 5.2},
 {2.3, 4.5, 1.2, 9.4, 3.1},
 {3.4, 5.2, 3.8, 6.5, 1.6},
 {1.2, 5.3, 6.1, 2.9, 3.8},
 {2.4, 1.2, 3.4, 7.2, 1.0}
};
double matrix_b[ROWS][COLS] = {
 {3.4, 5.9, 2.8, 3.4, 5.6},
 {7.2, 9.3, 4.6, 5.2, 1.3},
 {6.4, 5.2, 8.3, 9.4, 2.3},
 {7.2, 3.4, 6.9, 8.1, 2.3},
 {2.3, 4.5, 7.2, 3.4, 5.8}
};

/*  Num of ms to add to RT  */
static int rt_increment = 0;

/* Num of ms to add to rt_increment after a certain time. */
static int more_srv_work = 0;

/* how often (in second) to add more_srv_work to rt_increment*/
static int period_to_add_rt = 7*60;

/* how often (in second) to check if there is transaction */
static int period_to_check_tran = 10;

static struct timespec *get_wait_time(struct timespec *timeP, int tran)
{
  int ran = RANDOM() % 1000;
  int wait;

  if (0) {
      if (ran > 998) {
                timeP->tv_sec = 10;
      } else if (ran > 990) {
                timeP->tv_sec = 5;
      } else if (ran > 970) {
          timeP->tv_sec = 1;
      } else {
                timeP->tv_sec = 0;
      }
      timeP->tv_nsec = 50000000;
      if (tran == NEWO_TRANS) {
                timeP->tv_nsec *= 2;
                timeP->tv_sec *= 2;
      }
  } else {
                int time_ms = 0;
                if (tran == NEWO_TRANS) {
                    time_ms = 195;
                } else if (tran == PAYMENT_TRANS) {
                    time_ms = 50;
                } else if (tran == ORDER_STAT_TRANS) {
                    time_ms = 115;
                } else if (tran == STOCK_TRANS) {
                    time_ms = 10;
                } else if (tran == DELIVERY_TRANS) {
                    time_ms = 0;
                }
                time_ms += rt_increment;
                timeP->tv_sec = 0;
                timeP->tv_nsec = time_ms * 1000000;
    }
    return(timeP);
}

/**  A simulated new order transaction  */
void sim_new_order(dataP)
  newOrder_data_t *dataP;
{
  int i;
  static int next_id = 100;
  struct timespec wait_time;
  static int lasttime = 0;
  struct timeval now;
  static int periods = 0;

  get_local_time(&now);
  if (now.tv_sec - lasttime > period_to_check_tran) {
    static trans[3];  /*  Keep the counts for the last 5 periods  */
    lasttime = now.tv_sec;

    if ((trans[1] - trans[0] < 2) &&
                (trans[2] - trans[1] < 2)) {
      rt_increment = 0;
      periods = 0;
      more_srv_work = getenv("TPCC_MORE_SERVER_WORK") ?
                                        atoi(getenv("TPCC_MORE_SERVER_WORK")) : 0;
      err_printf("Nothing much happening - resetting test\n");
    } else {
      periods++;
      if (periods % (period_to_add_rt / period_to_check_tran) == 0) {
                rt_increment += more_srv_work;
                err_printf("rt_increment now %d\n", rt_increment);
      }
    }
    trans[0] = trans[1];
    trans[1] = trans[2];
    trans[2] = next_id;
  }


  if (null_with_sleep)
    pthread_delay_np(get_wait_time(&wait_time, NEWO_TRANS));

  mat_mult(num_mults);
  sprintf((char *)dataP->c_last, "BARBARBAR");
  sprintf((char *)dataP->c_credit, "GC");
  dataP->c_discount = 0.33;
  dataP->o_id = next_id++;
  sprintf((char *)dataP->entry_date, "17-12-1995.12:33:56");
  dataP->total = 99.1;
  dataP->w_tax = 0.729;
  dataP->d_tax = 0.15;
  for (i=0; i<dataP->o_ol_cnt; i++) {
    dataP->item[i].price = dataP->item[i].ol_i_id % 1000;
    sprintf((char *)dataP->item[i].name_i, "item %d", i);
    dataP->item[i].s_quantity = i;
    dataP->item[i].brand_generic[0] = i%2 ? 'O' : 'E',
    dataP->item[i].brand_generic[1] = '\0';
    dataP->item[i].ol_amount =
      dataP->item[i].price * dataP->item[i].ol_quantity;
  }

  if ((dataP->item[dataP->o_ol_cnt - 1].ol_i_id < 1) ||
      (dataP->item[dataP->o_ol_cnt - 1].ol_i_id > 100000)) {
    dataP->header.returncode = INVALID_NEWO;
  } else if (RANDOM() % 90 == 0) {
    dataP->header.returncode = SIM_ERROR_CODE;
  } else {
    dataP->header.returncode = TPCC_SUCCESS;
  }
  return;
}

/**  A simulated payment transaction  */
void sim_payment(dataP)
    payment_data_t *dataP;
{
    struct timespec wait_time;

    if (null_with_sleep)
      pthread_delay_np(get_wait_time(&wait_time, PAYMENT_TRANS));
    mat_mult(num_mults);

    dataP->c_id = 1;
    dataP->c_credit_lim = 100.9;
    dataP->c_discount = 0.2;
    dataP->c_balance = 11.1;

    sprintf((char *)dataP->c_first, "%-16s", "c_first");
    sprintf((char *)dataP->c_middle, "%-2s", "MI");
    sprintf((char *)dataP->c_last, "%-16s", "c_last");
    sprintf((char *)dataP->c_street_1, "%-20s", "c_street_1");
    sprintf((char *)dataP->c_street_2, "%-20s", "c_street_2");
    sprintf((char *)dataP->c_city, "%-20s", "c_city");
    sprintf((char *)dataP->c_state, "%-2s", "PA");
```

```
   sprintf((char *)dataP->c_zip, "%-9s", "152111111");
   sprintf((char *)dataP->c_phone, "%-16s", "6522573904218222");
   sprintf((char *)dataP->c_date, "%-19s", "28-11-1995");
   sprintf((char *)dataP->c_credit, "%-2s", "GC");
   sprintf((char *)dataP->pay_date, "%-19s", "17-12-1995.12:39:13");
   sprintf((char *)dataP->d_street_1, "%-20s", "d_street_1");
   sprintf((char *)dataP->d_street_2, "%-20s", "d_street_2");
   sprintf((char *)dataP->d_city, "%-20s", "d_city");
   sprintf((char *)dataP->d_state, "%-2s", "PA");
   sprintf((char *)dataP->d_zip, "%-9s", "152111111");
   sprintf((char *)dataP->w_street_1, "%-20s", "w_street_1");
   sprintf((char *)dataP->w_street_2, "%-20s", "w_street_2");
   sprintf((char *)dataP->w_city, "%-20s", "w_city");
   sprintf((char *)dataP->w_state, "%-2s", "OH");
   sprintf((char *)dataP->w_zip, "%-9s", "142411111");

   if (RANDOM() % 70 == 0) {
       dataP->header.returncode = SIM_ERROR_CODE;
   } else {
       dataP->header.returncode = TPCC_SUCCESS;
   }
}

/**  A simulated stock level  transaction  */
void sim_stock_level(dataP)
    stockLevel_data_t *dataP;
{
   struct timespec wait_time;

   if (null_with_sleep)
     pthread_delay_np(get_wait_time(&wait_time, STOCK_TRANS));

   mat_mult(num_mults);

   dataP->stock_count = 12;
   if (RANDOM() % 80 == 0) {
                dataP->header.returncode = SIM_ERROR_CODE;
   } else {
                dataP->header.returncode = TPCC_SUCCESS;
   }
}


/**  A simulated delivery transaction  */
void sim_delivery(dataP)
    delivery_data_t *dataP;
{
   struct timespec wait_time;

   if (null_with_sleep)
     pthread_delay_np(get_wait_time(&wait_time, DELIVERY_TRANS));

   dataP->start_queue = 2.2;
   dataP->header.returncode = TPCC_SUCCESS;
}

/**  A simulated order status transaction  */
void sim_order_status(dataP)
    orderStatus_data_t *dataP;
{
   int i;
   struct timespec wait_time;

   if (null_with_sleep)
     pthread_delay_np(get_wait_time(&wait_time, ORDER_STAT_TRANS));

   mat_mult(num_mults);


   dataP->c_id = dataP->c_id ? dataP->c_id : 99;
   strcpy((char *)dataP->c_first, "Jerome");
   strcpy((char *)dataP->c_middle, "LB");
   strcpy((char *)dataP->c_last, "Trevoe");
   dataP->c_balance = 90.78;
   dataP->o_id = 99;
   strcpy((char *)dataP->entry_date, "06-12-1995.16:42:28");
   dataP->o_carrier_id = 9;
   dataP->o_ol_cnt = 7;

   for (i=0; i<dataP->o_ol_cnt; i++) {
                dataP->item[i].ol_supply_w_id = 1;
                dataP->item[i].ol_i_id = dataP->w_id * 10 + dataP->d_id;
                dataP->item[i].ol_quantity = 10 * (i+1);
                dataP->item[i].ol_amount = dataP->item[i].ol_quantity * 10.1;
                strcpy((char *)dataP->item[i].delivery_date, "NOT DELIVR");
   }


 if (RANDOM() % 90 == 0) {
   dataP->header.returncode = SIM_ERROR_CODE;
 } else {
   dataP->header.returncode = 0;
 }
}

/*
*  mat_mult
*                Multiply the above two matrices
*/
static void mat_mult(iter)
    int iter;
{
  float res[ROWS][COLS];
  int i, j, k;
  int a_num_rows = ROWS;
  int a_num_columns = COLS;
  int b_num_rows = ROWS;
  int b_num_columns = COLS;

  for (; iter>0; iter--) {
    for (i=0; i<a_num_rows; i++) {
      for (j=0; j<b_num_columns; j++) {
                res[i][j] = 0;
                for (k=0; k<b_num_rows; k++) {
                  res[i][j] += matrix_a[i][k] * matrix_b[k][j];
                }
      matrix_a[i][j] = res[i][0];
      }
    }
    pthread_yield();
  }
}
```

## server.h

```
/*
*                server.h
*
* $Revision: 1.11 $
* $Date: 1999/05/06 21:28:31 $
* $Log:          $
*
*
* $TALog: server.h,v $
* Revision 1.11  1999/05/06  21:28:31  oz
* - Removed all the .. from the includes
* - Added -I.. to the makefiles instead
* - Moved all the thread related code and connection
*   selection to serverMon.c
* [from r1.9 by delta oz-24309-TPCC-add-oracle8.1-code, r1.5]
*
* Revision 1.9  1999/01/12  20:52:59  wenjian
* Define MAPOBJNAMEFORMAT so that the server processes and dll can communicate
* via the shared file mappings.
* [from r1.8 by delta wenjian-23856-TPCC-integrate-with-NT-performance-monitor, r1.1]
*
* Revision 1.8  1998/12/14  20:27:57  wenjian
* Made corresponding changes due to data structure change of tran_info_t.
*
* - change server_tran_t
* [from r1.7 by delta wenjian-23788-TPCC-use-single-stats-var-for-each-client-and-server, r1.3]
*
* Revision 1.7  1998/12/11  16:14:20  wenjian
* Add code for checking statistic data in a single variable and collecting
* statistic data based on iStatsFrequency.
*
* - Add server_tran_t and server_info_t
* [from r1.6 by delta wenjian-23788-TPCC-use-single-stats-var-for-each-client-and-server, r1.1]
*
* Revision 1.6  1998/11/09  16:59:48  wenjian
* In this revision, most of the changes are related to the directory of header
* files after directory reorganization. Other changes include adding or removing
* files to put them in the right directories. Makefiles are written for NT
* platform so that nmake is working on NT now. Need a top level Makefile for all
* the directories.
* [from r1.5 by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.2]
*
* Revision 1.5  1998/11/09  14:48:25  wenjian
* In an effort to make a new directory structure for TPCC, this delta
* creates two directories: tpcc/client and tpcc/server. All the files
* for this revision are copied from tpcc/sp-tpcc without any change.
* Further change may be needed for some files due to the change of
* the directory structure.
* [added by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.1]
*
* Revision 1.9  1998/10/22  15:33:05  wenjian
* Make changes to Encina server code to connect with SQL server and add
* callsql.c and sql directory.
*
* Add delivery_sql_t to deal with SYSTEMTIME struct used in SQL
* [from r1.7 by delta wenjian-23529-TPCC-integrate-with-SQL-server, r1.1]
*
* Revision 1.7  1998/01/23  15:08:50  oz
* - Updated the SP TPCC directory to the latest files used
*   during the SP tpcc audit.
* [from r1.6 by delta oz-20774-TPCC-update-to-latest-SP-version-11-27, r1.1]
*
*
*/

/**  server.h  **/

/**  Declarations common to all the server modules  **/
```

```
#ifndef TPCC_SERVER_H
#define TPCC_SERVER_H

#include "common/tpcc_type.h"

#define get_dbname_from_id(i) rmList[i].dbName
#define MAPOBJNAMEFORMAT "srv_%s_PA%d"

#ifdef WIN32
typedef struct {
   delivery_data_t  data;
   SYSTEMTIME       queue_time;
} delivery_sql_t;
#endif

typedef enum {
   mon_server = 11
} server_type_t;

typedef struct {
   int num;
   double RTtotal;
   int RTcount;
} server_tran_t;

typedef struct {
   server_tran_t tran[MAX_TRAN_TYPE + 1];
   int    total_trans;
} server_info_t;

extern int server_no_db;
extern int serverIdNumber;
extern int server_init;
extern server_type_t server_type;
extern int get_db_for_wh(int);

#endif   /*  TPCC_SERVER_H  */
```

## serverDebug.h

```
/*
 * serverDebug.h
 *
 * $Revision: 1.5 $
 * $Date: 1998/11/09 14:48:25 $
 * $Log:          serverDebug.h,v $
 * Revision 4.4  95/05/16  10:55:40  10:55:40  tpcc (TPCC Benchmark)
 * Added necessary RCS ident strings
 *
 *
 */
#ifndef SERVER_DEBUG
#define SERVER_DEBUG

#include <utils/trace.h>

#ifdef DEFINE_SERVER_DEBUG
long serverDebug = 0;
#else
extern long serverDebug;
#endif

#ifdef TRACE_TRANS
#define TRACETRAN(list) logprintf list
#else
#define TRACETRAN(list)
#endif

#ifdef DEBUG_SERVER
#define AUDITLOG(list) if (serverDebug & AUDIT_TRANS) UNCOND_EVENT list
#define NEWOLOG(list) if (serverDebug & DBG_NEWO) err_printf list
#define PAYLOG(list) if (serverDebug & DBG_PAY) err_printf list
#define OSLOG(list) if (serverDebug & DBG_OS) err_printf list
#define STKLOG(list) if (serverDebug & DBG_STK) err_printf list
#define DEBUGP(list) if (serverDebug) err_printf list
#else
#define AUDITLOG(list)
#define NEWOLOG(list)
#define PAYLOG(list)
#define OSLOG(list)
#define STKLOG(list)
#define DELLOG(list)
#define DEBUGP(list)
#endif

#define ERRLOG(list) err_printf list
#define SQL_RET_CODE(var, code) var = (code)

/* Fix DPRINT to write on a debugging unit that can get set differently
for delivery */

#ifdef UNIT_TEST
#define DPRINT(list) dprint list
#define DELPRINT(list) delprint list
#else
#define DPRINT(list)
#define DELPRINT(list)
#endif

#define DBG_NEWO        0x0001
#define DBG_PAY                 0x0002
#define DBG_OS                  0x0004
#define DBG_STK                 0x0008
#define DBG_DEL                 0x0010
#define DBG_ERR                 0x0020
#define AUDIT_TRANS     0x0100

#endif                  /* SERVER_DEBUG */
```

## serverMon.c

```
/*
 * serverMon.c
 *
 * $Revision: 1.23 $
 * $Date: 1999/05/28 19:44:17 $
 * $Log:          serverEncina.c,v $
 *
 * $TALog: serverMon.c,v $
 * Revision 1.23  1999/05/28  19:44:17  wenjian
 * Add create_null_connection and clean_null_connection so that
 * we can run with NULL DB.
 * [from r1.22 by delta wenjian-24433-TPCC-clean-up-and-update, r1.4]
 *
 * Revision 1.22  1999/05/28  14:30:22  wenjian
 * - Fix a bug for calling get_thread_data()
 * [from r1.21 by delta wenjian-24433-TPCC-clean-up-and-update, r1.3]
 *
 * Revision 1.21  1999/05/26  16:29:59  wenjian
 * Sync with Austin code, and sync code for Oracle DB and SQL server.
 *
 * - Fix some minor bugs
 * [from r1.20 by delta wenjian-24433-TPCC-clean-up-and-update, r1.2]
 *
 * Revision 1.20  1999/05/06  21:28:31  oz
 * - Removed all the .. from the includes
 * - Added -I.. to the makefiles instead
 * - Moved all the thread related code and connection
 *   selection to serverMon.c
 *
 * - Added connection and thread related code.
 * - pre_DB and post_DB always get called.
 * - get_db_ready has only 2 parameters
 * - added tran_info_t, total_tran_count_t, and thread_info_t
 * - Added clean_thread_data and get_thread_data
 * - Preallocate all the connections if necessary after
 *   initializing the DB.
 * - A connection is created by calling the DB specific
 *   create_connection() which returns a void* handle to
 *   be passed to all the transactions.
 * [from r1.18 by delta oz-24309-TPCC-add-oracle8.1-code, r1.5]
 *
 * Revision 1.18  1999/04/20  15:11:28  oz
 * [merge of changes from 1.13 to 1.17 into 1.12]
 *
 * Revision 1.17  1999/04/19  20:14:49  oz
 * - Moved all the simulated code to server.c
 * - Created nulldb.c for compilation with no DB
 * [from r1.13 by delta oz-24331-TPCC-move-sim-code-to-common-file, r1.1]
 *
 * Revision 1.12  1999/01/12  20:53:00  wenjian
 * - Call initialization function perfSrvDataInit to create the shared file
 *   mapping for this server process
 * - Change server_info to pServerInfo
 * [from r1.11 by delta wenjian-23856-TPCC-integrate-with-NT-performance-monitor, r1.1]
 *
 * Revision 1.11  1998/12/14  20:27:58  wenjian
 * Made corresponding changes due to data structure change of tran_info_t.
 *
 * - Made changes for server_tran_t
 * - Add tran_type to FUNCTION_BEGIN, FUNCTION_END, pre_DB, and post_DB
 * [from r1.10 by delta wenjian-23788-TPCC-use-single-stats-var-for-each-client-and-server, r1.3]
 *
 * Revision 1.10  1998/12/11  16:14:20  wenjian
 * Add code for checking statistic data in a single variable and collecting
 * statistic data based on iStatsFrequency.
 *
 * - Change pre_oracle to pre_DB, post_oracle to post_DB
 * - Add code to collect server RT in a global var
 * [from r1.9 by delta wenjian-23788-TPCC-use-single-stats-var-for-each-client-and-server, r1.1]
 *
 * Revision 1.9  1998/12/08  18:55:22  wenjian
 * - Remove "statsFrequency=" command line argument.
 * - Check rpc header for stats
 * [from r1.8 by delta wenjian-23785-TPCC-pass-statsFrequency-from-client-to-server, r1.1]
 *
 * Revision 1.8  1998/12/07  20:04:16  wenjian
 * Remove interfaces for explicit bindings
 * [from r1.7 by delta wenjian-23742-TPCC-update-with-Raliegh-code, r1.2]
 *
 * Revision 1.7  1998/11/24  21:46:03  wenjian
 * - Remove COLLECT_TIMESTAMPS; use command line argument iStatsFrequency
 *   instead
 * - Take care of MULTIPLE_INTERFACE and SINGLE_INTERFACE
 * [from r1.6 by delta wenjian-23742-TPCC-update-with-Raliegh-code, r1.1]
```

```
*
* Revision 1.6  1998/11/09  16:59:48  wenjian
* In this revision, most of the changes are related to the directory of header
* files after directory reorganization. Other changes include adding or removing
* files to put them in the right directories. Makefiles are written for NT
* platform so that nmake is working on NT now. Need a top level Makefile for all
* the directories.
* [from r1.5 by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.2]
*
* Revision 1.5  1998/11/09  14:48:25  wenjian
* In an effort to make a new directory structure for TPCC, this delta
* creates two directories: tpcc/client and tpcc/server. All the files
* for this revision are copied from tpcc/sp-tpcc without any change.
* Further change may be needed for some files due to the change of
* the directory structure.
* [added by delta wenjian-23677-TPCC-reorganize-directory-structure, r1.1]
*
* Revision 1.36  1998/11/06  16:10:56  wenjian
* - Increase the range for the number of threads communicating to the DB.
* - Print warning if the number of threads is out of the range.
* [from r1.35 by delta wenjian-23646-TPCC-clean-up-source-code, r1.1]
*
* Revision 1.35  1998/10/22  21:30:47  wenjian
* [merge of changes from 1.20 to 1.29 into 1.34]
*
* Revision 1.29  1998/10/08  14:18:02  dongfeng
* Add codes for doing web-based tpcc.
* [from r1.20 by delta dongfeng-23067-TPCC-add-web-based-tpcc-client, r1.1]
*
* Revision 1.34  1998/10/22  19:43:38  wenjian
* [merge of changes from 1.28 to 1.32 into 1.30]
*
* Revision 1.32  1998/10/22  16:25:13  wenjian
* Multi-threaded version.
*
* - Open server_logtrans for err_printf() and deliLog for delivery server
* - Call get_time_init() for get_local_time
* - Changes for multi-threaded version
* [from r1.31 by delta wenjian-23529-TPCC-integrate-with-SQL-server, r1.2]
*
* Revision 1.31  1998/10/22  15:33:05  wenjian
* Make changes to Encina server code to connect with SQL server and add
* callsql.c and sql directory.
*
* - Add SYSTEMTIME *queue_time to deferred_dvry_t for NT
* - Allocate space and set value for queue_time
* - Pass delivery_sql_t instead of delivery_data_t for SQLdel on NT
* [from r1.28 by delta wenjian-23529-TPCC-integrate-with-SQL-server, r1.1]
*
* Revision 1.30  1998/10/08  18:03:03  gerstl
* Changes to allow configurations where some servers only service
* specific transaction types. Split transaction interfaces by type.
*
* Transaction interface support is based upon a bitmap passed to the
* server.
* [from r1.28 by delta gerstl-23515-TPCC-allow-separate-online-transaction-interfaces, r1.1]
*
* Revision 1.28  1998/10/07  15:49:49  gerstl
* [merge of changes from 1.22 to 1.26 into 1.27]
*
* Revision 1.26  1998/09/03  20:22:02  wenjian
* Sync with Austin code: mostly use servrMon.c in Austin.
* [from r1.25 by delta wenjian-23183-TPCC-sync-AIX-code-with-Austin, r1.4]
*
* Revision 1.25  1998/09/03  16:07:12  wenjian
* Remove UNCOND_EVENT which is not in austin code.
* [from r1.24 by delta wenjian-23183-TPCC-sync-AIX-code-with-Austin, r1.3]
*
* Revision 1.24  1998/09/02  15:43:30  wenjian
* Define num_worker_threads.
* [from r1.23 by delta wenjian-23183-TPCC-sync-AIX-code-with-Austin, r1.2]
*
* Revision 1.23  1998/08/28  18:30:02  wenjian
* This delta sync the TPCC code with Austin.
*
* - Take care of 1 thread per PA
* - Update with Austin code
* - Remove the old code starting from #ifdef THIS_WAS_THE_OLD_CODE
* - Remove impTPCCDvryInfo()
* [from r1.22 by delta wenjian-23183-TPCC-sync-AIX-code-with-Austin, r1.1]
*
* Revision 1.27  1998/09/26  10:27:33  oz
* Changes for NT.
* [from r1.22 by delta oz-23339-TPCC-update-for-NT, r1.1]
*
* Revision 1.22  1998/08/18  14:38:43  wenjian
* Minor change
* [from r1.20 by delta wenjian-21750-TPCC-changes-for-porting-on-NT, r1.4]
*
* Revision 1.20  1998/02/17  22:07:06  wenjian
* Minor changes for NT
* [from r1.19 by delta wenjian-21750-TPCC-changes-for-porting-on-NT, r1.1]
*
* Revision 1.19  1998/01/30  15:12:28  oz
* - Remove the explicit binding functions from the tidl
*   files and from serverMon.c
* [from r1.18 by delta oz-21697-TPCC-remove-explicit-binding-code, r1.2]
*
* Revision 1.18  1998/01/24  14:17:06  oz
* - User server name to identify server and name delivery file
* - Use env variable HOME instead of /home/encina if HOME is set
*
* - Removed the machine list
*   The server ID is computed from the first number found in the host name
* [from r1.17 by delta oz-21687-TPCC-use-server-name-to-identify-process, r1.1]
*
* Revision 1.17  1998/01/23  21:59:00  oz
* - In order to simplify the Encina TPCC code: Merge the four
*   online transactions into 1 interface
* - Moved all the scripts to a scripts subdirectory
* - Removed unused files
* [from r1.16 by delta oz-21671-TPCC-merge-online-transaction-interfaces, r1.1]
*
* Revision 1.16  1998/01/23  15:08:53  oz
* - Updated the SP TPCC directory to the latest files used
*   during the SP tpcc audit.
* [from r1.15 by delta oz-20774-TPCC-update-to-latest-SP-version-11-27, r1.1]
*
*
*                    serverMon.c
*
*  Code that is monitor specific.
*
*/

#include <sys/types.h>
#ifndef WIN32
#include <unistd.h>
#else
#include <process.h>
#include <winsock.h>
#endif
#include <stdio.h>
#include <stdarg.h>
#include <time.h>
#include <tmxa/tmxa.h>
#include <tc/tc.h>
#include <tpm/mon/mon_server.h>

#if defined (solaris)
#include <dce/pthread.h>
#else   /* solaris */
#include <pthread.h>
#endif  /* solaris */
#include <utils/trace.h>

#include "common/databuf.h"
#include "common/utilities.h"
#include "serverDebug.h"
#include "common/delivery.h"
#ifdef MULTIPLE_INTERFACE
#include "common/neworder.h"
#include "common/payment.h"
#include "common/stocklevel.h"
#include "common/orderstatus.h"
#else
#include "common/tpcc_trans.h"
#endif
#include "server.h"

#  define FUNCTION_BEGIN(name, dataP, tran_type, infoP)                    \
                    pre_DB(name, &(dataP)->header, tran_type, infoP);

#  define FUNCTION_END(name, dataP, tran_type, infoP)   \
                    post_DB(name, &(dataP)->header, tran_type, infoP);   \


#ifdef WIN32
#define CASECMP(x,y) _stricmp(x,y) == 0
#define getpid  _getpid
extern void TPCexit();
#else
#define CASECMP(x,y) strcasecmp(x,y) == 0
extern void TPCexit();
#endif

extern void *create_connection();
extern void clean_connection(void *);
extern int get_db_ready(char *, int);

inModule("serverMon");

static void start_deferred_delivery_threads();
static void queue_delivery(delivery_data_t *dataP);
static void *create_null_connection();
static void clean_null_connection(void *ptr);

extern int server_null_test;

extern void err_printf( char *format, ...);
extern int get_db_ready(char *, int);
extern void logprintf(char *format, ...);
extern server_info_t *perfSrvDataInit(char *, int);
extern void *start_bg_thread();

static void get_mon_server_env();

server_type_t server_type = mon_server;
```

```
char *tpcc_serverName = NULL;
char *dbName = NULL;
int total_num_warehouses;
int num_deferred_dvry_threads = 1;
int num_worker_threads = 1;
int dvry_queue_size = 3000;
server_info_t *pServerInfo = NULL;
char oracle_home[256];  /* will be used in tpccpl.c */

typedef struct {
    pthread_mutex_t         lock;
    pthread_cond_t          q_cond;
    pthread_cond_t          work_cond;

    int                                     num_waiters;  /*  Number of new requests waiting   */

    int                                     head, tail;
    int                                     allocated;  /* Total size of the queue  */
    int                                     size;   /* Num elements currently there  */
#ifdef WIN32
    SYSTEMTIME              *queue_time;
#endif
    delivery_data_t         *data;
} deferred_dvry_t;

static deferred_dvry_t deferred_dvry_data;
#define MAX_DVRY_QUEUE deferred_dvry_data.allocated

/*
 *  Information about one transaction type
 */
typedef struct {
    int num;
    int errs;
    double RT;
} tran_info_t;

/*
 * total_tran_count_t
 *
 * structure that holds the total count of transaction of each type
 * as well as the reposne times.
 *
 */
typedef struct {
    tran_info_t tran[MAX_TRAN_TYPE + 1];
    int errors;
} total_tran_count_t;



typedef struct {
    void *cnP;  /*  DB specific connection to be used by this thread  */

    int calls;      /*  Number of times it was used  */
    int errors;     /*  Total number of errors on this connection  */
    int calls_last_err;   /*  Number of calls when the last error occured  */
    int consecutive_errs; /*  Number of consecutive errs  */
    int connect_time;               /*  Time (seconds) connections was created  */

    /*  For debug  */
    int state;                              /*  State of the connection  */
    struct timeval tran_time;     /*  Time this tran started */
    int cur_tran_type;
    void *cur_tran_dataP;
    total_tran_count_t stat;
    int printed;

} thread_info_t;


#define SVR_STATE_NONE                          0
#define SVR_STATE_SENT                          1
#define SVR_STATE_REPLIED               2
#define SVR_STATE_ERR                   3

/*  Connection related data structures */

static void clean_thread_data(void *ptr);

pthread_key_t thread_key;
pthread_mutex_t init_lock;
thread_info_t *info_array = NULL;  /*  Array of thread data */
int num_threads = 0;  /*  number of threads that have already been init */
int next_thread = 0;  /*  next thread id: next entry in the array  */

int preallocate_cn = 1;  /*  Should all connections be preallocated */
int num_connections = 0;
int num_allocated = 0;

static thread_info_t *get_thread_data();

static void display_mon_env()
{
    char *env_str;
    char envMsg[64];

#define DISPLAY_ENV_VAR(var) \
    if ((env_str = getenv(var)) != NULL) { \
                UNCOND_EVENT("%s == '%s'\n", var, env_str); \
    } else { \
                UNCOND_EVENT("%s not set\n", var);  \
    }

    UNCOND_EVENT("TPCC Server display env.  ID: %d\n", serverIdNumber);

    /*
     *          For debugging purpose: have the first PA
     *  display the following information
     */


    if ((serverIdNumber & 0xff) == 0) {
      DISPLAY_ENV_VAR("RPC_SUPPORTED_PROTSEQS");
      DISPLAY_ENV_VAR("RPC_UNSUPPORTED_NETADDRS");
      DISPLAY_ENV_VAR("ENCINA_BINDING_TIMEOUT");
      DISPLAY_ENV_VAR("ENCINA_THREAD_POOL_QUEUE_LENGTH");
      DISPLAY_ENV_VAR("ENCINA_THREAD_POOL_QUEUE_LENGTH");
      DISPLAY_ENV_VAR("ENCINA_TPOOL_SIZE");
      DISPLAY_ENV_VAR("ENCINA_RPC_THREAD_STACK_SIZE");
    }
}



/*  get_server_index()  --        This is used for debug purposes only
 *
 *  Return the server index for this server.
 *  By convention, all the client machines hvae similar
 *  names with different numbers, as in client1 client2, ...
 *  If the convention is followed the server index is the first
 *  number found.  Otherwise, it is 0.
 *
 */
static int get_server_index()
{
  int i, ind;
  char host_name[128];
  if (0 == gethostname(host_name, sizeof(host_name))) {
    err_printf("Machine is on host %s\n", host_name);
    ind = strcspn(host_name, "0123456789");
    return(atol(host_name + ind));
  }

  return(0);
}


static parse_cmd_line(int argc, char *argv[], char **scheduling, int *interface_type)
{
    int nextInd = 1;
    char usageStr[128];
    int envRetrieval;
    if ((nextInd + 3) > argc) {
        sprintf(usageStr,
                "Not enough parameters.  Usage: %s [-no_db] interfaces schedulingPolicy envRetrievalFlag
[dvry=#] [debugFlag] [db:<rmName>] [cn=#].", argv[0]);

        fprintf(stderr, "%s\n", usageStr);
        mon_TerminateServer(usageStr);

    } else {
        if (strcmp(argv[nextInd], "-no_db") == 0) {
            server_null_test = 1;
            fprintf(stderr, " ---== NULL test ==---\n");
            nextInd++;
        }
        *interface_type = strtol(argv[nextInd++], NULL, 0);
        *scheduling = argv[nextInd++];
        envRetrieval = atoi(argv[nextInd++]);

        while (nextInd < argc) {
            if (strncmp(argv[nextInd], "db:", 3) == 0) {
                                                                    dbName = argv[nextInd] + 3;
                nextInd++;
            } else if (strncmp(argv[nextInd], "dvry=", 5) == 0) {
                num_deferred_dvry_threads = atol(argv[nextInd] + 5);
                if (num_deferred_dvry_threads < 0 || num_deferred_dvry_threads > 200) {
                                        err_printf("num_deferred_dvry_threads was %d (>200), reset to 10\n",
num_deferred_dvry_threads);
                    num_deferred_dvry_threads = 10;
                                        }
                nextInd++;
            } else if (strncmp(argv[nextInd], "dvryQ=", 6) == 0) {
                dvry_queue_size = atol(argv[nextInd] + 6);
                if (dvry_queue_size < 1 || dvry_queue_size > 200000)
                    dvry_queue_size = 10;
                nextInd++;
            } else {
                serverDebug = atol(argv[nextInd++]);
            }
        }
    }
}


static void set_scheduling(char *scheduling)
```

```
{
   mon_paAccess_t paAccess;
   UNCOND_EVENT("Setting Scheduling Policy: %s\n", scheduling);

   if(CASECMP(scheduling, "MON_CONCURRENT_SHARED")) {
      paAccess = MON_CONCURRENT_SHARED;
   } else if(CASECMP(scheduling, "MON_EXCLUSIVE")) {
      num_deferred_dvry_threads = 1;
      paAccess = MON_EXCLUSIVE;
   } else if(CASECMP(scheduling, "MON_SHARED")) {
                  num_deferred_dvry_threads = 1;
      paAccess = MON_SHARED;
   } else {
                  err_printf("Invalid Policy: '%s'\n", scheduling);
      mon_TerminateServer("Invalid scheduling policy specified.");
   }

   ENCINA_CALL("mon_SetSchedulingPolicy",
            mon_SetSchedulingPolicy(paAccess));
}

static void register_interfaces(int interface_type)
{
   extern FILE *deliLog;
   char *env_str;
   int env_val;

   UNCOND_EVENT("Registering interfaces\n");

   num_worker_threads = 0;

   /* interface_type is a bitmap of the interfaces this
    * server needs to support.
    */
#ifdef MULTIPLE_INTERFACE
   if (interface_type & NEWO_INTERFACE) {
                  ENCINA_CALL("mon_InitServerInterface",
                                    mon_InitServerInterface(MON_SERVER_INTERFACE(neworder,1,0)));
   }
   if (interface_type & PAYMENT_INTERFACE) {
                  ENCINA_CALL("mon_InitServerInterface",
                                    mon_InitServerInterface(MON_SERVER_INTERFACE(payment,1,0)));
   }
   if (interface_type & ORDER_STAT_INTERFACE) {
                  ENCINA_CALL("mon_InitServerInterface",
                                    mon_InitServerInterface(MON_SERVER_INTERFACE(orderstatus,1,0)));
   }
   if (interface_type & STOCK_INTERFACE) {
                  ENCINA_CALL("mon_InitServerInterface",
                                    mon_InitServerInterface(MON_SERVER_INTERFACE(stocklevel,1,0)));
   }
#else
   if (interface_type & ONLINE_INTERFACES) {
                  ENCINA_CALL("mon_InitServerInterface",
                                    mon_InitServerInterface(MON_SERVER_INTERFACE(tpccTrans,1,0)));
   }
#endif

   if (interface_type & DELIVERY_INTERFACE) {
#ifdef WIN32
      deliLog = fopen("deliLog.out", "w");
#endif
      if (num_deferred_dvry_threads > 0) {
         start_deferred_delivery_threads();
      }
      ENCINA_CALL("mon_InitServerInterface",
                                    mon_InitServerInterface(MON_SERVER_INTERFACE(delivery,1,0)));
   } else {
      num_deferred_dvry_threads = 0;
   }

   /* ENCINA_TPOOL_SIZE and ENCINA_APPL_TPOOL_SIZE
    * are set in tpccCommon.tcl for each
    * server started. If we are delivery only, we don't care
    * about it, otherise we need to adjust num_worker_threads
    */
   if (interface_type & ONLINE_INTERFACES) {
      if ((env_str = getenv("ENCINA_APPL_TPOOL_SIZE")) != NULL) {
         env_val = atol(env_str);
         if (env_val >= 0 && env_val < 1000)
            num_worker_threads += env_val;
         else {
                  err_printf("ENCINA_APPL_TPOOL_SIZE was %d, reset to 10\n", env_val);
            num_worker_threads += 10;
                  }
      }
      if ((env_str = getenv("ENCINA_TPOOL_SIZE")) != NULL) {
         env_val = atol(env_str);
         if (env_val >= 0 && env_val < 1000)
            num_worker_threads += env_val;
         else {
                  err_printf("ENCINA_TPOOL_SIZE was %d, reset to 10\n", env_val);
            num_worker_threads += 5;
                  }
      }
      if (num_worker_threads < 1) num_worker_threads = 1;
   }

}
```

```
void main(argc,argv)
   int argc;
   char *argv[];
{
   extern FILE *server_logtrans;
   int rc;
   int pa_num;
   char *scheduling = "";
   int rmId;
   char intermediary[256];
   extern int serverPid;
   int interface_type = ALL_INTERFACE;
   int status;

   inFunction("server_Init");

   /* hard code first for a quick test */
   /* getenv didn't work, though we have ORACLE_HOME defined */
   /*    strcpy(oracle_home,getenv("ORACLE_HOME")); */
   strcpy(oracle_home, "/home/oracle817/app/oracle/product/8.1.7");

   server_logtrans = fopen("server_print.out", "w");

   get_time_init();

   serverPid = getpid();
   UNCOND_EVENT("TPCC Server Starting\n");

   /*  Use the top 8 bits of the serverIdNumber to store the server index */
   serverIdNumber = (get_server_index() & 0xff) * 1000;

   parse_cmd_line(argc, argv, &scheduling, &interface_type);

   display_mon_env();

   DEBUGP(("Debug level set at %d\n", serverDebug));


   DEBUGP(("Creating thread data key"));
   if(status = pthread_keycreate(&thread_key, clean_thread_data)) {
                  fprintf(stderr, "init_global_data : pthread_keycreate failed: %d\n", status);
                  mon_TerminateServer("Cannot create a key for the thread data");
   }

   mon_RetrieveEnable(FALSE);

   err_printf("Setting scheduling %s.\n", scheduling);
   set_scheduling(scheduling);
   err_printf(" Registering interfaces \n");
   register_interfaces(interface_type);

   err_printf("Calling mon_init\n");
   ENCINA_CALL("mon_InitServer", mon_InitServer());
   ENCINA_CALL("mon_SetHandleCacheRefreshInterval",
            mon_SetHandleCacheRefreshInterval(300));

   pa_num = mon_RetrievePaNum();
   tpcc_serverName = mon_RetrieveServerId();
   if (pa_num > 0)
                  serverIdNumber += pa_num;
   err_printf("PA Number %d, serverId %d (%s)\n",
                     pa_num, serverIdNumber, tpcc_serverName);


   num_connections = num_deferred_dvry_threads + num_worker_threads;

   if ((rc = get_db_ready(dbName, 0)) != 0) {
                  char msg[128];
                  sprintf(msg, "failed to open database tpcc/tpcc: %d", rc);
      WARNING("%s\n", msg);
      err_printf("%s\n", msg);
                  mon_TerminateServer(msg);
   }
   if (preallocate_cn || num_connections == 1) {
                  int i;
                  thread_info_t *curP;
                  /*  Preallocate all the desired connections  */
                  logprintf("Preallocating %d connections to the DB\n", num_connections);
                  info_array = (thread_info_t*)calloc(num_connections, sizeof(*info_array));

                  for (i=0, curP = info_array; i<num_connections; i++, curP++) {
                     if (server_null_test)
                                    curP->cnP = create_null_connection();
                     else
                                    curP->cnP = create_connection();
                  }
                  num_allocated = num_connections;
   }

   /* initialize pServerInfo */
#ifdef WIN32
   pServerInfo = perfSrvDataInit(tpcc_serverName, pa_num);
#endif
   if (pServerInfo == NULL)
                  pServerInfo = malloc(sizeof(server_info_t));
   memset(pServerInfo,0,sizeof(server_info_t));
#ifndef WIN32
   start_bg_thread();
```

```
#endif

   err_printf(">> Calling mon_BeginService()\n");

   ENCINA_CALL("mon_BeginService", mon_BeginService());

   fprintf(stderr, "mon_BeginService returned ... terminating\n");
   TPCexit();
}

static void clean_thread_data(void *ptr) {
   thread_info_t *threadP = (thread_info_t *)ptr;
   if (server_null_test)
                clean_null_connection(threadP->cnP);
   else
                clean_connection(threadP->cnP);
   err_printf("Closing connection 0x%p.  Called %d, %d errors\n",
                        threadP->cnP, threadP->calls, threadP->errors);
}

/*
 *  The routine executed by the deferred delivery thread
 *
 *  Logic:
 *              Wait until there is a valid request in the deferred delivery data.
 *              After processing the request data_valid is set to FALSE
 *              (allowing new requests to be queued).
 *  This is a simple fixed size queue implemented in a cyclic array
 */
static void deferred_delivery()
{
   thread_info_t *infoP;
   pthread_mutex_lock(&deferred_dvry_data.lock);

   while (1) {
                if (deferred_dvry_data.size > 0) {
                   /*
                    *  There is a request to be processed
                    */
                   int ind = deferred_dvry_data.head % MAX_DVRY_QUEUE;
#ifdef WIN32
                   delivery_sql_t  dbData;
                   dbData.data = deferred_dvry_data.data[ind];
                   dbData.queue_time = deferred_dvry_data.queue_time[ind];
#else
                   delivery_data_t data = deferred_dvry_data.data[ind];
#endif

                   deferred_dvry_data.head ++;
                   deferred_dvry_data.size --;

                   if (deferred_dvry_data.num_waiters > 0)
                                pthread_cond_signal(&deferred_dvry_data.q_cond);

                   if (deferred_dvry_data.head % 1000 == 0) {
                                err_printf("Processed %d deferred deliveries so far, queue size %d\n",
                                                deferred_dvry_data.head,
                                                deferred_dvry_data.size);
                   }
                   if (deferred_dvry_data.head > deferred_dvry_data.tail) {
                                err_printf("Error: Deferred Queue: head %d > tail %d\n",
                                                 deferred_dvry_data.head,
                                                 deferred_dvry_data.tail);
                                continue;
                   }
                   pthread_mutex_unlock(&deferred_dvry_data.lock);

#ifdef WIN32
                   if (server_null_test) {
                                sim_delivery(&dbData);
                   } else {
                                infoP = get_thread_data();
                                do_delivery(infoP->cnP, &dbData);
                   }
#else
                   if (server_null_test) {
                                sim_delivery(&data);
                   } else {
                                infoP = get_thread_data();
                                do_delivery(infoP->cnP, &data);
                   }
#endif

                   DPRINT(("Deferred: Locking\n"));
                   pthread_mutex_lock(&deferred_dvry_data.lock);

                } else {
                   /*
                    *  Wait for a request to be queued
                    */
                   DPRINT(("Deferred delivery waiting\n"));
                   pthread_cond_wait(&deferred_dvry_data.work_cond,
                                                  &deferred_dvry_data.lock);
         DPRINT(("Deferred: Awake\n"));
      }
   }
}
/*
 *  queue_delivery
 *
 *  Queue a delivery request to be processed in the background
 *  The queue is implemented as a simple queue of size 1.
 *  if data_valid is true: there is already a request waiting in the queue
 *  Sleep on a condition variable until the queue is empty.
 *  Once the queue is empty put the request in the queue, wake up the
 *  background thread and leave.
 */

static void queue_delivery(dataP)
  delivery_data_t *dataP;
{
   struct timeval now;
   int waited = 0;
   static int last_report_time = 0;
#ifdef WIN32
   SYSTEMTIME  queue_time;
#endif

   DPRINT(("queue: Locking\n"));
   pthread_mutex_lock(&deferred_dvry_data.lock);
   DPRINT(("queue: Locked\n"));

   while (deferred_dvry_data.size >= MAX_DVRY_QUEUE) {
                /*  The request queue is full
                 *  Wait until a request is processed and removed from the queue.
                 */
                deferred_dvry_data.num_waiters ++;
                DPRINT((">> queue_delivery: %d waiters, size %d\n",
                                deferred_dvry_data.num_waiters, deferred_dvry_data.size));
                DPRINT(("Queue Delivery waiting, %d waiters\n",
                                deferred_dvry_data.num_waiters));
                pthread_cond_wait(&deferred_dvry_data.q_cond,
                                                &deferred_dvry_data.lock);
                deferred_dvry_data.num_waiters --;
                waited ++;
   }
   DPRINT(("Queuing delivery\n"));
   /*
    *  There is room in the queue.
    *  Enter the request and wake up the background thread
    */
#ifdef WIN32
   GetLocalTime(&queue_time);
   deferred_dvry_data.size++;
   deferred_dvry_data.data[deferred_dvry_data.tail % MAX_DVRY_QUEUE] = *dataP;
   deferred_dvry_data.queue_time[deferred_dvry_data.tail % MAX_DVRY_QUEUE] = queue_time;

#else
   get_local_time(&now);
   dataP->start_queue = (double)now.tv_sec + (now.tv_usec / 1000000.0);
   deferred_dvry_data.size++;
   deferred_dvry_data.data[deferred_dvry_data.tail % MAX_DVRY_QUEUE] = *dataP;
   if (now.tv_sec - last_report_time > 29) {
                err_printf("queue_delivery - %d waiters, size %d\n",
              deferred_dvry_data.num_waiters, deferred_dvry_data.size);
                last_report_time = now.tv_sec;
   }
#endif

   deferred_dvry_data.tail++;
   DPRINT(("queue_delivery: Signalling\n"));
   pthread_cond_signal(&deferred_dvry_data.work_cond);

   DPRINT(("queue_delivery: Unlocking.  Tail %d, size %d Max %d\n",
                deferred_dvry_data.tail,
                deferred_dvry_data.size,
                MAX_DVRY_QUEUE));
   pthread_mutex_unlock(&deferred_dvry_data.lock);

   if (waited) err_printf(">> queue_delivery waited %d times\n", waited);
   dataP->header.returncode = TPCC_SUCCESS;
}

/*
 * start_deferred_delivery_threads
 *
 *              Initialize the deferred delivery data structure and start
 *              a background thread to process the delivery requests
 */
static void start_deferred_delivery_threads()
{
   pthread_t thread;
   int i;
   int rc;

   pthread_mutex_init(&deferred_dvry_data.lock, pthread_mutexattr_default);
   pthread_cond_init(&deferred_dvry_data.work_cond, pthread_condattr_default);
   pthread_cond_init(&deferred_dvry_data.q_cond, pthread_condattr_default);
   deferred_dvry_data.num_waiters = 0;
   deferred_dvry_data.head = 0;
   deferred_dvry_data.tail = 0;
   deferred_dvry_data.size = 0;
   deferred_dvry_data.allocated = dvry_queue_size;
   deferred_dvry_data.data =
                (delivery_data_t *)malloc(dvry_queue_size * sizeof(delivery_data_t));
#ifdef WIN32
   deferred_dvry_data.queue_time =
```

```
                (SYSTEMTIME *)malloc(dvry_queue_size * sizeof(SYSTEMTIME));
#endif

   /*
    *  Create the background delivery thread.
    */
   err_printf("Starting %d deferred delivery threads, queue size %d\n",
                        num_deferred_dvry_threads,
                        dvry_queue_size);
   for (i=0; i<num_deferred_dvry_threads; i++) {
      if ((rc = pthread_create(&thread,
                                                pthread_attr_default,
                                                (pthread_startroutine_t)deferred_delivery,
                                                (pthread_addr_t)0)) != 0) {
                    WARNING("Failed to create delivery thread rc=%d\n", rc);
                    exit(1);
      }
      (void)pthread_detach(&thread);
   }
}

void exit_program(code)
    int code;
{
  char errMsg[55];
  sprintf(errMsg, "exit_program called with code %d", code);
  fprintf(stderr, "%s\n", errMsg);

  TPCexit();

  mon_TerminateServer(errMsg);
}

static char *thread_state_to_str(int state)
{
   char *retval;
   switch(state) {
                case SVR_STATE_NONE: retval = "None"; break;
                case SVR_STATE_SENT: retval = "Sent"; break;
                case SVR_STATE_REPLIED: retval = "Replied"; break;
                case SVR_STATE_ERR: retval = "Err"; break;
                default: retval = "unknown"; break;
   }
   return retval;
}


static thread_info_t *get_thread_data() {
   thread_info_t *dataP;
   struct timeval cur_time;

   /*  Get a thread structure.
    *  Each thread always uses the same connection.
    *  The first time the thread tries to talk to the DB it creates
    *  a connection, initializes it and stores it in a thread global
    *  data structure.
    *
    *  There is a special case for the single connection case:  If there
    *  is exactly one connection then it is global and not per thread.
    *  There may be maany threads but it is assumed that the application is
    *  responsible for synchronizing the threads so that no two threads
    *  ever use the connection at the same time.
    */
   if (num_connections == 1) {
                dataP = &info_array[0];
   } else {
      pthread_getspecific(thread_key, (pthread_addr_t *)&dataP);
   }
   if (dataP == NULL) {  /* No connection assigned to this thread */
                pthread_mutex_lock(&init_lock);  /*  Initialize a connection */
                get_local_time(&cur_time);

      fprintf(stderr, "get_cn> initializing thread slot\n");

                if (preallocate_cn) {
                   if (next_thread >= num_allocated) {
                                fprintf(stderr, "Too many threads, not enough connections\n");
                                mon_TerminateServer("Too many threads, not enough connections");
                   }
                   dataP = &info_array[next_thread++];
                } else {
                   dataP = (thread_info_t *)malloc(sizeof(thread_info_t));
                   memset(dataP, (char)0, sizeof(*dataP));
                   if (server_null_test)
                                dataP->cnP = create_null_connection();
                   else
                                dataP->cnP = create_connection();
                }
      pthread_setspecific(thread_key, dataP);  /*  Store it  */

      fprintf(stderr, "get_cn> initialized connection 0x%x\n", dataP);
                pthread_mutex_unlock(&init_lock);

   }
   return dataP;
}


static void pre_DB(char *name, data_header *headerP,
                                        int tran_type, thread_info_t *infoP)
{
  struct timeval tp;
  DPRINT(("> %s", name));
  get_local_time(&tp);
if (infoP != NULL) {
  infoP->cur_tran_type = tran_type;
  infoP->calls++;
  infoP->state = SVR_STATE_SENT;
  infoP->tran_time = tp;
}

  headerP->start_time.sec = tp.tv_sec;
  headerP->start_time.usec = tp.tv_usec;
}

static void post_DB(char *name, data_header *headerP,
                                        int tran_type, thread_info_t *infoP)
{
  struct timeval tp;
  DPRINT(("< %s\n", name));
  get_local_time(&tp);
  headerP->end_time.sec = tp.tv_sec;
  headerP->end_time.usec = tp.tv_usec;
  headerP->dtype = serverIdNumber;

if (infoP != NULL){
  infoP->tran_time = tp;
  infoP->state = SVR_STATE_REPLIED;
}

  pServerInfo->tran[tran_type].num++;
  /* store the RT info for this server */
  if (tran_type <= MAX_TRAN_TYPE && tran_type > 0) {
       pServerInfo->tran[tran_type].RTtotal +=
time_diff_ms(&(headerP->end_time),&(headerP->start_time));
       pServerInfo->tran[tran_type].RTcount ++;
  }

}

/*
 * --------------------  The following are the entry points
 *                                                  for the RPCs arriving at the Server
 */

void impTPCCDbInfo(dataP,trpcStatus)
  dbInfo_data_t *dataP;
  trpc_status_t  *trpcStatus;
{
    UNCOND_EVENT("> impTPCCDbInfo");
    err_printf("> impTPCCDbInfo");
    dataP->server_id = serverIdNumber;
    err_printf("< impTPCCDbInfo");
}



void impTPCCNOInfo(dataP,trpcStatus)
  dbInfo_data_t *dataP;
  trpc_status_t  *trpcStatus;
{
    impTPCCDbInfo(dataP,trpcStatus);
}


void impTPCCNewOrder(dataP,trpcStatus)
  newOrder_data_t *dataP;
  trpc_status_t  *trpcStatus;
{

    static int numCalls = 0;
    thread_info_t *infoP = get_thread_data();
    FUNCTION_BEGIN("NewOrder", dataP, NEWO_TRANS, infoP);
    if (server_null_test) {
                sim_new_order(dataP);
    } else {
                do_new_order(infoP->cnP, dataP);
    }

    if ((dataP->header.returncode != TPCC_SUCCESS) &&
                (dataP->header.returncode != INVALID_NEWO)) {
      logprintf("< impTPCCNewOrder; rc=%d, sql=%d, isam=%d\n",
                                dataP->header.returncode,
                                dataP->header.sql_code,
                                dataP->header.isam_code);
    } else if (dataP->header.returncode == INVALID_NEWO) {
                DPRINT(("< impTPCCNewOrder INVALID_NEWO\n"));
    }
    if (++numCalls % 10000 == 0) {
                err_printf("impTPCCNewOrder so far %d\n", numCalls);
    }
    FUNCTION_END("NewOrder", dataP, NEWO_TRANS, infoP);
}

void impTPCCPayment(dataP,trpcStatus)
  payment_data_t *dataP;
  trpc_status_t  *trpcStatus;
{
```

```
   static int numCalls = 0;
   thread_info_t *infoP = get_thread_data();
   FUNCTION_BEGIN("Payment", dataP, PAYMENT_TRANS, infoP);
   if (server_null_test) {
                    sim_payment(dataP);
   } else {
                    do_payment(infoP->cnP, dataP);
   }

   if (dataP->header.returncode != TPCC_SUCCESS) {
     logprintf("< impTPCCPayment; rc=%d, sql=%d, isam=%d\n",
                                    dataP->header.returncode,
                                    dataP->header.sql_code,
                                    dataP->header.isam_code);
   }
   if (++numCalls % 10000 == 0) {
       err_printf("impTPCCPayment so far %d\n", numCalls);
   }
   FUNCTION_END("Payment", dataP, PAYMENT_TRANS, infoP);
}

void impTPCCOrderStatus(dataP,trpcStatus)
 orderStatus_data_t *dataP;
 trpc_status_t  *trpcStatus;
{
   thread_info_t *infoP = get_thread_data();
   FUNCTION_BEGIN("OrderStatus", dataP, ORDER_STAT_TRANS, infoP);
   if (server_null_test) {
                    sim_order_status(dataP);
   } else {
                    do_order_status(infoP->cnP, dataP);
   }

   if (dataP->header.returncode != TPCC_SUCCESS) {
     logprintf("< impTPCCOrderStatus; rc=%d, sql=%d, isam=%d\n",
                                    dataP->header.returncode,
                                    dataP->header.sql_code,
                                    dataP->header.isam_code);
   }
   FUNCTION_END("OrderStatus", dataP, ORDER_STAT_TRANS, infoP);
}


void impTPCCStockLevel(dataP,trpcStatus)
 stockLevel_data_t *dataP;
 trpc_status_t   *trpcStatus;
{
   thread_info_t *infoP = get_thread_data();
   FUNCTION_BEGIN("StockLevel", dataP, STOCK_TRANS, infoP);
   if (server_null_test) {
                    sim_stock_level(dataP);
   } else {
                    do_stock_level(infoP->cnP, dataP);
   }

   if (dataP->header.returncode != TPCC_SUCCESS) {
     logprintf("< impTPCCStockLevel; rc=%d, sql=%d, isam=%d\n",
                                    dataP->header.returncode,
                                    dataP->header.sql_code,
                                    dataP->header.isam_code);
   }
   FUNCTION_END("StockLevel", dataP, STOCK_TRANS, infoP);
}

void impTPCCDelivery(dataP,trpcStatus)
 delivery_data_t *dataP;
 trpc_status_t   *trpcStatus;
{
#ifdef WIN32
   delivery_sql_t dbData;
#endif

   thread_info_t *infoP = NULL;
   FUNCTION_BEGIN("DELIVERY", dataP, DELIVERY_TRANS, infoP);
   if (num_deferred_dvry_threads > 0) {
       queue_delivery(dataP);
   } else {
#ifdef WIN32
                    if (server_null_test) {
                        sim_delivery(&dbData);
                    } else {
                        infoP = get_thread_data();
                        do_delivery(infoP->cnP, &dbData);
                    }
#else
                    if (server_null_test) {
                        sim_delivery(dataP);
                    } else {
                        infoP = get_thread_data();
                        do_delivery(infoP->cnP, dataP);
                    }
#endif
   }


   if (dataP->header.returncode != TPCC_SUCCESS) {
     logprintf("< impTPCCDelivery; rc=%d, sql=%d, isam=%d\n",
                                    dataP->header.returncode,
                                    dataP->header.sql_code,
                                    dataP->header.isam_code);
   }
   FUNCTION_END("DELIVERY", dataP, DELIVERY_TRANS, infoP);
}

/* functions in order to run with NULL database */
static void *create_null_connection() {
    static cn_num = 0;
    int *id = (int *)malloc(sizeof(int));
    *id = cn_num++;
    return id;
}

static void clean_null_connection(void *ptr) {
    free(ptr);
    return;
}
```

## stocklevel.tacf

```
/*
 * Copyright (C) 1991, 1990 Transarc Corporation
 * All Rights Reserved
 */
/*
 * stocklevel.tacf -- attribute configuration file for tpcc server.
 * used for transparent binding
 *
 * $Revision: 1.1 $
 * $Date: 1998/11/06 21:10:16 $
 * $Log:          tpcc.tacf,v $
 *
 * $TALog: stocklevel.tacf,v $
 * Revision 1.1  1998/11/06  21:10:16  dongfeng
 * - Move all files common to client and server to tpcc/common
 *   directory
 * [added by delta dongfeng-23677-TPCC-new-directory-structures, r1.1]
 *
 * Revision 1.2  1998/10/08  18:03:04  gerstl
 * Changes to allow configurations where some servers only service
 * specific transaction types. Split transaction interfaces by type.
 * [added by delta gerstl-23515-TPCC-allow-separate-online-transaction-interfaces, r1.1]
 *
 *
 *
 */

[implicit_handle (mon_handle_t handle)]
interface stocklevel
{
}
```

## stocklevel.tidl

```
/*
 * id: $id: $
 *
 * component_name: encina benchmarks
 *
 * the following functions list may not be complete.
 * functions defined by/via macros may not be included.
 *
 * functions:
 *    <fill_me_in>
 *
 * origins: transarc corp.
 *
 * (c) copyright transarc corp. 1995, 1993
 * all rights reserved
 * licensed materials - property of transarc
 *
 * us government users restricted rights - use, duplication or
 * disclosure restricted by gsa adp schedule contract with transarc corp
 */
/*
 * history
 * $talog: $
 */
/*
 * stocklevel.tidl -- interface definition file for tpccserver.
 *
 * $revision: 1.0 $
 * $date: 1995/10/20 21:55:05 $
 * $log:          tpcc.tidl,v $
 */
[
    uuid(1dda58c8-5e05-11d2-bd18-9e621208aa77),
    version(1.0)
]
interface stocklevel
{
import "tpm/mon/mon_handle.idl";
import "tpcc_type.idl";

[nontransactional] void
```

```
                impTPCCStockLevel([in,out] stockLevel_data_t *dataP,
                                                    [out] trpc_status_t  * trpcStatus);
}
```

## tpcc.h

```
#if !defined(TPCC_H_INCLUDED)
#define TPCC_H_INCLUDED
/*************************************************************************/
/*                                                                       */
/*     File: tpcc.h                                                      */
/*     created: 8-26-91                                                  */
/*                                                                       */
/*     program description:                                              */
/*                                                                       */
/*     This module contains global variables and data definitions      */
/*     for the tpcc application.                                         */
/*                                                                       */
/*************************************************************************/

#include "../../common/tpcc_type.h"

#define TPCCH

/*-----------------------------------------------------------*/
/*            Global numbers, constants,...                  */
/*-----------------------------------------------------------*/

#define INVALID_ITEM            100
#define TRAN_OK                 0
#define REMOTE_WAREHOUSE        17

#define FORM_DATE               1
#define FORM_DATETIME           2

#define MAX_ITEMS 15

/*-----------------------------------------------------------*/
/*            transaction structures                         */
/*-----------------------------------------------------------*/

typedef orderStatus_data_t OrderStatus_data;
typedef newOrder_data_t NewOrder_data;
typedef stockLevel_data_t StockLevel_data;
typedef delivery_data_t Delivery_data;
typedef payment_data_t Payment_data;

/*****************************************************************************
 Compatibility for older .sqc files
 *****************************************************************************/
#define s_C_BALANCE c_balance
#define s_C_CITY c_city
#define s_C_CREDIT c_credit
#define s_C_CREDIT_LIM c_credit_lim
#define s_C_DATA c_data
#define s_C_DISCOUNT c_discount
#define s_C_D_ID c_d_id
#define s_C_FIRST c_first
#define s_C_ID c_id
#define s_C_LAST c_last
#define s_C_MIDDLE c_middle
#define s_C_PHONE c_phone
#define s_C_SINCE c_date
#define s_C_STATE c_state
#define s_C_STREET_1 c_street_1
#define s_C_STREET_2 c_street_2
#define s_C_W_ID c_w_id
#define s_C_ZIP c_zip
#define s_D_CITY d_city
#define s_D_ID d_id
#define s_D_STATE d_state
#define s_D_STREET_1 d_street_1
#define s_D_STREET_2 d_street_2
#define s_D_TAX d_tax
#define s_D_ZIP d_zip
#define s_H_AMOUNT h_amount
#define s_H_DATE pay_date
#define s_I_NAME name_i
#define s_I_PRICE price
#define s_OL_AMOUNT ol_amount
#define s_OL_DELIVERY_D delivery_date
#define s_OL_I_ID ol_i_id
#define s_OL_QUANTITY ol_quantity
#define s_OL_SUPPLY_W_ID ol_supply_w_id
#define s_O_CARRIER_ID o_carrier_id
#define s_O_ENTRY_D entry_date
#define s_O_ID o_id
#define s_O_OL_CNT o_ol_cnt
#define s_S_QUANTITY s_quantity
#define S_QUANTITY quantity
#define s_W_CITY w_city
#define s_W_ID w_id
#define s_W_STATE w_state
#define s_W_STREET_1 w_street_1
#define s_W_STREET_2 w_street_2
#define s_W_TAX w_tax
#define s_W_ZIP w_zip
#define s_all_local o_all_local
#define s_brand_generic brand_generic
#define s_exec_status exec_status
#define s_low_stock stock_count
#define s_ol_cnt o_ol_cnt
#define s_queued_time queued_time
#define s_status_line statusline
#define s_threshold threshold
#define s_total_amount total
#define s_transtatus header.returncode

#if 0
#define NEWORDER_SERVICE    "NEWORD"
#define PAYMENT_SERVICE     "PAYMENT"
#define DELIVERY_SERVICE    "DELIVERY"
#define STOCKLEVEL_SERVICE  "STOCKLEV"
#define ORDERSTATUS_SERVICE "ORDSTAT"
#else
#define NEWORDER_SERVICE    "neword_sql"
#define PAYMENT_SERVICE     "payment_sql"
#define DELIVERY_SERVICE    "delivery_sql"
#define STOCKLEVEL_SERVICE  "stocklev_sql"
#define ORDERSTATUS_SERVICE "ordstat_sql"
#endif

#endif /* TPCC_H_INCLUDED */
```

## tpcc.tacf

```
/*
 * Copyright (C) 1991, 1990 Transarc Corporation
 * All Rights Reserved
 */
/*
 *  tpcc.tacf -- attribute configuration file for tpcc server.
 * used for transparent binding
 *
 * $Revision: 1.1 $
 * $Date: 1998/11/06 21:10:17 $
 * $Log:         tpcc.tacf,v $
Revision 4.2  95/05/16  10:55:49  10:55:49  tpcc (TPCC Benchmark)
Added necessary RCS ident strings

 */

[implicit_handle (mon_handle_t handle)]
interface tpccTransactions
{
}
```

## tpcc_trans.tacf

```
/*
 * Copyright (C) 1991, 1990 Transarc Corporation
 * All Rights Reserved
 */
/*
 *  neworder.tacf -- attribute configuration file for tpcc server.
 * used for transparent binding
 *
 * $Revision: 1.1 $
 * $Date: 1998/11/06 21:10:17 $
 * $Log:         tpcc.tacf,v $
 *
 * $TALog: tpcc_trans.tacf,v $
 * Revision 1.1  1998/11/06  21:10:17  dongfeng
 * - Move all files common to client and server to tpcc/common
 *   directory
 * [added by delta dongfeng-23677-TPCC-new-directory-structures, r1.1]
 *
 * Revision 1.1  1997/06/16  22:04:48  oz
 * - Integration with Data Dependent Routing: Phase 1
 *   Separated the all the binding related code into its own files.
 * - Added mon_client_utils.[ch] that export binding related calls.
 * - Added a TPCC_USE_DDR compile time switch
 * - Added tpcc_trans.tidl: All the functions in one interface.
 * [added by delta oz-20170-TPCC-add-data-dependent-routing, r1.1]
 *
 *
 */

[implicit_handle (mon_handle_t handle)]
interface tpccTrans
{
}
```

## tpcc_trans.tidl

```
/*
 * id: $id: $
 *
 * component_name: encina benchmarks
```

```
*
* the following functions list may not be complete.
* functions defined by/via macros may not be included.
*
* functions:
*    <fill_me_in>
*
* origins: transarc corp.
*
* (c) copyright transarc corp. 1995, 1993
* all rights reserved
* licensed materials - property of transarc
*
* us government users restricted rights - use, duplication or
* disclosure restricted by gsa adp schedule contract with transarc corp
*/
/*
* history
* $talog: $
*/

/*
* tpcc_trans.tidl -- interface definition file for tpccserver.
*
* $revision: 1.11 $
* $date: 1995/10/20 21:55:05 $
* $log:          tpcc.tidl,v $
*/

[uuid(955d7288-e672-11d0-bcef-9e621234aa77), version(1.0)]

interface tpccTrans
{
import "tpm/mon/mon_handle.idl";
import "tpcc_type.idl";

[nontransactional] void
                impTPCCNewOrder([in,out] newOrder_data_t *dataP,
                                                [out] trpc_status_t  * trpcStatus);

[nontransactional] void
                impTPCCPayment([in,out] payment_data_t *dataP,
                                                [out] trpc_status_t  * trpcStatus);

[nontransactional] void
                impTPCCOrderStatus([in,out] orderStatus_data_t *dataP,
                                                [out] trpc_status_t  * trpcStatus);

[nontransactional] void
                impTPCCStockLevel([in,out] stockLevel_data_t *dataP,
                                                [out] trpc_status_t  * trpcStatus);


[nontransactional] void
        impTPCCNOInfo([out] dbInfo_data_t *dataP,
                [out] trpc_status_t  * trpcStatus);

}
```

## tpcc_type.idl

```
/*
*                tpcc_type.idl
*
* $Revision: 1.2 $
* $Date: 1998/12/08 18:55:21 $
* $Log:          $
*
*
* $TALog: tpcc_type.idl,v $
* Revision 1.2  1998/12/08  18:55:21  wenjian
* Add "int stats" to data_header structure
* [from r1.1 by delta wenjian-23785-TPCC-pass-statsFrequency-from-client-to-server, r1.1]
*
* 2001/11/25 klavs: Changed warehouses references to long int
*
* Revision 1.1  1998/11/06  21:10:17  dongfeng
* - Move all files common to client and server to tpcc/common
*   directory
* [added by delta dongfeng-23677-TPCC-new-directory-structures, r1.1]
*
* Revision 1.11  1998/01/24  14:17:07  oz
* - User server name to identify server and name delivery file
* - Use env variable HOME instead of /home/encina if HOME is set
*
* - Added const ONLINE_INTERFACES
* [from r1.10 by delta oz-21687-TPCC-use-server-name-to-identify-process, r1.1]
*
* Revision 1.10  1998/01/23  15:09:11  oz
* - Updated the SP TPCC directory to the latest files used
*   during the SP tpcc audit.
* [from r1.9 by delta oz-20774-TPCC-update-to-latest-SP-version-11-27, r1.1]
*
*
*
*/
[
uuid(008c6338-2b0a-1001-a9ab-02608c2f015a), version(1)
]
interface tpcc_types {

const long NAME_LENGTH = 32;

const long NEWO_INTERFACE =       0x01;
const long PAYMENT_INTERFACE =    0x02;
const long ORDER_STAT_INTERFACE = 0x04;
const long DELIVERY_INTERFACE =   0x08;
const long STOCK_INTERFACE =      0x10;
const long ONLINE_INTERFACES = NEWO_INTERFACE | PAYMENT_INTERFACE |
ORDER_STAT_INTERFACE | STOCK_INTERFACE;
const long ALL_INTERFACE =      0xffff;

const long NEWO_TRANS = 1;
const long PAYMENT_TRANS = 2;
const long ORDER_STAT_TRANS = 3;
const long DELIVERY_TRANS = 4;
const long STOCK_TRANS = 5;
const long MAX_TRAN_TYPE = 5;

typedef struct {
                long int sec;
                long int usec;
} time_type;

typedef struct  {
        short int  dtype;
        short int  returncode;
                long int   sql_code;
                long int   isam_code;
        long int   num_rms;

        short int  stats;       /*  For instrument only */
                time_type  start_time;          /*  For Debug Purposes only  */
                time_type  end_time;            /*  For Debug Purposes only  */
} data_header;

/* Definitions for payment transaction
 *
 *  payment_data_t
 *
 *  An in-out structure for payment transaction.
 *  It contains all the input parameters as well as the output parameters.
 */
typedef struct {
        data_header header;
        long  int w_id;
        short int d_id;
        short int c_id;
        long  int c_w_id;
        short int c_d_id;
        short int byname;
        double    h_amount;
        char      pay_date[20];

        char      w_name[11];
        char      w_street_1[21];
        char      w_street_2[21];
        char      w_city[21];
        char      w_state[3];
        char      w_zip[10];

        char      d_name[11];
        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]; /* was C_LAST_LEN already includes +1 */
        char      c_middle[3];
        char      c_last[17];
        char      c_phone[17];
        char      c_credit[3];
        char      c_street_1[21];
        char      c_street_2[21];
        char      c_city[21];
        char      c_state[3];
        char      c_zip[10];
        double    c_credit_lim;
        double    c_balance;
        double    c_discount;
        double    c_ytd_payment;
        short int c_payment_cnt;
        char      c_date[20];
        char      c_data[201];
} payment_data_t;

/* Definitions for new order transaction */

typedef struct {
        long  int  ol_supply_w_id;
        short int  ol_quantity;
        short int  s_quantity;
        long  int  ol_i_id;
        char       name_i[25];
        char       brand_generic[2];
```

```
        double     price;
        double     ol_amount;
                   long int   s_idx;
                   char       s_dist[25];
} OL_TABLE, newOrder_item_t;

typedef struct {
                   data_header     header;
                   long  int       w_id;
                   short int       d_id;
                   short int       c_id;
                   short int       o_ol_cnt;
                   short int       o_all_local;
                   short int       items_valid; /* true if all valid */
                   short int          total_items;
                   long int        o_id;
        double          w_tax;
                   double          d_tax;
                   double          total;
                   double          c_discount;
                   char            entry_date[20];
                   char            c_last[17];
                   char            c_credit[3];
                   char               statusline[26];
                   OL_TABLE    item[15];
} newOrder_data_t;

/* Definitions for order status transaction */

typedef struct {
  long int  ol_i_id;
  long int  ol_supply_w_id;
  short int  ol_quantity;
  double     ol_amount;
  char       delivery_date[20];
} orderStatusItem_t;

typedef struct {
        data_header header;
        long  int w_id;
        short int d_id;
        short int c_id;
        short int o_id;
        short int o_ol_cnt;
        short int byname;
        short      o_carrier_id;
        char       c_last[17];
        char       c_first[17];
        char       c_middle[3];
        char       entry_date[20];
        double     c_balance;
        orderStatusItem_t item[15];
} orderStatus_data_t;

/* Definitions for stock level transaction */

typedef struct {
  data_header header;
  long  int w_id;
  short int d_id;
  short int threshold;
  long int  stock_count;
} stockLevel_data_t;

/* Definitions for delivery transaction */

typedef struct {
  data_header header;
  long  int w_id;
  short int o_carrier_id;
  long int queued_time;
  short status;
  char exec_status[50];
  double start_queue;
} delivery_data_t;

typedef struct {
  long int first_wh;
  long int last_wh;
  long int server_id;
} dbInfo_data_t;

/*
 *  A union of all the transactions
 */
typedef union switch(long int tran_type) data {
  case NEWO_TRANS:            newOrder_data_t    new_order;
  case PAYMENT_TRANS:     payment_data_t     payment;
  case ORDER_STAT_TRANS:  orderStatus_data_t order_status;
  case DELIVERY_TRANS:    delivery_data_t    delivery;
  case STOCK_TRANS:          stockLevel_data_t  stock_level;
} tpcc_data_t;


}
```

## tpcc_utils.c

```
/*
 *
 *      tpcc_utils.c
 *
 * $Revision: 1.2 $
 * $Date: 1998/12/14 20:27:57 $
 * $Log:        $
 *
 *
 *
 *
 * $TALog: tpcc_utils.c,v $
 * Revision 1.2  1998/12/14  20:27:57  wenjian
 * Made corresponding changes due to data structure change of tran_info_t.
 *
 * - Add header file winsock.h for NT platform
 * [from r1.1 by delta wenjian-23788-TPCC-use-single-stats-var-for-each-client-and-server, r1.3]
 *
 * Revision 1.1  1998/12/11  16:37:58  wenjian
 * Move some common functions from client/client_utils.c to common/tpcc_utils.c.
 * In this version, we only move time_diff_ms(). Need some work in order to
 * move other functions like ERROUT.
 *
 * - A file including utility functions for both client and server
 * [added by delta wenjian-23788-TPCC-use-single-stats-var-for-each-client-and-server, r1.2]
 *
 *
 *
 *    tpcc_utils.c
 *      Generic utilities used by the client and server processes
 */

#include <stdio.h>
#include <time.h>
#include <string.h>
#include <stdarg.h>

#if defined (solaris)
#include <dce/pthread.h>
#else   /* solaris */
#include <pthread.h>
#endif

#include "databuf.h"
#include "do_tpcc.h"
#include "tpcc_type.h"

#ifdef WIN32
#include <winsock.h>
#endif

/*
 *  time_diff_ms
 *      Return the difference in miliseconds between two times
 */
int time_diff_ms(t2, t1)
  struct timeval *t2, *t1;
{
    int t_diff;

    t_diff = (t2->tv_usec + 1000000 - t1->tv_usec + 500) / 1000 +
            (t2->tv_sec - t1->tv_sec - 1) * 1000;

    return(t_diff);
}
```

## util.h

```
#ifndef LOCAL_UTIL_H
#define LOCAL_UTIL_H

#include "util_token.h"

#define UTIL_ALLOC(ptr, type, size)                    \
    ptr = (type)malloc(size);                                                    \
    if (ptr==NULL) {                                                                    \
                fprintf(stderr, "UTIL_ALLOC failed\n");                          \
                exit(1);                                                                \
    }

#endif
```

## util_alloc.h

```
/*
 * util_alloc.h
 *
 * $Revision: 1.1 $
 * $Date: 1998/11/06 21:10:18 $
 * $Log:        util_alloc.h,v $
 * Revision 4.2  95/05/16  10:55:43  10:55:43  tpcc (TPCC Benchmark)
 * Added necessary RCS ident strings
 *
 *
 */
```

```
#ifndef TRANSARC_UTIL_ALLOC_H
#define TRANSARC_UTIL_ALLOC_H

/*
 * UTIL_[ALLOC, REALLOC, NEW, FREE] -- macros that wrap calls to
 * malloc, realloc, free. The allocation macros check the return
 * value, a NULL pointer is converted into a fatal error.
 */
#define UTIL_ALLOC_ROBUST(ptr, type, size)                                  \
   ((ptr) = (type) malloc(size))

#define UTIL_ALLOC(ptr, type, size)                                         \
do {
\
   if (UTIL_ALLOC_ROBUST(ptr, type, size) == 0)                             \
                  util_MemoryError("UTIL_ALLOC", __FILE__, __LINE__);       \
} while (0)

#define UTIL_REALLOC_ROBUST(ptr, type, size)                                \
   (ptr = (type) realloc((void *) ptr, size))

#define UTIL_REALLOC(ptr, type, size)                                       \
do {
\
   if (UTIL_REALLOC_ROBUST(ptr, type, size) == 0)                           \
                  util_MemoryError("UTIL_REALLOC", __FILE__, __LINE__);     \
} while (0)

#define UTIL_FREE(ptr)                                                      \
do {
\
   if (!ptr) {                                                              \
                  util_MemoryError("UTIL_FREE", __FILE__, __LINE__); \
   }
\
   free((void *) (ptr));                                                    \
   ptr = 0;       /* Make all free'd pointers zero. */                      \
} while (0)

#define          UTIL_ALLOC_ARRAY_ROBUST(ptr, type, number)                 \
   ((ptr) = (type *)malloc(sizeof(type) * (number)))

#define          UTIL_ALLOC_ARRAY(ptr, type, number)                        \
do {
\
   if (UTIL_ALLOC_ARRAY_ROBUST(ptr, type, number) == 0)                     \
                  util_MemoryError("UTIL_ALLOC_ARRAY", __FILE__, __LINE__); \
} while (0)

#define          UTIL_COPY_STRING_ROBUST(to,from)                           \
   (((to) = (char *)malloc(strlen((char *)(from))+1)) ?          \
     strcpy((char *)(to), (char *)(from)) : 0)

#define          UTIL_COPY_STRING(to, from)                                 \
do {
\
   if (UTIL_COPY_STRING_ROBUST(to, from) == 0)                              \
                  util_MemoryError("UTIL_COPY_STRING", __FILE__, __LINE__); \
} while (0)


#endif /* TRANSARC_UTIL_ALLOC_H */
```

## __util_token.h

```
/*
 * ID: $Id: util_token.h,v 1.1 1998/11/06 21:10:18 dongfeng Exp $
 *
 * COMPONENT_NAME: Encina Toolkit Executive
 *
 * The following functions list may not be complete.
 * Functions defined by/via macros may not be included.
 *
 * FUNCTIONS:
 *
 * ORIGINS: Transarc Corp.
 *
 * (C) COPYRIGHT Transarc Corp. 1995, 1994, 1993, 1990
 * All Rights Reserved
 * Licensed Materials - Property of Transarc
 *
 * US Government Users Restricted Rights - Use, duplication or
 * disclosure restricted by GSA ADP Schedule Contract with Transarc Corp
 */
/*
 * HISTORY
 * $TALog: util_token.h,v $
 * Revision 1.1  1998/11/06  21:10:18  dongfeng
 * - Move all files common to client and server to tpcc/common
 *   directory
 * [added by delta dongfeng-23677-TPCC-new-directory-structures, r1.1]
 *
 * Revision 1.7  1995/01/30  12:50:13  barry
 * Update copyrights for Encina 1.2.
 * [from r1.6 by delta barry-0000-update-copyrights-for-1.2, r1.1]
 *
 * Revision 1.6  1995/01/13  14:12:51  psu
 * fix comment to conform to coding standards.
 * [from r1.5 by delta psu-13196-client-interoperate-with-oracle-pro-c-2, r1.3]
 *
 * Revision 1.5  1995/01/12  20:34:22  psu
 * put comment on ## fix in the code
 *
 * try to make sure people don't change the use of ##
 * [from r1.4 by delta psu-13196-client-interoperate-with-oracle-pro-c-2, r1.2]
 *
 * Revision 1.4  1995/01/12  15:48:28  psu
 * fix use of ## to make pro*c happy
 *
 * pro*c 2.0 can't deal with a ## b ## c, change to a ## b##c.
 * [from r1.3 by delta psu-13196-client-interoperate-with-oracle-pro-c-2, r1.1]
 *
 * Revision 1.3  1994/02/04  17:22:22  pinaki
 * Update copyright.
 * [from r1.2 by delta pinaki-0000-update-copyright-for-1.1, r1.1]
 *
 * Revision 1.2  1993/12/18  22:06:57  mwyoung
 * [from r1.1 by delta mwyoung-10043-util-always-offer-UTIL_IDENT, r1.1]
 *
 * Revision 1.1  1993/12/03  22:00:04  mwyoung
 * Split the various features into separate files, so that they can
 * be included separately.
 * [added by delta mwyoung-9848-utils-split-util.h-into-separately-usable-parts, r1.1]
 *
 */
#ifndef TRANSARC_UTIL_TOKEN_H
#define TRANSARC_UTIL_TOKEN_H

#include <encina/c_prologue.h>

/* UTIL_IDENT -- the identity function */
#define UTIL_IDENT(a)                    a

/*
 * UTIL_[STRING, CONCAT, CONCAT3] -- macros for converting into, and
 * concatenating together, strings.
 */

/* Note, the a ## b##c is needed to make some broken cpp's work correctly.
 * This was originally put here for Oracle Pro*C 2.0, but other compilers
 * may have similar problems.
 */

#if              ENCINA_C_ANSI_STRING_TOKEN_SUPPORT
#define UTIL_STRING(a)     # a
#define UTIL_CONCAT(a, b)                a ## b
#define          UTIL_CONCAT3(a,b,c)     a ## b##c
#else            /* ENCINA_C_ANSI_STRING_TOKEN_SUPPORT */
#define UTIL_STRING(a)                   "a"
#define UTIL_CONCAT(a, b)                UTIL_IDENT(a)b
#define          UTIL_CONCAT3(a,b,c)     UTIL_CONCAT(a,b)c
#endif           /* ENCINA_C_ANSI_STRING_TOKEN_SUPPORT */

#include <encina/c_epilogue.h>
#endif /* TRANSARC_UTIL_TOKEN_H */
```

## utilities.h

```
/*
 * ID: $Id: utilities.h,v 1.1 1998/11/06 21:10:19 dongfeng Exp $
 *
 * COMPONENT_NAME: Encina Toolkit Server Core
 *
 * ORIGINS: Transarc Corp.
 *
 * (C) COPYRIGHT Transarc Corp. 1995
 * All Rights Reserved
 * Licensed Materials - Property of Transarc
 *
 * US Government Users Restricted Rights - Use, duplication or
 * disclosure restricted by GSA ADP Schedule Contract with Transarc Corp
 * $Revision: 1.1 $
 * $Log:          utilities.h,v $
 *
 *
 * $TALog: utilities.h,v $
 * Revision 1.1  1998/11/06  21:10:19  dongfeng
 * - Move all files common to client and server to tpcc/common
 *   directory
 * [added by delta dongfeng-23677-TPCC-new-directory-structures, r1.1]
 *
 * Revision 1.7  1998/10/27  14:57:52  dongfeng
 * Change enc_status to a data structure that has fields:
 *   - Status code
 *   - Line Number
 *   - File Name
 *   - Encina Error Code
 *   - Error Msg
 * Remove statusMsgs in web_tpcc.c
 * [from r1.6 by delta dongfeng-23067-TPCC-add-web-based-tpcc-client, r1.6]
 *
 * Revision 1.6  1998/10/22  19:18:37  dongfeng
```

```
* [from r1.5 by delta dongfeng-23067-TPCC-add-web-based-tpcc-client, r1.2]
*
* Revision 1.5  1998/01/23  15:09:16  oz
* - Updated the SP TPCC directory to the latest files used
*   during the SP tpcc audit.
* [from r1.4 by delta oz-20774-TPCC-update-to-latest-SP-version-11-27, r1.1]
*
*
*/

/*
* utilities.h -- holds declarations, macros, and constants used by the
* telshop/merchandise client-server program.
*
* $Date: 1998/11/06 21:10:19 $
*/

#ifndef _UTILITIES_H_
#define _UTILITIES_H_

#include <dce/rpc.h>
#include <dce/dce_error.h>
#include <encina/encina.h>
#include <stdlib.h>

#include <utils/trace.h>
#include "util_alloc.h"

/*  Boolean type, and its constants  */

#define FALSE 0
#define TRUE  1

#if        ENCINA_C_ANSI_STRING_TOKEN_SUPPORT
#define UTIL_STRING(a)          # a
#define UTIL_CONCAT(a, b)       a ## b
#define UTIL_CONCAT3(a,b,c)     a ## b##c
#else   /* ENCINA_C_ANSI_STRING_TOKEN_SUPPORT */
#define UTIL_STRING(a)          "a"
#define UTIL_CONCAT(a, b)       UTIL_IDENT(a)b
#define UTIL_CONCAT3(a,b,c)     UTIL_CONCAT(a,b)c
#endif  /* ENCINA_C_ANSI_STRING_TOKEN_SUPPORT */

/*  ENCINA_CALL:  Make fail-fast calls on the various services.  */

/*  Macro delimiters  */

#define BEGIN_MACRO do {

#define END_MACRO } while (0)

/*  FATAL --  Failure.  Print error message and exit the program  */

void exit_program();

#ifndef FATAL
#define FATAL(args)
\
BEGIN_MACRO
                \
   printf args;                                                                    \
   exit(1);
\
END_MACRO
#endif

/*  ENCINA_CALL:  Make fail-fast calls on the various services.  */

#define ENCINA_CALL_RC(proc_name,call,rc)                    \
BEGIN_MACRO                                                  \
   char _errorMsg[ENCINA_MAX_STATUS_STRING_SIZE];                                  \
   rc = (call);                                                                    \
   if (rc)  {                                                \
      encina_StatusToString(rc, ENCINA_MAX_STATUS_STRING_SIZE,          \
                                                _errorMsg);
\
      err_printf( "%x \n", rc);                                                    \
      err_printf( "%s \n", _errorMsg);                                             \
      err_printf( "%s \n", proc_name);                                             \
   }
                \
END_MACRO

#define ENCINA_CALL(proc_name,call)                          \
BEGIN_MACRO                                                  \
   unsigned long _status;                                    \
   ENCINA_CALL_RC(proc_name,call,_status);                   \
   if (_status) exit_program(_status);                       \
END_MACRO

typedef enum {
   action_exit,
   action_continue
} error_action_t;

#define CHECK_DCE_STATUS(_status, _msg, _action)             \
{                                                            \
   int error_stat;                                           \
   unsigned long _rc = (_status);                            \
   unsigned char error_string[dce_c_error_string_len];       \
   if ((_status) != rpc_s_ok) {                              \
                dce_error_inq_text(_rc, error_string, &error_stat);          \
                err_printf("%s failed, error: %s (%d)\n", _msg, error_string, _rc);\
                if ((_action) == action_exit)                                \
                   exit(-1);                                                 \
   }                                                         \
}

#define DCE_CALL(call, args)                                 \
{                                                            \
   call args;                                                \
   CHECK_DCE_STATUS(status, UTIL_STRING(call), action_exit);\
}



/*  MALLOC_CHECK --  Make sure there is memory to be allocated;
 *  fail if there is not.  */

#define MALLOC_CHECK(memP)                                                   \
BEGIN_MACRO                                                                                  \
   if (!(memP))                                                              \
      FATAL(("Out of memory.\n"));                                   \
END_MACRO

/*  ASSERT --  internal checks that assure the program is running correctly.
 *  Use to check program correctness, not user input.  */

#ifndef ASSERT
#define ASSERT(condition)                                                                                    \
BEGIN_MACRO
                \
   if (!(condition))
\
      FATAL(("%s (%d):  Assertion failed.\n", __FILE__, __LINE__));     \
END_MACRO
#endif

#define RAND(lim1, lim2)  ((int)(drand48()*((lim2)-(lim1)+1)) + (lim1))

#ifndef BAD_STATUS
#define BAD_STATUS(call, status)                                 \
   BEGIN_MACRO                                                   \
      char _errorMsg[ENCINA_MAX_STATUS_STRING_SIZE];                    \
      encina_StatusToString(status, ENCINA_MAX_STATUS_STRING_SIZE,       \
                        _errorMsg);                                      \
      logprintf("%s: %s (%d)\n", UTIL_STRING(call), _errorMsg, status);   \
      exit(1);                                                           \
   END_MACRO
#endif

#ifndef boolean_t
#define boolean_t int
#endif

#ifndef EXPORT
#define EXPORT
#endif

#ifndef IMPORT
#define IMPORT extern
#endif

/* For web_tpcc_client */
#define CHK_STATUS(st, val, _errMsg)                         \
BEGIN_MACRO                                                  \
    if(st) {                                                 \
       enc_status.status=val;                                \
       strcpy(enc_status.file, __FILE__);                    \
       enc_status.line= __LINE__;                            \
       enc_status.encinaError = st;                          \
       if(_errMsg)strcpy(enc_status.errorMsg, _errMsg);      \
       if(st!=1) return;   \
    }                                                        \
END_MACRO

#endif /*  _UTILITIES_H_  */
```

# A.2 Client Transaction Code

## initpay.sql

```
CREATE OR REPLACE PACKAGE initpay
AS
 TYPE rowidarray IS TABLE OF ROWID INDEX BY BINARY_INTEGER;
 row_id                rowidarray;
```

```
 cust_rowid              ROWID;
 dist_name               VARCHAR2(11);
 ware_name               VARCHAR2(11);
 c_num                   BINARY_INTEGER;
 PROCEDURE pay_init;
END initpay;
/
CREATE OR REPLACE PACKAGE BODY initpay AS
 PROCEDURE pay_init IS
 BEGIN
   NULL;
 END pay_init;
END initpay;
/
exit
```

## 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 warehouse
        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 initpay.ware_name,
              :w_street_1, :w_street_2, :w_city, :w_state, :w_zip;


--Bulk fetch
       SELECT rowid
       BULK COLLECT INTO initpay.row_id
       FROM customer
       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;

--Store number of rows processed
      initpay.c_num := sql%rowcount;
      initpay.cust_rowid := initpay.row_id((initpay.c_num) / 2);

      UPDATE customer
        SET c_balance = c_balance - :h_amount,
            c_ytd_payment = c_ytd_payment+ :h_amount,
            c_payment_cnt = c_payment_cnt+1
      WHERE rowid = initpay.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 customer
          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 = initpay.cust_rowid
          RETURNING substr(c_data,1, 200)
          INTO :c_data;

      END IF;

      UPDATE district
        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 initpay.dist_name, :d_street_1, :d_street_2, :d_city,
             :d_state, :d_zip;

      INSERT INTO history (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, initpay.ware_name || '    ' || initpay.dist_name);

--Sanjay-No commit needed iff Commit on Success done
--      COMMIT;
      EXIT;

      EXCEPTION
         WHEN not_serializable OR deadlock OR snapshot_too_old THEN
           ROLLBACK;
           :retry := :retry + 1;
       END;

    END LOOP;
  END;
```

## paynz.sql

```
DECLARE /* paynz */
--      cust_rowid              ROWID;
--      dist_name               VARCHAR2(11);
--      ware_name               VARCHAR2(11);
    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 warehouse
        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 initpay.ware_name, :w_street_1, :w_street_2, :w_city,
             :w_state, :w_zip;

      UPDATE  customer
        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 initpay.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;


--      :c_data := ' ';

      IF :c_credit = 'BC' THEN
        UPDATE customer
                 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, '9999.99') || ' | ')
                     || c_data, 1, 500)
        WHERE rowid = initpay.cust_rowid
      RETURNING substr(c_data,1, 200)
        INTO :c_data;

      END IF;

        UPDATE district
          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 initpay.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 history  (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, initpay.ware_name || '    ' || initpay.dist_name);
--      COMMIT;
--      :h_date := to_char (:cr_date, 'DD-MM-YYYY.HH24:MI:SS');
      EXIT;

      EXCEPTION
        WHEN not_serializable OR deadlock OR snapshot_too_old THEN
          ROLLBACK;
          :retry := :retry + 1;
      END;

    END LOOP;
  END;
```

## pldel.c

```
#ifdef RCSID
static char *RCSid =
   "$Header: /afs/transarc.com/project/encina/rcs/test/src/benchmarks/tpcc/server/ora8.1_mt/RCS/pldel.c,v
1.2 1999/04/15 12:16:51 oz Exp $ Copyr (c) 1994 Oracle";
#endif /* RCSID */

/*===================================================================+
|       Copyright (c) 1996  Oracle Corp, Redwood Shores, CA       |
|                OPEN SYSTEMS PERFORMANCE GROUP                   |
|                    All Rights Reserved                          |
 +===================================================================+
| FILENAME
|    pldel.c
| DESCRIPTION
|    OCI version of DELIVERY transaction in TPC-C benchmark.
 +===================================================================*/

#include "tpcc.h"
#include "plora.h"
#ifdef TUX
#include <userlog.h>
#endif

#include "tpccflags.h"

#if defined(ISO) || defined(ISO5) || defined(ISO6) || defined(ISO8)
#define SQLTXT0 "SELECT substr(value,1,5) FROM v$parameter \
   WHERE name = 'instance_number'"
#endif

#ifdef PLSQLDEL
#define SQLTXT "BEGIN delivery.deliver (:w_id, :carrier_id, :order_id,\
 :retry); END;"
#else
# ifdef DMLRETDEL
#define SQLTXT1 "DELETE FROM new_order WHERE no_d_id = :d_id \
                AND no_w_id = :w_id and rownum <= 1 \
               RETURNING no_o_id into :o_id "
# else
#define SQLTXT1A "\
SELECT /*+ USE_NL(NEW_ORDER ORDERS) ORDERED */ 1, no_o_id, new_order.rowid, o_c_id,
orders.rowid \
FROM new_order, orders \
WHERE no_w_id = :w_id AND no_d_id = 1 AND o_w_id = :w_id AND o_d_id = 1 AND \
   o_id = no_o_id AND rownum <= 1 UNION ALL \
"

#define SQLTXT1B "\
SELECT /*+ USE_NL(NEW_ORDER ORDERS) ORDERED */ 2, no_o_id, new_order.rowid, o_c_id,
orders.rowid \
FROM new_order, orders \
WHERE no_w_id = :w_id AND no_d_id = 2 AND o_w_id = :w_id AND o_d_id = 2 AND \
   o_id = no_o_id AND rownum <= 1 UNION ALL \
"

#define SQLTXT1C "\
SELECT /*+ USE_NL(NEW_ORDER ORDERS) ORDERED */ 3, no_o_id, new_order.rowid, o_c_id,
orders.rowid \
FROM new_order, orders \
WHERE no_w_id = :w_id AND no_d_id = 3 AND o_w_id = :w_id AND o_d_id = 3 AND \
   o_id = no_o_id AND rownum <= 1 UNION ALL \
"

#define SQLTXT1D "\
SELECT /*+ USE_NL(NEW_ORDER ORDERS) ORDERED */ 4, no_o_id, new_order.rowid, o_c_id,
orders.rowid \
FROM new_order, orders \
WHERE no_w_id = :w_id AND no_d_id = 4 AND o_w_id = :w_id AND o_d_id = 4 AND \
   o_id = no_o_id AND rownum <= 1 UNION ALL \
"

#define SQLTXT1E "\
SELECT /*+ USE_NL(NEW_ORDER ORDERS) ORDERED */ 5, no_o_id, new_order.rowid, o_c_id,
orders.rowid \
FROM new_order, orders \
WHERE no_w_id = :w_id AND no_d_id = 5 AND o_w_id = :w_id AND o_d_id = 5 AND \
   o_id = no_o_id AND rownum <= 1 UNION ALL \
"

#define SQLTXT1F "\
SELECT /*+ USE_NL(NEW_ORDER ORDERS) ORDERED */ 6, no_o_id, new_order.rowid, o_c_id,
orders.rowid \
FROM new_order, orders \
WHERE no_w_id = :w_id AND no_d_id = 6 AND o_w_id = :w_id AND o_d_id = 6 AND \
   o_id = no_o_id AND rownum <= 1 UNION ALL \
"

#define SQLTXT1G "\
SELECT /*+ USE_NL(NEW_ORDER ORDERS) ORDERED */ 7, no_o_id, new_order.rowid, o_c_id,
orders.rowid \
FROM new_order, orders \
WHERE no_w_id = :w_id AND no_d_id = 7 AND o_w_id = :w_id AND o_d_id = 7 AND \
   o_id = no_o_id AND rownum <= 1 UNION ALL \
"

#define SQLTXT1H "\
SELECT /*+ USE_NL(NEW_ORDER ORDERS) ORDERED */ 8, no_o_id, new_order.rowid, o_c_id,
orders.rowid \
FROM new_order, orders \
WHERE no_w_id = :w_id AND no_d_id = 8 AND o_w_id = :w_id AND o_d_id = 8 AND \
   o_id = no_o_id AND rownum <= 1 UNION ALL \
"

#define SQLTXT1I "\
SELECT /*+ USE_NL(NEW_ORDER ORDERS) ORDERED */ 9, no_o_id, new_order.rowid, o_c_id,
orders.rowid \
FROM new_order, orders \
WHERE no_w_id = :w_id AND no_d_id = 9 AND o_w_id = :w_id AND o_d_id = 9 AND \
   o_id = no_o_id AND rownum <= 1 UNION ALL \
"

#define SQLTXT1J "\
SELECT /*+ USE_NL(NEW_ORDER ORDERS) ORDERED */ 10, no_o_id, new_order.rowid, o_c_id,
orders.rowid \
FROM new_order, orders \
WHERE no_w_id = :w_id AND no_d_id = 10 AND o_w_id = :w_id AND o_d_id = 10 AND \
   o_id = no_o_id AND rownum <= 1"

#define SQLTXT2 "DELETE FROM new_order WHERE rowid = :no_rowid"
#endif

#ifdef DMLRETDEL
#define SQLTXT3 "UPDATE orders 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"
#else
#define SQLTXT3 "UPDATE orders SET o_carrier_id = :carrier_id \
   WHERE rowid = :o_rowid"
#endif

#ifdef DMLRETDEL
#define SQLTXT4 "UPDATE /*+ buffer */ order_line 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 ol_amount into :ol_amount "
#else
#define SQLTXT4 "UPDATE order_line SET ol_delivery_d = :cr_date \
   WHERE ol_w_id = :w_id AND ol_d_id = :d_id AND ol_o_id = :o_id"

#define SQLTXT5A "\
SELECT :d_id1, SUM(ol_amount) FROM order_line WHERE ol_w_id = :w_id AND \
 ol_d_id = :d_id1 AND ol_o_id = :o_id1 UNION ALL \
SELECT :d_id2, SUM(ol_amount) FROM order_line WHERE ol_w_id = :w_id AND \
 ol_d_id = :d_id2 AND ol_o_id = :o_id2 UNION ALL \
"

#define SQLTXT5B "\
SELECT :d_id3, SUM(ol_amount) FROM order_line WHERE ol_w_id = :w_id AND \
 ol_d_id = :d_id3 AND ol_o_id = :o_id3 UNION ALL \
SELECT :d_id4, SUM(ol_amount) FROM order_line WHERE ol_w_id = :w_id AND \
 ol_d_id = :d_id4 AND ol_o_id = :o_id4 UNION ALL \
"

#define SQLTXT5C "\
SELECT :d_id5, SUM(ol_amount) FROM order_line WHERE ol_w_id = :w_id AND \
 ol_d_id = :d_id5 AND ol_o_id = :o_id5 UNION ALL \
SELECT :d_id6, SUM(ol_amount) FROM order_line WHERE ol_w_id = :w_id AND \
 ol_d_id = :d_id6 AND ol_o_id = :o_id6 UNION ALL \
"

#define SQLTXT5D "\
SELECT :d_id7, SUM(ol_amount) FROM order_line WHERE ol_w_id = :w_id AND \
 ol_d_id = :d_id7 AND ol_o_id = :o_id7 UNION ALL \
SELECT :d_id8, SUM(ol_amount) FROM order_line WHERE ol_w_id = :w_id AND \
 ol_d_id = :d_id8 AND ol_o_id = :o_id8 UNION ALL \
"

#define SQLTXT5E "\
SELECT :d_id9, SUM(ol_amount) FROM order_line WHERE ol_w_id = :w_id AND \
 ol_d_id = :d_id9 AND ol_o_id = :o_id9 UNION ALL \
SELECT :d_id10, SUM(ol_amount) FROM order_line WHERE ol_w_id = :w_id AND \
 ol_d_id = :d_id10 AND ol_o_id = :o_id10"

#endif
#endif /* PLSQLDEL */

#define SQLTXT6 "UPDATE customer SET c_balance = c_balance + :amt, \
   c_delivery_cnt = c_delivery_cnt + 1 WHERE c_w_id = :w_id AND \
   c_d_id = :d_id AND c_id = :c_id"

#define NDISTS 10
#define ROWIDLEN 20


struct delctx {
   sb2 del_o_id_ind[NDISTS];
   sb2 cons_ind[NDISTS];
   sb2 w_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];
   sb2 no_rowid_ind[NDISTS];
   sb2 o_rowid_ind[NDISTS];
#if defined(ISO) || defined(ISO5) || defined(ISO6) || defined(ISO8)
   sb2 inum_ind;
#endif
```

```
#ifdef DMLRETDEL
  ub4 del_o_id_len[NDISTS];
  ub4 c_id_len[NDISTS];
  int oid_ctx;
  int cid_ctx;
  OCIBind *olamt_bp;
#else
  ub2 del_o_id_len[NDISTS];
  ub2 c_id_len[NDISTS];
#endif

  ub2 cons_len[NDISTS];
  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 no_rowid_len[NDISTS];
  ub2 no_rowid_ptr_len[NDISTS];
  ub2 o_rowid_len[NDISTS];
  ub2 o_rowid_ptr_len[NDISTS];
#if defined(ISO) || defined(ISO5) || defined(ISO6) || defined(ISO8)
  ub2 inum_len;
#endif

  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];
  ub2 no_rowid_rcode[NDISTS];
  ub2 o_rowid_rcode[NDISTS];
#if defined(ISO) || defined(ISO5) || defined(ISO6) || defined(ISO8)
  ub2 inum_rcode;
#endif

  int del_o_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];
#if defined(ISO) || defined(ISO5) || defined(ISO6) || defined(ISO8)
  char inum[10];
#endif
  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;
/* delctx *dctx; */

#ifdef DMLRETDEL
struct amtctx {
  int ol_amt[NDISTS][NITEMS];
  sb2 ol_amt_ind[NDISTS][NITEMS];
  ub4 ol_amt_len[NDISTS][NITEMS];
  ub2 ol_amt_rcode[NDISTS][NITEMS];
  int ol_cnt[NDISTS];
};
typedef struct amtctx amtctx;
/* amtctx *actx; */

#endif


#ifdef DMLRETDEL
extern sb4 no_data();

sb4 TPC_oid_data(dvoid *ctxp, OCIBind *bp, ub4 iter, ub4 index,
            dvoid **bufpp, ub4 **alenp, ub1 *piecep,
            dvoid **indpp, ub2 **rcodepp)
{
  delctx *dctx = (delctx *)ctxp;
  *bufpp = &dctx->del_o_id[iter];
  *indpp= &dctx->del_o_id_ind[iter];
  dctx->del_o_id_len[iter]=sizeof(dctx->del_o_id[0]);
  *alenp= &dctx->del_o_id_len[iter];
  *rcodepp = &dctx->del_o_id_rcode[iter];
  *piecep =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)
{
  delctx *dctx = (delctx *)ctxp;
  *bufpp = &dctx->c_id[iter];
  *indpp= &dctx->c_id_ind[iter];
  dctx->c_id_len[iter]=sizeof(dctx->c_id[0]);
  *alenp= &dctx->c_id_len[iter];
  *rcodepp = &dctx->c_id_rcode[iter];
  *piecep =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;
  actx->ol_cnt[iter]=actx->ol_cnt[iter]+1;
  *bufpp = &actx->ol_amt[iter][index];
  *indpp= &actx->ol_amt_ind[iter][index];
  actx->ol_amt_len[iter][index]=sizeof(actx->ol_amt[0][0]);
  *alenp= &actx->ol_amt_len[iter][index];
  *rcodepp = &actx->ol_amt_rcode[iter][index];
  *piecep =OCI_ONE_PIECE;
  return (OCI_CONTINUE);
}

#endif


tkvcdinit (ora_cn_data_t *ora_SlotDataP)

{

  int i,j;
  char bstr1[10];
  char bstr2[10];
  text stmbuf[SQL_BUF_SIZE];

  delctx *dctx;
  amtctx *actx;
  global_delivery_t *delP;
  OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
  OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
  OCIError *errhp = ora_SlotDataP->errhp;
  OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
  OCISession *tpcusr = ora_SlotDataP->tpcusr;
  OCIStmt *curi = ora_SlotDataP->curi;

  dctx = (delctx *) malloc (sizeof(delctx));
  memset(dctx,(char)0,sizeof(delctx));
  dctx->norow = 0;

  ora_SlotDataP->dctx = (void *)dctx;
  delP = (global_delivery_t *)malloc(sizeof(global_delivery_t));
  memset(delP, (char)0, sizeof(global_delivery_t));
  ora_SlotDataP->delP = delP;

#ifdef DMLRETDEL
  actx = (amtctx *) malloc (sizeof(amtctx));
  memset(actx,(char)0,sizeof(amtctx));
  ora_SlotDataP->actx = (void *)actx;
#else
```

```
  for(i=0;i<NDISTS;i++) {
   OCIERROR(errhp, OCIDescriptorAlloc(tpcenv,(dvoid**)&dctx->o_rowid_ptr[i],
          OCI_DTYPE_ROWID,0,(dvoid**)0));
   OCIERROR(errhp, OCIDescriptorAlloc(tpcenv,(dvoid**)&dctx->no_rowid_ptr[i],
          OCI_DTYPE_ROWID,0,(dvoid**)0));
  }
#endif

#if defined(ISO) || defined(ISO5) || defined(ISO6) || defined(ISO8)
  OCIHandleAlloc(tpcenv, (dvoid **)(&dctx->curd0), OCI_HTYPE_STMT, 0, (dvoid**)0);
  sprintf ((char *) stmbuf, SQLTXT0);
  OCIStmtPrepare(dctx->curd0, errhp, stmbuf, strlen((char *)stmbuf),OCI_NTV_SYNTAX,
OCI_DEFAULT);

  OCIDFNRA(dctx->curd0, dctx->inum_dp,errhp,1,dctx->inum,SIZ(dctx->inum),SQLT_STR,
       &(dctx->inum_ind),&(dctx->inum_len),&(dctx->inum_rcode));
#endif

/* If PLSQLDEL and ISO? are both defined, then they both try to use
  curd0! This could cause a problem. Will try to fix later - VMM 12/30/97 */

#ifdef PLSQLDEL
  OCIHandleAlloc(tpcenv, (dvoid **)(&dctx->curd0), OCI_HTYPE_STMT,
             0, (dvoid**)0);
  sprintf ((char *) stmbuf, SQLTXT);
  OCIStmtPrepare(dctx->curd0, errhp, stmbuf, strlen((char *)stmbuf),
             OCI_NTV_SYNTAX, OCI_DEFAULT);
  OCIBND(dctx->curd0, dctx->w_id_bp , errhp,":w_id",ADR(delP->w_id),SIZ(int),
       SQLT_INT);
  OCIBND(dctx->curd0, dctx->carrier_id_bp , errhp,":carrier_id",
       ADR(dctx->carrier_id), SIZ(int), SQLT_INT);

  OCIBNDRAA(dctx->curd0, dctx->o_id_bp, errhp, ":order_id",
        dctx->del_o_id,SIZ(int),SQLT_INT, dctx->del_o_id_ind,
        dctx->del_o_id_len,dctx->del_o_id_rcode,NDISTS,
        &dctx->del_o_id_rcnt);
  OCIBND(dctx->curd0, dctx->retry_bp , errhp,":retry",ADR(dctx->retry),
       SIZ(int),SQLT_INT);
#else
# ifdef DMLRETDEL
  OCIHandleAlloc(tpcenv, (dvoid **)(&dctx->curd1), OCI_HTYPE_STMT, 0, (dvoid**)0);
  sprintf ((char *) stmbuf, "%s",    SQLTXT1);
  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,
         (dvoid *)dctx,no_data,TPC_oid_data);
# else

  OCIHandleAlloc(tpcenv, (dvoid **)(&dctx->curd1), OCI_HTYPE_STMT, 0, (dvoid**)0);
  sprintf ((char *) stmbuf, "%s%s%s%s%s%s%s%s%s",    SQLTXT1A,

SQLTXT1B,

SQLTXT1C,

SQLTXT1D,

SQLTXT1E,

SQLTXT1F,

SQLTXT1G,

SQLTXT1H,

SQLTXT1I,

SQLTXT1J
                );
  OCIStmtPrepare(dctx->curd1, errhp, stmbuf, strlen((char *)stmbuf),OCI_NTV_SYNTAX,
OCI_DEFAULT);

  OCIERROR(errhp,
    OCIAttrSet(dctx->curd1,OCI_HTYPE_STMT,(dvoid*)&dctx->norow,0,
            OCI_ATTR_PREFETCH_ROWS,errhp));



  /* bind variables */

  OCIBND(dctx->curd1, dctx->w_id_bp,errhp,":w_id",ADR(delP->w_id),SIZ(int),SQLT_INT);

  OCIDFNRA(dctx->curd1, dctx->d_id_dp,errhp,1,dctx->d_id,SIZ(int),
        SQLT_INT, dctx->d_id_ind,dctx->d_id_len,dctx->d_id_rcode);
  OCIDFNRA(dctx->curd1, dctx->del_o_id_dp,errhp,2,dctx->del_o_id,
        SIZ(int), SQLT_INT,dctx->del_o_id_ind,
        dctx->del_o_id_len, dctx->del_o_id_rcode);
  OCIDFNRA(dctx->curd1, dctx->no_rowid_dp,errhp,3,dctx->no_rowid_ptr,
        SIZ(OCIRowid *), SQLT_RDD,dctx->no_rowid_ind,
        dctx->no_rowid_len, dctx->no_rowid_rcode);
  OCIDFNRA(dctx->curd1, dctx->c_id_dp,errhp,4,dctx->c_id,SIZ(dctx->c_id[0]),
        SQLT_INT, dctx->c_id_ind,dctx->c_id_len,dctx->c_id_rcode);
  OCIDFNRA(dctx->curd1, dctx->o_rowid_dp,errhp,5,dctx->o_rowid_ptr,
        SIZ(OCIRowid *), SQLT_RDD,dctx->o_rowid_ind,
        dctx->o_rowid_len, dctx->o_rowid_rcode);

  /* open second cursor */

  OCIHandleAlloc(tpcenv, (dvoid **)(&dctx->curd2), OCI_HTYPE_STMT, 0, (dvoid**)0);
  sprintf ((char *) stmbuf, SQLTXT2);
  OCIStmtPrepare(dctx->curd2, errhp, stmbuf, strlen((char *)stmbuf),
                        OCI_NTV_SYNTAX, OCI_DEFAULT);

  /* bind variables */
  OCIBNDRA(dctx->curd2, dctx->no_rowid_bp,errhp,":no_rowid",&(dctx->no_rowid_ptr[0]),
                SIZ(dctx->no_rowid_ptr[0]),SQLT_RDD,dctx->no_rowid_ind,
                dctx->no_rowid_len,dctx->no_rowid_rcode);

# endif /*DMLRETDEL*/

  /* open third cursor */

  OCIHandleAlloc(tpcenv, (dvoid **)(&dctx->curd3), OCI_HTYPE_STMT, 0, (dvoid**)0);
  sprintf ((char *) stmbuf, SQLTXT3);
  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);

# ifdef DMLRETDEL
  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,(dvoid *)dctx,no_data, cid_data);
# else

  OCIBNDRA(dctx->curd3, dctx->o_rowid_bp,errhp,":o_rowid",&(dctx->o_rowid_ptr[0]),
                SIZ(dctx->o_rowid_ptr[0]),SQLT_RDD,dctx->o_rowid_ind,
                dctx->o_rowid_ptr_len,dctx->o_rowid_rcode);
#endif

  /* open fourth cursor */

  OCIHandleAlloc(tpcenv, (dvoid **)(&dctx->curd4), OCI_HTYPE_STMT, 0, (dvoid**)0);
  sprintf ((char *) stmbuf, SQLTXT4);
  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);
# ifdef DMLRETDEL
  OCIBNDRAD(dctx->curd4, dctx->olamt_bp, errhp, ":ol_amount",
         SIZ(int), SQLT_INT,NULL, actx,no_data,amt_data);
# else



  /* open fifth cursor */

  OCIHandleAlloc(tpcenv, (dvoid **)(&dctx->curd5), OCI_HTYPE_STMT, 0, (dvoid**)0);
  sprintf ((char *) stmbuf, "%s%s%s%s%s", SQLTXT5A,
                                                                SQLTXT5B,
                                                                SQLTXT5C,
                                                                SQLTXT5D,
                                                                SQLTXT5E
  );
  OCIStmtPrepare(dctx->curd5, errhp, stmbuf, strlen((char *)stmbuf),
                        OCI_NTV_SYNTAX, OCI_DEFAULT);

  OCIERROR(errhp,
    OCIAttrSet(dctx->curd5,OCI_HTYPE_STMT,(dvoid*)&dctx->norow,0,
            OCI_ATTR_PREFETCH_ROWS,errhp));

  /* bind variables */

  OCIBND(dctx->curd5,dctx->w_id_bp,errhp,":w_id",ADR(delP->w_id),SIZ(delP->w_id),SQLT_INT);
  for (i = 0; i < NDISTS; i++) {
    sprintf (bstr1, ":d_id%d", i + 1);
    sprintf (bstr2, ":o_id%d", i + 1);
    OCIBNDRA(dctx->curd5,dctx->bstr1_bp[i],errhp,bstr1,ADR(dctx->d_id[i]),
                SIZ(dctx->d_id[0]),SQLT_INT, &(dctx->d_id_ind[i]),
                &(dctx->d_id_len[i]),&(dctx->d_id_rcode[i]));
    OCIBNDRA(dctx->curd5,dctx->bstr2_bp[i],errhp,bstr2,ADR(dctx->del_o_id[i]),
                SIZ(dctx->del_o_id[0]),SQLT_INT, &(dctx->del_o_id_ind[i]),
```

```
                    &(dctx->del_o_id_len[i]),&(dctx->del_o_id_rcode[i]));
  }

  OCIDFNRA(dctx->curd5,dctx->cons_dp,errhp,1,dctx->cons,SIZ(dctx->cons[0]),SQLT_INT,
       dctx->cons_ind,dctx->cons_len,dctx->cons_rcode);
  OCIDFNRA(dctx->curd5,dctx->amt_dp,errhp,2,dctx->amt,SIZ(dctx->amt[0]),SQLT_INT,
       dctx->amt_ind,dctx->amt_len,dctx->amt_rcode);
#endif
  /* open sixth cursor */

  OCIHandleAlloc(tpcenv, (dvoid **)(&dctx->curd6), OCI_HTYPE_STMT, 0, (dvoid**)0);
  sprintf ((char *) stmbuf, SQLTXT6);
  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);
#endif
  return (0);

}


void shiftdata(delctx *dctx,int from)
{
  int i;
  for (i=from;i<NDISTS-1; i++)
  {
    dctx->del_o_id_ind[i] = dctx->del_o_id_ind[i+1];
    dctx->del_o_id[i] = dctx->del_o_id[i+1];
    dctx->w_id[i] = dctx->w_id[i+1];
    dctx->d_id[i] = dctx->d_id[i+1];
    dctx->carrier_id[i] = dctx->carrier_id[i+1];
  }
}


tkvcd (ora_cn_data_t *ora_SlotDataP)

{

  int i, j,v;
  int rpc,rcount,count;
  int invalid;
  int tmp_id;
  int tmp_amt;

  delctx *dctx = (delctx *)ora_SlotDataP->dctx;
#ifdef DMLRETDEL /* VMM 1/13/98 */
  amtctx *actx = (amtctx *)ora_SlotDataP->actx;
#endif /* DMLRETDEL */
  global_delivery_t *delP = ora_SlotDataP->delP;
  OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
  OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
  OCIError *errhp = ora_SlotDataP->errhp;
  OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
  OCISession *tpcusr = ora_SlotDataP->tpcusr;
  OCIStmt *curi = ora_SlotDataP->curi;

#if defined(ISO) || defined(ISO5) || defined(ISO6) || defined(ISO8)
  int hasno;
  int reread;
  char sdate[30];

  OCIStmtExecute(tpcsvc,dctx->curd0,errhp,1,0,0,0,OCI_DEFAULT);
  sysdate (sdate);
  printf ("Delivery started at %s on node %s\n", sdate, dctx->inum);
#endif
#ifdef PLSQLDEL
  for (i = 0; i < NDISTS; i++)
  {
    dctx->del_o_id_ind[i] = TRUE;
    dctx->del_o_id_len[i] = sizeof(int);
  }

  OCIERROR(errhp,
    OCIStmtExecute(tpcsvc,dctx->curd0,errhp,1,0,0,0,OCI_DEFAULT));

  for (i = 0; i < NDISTS; i++)
  {
    delP->del_o_id[i] = 0;
    if (dctx->del_o_id_ind[i] == 0)
    {
      delP->del_o_id[i] = dctx->del_o_id[i];
    }
  }
#else

retry:
#if defined(ISO) || defined(ISO5) || defined(ISO6) || defined(ISO8)
  reread = 1;
#endif

iso:

  invalid = 0;

  /* initialization for array operations */

  for (i = 0; i < NDISTS; i++) {
    dctx->del_o_id_ind[i] = TRUE;
    dctx->cons_ind[i] = TRUE;
    dctx->w_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->no_rowid_ind[i] = TRUE;
    dctx->o_rowid_ind[i] = TRUE;

    dctx->del_o_id_len[i] = SIZ(dctx->del_o_id[0]);
    dctx->cons_len[i] = SIZ(dctx->cons[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->no_rowid_len[i] = ROWIDLEN;
    dctx->o_rowid_len[i] = ROWIDLEN;
    dctx->o_rowid_ptr_len[i] = SIZ(dctx->o_rowid_ptr[0]);
    dctx->no_rowid_ptr_len[i] = SIZ(dctx->no_rowid_ptr[0]);

    dctx->w_id[i] = delP->w_id;
    dctx->d_id[i] = i+1;
    dctx->carrier_id[i] = delP->o_carrier_id;
    memcpy(&dctx->del_date[i],&delP->cr_date,sizeof(OCIDate));
  }

#ifdef DMLRETDEL /* VMM 1/13/98 */
  memset(actx,(char)0,sizeof(amtctx));
#endif /* DMLRETDEL */
  /* array select from new_order and orders tables */

  delP->execstatus=OCIStmtExecute(tpcsvc,dctx->curd1,errhp,NDISTS,0,0,0,OCI_DEFAULT);
  if((delP->execstatus != OCI_SUCCESS) && (delP->execstatus != OCI_NO_DATA)) {
    OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
    delP->errcode = OCIERROR(errhp,delP->execstatus);
    if(delP->errcode == NOT_SERIALIZABLE) {
      delP->retries++;
      goto retry;
    } else if (delP->errcode == RECOVERR) {
      delP->retries++;
      goto retry;
    } else {
      return -1;
    }
  }
  /* mark districts with no new order */
  OCIAttrGet(dctx->curd1,OCI_HTYPE_STMT,&rcount,0,OCI_ATTR_ROW_COUNT,errhp);
  rpc = rcount;
#ifdef DMLRETDEL   /* we have to compress the array here */
  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(dctx, j);
    }
  }
#else
  invalid = NDISTS - rcount;
  for (i = rpc; i < NDISTS; i++) {
    dctx->del_o_id_ind[i] = NA;
    dctx->w_id_ind[i] = NA;
    dctx->d_id_ind[i] = NA;
    dctx->c_id_ind[i] = NA;
    dctx->carrier_id_ind[i] = NA;
    dctx->no_rowid_ind[i] = NA;
    dctx->o_rowid_ind[i] = NA;
  }
#endif

#if defined(ISO) || defined(ISO5) || defined(ISO6) || defined(ISO8)
  if (invalid) {
    sysdate (sdate);
    for (i = 1; i <= NDISTS; i++) {
      hasno = 0;
      for (j = 0; j < rpc; j++) {
        if (dctx->d_id[j] == i) {
          hasno = 1;
          break;
        }
      }
```

```
      if (!hasno)
        printf ("Delivery [dist %d] found no new order at %s\n", i, sdate);
    }
    if (reread) {
      sleep (60);
      sysdate (sdate);
      printf ("Delivery wake up at %s\n", sdate);
      reread = 0;
      goto iso;
    }
  }
#endif

#ifndef DMLRETDEL
  /* array delete of new_order table */
  delP->execstatus=OCIStmtExecute(tpcsvc,dctx->curd2,errhp,rpc,0,0,0,OCI_DEFAULT);
  if(delP->execstatus != OCI_SUCCESS) {
    OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
    delP->errcode = OCIERROR(errhp,delP->execstatus);
    if(delP->errcode == NOT_SERIALIZABLE) {
      delP->retries++;
      goto retry;
    } else if (delP->errcode == RECOVERR) {
      delP->retries++;
      goto retry;
    } else {
      return -1;
    }
  }

  /* mark districts with no new order */
  OCIAttrGet(dctx->curd2,OCI_HTYPE_STMT,&rcount,0,OCI_ATTR_ROW_COUNT,errhp);

  if (rcount != rpc) {
#ifdef TUX
    userlog ("Error in TPC-C server %d: %d rows selected, %d rows deleted\n",
             proc_no, rpc, dctx->curd2.rpc);
#else
    fprintf (stderr,
             "Error in TPC-C server %d: %d rows selected, %d rows deleted\n",
             proc_no, rpc, rcount);
#endif /* TUX */
    OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
    return (DEL_ERROR);
  }
#endif /* DMLRETDEL */

  delP->execstatus=OCIStmtExecute(tpcsvc,dctx->curd3,errhp,rpc,0,0,0,OCI_DEFAULT);
  if(delP->execstatus != OCI_SUCCESS) {
    OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
    delP->errcode = OCIERROR(errhp,delP->execstatus);
    if(delP->errcode == NOT_SERIALIZABLE) {
      delP->retries++;
      goto retry;
    } else if (delP->errcode == RECOVERR) {
      delP->retries++;
      goto retry;
    } else {
      return -1;
    }
  }

  OCIAttrGet(dctx->curd3,OCI_HTYPE_STMT,&rcount,0,OCI_ATTR_ROW_COUNT,errhp);

  if (rcount != rpc) {
#ifdef TUX
    userlog ("Error in TPC-C server %d: %d rows selected, %d ords updated\n",
             proc_no, rpc, rcount);
#else
    fprintf (stderr,
             "Error in TPC-C server %d: %d rows selected, %d ords updated\n",
             proc_no, rpc, rcount);
#endif
    OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
    return (-1);
  }

  /* array update of order_line table */
  delP->execstatus=OCIStmtExecute(tpcsvc,dctx->curd4,errhp,rpc,0,0,0,OCI_DEFAULT);
  if(delP->execstatus != OCI_SUCCESS) {
    OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
    delP->errcode = OCIERROR(errhp,delP->execstatus);
    if(delP->errcode == NOT_SERIALIZABLE) {
      delP->retries++;
      goto retry;
    } else if (delP->errcode == RECOVERR) {
      delP->retries++;
      goto retry;
    } else {
      return -1;
    }
  }
#ifdef DMLRETDEL
  OCIAttrGet(dctx->curd4,OCI_HTYPE_STMT,&rcount,NULL,OCI_ATTR_ROW_COUNT,errhp);
/* add up amounts */
  count=0;
  for (i=0;i<rpc;i++)
  {
    dctx->amt[i]=0;
    for (j=0;j<actx->ol_cnt[i];j++)
      if ( actx->ol_amt_rcode[i][j] == 0)
      {
        dctx->amt[i] = dctx->amt[i] + actx->ol_amt[i][j];
        count = count+1;
      }
  }
  if (rcount > rpc*NITEMS) {
    userlog ("Error in TPC-C server %d: %d ordnrs updated, %d ordl updated\n",
             proc_no, rpc, rcount);
  }
#else
  /* array select from order_line table */
  delP->execstatus=OCIStmtExecute(tpcsvc,dctx->curd5,errhp,rpc,0,0,0,OCI_DEFAULT);
  if((delP->execstatus != OCI_SUCCESS) && (delP->execstatus != OCI_NO_DATA)) {
    OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
    delP->errcode = OCIERROR(errhp,delP->execstatus);
    if(delP->errcode == NOT_SERIALIZABLE) {
      delP->retries++;
      goto retry;
    } else if (delP->errcode == RECOVERR) {
      delP->retries++;
      goto retry;
    } else {
      return -1;
    }
  }

  OCIAttrGet(dctx->curd5,OCI_HTYPE_STMT,&rcount,0,OCI_ATTR_ROW_COUNT,errhp);
  if (rcount != rpc) {
#ifdef TUX
    userlog ("Error in TPC-C server %d: %d rows selected, %d ordl selected\n",
             proc_no, rpc, rcount);
#else
    fprintf (stderr,
             "Error in TPC-C server %d: %d rows selected, %d ordl selected\n",
             proc_no, rpc, rcount);
#endif
    OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
    return (-1);
  }

  /* reorder amount selected if necessary */

  for (i = 0; i < rpc; i++) {
    if (dctx->cons[i] != dctx->d_id[i]) {
#ifdef TUX
      userlog ("TPC-C server %d: reordering amount\n", proc_no);
#else
      fprintf (stderr, "TPC-C server %d: reordering amount\n", proc_no);
#endif
      for (j = i + 1; j < rpc; j++) {
        if (dctx->cons[j] == dctx->d_id[i]) {
          tmp_id = dctx->cons[i];
          dctx->cons[i] = dctx->cons[j];
          dctx->cons[j] = tmp_id;
          tmp_amt = dctx->amt[i];
          dctx->amt[i] = dctx->amt[j];
          dctx->amt[j] = tmp_amt;
          break;
        }
      }
      if (j >= rpc) {
#ifdef TUX
        userlog ("Error in TPC-C server %d: missing ordl?\n", proc_no);
#else
        fprintf (stderr,
                 "Error in TPC-C server %d: missing ordl?\n", proc_no);
#endif
                 OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
        return (-1);
      }
    }
  }
#endif
#if defined(ISO5) || defined(ISO6)
  printf ("d_id:amount\n");
  for (i = 0; i < rpc; i++)
    printf ("%d:%.2f ", dctx->d_id[i], (float)dctx->amt[i]/100);
  printf ("\n");
#endif

  /* array update of customer table */
#if defined(ISO5) || defined (ISO6)
  execstatus=OCIStmtExecute(tpcsvc,dctx->curd6,errhp,rpc,0,0,0,
                                                          OCI_DEFAULT);
#else
  delP->execstatus=OCIStmtExecute(tpcsvc,dctx->curd6,errhp,rpc,0,0,0,
                          OCI_COMMIT_ON_SUCCESS | OCI_DEFAULT);
#endif

  if(delP->execstatus != OCI_SUCCESS) {
    OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
    delP->errcode = OCIERROR(errhp,delP->execstatus);
    if(delP->errcode == NOT_SERIALIZABLE) {
      delP->retries++;
      goto retry;
    } else if (delP->errcode == RECOVERR) {
      delP->retries++;
```

```
      goto retry;
    } else {
      return -1;
    }
  }

  OCIAttrGet(dctx->curd6,OCI_HTYPE_STMT,&rcount,0,OCI_ATTR_ROW_COUNT,errhp);

  if (rcount != rpc) {
#ifdef TUX
    userlog ("Error in TPC-C server %d: %d rows selected, %d cust updated\n",
             proc_no, rpc, rcount);
#else
    fprintf (stderr,
             "Error in TPC-C server %d: %d rows selected, %d cust updated\n",
             proc_no, rpc, rcount);
#endif
    OCITransRollback(tpcsvc, errhp, OCI_DEFAULT);
    return (-1);
  }

#if defined(ISO5) || defined(ISO6)
  sysdate (sdate);
#ifdef ISO5
  printf ("Delivery sleep before commit at %s\n", sdate);
#else
  printf ("Delivery sleep before abort at %s\n", sdate);
#endif
  sleep (60);
  sysdate (sdate);
  printf ("Delivery wake up at %s\n", sdate);
#endif

#ifdef ISO6
  printf("Delivery ISO6 Rolling back.\n");
  OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
#endif

#ifdef ISO5
  OCITransCommit(tpcsvc, errhp, OCI_DEFAULT);
#endif

#if defined(ISO5) || defined(ISO6)
  sysdate (sdate);
  printf ("Delivery completed at: %s\n", sdate);
#endif

  /* return o_id's in district id order */

  for (i = 0; i < NDISTS; i++)
    delP->del_o_id[i] = 0;
  for (i = 0; i < rpc; i++)
    delP->del_o_id[dctx->d_id[i] - 1] = dctx->del_o_id[i];
#endif

  return (0);

}



void tkvcddone (ora_cn_data_t *ora_SlotDataP)

{
  delctx *dctx = (delctx *)ora_SlotDataP->dctx;
  global_delivery_t *delP = ora_SlotDataP->delP;

  if (dctx)
  {
#if defined(ISO) || defined(ISO5) || defined(ISO6) || defined(ISO8)
    OCIHandleFree((dvoid *)dctx->curd0,OCI_HTYPE_STMT);
#endif
#ifdef PLSQLDEL
    OCIHandleFree((dvoid *)dctx->curd0,OCI_HTYPE_STMT);
#else
    /* Again the above will cause a problem if both PSQLDEL and ISO are
                defined - VMM 12/30/97 */
    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);
#endif
    free (dctx);
    ora_SlotDataP->dctx = NULL;
  }

  if (delP) {
    free(delP);
    ora_SlotDataP->delP = NULL;
  }
}
```

## plnew.c

```
#ifdef RCSID
static char *RCSid =
  "$Header: /afs/transarc.com/project/encina/rcs/test/src/benchmarks/tpcc/server/ora8.1_mt/RCS/plnew.c,v
1.3 1999/05/26 16:29:56 wenjian Exp $ Copyr (c) 1994 Oracle";
#endif /* RCSID */

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

#include "tpcc.h"
#include "plora.h"
#ifdef TUX
#include <userlog.h>
#endif
#include "tpccflags.h"

extern void err_printf(char *format, ...);

#define PLSQLNO

#ifdef PLSQLNO
#define SQLTXT2 "BEGIN initnew.new_init(:idx1arr); END;"
#else
#define SQLTXT2 "UPDATE stock SET s_order_cnt = s_order_cnt + 1, \
   s_ytd = s_ytd + :ol_quantity, s_remote_cnt = s_remote_cnt + :s_remote, \
   s_quantity = :s_quantity \
   WHERE rowid = :s_rowid"

#define SQLTXT3 "\
SELECT 0,stock.rowid,i_price,i_name,i_data,s_dist_%02d,s_data,s_quantity \
FROM item,stock WHERE i_id = :10 AND s_w_id = :30 AND s_i_id = i_id UNION ALL \
SELECT 1,stock.rowid,i_price,i_name,i_data,s_dist_%02d,s_data,s_quantity \
FROM item,stock WHERE i_id = :11 AND s_w_id = :31 AND s_i_id = i_id UNION ALL \
SELECT 2,stock.rowid,i_price,i_name,i_data,s_dist_%02d,s_data,s_quantity \
FROM item,stock WHERE i_id = :12 AND s_w_id = :32 AND s_i_id = i_id UNION ALL \
SELECT 3,stock.rowid,i_price,i_name,i_data,s_dist_%02d,s_data,s_quantity \
FROM item,stock WHERE i_id = :13 AND s_w_id = :33 AND s_i_id = i_id UNION ALL \
SELECT 4,stock.rowid,i_price,i_name,i_data,s_dist_%02d,s_data,s_quantity \
FROM item,stock WHERE i_id = :14 AND s_w_id = :34 AND s_i_id = i_id UNION ALL \
SELECT 5,stock.rowid,i_price,i_name,i_data,s_dist_%02d,s_data,s_quantity \
FROM item,stock WHERE i_id = :15 AND s_w_id = :35 AND s_i_id = i_id UNION ALL \
SELECT 6,stock.rowid,i_price,i_name,i_data,s_dist_%02d,s_data,s_quantity \
FROM item,stock WHERE i_id = :16 AND s_w_id = :36 AND s_i_id = i_id UNION ALL \
SELECT 7,stock.rowid,i_price,i_name,i_data,s_dist_%02d,s_data,s_quantity \
FROM item,stock WHERE i_id = :17 AND s_w_id = :37 AND s_i_id = i_id UNION ALL \
SELECT 8,stock.rowid,i_price,i_name,i_data,s_dist_%02d,s_data,s_quantity \
FROM item,stock WHERE i_id = :18 AND s_w_id = :38 AND s_i_id = i_id UNION ALL \
SELECT 9,stock.rowid,i_price,i_name,i_data,s_dist_%02d,s_data,s_quantity \
FROM item,stock WHERE i_id = :19 AND s_w_id = :39 AND s_i_id = i_id UNION ALL \
SELECT 10,stock.rowid,i_price,i_name,i_data,s_dist_%02d,s_data,s_quantity \
FROM item,stock WHERE i_id = :20 AND s_w_id = :40 AND s_i_id = i_id UNION ALL \
SELECT 11,stock.rowid,i_price,i_name,i_data,s_dist_%02d,s_data,s_quantity \
FROM item,stock WHERE i_id = :21 AND s_w_id = :41 AND s_i_id = i_id UNION ALL \
SELECT 12,stock.rowid,i_price,i_name,i_data,s_dist_%02d,s_data,s_quantity \
FROM item,stock WHERE i_id = :22 AND s_w_id = :42 AND s_i_id = i_id UNION ALL \
SELECT 13,stock.rowid,i_price,i_name,i_data,s_dist_%02d,s_data,s_quantity \
FROM item,stock WHERE i_id = :23 AND s_w_id = :43 AND s_i_id = i_id UNION ALL \
SELECT 14,stock.rowid,i_price,i_name,i_data,s_dist_%02d,s_data,s_quantity \
FROM item,stock WHERE i_id = :24 AND s_w_id = :44 AND s_i_id = i_id"


#define SQLTXT4 "INSERT INTO order_line \
   (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 (:ol_o_id, :ol_d_id, \
   :ol_w_id, :ol_number, :null_date, :ol_i_id, :ol_supply_w_id, :ol_quantity, \
   :ol_amount, :ol_dist_info)"
#endif  /* PLSQLNO */

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

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);
}
struct newctx {
  sb2 nol_i_id_ind[NITEMS];
  sb2 nol_supply_w_id_ind[NITEMS];
  sb2 nol_quantity_ind[NITEMS];
  sb2 nol_amount_ind[NITEMS];
  sb2 i_name_ind[NITEMS];
  sb2 s_quantity_ind[NITEMS];
  sb2 i_price_ind[NITEMS];
  sb2 ol_w_id_ind[NITEMS];
```

```
 sb2 ol_d_id_ind[NITEMS];
 sb2 ol_o_id_ind[NITEMS];
 sb2 ol_number_ind[NITEMS];
 sb2 cons_ind[NITEMS];
 sb2 s_rowid_ind[NITEMS];
 sb2 s_remote_ind[NITEMS];
 sb2 s_quant_ind[NITEMS];
 sb2 i_data_ind[NITEMS];
 sb2 s_data_ind[NITEMS];
 sb2 s_dist_info_ind[NITEMS];
 sb2 ol_dist_info_ind[NITEMS];
 sb2 null_date_ind[NITEMS];
#ifdef PLSQLNO
 sb2 s_bg_ind[NITEMS];
#endif

 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 i_data_len[NITEMS];
 ub2 s_dist_info_len[NITEMS];
 ub2 s_data_len[NITEMS];
 ub2 ol_w_id_len[NITEMS];
 ub2 ol_d_id_len[NITEMS];
 ub2 ol_o_id_len[NITEMS];
 ub2 ol_number_len[NITEMS];
 ub2 cons_len[NITEMS];
 ub2 s_rowid_len[NITEMS];
 ub2 s_remote_len[NITEMS];
 ub2 s_quant_len[NITEMS];
 ub2 ol_dist_info_len[NITEMS];
 ub2 null_date_len[NITEMS];
#ifdef PLSQLNO
 ub2 s_bg_len[NITEMS];
#endif

 ub2 nol_i_id_rcode[NITEMS];
 ub2 nol_supply_w_id_rcode[NITEMS];
 ub2 nol_quantity_rcode[NITEMS];
 ub2 nol_amount_rcode[NITEMS];
 ub2 i_name_rcode[NITEMS];
 ub2 s_quantity_rcode[NITEMS];
 ub2 i_price_rcode[NITEMS];
 ub2 ol_w_id_rcode[NITEMS];
 ub2 ol_d_id_rcode[NITEMS];
 ub2 ol_o_id_rcode[NITEMS];
 ub2 ol_number_rcode[NITEMS];
 ub2 cons_rcode[NITEMS];
 ub2 s_rowid_rcode[NITEMS];
 ub2 s_remote_rcode[NITEMS];
 ub2 s_quant_rcode[NITEMS];
 ub2 i_data_rcode[NITEMS];
 ub2 s_data_rcode[NITEMS];
 ub2 s_dist_info_rcode[NITEMS];
 ub2 ol_dist_info_rcode[NITEMS];
 ub2 null_date_rcode[NITEMS];
#ifdef PLSQLNO
 ub2 s_bg_rcode[NITEMS];
#endif

 int ol_w_id[NITEMS];
 int ol_d_id[NITEMS];
 int ol_o_id[NITEMS];
 int ol_number[NITEMS];
 int cons[NITEMS];

 OCIRowid  *s_rowid_ptr[NITEMS];

 int s_remote[NITEMS];
 char i_data[NITEMS][51];
 char s_data[NITEMS][51];
 char s_dist_info[NITEMS][25];
 OCIDate null_date[NITEMS]; /* base date for null date entry */
 OCIStmt *curn1;
#ifdef PLSQLNO
 OCIBind *ol_i_id_bp;
 OCIBind *ol_supply_w_id_bp;
 OCIBind *i_price_bp;
 OCIBind *i_name_bp;
 OCIBind *s_bg_bp;
 OCIBind *s_data_bp;
 OCIBind *i_data_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;
 ub4 s_data_count;
 ub4 i_data_count;
#endif
 OCIStmt *curn2;
 OCIStmt *curn3[10];
 OCIBind *ol_i_id_bp4;
 OCIBind *ol_supply_w_id_bp4;
 OCIBind *ol_quantity_bp;
 OCIBind *ol_quantity_bp4;
 OCIBind *s_remote_bp;
 OCIBind *s_quantity_bp;
 OCIStmt *curn4;
 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 *s_rowid_bp;
 OCIBind *id_bp[10][15];
 OCIBind *sd_bp[10][15];
 OCIDefine *Dcons[10];
 OCIDefine *Ds_rowid[10];
 OCIDefine *Di_price[10];
 OCIDefine *Di_data[10];
 OCIDefine *Ds_dist_info[10];
 OCIDefine *Ds_data[10];
 OCIDefine *Ds_quantity[10];
 OCIDefine *Di_name[10];
 OCIBind *ol_o_id_bp;
 OCIBind *ol_d_id_bp;
 OCIBind *ol_w_id_bp;
 OCIBind *ol_number_bp;
 OCIBind *ol_amount_bp;
 OCIBind *ol_dist_info_bp;
 OCIBind *null_date_bp;

 sb2 w_id_ind;
 ub2 w_id_len;
 ub2 w_id_rc;

 sb2 d_id_ind;
 ub2 d_id_len;
 ub2 d_id_rc;

 sb2 c_id_ind;
 ub2 c_id_len;
 ub2 c_id_rc;

 sb2 o_all_local_ind;
 ub2 o_all_local_len;
 ub2 o_all_local_rc;

 sb2 o_ol_cnt_ind;
 ub2 o_ol_cnt_len;
 ub2 o_ol_cnt_rc;

 sb2 w_tax_ind;
 ub2 w_tax_len;
 ub2 w_tax_rc;

 sb2 d_tax_ind;
 ub2 d_tax_len;
 ub2 d_tax_rc;

 sb2 o_id_ind;
 ub2 o_id_len;
 ub2 o_id_rc;

 sb2 c_discount_ind;
 ub2 c_discount_len;
 ub2 c_discount_rc;

 sb2 c_credit_ind;
 ub2 c_credit_len;
 ub2 c_credit_rc;

 sb2 c_last_ind;
 ub2 c_last_len;
 ub2 c_last_rc;

 sb2 retries_ind;
 ub2 retries_len;
 ub2 retries_rc;

 sb2 cr_date_ind;
 ub2 cr_date_len;
 ub2 cr_date_rc;

 int cs;
 int norow;

/* context holders */
 int i_name_ctx;
 int i_data_ctx;
 int i_price_ctx;
```

```
 int s_data_ctx;
 int s_dist_info_ctx;
 int s_quantity_ctx;
};

typedef struct newctx newctx;

/* newctx *nctx; */

tkvcninit (ora_cn_data_t *ora_SlotDataP)
{

 int i, j;
 text stmbuf[16*1024];
 char id[4];
 char sd[4];

 newctx *nctx;
 OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
 OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
 OCIError *errhp = ora_SlotDataP->errhp;
 OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
 OCISession *tpcusr = ora_SlotDataP->tpcusr;
 OCIStmt *curi = ora_SlotDataP->curi;
 global_newOrder_t *newP;

 nctx = (newctx *) malloc (sizeof(newctx));
 memset(nctx,(char)0,sizeof(newctx));
 ora_SlotDataP->nctx = (void *)nctx;

 ora_SlotDataP->globals = (global_newOrder_t *)malloc(sizeof(global_newOrder_t));
 memset(ora_SlotDataP->globals,(char)0,sizeof(global_newOrder_t));
 newP = ora_SlotDataP->globals;

 nctx->cs = 1;
 nctx->norow=0;
 for(i=0;i<NITEMS;i++) {
   OCIERROR(errhp, OCIDescriptorAlloc(tpcenv,(dvoid**)&nctx->s_rowid_ptr[i],
      OCI_DTYPE_ROWID,0,(dvoid**)0));
 }
 nctx->w_id_ind = TRUE;
 nctx->w_id_len = sizeof(newP->w_id);
 nctx->d_id_ind = TRUE;
 nctx->d_id_len = sizeof(newP->d_id);
 nctx->c_id_ind = TRUE;
 nctx->c_id_len = sizeof(newP->c_id);
 nctx->o_all_local_ind = TRUE;
 nctx->o_all_local_len = sizeof(newP->o_all_local);
 nctx->o_ol_cnt_ind = TRUE;
 nctx->o_ol_cnt_len = sizeof(newP->o_ol_cnt);
 nctx->w_tax_ind = TRUE;
 nctx->w_tax_len = 0;
 nctx->d_tax_ind = TRUE;
 nctx->d_tax_len = 0;
 nctx->o_id_ind = TRUE;
 nctx->o_id_len = sizeof(newP->o_id);
 nctx->c_discount_ind = TRUE;
 nctx->c_discount_len = 0;
 nctx->c_credit_ind = TRUE;
 nctx->c_credit_len = 0;
 nctx->c_last_ind = TRUE;
 nctx->c_last_len = 0;
 nctx->retries_ind = TRUE;
 nctx->retries_len = sizeof(newP->retries);
 nctx->cr_date_ind = TRUE;
 nctx->cr_date_len = sizeof(newP->cr_date);

 /* open first cursor */
 OCIERROR(errhp,OCIHandleAlloc(tpcenv,(dvoid **)(&nctx->curn1),
        OCI_HTYPE_STMT, 0, (dvoid**)0));
#ifdef PLSQLNO
 sqlfile("tkvcpnew.sql",stmbuf);
#else
 sqlfile("tkvcbnew.sql",stmbuf);
#endif
 OCIERROR(errhp,OCIStmtPrepare(nctx->curn1, errhp, stmbuf, strlen((char *)stmbuf),
                                                    OCI_NTV_SYNTAX, OCI_DEFAULT));

 /* bind variables */

 OCIBNDR(nctx->curn1, nctx->w_id_bp, errhp, ":w_id",ADR(newP->w_id),SIZ(newP->w_id),
        SQLT_INT, &nctx->w_id_ind, &nctx->w_id_len, &nctx->w_id_rc);
 OCIBNDR(nctx->curn1, nctx->d_id_bp, errhp, ":d_id",ADR(newP->d_id),SIZ(newP->d_id),
        SQLT_INT, &nctx->d_id_ind, &nctx->d_id_len, &nctx->d_id_rc);
 OCIBNDR(nctx->curn1, nctx->c_id_bp, errhp, ":c_id",ADR(newP->c_id),SIZ(newP->c_id),
        SQLT_INT, &nctx->c_id_ind, &nctx->c_id_len, &nctx->c_id_rc);
 OCIBNDR(nctx->curn1, nctx->o_all_local_bp, errhp, ":o_all_local",
        ADR(newP->o_all_local), SIZ(newP->o_all_local),SQLT_INT, &nctx->o_all_local_ind,
        &nctx->o_all_local_len, &nctx->o_all_local_rc);
 OCIBNDR(nctx->curn1, nctx->o_all_cnt_bp, errhp, ":o_ol_cnt",ADR(newP->o_ol_cnt),
        SIZ(newP->o_ol_cnt),SQLT_INT,&nctx->o_ol_cnt_ind, &nctx->o_ol_cnt_len,
        &nctx->o_ol_cnt_rc);
 OCIBNDR(nctx->curn1, nctx->w_tax_bp, errhp, ":w_tax",ADR(newP->w_tax),SIZ(newP->w_tax),
        SQLT_FLT, &nctx->w_tax_ind, &nctx->w_tax_len, &nctx->w_tax_rc);
 OCIBNDR(nctx->curn1, nctx->d_tax_bp, errhp, ":d_tax",ADR(newP->d_tax),SIZ(newP->d_tax),
        SQLT_FLT, &nctx->d_tax_ind, &nctx->d_tax_len, &nctx->d_tax_rc);
 OCIBNDR(nctx->curn1, nctx->o_id_bp, errhp, ":o_id",ADR(newP->o_id),SIZ(newP->o_id),
        SQLT_INT, &nctx->o_id_ind, &nctx->o_id_len, &nctx->o_id_rc);
 OCIBNDR(nctx->curn1, nctx->c_discount_bp, errhp, ":c_discount",
        ADR(newP->c_discount), SIZ(newP->c_discount),SQLT_FLT,
      &nctx->c_discount_ind, &nctx->c_discount_len, &nctx->c_discount_rc);
 OCIBNDR(nctx->curn1, nctx->c_credit_bp, errhp, ":c_credit",newP->c_credit,
        SIZ(newP->c_credit),SQLT_CHR,
      &nctx->c_credit_ind, &nctx->c_credit_len, &nctx->c_credit_rc);
 OCIBNDR(nctx->curn1, nctx->c_last_bp, errhp, ":c_last",newP->c_last,SIZ(newP->c_last),
        SQLT_STR, &nctx->c_last_ind, &nctx->c_last_len, &nctx->c_last_rc);
 OCIBNDR(nctx->curn1, nctx->retries_bp, errhp, ":retry",ADR(newP->retries),
        SIZ(newP->retries),SQLT_INT,
      &nctx->retries_ind, &nctx->retries_len, &nctx->retries_rc);
 OCIBNDR(nctx->curn1, nctx->cr_date_bp, errhp, ":cr_date",&newP->cr_date,SIZ(OCIDate),
 SQLT_ODT, &nctx->cr_date_ind, &nctx->cr_date_len, &nctx->cr_date_rc);

#ifdef PLSQLNO
 OCIBNDRAA(nctx->curn1, nctx->ol_i_id_bp,errhp,":ol_i_id",newP->nol_i_id,
        SIZ(int), SQLT_INT, nctx->nol_i_id_ind,nctx->nol_i_id_len,
        nctx->nol_i_id_rcode,NITEMS,&nctx->nol_i_count);
 OCIBNDRAA(nctx->curn1, nctx->ol_supply_w_id_bp, errhp, ":ol_supply_w_id",
        newP->nol_supply_w_id,SIZ(int),SQLT_INT, nctx->nol_supply_w_id_ind,
        nctx->nol_supply_w_id_len, nctx->nol_supply_w_id_rcode,
        NITEMS, &nctx->nol_s_count);
 OCIBNDRAA(nctx->curn1, nctx->ol_quantity_bp,errhp,":ol_quantity",newP->nol_quantity,
        SIZ(int),SQLT_INT,nctx->nol_quantity_ind,nctx->nol_quantity_len,
        nctx->nol_quantity_rcode,NITEMS,&nctx->nol_q_count);
 OCIBNDRAA(nctx->curn1, nctx->i_price_bp,errhp,":i_price",newP->i_price,SIZ(float),
        SQLT_FLT, nctx->i_price_ind,nctx->i_price_len,nctx->i_price_rcode,
        NITEMS, &nctx->nol_item_count);
 OCIBNDRAA(nctx->curn1, nctx->i_name_bp,errhp,":i_name",newP->i_name,
        SIZ(newP->i_name[0]),SQLT_STR, nctx->i_name_ind,nctx->i_name_len,
        nctx->i_name_rcode,NITEMS,&nctx->nol_name_count);
 OCIBNDRAA(nctx->curn1, nctx->s_quantity_bp,errhp,":s_quantity",newP->s_quantity,
        SIZ(int), SQLT_INT,nctx->s_quant_ind,nctx->s_quant_len,
        nctx->s_quant_rcode,NITEMS,&nctx->nol_qty_count);
 OCIBNDRAA(nctx->curn1, nctx->s_bg_bp,errhp,":brand_generic",newP->brand_generic,
        SIZ(char), SQLT_CHR,nctx->s_bg_ind,nctx->s_bg_len,
        nctx->s_bg_rcode,NITEMS,&nctx->nol_bg_count);
 OCIBNDRAA(nctx->curn1, nctx->ol_amount_bp,errhp,":ol_amount",newP->nol_amount,
        SIZ(int),SQLT_INT, nctx->nol_amount_ind,nctx->nol_amount_len,
        nctx->nol_amount_rcode,NITEMS,&nctx->nol_am_count);
 OCIBNDRAA(nctx->curn1, nctx->s_remote_bp,errhp,":s_remote",nctx->s_remote,
        SIZ(int),SQLT_INT, nctx->s_remote_ind,nctx->s_remote_len,
        nctx->s_remote_rcode,NITEMS,&nctx->s_remote_count);

 /* open second cursor */
 OCIERROR(errhp,OCIHandleAlloc(tpcenv, (dvoid **)(&nctx->curn2), OCI_HTYPE_STMT,
                                                                    0, (dvoid**)0));
 sprintf ((char *) stmbuf, SQLTXT2);
 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];
  ub2 idx1arr_rcode[NITEMS];
  sb2 idx1arr_ind[NITEMS];
  ub4 idx1arr_count;
  ub2 idx;

  for (idx = 0; idx < NITEMS; idx++) {
    idx1arr[idx] = idx + 1;
    idx1arr_ind[idx] = TRUE;
    idx1arr_len[idx] = sizeof(int);
  }
  idx1arr_count = NITEMS;
                 newP->o_ol_cnt = NITEMS;


  /* Bind array */
  OCIBNDRAA(nctx->curn2, idx1arr_bp,errhp,":idx1arr",idx1arr,
        SIZ(int), SQLT_INT, idx1arr_ind,idx1arr_len,
        idx1arr_rcode,NITEMS,&idx1arr_count);

   newP->execstatus = OCIStmtExecute(tpcsvc,nctx->curn2,errhp,1,0,0,0,OCI_DEFAULT);
   if(newP->execstatus != OCI_SUCCESS) {
     OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
     newP->errcode = OCIERROR(errhp,newP->execstatus);
     return -1;
   }
 }
#else

 /* open second cursor */
 OCIERROR(errhp,OCIHandleAlloc(tpcenv, (dvoid **)(&nctx->curn2), OCI_HTYPE_STMT,
                                                                    0, (dvoid**)0));
 sprintf ((char *) stmbuf, SQLTXT2);
 OCIERROR(errhp,OCIStmtPrepare(nctx->curn2, errhp, stmbuf,
        strlen((char *)stmbuf), OCI_NTV_SYNTAX, OCI_DEFAULT));



 /* bind variables */

 OCIBNDRA(nctx->curn2, nctx->s_quantity_bp,errhp,":s_quantity",newP->s_quantity,
        SIZ(int), SQLT_INT,nctx->s_quant_ind,nctx->s_quant_len,
        nctx->s_quant_rcode);
 OCIBNDRA(nctx->curn2, nctx->s_rowid_bp, errhp, ":s_rowid",nctx->s_rowid_ptr,
```

```
        sizeof(nctx->s_rowid_ptr[0]),SQLT_RDD,nctx->s_rowid_ind,
                    nctx->s_rowid_len,nctx->s_rowid_rcode);
OCIBNDRA(nctx->curn2, nctx->ol_quantity_bp,errhp,":ol_quantity",newP->nol_quantity,
                    SIZ(int),SQLT_INT,nctx->nol_quantity_ind,nctx->nol_quantity_len,
                    nctx->nol_quantity_rcode);
OCIBNDRA(nctx->curn2, nctx->s_remote_bp, errhp, ":s_remote",nctx->s_remote,
        SIZ(int), SQLT_INT,nctx->s_remote_ind,nctx->s_remote_len,
                    nctx->s_remote_rcode);

/* open third cursor and bind variables */

for (i = 0; i < 10; i++)
{
 j = i + 1;
 OCIERROR(errhp,OCIHandleAlloc(tpcenv, (dvoid **)&((nctx->curn3)[i]),
                                                    OCI_HTYPE_STMT, 0, (dvoid**)0));

 sprintf ((char *) stmbuf, SQLTXT3, j, j, j, j, j, j, j, j, j, j, j, j,
                    j, j, j);

 OCIERROR(errhp,OCIStmtPrepare((nctx->curn3)[i], errhp, stmbuf,
                        strlen((char *)stmbuf),OCI_NTV_SYNTAX,
                                                    OCI_DEFAULT));
 OCIERROR(errhp,
        OCIAttrSet(nctx->curn3[i],OCI_HTYPE_STMT,(dvoid*)&nctx->norow,0,
            OCI_ATTR_PREFETCH_ROWS,errhp));
 for (j = 0; j < NITEMS; j++)
 {
  sprintf (id, ":%d", j + 10);
  sprintf (sd, ":%d", j + 30);
  OCIBNDRA((nctx->curn3)[i],(nctx->id_bp)[i][j],errhp,id,ADR(newP->nol_i_id[j]),
                    SIZ(int),SQLT_INT,
                    &nctx->nol_i_id_ind[j],&nctx->nol_i_id_len[j],
                    &nctx->nol_i_id_rcode[j]);
  OCIBNDRA((nctx->curn3)[i],(nctx->sd_bp)[i][j],errhp,sd,
                    ADR(nol_supply_w_id[j]),SIZ(int),SQLT_INT,
                    &nctx->nol_supply_w_id_ind[j],&nctx->nol_supply_w_id_len[j],
                    &nctx->nol_supply_w_id_rcode[j]);
  nctx->nol_i_id_ind[j] = NA;
  nctx->nol_supply_w_id_ind[j] = NA;
  nctx->nol_i_id_len[j] = sizeof(int);
  nctx->nol_supply_w_id_len[j] = sizeof(int);
 }

 OCIDEF((nctx->curn3)[i],(nctx->Dcons)[i],errhp,1,&(nctx->cons[0]),
                    SIZ(nctx->cons[0]),SQLT_INT);
 OCIDEF((nctx->curn3)[i], (nctx->Ds_rowid)[i],errhp,2,
        nctx->s_rowid_ptr, sizeof(nctx->s_rowid_ptr[0]), SQLT_RDD);
 OCIDEF((nctx->curn3)[i], (nctx->Di_price)[i],errhp,3,newP->i_price,SIZ(int),
        SQLT_INT);

 OCIDFNRA((nctx->curn3)[i], (nctx->Di_name)[i],errhp,4,newP->i_name,
        SIZ(i_name[0]),SQLT_STR, nctx->i_name_ind,nctx->i_name_len,
        nctx->i_name_rcode);
 OCIDFNRA((nctx->curn3)[i], (nctx->Di_data)[i],errhp,5,nctx->i_data,
                    SIZ(nctx->i_data[0]), SQLT_STR, NULL,nctx->i_data_len,NULL);
 OCIDFNRA((nctx->curn3)[i], (nctx->Ds_dist_info)[i],errhp,6,
        nctx->s_dist_info, SIZ(nctx->s_dist_info[0]),SQLT_STR,
        NULL,nctx->s_dist_info_len, NULL);
 OCIDFNRA((nctx->curn3)[i],(nctx->Ds_data)[i],errhp,7,nctx->s_data,
                    SIZ(nctx->s_data[0]),SQLT_STR,NULL,nctx->s_data_len,NULL);
 OCIDEF((nctx->curn3)[i],(nctx->Ds_quantity)[i],errhp,8,newP->s_quantity,
                    SIZ(int),SQLT_INT);

 }

/* open fourth cursor */
OCIHandleAlloc(tpcenv, (dvoid **)(&nctx->curn4), OCI_HTYPE_STMT, 0,
            (dvoid**)0);
sprintf ((char *) stmbuf, SQLTXT4);
OCIStmtPrepare(nctx->curn4, errhp, stmbuf, strlen((char *)stmbuf),
                                OCI_NTV_SYNTAX, OCI_DEFAULT);
/* bind variables */

OCIBNDRA(nctx->curn4, nctx->ol_o_id_bp,errhp,":ol_o_id",nctx->ol_o_id,
        SIZ(int),SQLT_INT, NULL,nctx->ol_o_id_len,
        NULL);
OCIBNDRA(nctx->curn4, nctx->ol_d_id_bp,errhp,":ol_d_id",nctx->ol_d_id,
        SIZ(int),SQLT_INT, NULL,nctx->ol_d_id_len,
        NULL);
OCIBNDRA(nctx->curn4, nctx->ol_w_id_bp,errhp,":ol_w_id",nctx->ol_w_id,
        SIZ(int),SQLT_INT, NULL,nctx->ol_w_id_len,
        NULL);
OCIBNDRA(nctx->curn4, nctx->ol_number_bp,errhp,":ol_number",nctx->ol_number,
        SIZ(int),SQLT_INT, NULL,nctx->ol_number_len,
        NULL);
OCIBNDRA(nctx->curn4, nctx->ol_i_id_bp4,errhp,":ol_i_id",newP->nol_i_id,SIZ(int),
        SQLT_INT, NULL,nctx->nol_i_id_len, NULL);
OCIBNDRA(nctx->curn4, nctx->ol_supply_w_id_bp4,errhp,":ol_supply_w_id",
        newP->nol_supply_w_id,SIZ(int),SQLT_INT, NULL,
        nctx->nol_supply_w_id_len, NULL);
OCIBNDRA(nctx->curn4, nctx->ol_quantity_bp4,errhp,":ol_quantity",newP->nol_quantity,
        SIZ(int),SQLT_INT, NULL,nctx->nol_quantity_len,
                    NULL);
OCIBNDRA(nctx->curn4, nctx->ol_amount_bp,errhp,":ol_amount",newP->nol_amount,
        SIZ(int),SQLT_INT, NULL,nctx->nol_amount_len,
        NULL);
OCIBNDRA(nctx->curn4, nctx->ol_dist_info_bp,errhp,":ol_dist_info",
        nctx->s_dist_info, SIZ(nctx->s_dist_info[0]),SQLT_AFC,
        NULL, nctx->ol_dist_info_len,
        NULL);
  OCIBNDRA(nctx->curn4, nctx->null_date_bp,errhp,":null_date",nctx->null_date,
        SIZ(OCIDate), SQLT_ODT,NULL,
        nctx->null_date_len, NULL);

  /* set up the null date Null date is 15-sep-11 */
  for (i=0;i<NITEMS;i++)
  {
    OCIDateSetDate(&nctx->null_date[i],(sb2)1811,(ub1)9,(ub1)15);
  }
#endif

  return (0);

}



tkvcn (ora_cn_data_t *ora_SlotDataP)
{

  int i, j, k;
  int rpc, rpc3, rowoff, iters,rcount;
  ub4 flags;
  int failed = 0;

  OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
  OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
  OCIError *errhp = ora_SlotDataP->errhp;
  OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
  OCISession *tpcusr = ora_SlotDataP->tpcusr;
  OCIStmt *curi = ora_SlotDataP->curi;
  global_newOrder_t *newP = ora_SlotDataP->globals;
  newctx *nctx = (newctx *)ora_SlotDataP->nctx;

retry:

  newP->status = 0;                    /* number of invalid items */

  /* get number of order lines, and check if all are local */

  newP->o_ol_cnt = NITEMS;
  newP->o_all_local = 1;
  for (i = 0; i < NITEMS; i++) {
    if (newP->nol_i_id[i] == 0) {
      newP->o_ol_cnt = i;
      break;
    }
    if (newP->nol_supply_w_id[i] != newP->w_id) {
      nctx->s_remote[i] = 1;
      newP->o_all_local = 0;
    }
    else
      nctx->s_remote[i] = 0;
  }

  nctx->w_id_ind = TRUE;
  nctx->w_id_len = sizeof(newP->w_id);
  nctx->d_id_ind = TRUE;
  nctx->d_id_len = sizeof(newP->d_id);
  nctx->c_id_ind = TRUE;
  nctx->c_id_len = sizeof(newP->c_id);
  nctx->o_all_local_ind = TRUE;
  nctx->o_all_local_len = sizeof(newP->o_all_local);
  nctx->o_ol_cnt_ind = TRUE;
  nctx->o_ol_cnt_len = sizeof(newP->o_ol_cnt);
  nctx->w_tax_ind = TRUE;
  nctx->w_tax_len = 0;
  nctx->d_tax_ind = TRUE;
  nctx->d_tax_len = 0;
  nctx->o_id_ind = TRUE;
  nctx->o_id_len = sizeof(newP->o_id);
  nctx->c_discount_ind = TRUE;
  nctx->c_discount_len = 0;
  nctx->c_credit_ind = TRUE;
  nctx->c_credit_len = 0;
  nctx->c_last_ind = TRUE;
  nctx->c_last_len = 0;
  nctx->retries_ind = TRUE;
  nctx->retries_len = sizeof(newP->retries);
  nctx->cr_date_ind = TRUE;
  nctx->cr_date_len = sizeof(newP->cr_date);
#ifdef PLSQLNO
  /* this is the row count */
  rcount = newP->o_ol_cnt;
  nctx->nol_i_count = newP->o_ol_cnt;
  nctx->nol_q_count = newP->o_ol_cnt;
  nctx->nol_s_count = newP->o_ol_cnt;
  nctx->s_remote_count = newP->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;
  /* following not relevant */
  nctx->s_data_count = newP->o_ol_cnt;
  nctx->i_data_count = newP->o_ol_cnt;
```

```
  /* initialization for array operations */
  for (i = 0; i < newP->o_ol_cnt; i++) {
    nctx->ol_w_id[i] = newP->w_id;
    nctx->ol_d_id[i] = newP->d_id;
    nctx->ol_number[i] = i + 1;
    nctx->null_date_ind[i]= TRUE;
    nctx->nol_i_id_ind[i] = 0;
    nctx->nol_supply_w_id_ind[i] = TRUE;
    nctx->nol_quantity_ind[i] = TRUE;
    nctx->nol_amount_ind[i] = TRUE;
    nctx->ol_w_id_ind[i] = TRUE;
    nctx->ol_d_id_ind[i] = TRUE;
    nctx->ol_o_id_ind[i] = TRUE;
    nctx->ol_number_ind[i] = TRUE;
    nctx->ol_dist_info_ind[i] = TRUE;
    nctx->s_remote_ind[i] = TRUE;
    nctx->s_data_ind[i] = TRUE;
    nctx->i_data_ind[i] = TRUE;
    nctx->s_quant_ind[i] = TRUE;
    nctx->s_bg_ind[i] = TRUE;
    nctx->cons_ind[i] = TRUE;
    nctx->s_rowid_ind[i] = TRUE;
    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_w_id_len[i] = sizeof(int);
    nctx->ol_d_id_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->null_date_len[i]=sizeof(OCIDate);
    nctx->s_remote_len[i] = sizeof(int);
    nctx->s_data_len[i] = sizeof(int);
    nctx->i_data_len[i] = sizeof(int);
    nctx->s_quant_len[i] = sizeof(int);
    nctx->s_rowid_len[i] = sizeof(nctx->s_rowid_ptr[0]);
    nctx->cons_len[i] = sizeof(int);
    nctx->i_name_len[i]=0;
    nctx->s_bg_len[i] = 0;
  }
  for (i = newP->o_ol_cnt; i < NITEMS; i++) {
    nctx->nol_i_id_ind[i] = NA;
    nctx->nol_supply_w_id_ind[i] = NA;
    nctx->nol_quantity_ind[i] = NA;
    nctx->nol_amount_ind[i] = NA;
    nctx->ol_w_id_ind[i] = NA;
    nctx->ol_d_id_ind[i] = NA;
    nctx->ol_o_id_ind[i] = NA;
    nctx->ol_number_ind[i] = NA;
    nctx->ol_dist_info_ind[i] = NA;
    nctx->null_date_ind[i]= NA;
    nctx->s_remote_ind[i] = NA;
    nctx->s_data_ind[i] = NA;
    nctx->i_data_ind[i] = NA;
    nctx->s_quant_ind[i] = NA;
    nctx->s_bg_ind[i] = NA;
    nctx->cons_ind[i] = NA;
    nctx->s_rowid_ind[i] = NA;

    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_w_id_len[i] = 0;
    nctx->ol_d_id_len[i] = 0;
    nctx->ol_o_id_len[i] = 0;
    nctx->ol_number_len[i] = 0;
    nctx->ol_dist_info_len[i] = 0;
    nctx->null_date_len[i]= 0;
    nctx->s_remote_len[i] = 0;
    nctx->i_data_len[i] = 0;
    nctx->s_data_len[i] = 0;
    nctx->s_quant_len[i] = 0;
    nctx->s_rowid_len[i] = 0;
    nctx->cons_len[i] = 0;
    nctx->i_name_len[i]=0;
    nctx->s_bg_len[i] = 0;
  }

  newP->execstatus = OCIStmtExecute(tpcsvc,nctx->curn1,errhp,1,0,0,0,
                                    OCI_DEFAULT | OCI_COMMIT_ON_SUCCESS);

#else
  newP->execstatus = OCIStmtExecute(tpcsvc,nctx->curn1,errhp,1,0,0,0,OCI_DEFAULT);
#endif


  if(newP->execstatus != OCI_SUCCESS) {
    OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
    newP->errcode = OCIERROR(errhp,newP->execstatus);
    if(newP->errcode == NOT_SERIALIZABLE) {
            newP->retries++;
            goto retry;
    } else if (newP->errcode == RECOVERR) {
            newP->retries++;
            goto retry;
    }
    else {
            return -1;
    }
  }

#ifdef PLSQLNO
  /* did the txn succeed ? */
  if (rcount != newP->o_ol_cnt)
  {
    newP->status = rcount - newP->o_ol_cnt;
    newP->o_ol_cnt = rcount;
  }
#endif

#ifdef DEBUG
  err_printf("tkvcn (NO): w_id = %d, d_id = %d, c_id = %d\n",w_id, d_id, c_id);
#endif


#ifndef PLSQLNO
  /* initialization for array operations */

  for (i = 0; i < o_ol_cnt; i++) {
    nctx->ol_w_id[i] = w_id;
    nctx->ol_d_id[i] = d_id;
    nctx->ol_number[i] = i + 1;
    nctx->null_date_ind[i]= TRUE;
    nctx->nol_i_id_ind[i] = TRUE;
    nctx->nol_supply_w_id_ind[i] = TRUE;
    nctx->nol_quantity_ind[i] = TRUE;
    nctx->nol_amount_ind[i] = TRUE;
    nctx->ol_w_id_ind[i] = TRUE;
    nctx->ol_d_id_ind[i] = TRUE;
    nctx->ol_o_id_ind[i] = TRUE;
    nctx->ol_number_ind[i] = TRUE;
    nctx->ol_dist_info_ind[i] = TRUE;
    nctx->s_remote_ind[i] = TRUE;
    nctx->s_quant_ind[i] = TRUE;
    nctx->cons_ind[i] = TRUE;
    nctx->s_rowid_ind[i] = TRUE;

    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_w_id_len[i] = sizeof(int);
    nctx->ol_d_id_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->null_date_len[i]=sizeof(OCIDate);
    nctx->s_remote_len[i] = sizeof(int);
    nctx->s_quant_len[i] = sizeof(int);
    nctx->s_rowid_len[i] = sizeof(nctx->s_rowid_ptr[0]);
    nctx->cons_len[i] = sizeof(int);
  }
  for (i = o_ol_cnt; i < NITEMS; i++) {
    nctx->nol_i_id_ind[i] = NA;
    nctx->nol_supply_w_id_ind[i] = NA;
    nctx->nol_quantity_ind[i] = NA;
    nctx->nol_amount_ind[i] = NA;
    nctx->ol_w_id_ind[i] = NA;
    nctx->ol_d_id_ind[i] = NA;
    nctx->ol_o_id_ind[i] = NA;
    nctx->ol_number_ind[i] = NA;
    nctx->ol_dist_info_ind[i] = NA;
    nctx->null_date_ind[i]= NA;
    nctx->s_remote_ind[i] = NA;
    nctx->s_quant_ind[i] = NA;
    nctx->cons_ind[i] = NA;
    nctx->s_rowid_ind[i] = NA;

    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_w_id_len[i] = 0;
    nctx->ol_d_id_len[i] = 0;
    nctx->ol_o_id_len[i] = 0;
    nctx->ol_number_len[i] = 0;
    nctx->ol_dist_info_len[i] = 0;
    nctx->null_date_len[i]= 0;
    nctx->s_remote_len[i] = 0;
    nctx->s_quant_len[i] = 0;
    nctx->s_rowid_len[i] = 0;
    nctx->cons_len[i] = 0;
  }

  rpc3 = SelItemStk (nctx, newP, tpcsvc, errhp);
  if (rpc3 == -2)
    goto retry;
  else if (rpc3 == -1)
    return (-1);

  /* compute order line amounts, total amount and stock quantities */

  total_amount = 0.0;
  for (i = 0; i < newP->o_ol_cnt; i++)
    {
```

```
    nctx->ol_o_id[i] = newP->o_id;
    if (nctx->nol_i_id_ind[i] != NA) {
      newP->s_quantity[i] -= newP->nol_quantity[i];
      if (newP->s_quantity[i] < 10)
        newP->s_quantity[i] += 91;
      newP->nol_amount[i] = (newP->nol_quantity[i] * newP->i_price[i]);
      newP->total_amount += newP->nol_amount[i];
      if (strstr (nctx->i_data[i], "ORIGINAL") &&
          strstr (nctx->s_data[i], "ORIGINAL"))
        newP->brand_gen[i] = 'B';
      else
        newP->brand_gen[i] = 'G';
    }

  }
  total_amount *= ((float)(10000 - c_discount)/10000) * (1.0 + ((float)(d_tax)/10000) +
((float)(w_tax)/10000));
  newP->total_amount = newP->total_amount/100;

  rpc = UpdStk2 (nctx, newP, tpcsvc, errhp);
  if (rpc == -2)
    goto retry;
  else if (rpc == -1)
    return (-1);

  /* error processing - will keep it separated for readablity */
  /* number of items selected != number of stock updated */

  if (rpc3 != rpc) {
    userlog ("Error in TPC-C server %d: %d rows of item read, ",
             newP->proc_no, rpc3);
    userlog ("                          but %d rows of stock updated\n", rpc);
    /* rollback */
    OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
    return (-1);
  }


/* common code for insert into order_line */
  for (i=0; i< newP->o_ol_cnt; i++)  /* move district info in place */
  {
    nctx->ol_dist_info_len[i]=nctx->s_dist_info_len[i];
  }

  /* array insert into order line table */
  flags= (newP->status ? OCI_DEFAULT : (OCI_DEFAULT|OCI_COMMIT_ON_SUCCESS));
  if ((newP->o_ol_cnt - newP->status) > 0)
  {
    newP->execstatus = OCIStmtExecute(tpcsvc,nctx->curn4,errhp,newP->o_ol_cnt - newP->status,
                          0,0,0,flags);
    if(newP->execstatus != OCI_SUCCESS) {
      OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
      newP->errcode = OCIERROR(errhp,execstatus);
      if(newP->errcode == NOT_SERIALIZABLE) {
        newP->retries++;
        goto retry;
      } else if (newP->errcode == RECOVERR) {
        newP->retries++;
        goto retry;
      } else {
        return -1;
      }
    }
    OCIAttrGet(nctx->curn4,OCI_HTYPE_STMT,&rcount,NULL,
                                OCI_ATTR_ROW_COUNT, errhp);
    if (rcount != (newP->o_ol_cnt - newP->status))
    {
      userlog ("Error in TPC-C server %d: array insert failed\n",
                                newP->proc_no);
      /* rollback */
      OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
      return (-1);
    }
  }

  /* commit if no invalid item */

  if (newP->status) {
    OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
    fflush(stdout);
  }

#else
  newP->total_amount = 0.0;
  for (i = 0; i < newP->o_ol_cnt; i++)
  {
    if (nctx->nol_i_id_ind[i] != NA) {
      newP->total_amount += newP->nol_amount[i];
    }
  }
  newP->total_amount *= ((float)(10000 - newP->c_discount)/10000) * (1.0 + ((float)(newP->d_tax)/
10000) + ((float)(newP->w_tax)/10000));
  newP->total_amount = newP->total_amount/100;
#endif
  return (0);

}
```

```
void tkvcndone (ora_cn_data_t *ora_SlotDataP)

{

  int i;
  newctx *nctx = (newctx *)ora_SlotDataP->nctx;
  global_newOrder_t *newP = ora_SlotDataP->globals;

  if (nctx)
  {
    OCIHandleFree((dvoid *)nctx->curn1,OCI_HTYPE_STMT);
    OCIHandleFree((dvoid *)nctx->curn2,OCI_HTYPE_STMT);
    for (i = 0; i < 10; i++)
      OCIHandleFree((dvoid *)(nctx->curn3)[i],OCI_HTYPE_STMT);
    OCIHandleFree((dvoid *)nctx->curn4,OCI_HTYPE_STMT);
    free (nctx);
  }
  if (newP) {
    err_printf("free_handles> newP: 0x%x\n", newP);
    free(newP);
    ora_SlotDataP->globals = NULL;
  }
}

/* the arrays are initialized based on a successful select from */
/* stock/item. We need to shift the values in the orderline array */
/* one position up to compensate when we have an invalid item */

shiftitemstock (i, j, nctx, newP)

int i, j;
newctx *nctx;
global_newOrder_t *newP;
{
  /* shift up the values for the stock table */
   nctx->s_remote[i] =  nctx->s_remote[j];

  /* shift up the order_line values */

  nctx->nol_i_id_ind[i]=nctx->nol_i_id_ind[j];
  newP->nol_i_id[i] = newP->nol_i_id[j];

  nctx->nol_quantity_ind[i] =  nctx->nol_quantity_ind[j];
  newP->nol_quantity[i] = newP->nol_quantity[j];

  nctx->nol_supply_w_id_ind [i] =  nctx->nol_supply_w_id_ind[j];
  newP->nol_supply_w_id[i] = newP->nol_supply_w_id[j];
}

#if 0
/* TODO - this routine is not ever called. So, no changes for now */

swapitemstock (i, j)

int i, j;

{

  int k;
  int tempi;
  int tempf;
  char tempstr[52];
  ub2 tempub2;
  sb2 tempsb2;
  OCIRowid  *tmprid;

  tempsb2 = nctx->cons_ind[i];
  nctx->cons_ind[i] = nctx->cons_ind[j];
  nctx->cons_ind[j] = tempsb2;
  tempub2 = nctx->cons_len[i];
  nctx->cons_len[i] = nctx->cons_len[j];
  nctx->cons_len[j] = tempub2;
  tempub2 = nctx->cons_rcode[i];
  nctx->cons_rcode[i] = nctx->cons_rcode[j];
  nctx->cons_rcode[j] = tempub2;
  tempi = nctx->cons[i];
  nctx->cons[i] = nctx->cons[j];
  nctx->cons[j] = tempi;

  tempsb2 = nctx->s_rowid_ind[i];
  nctx->s_rowid_ind[i] = nctx->s_rowid_ind[j];
  nctx->s_rowid_ind[j] = tempsb2;
  tempub2 = nctx->s_rowid_len[i];
  nctx->s_rowid_len[i] = nctx->s_rowid_len[j];
  nctx->s_rowid_len[j] = tempub2;
  tempub2 = nctx->s_rowid_rcode[i];
  nctx->s_rowid_rcode[i] = nctx->s_rowid_rcode[j];
  nctx->s_rowid_rcode[j] = tempub2;
  tmprid = nctx->s_rowid_ptr[i];
  nctx->s_rowid_ptr[i]= nctx->s_rowid_ptr[j];
  nctx->s_rowid_ptr[j]=tmprid;

  tempsb2 = nctx->i_price_ind[i];
  nctx->i_price_ind[i] = nctx->i_price_ind[j];
  nctx->i_price_ind[j] = tempsb2;
  tempub2 = nctx->i_price_len[i];
  nctx->i_price_len[i] = nctx->i_price_len[j];
  nctx->i_price_len[j] = tempub2;
```

```
  tempub2 = nctx->i_price_rcode[i];
  nctx->i_price_rcode[i] = nctx->i_price_rcode[j];
  nctx->i_price_rcode[j] = tempub2;
  tempf = i_price[i];
  i_price[i] = i_price[j];
  i_price[j] = tempf;

  tempsb2 = nctx->i_name_ind[i];
  nctx->i_name_ind[i] = nctx->i_name_ind[j];
  nctx->i_name_ind[j] = tempsb2;
  tempub2 = nctx->i_name_len[i];
  nctx->i_name_len[i] = nctx->i_name_len[j];
  nctx->i_name_len[j] = tempub2;
  tempub2 = nctx->i_name_rcode[i];
  nctx->i_name_rcode[i] = nctx->i_name_rcode[j];
  nctx->i_name_rcode[j] = tempub2;
  strncpy (tempstr, i_name[i], 25);
  strncpy (i_name[i], i_name[j], 25);
  strncpy (i_name[j], tempstr, 25);

  tempsb2 = nctx->i_data_ind[i];
  nctx->i_data_ind[i] = nctx->i_data_ind[j];
  nctx->i_data_ind[j] = tempsb2;
  tempub2 = nctx->i_data_len[i];
  nctx->i_data_len[i] = nctx->i_data_len[j];
  nctx->i_data_len[j] = tempub2;
  tempub2 = nctx->i_data_rcode[i];
  nctx->i_data_rcode[i] = nctx->i_data_rcode[j];
  nctx->i_data_rcode[j] = tempub2;
  strncpy (tempstr, nctx->i_data[i], 51);
  strncpy (nctx->i_data[i], nctx->i_data[j], 51);
  strncpy (nctx->i_data[j], tempstr, 51);

  tempsb2 = nctx->s_quantity_ind[i];
  nctx->s_quantity_ind[i] = nctx->s_quantity_ind[j];
  nctx->s_quantity_ind[j] = tempsb2;
  tempub2 = nctx->s_quantity_len[i];
  nctx->s_quantity_len[i] = nctx->s_quantity_len[j];
  nctx->s_quantity_len[j] = tempub2;
  tempub2 = nctx->s_quantity_rcode[i];
  nctx->s_quantity_rcode[i] = nctx->s_quantity_rcode[j];
  nctx->s_quantity_rcode[j] = tempub2;
  tempi = s_quantity[i];
  s_quantity[i] = s_quantity[j];
  s_quantity[j] = tempi;

  tempsb2 = nctx->s_dist_info_ind[i];
  nctx->s_dist_info_ind[i] = nctx->s_dist_info_ind[j];
  nctx->s_dist_info_ind[j] = tempsb2;
  tempub2 = nctx->s_dist_info_len[i];
  nctx->s_dist_info_len[i] = nctx->s_dist_info_len[j];
  nctx->s_dist_info_len[j] = tempub2;
  tempub2 = nctx->s_dist_info_rcode[i];
  nctx->s_dist_info_rcode[i] = nctx->s_dist_info_rcode[j];
  nctx->s_dist_info_rcode[j] = tempub2;
  strncpy (tempstr, nctx->s_dist_info[i], 25);
  strncpy (nctx->s_dist_info[i], nctx->s_dist_info[j], 25);
  strncpy (nctx->s_dist_info[j], tempstr, 25);

  tempsb2 = nctx->s_data_ind[i];
  nctx->s_data_ind[i] = nctx->s_data_ind[j];
  nctx->s_data_ind[j] = tempsb2;
  tempub2 = nctx->s_data_len[i];
  nctx->s_data_len[i] = nctx->s_data_len[j];
  nctx->s_data_len[j] = tempub2;
  tempub2 = nctx->s_data_rcode[i];
  nctx->s_data_rcode[i] = nctx->s_data_rcode[j];
  nctx->s_data_rcode[j] = tempub2;
  strncpy (tempstr, nctx->s_data[i], 51);
  strncpy (nctx->s_data[i], nctx->s_data[j], 51);
  strncpy (nctx->s_data[j], tempstr, 51);

}
#endif


SelItemStk (nctx, newP, tpcsvc, errhp)
newctx *nctx;
global_newOrder_t *newP;
OCISvcCtx *tpcsvc;
OCIError *errhp;
{

  int i, j, rpc3,rcount;

  /* array select from item and stock tables */
  newP->execstatus=OCIStmtExecute(tpcsvc,(nctx->curn3)[newP->d_id-1],errhp,newP->o_ol_cnt,
                                  0,0,0,OCI_DEFAULT);
  if((newP->execstatus != OCI_SUCCESS) && (newP->execstatus != OCI_NO_DATA)) {
    newP->errcode = OCIERROR(errhp,newP->execstatus);
    if(newP->errcode == NOT_SERIALIZABLE) {
      newP->retries++;
      OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
      return (-2);
    } else if (newP->errcode == RECOVERR) {
    /* In case of NO_DATA this should NOT return, but simply fall through */
      OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
      newP->retries++;
      return (-2);
    } else {
      OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
      return (-1);
    }
  }
  /* mark invalid items */
  OCIAttrGet((nctx->curn3)[newP->d_id-1], OCI_HTYPE_STMT,&rcount,NULL,
                        OCI_ATTR_ROW_COUNT, errhp);
  rpc3 = rcount;

  /* the result is in order, so we have to shift up to fill    */
  /* the slot for the line with the invalid item.              */
  /* If more than one item is wrong, this is not an simulated  */
  /* error and we'll blow off */

  if ((newP->status = newP->o_ol_cnt - rcount) >1)
  {
    userlog ("TPC-C server %d: more than 1 invalid item?\n", proc_no);
    return (rpc3);
  }
  if (newP->status == 0) return (rpc3);

  /* find the invalid item, transfer the rowid information */

  for (i = 0; i < newP->o_ol_cnt; i++) {
    if (nctx->cons[i] != i) break;   /* this item is invalid */
  }


          userlog ("TPC-C server %d: reordering items and stocks\n",
                   proc_no);

  /* not the last item - shift up */

  for (j = i; j < newP->o_ol_cnt-1; j++)
  {
    shiftitemstock (j, j+1, nctx, newP);
  }
  /* zero the last item */
    i = newP->o_ol_cnt-1;
    nctx->nol_i_id_ind[i] = NA;
    nctx->nol_supply_w_id_ind[i] = NA;
    nctx->nol_quantity_ind[i] = NA;
    nctx->nol_amount_ind[i] = NA;
    nctx->ol_w_id_ind[i] = NA;
    nctx->ol_d_id_ind[i] = NA;
    nctx->ol_o_id_ind[i] = NA;
    nctx->null_date_ind[i]= NA;
    nctx->ol_number_ind[i] = NA;
    nctx->ol_dist_info_ind[i] = NA;
    nctx->s_remote_ind[i] = NA;
    nctx->s_quant_ind[i] = NA;

    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_w_id_len[i] = 0;
    nctx->ol_d_id_len[i] = 0;
    nctx->ol_o_id_len[i] = 0;
    nctx->ol_number_len[i] = 0;
    nctx->ol_dist_info_len[i] = 0;
    nctx->null_date_ind[i] = 0;
    nctx->s_remote_len[i] = 0;
    nctx->s_quant_len[i] = 0;

  return (rpc3);

}



UpdStk2 (nctx, newP, tpcsvc, errhp)
newctx *nctx;
global_newOrder_t *newP;
OCISvcCtx *tpcsvc;
OCIError *errhp;
{

  int rpc, rowoff, iters,rcount;

  /* array update of stock table */

  newP->execstatus = OCIStmtExecute(tpcsvc,nctx->curn2,errhp,newP->o_ol_cnt-newP->status,0,0,0,
                                    OCI_DEFAULT);
  if(newP->execstatus != OCI_SUCCESS) {
    OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
    newP->errcode = OCIERROR(errhp,newP->execstatus);
    if(newP->errcode == NOT_SERIALIZABLE) {
      newP->retries++;
                return (-2);
    } else if (newP->errcode == RECOVERR) {
      newP->retries++;
                return (-2);
    } else {
      return -1;
    }
  }
  OCIAttrGet(nctx->curn2,OCI_HTYPE_STMT,&rcount,NULL, OCI_ATTR_ROW_COUNT, errhp);
```

```
  rpc = rcount;

  if (rpc != (newP->o_ol_cnt - newP->status)) {
     userlog ("Error in TPC-C server %d: array update failed\n",
              newP->proc_no);
     OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
     return (-1);
  }

  return (rpc);

}
```

## plora.h

```
#ifndef TPCC_PLORA_H
#define TPCC_PLORA_H

#include "tpcc.h"
#include "tpcc_info.h"

#define NEWO_TRANS (1)
#define PAYMENT_TRANS (2)
#define ORDER_STAT_TRANS (3)
#define DELIVERY_TRANS (4)
#define STOCK_TRANS (5)
#define MAX_TRAN_TYPE (5)

/* struct to copy-in/out neworder vars */
struct global_newOrder_t {
  int w_id;
  int d_id;
  int c_id;
  int nol_i_id[15];
  int nol_supply_w_id[15];
  int nol_quantity[15];
  int retries;
  ub4  datelen;
  text o_entry_d[20];
  int o_id;
  int o_ol_cnt;
  char c_last[17];
  char c_credit[3];
  float c_discount;
  float w_tax;
  float d_tax;
  float total_amount;
  char i_name[15][25];
  int s_quantity[15];
  char brand_gen[15];
  float i_price[15];
  int nol_amount[15];
  int status;
  int o_all_local;
  int errcode;
  int execstatus;
  int proc_no;
  char brand_generic[15][1];
  int tracelevel;
  OCIDate cr_date;
  OCIDate c_since;
  OCIDate o_entry_d_base;
  OCIDate ol_d_base[15];
};

typedef struct global_newOrder_t global_newOrder_t;

struct global_payment_t {
  int w_id;
  int d_id;
  int c_id;
  char c_last[17];
  char c_first[17];
  char c_middle[3];
  double c_balance;
  int retries;
  int bylastname;
  OCIDate c_since;
  int execstatus;
  int errcode;
  int c_w_id;
  int c_d_id;
  int h_amount;
  char w_street_1[21];
  char w_street_2[21];
  char w_city[21];
  char w_state[3];
  char w_zip[10];
  char d_street_1[21];
  char d_street_2[21];
  char d_city[21];
  char d_state[3];
  char d_zip[10];
  char c_street_1[21];
  char c_street_2[21];
  char c_city[21];
  char c_state[3];
  char c_zip[10];
  char c_phone[17];
  ub4  sincelen;
  text c_since_d[11];
  float c_discount;
  char c_credit[3];
  int c_credit_lim;
  char c_data[201];
  ub4 hlen;
  text h_date[20];
  OCIDate cr_date;
};

typedef struct global_payment_t global_payment_t;

struct global_order_t {
  OCIDate ol_d_base[15];
  int w_id;
  int d_id;
  int c_id;
  char c_last[17];
  char c_first[17];
  char c_middle[3];
  double c_balance;
  int o_id;
  int o_carrier_id;
  int o_ol_cnt;
  int ol_supply_w_id[15];
  int ol_i_id[15];
  unsigned char o_entry_d_base[7];
  int ol_quantity[15];
  ub4  ol_del_len[15];
  text ol_delivery_d[15][11];
  int ol_amount[15];
  int errcode;
  int execstatus;
  int retries;
  int bylastname;
  char o_entry_d[20];
};

typedef struct global_order_t global_order_t;

struct global_delivery_t {
  int w_id;
  int o_carrier_id;
  int retries;
  int del_o_id[10];
  int errcode;
  int execstatus;
  int proc_no;
  OCIDate cr_date;
};
typedef struct global_delivery_t global_delivery_t;

struct global_stock_t {
  int w_id;
  int d_id;
  int threshold;
  int retries;
  int low_stock;
  int errcode;
  int execstatus;
};

typedef struct global_stock_t global_stock_t;


/* Oracle handles and rest of thread specific vars(thread slot data ) */

struct ora_cn_data_t {
  OCIEnv *tpcenv;
  OCIServer *tpcsrv;
  OCIError *errhp;
  OCISvcCtx *tpcsvc;
  OCISession *tpcusr;
  OCIStmt *curi;
  dvoid *xmem;

  global_newOrder_t *globals;
  global_payment_t *payP;
  global_order_t *ordP;
  global_delivery_t *delP;
  global_stock_t *stoP;
  void *nctx;
  void *pctx;
  void *octx;
  void *sctx;
  void *dctx;
  void *actx;  /* for #ifdef DMLRETDEL */
  void *cbctx; /* for orderstatus */
  void *ctxp_octx; /* for orderstatus */
};

typedef struct ora_cn_data_t ora_cn_data_t;

#endif /* TPCC_PLORA_H */
```

# plord.c

```
#ifdef RCSID
static char *RCSid =
  "$Header: /afs/transarc.com/project/encina/rcs/test/src/benchmarks/tpcc/server/ora8.1_mt/RCS/plord.c,v
1.2 1999/04/15 12:16:51 oz Exp $ Copyr (c) 1994 Oracle";
#endif /* RCSID */

/*===================================================================+
|       Copyright (c) 1995  Oracle Corp, Redwood Shores, CA       |
|                OPEN SYSTEMS PERFORMANCE GROUP                   |
|                    All Rights Reserved                          |
 +===================================================================+
| FILENAME
|    plord.c
| DESCRIPTION
|    OCI version (using PL/SQL anynomous block) of
|    ORDER STATUS transaction in TPC-C benchmark.
 +===================================================================*/

#include "tpcc.h"
#include "plora.h"  /*  */
#include "tpccflags.h"

#ifdef PLSQLORD
#define SQLTXT "BEGIN orderstatus.getstatus (:w_id, :d_id, :c_id, :byln, \
  :c_last, :c_first, :c_middle, :c_balance, :o_id, :o_entry_d, :o_cr_id, \
  :o_ol_cnt, :ol_s_w_id, :ol_i_id, :ol_quantity, :ol_amount, :ol_d_d); END;"
#else

#define SQLCUR0 "SELECT rowid FROM customer \
                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 c_id, c_balance, c_first, c_middle, c_last, \
                o_id, o_entry_d, o_carrier_id, o_ol_cnt \
                FROM customer, orders \
                WHERE customer.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, o_d_id, o_w_id, o_id DESC"


#define SQLCUR2 "SELECT c_balance, c_first, c_middle, c_last, \
                o_id, o_entry_d, o_carrier_id, o_ol_cnt \
                FROM customer, orders \
                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, o_d_id, o_w_id, o_id DESC"


#define SQLCUR3 "SELECT ol_i_id,ol_supply_w_id,ol_quantity,ol_amount, \
               ol_delivery_d\
               FROM order_line \
               WHERE ol_d_id = :d_id AND ol_w_id = :w_id AND ol_o_id = :o_id"

#define SQLCUR4 "SELECT count(c_last) FROM customer \
                WHERE c_d_id = :d_id AND c_w_id = :w_id AND c_last = :c_last "
#endif



struct ordctx {
  sb2 c_rowid_ind[100];
  sb2 ol_supply_w_id_ind[NITEMS];
  sb2 ol_i_id_ind[NITEMS];
  sb2 ol_quantity_ind[NITEMS];
  sb2 ol_amount_ind[NITEMS];
  sb2 ol_delivery_d_ind[NITEMS];
  sb2 ol_w_id_ind;
  sb2 ol_d_id_ind;
  sb2 ol_o_id_ind;
  sb2 c_id_ind;
  sb2 c_first_ind;
  sb2 c_middle_ind;
  sb2 c_balance_ind;
  sb2 c_last_ind;
  sb2 o_id_ind;
  sb2 o_entry_d_ind;
  sb2 o_carrier_id_ind;
  sb2 o_ol_cnt_ind;

  ub4 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;

  ub2 c_rowid_rcode[100];
  ub2 ol_supply_w_id_rcode[NITEMS];
  ub2 ol_i_id_rcode[NITEMS];
  ub2 ol_quantity_rcode[NITEMS];
  ub2 ol_amount_rcode[NITEMS];
  ub2 ol_delivery_d_rcode[NITEMS];
  ub2 ol_w_id_rcode;
  ub2 ol_d_id_rcode;
  ub2 ol_o_id_rcode;

  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;
  OCIBind *w_id_bp0;
  OCIBind *d_id_bp0;
  OCIBind *c_id_bp;
  OCIBind *c_last_bp;
#ifdef PLSQLORD
  OCIBind *byln_bp;
  OCIBind *c_first_bp;
  OCIBind *c_middle_bp;
  OCIBind *c_balance_bp;
  OCIBind *o_entry_d_bp;
  OCIBind *o_cr_id_bp;
  OCIBind *o_ol_cnt_bp;
  OCIBind *ol_i_id_bp;
  OCIBind *ol_supply_w_id_bp;
  OCIBind *ol_quantity_bp;
  OCIBind *ol_amount_bp;
  OCIBind *ol_d_base_bp;
  ub4 ol_i_id_cnt;
  ub4 ol_sup_cnt;
  ub4 ol_qty_cnt;
  ub4 ol_amt_cnt;
  ub4 ol_del_d_cnt;
#else
  OCIStmt *curo1;
  OCIStmt *curo2;
  OCIStmt *curo3;
  OCIStmt *curo4;
  OCIBind *w_id_bp2;
  OCIBind *w_id_bp3;
  OCIBind *w_id_bp4;
  OCIBind *d_id_bp2;
  OCIBind *d_id_bp3;
  OCIBind *d_id_bp4;
  OCIBind *c_last_bp4;
  OCIBind *o_id_bp;
  OCIBind *c_rowid_bp;
  OCIDefine *c_rowid_dp;
  OCIDefine *c_last_dp;
  OCIDefine *c_last_dp1;
  OCIDefine *c_id_dp;
  OCIDefine *c_first_dp1;
  OCIDefine *c_first_dp2;
  OCIDefine *c_middle_dp1;
  OCIDefine *c_middle_dp2;
  OCIDefine *c_balance_dp1;
  OCIDefine *c_balance_dp2;
  OCIDefine *o_id_dp1;
  OCIDefine *o_id_dp2;
  OCIDefine *o_entry_d_dp1;
  OCIDefine *o_entry_d_dp2;
  OCIDefine *o_cr_id_dp1;
  OCIDefine *o_cr_id_dp2;
  OCIDefine *o_ol_cnt_dp1;
  OCIDefine *o_ol_cnt_dp2;
  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];
  int cs;
  int cust_idx;
  int norow;
  int rcount;
  int somerows;
#endif
};

typedef struct ordctx ordctx;

struct defctx
{
 boolean reexec;
 ub4 count;
};
typedef struct defctx defctx;

struct defctx_ordctx {
    defctx *ctxp;
    ordctx *octx;
};
typedef struct defctx_ordctx defctx_ordctx;

/* ordctx *octx; */
```

```
/* defctx cbctx; */

#ifndef PLSQLORD
sb4 rid_data(dvoid *ctxp_octx, OCIDefine *dp, ub4 iter,
             dvoid **bufpp, ub4 **alenp, ub1 *piecep,
             dvoid **indpp, ub2 **rcodepp)
{
 ub4 i;
 defctx *ctxp = ((defctx_ordctx *)ctxp_octx)->ctxp;
 ordctx *octx = ((defctx_ordctx *)ctxp_octx)->octx;
 if (((defctx*)ctxp)->reexec)/* if this is the second execute - use entry 0 */
 {
   i = 0;
   ((defctx*)ctxp)->count--;   /* count down */
 }
 else
   i = iter;
 *bufpp = octx->c_rowid_ptr[i];
 *indpp= &octx->c_rowid_ind[i];
 *alenp= &octx->c_rowid_len[i];
 *rcodepp = &octx->c_rowid_rcode[i];
 *piecep =OCI_ONE_PIECE;
 return (OCI_CONTINUE);
}
#endif

tkvcoinit (ora_cn_data_t *ora_SlotDataP)

{

  int i;
  text stmbuf[SQL_BUF_SIZE];

  ordctx *octx;
  defctx *cbctx;
  global_order_t *ordP;
  OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
  OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
  OCIError *errhp = ora_SlotDataP->errhp;
  OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
  OCISession *tpcusr = ora_SlotDataP->tpcusr;
  OCIStmt *curi = ora_SlotDataP->curi;
  defctx_ordctx *ctxp_octx;

  octx = (ordctx *) malloc (sizeof(ordctx));
  memset(octx,(char)0,sizeof(ordctx));
  ora_SlotDataP->octx = (void *)octx;  /*  */

  cbctx = (defctx *) malloc (sizeof(defctx));
  memset(cbctx,(char)0,sizeof(defctx));
  ora_SlotDataP->cbctx = (void *)cbctx;  /*  */

  /* allocate the space */
  ctxp_octx = (defctx_ordctx *)malloc(sizeof(defctx_ordctx));
  ora_SlotDataP->ctxp_octx = (void *)ctxp_octx;

  ora_SlotDataP->ordP = (global_order_t *)malloc(sizeof(global_order_t));
  memset(ora_SlotDataP->ordP,(char)0,sizeof(global_order_t));
  ordP = ora_SlotDataP->ordP;

#ifndef PLSQLORD
  octx->cs = 1;
  octx->norow = 0;
  octx->somerows = 10;
/* get the rowid handles */
  for(i=0;i<100;i++) {
   OCIERROR(errhp, OCIDescriptorAlloc(tpcenv,(dvoid**)&octx->c_rowid_ptr[i],
      OCI_DTYPE_ROWID,0,(dvoid**)0));
  }
#endif


  OCIERROR(errhp,
     OCIHandleAlloc(tpcenv,(dvoid**)&octx->curo0,OCI_HTYPE_STMT,0,(dvoid**)0));
  OCIERROR(errhp,
     OCIHandleAlloc(tpcenv,(dvoid**)&octx->curo0,OCI_HTYPE_STMT,0,(dvoid**)0));
#ifndef PLSQLORD
  OCIERROR(errhp,
     OCIHandleAlloc(tpcenv,(dvoid**)&octx->curo1,OCI_HTYPE_STMT,0,(dvoid**)0));
  OCIERROR(errhp,
     OCIHandleAlloc(tpcenv,(dvoid**)&octx->curo2,OCI_HTYPE_STMT,0,(dvoid**)0));
  OCIERROR(errhp,
     OCIHandleAlloc(tpcenv,(dvoid**)&octx->curo3,OCI_HTYPE_STMT,0,(dvoid**)0));
  OCIERROR(errhp,
     OCIHandleAlloc(tpcenv,(dvoid**)&octx->curo4,OCI_HTYPE_STMT,0,(dvoid**)0));
#endif

#ifdef PLSQLORD
  sprintf((char *) stmbuf, SQLTXT);
  OCIERROR(errhp,
     OCIStmtPrepare(octx->curo0,errhp,stmbuf,strlen((char *)stmbuf),
              OCI_NTV_SYNTAX,OCI_DEFAULT));
#else
/*  c_id = 0, use find customer by lastname. Get an array or rowid's back*/
  sprintf((char *) stmbuf, SQLCUR0);
  OCIERROR(errhp,
     OCIStmtPrepare(octx->curo0,errhp,stmbuf,strlen((char *)stmbuf),
                                  OCI_NTV_SYNTAX,OCI_DEFAULT));
  OCIERROR(errhp,
     OCIAttrSet(octx->curo0,OCI_HTYPE_STMT,(dvoid*)&octx->norow,0,
              OCI_ATTR_PREFETCH_ROWS,errhp));
/* get order/customer info back based on rowid */
  sprintf((char *) stmbuf, SQLCUR1);
  OCIERROR(errhp,
     OCIStmtPrepare(octx->curo1,errhp,stmbuf,strlen((char *)stmbuf),
                                  OCI_NTV_SYNTAX,OCI_DEFAULT));
  OCIERROR(errhp,
     OCIAttrSet(octx->curo1,OCI_HTYPE_STMT,(dvoid*)&octx->norow,0,
              OCI_ATTR_PREFETCH_ROWS,errhp));

/*  c_id == 0, use lastname to find customer */
  sprintf((char *) stmbuf, SQLCUR2);
  OCIERROR(errhp,
     OCIStmtPrepare(octx->curo2,errhp,stmbuf,strlen((char *)stmbuf),
                                  OCI_NTV_SYNTAX,OCI_DEFAULT));
  OCIERROR(errhp,
     OCIAttrSet(octx->curo2,OCI_HTYPE_STMT,(dvoid*)&octx->norow,0,
              OCI_ATTR_PREFETCH_ROWS,errhp));

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

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

  for (i = 0; i < NITEMS; i++) {
     octx->ol_supply_w_id_ind[i] = TRUE;
     octx->ol_i_id_ind[i] = TRUE;
     octx->ol_quantity_ind[i] = TRUE;
     octx->ol_amount_ind[i] = TRUE;
     octx->ol_delivery_d_ind[i] = TRUE;

     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(ordP->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_ind = TRUE;
  octx->ol_d_id_ind = TRUE;
  octx->ol_o_id_ind = TRUE;
  octx->ol_w_id_len = sizeof(int);
  octx->ol_d_id_len = sizeof(int);
  octx->ol_o_id_len = sizeof(int);

  /* bind variables */
#ifdef PLSQLORD

  OCIBND(octx->curo0, octx->w_id_bp0, errhp,":w_id",ADR(ordP->w_id),
       SIZ(int),SQLT_INT);
  OCIBND(octx->curo0, octx->d_id_bp0, errhp,":d_id",ADR(ordP->d_id),
       SIZ(int), SQLT_INT);
  OCIBND(octx->curo0, octx->c_id_bp , errhp,":c_id",ADR(ordP->c_id),
       SIZ(c_id),SQLT_INT);
  OCIBND(octx->curo0, octx->byln_bp , errhp,":byln",ADR(ordP->bylastname),
       SIZ(int),SQLT_INT);
  OCIBND(octx->curo0, octx->c_last_bp , errhp,":c_last",ordP->c_last,
       SIZ(ordP->c_last),SQLT_STR);
  OCIBND(octx->curo0, octx->c_first_bp , errhp,":c_first",ordP->c_first,
       SIZ(ordP->c_first),SQLT_STR);
  OCIBND(octx->curo0, octx->c_middle_bp , errhp,":c_middle",ordP->c_middle,
       SIZ(ordP->c_middle),SQLT_STR);
  OCIBND(octx->curo0, octx->c_balance_bp , errhp,":c_balance",
       ADR(ordP->c_balance),SIZ (float),SQLT_FLT);
  OCIBND(octx->curo0, octx->c_id_bp , errhp,":o_id",ADR(ordP->o_id),
       SIZ(int),SQLT_INT);
  OCIBND(octx->curo0, octx->o_entry_d_bp , errhp,":o_entry_d",ordP->o_entry_d,
       SIZ(ordP->o_entry_d),SQLT_STR);
  OCIBND(octx->curo0, octx->o_cr_id_bp , errhp,":o_cr_id",ADR(ordP->o_carrier_id),
       SIZ(int), SQLT_INT);
  OCIBND(octx->curo0, octx->o_ol_cnt_bp , errhp,":o_ol_cnt",ADR(ordP->o_ol_cnt),
       SIZ(int),SQLT_INT);

  OCIBNDRAA(octx->curo0, octx->ol_i_id_bp, errhp, ":ol_i_id",
        ordP->ol_i_id,SIZ(int),SQLT_INT,
        octx->ol_i_id_ind,octx->ol_i_id_len,
        octx->ol_i_id_rcode,NITEMS,&octx->ol_i_id_cnt);
  OCIBNDRAA(octx->curo0,octx->ol_supply_w_id_bp,errhp,":ol_s_w_id",
```

```
        ordP->ol_supply_w_id,SIZ(int),SQLT_INT,
        octx->ol_supply_w_id_ind,octx->ol_supply_w_id_len,
        octx->ol_supply_w_id_rcode,NITEMS,&octx->ol_sup_cnt);
 OCIBNDRAA(octx->curo0, octx->ol_quantity_bp,errhp,":ol_quantity",
        ordP->ol_quantity,SIZ(int),SQLT_INT,
        octx->ol_quantity_ind,octx->ol_quantity_len,
        octx->ol_quantity_rcode,NITEMS,&octx->ol_qty_cnt);
 OCIBNDRAA(octx->curo0,octx->ol_amount_bp,errhp,":ol_amount",ordP->ol_amount,
        SIZ(float),SQLT_FLT,octx->ol_amount_ind,
        octx->ol_amount_len, octx->ol_amount_rcode,NITEMS,
        &octx->ol_amt_cnt);
 OCIBNDRAA(octx->curo0,octx->ol_d_base_bp,errhp,":ol_d_d",ordP->ol_d_base,
        SIZ(OCIDate),SQLT_ODT,octx->ol_delivery_d_ind,
        octx->ol_delivery_d_len, octx->ol_delivery_d_rcode,NITEMS,
        &octx->ol_del_d_cnt);

#else

 /* c_id (customer id) is not known */
 OCIBND(octx->curo0,octx->w_id_bp0,errhp,":w_id",ADR(ordP->w_id),SIZ(int),SQLT_INT);
 OCIBND(octx->curo0,octx->d_id_bp0,errhp,":d_id",ADR(ordP->d_id),SIZ(int),SQLT_INT);
 OCIBND(octx->curo0,octx->c_last_bp,errhp,":c_last",ordP->c_last,SIZ(ordP->c_last),
       SQLT_STR);
 ctxp_octx->ctxp = cbctx;
 ctxp_octx->octx = octx;
 OCIDFNDYN(octx->curo0,octx->c_rowid_dp,errhp,1,octx->c_rowid_ptr,
        SIZ(OCIRowid*), SQLT_RDD, octx->c_rowid_ind, (dvoid *)ctxp_octx, rid_data);

 OCIBND(octx->curo1,octx->c_rowid_bp,errhp,":cust_rowid",
       &octx->c_rowid_ptr[octx->cust_idx],
       sizeof( octx->c_rowid_ptr[0]),SQLT_RDD);
 OCIDEF(octx->curo1,octx->c_id_dp,errhp,1,ADR(ordP->c_id),SIZ(int),SQLT_INT);
 OCIDEF(octx->curo1,octx->c_balance_dp1,errhp,2,ADR(ordP->c_balance),
        SIZ(double),SQLT_FLT);
 OCIDEF(octx->curo1,octx->c_first_dp1,errhp,3,ordP->c_first,SIZ(ordP->c_first)-1,
        SQLT_CHR);
 OCIDEF(octx->curo1,octx->c_middle_dp1,errhp,4,ordP->c_middle,
        SIZ(ordP->c_middle)-1,SQLT_AFC);
 OCIDEF(octx->curo1,octx->c_last_dp1,errhp,5,ordP->c_last,SIZ(ordP->c_last)-1,
        SQLT_CHR);
 OCIDEF(octx->curo1,octx->o_id_dp1,errhp,6,ADR(ordP->o_id),SIZ(int),SQLT_INT);
 OCIDEF(octx->curo1,octx->o_entry_d_dp1,errhp,7,
        &ordP->o_entry_d_base,SIZ(OCIDate),SQLT_ODT);
 OCIDEF(octx->curo1,octx->o_cr_id_dp1,errhp,8,ADR(ordP->o_carrier_id),
        SIZ(int),SQLT_INT);
 OCIDEF(octx->curo1,octx->o_ol_cnt_dp1,errhp,9,ADR(ordP->o_ol_cnt),
        SIZ(int),SQLT_INT);

/* Bind for third cursor , no-zero customer id */
 OCIBND(octx->curo2,octx->w_id_bp2,errhp,":w_id",ADR(ordP->w_id),SIZ(int),SQLT_INT);
 OCIBND(octx->curo2,octx->d_id_bp2,errhp,":d_id",ADR(ordP->d_id),SIZ(int),SQLT_INT);
 OCIBND(octx->curo2,octx->c_id_bp,errhp,":c_id",ADR(ordP->c_id),SIZ(int),SQLT_INT);
 OCIDEF(octx->curo2,octx->c_balance_dp2,errhp,1,ADR(ordP->c_balance),
        SIZ(double),SQLT_FLT);
 OCIDEF(octx->curo2,octx->c_first_dp2,errhp,2,ordP->c_first,SIZ(ordP->c_first)-1,
        SQLT_CHR);
 OCIDEF(octx->curo2,octx->c_middle_dp2,errhp,3,ordP->c_middle,
        SIZ(ordP->c_middle)-1,SQLT_AFC);
 OCIDEF(octx->curo2,octx->c_last_dp,errhp,4,ordP->c_last,SIZ(ordP->c_last)-1, SQLT_CHR);
 OCIDEF(octx->curo2,octx->o_id_dp2,errhp,5,ADR(ordP->o_id),SIZ(int),SQLT_INT);
 OCIDEF(octx->curo2,octx->o_entry_d_dp2,errhp,6, &ordP->o_entry_d_base,
       SIZ(OCIDate),SQLT_ODT);
 OCIDEF(octx->curo2, octx->o_cr_id_dp2,errhp,7,ADR(ordP->o_carrier_id),
        SIZ(int), SQLT_INT);
 OCIDEF(octx->curo2,octx->o_ol_cnt_dp2,errhp,8,ADR(ordP->o_ol_cnt),
        SIZ(int),SQLT_INT);

/* Bind for last cursor */

 OCIBND(octx->curo3,octx->w_id_bp3,errhp,":w_id",ADR(ordP->w_id),SIZ(int),SQLT_INT);
 OCIBND(octx->curo3,octx->d_id_bp3,errhp,":d_id",ADR(ordP->d_id),SIZ(int),SQLT_INT);
 OCIBND(octx->curo3,octx->o_id_bp,errhp,":o_id",ADR(ordP->o_id),SIZ(int),SQLT_INT);

 OCIDFNRA(octx->curo3, octx->ol_i_id_dp, errhp, 1, ordP->ol_i_id,SIZ(int),SQLT_INT,
                octx->ol_i_id_ind,octx->ol_i_id_len, octx->ol_i_id_rcode);
 OCIDFNRA(octx->curo3,octx->ol_supply_w_id_dp,errhp,2, ordP->ol_supply_w_id,
        SIZ(int),SQLT_INT, octx->ol_supply_w_id_ind,
        octx->ol_supply_w_id_len, octx->ol_supply_w_id_rcode);
 OCIDFNRA(octx->curo3, octx->ol_quantity_dp,errhp,3, ordP->ol_quantity,SIZ(int),
        SQLT_INT, octx->ol_quantity_ind,octx->ol_quantity_len,
                octx->ol_quantity_rcode);
 OCIDFNRA(octx->curo3,octx->ol_amount_dp,errhp,4,ordP->ol_amount, SIZ(int),
        SQLT_INT,octx->ol_amount_ind, octx->ol_amount_len,
        octx->ol_amount_rcode);
 OCIDFNRA(octx->curo3,octx->ol_d_base_dp,errhp,5,ordP->ol_d_base,SIZ(OCIDate),
        SQLT_ODT, octx->ol_delivery_d_ind,octx->ol_delivery_d_len,
                octx->ol_delivery_d_rcode);

 OCIBND(octx->curo4,octx->w_id_bp4,errhp,":w_id",ADR(ordP->w_id),SIZ(int),SQLT_INT);
 OCIBND(octx->curo4,octx->d_id_bp4,errhp,":d_id",ADR(ordP->d_id),SIZ(int),SQLT_INT);
 OCIBND(octx->curo4,octx->c_last_bp4,errhp,":c_last",ordP->c_last,SIZ(ordP->c_last),
       SQLT_STR);
 OCIDEF(octx->curo4,octx->c_count_dp,errhp,1,ADR(octx->rcount),SIZ(int),
        SQLT_INT);


#endif
 return (0);
}



tkvco (ora_cn_data_t *ora_SlotDataP)

{

  int i;
  int rcount;

  /*  */
  ordctx *octx = (ordctx *)ora_SlotDataP->octx;
  defctx *cbctx = (defctx *)ora_SlotDataP->cbctx;
  global_order_t *ordP = ora_SlotDataP->ordP;
  OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
  OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
  OCIError *errhp = ora_SlotDataP->errhp;
  OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
  OCISession *tpcusr = ora_SlotDataP->tpcusr;
  OCIStmt *curi = ora_SlotDataP->curi;

  for (i = 0; i < NITEMS; i++) {
    octx->ol_supply_w_id_ind[i] = TRUE;
    octx->ol_i_id_ind[i] = TRUE;
    octx->ol_quantity_ind[i] = TRUE;
    octx->ol_amount_ind[i] = TRUE;
    octx->ol_delivery_d_ind[i] = TRUE;
    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;
#ifdef PLSQLORD
  octx->ol_i_id_cnt = 0;
  octx->ol_sup_cnt = 0;
  octx->ol_qty_cnt = 0;
  octx->ol_amt_cnt = 0;
  octx->ol_del_d_cnt = 0;
  OCIERROR(errhp,
     OCIStmtExecute(tpcsvc,octx->curo0,errhp,1,0,0,0,OCI_DEFAULT));
#else
retry:
  if(ordP->bylastname)
  {
    cbctx->reexec = FALSE;
    ordP->execstatus=OCIStmtExecute(tpcsvc,octx->curo0,errhp,100,0,0,0,OCI_DEFAULT);
    /* will get OCI_NO_DATA if <100 found */
    if ((ordP->execstatus != OCI_NO_DATA) && (ordP->execstatus != OCI_SUCCESS))
    {
      ordP->errcode=OCIERROR(errhp, ordP->execstatus);
      if((ordP->errcode == NOT_SERIALIZABLE) || (ordP->errcode == RECOVERR))
      {
        OCITransCommit(tpcsvc,errhp,OCI_DEFAULT);
        ordP->retries++;
        goto retry;
      } else {
        return -1;
      }
    }
    if (ordP->execstatus == OCI_NO_DATA) /* there are no more rows */
    {
      /* get rowcount, find middle one */
      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+1)/2 ;
    }
    else
    {
      /* count the number of rows */
      ordP->execstatus=OCIStmtExecute(tpcsvc,octx->curo4,errhp,1,0,0,0,OCI_DEFAULT);
      if ((ordP->execstatus != OCI_NO_DATA) && (ordP->execstatus != OCI_SUCCESS))
      {
        if ((ordP->errcode == NOT_SERIALIZABLE) || (ordP->errcode == RECOVERR))
        {
          OCITransCommit(tpcsvc,errhp,OCI_DEFAULT);
          ordP->retries++;
          goto retry;
        } else {
          return -1;
        }
      }
      if (octx->rcount+1 < 2*10 )
        octx->cust_idx=(octx->rcount+1)/2 ;
      else          /* */
      {
        cbctx->reexec = TRUE;
        cbctx->count = (octx->rcount+1)/2 ;
        ordP->execstatus=OCIStmtExecute(tpcsvc,octx->curo0,errhp,cbctx->count,
```

```
                        0,0,0,OCI_DEFAULT);
      /* will get OCI_NO_DATA if <100 found */
      if (cbctx->count > 0)
      {
        userlog ("did not get all rows ");
        return (-1);
      }

      if ((ordP->execstatus != OCI_NO_DATA) && (ordP->execstatus != OCI_SUCCESS))
      {
        ordP->errcode=OCIERROR(errhp, ordP->execstatus);
        if((ordP->errcode == NOT_SERIALIZABLE) || (ordP->errcode == RECOVERR))
        {
          OCITransCommit(tpcsvc,errhp,OCI_DEFAULT);
          ordP->retries++;
          goto retry;
        } else {
        return -1;
        }
      }
      octx->cust_idx=0 ;
    }
  }

  ordP->execstatus=OCIStmtExecute(tpcsvc,octx->curo1,errhp,1,0,0,0,OCI_DEFAULT);
  if (ordP->execstatus |= OCI_SUCCESS)
  {
    ordP->errcode=OCIERROR(errhp,ordP->execstatus);
    OCITransCommit(tpcsvc,errhp,OCI_DEFAULT);
    if((ordP->errcode == NOT_SERIALIZABLE) || (ordP->errcode == RECOVERR))
    {
      ordP->retries++;
      goto retry;
      } else {
      return -1;
    }
  }
 }
 else
 {
  ordP->execstatus=OCIStmtExecute(tpcsvc,octx->curo2,errhp,1,0,0,0,OCI_DEFAULT);
  if (ordP->execstatus |= OCI_SUCCESS)
  {
    ordP->errcode=OCIERROR(errhp,ordP->execstatus);
    OCITransCommit(tpcsvc,errhp,OCI_DEFAULT);
    if((ordP->errcode == NOT_SERIALIZABLE) || (ordP->errcode == RECOVERR))
    {
      ordP->retries++;
      goto retry;
    }
    else
    {
      return -1;
    }
  }
 }
 octx->ol_w_id_ind = TRUE;
 octx->ol_d_id_ind = TRUE;
 octx->ol_o_id_ind = TRUE;
 octx->ol_w_id_len = sizeof(int);
 octx->ol_d_id_len = sizeof(int);
 octx->ol_o_id_len = sizeof(int);

 ordP->execstatus = OCIStmtExecute(tpcsvc,octx->curo3,errhp,ordP->o_ol_cnt,0,0,0,
              OCI_DEFAULT | OCI_COMMIT_ON_SUCCESS);
 if (ordP->execstatus |= OCI_SUCCESS )
 {
  ordP->errcode=OCIERROR(errhp,ordP->execstatus);
  OCITransCommit(tpcsvc,errhp,OCI_DEFAULT);
  if((ordP->errcode == NOT_SERIALIZABLE) || (ordP->errcode == RECOVERR))
  {
    ordP->retries++;
    goto retry;
  }
  else
  {
    return -1;
  }

 }
#endif
 /* clean up and convert the delivery dates */
 for (i = 0; i < ordP->o_ol_cnt; i++)
 {
  if (octx->ol_delivery_d_ind[i] == -1) /* null date in field */
              strncpy((char*)ordP->ol_delivery_d[i],"01-01-1811",10);
  else
  {
    ordP->ol_del_len[i]=sizeof(ordP->ol_delivery_d[i]);
    OCIERROR(errhp,OCIDateToText(errhp,&ordP->ol_d_base[i],

(text*)SHORTDATE,strlen(SHORTDATE),(text*)0,0,&ordP->ol_del_len[i],ordP->ol_delivery_d[i]));
    }
/*
              cvtdmy(ol_d_base[i],ol_delivery_d[i]);
*/
  }

 return (0);
}



void tkvcodone (ora_cn_data_t *ora_SlotDataP)

{
 /*  TODO:  Should we free the cursor handles??  */

  if (ora_SlotDataP->octx) {
    free (ora_SlotDataP->octx);
    ora_SlotDataP->octx = NULL;
  }
  if (ora_SlotDataP->ordP) {
    free(ora_SlotDataP->ordP);
    ora_SlotDataP->ordP = NULL;
  }
}
```

## plpay.c

```
#ifdef RCSID
static char *RCSid =
   "$Header: /afs/transarc.com/project/encina/rcs/test/src/benchmarks/tpcc/server/ora8.1_mt/RCS/plpay.c,v
1.3 1999/05/26 16:29:58 wenjian Exp $ Copyr (c) 1994 Oracle";
#endif /* RCSID */

/*================================================================+
 |      Copyright (c) 1995  Oracle Corp, Redwood Shores, CA       |
 |                OPEN SYSTEMS PERFORMANCE GROUP                  |
 |                    All Rights Reserved                         |
 +================================================================+
 | FILENAME
 |    plpay.c
 | DESCRIPTION
 |    OCI version (using PL/SQL stored procedure) of
 |    PAYMENT transaction in TPC-C benchmark.
 +================================================================*/

#include <oci.h>
#include "tpcc.h"
#include "plora.h"   /*  */
#include "tpccflags.h"

#define SQLTXT_INIT "BEGIN initpay.pay_init; END;"
#define SQLTXT_STP  "begin payment.dopayment(:w_id,:d_id,:c_w_id,:c_d_id,     \
                :c_id,:by_lname,:h_amount,:c_last,:w_street_1,:w_street_2,\
                :w_city,:w_state,:w_zip,:d_street_1,:d_street_2,:d_city,  \
                :d_state,:d_zip,:c_first,:c_middle,: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,   \
                :cr_date,:retry); end;"


struct payctx {
  OCIStmt *curpi;
  OCIStmt *curp0;
  OCIStmt *curp1;
  OCIBind *w_id_bp;
  OCIBind *w_id_bp1;
  sb2 w_id_ind;
  ub2 w_id_len;
  ub2 w_id_rc;

  OCIBind *d_id_bp;
  OCIBind *d_id_bp1;
  sb2 d_id_ind;
  ub2 d_id_len;
  ub2 d_id_rc;

  OCIBind *c_w_id_bp;
  OCIBind *c_w_id_bp1;
  sb2 c_w_id_ind;
  ub2 c_w_id_len;
  ub2 c_w_id_rc;

  OCIBind *c_d_id_bp;
  OCIBind *c_d_id_bp1;
  sb2 c_d_id_ind;
  ub2 c_d_id_len;
  ub2 c_d_id_rc;

  OCIBind *c_id_bp;
  OCIBind *c_id_bp1;
  sb2 c_id_ind;
  ub2 c_id_len;
  ub2 c_id_rc;

  OCIBind *by_lname_bp;

  OCIBind *h_amount_bp;
  OCIBind *h_amount_bp1;
  sb2 h_amount_ind;
  ub2 h_amount_len;
  ub2 h_amount_rc;

  OCIBind *c_last_bp;
```

```
OCIBind *c_last_bp1;
sb2 c_last_ind;
ub2 c_last_len;
ub2 c_last_rc;

OCIBind *w_street_1_bp;
OCIBind *w_street_1_bp1;
sb2 w_street_1_ind;
ub2 w_street_1_len;
ub2 w_street_1_rc;

OCIBind *w_street_2_bp;
OCIBind *w_street_2_bp1;
sb2 w_street_2_ind;
ub2 w_street_2_len;
ub2 w_street_2_rc;

OCIBind *w_city_bp;
OCIBind *w_city_bp1;
sb2 w_city_ind;
ub2 w_city_len;
ub2 w_city_rc;

OCIBind *w_state_bp;
OCIBind *w_state_bp1;
sb2 w_state_ind;
ub2 w_state_len;
ub2 w_state_rc;

OCIBind *w_zip_bp;
OCIBind *w_zip_bp1;
sb2 w_zip_ind;
ub2 w_zip_len;
ub2 w_zip_rc;

OCIBind *d_street_1_bp;
OCIBind *d_street_1_bp1;
sb2 d_street_1_ind;
ub2 d_street_1_len;
ub2 d_street_1_rc;

OCIBind *d_street_2_bp;
OCIBind *d_street_2_bp1;
sb2 d_street_2_ind;
ub2 d_street_2_len;
ub2 d_street_2_rc;

OCIBind *d_city_bp;
OCIBind *d_city_bp1;
sb2 d_city_ind;
ub2 d_city_len;
ub2 d_city_rc;

OCIBind *d_state_bp;
OCIBind *d_state_bp1;
sb2 d_state_ind;
ub2 d_state_len;
ub2 d_state_rc;

OCIBind *d_zip_bp;
OCIBind *d_zip_bp1;
sb2 d_zip_ind;
ub2 d_zip_len;
ub2 d_zip_rc;

OCIBind *c_first_bp;
OCIBind *c_first_bp1;
sb2 c_first_ind;
ub2 c_first_len;
ub2 c_first_rc;

OCIBind *c_middle_bp;
OCIBind *c_middle_bp1;
sb2 c_middle_ind;
ub2 c_middle_len;
ub2 c_middle_rc;

OCIBind *c_street_1_bp;
OCIBind *c_street_1_bp1;
sb2 c_street_1_ind;
ub2 c_street_1_len;
ub2 c_street_1_rc;

OCIBind *c_street_2_bp;
OCIBind *c_street_2_bp1;
sb2 c_street_2_ind;
ub2 c_street_2_len;
ub2 c_street_2_rc;

OCIBind *c_city_bp;
OCIBind *c_city_bp1;
sb2 c_city_ind;
ub2 c_city_len;
ub2 c_city_rc;

OCIBind *c_state_bp;
OCIBind *c_state_bp1;
sb2 c_state_ind;
ub2 c_state_len;
ub2 c_state_rc;

OCIBind *c_zip_bp;
OCIBind *c_zip_bp1;
sb2 c_zip_ind;
ub2 c_zip_len;
ub2 c_zip_rc;

OCIBind *c_phone_bp;
OCIBind *c_phone_bp1;
sb2 c_phone_ind;
ub2 c_phone_len;
ub2 c_phone_rc;

OCIBind *c_since_bp;
OCIBind *c_since_bp1;
sb2 c_since_ind;
ub2 c_since_len;
ub2 c_since_rc;

OCIBind *c_credit_bp;
OCIBind *c_credit_bp1;
sb2 c_credit_ind;
ub2 c_credit_len;
ub2 c_credit_rc;

OCIBind *c_credit_lim_bp;
OCIBind *c_credit_lim_bp1;
sb2 c_credit_lim_ind;
ub2 c_credit_lim_len;
ub2 c_credit_lim_rc;

OCIBind *c_discount_bp;
OCIBind *c_discount_bp1;
sb2 c_discount_ind;
ub2 c_discount_len;
ub2 c_discount_rc;

OCIBind *c_balance_bp;
OCIBind *c_balance_bp1;
sb2 c_balance_ind;
ub2 c_balance_len;
ub2 c_balance_rc;

OCIBind *c_data_bp;
OCIBind *c_data_bp1;
sb2 c_data_ind;
ub2 c_data_len;
ub2 c_data_rc;

OCIBind *h_date_bp;
OCIBind *h_date_bp1;
sb2 h_date_ind;
ub2 h_date_len;
ub2 h_date_rc;

OCIBind *retries_bp;
OCIBind *retries_bp1;
sb2 retries_ind;
ub2 retries_len;
ub2 retries_rc;

OCIBind *cr_date_bp;
OCIBind *cr_date_bp1;
sb2 cr_date_ind;
ub2 cr_date_len;
ub2 cr_date_rc;

OCIBind *byln_bp;
sb2 byln_ind;
ub2 byln_len;
ub2 byln_rc;
};

typedef struct payctx payctx;



/* payctx *pctx; */

tkvcpinit (ora_cn_data_t *ora_SlotDataP)

{
  /*  */
  char *ora_home = getenv("ORACLE_HOME");
  char sql_file_name[256];
  payctx *pctx;
  global_payment_t *payP;
  OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
  OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
  OCIError *errhp = ora_SlotDataP->errhp;
  OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
  OCISession *tpcusr = ora_SlotDataP->tpcusr;
  OCIStmt *curi = ora_SlotDataP->curi;

  text stmbuf[SQL_BUF_SIZE];

  if (!ora_home) {
```

```
    err_printf("Cannot find env variable ORACLE_HOME\n");
    exit(13);
  }

  pctx = (payctx *)malloc(sizeof(payctx));
  memset(pctx,(char)0,sizeof(payctx));
  ora_SlotDataP->pctx = (void *)pctx;

  ora_SlotDataP->payP = (global_payment_t *)malloc(sizeof(global_payment_t));
  memset(ora_SlotDataP->payP,(char)0,sizeof(global_payment_t));
  payP = ora_SlotDataP->payP;

/* cursor for init */
  OCIERROR(errhp,OCIHandleAlloc(tpcenv, (dvoid **)(&(pctx->curpi)),
          OCI_HTYPE_STMT,0,(dvoid**)0));

  OCIERROR(errhp,OCIHandleAlloc(tpcenv, (dvoid **)(&(pctx->curp0)),
          OCI_HTYPE_STMT,0,(dvoid**)0));
  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);
  OCIERROR(errhp,OCIStmtPrepare(pctx->curpi, errhp, stmbuf,
          strlen((char *)stmbuf), OCI_NTV_SYNTAX, OCI_DEFAULT));
  OCIERROR(errhp,
    OCIStmtExecute(tpcsvc,pctx->curpi,errhp,1,0,0,0,OCI_DEFAULT));
#ifdef PLSQLPAY
  /*   prepare the stub for calling plsql stored procedure */
  sprintf ((char*)stmbuf, SQLTXT_STP);
  OCIERROR(errhp,OCIStmtPrepare(pctx->curp0, errhp, stmbuf,
          strlen((char *)stmbuf), OCI_NTV_SYNTAX, OCI_DEFAULT));
#else

  /* customer id !=  0, go by last name */

  sqlfile("paynz.sql",stmbuf);
  OCIERROR(errhp,OCIStmtPrepare(pctx->curp0, errhp, stmbuf,
          strlen((char *)stmbuf), OCI_NTV_SYNTAX, OCI_DEFAULT));

  /* customer id ==  0, go by last name */

  sqlfile("payz.sql",stmbuf); /* sqlfile opens $O/bench/.../blocks/... */
  OCIERROR(errhp,OCIStmtPrepare(pctx->curp1, errhp, stmbuf,
          strlen((char *)stmbuf), OCI_NTV_SYNTAX, OCI_DEFAULT));

#endif
  pctx->w_id_ind = TRUE;
  pctx->w_id_len = SIZ(payP->w_id);
  pctx->d_id_ind = TRUE;
  pctx->d_id_len = SIZ(payP->d_id);
  pctx->c_w_id_ind = TRUE;
  pctx->c_w_id_len = SIZ(payP->c_w_id);
  pctx->c_d_id_ind = TRUE;
  pctx->c_d_id_len = SIZ(payP->c_d_id);
  pctx->c_id_ind = TRUE;
  pctx->c_id_len = 0;
  pctx->h_amount_len = SIZ(payP->h_amount);
  pctx->h_amount_ind = TRUE;
  pctx->c_last_ind = TRUE;
  pctx->c_last_len = 0;
  pctx->w_street_1_ind = TRUE;
  pctx->w_street_1_len = 0;
  pctx->w_street_2_ind = TRUE;
  pctx->w_street_2_len = 0;
  pctx->w_city_ind = TRUE;
  pctx->w_city_len = 0;
  pctx->w_state_ind = TRUE;
  pctx->w_state_len = 0;
  pctx->w_zip_ind = TRUE;
  pctx->w_zip_len = 0;
  pctx->d_street_1_ind = TRUE;
  pctx->d_street_1_len = 0;
  pctx->d_street_2_ind = TRUE;
  pctx->d_street_2_len = 0;
  pctx->d_city_ind = TRUE;
  pctx->d_city_len = 0;
  pctx->d_state_ind = TRUE;
  pctx->d_state_len = 0;
  pctx->d_zip_ind = TRUE;
  pctx->d_zip_len = 0;
  pctx->c_first_ind = TRUE;
  pctx->c_first_len = 0;
  pctx->c_middle_ind = TRUE;
  pctx->c_middle_len = 0;
  pctx->c_street_1_ind = TRUE;
  pctx->c_street_1_len = 0;
  pctx->c_street_2_ind = TRUE;
  pctx->c_street_2_len = 0;
  pctx->c_city_ind = TRUE;
  pctx->c_city_len = 0;
  pctx->c_state_ind = TRUE;
  pctx->c_state_len = 0;
  pctx->c_zip_ind = TRUE;
  pctx->c_zip_len = 0;
  pctx->c_phone_ind = TRUE;
  pctx->c_phone_len = 0;
  pctx->c_since_ind = TRUE;
  pctx->c_since_len = 0;
  pctx->c_credit_ind = TRUE;
  pctx->c_credit_len = 0;
  pctx->c_credit_lim_ind = TRUE;
  pctx->c_credit_lim_len = 0;
  pctx->c_discount_ind = TRUE;
  pctx->c_discount_len = 0;
  pctx->c_balance_ind = TRUE;
  pctx->c_balance_len = sizeof(double);
  pctx->c_data_ind = TRUE;
  pctx->c_data_len = 0;
  pctx->h_date_ind = TRUE;
  pctx->h_date_len = 0;
  pctx->retries_ind = TRUE;
  pctx->retries_len = 0;
  pctx->cr_date_ind = TRUE;
  pctx->cr_date_len = 7;



  /* bind variables */


  OCIBNDR(pctx->curp0, pctx->w_id_bp, errhp,":w_id",ADR(payP->w_id),SIZ(int),
          SQLT_INT, &pctx->w_id_ind, NULL, NULL);
  OCIBNDR(pctx->curp0, pctx->d_id_bp, errhp,":d_id",ADR(payP->d_id),SIZ(int),
          SQLT_INT, &pctx->d_id_ind, NULL, NULL);
  OCIBND(pctx->curp0, pctx->c_w_id_bp, errhp,":c_w_id",ADR(payP->c_w_id),SIZ(int),
          SQLT_INT);
  OCIBND(pctx->curp0, pctx->c_d_id_bp, errhp,":c_d_id",ADR(payP->c_d_id),SIZ(int),
          SQLT_INT);
  OCIBND(pctx->curp0, pctx->c_id_bp, errhp,":c_id",ADR(payP->c_id),SIZ(int),
          SQLT_INT);
#ifdef PLSQLPAY
  OCIBND(pctx->curp0, pctx->by_lname_bp, errhp,":by_lname",ADR(payP->bylastname),
         SIZ(int), SQLT_INT);
#endif
  OCIBNDR(pctx->curp0, pctx->h_amount_bp, errhp,":h_amount",ADR(payP->h_amount),
          SIZ(int),SQLT_INT, &pctx->h_amount_ind, &pctx->h_amount_len,
          &pctx->h_amount_rc);
  OCIBNDR(pctx->curp0, pctx->c_last_bp, errhp,":c_last",payP->c_last,SIZ(payP->c_last),
          SQLT_STR, &pctx->c_last_ind, &pctx->c_last_len, &pctx->c_last_rc);
  OCIBNDR(pctx->curp0, pctx->w_street_1_bp, errhp,":w_street_1",payP->w_street_1,
          SIZ(payP->w_street_1),SQLT_STR, &pctx->w_street_1_ind,
          &pctx->w_street_1_len, &pctx->w_street_1_rc);
  OCIBNDR(pctx->curp0, pctx->w_street_2_bp, errhp,":w_street_2",payP->w_street_2,
          SIZ(payP->w_street_2),SQLT_STR, &pctx->w_street_2_ind,
          &pctx->w_street_2_len, &pctx->w_street_2_rc);
  OCIBNDR(pctx->curp0, pctx->w_city_bp, errhp,":w_city",payP->w_city,SIZ(payP->w_city),
          SQLT_STR, &pctx->w_city_ind, &pctx->w_city_len, &pctx->w_city_rc);
  OCIBNDR(pctx->curp0, pctx->w_state_bp, errhp,":w_state",payP->w_state,SIZ(payP->w_state),
          SQLT_STR, &pctx->w_state_ind, &pctx->w_state_len, &pctx->w_state_rc);
  OCIBNDR(pctx->curp0, pctx->w_zip_bp, errhp,":w_zip",payP->w_zip,SIZ(payP->w_zip),
          SQLT_STR, &pctx->w_zip_ind, &pctx->w_zip_len, &pctx->w_zip_rc);
  OCIBNDR(pctx->curp0, pctx->d_street_1_bp, errhp,":d_street_1",payP->d_street_1,
          SIZ(payP->d_street_1),SQLT_STR, &pctx->d_street_1_ind,
          &pctx->d_street_1_len, &pctx->d_street_1_rc);
  OCIBNDR(pctx->curp0, pctx->d_street_2_bp, errhp,":d_street_2",payP->d_street_2,
          SIZ(payP->d_street_2),SQLT_STR, &pctx->d_street_2_ind,
          &pctx->d_street_2_len, &pctx->d_street_2_rc);
  OCIBNDR(pctx->curp0, pctx->d_city_bp, errhp,":d_city",payP->d_city,SIZ(payP->d_city),
          SQLT_STR, &pctx->d_city_ind, &pctx->d_city_len, &pctx->d_city_rc);
  OCIBNDR(pctx->curp0, pctx->d_state_bp, errhp,":d_state",payP->d_state,SIZ(payP->d_state),
          SQLT_STR, &pctx->d_state_ind, &pctx->d_state_len, &pctx->d_state_rc);
  OCIBNDR(pctx->curp0, pctx->d_zip_bp, errhp,":d_zip",payP->d_zip,SIZ(payP->d_zip),
          SQLT_STR, &pctx->d_zip_ind, &pctx->d_zip_len, &pctx->d_zip_rc);
  OCIBNDR(pctx->curp0, pctx->c_first_bp, errhp,":c_first",payP->c_first,SIZ(payP->c_first),
          SQLT_STR, &pctx->c_first_ind, &pctx->c_first_len, &pctx->c_first_rc);
  OCIBNDR(pctx->curp0, pctx->c_middle_bp, errhp,":c_middle",payP->c_middle,2,
          SQLT_AFC, &pctx->c_middle_ind, &pctx->c_middle_len,
          &pctx->c_middle_rc);
  OCIBNDR(pctx->curp0, pctx->c_street_1_bp, errhp,":c_street_1",payP->c_street_1,
          SIZ(payP->c_street_1),SQLT_STR, &pctx->c_street_1_ind,
          &pctx->c_street_1_len, &pctx->c_street_1_rc);
  OCIBNDR(pctx->curp0, pctx->c_street_2_bp, errhp,":c_street_2",payP->c_street_2,
          SIZ(payP->c_street_2),SQLT_STR, &pctx->c_street_2_ind,
          &pctx->c_street_2_len, &pctx->c_street_2_rc);
  OCIBNDR(pctx->curp0, pctx->c_city_bp, errhp,":c_city",payP->c_city,SIZ(payP->c_city),
          SQLT_STR, &pctx->c_city_ind, &pctx->c_city_len, &pctx->c_city_rc);
  OCIBNDR(pctx->curp0, pctx->c_state_bp, errhp,":c_state",payP->c_state,SIZ(payP->c_state),
          SQLT_STR, &pctx->c_state_ind, &pctx->c_state_len, &pctx->c_state_rc);
  OCIBNDR(pctx->curp0, pctx->c_zip_bp, errhp,":c_zip",payP->c_zip,SIZ(payP->c_zip),
          SQLT_STR, &pctx->c_zip_ind, &pctx->c_zip_len, &pctx->c_zip_rc);
  OCIBNDR(pctx->curp0, pctx->c_phone_bp, errhp,":c_phone",payP->c_phone,SIZ(payP->c_phone),
 SQLT_STR, &pctx->c_phone_ind, &pctx->c_phone_len, &pctx->c_phone_rc);
  OCIBNDR(pctx->curp0, pctx->c_since_bp, errhp,":c_since",&payP->c_since,
          SIZ(OCIDate), SQLT_ODT, &pctx->c_since_ind, &pctx->c_since_len,
          &pctx->c_since_rc);
  OCIBNDR(pctx->curp0, pctx->c_credit_bp, errhp,":c_credit",payP->c_credit,
          SIZ(payP->c_credit),SQLT_CHR, &pctx->c_credit_ind, &pctx->c_credit_len,
          &pctx->c_credit_rc);
  OCIBNDR(pctx->curp0, pctx->c_credit_lim_bp, errhp,":c_credit_lim",
          ADR(payP->c_credit_lim),SIZ(int), SQLT_INT, &pctx->c_credit_lim_ind,
          &pctx->c_credit_lim_len, &pctx->c_credit_lim_rc);
  OCIBNDR(pctx->curp0, pctx->c_discount_bp, errhp,":c_discount",
          ADR(payP->c_discount),SIZ(float), SQLT_FLT, &pctx->c_discount_ind,
          &pctx->c_discount_len, &pctx->c_discount_rc);
  OCIBNDR(pctx->curp0, pctx->c_balance_bp, errhp,":c_balance",ADR(payP->c_balance),
          SIZ(double),SQLT_FLT, &pctx->c_balance_ind, &pctx->c_balance_len,
```

```
        &pctx->c_balance_rc);
  OCIBNDR(pctx->curp0, pctx->c_data_bp, errhp,":c_data",payP->c_data,SIZ(payP->c_data),
        SQLT_STR, &pctx->c_data_ind, &pctx->c_data_len, &pctx->c_data_rc);
/*
  OCIBNDR(pctx->curp0, pctx->h_date_bp, errhp,":h_date",payP->h_date,SIZ(payP->h_date),
        SQLT_STR, &pctx->h_date_ind, &pctx->h_date_len, &pctx->h_date_rc);
*/
  OCIBNDR(pctx->curp0, pctx->retries_bp, errhp,":retry",ADR(payP->retries),SIZ(int),
        SQLT_INT, &pctx->retries_ind, &pctx->retries_len, &pctx->retries_rc);
  OCIBNDR(pctx->curp0, pctx->cr_date_bp, errhp,":cr_date",ADR(payP->cr_date),
        SIZ(OCIDate),SQLT_ODT, &pctx->cr_date_ind, &pctx->cr_date_len,
        &pctx->cr_date_rc);
#ifndef PLSQLPAY

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



  OCIBNDR(pctx->curp1, pctx->w_id_bp1, errhp,":w_id",ADR(payP->w_id),SIZ(int),
        SQLT_INT, &pctx->w_id_ind, &pctx->w_id_len, &pctx->w_id_rc);
  OCIBNDR(pctx->curp1, pctx->d_id_bp1, errhp,":d_id",ADR(payP->d_id),SIZ(int),
        SQLT_INT, &pctx->d_id_ind, &pctx->d_id_len, &pctx->d_id_rc);
  OCIBND(pctx->curp1, pctx->c_w_id_bp1, errhp,":c_w_id",ADR(payP->c_w_id),SIZ(int),
        SQLT_INT);
  OCIBND(pctx->curp1, pctx->c_d_id_bp1, errhp,":c_d_id",ADR(payP->c_d_id),SIZ(int),
        SQLT_INT);
  OCIBNDR(pctx->curp1, pctx->c_id_bp1, errhp,":c_id",ADR(payP->c_id),SIZ(int),
        SQLT_INT, &pctx->c_id_ind, &pctx->c_id_len, &pctx->c_id_rc);
  OCIBNDR(pctx->curp1, pctx->h_amount_bp1, errhp,":h_amount",ADR(payP->h_amount),
        SIZ(int),SQLT_INT, &pctx->h_amount_ind, &pctx->h_amount_len,
        &pctx->h_amount_rc);
  OCIBND(pctx->curp1, pctx->c_last_bp1, errhp,":c_last",payP->c_last,SIZ(payP->c_last),
        SQLT_STR);
  OCIBNDR(pctx->curp1, pctx->w_street_1_bp1, errhp,":w_street_1",payP->w_street_1,
        SIZ(payP->w_street_1),SQLT_STR, &pctx->w_street_1_ind,
        &pctx->w_street_1_len, &pctx->w_street_1_rc);
  OCIBNDR(pctx->curp1, pctx->w_street_2_bp1, errhp,":w_street_2",payP->w_street_2,
        SIZ(payP->w_street_2),SQLT_STR, &pctx->w_street_2_ind,
        &pctx->w_street_2_len, &pctx->w_street_2_rc);
  OCIBNDR(pctx->curp1, pctx->w_city_bp1, errhp,":w_city",payP->w_city,SIZ(payP->w_city),
        SQLT_STR, &pctx->w_city_ind, &pctx->w_city_len, &pctx->w_city_rc);
  OCIBNDR(pctx->curp1, pctx->w_state_bp1, errhp,":w_state",payP->w_state,SIZ(payP->w_state),
        SQLT_STR, &pctx->w_state_ind, &pctx->w_state_len, &pctx->w_state_rc);
  OCIBNDR(pctx->curp1, pctx->w_zip_bp1, errhp,":w_zip",payP->w_zip,SIZ(payP->w_zip),
        SQLT_STR, &pctx->w_zip_ind, &pctx->w_zip_len, &pctx->w_zip_rc);
  OCIBNDR(pctx->curp1, pctx->d_street_1_bp1, errhp,":d_street_1",payP->d_street_1,
        SIZ(payP->d_street_1),SQLT_STR, &pctx->d_street_1_ind,
        &pctx->d_street_1_len, &pctx->d_street_1_rc);
  OCIBNDR(pctx->curp1, pctx->d_street_2_bp1, errhp,":d_street_2",payP->d_street_2,
        SIZ(payP->d_street_2),SQLT_STR, &pctx->d_street_2_ind,
        &pctx->d_street_2_len, &pctx->d_street_2_rc);
  OCIBNDR(pctx->curp1, pctx->d_city_bp1, errhp,":d_city",payP->d_city,SIZ(payP->d_city),
        SQLT_STR, &pctx->d_city_ind, &pctx->d_city_len, &pctx->d_city_rc);
  OCIBNDR(pctx->curp1, pctx->d_state_bp1, errhp,":d_state",payP->d_state,
        SIZ(payP->d_state), SQLT_STR, &pctx->d_state_ind, &pctx->d_state_len,
        &pctx->d_state_rc);
  OCIBNDR(pctx->curp1, pctx->d_zip_bp1, errhp,":d_zip",payP->d_zip,SIZ(payP->d_zip),
        SQLT_STR, &pctx->d_zip_ind, &pctx->d_zip_len, &pctx->d_zip_rc);
  OCIBNDR(pctx->curp1, pctx->c_first_bp1, errhp,":c_first",payP->c_first,
        SIZ(payP->c_first), SQLT_STR, &pctx->c_first_ind, &pctx->c_first_len,
        &pctx->c_first_rc);
  OCIBNDR(pctx->curp1, pctx->c_middle_bp1, errhp,":c_middle",payP->c_middle,2,
        SQLT_AFC, &pctx->c_middle_ind, &pctx->c_middle_len,
        &pctx->c_middle_rc);

  OCIBNDR(pctx->curp1, pctx->c_street_1_bp1, errhp,":c_street_1",payP->c_street_1,
        SIZ(payP->c_street_1),SQLT_STR, &pctx->c_street_1_ind,
        &pctx->c_street_1_len, &pctx->c_street_1_rc);
  OCIBNDR(pctx->curp1, pctx->c_street_2_bp1, errhp,":c_street_2",payP->c_street_2,
        SIZ(payP->c_street_2),SQLT_STR, &pctx->c_street_2_ind,
        &pctx->c_street_2_len, &pctx->c_street_2_rc);
  OCIBNDR(pctx->curp1, pctx->c_city_bp1, errhp,":c_city",payP->c_city,SIZ(payP->c_city),SQLT_STR,
                &pctx->c_city_ind, &pctx->c_city_len, &pctx->c_city_rc);
  OCIBNDR(pctx->curp1, pctx->c_state_bp1, errhp,":c_state",payP->c_state,SIZ(payP->c_state),
SQLT_STR, &pctx->c_state_ind, &pctx->c_state_len, &pctx->c_state_rc);
  OCIBNDR(pctx->curp1, pctx->c_zip_bp1, errhp,":c_zip",payP->c_zip,SIZ(payP->c_zip),
        SQLT_STR, &pctx->c_zip_ind, &pctx->c_zip_len, &pctx->c_zip_rc);
  OCIBNDR(pctx->curp1, pctx->c_phone_bp1, errhp,":c_phone",payP->c_phone,SIZ(payP->c_phone),
        SQLT_STR, &pctx->c_phone_ind, &pctx->c_phone_len, &pctx->c_phone_rc);
  OCIBNDR(pctx->curp1, pctx->c_since_bp1, errhp,":c_since",&payP->c_since,
        SIZ(OCIDate), SQLT_ODT, &pctx->c_since_ind, &pctx->c_since_len,
        &pctx->c_since_rc);
  OCIBNDR(pctx->curp1, pctx->c_credit_bp1, errhp,":c_credit",payP->c_credit,
        SIZ(payP->c_credit),SQLT_CHR, &pctx->c_credit_ind, &pctx->c_credit_len,
        &pctx->c_credit_rc);
  OCIBNDR(pctx->curp1, pctx->c_credit_lim_bp1, errhp,":c_credit_lim",
        ADR(payP->c_credit_lim),SIZ(int), SQLT_INT, &pctx->c_credit_lim_ind,
        &pctx->c_credit_lim_len, &pctx->c_credit_lim_rc);
  OCIBNDR(pctx->curp1, pctx->c_discount_bp1, errhp,":c_discount",
        ADR(payP->c_discount),SIZ(int), SQLT_FLT, &pctx->c_discount_ind,
        &pctx->c_discount_len, &pctx->c_discount_rc);
  OCIBNDR(pctx->curp1, pctx->c_balance_bp1, errhp,":c_balance",ADR(payP->c_balance),
        SIZ(double),SQLT_FLT, &pctx->c_balance_ind, &pctx->c_balance_len,
        &pctx->c_balance_rc);
  OCIBNDR(pctx->curp1, pctx->c_data_bp1, errhp,":c_data",payP->c_data,SIZ(payP->c_data),
        SQLT_STR, &pctx->c_data_ind, &pctx->c_data_len, &pctx->c_data_rc);
/*
  OCIBNDR(pctx->curp1, pctx->h_date_bp1, errhp,":h_date",payP->h_date,SIZ(payP->h_date),
        SQLT_STR, &pctx->h_date_ind, &pctx->h_date_len, &pctx->h_date_rc);
*/
  OCIBNDR(pctx->curp1, pctx->retries_bp1, errhp,":retry",ADR(payP->retries),SIZ(int),
        SQLT_INT, &pctx->retries_ind, &pctx->retries_len, &pctx->retries_rc);
  OCIBNDR(pctx->curp1, pctx->cr_date_bp1, errhp,":cr_date",ADR(payP->cr_date),
        SIZ(OCIDate),SQLT_ODT, &pctx->cr_date_ind, &pctx->cr_date_len,
        &pctx->cr_date_rc);
#endif

  return (0);

}



tkvcp (ora_cn_data_t *ora_SlotDataP)

{
  /*  */
  payctx *pctx = ora_SlotDataP->pctx;
  global_payment_t *payP = ora_SlotDataP->payP;
  OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
  OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
  OCIError *errhp = ora_SlotDataP->errhp;
  OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
  OCISession *tpcusr = ora_SlotDataP->tpcusr;
  OCIStmt *curi = ora_SlotDataP->curi;

retry:

  pctx->w_id_ind = TRUE;
  pctx->w_id_len = SIZ(payP->w_id);
  pctx->d_id_ind = TRUE;
  pctx->d_id_len = SIZ(payP->d_id);
  pctx->c_w_id_ind = TRUE;
  pctx->c_w_id_len = 0;
  pctx->c_d_id_ind = TRUE;
  pctx->c_d_id_len = 0;
  pctx->c_id_ind = TRUE;
  pctx->c_id_len = 0;
  pctx->h_amount_len = SIZ(payP->h_amount);
  pctx->h_amount_ind = TRUE;
  pctx->c_last_ind = TRUE;
  pctx->c_last_len = SIZ(payP->c_last);
  pctx->w_street_1_ind = TRUE;
  pctx->w_street_1_len = 0;
  pctx->w_street_2_ind = TRUE;
  pctx->w_street_2_len = 0;
  pctx->w_city_ind = TRUE;
  pctx->w_city_len = 0;
  pctx->w_state_ind = TRUE;
  pctx->w_state_len = 0;
  pctx->w_zip_ind = TRUE;
  pctx->w_zip_len = 0;
  pctx->d_street_1_ind = TRUE;
  pctx->d_street_1_len = 0;
  pctx->d_street_2_ind = TRUE;
  pctx->d_street_2_len = 0;
  pctx->d_city_ind = TRUE;
  pctx->d_city_len = 0;
  pctx->d_state_ind = TRUE;
  pctx->d_state_len = 0;
  pctx->d_zip_ind = TRUE;
  pctx->d_zip_len = 0;
  pctx->c_first_ind = TRUE;
  pctx->c_first_len = 0;
  pctx->c_middle_ind = TRUE;
  pctx->c_middle_len = 0;
  pctx->c_street_1_ind = TRUE;
  pctx->c_street_1_len = 0;
  pctx->c_street_2_ind = TRUE;
  pctx->c_street_2_len = 0;
  pctx->c_city_ind = TRUE;
  pctx->c_city_len = 0;
  pctx->c_state_ind = TRUE;
  pctx->c_state_len = 0;
  pctx->c_zip_ind = TRUE;
  pctx->c_zip_len = 0;
  pctx->c_phone_ind = TRUE;
  pctx->c_phone_len = 0;
  pctx->c_since_ind = TRUE;
  pctx->c_since_len = 0;
  pctx->c_credit_ind = TRUE;
  pctx->c_credit_len = 0;
  pctx->c_credit_lim_ind = TRUE;
  pctx->c_credit_lim_len = 0;
  pctx->c_discount_ind = TRUE;
  pctx->c_discount_len = 0;
  pctx->c_balance_ind = TRUE;
  pctx->c_balance_len = sizeof(double);
  pctx->c_data_ind = TRUE;
  pctx->c_data_len = 0;
  pctx->h_date_ind = TRUE;
  pctx->h_date_len = 0;
  pctx->retries_ind = TRUE;
  pctx->retries_len = 0;
  pctx->cr_date_ind = TRUE;
  pctx->cr_date_len = 7;

#ifdef PLSQLPAY
```

```
payP->execstatus=OCIStmtExecute(tpcsvc,pctx->curp0,errhp,1,0,0,0,OCI_DEFAULT|OCI_COMMIT_ON
_SUCCESS);
#else
 if(payP->bylastname) {

payP->execstatus=OCIStmtExecute(tpcsvc,pctx->curp1,errhp,1,0,0,0,OCI_DEFAULT|OCI_COMMIT_ON
_SUCCESS);
 } else {

payP->execstatus=OCIStmtExecute(tpcsvc,pctx->curp0,errhp,1,0,0,0,OCI_DEFAULT|OCI_COMMIT_ON
_SUCCESS);
 }
#endif

 if(payP->execstatus != OCI_SUCCESS) {
    OCITransRollback(tpcsvc,errhp,OCI_DEFAULT);
    payP->errcode = OCIERROR(errhp,payP->execstatus);
    if(payP->errcode == NOT_SERIALIZABLE) {
       payP->retries++;
       goto retry;
    } else if (payP->errcode == RECOVERR) {
       payP->retries++;
       goto retry;
    } else {
       return -1;
    }
  }
  return 0;
}


void tkvcpdone (ora_cn_data_t *ora_SlotDataP)

{
 /*  TODO:  Should we free the cursor handles??  */
 if(ora_SlotDataP->pctx) {
   free(ora_SlotDataP->pctx);
   ora_SlotDataP->pctx = NULL;
 }
 if (ora_SlotDataP->payP) {
   free(ora_SlotDataP->payP);
   ora_SlotDataP->payP = NULL;
 }
}
```

## plsto.c

```
#ifdef RCSID
static char *RCSid =
  "$Header: /afs/transarc.com/project/encina/rcs/test/src/benchmarks/tpcc/server/ora8.1_mt/RCS/plsto.c,v
1.2 1999/04/15 12:16:52 oz Exp $ Copyr (c) 1994 Oracle";
#endif /* RCSID */

/*==================================================================+
|       Copyright (c) 1994  Oracle Corp, Redwood Shores, CA       |
|                OPEN SYSTEMS PERFORMANCE GROUP                   |
|                    All Rights Reserved                          |
 +==================================================================+
 | FILENAME
 |    plsto.c
 | DESCRIPTION
 |    OCI version of STOCK LEVEL transaction in TPC-C benchmark.
 +==================================================================*/

#include "tpcc.h"
#include "plora.h"  /*  */
#include "tpccflags.h"

#ifdef PLSQLSTO
#define SQLTXT "BEGIN stocklevel.getstocklevel (:w_id, :d_id, :threshold, \
   :low_stock); END;"
#else
#define SQLTXT "SELECT /*+ nocache(stock) hash(stock) no_index(stock) */ \
                                  count (DISTINCT s_i_id) \
          FROM order_line, stock, district \
          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)"
/* query using functional index */
/*
#define SQLTXT "SELECT count (DISTINCT s_i_id) \
          FROM order_line, stock, district \
          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_o_id BETWEEN (d_next_o_id - 20) AND (d_next_o_id - 1) AND \
               decode(SIGN(s_quantity -21) , -1, s_w_id*100000 + s_i_id, NULL) \
                                  = ol_w_id*100000 + ol_i_id  AND \
               s_quantity < :threshold;"

*/

#endif

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;

/* stoctx *sctx; */


tkvcsinit (ora_cn_data_t *ora_SlotDataP)

{

  /*  */
  stoctx *sctx;
  global_stock_t *stoP;
  OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
  OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
  OCIError *errhp = ora_SlotDataP->errhp;
  OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
  OCISession *tpcusr = ora_SlotDataP->tpcusr;
  OCIStmt *curi = ora_SlotDataP->curi;

  text stmbuf[SQL_BUF_SIZE];

  sctx = (stoctx *)malloc(sizeof(stoctx));
  memset(sctx,(char)0,sizeof(stoctx));
  ora_SlotDataP->sctx = (void *)sctx;

  ora_SlotDataP->stoP = (global_stock_t *)malloc(sizeof(global_stock_t));
  memset(ora_SlotDataP->stoP,(char)0,sizeof(global_stock_t));
  stoP = ora_SlotDataP->stoP;

  sctx->norow=0;

  OCIERROR(errhp,
    OCIHandleAlloc(tpcenv,(dvoid**)&sctx->curs,OCI_HTYPE_STMT,0,(dvoid**)0));
  sprintf ((char *) stmbuf, SQLTXT);
  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(stoP->w_id),sizeof(int),
        SQLT_INT);
  OCIBND(sctx->curs,sctx->d_id_bp,errhp, ":d_id", ADR(stoP->d_id),sizeof(int),
    SQLT_INT);
  OCIBND(sctx->curs,sctx->threshold_bp,errhp, ":threshold", ADR(stoP->threshold),
    sizeof(int),SQLT_INT);
#ifdef PLSQLSTO
  OCIBND(sctx->curs,sctx->low_stock_bp,errhp,":low_stock" , ADR(stoP->low_stock),
    sizeof(int), SQLT_INT);
#else
  OCIDEFINE(sctx->curs,sctx->low_stock_bp,errhp, 1, ADR(stoP->low_stock),
    sizeof(int), SQLT_INT);
#endif

  return (0);

}



tkvcs (ora_cn_data_t *ora_SlotDataP)

{
 stoctx *sctx = (stoctx *)ora_SlotDataP->sctx;
 global_stock_t *stoP = ora_SlotDataP->stoP;
 OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
 OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
 OCIError *errhp = ora_SlotDataP->errhp;
 OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
 OCISession *tpcusr = ora_SlotDataP->tpcusr;
 OCIStmt *curi = ora_SlotDataP->curi;

retry:
   stoP->execstatus= OCIStmtExecute(tpcsvc,sctx->curs,errhp,1,0,0,0,
                        OCI_COMMIT_ON_SUCCESS | OCI_DEFAULT);
   if (stoP->execstatus != OCI_SUCCESS)
   {
     stoP->errcode=OCIERROR(errhp,stoP->execstatus);
     OCITransCommit(tpcsvc,errhp,OCI_DEFAULT);
     if((stoP->errcode == NOT_SERIALIZABLE) || (stoP->errcode == RECOVERR))
     {
       stoP->retries++;
       goto retry;
```

```
    } else {
      return -1;
    }
   }

 return (0);
}



void tkvcsdone (ora_cn_data_t *ora_SlotDataP)

{
 /*  */
 stoctx *sctx = (stoctx *)ora_SlotDataP->sctx;
 if (sctx) {
   free(sctx);
   ora_SlotDataP->sctx = NULL;
 }
 if (ora_SlotDataP->stoP) {
   free(ora_SlotDataP->stoP);
   ora_SlotDataP->stoP = NULL;
 }

}
```

## tkvcinin.sql

```
-- The initnew package for storing variables used in the
-- New Order anonymous block

CREATE OR REPLACE PACKAGE initnew
AS
 TYPE intarray IS TABLE OF INTEGER index by binary_integer;
 TYPE distarray IS TABLE OF VARCHAR(24) index by binary_integer;
 nulldate      DATE;
 s_dist                                        distarray;
 idx1arr                          intarray;
 s_remote                         intarray;
 PROCEDURE new_init(idxarr intarray);
END initnew;
/
show errors;

CREATE OR REPLACE PACKAGE BODY initnew AS
  PROCEDURE new_init (idxarr  intarray)
  IS
  BEGIN
      -- initialize null date
   nulldate := TO_DATE('01-01-1811', 'MM-DD-YYYY');
    idx1arr := idxarr;
  END new_init;
END initnew;
/
show errors
exit
```

## tkvcpnew.sql

```
-- New Order Anonymous block

  DECLARE
     idx                    BINARY_INTEGER;
     dummy_local            BINARY_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 .. :o_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 = s_quantity - :ol_quantity(idx) +
                 DECODE(sign(s_quantity - :ol_quantity(idx) -
10),-1,91,0)
        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,
                  DECODE (instr(i_data,'original'), 0, 'G',
                DECODE(instr(s_data,'original'), 0, 'G', 'B'))
                 BULK COLLECT INTO :i_price, :i_name, :s_quantity, initnew.s_dist,
:brand_generic;

   END u1;

   PROCEDURE u2 IS
   BEGIN
       FORALL idx IN 1 .. :o_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 = s_quantity - :ol_quantity(idx) +
                 DECODE(sign(s_quantity - :ol_quantity(idx) -
10),-1,91,0)
        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,
                  DECODE (instr(i_data,'original'), 0, 'G',
                DECODE(instr(s_data,'original'), 0, 'G', 'B'))
                 BULK COLLECT INTO :i_price, :i_name, :s_quantity, initnew.s_dist,
                   :brand_generic;
   END u2;

   PROCEDURE u3 IS
   BEGIN
       FORALL idx IN 1 .. :o_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 = s_quantity - :ol_quantity(idx) +
                 DECODE(sign(s_quantity - :ol_quantity(idx) -
10),-1,91,0)
        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,
                  DECODE (instr(i_data,'original'), 0, 'G',
                DECODE(instr(s_data,'original'), 0, 'G', 'B'))
                 BULK COLLECT INTO :i_price, :i_name, :s_quantity, initnew.s_dist,
                   :brand_generic;
   END u3;

   PROCEDURE u4 IS
   BEGIN
       FORALL idx IN 1 .. :o_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 = s_quantity - :ol_quantity(idx) +
                 DECODE(sign(s_quantity - :ol_quantity(idx) -
10),-1,91,0)
        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,
                  DECODE (instr(i_data,'original'), 0, 'G',
                DECODE(instr(s_data,'original'), 0, 'G', 'B'))
                 BULK COLLECT INTO :i_price, :i_name, :s_quantity, initnew.s_dist,
                   :brand_generic;
   END u4;

   PROCEDURE u5 IS
   BEGIN
       FORALL idx IN 1 .. :o_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 = s_quantity - :ol_quantity(idx) +
                 DECODE(sign(s_quantity - :ol_quantity(idx) -
10),-1,91,0)
        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,
                  DECODE (instr(i_data,'original'), 0, 'G',
                DECODE(instr(s_data,'original'), 0, 'G', 'B'))
                 BULK COLLECT INTO :i_price, :i_name, :s_quantity, initnew.s_dist,
                   :brand_generic;
   END u5;

   PROCEDURE u6 IS
   BEGIN
       FORALL idx IN 1 .. :o_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 = s_quantity - :ol_quantity(idx) +
                 DECODE(sign(s_quantity - :ol_quantity(idx) -
10),-1,91,0)
        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,
                  DECODE (instr(i_data,'original'), 0, 'G',
                DECODE(instr(s_data,'original'), 0, 'G', 'B'))
                 BULK COLLECT INTO :i_price, :i_name, :s_quantity, initnew.s_dist,
                   :brand_generic;
   END u6;

   PROCEDURE u7 IS
   BEGIN
       FORALL idx IN 1 .. :o_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 = s_quantity - :ol_quantity(idx) +
                 DECODE(sign(s_quantity - :ol_quantity(idx) -
10),-1,91,0)
        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,
                 DECODE (instr(i_data,'original'), 0, 'G',
               DECODE(instr(s_data,'original'), 0, 'G', 'B'))
                BULK COLLECT INTO :i_price, :i_name, :s_quantity, initnew.s_dist,
                  :brand_generic;
 END u7;

 PROCEDURE u8 IS
 BEGIN
     FORALL idx IN 1 .. :o_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 = s_quantity - :ol_quantity(idx) +
               DECODE(sign(s_quantity - :ol_quantity(idx) -
10),-1,91,0)
      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,
                 DECODE (instr(i_data,'original'), 0, 'G',
               DECODE(instr(s_data,'original'), 0, 'G', 'B'))
                BULK COLLECT INTO :i_price, :i_name, :s_quantity, initnew.s_dist,
                  :brand_generic;
 END u8;

 PROCEDURE u9 IS
 BEGIN
     FORALL idx IN 1 .. :o_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 = s_quantity - :ol_quantity(idx) +
               DECODE(sign(s_quantity - :ol_quantity(idx) -
10),-1,91,0)
      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,
                 DECODE (instr(i_data,'original'), 0, 'G',
               DECODE(instr(s_data,'original'), 0, 'G', 'B'))
                BULK COLLECT INTO :i_price, :i_name, :s_quantity, initnew.s_dist,
                  :brand_generic;
 END u9;

 PROCEDURE u10 IS
 BEGIN
     FORALL idx IN 1 .. :o_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 = s_quantity - :ol_quantity(idx) +
               DECODE(sign(s_quantity - :ol_quantity(idx) -
10),-1,91,0)
      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,
                 DECODE (instr(i_data,'original'), 0, 'G',
               DECODE(instr(s_data,'original'), 0, 'G', 'B'))
                BULK COLLECT INTO :i_price, :i_name, :s_quantity, initnew.s_dist,
                  :brand_generic;
 END u10;

 PROCEDURE fix_items IS
  rows_lost          BINARY_INTEGER;
  max_index          BINARY_INTEGER;
  temp_index         BINARY_INTEGER;
 BEGIN
-- gotta shift price, name, s_quantity, brand_generic, s_dist, ol_amount
     idx := 1;
-- found 0 bad rows
     rows_lost := 0;
-- so many rows in out array to begin with
               max_index := sql%rowcount;

     WHILE (max_index != :o_ol_cnt) LOOP

-- find item where item ids dont match
                WHILE (idx <= sql%rowcount AND
                       sql%bulk_rowcount(idx + rows_lost) = 1)
      LOOP
                idx := idx + 1;
      END LOOP;

-- shift the items please
      temp_index := max_index;
      WHILE (temp_index >= idx + rows_lost) LOOP
                :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);
        initnew.s_dist(temp_index + 1) :=  initnew.s_dist(temp_index);
                :brand_generic(temp_index + 1) :=  :brand_generic(temp_index);
                temp_index := temp_index - 1;
      END LOOP;

--  values for the non-existent items if not at end
       IF (idx + rows_lost <= :o_ol_cnt) THEN
                :i_price(idx + rows_lost)    :=   0;
                :i_name(idx + rows_lost)     :=   NULL;
        :s_quantity(idx + rows_lost)  :=   0;
        initnew.s_dist(idx + rows_lost) := NULL;
        :brand_generic(idx + rows_lost) := NULL;

--  one more bad row
        rows_lost := rows_lost + 1;
        max_index := max_index + 1;
                END IF;

     END LOOP;
  END fix_items;

  BEGIN
    LOOP BEGIN
     UPDATE district 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 customer , warehouse
      WHERE c_id = :c_id AND c_d_id = :d_id AND c_w_id = :w_id
      AND  w_id = :w_id;


     INSERT INTO new_order (no_o_id, no_d_id, no_w_id)
      VALUES (:o_id, :d_id, :w_id);
      INSERT INTO orders  (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);

     -- copying :d_id in local variable .
     dummy_local :=  :d_id;

     IF (dummy_local = 1) THEN u1; END IF;

     IF (dummy_local = 2) THEN u2; END IF;

     IF (dummy_local = 3) THEN u3; END IF;

     IF (dummy_local = 4) THEN u4; END IF;

     IF (dummy_local = 5) THEN u5; END IF;

     IF (dummy_local = 6) THEN u6; END IF;

     IF (dummy_local = 7) THEN u7; END IF;

     IF (dummy_local = 8) THEN u8; END IF;

     IF (dummy_local = 9) THEN u9; END IF;

     IF (dummy_local = 10) THEN u10; END IF;

-- cache the no of rows processed
     dummy_local := sql%rowcount;

-- fix the rows if necessary
     IF (dummy_local != :o_ol_cnt )  THEN fix_items; END IF;

-- calculate ol_amount

     FOR idx IN 1 ..:o_ol_cnt LOOP
      :ol_amount(idx):=:ol_quantity(idx)*:i_price(idx);
     END LOOP;

     FORALL idx IN 1..:o_ol_cnt
-- doesnt hurt if we insert entries for invalid item too
     INSERT INTO order_line
       (ol_o_id, ol_d_id, ol_w_id, ol_number, ol_delivery_d, ol_i_i_id,
            ol_supply_w_id, ol_quantity,ol_amount,ol_dist_info)
     VALUES (:o_id, :d_id, :w_id, initnew.idx1arr(idx), initnew.nulldate,
            :ol_i_id(idx), :ol_supply_w_id(idx),
                  :ol_quantity(idx), :ol_amount(idx), initnew.s_dist(idx));

--If there are no errors, then just return without COMMITing
--The COMMIT is done on the driver side by OCI
-- If there are errors, then rollback and set o_ol_cnt to the processed value
                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;
```

**tpcc.h**

```
/*
 * $Header: /afs/transarc.com/project/encina/rcs/test/src/benchmarks/tpcc/server/ora8.1_mt/RCS/tpcc.h,v 1.1
1999/04/14 19:03:06 wenjian Exp $ Copyr (c) 1993 Oracle
 */
/*===================================================================+
|       Copyright (c) 1995  Oracle Corp, Redwood Shores, CA      |
|                OPEN SYSTEMS PERFORMANCE GROUP                 |
|                    All Rights Reserved                        |
+===================================================================+
| FILENAME
|    tpcc.h
| DESCRIPTION
|    Include file for TPC-C benchmark programs.
+===================================================================*/

#ifndef TPCC_H
#define TPCC_H

#ifndef FALSE
# define FALSE 0
#endif

#ifndef TRUE
# define TRUE 1
#endif

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

#include <oratypes.h>
#include <oci.h>
#include <ocidfn.h>
/*
#ifdef __STDC__
#include "ociapr.h"
#else
#include "ocikpr.h"
#endif
*/

typedef struct cda_def csrdef;
typedef struct cda_def ldadef;


/* TPC-C transaction functions */

extern int TPCinit ();
extern int TPCnew ();
extern int TPCpay ();
extern int TPCord ();
extern int TPCdel ();
extern int TPCsto ();
extern int TPCexit ();
extern int TPCdumpinit ();
extern int TPCdumpnew ();
extern int TPCdumppay ();
extern int TPCdumpord ();
extern int TPCdumpdel ();
extern int TPCdumpsto ();
extern int TPCdumpexit ();


/* 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.hh:mi:ss"
#define SHORTDATE "dd-mm-yyyy"



#define DELRT 80.0

extern int tkvcninit ();
extern int tkvcpnit ();
extern int tkvcoinit ();
extern int tkvcdinit ();
extern int tkvcsinit ();

extern int tkvcn ();
extern int tkvcp ();
extern int tkvco ();
extern int tkvcd ();
extern int tkvcs ();

extern void tkvcndone ();
extern void tkvcpdone ();
extern void tkvcodone ();
extern void tkvcddone ();
extern void tkvcsdone ();

extern int tkvcss (); /* for alter session to get memory size and trace */
extern boolean multitranx;
extern int ord_init;


extern errrpt ();
extern int ocierror(char *fname, int lineno,OCIError *errhp, sword status);
extern int sqlfile(char *fname, text *linebuf);

extern FILE *lfp;
extern FILE *fopen ();
extern int proc_no;
extern int doid[];

#if 0
extern int execstatus;
extern int errcode;

extern OCIEnv *tpcenv;
extern OCIServer *tpcsrv;
extern OCIError *errhp;
extern OCISvcCtx *tpcsvc;
extern OCISession *tpcusr;
extern OCIStmt *curntest;
/* The bind and define handles for each transaction are
   included in their respective header files. */



/* for stock-level transaction */

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

/* for delivery transaction */

extern int del_o_id[10];
extern int carrier_id;
extern int retries;

/* for order-status transaction */

extern int bylastname;
extern char c_last[17];
extern char c_first[17];
extern char c_middle[3];
extern double c_balance;
extern int o_id;
extern text o_entry_d[20];
extern int o_carrier_id;
extern int o_ol_cnt;
extern int ol_supply_w_id[15];
extern int ol_i_id[15];
extern int ol_quantity[15];
extern int ol_amount[15];
ub4    ol_del_len[15];
extern text ol_delivery_d[15][11];

/* for payment transaction */

extern int c_w_id;
extern int c_d_id;
extern int h_amount;
extern char w_street_1[21];
extern char w_street_2[21];
extern char w_city[21];
extern char w_state[3];
extern char w_zip[10];
extern char d_street_1[21];
extern char d_street_2[21];
extern char d_city[21];
extern char d_state[3];
extern char d_zip[10];
extern char c_street_1[21];
extern char c_street_2[21];
extern char c_city[21];
extern char c_state[3];
extern char c_zip[10];
extern char c_phone[17];
extern text c_since_d[11];
extern char c_credit[3];
extern int c_credit_lim;
extern float c_discount;
extern char c_data[201];
extern text h_date[20];

/* for new order transaction */

extern int nol_i_id[15];
extern int nol_supply_w_id[15];
extern int nol_quantity[15];
extern int nol_quanti10[15];
extern int nol_quanti91[15];
extern int nol_ytdqty[15];
```

```
extern int nol_amount[15];
extern int o_all_local;
extern float w_tax;
extern float d_tax;
extern float total_amount;
extern char i_name[15][25];
extern int i_name_strlen[15];
extern ub2 i_name_strlen_len[15];
extern ub2 i_name_strlen_rcode[15];
extern ub4 i_name_strlen_csize;
extern int s_quantity[15];
extern char brand_gen[15];
extern ub2 brand_gen_len[15];
extern ub2 brand_gen_rcode[15];
extern ub4 brand_gen_csize;
extern int i_price[15];
extern char brand_generic[15][1];
extern int status;
extern int tracelevel;

/* Miscellaneous */
extern OCIDate cr_date;
extern OCIDate c_since;
extern OCIDate o_entry_d_base;
extern OCIDate ol_d_base[15];
#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 */

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

#define ADR(object) ((ub1 *)&(object))
#define SIZ(object) ((sword)sizeof(object))

typedef char date[24+NLT];
typedef char varchar2;

#define min(x,y)  (((x) < (y)) ? (x) : (y))

#define OCIERROR(errp,function)\
      ocierror(__FILE__,__LINE__,(errp),(function));

#define OCIBND(stmp, bndp, errp, sqlvar, 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,cbf_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),(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),(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)));


#if 0

/* 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;
};

struct deloutstruct {
  int terror;
  int retry;
};

struct delstruct {
  struct delinstruct delin;
  struct deloutstruct delout;
};


/* Stock level */

struct stoinstruct {
  int w_id;
  int d_id;
  int threshold;
};

struct stooutstruct {
  int terror;
  int low_stock;
  int retry;
};

struct stostruct {
  struct stoinstruct stoin;
  struct stooutstruct stoout;
};
```

```
#endif

#endif
```

## tpcc_info.h

```
/*
 * $Header:
/afs/transarc.com/project/encina/rcs/test/src/benchmarks/tpcc/server/ora8.1_mt/RCS/tpcc_info.h,v 1.1
1999/04/14 19:03:06 wenjian Exp $ Copyr (c) 1993 Oracle
 */
/*==================================================================+
|       Copyright (c) 1995  Oracle Corp, Redwood Shores, CA      |
|                OPEN SYSTEMS PERFORMANCE GROUP                  |
|                     All Rights Reserved                        |
 +==================================================================+
| FILENAME
|    tpcc.h
| DESCRIPTION
|    Include file for TPC-C benchmark programs.
 +==================================================================*/

#ifndef TPCC_INFO_H
#define TPCC_INFO_H


/* 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;
};

struct deloutstruct {
  int terror;
  int retry;
};

struct delstruct {
  struct delinstruct delin;
  struct deloutstruct delout;
};


/* Stock level */

struct stoinstruct {
  int w_id;
  int d_id;
  int threshold;
};

struct stooutstruct {
  int terror;
  int low_stock;
  int retry;
};

struct stostruct {
  struct stoinstruct stoin;
  struct stooutstruct stoout;
};

#endif
```

## tpccflags.h

```
/* #define DMLRETNO */
#define PLSOLNO
#define DMLRETDEL
/* #define PLSQLORD */
```

## tpccpl.c

```
#ifdef RCSID
static char *RCSid =
   "$Header: /afs/transarc.com/project/encina/rcs/test/src/benchmarks/tpcc/server/ora8.1_mt/RCS/tpccpl.c,v
1.7 1999/05/26 16:29:59 wenjian Exp $ Copyr (c) 1994 Oracle";
#endif /* RCSID */

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

#include <stdio.h>
#include <time.h>
#include "tpcc.h"
#ifdef TUX
#include <userlog.h>
#else
#include <stdarg.h>
#endif
#ifdef MULTI_THREADED
#include <dce/pthread.h>
#endif
#include "plora.h"


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

int proc_no;
static char *db_uid;
static char *db_pwd;

/** Delivery file infomation: Global.
  * One output file for deliveries for the server
  */
static char delivery_file_name[100];

#ifdef MULTI_THREADED
pthread_mutex_t dvry_log_lock;
#define DVRY_LOCK pthread_mutex_lock(&dvry_log_lock);
#define DVRY_UNLOCK pthread_mutex_unlock(&dvry_log_lock);
#define DVRY_LOCK_INIT pthread_mutex_init(&dvry_log_lock, pthread_mutexattr_default);
#else
#define DVRY_LOCK
#define DVRY_UNLOCK
#define DVRY_LOCK_INIT
#endif
FILE *lfp;
FILE *fopen ();

#ifdef ORA_NT
extern double dpbtimef();
#define gettime dpbtimef
#else
double gettime ();
#endif

/** Initialization of one connection  */
static void initOCIhandles(ora_cn_data_t *cn_dataP, char* uid, char *pwd);

static int init_cn_data(ora_cn_data_t *dataP);

extern char oracle_home[256];

/* NewOrder Binding stuff */

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

/* vmm313 void ocierror(fname, lineno, errhp, status)  */
int ocierror(fname, lineno, errhp, status)
char *fname;
int lineno;
OCIError *errhp;
sword status;
{
  text errbuf[512];
  ub4 buflen;
  sb4 errcode;
  sb4 lstat;
```

```
 ub4 recno=2;

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


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

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

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

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

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

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

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

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

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

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

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

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

Date.century = (unsigned char)(century + 100);
if (Date.century < 119 || Date.century > 120) cnvrtOK = 0;
Date.year  = (unsigned char)(loctime->tm_year+100);
if (Date.year < 100 || Date.year > 199) cnvrtOK = 0;
Date.month = (unsigned char)(loctime->tm_mon + 1);
if (Date.month < 1 || Date.month > 12) cnvrtOK = 0;
Date.day   = (unsigned char)loctime->tm_mday;
if (Date.day < 1 || Date.day > 31) cnvrtOK = 0;
Date.hour  = (unsigned char)(loctime->tm_hour + 1);
if (Date.hour < 1 || Date.hour > 24) cnvrtOK = 0;
Date.minute= (unsigned char)(loctime->tm_min + 1);
if (Date.minute < 1 || Date.minute > 60) cnvrtOK = 0;
Date.second= (unsigned char)(loctime->tm_sec + 1);
if (Date.second < 1 || Date.second > 60) cnvrtOK = 0;


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

 return;

}
void cvtdmy (unsigned char *oradt, char *outdate)
{

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


        int day,month,year;

        memcpy(&Date,oradt,7);

        year = (Date.century-100)*100 + Date.year-100;
        month = Date.month;
        day = Date.day;
        sprintf(outdate,"%02d-%02d-%4d\0",day,month,year);

        return;
}

void cvtdmyhms (unsigned char *oradt, char *outdate)
{

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


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

        memcpy(&Date,oradt,7);

        year = (Date.century-100)*100 + Date.year-100;
        month = Date.month;
        day = Date.day;
        hour = Date.hour - 1;
```

```
      min = Date.minute - 1;
      sec = Date.second - 1;

      sprintf(outdate,"%02d-%02d-%4d %02d:%02d:%02d\0",
                day,month,year,hour,min,sec);

      return;
}
#endif


TPCexit ()

{
  if (lfp) {
     fclose (lfp);
     lfp = NULL;
  }
}

/*  clean_connection
 *
 *  Called to clean a connection.
 *  When using pthread this is registered during pthread_create
 *  and called automatically by pthread when the thread exits.
 */
void clean_connection(void *ptr)
{

  /* free trans specific cursor handles first and later the ora handles */
  ora_cn_data_t *cn_dataP = (ora_cn_data_t *)ptr;

  if (cn_dataP != NULL) {
      OCIServer *tpcsrv;
                OCISession *tpcusr;
                OCIEnv *tpcenv;
                OCIError *errhp;
                OCISvcCtx *tpcsvc;

      fprintf(stderr, "clean_connection, Freeing OCI handles\n");
      tkvcndone(cn_dataP);
      tkvcpdone(cn_dataP);
      tkvcodone(cn_dataP);
      tkvcddone(cn_dataP);
      tkvcsdone(cn_dataP);

      /* free OCI handles */
      if (tpcusr = cn_dataP->tpcusr) {
                        fprintf(stderr, "free_handles> OCIHandleFree tpcusr\n");
                        OCIHandleFree((dvoid *)tpcusr, OCI_HTYPE_SESSION);
                }
                if (tpcsvc = cn_dataP->tpcsvc) {
                        fprintf(stderr, "free_handles> OCIHandleFree tpcsvc\n");
                        OCIHandleFree((dvoid *)tpcsvc, OCI_HTYPE_SVCCTX);
                }
                if (errhp = cn_dataP->errhp) {
                        fprintf(stderr, "free_handles> OCIHandleFree errhp\n");
                        OCIHandleFree((dvoid *)errhp, OCI_HTYPE_ERROR);
                }
                if (tpcsrv = cn_dataP->tpcsrv) {
                        fprintf(stderr, "free_handles> OCIHandleFree tpcsrv\n");
                        OCIHandleFree((dvoid *)tpcsrv, OCI_HTYPE_SERVER);
                }
                if (tpcenv = cn_dataP->tpcenv) {
                        fprintf(stderr, "free_handles> OCIHandleFree tpcenv\n");
                        OCIHandleFree((dvoid *)tpcenv, OCI_HTYPE_ENV);
                }

      fprintf(stderr, "free_handles> free cn_dataP\n");
  }
}


TPCinit (id, uid, pwd, dvryFileName)
int id;
char *uid;
char *pwd;
char *dvryFileName;
{

  int i;
  text stmbuf[100];

  fprintf(stderr, "TPCinit id %d, uid %s pwd %s\n", id, uid, pwd);

  DVRY_LOCK_INIT;

  proc_no = id;
  db_uid = (char *)calloc(strlen(uid) + 1, sizeof(char));
  strcpy(db_uid, uid);
  db_pwd = (char *)calloc(strlen(pwd) + 1, sizeof(char));
  strcpy(db_pwd, pwd);

  err_printf("dvryFileName is %s\n", dvryFileName);
  sprintf (delivery_file_name, "%s.%d", dvryFileName, proc_no);
  err_printf("delivery_file_name is %s\n", delivery_file_name);
#ifdef USE_ORACLE_WAY
  if ((lfp = fopen (delivery_file_name, "w")) == NULL) {
#ifdef TUX
      userlog ("Error in TPC-C server %d: Failed to open %s\n",
              proc_no, delivery_file_name);
#else
      fprintf (stderr, "Error in TPC-C server %d: Failed to open %s\n",
              proc_no, delivery_file_name);
#endif
      return (-1);
    }
#endif

   OCIInitialize(OCI_DEFAULT|OCI_OBJECT,(dvoid *)0,0,0,0); /* check tpccpl.c */

   return (0);

}

static void initOCIhandles(ora_cn_data_t *cn_dataP, char *uid, char *pwd)
{
   int tracelevel = 0;  /* new define */
   OCIDate cr_date;
   text stmbuf[100];
   OCIEnv *tpcenv;
   OCIServer *tpcsrv;
   OCIError *errhp;
   OCISvcCtx *tpcsvc;
   OCISession *tpcusr;
   OCIStmt *curi;

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

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

   /* run all transaction in serializable mode */

   OCIHandleAlloc(tpcenv, (dvoid **)&curi, OCI_HTYPE_STMT, 0, (dvoid**)0);
   sprintf ((char *) stmbuf, 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);


/*
This is done in cvdrv.c
   if (tracelevel == 2) {
     OCIHandleAlloc(tpcenv, (dvoid **)&curi, OCI_HTYPE_STMT, 0, (dvoid**)0);
     memset(stmbuf,0,100);
     sprintf ((char *) stmbuf, SQLTXTTRC);
     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);
   }
   */
   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);
   }


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

   /*  Store the handles just initialized in the thread slot
    */
   cn_dataP->tpcenv = tpcenv;
   cn_dataP->tpcsrv = tpcsrv;
   cn_dataP->errhp  = errhp;
   cn_dataP->tpcsvc = tpcsvc;
   cn_dataP->tpcusr = tpcusr;
   cn_dataP->curi   = curi;
}

/*
 *  init_cn_data
 *      Initializes all the transactions for a single connection
 */
static int init_cn_data(ora_cn_data_t *cnP)
{
    int status;

    initOCIhandles(cnP, db_uid, db_pwd);

    if (status = tkvcninit (cnP)) {  /* new order */
```

```
                fprintf(stderr, "tkvcninit failed: %d\n", status);
                TPCexit ();
                return (status);
  }

  if (status = tkvcpinit (cnP)) {   /* payment */
                fprintf(stderr, "tkvcpinit failed: %d\n", status);
                TPCexit ();
                return (status);
  }

  if (status = tkvcoinit (cnP)) {   /* order status */
                fprintf(stderr, "tkvcoinit failed: %d\n", status);
                TPCexit ();
                return (status);
  }

  if (status = tkvcdinit (cnP)) {   /* delivery */
                fprintf(stderr, "tkvcdinit failed: %d\n", status);
                TPCexit ();
                return (status);
  }

  if (status = tkvcsinit (cnP)) {   /* stock level */
                fprintf(stderr, "tkvcsinit failed: %d\n", status);
                TPCexit ();
                return (status);
  }
  return 0;
}

void *create_ora_connection() {
   ora_cn_data_t *cnP = (ora_cn_data_t *)malloc(sizeof(ora_cn_data_t));
   init_cn_data(cnP);
   return (void *)cnP;
}

/*****   The Transaction Code  *****/

TPCnew (cnP, str)
    void *cnP;
    struct newstruct *str;
{
  int i;
  ora_cn_data_t *cn_dataP = (ora_cn_data_t *)cnP;
  global_newOrder_t *newP = cn_dataP->globals;
  OCIError *errhp = cn_dataP->errhp;

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

  OCIERROR(errhp,OCIDateSysDate(errhp,&newP->cr_date));

  if (str->newout.terror = tkvcn (cn_dataP)) {
    if (str->newout.terror != RECOVERR)
      str->newout.terror = IRRECERR;
    str->newout.retry = newP->retries;
    return (-1);
  }

  /* fill in date for o_entry_d from time in beginning of txn*/
/*
  cvtdmyhms(newP->cr_date,newP->o_entry_d);
*/
   newP->datelen = sizeof(newP->o_entry_d);
   OCIERROR(errhp,
      OCIDateToText(errhp,&newP->cr_date,(text*)FULLDATE,SIZ(FULLDATE),(text*)0,0,
                &newP->datelen,newP->o_entry_d));

  str->newout.terror = NOERR;
  str->newout.o_id = newP->o_id;
  str->newout.o_ol_cnt = newP->o_ol_cnt;
  strncpy (str->newout.c_last, newP->c_last, 17);
  strncpy (str->newout.c_credit, newP->c_credit, 3);
  str->newout.c_discount = newP->c_discount;
  str->newout.w_tax = newP->w_tax;
  str->newout.d_tax = newP->d_tax;
  strncpy (str->newout.o_entry_d, (char*)newP->o_entry_d, 20);
  str->newout.total_amount = newP->total_amount;
  for (i = 0; i < newP->o_ol_cnt; i++) {
    strncpy (str->newout.i_name[i], newP->i_name[i], 25);
    str->newout.s_quantity[i] = newP->s_quantity[i];
    str->newout.brand_generic[i] = newP->brand_gen[i];
    str->newout.i_price[i] = (float)(newP->i_price[i])/100;
    str->newout.ol_amount[i] = (float)(newP->nol_amount[i])/100;
  }
  if (newP->status)
    strcpy (str->newout.status, "Item number is not valid");
  else
    str->newout.status[0] = '\0';
  str->newout.retry = newP->retries;

  return (0);

}



TPCpay (cnP, str)
void *cnP;
struct paystruct *str;

{
  ora_cn_data_t *cn_dataP = (ora_cn_data_t *)cnP;
  global_payment_t *payP = cn_dataP->payP;
  OCIError *errhp = cn_dataP->errhp;

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

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

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

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

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

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



  str->payout.terror = NOERR;
  strncpy (str->payout.w_street_1, payP->w_street_1, 21);
  strncpy (str->payout.w_street_2, payP->w_street_2, 21);
  strncpy (str->payout.w_city, payP->w_city, 21);
  strncpy (str->payout.w_state, payP->w_state, 3);
  strncpy (str->payout.w_zip, payP->w_zip, 10);
  strncpy (str->payout.d_street_1, payP->d_street_1, 21);
  strncpy (str->payout.d_street_2, payP->d_street_2, 21);
  strncpy (str->payout.d_city, payP->d_city, 21);
  strncpy (str->payout.d_state, payP->d_state, 3);
  strncpy (str->payout.d_zip, payP->d_zip, 10);
  str->payout.c_id = payP->c_id;
  strncpy (str->payout.c_first, payP->c_first, 17);
  strncpy (str->payout.c_middle, payP->c_middle, 3);
  strncpy (str->payout.c_last, payP->c_last, 17);
  strncpy (str->payout.c_street_1, payP->c_street_1, 21);
  strncpy (str->payout.c_street_2, payP->c_street_2, 21);
  strncpy (str->payout.c_city, payP->c_city, 21);
  strncpy (str->payout.c_state, payP->c_state, 3);
  strncpy (str->payout.c_zip, payP->c_zip, 10);
  strncpy (str->payout.c_phone, payP->c_phone, 17);
  strncpy (str->payout.c_since, (char*)payP->c_since_d, 11);
  strncpy (str->payout.c_credit, payP->c_credit, 3);
  str->payout.c_credit_lim = (float)(payP->c_credit_lim)/100;
  str->payout.c_discount = payP->c_discount;
  str->payout.c_balance = (float)(payP->c_balance)/100;
  strncpy (str->payout.c_data, payP->c_data, 201);
  strncpy (str->payout.h_date, (char*)payP->h_date, 20);
  str->payout.retry = payP->retries;

  return (0);

}



TPCord (cnP, str)
void *cnP;
struct ordstruct *str;
```

```
{
  ora_cn_data_t *cn_dataP = (ora_cn_data_t *)cnP;
  global_order_t *ordP = cn_dataP->ordP;
  int i;

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

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

  str->ordout.terror = NOERR;
  str->ordout.c_id = ordP->c_id;
  strncpy (str->ordout.c_last, ordP->c_last, 17);
  strncpy (str->ordout.c_first, ordP->c_first, 17);
  strncpy (str->ordout.c_middle, ordP->c_middle, 3);
  str->ordout.c_balance = ordP->c_balance/100;
  str->ordout.o_id = ordP->o_id;
  strncpy (str->ordout.o_entry_d, (char*)ordP->o_entry_d, 20);
  if ( ordP->o_carrier_id == 11 )
     str->ordout.o_carrier_id = 0;
  else
     str->ordout.o_carrier_id = ordP->o_carrier_id;
  str->ordout.o_ol_cnt = ordP->o_ol_cnt;
  for (i = 0; i < ordP->o_ol_cnt; i++) {
    ordP->ol_delivery_d[i][10] = '\0';
    if ( !strcmp((char*)ordP->ol_delivery_d[i],"01-01-1811") )
                  strncpy((char*)ordP->ol_delivery_d[i],"NOT DELIVR",10);
    str->ordout.ol_supply_w_id[i] = ordP->ol_supply_w_id[i];
    str->ordout.ol_i_id[i] = ordP->ol_i_id[i];
    str->ordout.ol_quantity[i] = ordP->ol_quantity[i];
    str->ordout.ol_amount[i] = (float)(ordP->ol_amount[i])/100;
    strncpy (str->ordout.ol_delivery_d[i], (char*)ordP->ol_delivery_d[i], 11);
  }
  str->ordout.retry = ordP->retries;

  return (0);
}



TPCdel (cnP, str)
void *cnP;
struct delstruct *str;

{
  ora_cn_data_t *cn_dataP = (ora_cn_data_t *)cnP;
  global_delivery_t *delP = cn_dataP->delP;
  OCIError *errhp = cn_dataP->errhp;
  double tr_end, tr_begin;
  int i, skipped;
  struct timeval cur_time;
  static int tran_cntr=0;
  int pos, len;
  int queue_time, start_time, end_time;
  char stdout_buf[1024];

  /*  Open the delivery log file if needed  */
  if (lfp == NULL) {
    DVRY_LOCK;
    if (lfp == NULL) {
                  err_printf("TPCdel: delivery_file_name is %s\n", delivery_file_name);
      if ((lfp = fopen (delivery_file_name, "w")) == NULL) {
        fprintf (stderr, "Error in TPC-C server: Failed to open %s\n",
                delivery_file_name);
        DVRY_UNLOCK;
        return(-1);
      }
      err_printf("Opened delivery file %s\n", delivery_file_name);
    }
    DVRY_UNLOCK;
  }

#ifndef USE_ORACLE_DVRY_FORMAT
  gettimeofday(&cur_time, NULL);
  tr_begin = (double)cur_time.tv_sec + 1.0e-6 * (double)cur_time.tv_usec;
  start_time = cur_time.tv_sec;
#endif

  delP->w_id = str->delin.w_id;
  delP->o_carrier_id = str->delin.o_carrier_id;
  delP->retries = 0;
/*
  vgetdate(cr_date);  */
  OCIERROR(errhp,OCIDateSysDate(errhp,&delP->cr_date));
  if (str->delout.terror = tkvcd (cn_dataP)) {
    if(str->delout.terror == DEL_ERROR)
      return DEL_ERROR;
    if (str->delout.terror != RECOVERR)
      str->delout.terror = IRRECERR;
    return (-1);
  }

#ifdef USE_ORACLE_DVRY_FORMAT
  tr_end = gettime ();
  DVRY_LOCK;
  fprintf (lfp, "%d %d %f %f %d %d", str->delin.in_timing_int,
          (tr_end - str->delin.qtime) <= DELRT ? 1 : 0,
          str->delin.qtime, tr_end, delP->w_id, delP->o_carrier_id);
  for (i = 0; i < 10; i++) {
     fprintf (lfp, " %d %d", i + 1, delP->del_o_id[i]);
     if (delP->del_o_id[i] <= 0) {
#ifdef TUX
        userlog ("DELIVERY: no new order for w_id: %d, d_id %d\n",
                delP->w_id, i + 1);
#else
        fprintf (stderr, "DELIVERY: no new order for w_id: %d, d_id %d\n",
                delP->w_id, i + 1);
#endif
     }
  }
  fprintf (lfp, " %d\n", delP->retries);

#else  /* not USE_ORACLE_DVRY_FORMAT */
  gettimeofday(&cur_time, NULL);
  tr_end = (double)cur_time.tv_sec + 1.0e-6 * (double)cur_time.tv_usec;
  end_time = cur_time.tv_sec;

  queue_time = str->delin.qtime;
  pos = 0;

  DVRY_LOCK;
  ++tran_cntr;

  pos += sprintf(&stdout_buf[pos], "--Tran %d Queue %.3f Start %.3f\n",
                tran_cntr, str->delin.qtime, tr_begin);
  pos += sprintf(&stdout_buf[pos], "W_ID: %d, CARRIER_ID: %d",
                str->delin.w_id, str->delin.o_carrier_id);

  if (str->delout.terror == DEL_ERROR) {
    pos += sprintf(&stdout_buf[pos],
                  "\nDelivery transaction failed (DEL_ERROR)\n");
  } else if (str->delout.terror != 0) {
    pos += sprintf(&stdout_buf[pos], "Delivery transaction failed (%d)",
                  str->delout.terror);
  } else {
    int skipped[10];
    int num_skipped = 0;
    for (i = 0; i < 10; i++) {
       if (delP->del_o_id[i] <= 0) {
          skipped[i] = 1;
          num_skipped ++;
       } else {
          skipped[i] = 0;
       }
       pos += sprintf(&stdout_buf[pos], " %d", delP->del_o_id[i]);
    }
    pos += sprintf(&stdout_buf[pos], "\n");
    if (num_skipped > 0) {
       for (i=0; i<10; i++) {
          if (skipped[i] == 1) {
             pos += sprintf(&stdout_buf[pos],
                          "D_ID %d has no new orders.\n", i+1);
          }
       }
    }
  }

  fprintf(lfp, "%send-time: %.3f\n", stdout_buf, tr_end);
  fflush (lfp);
#endif /* USE_ORACLE_DVRY_FORMAT */

  DVRY_UNLOCK;
  str->delout.terror = NOERR;
  str->delout.retry = delP->retries;

  return (0);

}



TPCsto (cnP, str)
void *cnP;
struct stostruct *str;

{
  ora_cn_data_t *cn_dataP = (ora_cn_data_t *)cnP;
  global_stock_t *stoP = cn_dataP->stoP;

  stoP->w_id = str->stoin.w_id;
  stoP->d_id = str->stoin.d_id;
  stoP->threshold = str->stoin.threshold;
```

```
  stoP->retries = 0;

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

  str->stoout.terror = NOERR;
  str->stoout.low_stock = stoP->low_stock;
  str->stoout.retry = stoP->retries;

  return (0);

}
```

## views.sql

```
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 customer c, warehouse 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 district d, warehouse w
  where w.w_id = d.d_w_id
/

create  or replace view stock_item
(i_id, s_w_id, i_price, i_name, i_data, s_data, s_quantity,
 s_order_cnt, s_ytd, s_remote_cnt,
 s_dist_01, s_dist_02, s_dist_03, s_dist_04, s_dist_05,
 s_dist_06, s_dist_07, s_dist_08, s_dist_09, s_dist_10)
as
 select i.i_id, s_w_id, i.i_price, i.i_name, i.i_data, s_data, s_quantity,
 s_order_cnt, s_ytd, s_remote_cnt,
 s_dist_01, s_dist_02, s_dist_03, s_dist_04, s_dist_05,
 s_dist_06, s_dist_07, s_dist_08, s_dist_09, s_dist_10
  from stock s, item i
 where i.i_id = s.s_i_id
/
exit
```

# APPENDIX B: Tunable Parameters

## B.1 Database Parameters

```
# $Header: p_run.ora 7030100.1 95/07/14 18:49:15 plai Generic<base> $ Copyr (c) 1993 Oracle
#
#==================================================================+
#       Copyright (c) 1995  Oracle Corp, Redwood Shores, CA                          |
#               OPEN SYSTEMS PERFORMANCE GROUP                                      |
#                   All Rights Reserved                                             |
#==================================================================+
# FILENAME
#      p_run.ora
# DESCRIPTION
#      Oracle parameter file for running TPC-C.
#===================================================================
#
control_files       = /dev/rtpc_lvcntl1, /dev/rtpc_lvcntl2, /dev/rtpc_lvcntl3

statistics_level = basic
log_parallelism = 4
timed_statistics=FALSE
remote_login_passwordfile=shared
java_pool_size          = 1M
disk_asynch_io          = TRUE
db_writer_processes     = 8
recovery_parallelism    = 32
parallel_max_servers              = 200
#9i
_lgwr_async_io                                  = FALSE
_db_writer_chunk_writes        = 1000
_db_writer_max_writes    = 1000
_db_aging_hot_criteria   = 2
db_block_checksum = FALSE
trace_enabled = FALSE
enqueue_resources                 = 60000
compatible              = 9.2.0.0.0
db_name                 = tpcc
db_files                = 2000
db_block_size           = 4096
dml_locks               = 500

hash_join_enabled                 = FALSE

log_archive_start       = FALSE
log_checkpoint_timeout   = 0
log_checkpoint_interval  = 1000000000
log_checkpoints_to_alert = TRUE
max_rollback_segments    = 1250
max_dump_file_size       = 3000
open_cursors            = 2000
processes               = 2000
sessions                = 2250
transactions            = 6000

transactions_per_rollback_segment = 1

cursor_space_for_time    = TRUE
replication_dependency_tracking = FALSE

shared_pool_size        = 500000000

db_cache_size =     29057M
db_16k_cache_size               =     25943M
db_keep_cache_size = 178000M
db_recycle_cache_size = 1000M
_db_block_max_dirty_target  = 30670848 # db_block_buffers/2

log_buffer              = 33554432 # 1.0M x cpu

_disable_incremental_checkpoints = TRUE

lock_sga = TRUE

# DB Writer inportant parameters
_db_aging_stay_count                            =                1
####

transaction_auditing=false
db_file_multiblock_read_count=1

_log_simultaneous_copies=32

rollback_segments       = (t1,t2,t3,t4,t5,t6,t7,t8,t9,t10, \
t11,t12,t13,t14,t15,t16,t17,t18,t19,t20, \
t21,t22,t23,t24,t25,t26,t27,t28,t29,t30, \
t31,t32,t33,t34,t35,t36,t37,t38,t39,t40, \
t41,t42,t43,t44,t45,t46,t47,t48,t49,t50, \
t51,t52,t53,t54,t55,t56,t57,t58,t59,t60, \
t61,t62,t63,t64,t65,t66,t67,t68,t69,t70, \
t71,t72,t73,t74,t75,t76,t77,t78,t79,t80, \
t81,t82,t83,t84,t85,t86,t87,t88,t89,t90, \
t91,t92,t93,t94,t95,t96,t97,t98,t99,t100, \
t101,t102,t103,t104,t105,t106,t107,t108,t109,t110, \
t111,t112,t113,t114,t115,t116,t117,t118,t119,t120, \
t121,t122,t123,t124,t125,t126,t127,t128,t129,t130, \
t131,t132,t133,t134,t135,t136,t137,t138,t139,t140, \
t141,t142,t143,t144,t145,t146,t147,t148,t149,t150, \
t151,t152,t153,t154,t155,t156,t157,t158,t159,t160, \
t161,t162,t163,t164,t165,t166,t167,t168,t169,t170, \
t171,t172,t173,t174,t175,t176,t177,t178,t179,t180, \
t181,t182,t183,t184,t185,t186,t187,t188,t189,t190, \
t191,t192,t193,t194,t195,t196,t197,t198,t199,t200, \
t201,t202,t203,t204,t205,t206,t207,t208,t209,t210, \
t211,t212,t213,t214,t215,t216,t217,t218,t219,t220, \
t221,t222,t223,t224,t225,t226,t227,t228,t229,t230, \
t231,t232,t233,t234,t235,t236,t237,t238,t239,t240, \
t241,t242,t243,t244,t245,t246,t247,t248,t249,t250, \
t251,t252,t253,t254,t255,t256,t257,t258,t259,t260, \
t261,t262,t263,t264,t265,t266,t267,t268,t269,t270, \
t271,t272,t273,t274,t275,t276,t277,t278,t279,t280, \
t281,t282,t283,t284,t285,t286,t287,t288,t289,t290, \
t291,t292,t293,t294,t295,t296,t297,t298,t299,t300, \
t301,t302,t303,t304,t305,t306,t307,t308,t309,t310, \
t311,t312,t313,t314,t315,t316,t317,t318,t319,t320, \
t321,t322,t323,t324,t325,t326,t327,t328,t329,t330, \
t331,t332,t333,t334,t335,t336,t337,t338,t339,t340, \
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t611,t612,t613,t614,t615,t616,t617,t618,t619,t620, \
t621,t622,t623,t624,t625,t626,t627,t628,t629,t630, \
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t671,t672,t673,t674,t675,t676,t677,t678,t679,t680, \
t681,t682,t683,t684,t685,t686,t687,t688,t689,t690, \
t691,t692,t693,t694,t695,t696,t697,t698,t699,t700, \
t701,t702,t703,t704,t705,t706,t707,t708,t709,t710, \
t711,t712,t713,t714,t715,t716,t717,t718,t719,t720, \
t721,t722,t723,t724,t725,t726,t727,t728,t729,t730, \
t731,t732,t733,t734,t735,t736,t737,t738,t739,t740, \
t741,t742,t743,t744,t745,t746,t747,t748,t749,t750, \
t751,t752,t753,t754,t755,t756,t757,t758,t759,t760, \
t761,t762,t763,t764,t765,t766,t767,t768,t769,t770, \
t771,t772,t773,t774,t775,t776,t777,t778,t779,t780, \
t781,t782,t783,t784,t785,t786,t787,t788,t789,t790, \
t791,t792,t793,t794,t795,t796,t797,t798,t799,t800, \
t801,t802,t803,t804,t805,t806,t807,t808,t809,t810, \
t811,t812,t813,t814,t815,t816,t817,t818,t819,t820, \
t821,t822,t823,t824,t825,t826,t827,t828,t829,t830, \
t831,t832,t833,t834,t835,t836,t837,t838,t839,t840, \
t841,t842,t843,t844,t845,t846,t847,t848,t849,t850, \
t851,t852,t853,t854,t855,t856,t857,t858,t859,t860, \
t861,t862,t863,t864,t865,t866,t867,t868,t869,t870, \
t871,t872,t873,t874,t875,t876,t877,t879,t880, \
t881,t882,t883,t884,t885,t886,t887,t888,t889,t890, \
t891,t892,t893,t894,t895,t896,t897,t898,t899,t900, \
t901,t902,t903,t904,t905,t906,t907,t908,t909,t910, \
t911,t912,t913,t914,t915,t916,t917,t918,t919,t920, \
t921,t922,t923,t924,t925,t926,t927,t929,t930, \
t931,t932,t933,t934,t935,t936,t937,t938,t939,t940, \
t941,t942,t943,t944,t945,t946,t947,t948,t949,t950, \
t951,t952,t953,t954,t955,t956,t957,t958,t959,t960, \
t961,t962,t963,t964,t965,t966,t967,t968,t969,t970, \
t971,t972,t973,t974,t975,t976,t977,t978,t979,t980, \
t981,t982,t983,t984,t985,t986,t987,t988,t989,t990, \
t991,t992,t993,t994,t995,t996,t997,t998,t999,t1000)
```

## B.2 Transaction Monitor Parameters

**tpccrc**

```
CellLogVolume ecmlog
CellDataVolume ecmdata
```

```
NodeLogVolume enmlog
TpccApplicationDirectory /home/encina
TpccDbServer oratpcc.world
StatsFrequency 10
Version 1.0
Servers:delivery PAS 2 Threads 3 Name del IFS ---D- Dvry 2
Servers:1online PAS 38 Threads 1 Name on1 IFS NPO-S Dvry 0
```

# B.3 AIX Parameters

## BULL ESCALA PL3200R

OS PARAMETERS

```
keylock      normal        State of system keylock at boot time              False
maxbuf       20            Maximum number of pages in block I/O BUFFER CACHE True
maxmbuf      0             Maximum Kbytes of real memory allowed for MBUFS   True
maxuproc     8192          Maximum number of PROCESSES allowed per user      True
autorestart  false         Automatically REBOOT system after a crash         True
iostat       false         Continuously maintain DISK I/O history            True
realmem      268435456     Amount of usable physical memory in Kbytes        False
conslogin    enable        System Console Login                              False
fwversion    IBM,H2020228B Firmware version and revision levels              False
maxpout      0             HIGH water mark for pending write I/Os per file   True
minpout      0             LOW water mark for pending write I/Os per file    True
fullcore     false         Enable full CORE dump                             True
pre430core   false         Use pre-430 style CORE dump                       True
ncargs       60            ARG/ENV list size in 4K byte blocks               True
rtasversion  1             Open Firmware RTAS version                        False
modelname    IBM,7040-681  Machine name                                      False
systemid     IBM,010YHRH0G Hardware system identifier                        False
boottype     disk          N/A                                               False
SW_dist_intr false         Enable SW distribution of interrupts              True
cpuguard     disable       CPU Guard                                         True
frequency    433000000     System Bus Frequency                              False

vmtune -S 1
vmtune -L 926 -g 268435456
chuser capabilities=CAP_BYPASS_RAC_VMM,CAP_PROPOGATE  oracle
```

# Appendix C: Database Setup Code

## C.1 Database Creation Scripts

### addfile.sh

```
#
# addfile.sh 7030100.1 96/05/02 10:30:04 plai Generic<base> $ Copyr (c) 1995 Oracle
#
#==================================================================+
#       Copyright (c) 1996  Oracle Corp, Redwood Shores, CA         |
#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                    All Rights Reserved                            |
#==================================================================+
# FILENAME
#     addfile.sh
# DESCRIPTION
#     Add datafile to a tablespace.
# USAGE
#     addfile.sh <tablespace> <data file> <size>
#==================================================================*/
. setenv
FILE=`basename $2`

if [ -d ./outdir ]
then
  echo `date` > ./outdir/${FILE}.addf
fi

sqlsys  <<!
  set echo on
  alter tablespace $1 add datafile '$2' size $3 reuse;
  exit;
!

if [ -d ./outdir ]
then
  echo `date` >> ./outdir/${FILE}.addf
fi
```

### addfs.sh

```
#!/bin/ksh
#==================================================================+
#       Copyright (c) 1996  Oracle Corp, Redwood Shores, CA         |
#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                    All Rights Reserved                            |
#==================================================================+
# FILENAME
#     addfs.sh
# DESCRIPTION
#     Add tablespace to database.
# USAGE
#     addfs.sh <tablespace> <data file> <size> <# of files>
#==================================================================*/

. setenv

tablespace=$1
datafile=$2
size=$3
nfiles=$4
let total=$nfiles+1

i=2
while [ $i -le $total ]
do
   j=1
   while [ $j -le 70 ]
   do
      if [ $i -le $total ]
      then
         echo "addfile.sh $tablespace ${datafile}$i $size"
         addfile.sh $tablespace ${datafile}$i $size &
         let i=$i+1
         let j=$j+1
      else
         j=21
      fi
   done
   wait
done
```

### addroll.sh

```
#!/bin/ksh
#==================================================================+
#       Copyright (c) 1996  Oracle Corp, Redwood Shores, CA         |
#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                    All Rights Reserved                            |
#==================================================================+
# FILENAME
#     addroll.sh
# DESCRIPTION
#     Add tablespace to database.
# USAGE
#     addroll.sh <data file> <size>
#==================================================================*/
. setenv
echo 'ORACLE_HOME=' $ORACLE_HOME
echo 'ORACLE_SID=' $ORACLE_SID

FILE=`basename $1`

if [ -d ./outdir ]
then
  echo `date` > ./outdir/${FILE}.addts
fi

#   create tablespace roll datafile '$1' size $2 reuse extent management local uniform size 40K nologging ;

sqlsys <<!
  create tablespace roll datafile '$1' size $2 reuse;

  exit;
!

if [ -d ./outdir ]
then
  echo `date` >> ./outdir/${FILE}.addts
fi
```

### addts.sh

```
#!/bin/ksh
#==================================================================+
#       Copyright (c) 1996  Oracle Corp, Redwood Shores, CA         |
#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                    All Rights Reserved                            |
#==================================================================+
# FILENAME
#     addts.sh
# DESCRIPTION
#     Add tablespace to database.
# USAGE
#     addts.sh <tablespace> <data file> <size>
#==================================================================*/
. setenv
FILE=`basename $2`

if [ -d ./outdir ]
then
  echo `date` > ./outdir/${FILE}.addts
fi

sqlsys <<!
  set echo on
  create tablespace $1 datafile '$2' size $3 reuse extent management local uniform size $4 nologging ;

  exit;
!

if [ -d ./outdir ]
then
  echo `date` >> ./outdir/${FILE}.addts
fi
```

### alter_temp.sh

```
#!/bin/ksh

# alter_temp 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle
#
#
#==================================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA         |
#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                    All Rights Reserved                            |
#==================================================================+
# NAME
#     alter_temp.sh
# DESCRIPTION
#     Usage: alter_temp.sh [options]
#==================================================================
```

```
#
. setenv

sqlplus system/manager <<!
  alter user tpcc temporary tablespace temp;
  quit;
!

sqlplus <<!
  connect /as sysdba
  alter tablespace temp
     default storage (initial 20M next 20M pctincrease 0);
#     default storage (initial 5M next 5M pctincrease 0);
  exit;
!
```

## benchdb.sh

```
 #!/bin/ksh
#
# benchdb.sh 8030100 98/7/7 15:45 vmakhija
# Copyr (c) 1998 Oracle
#
#
#==================================================================+
#       Copyright (c) 1997  Oracle Corp, Redwood Shores, CA                        |
#                  OPEN SYSTEMS PERFORMANCE GROUP                                  |
#                       All Rights Reserved                                        |
#==================================================================+
# FILENAME
#      benchdb.sh
# DESCRIPTION
#      Usage: benchdb.sh [options]
#            -n          do not create new tpcc database
#            -c          do not run catalog scripts
#================================================================
#
. setenv


while [ "$#" != "0" ]
do
  case $1 in
     -n) shift
        NO_CREATE="y"
        ;;
     -c) shift
        NO_CAT="y"
        ;;
      *) echo "Bad arg: $1"
        exit 1;
        ;;
  esac
done


#
# Create database if NO_CREATE unset
#

if [ "$NO_CREATE" = "" ]
then
sqlsys  <<!
       set echo on
       startup  pfile=$TPCC_ADMIN/p_create.ora  nomount
       create database tpcc controlfile reuse maxdatafiles 1800
           datafile '/dev/rtpc_lvsystem1' size 4159M reuse
       DEFAULT TEMPORARY TABLESPACE temp
           TEMPFILE '/dev/rtpc_lvtemp1'   size   6271M reuse
           EXTENT MANAGEMENT LOCAL UNIFORM SIZE 16M
           logfile  '/dev/rtpc_redolog1' size 4000M reuse,
                    '/dev/rtpc_redolog2' size 4000M reuse;
       exit
!
#
#
# Create more rollback segments
# Not in 9i
sqlsys  <<!
  create rollback segment s1  storage (initial 200k minextents 2 next 200k);
  create rollback segment s2  storage (initial 200k minextents 2 next 200k);
  create rollback segment s3  storage (initial 200k minextents 2 next 200k);
  create rollback segment s4  storage (initial 200k minextents 2 next 200k);
  create rollback segment s5  storage (initial 200k minextents 2 next 200k);
  create rollback segment s6  storage (initial 200k minextents 2 next 200k);
  create rollback segment s7  storage (initial 200k minextents 2 next 200k);
  create rollback segment s8  storage (initial 200k minextents 2 next 200k);
  create rollback segment s9  storage (initial 200k minextents 2 next 200k);
  create rollback segment s10 storage (initial 200k minextents 2 next 200k);
  create rollback segment s11 storage (initial 200k minextents 2 next 200k);
  create rollback segment s12 storage (initial 200k minextents 2 next 200k);
  create rollback segment s13 storage (initial 200k minextents 2 next 200k);
  create rollback segment s14 storage (initial 200k minextents 2 next 200k);
  create rollback segment s15 storage (initial 200k minextents 2 next 200k);
  create rollback segment s16 storage (initial 200k minextents 2 next 200k);
  create rollback segment s17 storage (initial 200k minextents 2 next 200k);
  create rollback segment s18 storage (initial 200k minextents 2 next 200k);
  create rollback segment s19 storage (initial 200k minextents 2 next 200k);
  create rollback segment s20 storage (initial 200k minextents 2 next 200k);
  create rollback segment s21 storage (initial 200k minextents 2 next 200k);
  create rollback segment s22 storage (initial 200k minextents 2 next 200k);
  create rollback segment s23 storage (initial 200k minextents 2 next 200k);
  create rollback segment s24 storage (initial 200k minextents 2 next 200k);
  create rollback segment s25 storage (initial 200k minextents 2 next 200k);
  create rollback segment s26 storage (initial 200k minextents 2 next 200k);
  create rollback segment s27 storage (initial 200k minextents 2 next 200k);
  create rollback segment s28 storage (initial 200k minextents 2 next 200k);
  create rollback segment s29 storage (initial 200k minextents 2 next 200k);
  create rollback segment s30 storage (initial 200k minextents 2 next 200k);
  create rollback segment s31 storage (initial 200k minextents 2 next 200k);
  create rollback segment s32 storage (initial 200k minextents 2 next 200k);
  create rollback segment s33 storage (initial 200k minextents 2 next 200k);
  create rollback segment s34 storage (initial 200k minextents 2 next 200k);
  create rollback segment s35 storage (initial 200k minextents 2 next 200k);
  create rollback segment s36 storage (initial 200k minextents 2 next 200k);
  create rollback segment s37 storage (initial 200k minextents 2 next 200k);
  create rollback segment s38 storage (initial 200k minextents 2 next 200k);
  create rollback segment s39 storage (initial 200k minextents 2 next 200k);
  create rollback segment s40 storage (initial 200k minextents 2 next 200k);
  create rollback segment s41 storage (initial 200k minextents 2 next 200k);
  create rollback segment s42 storage (initial 200k minextents 2 next 200k);
  create rollback segment s43 storage (initial 200k minextents 2 next 200k);
  create rollback segment s44 storage (initial 200k minextents 2 next 200k);
  create rollback segment s45 storage (initial 200k minextents 2 next 200k);
  create rollback segment s46 storage (initial 200k minextents 2 next 200k);
  create rollback segment s47 storage (initial 200k minextents 2 next 200k);
  create rollback segment s48 storage (initial 200k minextents 2 next 200k);
  create rollback segment s49 storage (initial 200k minextents 2 next 200k);
  create rollback segment s50 storage (initial 200k minextents 2 next 200k);
  create rollback segment s51 storage (initial 200k minextents 2 next 200k);
  create rollback segment s52 storage (initial 200k minextents 2 next 200k);
  create rollback segment s54 storage (initial 200k minextents 2 next 200k);
  create rollback segment s55 storage (initial 200k minextents 2 next 200k);
  create rollback segment s56 storage (initial 200k minextents 2 next 200k);
  create rollback segment s57 storage (initial 200k minextents 2 next 200k);
  create rollback segment s58 storage (initial 200k minextents 2 next 200k);
  create rollback segment s59 storage (initial 200k minextents 2 next 200k);
  create rollback segment s60 storage (initial 200k minextents 2 next 200k);
  shutdown;
  exit;
!


#
#  Startup database with params file that includes new rollback segments
#

sqlsys <<!
       startup pfile=$TPCC_ADMIN/p_build.ora;
       exit;
!

#
#
#
#       Add tablespaces in parallel
#
addroll.sh      /dev/rtpc_lvroll1   3199M &
addts.sh hist   /dev/rtpc_lvhist1     5855M 1171M & # F=5                    MAXE=100
addts.sh ware   /dev/rtpc_lvware1    319M    3M & # F=533MAXE=533
addts.sh cust   /dev/rtpc_lvcust1   1983M  660M & # F=3                      MAXE=1590
addts.sh items  /dev/rtpc_lvitems1     31M    5M & # F=6                      MAXE=6
addts.sh ord    /dev/rtpc_lvord1    6271M 1254M & # F=5                      MAXE=75
addts.sh nord   /dev/rtpc_lvnord1   2111M 2110M & # F=1                      MAXE=5
addts.sh ordl   /dev/rtpc_lvordl1   6175M 1234M & # F=5                      MAXE=1400
addts.sh stocks /dev/rtpc_lvstk1    2623M 1311M & # F=2                      MAXE=980
addts.sh icust1 /dev/rtpc_lvi1cust1 3327M  166M & # F=20MAXE=200
addts.sh icust2 /dev/rtpc_lvi2cust1 2527M  126M & # F=20MAXE=400
addts.sh istk   /dev/rtpc_lvistk1   8863M  443M & # F=20   MAXE=200
addts.sh iord1  /dev/rtpc_lvi1ord1  2719M  135M & # F=20MAXE=400
addts.sh iord2  /dev/rtpc_lvi2ord1  1839M   91M & # F=20 MAXE=880
wait

#
#                    Add datafiles to tablespaces in parallel
#
addfs.sh roll /dev/rtpc_lvroll 3199M 16 &
fi
addfs.sh hist /dev/rtpc_lvhist 5855M 20 &

addfs.sh ware /dev/rtpc_lvware 319M 6 &

addfs.sh cust /dev/rtpc_lvcust 1983M 530 &

addfs.sh ord /dev/rtpc_lvord 6271M 15 &

addfs.sh nord /dev/rtpc_lvnord 2111M 5 &

addfs.sh ordl /dev/rtpc_lvordl 6175M 280 &

addfs.sh stocks /dev/rtpc_lvstk 2623M 490 &
wait

addfs.sh icust1 /dev/rtpc_lvi1cust 3327M 10 &

addfs.sh icust2 /dev/rtpc_lvi2cust 2527M 20 &
```

```
addfs.sh istk /dev/rtpc_lvistk 8863M 10 &

addfs.sh iord1 /dev/rtpc_lvi1ord 2719M 20 &

addfs.sh iord2 /dev/rtpc_lvi2ord 1839M 44 &

addfs_temp.sh temp /dev/rtpc_lvtemp 6271M 53 &
wait

#
# run catalog if NO_CAT unset
#

if [ "$NO_CAT" = "" ]
then
sqlsys <<!
        set echo off;
        @?/rdbms/admin/catalog;
        @?/rdbms/admin/catproc;
        @?/rdbms/admin/catparr;
        exit;
!
fi
```

## benchsetup.sh

```
#!/bin/ksh

# benchsetup 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle
#
#
#==================================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA                          |
#                  OPEN SYSTEMS PERFORMANCE GROUP                                    |
#                       All Rights Reserved                                          |
#==================================================================+
# NAME
#      benchsetup.sh
# DESCRIPTION
#      Usage: benchsetup.sh [options]
#===================================================================
#
. setenv

STEP=0
START=0
END=0
CONTINUE=1
PROGNAME=$0


function usage {
  echo ""
  echo "Usage:       $PROGNAME [<start> <stop>] [<start>] [-step <stepno>]"
  echo "      [<start> <stop>]        - allows user to run a specified"
  echo "                                range of steps."
  echo "      [<start>]               - runs from step number <start> till"
  echo "                                the end of the script."
  echo "      [-step <stepno>]        - runs only step number <stepno> and"
  echo "                                then stops."
  echo ""
  echo "            STEP    FUNCTION"
  echo "-----------------------------------------------------------------"
  echo "            0       Create DB."
  echo "            1       Create user tpcc."
  echo "            2       Create warehouse table."
  echo "            3       Create district table."
  echo "            4       Create history table."
  echo "            5       Create Orders table."
  echo "            6       Create New-order table."
  echo "            7       Create Orderline table."
  echo "            8       Create Item table."
  echo "            9       Create Customer table."
  echo "            10      Create Stock table."
  echo "            11      Create rollback segments."
  echo "            12      Load New-order."
  echo "            13      Load History."
  echo "            14      Load Order/Orderline."
  echo "            15      Load Warehouse."
  echo "            16      Load District."
  echo "            17      Load Item."
  echo "            18      Load Customer."
  echo "            19      Load Stock"
  echo "            20      Alter temp space."
  echo "            21      Create Warehouse index."
  echo "            22      Create District index."
  echo "            23      Create Item index."
  echo "            24      Create Customer index."
  echo "            25      Create Customer2 index."
  echo "            26      Create Stock index."
  echo "            27      Create Orders index."
  echo "            28      Create Orders2 index."
  echo "            29      Create New-order index."
  echo "            30      Create Orderline index."
  echo "            31      Re-alter temp space."
  echo "            32      Analyze."
  echo "            33      Create TPC-C reports tables."
  echo "            34      Create stored procs."
  echo "            35      Space rpts / etc."
  echo "            36      Alter extents and Lock tables."
  echo "            37      Run catalog scripts."
  echo "            38      Shutdown database."
  echo "-----------------------------------------------------------------"

  exit 1;
}

function runnable {
 if [ -a "./stop" ]
 then
   exit 1;
 fi
 if [ $STEP -ge $START ]
 then
   if [ $STEP -le $END ]
   then
      STEP=`expr $STEP + 1`;
      return 0;
   else
      if [ $CONTINUE = 0 ]
      then
        STEP=`expr $STEP + 1`;
        return 0;
      fi
   fi
 fi
 STEP=`expr $STEP + 1`;
 return 1;
}

case $# in
      0)    usage
            CONTINUE=0
            ;;
      1)    case $1 in
                  -h)    usage
                         ;;
                  *)     START=$1
                         CONTINUE=0
                         ;;
            esac
            ;;
      2)    case $1 in
                  -step)  shift
                         START=$1
                         END=$1
                         CONTINUE=1
                         ;;
                  *)     START=$1
                         shift
                         END=$1
                         CONTINUE=1
                         ;;
            esac
            ;;
      *)    usage
            ;;
esac

if [ ! -d $BUILD_HOME ]
then
  mkdir $BUILD_HOME
fi

if [ ! -d $LOAD_SCRIPTS ]
then
  mkdir $LOAD_SCRIPTS
fi



if [ ! -d $OUTDIR ]
then
  mkdir $OUTDIR
fi

date

if runnable
then
${LOAD_SCRIPTS}/benchdb.sh  > ${OUTDIR}/benchdb.out 2>&1
 echo "Switching Logs ..."
 ${TPCC_UTILS}/switchlog.sh >> ${OUTDIR}/switchlog.out 2>&1
fi


if runnable
then
 echo "Creating user ..."
${LOAD_SCRIPTS}/create_user.sh > ${OUTDIR}/create_user.out 2>&1
fi

if runnable
then
 echo "Creating warehouse ..."
```

```
${LOAD_SCRIPTS}/create_ware.sh > ${OUTDIR}/create_ware.out 2>&1
fi

if runnable
then
  echo "Creating district ..."
${LOAD_SCRIPTS}/create_dist.sh > ${OUTDIR}/create_dist.out 2>&1
fi

if runnable
then
  echo "Creating history ..."
${LOAD_SCRIPTS}/create_hist.sh > ${OUTDIR}/create_hist.out 2>&1
fi

if runnable
then
  echo "Creating orders ..."
${LOAD_SCRIPTS}/create_ordr.sh > ${OUTDIR}/create_ordr.out 2>&1
fi

if runnable
then
  echo "Creating new-order ..."
${LOAD_SCRIPTS}/create_nord.sh > ${OUTDIR}/create_nord.out 2>&1
fi

if runnable
then
  echo "Creating order-line ..."
${LOAD_SCRIPTS}/create_ordl.sh > ${OUTDIR}/create_ordl.out 2>&1
fi

if runnable
then
  echo "Creating item ..."
${LOAD_SCRIPTS}/create_item.sh > ${OUTDIR}/create_item.out 2>&1
fi

if runnable
then
  echo "Creating customer ..."
${LOAD_SCRIPTS}/create_cust.sh > ${OUTDIR}/create_cust.out 2>&1 &
fi

if runnable
then
  echo "Creating stock ..."
${LOAD_SCRIPTS}/create_stok.sh > ${OUTDIR}/create_stok.out 2>&1 &
fi

wait

if runnable
then
  echo "Creating rollback segment ..."
${LOAD_SCRIPTS}/tpcc_rol.sh > ${OUTDIR}/tpcc_rol.out 2>&1 &
fi

echo "Switching Logs ..."
${TPCC_UTILS}/switchlog.sh >> ${OUTDIR}/switchlog.out 2>&1

if runnable
then
  echo "Loading new-order ..."
${LOAD_SCRIPTS}/load_nord.sh > ${OUTDIR}/load_nord.out 2>&1
fi

if runnable
then
  echo "Loading history ..."
${LOAD_SCRIPTS}/load_hist.sh > ${OUTDIR}/load_hist.out 2>&1
fi

if runnable
then
  echo "Loading orders and order-line ..."
${LOAD_SCRIPTS}/load_ordr.sh > ${OUTDIR}/load_ordr.out 2>&1
fi

echo "Switching Logs ..."
${TPCC_UTILS}/switchlog.sh >> ${OUTDIR}/switchlog.out 2>&1

if runnable
then
  echo "Loading warehouse ..."
${LOAD_SCRIPTS}/load_ware.sh > ${OUTDIR}/load_ware.out 2>&1
fi

if runnable
then
  echo "Loading district ..."
${LOAD_SCRIPTS}/load_dist.sh > ${OUTDIR}/load_dist.out 2>&1
fi

if runnable
then
  echo "Loading item ..."
${LOAD_SCRIPTS}/load_item.sh > ${OUTDIR}/load_item.out 2>&1
fi

if runnable
then
  echo "Loading customer ..."
${LOAD_SCRIPTS}/load_cust.sh > ${OUTDIR}/load_cust.out 2>&1
fi

if runnable
then
  echo "Loading stock ..."
${LOAD_SCRIPTS}/load_stok.sh > ${OUTDIR}/load_stok.out 2>&1
fi

wait

echo "Switching Logs ..."
${TPCC_UTILS}/switchlog.sh >> ${OUTDIR}/switchlog.out 2>&1


if runnable
then
  echo "Alter temp ..."
${LOAD_SCRIPTS}/alter_temp.sh > ${OUTDIR}/alter_temp.out 2>&1
fi

if runnable
then
  echo "Creating warehouse index ..."
${LOAD_SCRIPTS}/create_iware.sh > ${OUTDIR}/create_iware.out 2>&1
fi

if runnable
then
  echo "Creating district index ..."
${LOAD_SCRIPTS}/create_idist.sh > ${OUTDIR}/create_idist.out 2>&1
fi

if runnable
then
  echo "Creating item index ..."
${LOAD_SCRIPTS}/create_iitem.sh > ${OUTDIR}/create_iitem.out 2>&1
fi

if runnable
then
  echo "Creating customer index ..."
${LOAD_SCRIPTS}/create_icust.sh > ${OUTDIR}/create_icust.out 2>&1
fi

if runnable
then
  echo "Creating customer2 index ..."
${LOAD_SCRIPTS}/create_icust2.sh > ${OUTDIR}/create_icust2.out 2>&1
fi

if runnable
then
  echo "Creating stock index ..."
${LOAD_SCRIPTS}/create_istok.sh > ${OUTDIR}/create_istok.out 2>&1
fi

if runnable
then
  echo "Creating orders index ..."
${LOAD_SCRIPTS}/create_iordr.sh > ${OUTDIR}/create_iordr.out 2>&1
fi

if runnable
then
  echo "Creating orders2 index ..."
${LOAD_SCRIPTS}/create_iordr2.sh > ${OUTDIR}/create_iordr2.out 2>&1
fi

if runnable
then
echo "No need to create inord"
#${LOAD_SCRIPTS}/create_inord.sh > ${OUTDIR}/create_inord.out 2>&1
fi

if runnable
then
echo "No need to create iordl"
#${LOAD_SCRIPTS}/create_iordl.sh > ${OUTDIR}/create_iordl.out 2>&1
fi

if runnable
then
  echo "Re-alter temp ..."
${LOAD_SCRIPTS}/realter_temp.sh > ${OUTDIR}/realter_temp.out 2>&1
fi


if runnable
then
  echo "Analyze ..."
sqlplus tpcc/tpcc @$TPCC_SQL/tpcc_ana > ${OUTDIR}/tpcc_ana.out 2>&1
fi
```

```
if runnable
then
  echo "Creating report tables ..."
${LOAD_SCRIPTS}/tpcc_reports.sh > ${OUTDIR}/tpcc_reports.out 2>&1
fi

if runnable
then
  echo "Creating stored procs ..."
${LOAD_SCRIPTS}/tpcc_stored_proc.sh > ${OUTDIR}/tpcc_stored_prod.out 2>&1
$TPCC_UTILS/create_cache_views.sh > ${OUTDIR}/create_cache_views.out 2>&1
fi

if runnable
then
  echo "Space rpts / etc. ..."
${LOAD_SCRIPTS}/tpcc_misc.sh > ${OUTDIR}/tpcc_misc.out 2>&1
fi

if runnable
then
  echo "Alter extents and lock ..."
#${LOAD_SCRIPTS}/alter.sh > ${OUTDIR}/alter.out 2>&1
${LOAD_SCRIPTS}/altundef.sh > ${OUTDIR}/altundef.out 2>&1
${TPCC_UTILS}/dml.sh > ${OUTDIR}/dml.out 2>&1
fi

if runnable
then
  echo "Running catalog scripts ..."
${LOAD_SCRIPTS}/cat.sh > ${OUTDIR}/cat.out 2>&1
fi

if runnable
then
sqlsys <<!
   alter system switch logfile;
   alter system switch logfile;
   shutdown;
   exit;
!
fi

date
```

## cat.sh

```
#!/bin/ksh

# benchsetup 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle
#
#
#==================================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA         |
#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                     All Rights Reserved                           |
#==================================================================+
# NAME
#      benchsetup
# DESCRIPTION
#      Usage: benchsetup.sh [options]
#================================================================
#
. setenv

sqlsys <<!
   set echo off;
   @?/rdbms/admin/catparr;
   exit;
!
```

## create_cust.sh

```
#!/bin/ksh
#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
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#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                     All Rights Reserved                           |
#==================================================================+
# FILENAME
#      create_cust.sh
# DESCRIPTION
#      Usage: create_cust.sh
#
#================================================================
#
. setenv

sqlplus tpcc/tpcc @cust
```

## create_dist.sh

```
#!/bin/ksh

#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
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#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                     All Rights Reserved                           |
#==================================================================+
# FILENAME
#      create_dist.sh
# DESCRIPTION
#      Usage: create_dist.sh
#
#================================================================
#
. setenv

sqlplus tpcc/tpcc @dist
```

## create_hist.sh

```
#!/bin/ksh
#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
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#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA         |
#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                     All Rights Reserved                           |
#==================================================================+
# FILENAME
#      create_hist.sh
# DESCRIPTION
#      Usage: create_hist.sh
#
#================================================================
#
. setenv

sqlplus tpcc/tpcc @hist
```

## create_icust.sh

```
#!/bin/ksh

#
# 80301 98/7/7 15:45 vmakhija
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#
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#                     All Rights Reserved                           |
#==================================================================+
# FILENAME
#      create_icust.sh
# DESCRIPTION
#      Usage: create_icust.sh
#
#================================================================
#
. setenv

sqlplus tpcc/tpcc @icust
```

## create_icust2.sh

```
#!/bin/ksh

#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
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#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                     All Rights Reserved                           |
#==================================================================+
# FILENAME
#      create_icust2.sh
# DESCRIPTION
#      Usage: create_icust2.sh
```

```
#
#==============================================================
#
. setenv

sqlplus tpcc/tpcc @icust2
```

## create_idist.sh

```
#!/bin/ksh

#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
#==============================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA     |
#               OPEN SYSTEMS PERFORMANCE GROUP                  |
#                   All Rights Reserved                         |
#==============================================================+
# FILENAME
#       create_idist.sh
# DESCRIPTION
#       Usage: create_idist.sh
#
#==============================================================
#
. setenv

sqlplus tpcc/tpcc @idist
```

## create_iitem.sh

```
#!/bin/ksh

#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
#==============================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA     |
#               OPEN SYSTEMS PERFORMANCE GROUP                  |
#                   All Rights Reserved                         |
#==============================================================+
# FILENAME
#       create_iitem.sh
# DESCRIPTION
#       Usage: create_iitem.sh
#
#==============================================================
#
. setenv

sqlplus tpcc/tpcc @iitem
```

## create_iordr.sh

```
#!/bin/ksh

#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
#==============================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA     |
#               OPEN SYSTEMS PERFORMANCE GROUP                  |
#                   All Rights Reserved                         |
#==============================================================+
# FILENAME
#       create_iordr.sh
# DESCRIPTION
#       Usage: create_iordr.sh
#
#==============================================================
#
. setenv

sqlplus tpcc/tpcc @iordr
```

## create_iordr2.sh

```
#!/bin/ksh
#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
#==============================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA     |
#               OPEN SYSTEMS PERFORMANCE GROUP                  |
#                   All Rights Reserved                         |
#==============================================================+
# FILENAME
#       create_iordr2.sh
# DESCRIPTION
#       Usage: create_iordr2.sh
#
#==============================================================
#
. setenv

sqlplus tpcc/tpcc @iordr2
```

## create_istok.sh

```
#!/bin/ksh

#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
#==============================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA     |
#               OPEN SYSTEMS PERFORMANCE GROUP                  |
#                   All Rights Reserved                         |
#==============================================================+
# FILENAME
#       create_istok.sh
# DESCRIPTION
#       Usage: create_istok.sh
#
#==============================================================
#
. setenv

sqlplus tpcc/tpcc @istok
```

## create.item.sh

```
#!/bin/ksh

#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
#==============================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA     |
#               OPEN SYSTEMS PERFORMANCE GROUP                  |
#                   All Rights Reserved                         |
#==============================================================+
# FILENAME
#       create_item.sh
# DESCRIPTION
#       Usage: create_item.sh
#
#==============================================================
#
. setenv

sqlplus tpcc/tpcc @item
```

## create_iware.sh

```
#!/bin/ksh

#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
#==============================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA     |
#               OPEN SYSTEMS PERFORMANCE GROUP                  |
#                   All Rights Reserved                         |
#==============================================================+
# FILENAME
#       create_iware.sh
# DESCRIPTION
#       Usage: create_iware.sh
#
#==============================================================
#
. setenv

sqlplus tpcc/tpcc @iware
```

## create_nord.sh

```
#!/bin/ksh

#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
#==============================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA     |
#               OPEN SYSTEMS PERFORMANCE GROUP                  |
#                   All Rights Reserved                         |
#==============================================================+
```

```
# FILENAME
#     create_nord.sh
# DESCRIPTION
#     Usage: create_nord.sh
#
#==============================================================
#
. setenv

sqlplus tpcc/tpcc @nord
```

## create_ordl.sh

```
#!/bin/ksh

#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
#==============================================================+
#      Copyright (c) 1998  Oracle Corp, Redwood Shores, CA      |
#              OPEN SYSTEMS PERFORMANCE GROUP                   |
#                  All Rights Reserved                          |
#==============================================================+
# FILENAME
#     create_ordl.sh
# DESCRIPTION
#     Usage: create_ordl.sh
#
#==============================================================
#
. setenv

sqlplus tpcc/tpcc @ordl
```

## create_ordr.sh

```
#!/bin/ksh

#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
#==============================================================+
#      Copyright (c) 1998  Oracle Corp, Redwood Shores, CA      |
#              OPEN SYSTEMS PERFORMANCE GROUP                   |
#                  All Rights Reserved                          |
#==============================================================+
# FILENAME
#     create_ordr.sh
# DESCRIPTION
#     Usage: create_ordr.sh
#
#==============================================================
#
. setenv

sqlplus tpcc/tpcc @ordr
```

## create_stok.sh

```
#!/bin/ksh

#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
#==============================================================+
#      Copyright (c) 1998  Oracle Corp, Redwood Shores, CA      |
#              OPEN SYSTEMS PERFORMANCE GROUP                   |
#                  All Rights Reserved                          |
#==============================================================+
# FILENAME
#     create_stok.sh
# DESCRIPTION
#     Usage: create_stok.sh
#
#==============================================================
#
. setenv

sqlplus tpcc/tpcc @stok
```

## create_user.sh

```
#!/bin/ksh

#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
#==============================================================+
#      Copyright (c) 1998  Oracle Corp, Redwood Shores, CA      |
#              OPEN SYSTEMS PERFORMANCE GROUP                   |
#                  All Rights Reserved                          |
#==============================================================+
# FILENAME
#     create_user.sh
# DESCRIPTION
#     Usage: create_user.sh
#         create tpcc user on DB
#==============================================================
#
. setenv

#
# ==============================================================+
#      Copyright (c) 1997  Oracle Corp, Redwood Shores, CA      |
#              OPEN SYSTEMS PERFORMANCE GROUP                   |
#                  All Rights Reserved                          |
# ==============================================================+
#  FILENAME
#     tpcc_user.sql
#  DESCRIPTION
#     Create user for TPC-C database.
# ==============================================================
#
#
#
# Create TPCC userid and connect to it.
#
sqlsys <<!
      grant connect,resource,unlimited tablespace to tpcc identified by tpcc;
      alter user tpcc temporary tablespace temp;
      connect tpcc/tpcc;
      exit;
!
```

## create_ware.sh

```
#!/bin/ksh

#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
#==============================================================+
#      Copyright (c) 1998  Oracle Corp, Redwood Shores, CA      |
#              OPEN SYSTEMS PERFORMANCE GROUP                   |
#                  All Rights Reserved                          |
#==============================================================+
# FILENAME
#     create_ware.sh
# DESCRIPTION
#     Usage: create_ware.sh
#
#==============================================================
#
. setenv

sqlplus tpcc/tpcc @ware
```

## dml.sh

```
#
# $Header: dml.sh 7030100.1 96/05/02 10:22:52 plai Generic<base> $ Copyr (c) 1995 Oracle
#

#==============================================================+
#      Copyright (c) 1996  Oracle Corp, Redwood Shores, CA      |
#              OPEN SYSTEMS PERFORMANCE GROUP                   |
#                  All Rights Reserved                          |
#==============================================================+
# FILENAME
#     dml.sh
# DESCRIPTION
#     Disable table locks for TPC-C tables.
# USAGE
#     dml.sh
#==============================================================*/

sqlplus tpcc/tpcc <<!
  alter table warehouse  disable table lock;
  alter table district   disable table lock;
  alter table customer   disable table lock;
  alter table history    disable table lock;
  alter table item       disable table lock;
  alter table stock      disable table lock;
  alter table orders     disable table lock;
  alter table new_order  disable table lock;
  alter table order_line disable table lock;
  quit;
!
```

## load_cust.sh

```
#!/bin/ksh

# 80301 98/7/7 15:45 vmakhija
```

```
# Copyright (c) 1998 Oracle
#
#
#==================================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA         |
#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                    All Rights Reserved                            |
#==================================================================+
# NAME
#      load_cust.sh
# DESCRIPTION
#      Usage: load_cust.sh [options]
#==================================================================
#
. setenv


#
#  Load customer table (in parallel with loading stock table)
#

I=31
SW=6001
INC=200
let EW=$SW+$INC-1
J=4
X=$J
while [ $J -le 17 ]
do
  let X=$J*10
  while [ $I -le $X ]
  do
echo "j = $J, x = $X, sw = $SW, ew = $EW"
     tpccload -M $MULT -c -b $SW -e $EW > ${OUTDIR}/cust${I}.out 2>&1 &
     I=`expr $I + 1`
     SW=`expr $SW + $INC`
     EW=`expr $EW + $INC`
  done
  wait
  J=`expr $J + 1`
done

wait
```

## load_dist.sh

```
#!/bin/ksh

# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle
#
#
#==================================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA         |
#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                    All Rights Reserved                            |
#==================================================================+
# NAME
#      load_dist.sh
# DESCRIPTION
#      Usage: load_dist.sh [options]
#==================================================================
#
. setenv


tpccload -M $MULT -d
```

## load_hist.sh

```
 #!/bin/ksh

#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
#==================================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA         |
#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                    All Rights Reserved                            |
#==================================================================+
# FILENAME
#      load_hist.sh
# DESCRIPTION
#      Usage: load_hist.sh [options]
#           -mu <multiplier>     (# of warehouses)
#==================================================================
#
. setenv

if echo "\c" | grep c >/dev/null 2>&1; then
   N='-n'
else
   C='\c'
fi
export N C

while [ "$#" != "0" ]
do
   case $1 in
      -mu) shift
           if [ "$1" != "" ]
           then
              MULT=$1
              shift
           fi
           ;;
      -nd) shift
           NO_DB="y"
           ;;
      -nt) shift
           NO_TAB="y"
           ;;
      -nx) shift
           NO_IND="y"
           ;;
        *) echo "Bad arg: $1"
           exit 1;
           ;;
   esac
done

if [ "$MULT" = "" ]
then
   echo $N "Database multiplier (# of warehouses)? [1]" $C
   read MULT
   if [ "$MULT" = "" ]
   then
      MULT=1
   fi
fi

if [ ! -d $BUILD_HOME ]
then
   mkdir $BUILD_HOME
fi

if [ ! -d $LOAD_SCRIPTS ]
then
   mkdir $LOAD_SCRIPTS
fi

if [ ! -d $LDIR ]
then
   mkdir $LDIR
fi

if [ ! -d $OUTDIR ]
then
   mkdir $OUTDIR
fi
#
#  Load history table
#

I=1
SW=1
INC=200
let EW=$SW+$INC-1
J=1
X=$J
while [ $J -le 17 ]
do
   let X=$J*10
   while [ $I -le $X ]
   do
echo "j = $J, x = $X, sw = $SW, ew = $EW"
      tpccload -M $MULT -h -b $SW -e $EW > ${LDIR}/hist${I}.dat 2> ${OUTDIR}/hist${I}.out &
      I=`expr $I + 1`
      SW=`expr $SW + $INC`
      EW=`expr $EW + $INC`
   done
   wait
   J=`expr $J + 1`
done
wait
```

## load_item.sh

```
#!/bin/ksh

# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle
#
#
#==================================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA         |
#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                    All Rights Reserved                            |
#==================================================================+
# NAME
#      load_item.sh
# DESCRIPTION
#      Usage: load_item.sh [options]
```

```
#==================================================================
#
. setenv

tpccload -M $MULT -i
```

## load_nord.sh

```
#!/bin/ksh

#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
#==================================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA         |
#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                     All Rights Reserved                           |
#==================================================================+
# FILENAME
#      load_nord.sh
# DESCRIPTION
#      Usage: load_nord.sh [options]
#            -mu <multiplier>     (# of warehouses)
#==================================================================
#
. setenv

if echo "\c" | grep c >/dev/null 2>&1; then
   N='-n'
else
   C='\c'
fi
export N C

while [ "$#" != "0" ]
do
  case $1 in
     -mu) shift
          if [ "$1" != "" ]
          then
             MULT=$1
             shift
          fi
          ;;
     -nd) shift
          NO_DB="y"
          ;;
     -nt) shift
          NO_TAB="y"
          ;;
     -nx) shift
          NO_IND="y"
           ;;
       *) echo "Bad arg: $1"
          exit 1;
          ;;
  esac
done

if [ "$MULT" = "" ]
then
  echo $N "Database multiplier (# of warehouses)? [1]" $C
  read MULT
  if [ "$MULT" = "" ]
  then
     MULT=1
  fi
fi

if [ ! -d $BUILD_HOME ]
then
  mkdir $BUILD_HOME
fi

if [ ! -d $LOAD_SCRIPTS ]
then
  mkdir $LOAD_SCRIPTS
fi

if [ ! -d $LDIR ]
then
  mkdir $LDIR
fi

if [ ! -d $OUTDIR ]
then
  mkdir $OUTDIR
fi

#
#   Load new-order table
#


I=1
SW=1
INC=100
let EW=$SW+$INC-1
J=1
X=$J
while [ $J -le 17 ]
do
  let X=$J*20
  while [ $I -le $X ]
  do
echo "j = $J, x = $X, sw = $SW, ew = $EW"
    tpccload -M $MULT -n -b $SW -e $EW > ${LDIR}/neword${I}.dat 2> ${OUTDIR}/neword${I}.out
&
    I=`expr $I + 1`
    SW=`expr $SW + $INC`
    EW=`expr $EW + $INC`
  done
  wait
  J=`expr $J + 1`
done
wait
```

## load_ordr.sh

```
#!/bin/ksh

#
# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle Corp.
#
#==================================================================+
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#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                     All Rights Reserved                           |
#==================================================================+
# FILENAME
#      load_ordr.sh
# DESCRIPTION
#      Usage: load_ordr.sh [options]
#            -mu <multiplier>     (# of warehouses)
#==================================================================
#
. setenv

if echo "\c" | grep c >/dev/null 2>&1; then
   N='-n'
else
   C='\c'
fi
export N C

while [ "$#" != "0" ]
do
  case $1 in
     -mu) shift
          if [ "$1" != "" ]
          then
             MULT=$1
             shift
          fi
          ;;
     -nd) shift
          NO_DB="y"
          ;;
     -nt) shift
          NO_TAB="y"
          ;;
     -nx) shift
          NO_IND="y"
           ;;
       *) echo "Bad arg: $1"
          exit 1;
          ;;
  esac
done

if [ "$MULT" = "" ]
then
  echo $N "Database multiplier (# of warehouses)? [1]" $C
  read MULT
  if [ "$MULT" = "" ]
  then
     MULT=1
  fi
fi

if [ ! -d $BUILD_HOME ]
then
  mkdir $BUILD_HOME
fi

if [ ! -d $LOAD_SCRIPTS ]
then
  mkdir $LOAD_SCRIPTS
fi

if [ ! -d $LDIR ]
then
  mkdir $LDIR
fi
```

```
if [ ! -d $OUTDIR ]
then
  mkdir $OUTDIR
fi

#
#  Load order and order-line table
#

I=1
SW=1
INC=200
let EW=$SW+$INC-1
J=1
X=$J
while [ $J -le 10 ]
do
  let X=$J*17
  while [ $I -le $X ]
  do
echo "j = $J, x = $X, sw = $SW, ew = $EW"
    tpccload -M $MULT -o ${LDIR}/ordline${I}.dat -b $SW -e $EW > \
      ${LDIR}/order${I}.dat 2> ${OUTDIR}/order${I}.out &
    I=`expr $I + 1`
    SW=`expr $SW + $INC`
    EW=`expr $EW + $INC`
  done
  let TST=$EW-$INC
  if [ $TST%3400 -eq 0 ]
  then
    print "Waiting for return:"
    read $RETURN
  fi
  echo New block
  wait
  J=`expr $J + 1`
done

wait
```

## load_stok.sh

```
#!/bin/ksh

# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle
#
#
#==================================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA         |
#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                    All Rights Reserved                            |
#==================================================================+
# NAME
#      load_stok.sh
# DESCRIPTION
#      Usage: load_stok.sh [options]
#=================================================================
#
. setenv

#
#  Load stock table (in parallel with loading customer table)
#

I=1
SI=1
EI=200
INC=200
J=1
X=$J
while [ $J -le 10 ]
do
  let X=$J*50
  while [ $I -le $X ]
  do
    tpccload -M $MULT -S -j $SI -k $EI > ${OUTDIR}/stk${I}.out 2>&1 &
    I=`expr $I + 1`
    SI=`expr $SI + $INC`
    EI=`expr $EI + $INC`
  done
  wait
  J=`expr $J + 1`
done

wait
```

## load_ware.sh

```
#!/bin/ksh

# 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle
#
#
#==================================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA         |
#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                    All Rights Reserved                            |
#==================================================================+
# NAME
#      load_ware.sh
# DESCRIPTION
#      Usage: load_ware.sh [options]
#=================================================================
#
. setenv


tpccload -M $MULT -w
```

## realter_temp.sh

```
#!/bin/ksh

# realter_temp 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle
#
#
#==================================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA         |
#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                    All Rights Reserved                            |
#==================================================================+
# NAME
#      realter_temp
# DESCRIPTION
#      Usage: realter_temp.sh [options]
#=================================================================
#
. setenv

sqlsys <<!
  alter tablespace temp
    default storage (initial 10M next 10M pctincrease 50);
  exit;
!
```

## switchlog.sh

```
#
# $Header: switchlog.sh 7030100.1 96/05/02 10:20:11 plai Generic<base> $ Copyr (c) 1995 Oracle
#

#==================================================================+
#       Copyright (c) 1996  Oracle Corp, Redwood Shores, CA         |
#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                    All Rights Reserved                            |
#==================================================================+
# FILENAME
#     switchlog.sh
# DESCRIPTION
#     Switch to next log file twice.
# USAGE
#     switchlog.sh
#=================================================================*/

svrmgrl lmode=y <<!
  connect internal;
  alter system switch logfile;
  alter system switch logfile;
  exit;
!
```

## tpcc_rol.sh

```
#!/bin/ksh
#
#
#==================================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA         |
#                OPEN SYSTEMS PERFORMANCE GROUP                     |
#                    All Rights Reserved                            |
#==================================================================+
# FILENAME
#      tpcc_rol.sh
# DESCRIPTION
#      Script file for creating the rollback segments.
#=================================================================
#
. setenv

sqlsys <<!
  @$LOAD_SCRIPTS/tpcc_rol;
  exit;
!
```

# tpcc_rol.sql

```
rem
rem ===================================================================+
rem        Copyright (c) 1996  Oracle Corp, Redwood Shores, CA                 |
rem                  OPEN SYSTEMS PERFORMANCE GROUP                          |
rem                       All Rights Reserved                                 |
rem ===================================================================+
rem  FILENAME
rem       tpcc_rol.sql
rem  DESCRIPTION
rem       Create rollback segments for TPCC database.
rem ===================================================================
rem


  set timing on;

  host date;

  CREATE ROLLBACK SEGMENT t1
    TABLESPACE roll
    STORAGE (initial 100K next 100K minextents 2);
  CREATE ROLLBACK SEGMENT t2
    TABLESPACE roll
    STORAGE (initial 100K next 100K minextents 2);
  CREATE ROLLBACK SEGMENT t3
    TABLESPACE roll
    STORAGE (initial 100K next 100K minextents 2);
  CREATE ROLLBACK SEGMENT t4
    TABLESPACE roll
    STORAGE (initial 100K next 100K minextents 2);
  CREATE ROLLBACK SEGMENT t5
    TABLESPACE roll
    STORAGE (initial 100K next 100K minextents 2);
  CREATE ROLLBACK SEGMENT t6
    TABLESPACE roll
    STORAGE (initial 100K next 100K minextents 2);
  CREATE ROLLBACK SEGMENT t7
    TABLESPACE roll
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CREATE ROLLBACK SEGMENT t124
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CREATE ROLLBACK SEGMENT t125
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CREATE ROLLBACK SEGMENT t191
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CREATE ROLLBACK SEGMENT t257
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CREATE ROLLBACK SEGMENT t389
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CREATE ROLLBACK SEGMENT t455
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CREATE ROLLBACK SEGMENT t587
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CREATE ROLLBACK SEGMENT t665
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t666
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t667
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t668
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t669
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t670
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t671
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t672
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t673
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t674
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t675
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t676
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t677
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t678
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t679
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t680
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t681
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t682
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t683
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t684
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t685
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t686
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t687
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t688
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t689
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t690
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t691
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t692
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t693
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t694
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t695
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t696
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t697
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t698
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t699
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
CREATE ROLLBACK SEGMENT t700
  TABLESPACE roll
  STORAGE (initial 100K next 100K minextents 2);
host date;

exit;
```

## tpcc_stored_proc.sh

```
#!/bin/ksh

# tpcc_stored_proc 80301 98/7/7 15:45 vmakhija
# Copyright (c) 1998 Oracle
#
#
#==================================================================+
#       Copyright (c) 1998  Oracle Corp, Redwood Shores, CA         |
#               OPEN SYSTEMS PERFORMANCE GROUP                      |
#                   All Rights Reserved                             |
#==================================================================+
# NAME
#     tpcc_stored_proc.sh
# DESCRIPTION
#     Usage: tpcc_stored_proc.sh [options]
#==================================================================
#
. setenv


sqlplus tpcc/tpcc @$TPCC_BLOCKS/views

# Oracle said to use payz.sql, it is better than pay.sql
#sqlplus tpcc/tpcc @$TPCC_BLOCKS/pay
#sqlplus tpcc/tpcc @$TPCC_BLOCKS/payz
# Sun is using initpay
sqlplus tpcc/tpcc @$TPCC_BLOCKS/initpay
# this is needed to do runs
sqlplus tpcc/tpcc @$TPCC_BLOCKS/tkvcinin
```

## undml.sh

```
#
# $Header: undml.sh 7030100.2 96/05/02 10:29:30 plai Generic<base> $ Copyr (c) 1995 Oracle
#

#==================================================================+
#       Copyright (c) 1996  Oracle Corp, Redwood Shores, CA         |
#               OPEN SYSTEMS PERFORMANCE GROUP                      |
#                   All Rights Reserved                             |
#==================================================================+
# FILENAME
#     undml.sh
# DESCRIPTION
#     Enable table locks for TPC-C tables.
# USAGE
#     undml.sh
```

```
#==================================================================*/

sqlplus tpcc/tpcc <<!
  alter table warehouse  enable table lock;
  alter table district   enable table lock;
  alter table customer   enable table lock;
  alter table history    enable table lock;
  alter table item       enable table lock;
  alter table stock      enable table lock;
  alter table orders     enable table lock;
  alter table new_order  enable table lock;
  alter table order_line enable table lock;
  quit;
```

# C.2 SQL Scripts

## cust.sql

```
rem
rem ================================================================+
rem        Copyright (c) 1996  Oracle Corp, Redwood Shores, CA                  |
rem                 OPEN SYSTEMS PERFORMANCE GROUP                              |
rem                      All Rights Reserved                                    |
rem ================================================================+
rem  FILENAME
rem       cust.sql
rem  DESCRIPTION
rem       Create customer table for TPC-C database.
rem ================================================================
rem

rem
rem DROP all first
rem
       drop cluster ccluster including tables;
       drop table customer;

set timing on

rem
rem CUSTOMER table
rem

       create cluster ccluster (
          c_id         number(5,0),
          c_d_id       number(2,0),
          c_w_id       number(5,0)
       )
                 single                              table
       hashkeys       1020000000
       hash is        ((c_id * 340000) + (c_w_id * 10) + c_d_id)
       size           850
       initrans       3
       pctfree        0
       tablespace     cust
                 storage (buffer_pool recycle);

       create table customer (
       c_id           number(5,0),
       c_d_id         number(2,0),
       c_w_id         number(5,0),
       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         varchar2(500)
       )
       cluster ccluster (c_id, c_d_id, c_w_id);

rem
rem done
rem

       exit;
```

## dist.sql

```
rem
rem ================================================================+
rem        Copyright (c) 1996  Oracle Corp, Redwood Shores, CA                  |
rem                 OPEN SYSTEMS PERFORMANCE GROUP                              |
rem                      All Rights Reserved                                    |
rem ================================================================+
rem  FILENAME
rem       dist.sql
rem  DESCRIPTION
rem       Create district table for TPC-C database.
rem ================================================================
rem

rem
rem DROP all first
rem
       drop table district;
                 drop cluster dcluster including tables;

set timing on

rem
rem DISTRICT table
rem

                 create cluster dcluster (
                          d_w_id        number(5,0),
                          d_id          number(2,0)
                 )
                 single                 table
                 hashkeys       340000
                 hash is                (d_w_id) * 10 + d_id
                 size                   1536
                 initrans       3
                 pctfree                0
       tablespace               ware;

       create table district (
                 d_id           number(2,0),
                 d_w_id         number(5,0),
                 d_ytd          number,
                 d_tax          number,
                 d_next_o_id    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 dcluster (d_w_id, d_id);

rem
rem done
rem

       exit;
```

## hist.sql

```
rem
rem ================================================================+
rem        Copyright (c) 1996  Oracle Corp, Redwood Shores, CA                  |
rem                 OPEN SYSTEMS PERFORMANCE GROUP                              |
rem                      All Rights Reserved                                    |
rem ================================================================+
rem  FILENAME
rem       hist.sql
rem  DESCRIPTION
rem       Create history table for TPC-C database.
rem ================================================================
rem

rem
rem DROP all first
rem
       drop table history;

set timing on

rem
rem HISTORY table
rem

       create table history (
        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)
        )
        tablespace hist
        initrans 4
        pctfree  5
        storage (freelist groups 43 freelists 19  minextents 68
                                 buffer_pool recycle );

rem
rem done
rem

       exit;
```

## icust.sql

```
rem
```

```
rem ================================================================+
rem        Copyright (c) 1996  Oracle Corp, Redwood Shores, CA      |
rem                 OPEN SYSTEMS PERFORMANCE GROUP                  |
rem                     All Rights Reserved                         |
rem ================================================================+
rem  FILENAME
rem      icust.sql
rem  DESCRIPTION
rem      Create customer index for TPC-C database.
rem ================================================================
rem

rem
rem DROP all first
rem
       drop index icustomer;

set timing on

rem
rem ICUST1 index
rem

      create unique index icustomer on customer(c_w_id, c_d_id, c_id)
       tablespace icust1
       initrans 3
                 parallel 22
       pctfree  1
       storage  (freelist groups 43 freelists 19);

rem
rem done
rem

       exit;

rem ================================================================+
```

## icust2.sql

```
rem
rem ================================================================+
rem        Copyright (c) 1996  Oracle Corp, Redwood Shores, CA      |
rem                 OPEN SYSTEMS PERFORMANCE GROUP                  |
rem                     All Rights Reserved                         |
rem ================================================================+
rem  FILENAME
rem      icust2.sql
rem  DESCRIPTION
rem      Create customer index 2 for TPC-C database.
rem ================================================================
rem

rem
rem DROP all first
rem
                 alter table customer enable table lock;
       drop index icustomer2;

set timing on

rem
rem ICUST2 index
rem

      create unique index icustomer2 on customer(c_last, c_d_id, c_w_id, c_first)
       tablespace icust2
       initrans 3
                 parallel 22
       pctfree  1
       storage  (freelist groups 43 freelists 19);

rem
rem done
rem

       exit;
```

## idist.sql

```
rem
rem ================================================================+
rem        Copyright (c) 1996  Oracle Corp, Redwood Shores, CA      |
rem                 OPEN SYSTEMS PERFORMANCE GROUP                  |
rem                     All Rights Reserved                         |
rem ================================================================+
rem  FILENAME
rem      idist.sql
rem  DESCRIPTION
rem      Create district index for TPC-C database.
rem ================================================================
rem

rem
rem DROP all first
rem
       drop index idistrict;

set timing on

rem
rem DISTRICT index
rem

      create unique index idistrict on district(d_w_id, d_id)
       tablespace ware
       initrans 3
       parallel 6
       pctfree  5
       storage  (freelist groups 43 freelists 19);

rem
rem done
rem

       exit;
```

## iitem.sql

```
rem
rem ================================================================+
rem        Copyright (c) 1996  Oracle Corp, Redwood Shores, CA      |
rem                 OPEN SYSTEMS PERFORMANCE GROUP                  |
rem                     All Rights Reserved                         |
rem ================================================================+
rem  FILENAME
rem      iitem.sql
rem  DESCRIPTION
rem      Create item index for TPC-C database.
rem ================================================================
rem

rem
rem DROP all first
rem
       drop index iitem;

set timing on

rem
rem ITEM index
rem

      create unique index iitem on item(i_id)
       tablespace items
       initrans 4
       pctfree  5
       storage  (freelist groups 43 freelists 19
                buffer_pool keep);

rem
rem done
rem

       exit;
```

## iordr.sql

```
rem
rem ================================================================+
rem        Copyright (c) 1996  Oracle Corp, Redwood Shores, CA      |
rem                 OPEN SYSTEMS PERFORMANCE GROUP                  |
rem                     All Rights Reserved                         |
rem ================================================================+
rem  FILENAME
rem      iordr.sql
rem  DESCRIPTION
rem      Create orders index for TPC-C database.
rem ================================================================
rem

rem
rem DROP all first
rem

set timing on
                 alter table orders enable table lock;
       drop index iorders;
rem
rem ORDERS index
rem

      create unique index iorders on orders(o_w_id, o_d_id, o_id)
       tablespace iord1
       initrans 3
                 parallel 42
       pctfree  1
       storage  (freelist groups 86 freelists 19 );
```

```
alter table orders disable table lock;
rem
rem done
rem

      exit;
```

## iordr2.sql

```
rem
rem ================================================================+
rem        Copyright (c) 1996  Oracle Corp, Redwood Shores, CA                  |
rem                 OPEN SYSTEMS PERFORMANCE GROUP                              |
rem                      All Rights Reserved                                    |
rem ================================================================+
rem  FILENAME
rem       iordr2.sql
rem  DESCRIPTION
rem       Create orders index 2 for TPC-C database.
rem ===================================================================
rem

rem
rem DROP all first
rem
                    alter table orders enable table lock;
      drop index iorders2;

set timing on

rem
rem ORDERS index 2
rem
rem     storage (initial 1015M next 1015M pctincrease 0
rem                                  maxextents unlimited freelist groups 43 freelists 19)
rem    create unique index iorders2 on orders(o_w_id, o_d_id, o_c_id, o_id)

     create unique index iorders2 on orders(o_c_id, o_d_id, o_w_id, o_id)
      tablespace iord2
      initrans 4
                    parallel 64
      pctfree  25
      storage (freelist groups 86 freelists 19 );

                    alter table orders disable table lock;
rem
rem done
rem

      exit;
```

## istok.sql

```
rem
rem ================================================================+
rem        Copyright (c) 1996  Oracle Corp, Redwood Shores, CA                  |
rem                 OPEN SYSTEMS PERFORMANCE GROUP                              |
rem                      All Rights Reserved                                    |
rem ================================================================+
rem  FILENAME
rem       istok.sql
rem  DESCRIPTION
rem       Create stock index for TPC-C database.
rem ===================================================================
rem

rem
rem DROP all first
rem
      drop index istock;

set timing on

rem
rem STOCK index
rem

     create unique index istock on stock(s_i_id, s_w_id)
      tablespace istk
      initrans 3
                    parallel 22
      pctfree  1
      storage  (freelist groups 43 freelists 19);

rem
rem done
rem

      exit;
```

## item.sql

```
rem
rem ================================================================+
rem        Copyright (c) 1996  Oracle Corp, Redwood Shores, CA                  |
rem                 OPEN SYSTEMS PERFORMANCE GROUP                              |
rem                      All Rights Reserved                                    |
rem ================================================================+
rem  FILENAME
rem       item.sql
rem  DESCRIPTION
rem       Create ITEM table for TPC-C database.
rem ===================================================================
rem

rem
rem DROP item cluster and table
rem
      drop cluster icluster including tables;
      drop table item;

      set timing on;

rem
rem ITEM table
rem

      create cluster icluster (
      i_id          number (6,0)
      )
                    single                          table
      hashkeys      100000
      hash is       i_id
      size          120
      initrans      3
      pctfree       0
      tablespace    items
                    storage (buffer_pool keep);

      create table item (
      i_id          number(6,0),
      i_name        varchar2(24),
      i_price       number,
      i_data        varchar2(50),
      i_im_id       number
      )
      cluster icluster(i_id);


rem
rem done
rem

      exit;
```

## iware.sql

```
rem
rem ================================================================+
rem        Copyright (c) 1996  Oracle Corp, Redwood Shores, CA                  |
rem                 OPEN SYSTEMS PERFORMANCE GROUP                              |
rem                      All Rights Reserved                                    |
rem ================================================================+
rem  FILENAME
rem       iware.sql
rem  DESCRIPTION
rem       Create warehouse index for TPC-C database.
rem ===================================================================
rem

rem
rem DROP all first
rem
      drop index iwarehouse;

set timing on

rem
rem WAREHOUSE index
rem

     create unique index iwarehouse on warehouse (w_id)
      tablespace ware
      initrans 3
                    pctfree 1;

rem
rem done
rem

      exit;
```

## nord.sql

```
rem
rem ================================================================+
rem        Copyright (c) 1996  Oracle Corp, Redwood Shores, CA                  |
```

```
rem                 OPEN SYSTEMS PERFORMANCE GROUP                                  |
rem                     All Rights Reserved                                         |
rem ================================================================+
rem  FILENAME
rem      nord.sql
rem  DESCRIPTION
rem      Create NEW_ORDER table for TPC-C database.
rem ================================================================
rem

rem
rem DROP all first
rem
rem                 alter table new_order enable table lock;
      drop table new_order;

set timing on

rem
rem NEW_ORDER table
rem

      create table new_order (
            no_w_id        number,
            no_d_id        number,
            no_o_id        number,
                                    constraint inord primary key (no_w_id, no_d_id, no_o_id)
      )
                 organization index tablespace nord
      initrans 4
      pctfree  5
                 storage ( freelist groups 43 freelists 19 minextents 5 );

rem              alter table new_order disable table lock;

rem
rem done
rem

      exit;
```

## ordl.sql

```
rem
rem ================================================================+
rem        Copyright (c) 1996  Oracle Corp, Redwood Shores, CA                      |
rem                 OPEN SYSTEMS PERFORMANCE GROUP                                  |
rem                     All Rights Reserved                                         |
rem ================================================================+
rem  FILENAME
rem      ordl.sql
rem  DESCRIPTION
rem      Create ORDER_LINE table for TPC-C database.
rem ================================================================
rem

rem
rem DROP all first
rem
      drop table order_line;

set timing on

rem
rem ORDER_LINE table
rem

      create table order_line (
      ol_w_id         number,
      ol_d_id         number,
      ol_o_id         number,
      ol_number       number,
      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 iordl primary key (ol_w_id, ol_d_id, ol_o_id, ol_number)
      )
                 organization index tablespace ordl
      initrans 4
      pctfree  5
      storage ( freelist groups 43 freelists 19 minextents 1380 );

rem
rem done
rem

      exit;
```

## ordr.sql

```
rem
rem ================================================================+
rem        Copyright (c) 1996  Oracle Corp, Redwood Shores, CA                      |
rem                 OPEN SYSTEMS PERFORMANCE GROUP                                  |
rem                     All Rights Reserved                                         |
rem ================================================================+
rem  FILENAME
rem      ordr.sql
rem  DESCRIPTION
rem      Create orders table for TPC-C database.
rem ================================================================
rem

rem
rem DROP all first
rem
      drop table orders;

set timing on

rem
rem ORDERS table
rem

      create table orders (
      o_id           number,
      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
      )
      tablespace ord
      initrans 4
      pctfree  5
      storage ( freelist groups 43 freelists 19 minextents 65 );


rem
rem done
rem

      exit;
```

## stok.sql

```
rem
rem ================================================================+
rem        Copyright (c) 1996  Oracle Corp, Redwood Shores, CA                      |
rem                 OPEN SYSTEMS PERFORMANCE GROUP                                  |
rem                     All Rights Reserved                                         |
rem ================================================================+
rem  FILENAME
rem      stok.sql
rem  DESCRIPTION
rem      Create stock table for TPC-C database.
rem ================================================================
rem

rem
rem DROP all first
rem
      drop cluster scluster including tables;
      drop table stock;

set timing on

rem
rem STOCK table
rem

      create cluster scluster (
        s_i_id      number(6,0),
        s_w_id      number(5,0)
      )
                 single                          table
      hashkeys       3400000000
      hash is        (s_i_id * 34000 + s_w_id)
      size           350
      initrans       3
      pctfree        0
      tablespace     stocks
                 storage (freelist groups 43 freelists 19 buffer_pool keep);

      create table stock (
      s_i_id         number(6,0),
      s_w_id         number(5,0),
      s_quantity     number,
      s_ytd          number,
      s_order_cnt    number,
      s_remote_cnt   number,
      s_data         varchar2(50),
      s_dist_01      char(24),
      s_dist_02      char(24),
      s_dist_03      char(24),
      s_dist_04      char(24),
      s_dist_05      char(24),
```

```
      s_dist_06       char(24),
      s_dist_07       char(24),
      s_dist_08       char(24),
      s_dist_09       char(24),
      s_dist_10       char(24)
      )
      cluster scluster (s_i_id, s_w_id);

rem
rem done
rem

      exit;
```

## tpcc_ana.sql

```
rem
rem ================================================================+
rem        Copyright (c) 1995  Oracle Corp, Redwood Shores, CA                  |
rem                OPEN SYSTEMS PERFORMANCE GROUP                              |
rem                    All Rights Reserved                                      |
rem ================================================================+
rem  FILENAME
rem      tpcc_ana.sql
rem  DESCRIPTION
rem      Analyze all tables and indexes of TPC-C database.
rem ================================================================
rem

set timing on;
analyze table warehouse compute statistics;
analyze table district compute statistics;
analyze table item estimate statistics;
analyze table history estimate statistics;
analyze table customer estimate statistics;
analyze table stock estimate statistics;
analyze table orders estimate statistics;
analyze table new_order estimate statistics;
analyze table order_line estimate statistics;
analyze cluster icluster estimate statistics;
analyze cluster scluster estimate statistics;
analyze cluster ccluster estimate statistics;
analyze index iwarehouse compute statistics;
analyze index idistrict compute statistics;
analyze index icustomer estimate statistics;
analyze index icustomer2 estimate statistics;
analyze index istock estimate statistics;
analyze index iitem estimate statistics;
analyze index iorders estimate statistics;
analyze index iorders2 estimate statistics;
analyze index inew_order estimate statistics;
analyze index iorder_line estimate statistics;
quit;
```

## ware.sql

```
 rem
rem ================================================================+
rem        Copyright (c) 1996  Oracle Corp, Redwood Shores, CA                  |
rem                OPEN SYSTEMS PERFORMANCE GROUP                              |
rem                    All Rights Reserved                                      |
rem ================================================================+
rem  FILENAME
rem      ware.sql
rem  DESCRIPTION
rem      Create warehouse table for TPC-C database.
rem ================================================================
rem

rem
rem DROP all first
rem
      drop table warehouse;
                drop cluster wcluster including tables;

set timing on

rem
rem WAREHOUSE table
rem

                create cluster wcluster (
                        w_id                    number (5,0)
                )
                single                          table
                hashkeys                34000
                hash is                         w_id
                size                            1536
                initrans                3
                pctfree                         0
      tablespace                ware;

      create table warehouse (
            w_id        number(5,0),
            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 wcluster (w_id);

rem
rem done
rem

      exit;
```

# C.3 Data Generation Code

## tpccload.c

```
#ifdef RCSID
static char *RCSid =
   "$Header: tpccload.c 7030100.1 96/05/13 16:20:36 plai Generic<base> $ Copyr (c) 1993 Oracle";
#endif /* RCSID */

/*================================================================+
 |      Copyright (c) 1994  Oracle Corp, Redwood Shores, CA                  |
 |                OPEN SYSTEMS PERFORMANCE GROUP                             |
 |                    All Rights Reserved                                    |
 +================================================================+
 | FILENAME
 |   tpccload.c
 | DESCRIPTION
 |   Load or generate TPC-C database tables.
 |   Usage: tpccload -M <# of warehouses> [options]
 |          options: -A  load all tables
 |                   -w  load warehouse table
 |                   -d  load district table
 |                   -c  load customer table
 |                   -i  load item table
 |                   -s  load stock table (cluster around s_w_id)
 |                   -S  load stock table (cluster around s_i_id)
 |                   -h  load history table
 |                   -n  load new-order table
 |                   -o <oline file> load order and order-line table
 |                   -b <ware#>  beginning warehouse number
 |                   -e <ware#>  ending warehouse number
 |                   -j <item#>  beginning item number (with -S)
 |                   -k <item#>  ending item number (with -S)
 |                   -g  generate rows to standard output
 +================================================================*/

#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <unistd.h>
#include <time.h>
#include <sys/types.h>
#include "tpcc.h"

#define DISTARR 10                      /* district insert array size      */
#define CUSTARR 100                     /* customer insert array size      */
#define STOCARR 100                     /* stock insert array size         */
#define ITEMARR 100                     /* item insert array size          */
#define HISTARR 100             /* history insert array size    */
#define ORDEARR 100             /* order insert array size      */
#define NEWOARR 100             /* new order insert array size  */

#define DISTFAC 10                      /* max. disctrict id               */
#define CUSTFAC 3000                    /* max. customer id                */
#define STOCFAC 100000                  /* max. stock id                   */
#define ITEMFAC 100000                  /* max. item id                    */
#define HISTFAC 30000           /* history / warehouse  */
#define ORDEFAC 3000            /* order / district     */
#define NEWOFAC 900             /* new order / district */

#define C       0               /* constant in non-uniform dist. eqt. */
#define CNUM1   1               /* first constant in non-uniform dist. eqt. */
#define CNUM2   2               /* second constant in non-uniform dist. eqt. */
#define CNUM3   3               /* third constant in non-uniform dist. eqt. */

#define SEED    2               /* seed for random functions */

#define SQLTXTW "INSERT INTO warehouse (w_id, w_ytd, w_tax, w_name, w_street_1, w_street_2,
w_city, w_state, w_zip) VALUES (:w_id, 30000000, :w_tax, :w_name, :w_street_1, \
   :w_street_2, :w_city, :w_state, :w_zip)"

#define SQLTXTD "INSERT INTO district (d_id, d_w_id, d_ytd, d_tax, d_next_o_id, d_name, d_street_1,
d_street_2, d_city, d_state, d_zip) VALUES (:d_id, :d_w_id,3000000, :d_tax, \
    3001, :d_name, :d_street_1, :d_street_2, :d_city, :d_state, :d_zip)"

#define SQLTXTC "INSERT INTO customer (C_ID, C_D_ID, C_W_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_YTD_PAYMENT,
```

```
C_PAYMENT_CNT, C_DELIVERY_CNT, C_DATA) VALUES (:c_id, :c_d_id, :c_w_id, \
  :c_first, 'OE', :c_last, :c_street_1, :c_street_2, :c_city, :c_state, \
  :c_zip, :c_phone, SYSDATE, :c_credit, 5000000, :c_discount, -1000, 1000, 1, \
  0, :c_data)"

#define SQLTXTH "INSERT INTO history (h_c_id, h_c_d_id, h_c_w_id, h_d_id, h_w_id, h_date,
h_amount, h_data) VALUES (:h_c_id, :h_c_d_id, :h_c_w_id, \
  :h_d_id, :h_w_id, SYSDATE, 1000, :h_data)"

#define SQLTXTS "INSERT INTO stock (s_i_id, s_w_id, s_quantity,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, s_ytd, s_order_cnt,
s_remote_cnt, s_data) \
VALUES (:s_i_id, :s_w_id, :s_quantity, \
  :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, 0, 0, 0, :s_data)" \

#define SQLTXTI "INSERT INTO item (I_ID,I_IM_ID,I_NAME,I_PRICE,I_DATA) VALUES (:i_id,
:i_im_id, :i_name, :i_price, \
  :i_data)"

#define SQLTXTO1 "INSERT INTO orders (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, :o_d_id, :o_w_id, :o_c_id, \
  SYSDATE, :o_carrier_id, :o_ol_cnt, 1)"

#define SQLTXTO2 "INSERT INTO orders (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, :o_d_id, :o_w_id, :o_c_id, \
  SYSDATE, 11, :o_ol_cnt, 1)"

#define SQLTXTOL1 "INSERT INTO order_line (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 (:ol_o_id, :ol_d_id, \
  :ol_w_id, :ol_number, SYSDATE, :ol_i_id, :ol_supply_w_id, 5, 0, \
  :ol_dist_info)"

#define SQLTXTOL2 "INSERT INTO order_line (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 (:ol_o_id, :ol_d_id, \
  :ol_w_id, :ol_number, to_date('01-Jan-1811'), :ol_i_id, :ol_supply_w_id, 5, :ol_amount, \
  :ol_dist_info)"

#define SQLTXTNO "INSERT INTO new_order (no_o_id, no_d_id, no_w_id) VALUES (:no_o_id,
:no_d_id, :no_w_id)"

ldadef tpclda;
csrdef curw, curd, curc, curh, curs, curi, curo1, curo2, curol1, curol2, curno;
unsigned long tpchda[256];

static char *lastname[] = {
  "BAR",
  "OUGHT",
  "ABLE",
  "PRI",
  "PRES",
  "ESE",
  "ANTI",
  "CALLY",
  "ATION",
  "EING"
};

char num9[10];
char num16[17];
char str2[3];
char str24[15][25];
int randperm3000[3000];



myusage()

{

  fprintf (stderr, "\n");
  fprintf (stderr, "Usage:\ttpccload -M <multiplier> [options]\n");
  fprintf (stderr, "options:\n");
  fprintf (stderr, "\t-A :\tload all tables\n");
  fprintf (stderr, "\t-w :\tload warehouse table\n");
  fprintf (stderr, "\t-d :\tload district table\n");
  fprintf (stderr, "\t-c :\tload customer table\n");
  fprintf (stderr, "\t-i :\tload item table\n");
  fprintf (stderr, "\t-s :\tload stock table (cluster around s_w_id)\n");
  fprintf (stderr, "\t-S :\tload stock table (cluster around s_i_id)\n");
  fprintf (stderr, "\t-h :\tload history table\n");
  fprintf (stderr, "\t-n :\tload new-order table\n");
  fprintf (stderr, "\t-o <oline file> :\tload order and order-line table\n");
  fprintf (stderr, "\t-b <ware#> :\tbeginning warehouse number\n");
  fprintf (stderr, "\t-e <ware#> :\tending warehouse number\n");
  fprintf (stderr, "\t-j <item#> :\tbeginning item number (with -S)\n");
  fprintf (stderr, "\t-k <item#> :\tending item number (with -S)\n");
  fprintf (stderr, "\t-g :\tgenerate rows to standard output\n");
  fprintf (stderr, "\n");
  exit(1);

}


errrpt (lda, cur)

csrdef *lda;
csrdef *cur;

{

  text msg[2048];

  if (cur->rc) {
    oerhms (lda, cur->rc, msg, 2048);
    fprintf (stderr, "TPC-C load error: %s\n", msg);
  }

}



quit ()

{

  if (oclose (&curw))
    errrpt (&tpclda, &curw);

  if (oclose (&curd))
    errrpt (&tpclda, &curd);

  if (oclose (&curc))
    errrpt (&tpclda, &curc);

  if (oclose (&curh))
    errrpt (&tpclda, &curh);

  if (oclose (&curs))
    errrpt (&tpclda, &curs);

  if (oclose (&curi))
    errrpt (&tpclda, &curi);

  if (oclose (&curo1))
    errrpt (&tpclda, &curo1);

  if (oclose (&curo2))
    errrpt (&tpclda, &curo2);

  if (oclose (&curol1))
    errrpt (&tpclda, &curol1);

  if (oclose (&curol2))
    errrpt (&tpclda, &curol2);

  if (oclose (&curno))
    errrpt (&tpclda, &curno);

  if (ologof (&tpclda))
    fprintf (stderr, "TPC-C load error: Error in logging off\n");

}



main (argc, argv)

int argc;
char *argv[];

{

  char *uid="tpcc/tpcc";
  text sqlbuf[1024];
  int scale=0;
  int i, j;
  int loop;
  int loopcount;
  int cid;
  int dwid;
  int cdid;
  int cwid;
  int sid;
  int swid;
  int olcnt;
  int nrows;
  int row;

  int w_id;
  char w_name[11];
  char w_street_1[21];
  char w_street_2[21];
  char w_city[21];
  char w_state[2];
  char w_zip[9];
  float w_tax;

  int d_id[10];
  int d_w_id[10];
  char d_name[10][11];
```

```
  char d_street_1[10][21];
  char d_street_2[10][21];
  char d_city[10][21];
  char d_state[10][2];
  char d_zip[10][9];
  float d_tax[10];

  int c_id[100];
  int c_d_id[100];
  int c_w_id[100];
  char c_first[100][17];
  char c_last[100][17];
  char c_street_1[100][21];
  char c_street_2[100][21];
  char c_city[100][21];
  char c_state[100][2];
  char c_zip[100][9];
  char c_phone[100][16];
  char c_credit[100][2];
  float c_discount[100];
  char c_data[100][501];

  int i_id[100];
  int i_im_id[100];
  int i_price[100];
  char i_name[100][25];
  char i_data[100][51];

  int s_i_id[100];
  int s_w_id[100];
  int s_quantity[100];
  char s_dist_01[100][24];
  char s_dist_02[100][24];
  char s_dist_03[100][24];
  char s_dist_04[100][24];
  char s_dist_05[100][24];
  char s_dist_06[100][24];
  char s_dist_07[100][24];
  char s_dist_08[100][24];
  char s_dist_09[100][24];
  char s_dist_10[100][24];
  char s_data[100][51];

  int h_w_id[100];
  int h_d_id[100];
  int h_c_id[100];
  char h_data[100][25];

  int o_id[100];
  int o_d_id[100];
  int o_w_id[100];
  int o_c_id[100];
  int o_carrier_id[100];
  int o_ol_cnt[100];

  int ol_o_id[15];
  int ol_d_id[15];
  int ol_w_id[15];
  int ol_number[15];
  int ol_i_id[15];
  int ol_supply_w_id[15];
  int ol_amount[15];
  char ol_dist_info[15][24];

  int no_o_id[100];
  int no_d_id[100];
  int no_w_id[100];

  char sdate[30];

  double begin_time, end_time;
  double begin_cpu, end_cpu;
  double gettime(), getcpu();

  extern int getopt();
  extern char *optarg;
  extern int optind, opterr;

  char          *argstr="M:AwdcisShno:b:e:j:k:g";
  int opt;
  int do_A=0;
  int do_w=0;
  int do_d=0;
  int do_i=0;
  int do_c=0;
  int do_s=0;
  int do_S=0;
  int do_h=0;
  int do_o=0;
  int do_n=0;
  int gen=0;
  int bware=1;
  int eware=0;
  int bitem=1;
  int eitem=0;

  FILE *olfp=NULL;
  char olfname[100];
#define FIRSTNAME_WITH_CLAST
  #ifdef FIRSTNAME_WITH_CLAST
    char firstname_with_clast[100];
    sprintf(firstname_with_clast, "C_LAST=%d", CNUM1);
  #endif /* FIRSTNAME_WITH_CLAST */


  /*-----------------------------------------------------------------+
  | Parse command line -- look for scale factor.                     |
  +-----------------------------------------------------------------*/

    if (argc == 1) {
      myusage ();
    }

    while ((opt = getopt (argc, argv, argstr)) != -1) {
      switch (opt) {
        case '?': myusage ();
                  break;
        case 'M': scale = atoi (optarg);
                  break;
        case 'A': do_A = 1;
                  break;
        case 'w': do_w = 1;
                  break;
        case 'd': do_d = 1;
                  break;
        case 'c': do_c = 1;
                  break;
        case 'i': do_i = 1;
                  break;
        case 's': do_s = 1;
                  break;
        case 'S': do_S = 1;
                  break;
        case 'h': do_h = 1;
                  break;
        case 'n': do_n = 1;
                  break;
        case 'o': do_o = 1;
                   strcpy (olfname, optarg);
                  break;
        case 'b': bware = atoi (optarg);
                  break;
        case 'e': eware = atoi (optarg);
                  break;
        case 'j': bitem = atoi (optarg);
                  break;
        case 'k': eitem = atoi (optarg);
                  break;
        case 'g': gen = 1;
                  break;
        default: fprintf (stderr, "THIS SHOULD NEVER HAPPEN!!!\n");
                 fprintf (stderr, "(reached default case in getopt ())\n");
                 myusage ();
      }
    }

  /*-----------------------------------------------------------------*|
  |                    Rudimentary error checking                    |
  |*-----------------------------------------------------------------*/

    if (scale  < 1) {
      fprintf (stderr, "Invalid scale factor: '%d'\n", scale);
      myusage ();
    }

    if (!(do_A || do_w || do_d || do_c || do_i || do_s || do_S || do_h || do_o ||
          do_n)) {
      fprintf (stderr, "What should I load???\n");
      myusage ();
    }

    if (gen && (do_A || (do_w + do_d + do_c + do_i + do_s + do_S + do_h + do_o +
                         do_n > 1))) {
      fprintf (stderr, "Can only generate table one at a time\n");
      myusage ();
    }

    if (do_S && (do_A || do_s)) {
      fprintf (stderr, "Cluster stock table around s_w_id or s_i_id?\n");
      myusage ();
    }

    if (eware <= 0)
      eware = scale;
    if (eitem <= 0)
      eitem = STOCFAC;

    if (do_S) {
      if ((bitem  < 1) || (bitem > STOCFAC)) {
        fprintf (stderr, "Invalid beginning item number: '%d'\n", bitem);
        myusage ();
      }

      if ((eitem  < bitem) || (eitem > STOCFAC)) {
        fprintf (stderr, "Invalid ending item number: '%d'\n", eitem);
        myusage ();
      }
    }
```

```
 if ((bware  < 1) || (bware > scale)) {
   fprintf (stderr, "Invalid beginning warehouse number: '%d'\n", bware);
   myusage ();
 }

 if ((eware  < bware) || (eware > scale)) {
   fprintf (stderr, "Invalid ending warehouse number: '%d'\n", eware);
   myusage ();
 }

 if (gen && do_o) {
   if ((olfp = fopen (olfname, "w")) == NULL) {
      fprintf (stderr, "Can't open '%s' for writing order lines\n", olfname);
      myusage ();
   }
 }

/*-----------------------------------------------------------------+
| Prepare to insert into database.                                  |
+-----------------------------------------------------------------*/

 sysdate (sdate);
 if (!gen) {

   /* log on to Oracle */

   if (orlon (&tpclda, (ub1 *) tpchda, (text *) uid, -1, (text *) 0, -1, 0)) {
      fprintf (stderr, "TPC-C load error: Error in logging on\n");
      errrpt (&tpclda, &tpclda);
      exit (1);
   }

   fprintf (stderr, "\nConnected to Oracle userid '%s'.\n", uid);

   /* turn off auto-commit */

   if (ocof (&tpclda)) {
      errrpt (&tpclda, &tpclda);
      ologof (&tpclda);
      exit (1);
   }

   /* open cursors */

   if (oopen (&curw, &tpclda, (text *) 0, -1, -1, (text *) uid, -1)) {
      errrpt (&tpclda, &curw);
      ologof (&tpclda);
      exit (1);
   }

   if (oopen (&curd, &tpclda, (text *) 0, -1, -1, (text *) uid, -1)) {
      errrpt (&tpclda, &curd);
      oclose (&curw);
      ologof (&tpclda);
      exit (1);
   }

   if (oopen (&curc, &tpclda, (text *) 0, -1, -1, (text *) uid, -1)) {
      errrpt (&tpclda, &curc);
      oclose (&curw);
      oclose (&curd);
      ologof (&tpclda);
      exit (1);
   }

   if (oopen (&curh, &tpclda, (text *) 0, -1, -1, (text *) uid, -1)) {
      errrpt (&tpclda, &curh);
      oclose (&curw);
      oclose (&curd);
      oclose (&curc);
      ologof (&tpclda);
      exit (1);
   }

   if (oopen (&curs, &tpclda, (text *) 0, -1, -1, (text *) uid, -1)) {
      errrpt (&tpclda, &curs);
      oclose (&curw);
      oclose (&curd);
      oclose (&curc);
      oclose (&curh);
      ologof (&tpclda);
      exit (1);
   }

   if (oopen (&curi, &tpclda, (text *) 0, -1, -1, (text *) uid, -1)) {
      errrpt (&tpclda, &curi);
      oclose (&curw);
      oclose (&curd);
      oclose (&curc);
      oclose (&curh);
      oclose (&curs);
      ologof (&tpclda);
      exit (1);
   }

   if (oopen (&curo1, &tpclda, (text *) 0, -1, -1, (text *) uid, -1)) {
      errrpt (&tpclda, &curo1);
      oclose (&curw);
      oclose (&curd);
      oclose (&curc);
      oclose (&curh);
      oclose (&curs);
      oclose (&curi);
      ologof (&tpclda);
      exit (1);
   }

   if (oopen (&curo2, &tpclda, (text *) 0, -1, -1, (text *) uid, -1)) {
      errrpt (&tpclda, &curo2);
      oclose (&curw);
      oclose (&curd);
      oclose (&curc);
      oclose (&curh);
      oclose (&curs);
      oclose (&curi);
      oclose (&curo1);
      ologof (&tpclda);
      exit (1);
   }

   if (oopen (&curol1, &tpclda, (text *) 0, -1, -1, (text *) uid, -1)) {
      errrpt (&tpclda, &curol1);
      oclose (&curw);
      oclose (&curd);
      oclose (&curc);
      oclose (&curh);
      oclose (&curs);
      oclose (&curi);
      oclose (&curo1);
      oclose (&curo2);
      ologof (&tpclda);
      exit (1);
   }

   if (oopen (&curol2, &tpclda, (text *) 0, -1, -1, (text *) uid, -1)) {
      errrpt (&tpclda, &curol2);
      oclose (&curw);
      oclose (&curd);
      oclose (&curc);
      oclose (&curh);
      oclose (&curs);
      oclose (&curi);
      oclose (&curo1);
      oclose (&curo2);
      oclose (&curol1);
      ologof (&tpclda);
      exit (1);
   }

   if (oopen (&curno, &tpclda, (text *) 0, -1, -1, (text *) uid, -1)) {
      errrpt (&tpclda, &curno);
      oclose (&curw);
      oclose (&curd);
      oclose (&curc);
      oclose (&curh);
      oclose (&curs);
      oclose (&curi);
      oclose (&curo1);
      oclose (&curo2);
      oclose (&curol1);
      oclose (&curol2);
      ologof (&tpclda);
      exit (1);
   }

   /* parse statements */

   sprintf ((char *) sqlbuf, SQLTXTW);
   if (oparse (&curw, sqlbuf, -1, 0, 1)) {
      errrpt (&tpclda, &curw);
      quit ();
      exit (1);
   }

   sprintf ((char *) sqlbuf, SQLTXTD);
   if (oparse (&curd, sqlbuf, -1, 0, 1)) {
      errrpt (&tpclda, &curd);
      quit ();
      exit (1);
   }

   sprintf ((char *) sqlbuf, SQLTXTC);
   if (oparse (&curc, sqlbuf, -1, 0, 1)) {
      errrpt (&tpclda, &curc);
      quit ();
      exit (1);
   }

   sprintf ((char *) sqlbuf, SQLTXTH);
   if (oparse (&curh, sqlbuf, -1, 0, 1)) {
      errrpt (&tpclda, &curh);
      quit ();
      exit (1);
   }

   sprintf ((char *) sqlbuf, SQLTXTS);
   if (oparse (&curs, sqlbuf, -1, 0, 1)) {
```

```
    errrpt (&tpclda, &curs);
    quit ();
    exit (1);
  }

  sprintf ((char *) sqlbuf, SQLTXTI);
  if (oparse (&curi, sqlbuf, -1, 0, 1)) {
    errrpt (&tpclda, &curi);
    quit ();
    exit (1);
  }

  sprintf ((char *) sqlbuf, SQLTXTO1);
  if (oparse (&curo1, sqlbuf, -1, 0, 1)) {
    errrpt (&tpclda, &curo1);
    quit ();
    exit (1);
  }

  sprintf ((char *) sqlbuf, SQLTXTO2);
  if (oparse (&curo2, sqlbuf, -1, 0, 1)) {
    errrpt (&tpclda, &curo2);
    quit ();
    exit (1);
  }

  sprintf ((char *) sqlbuf, SQLTXTOL1);
  if (oparse (&curol1, sqlbuf, -1, 0, 1)) {
    errrpt (&tpclda, &curol1);
    quit ();
    exit (1);
  }

  sprintf ((char *) sqlbuf, SQLTXTOL2);
  if (oparse (&curol2, sqlbuf, -1, 0, 1)) {
    errrpt (&tpclda, &curol2);
    quit ();
    exit (1);
  }

  sprintf ((char *) sqlbuf, SQLTXTNO);
  if (oparse (&curno, sqlbuf, -1, 0, 1)) {
    errrpt (&tpclda, &curno);
    quit ();
    exit (1);
  }

  /* bind variables */

  /* warehouse */

  if (obndrv (&curw, (text *) ":w_id", -1, (ub1 *) &w_id, sizeof (w_id),
          SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curw);
    quit ();
    exit (1);
  }

  if (obndrv (&curw, (text *) ":w_name", -1, (ub1 *) w_name, 11,
          SQLT_STR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curw);
    quit ();
    exit (1);
  }

  if (obndrv (&curw, (text *) ":w_street_1", -1, (ub1 *) w_street_1, 21,
          SQLT_STR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curw);
    quit ();
    exit (1);
  }

  if (obndrv (&curw, (text *) ":w_street_2", -1, (ub1 *) w_street_2, 21,
          SQLT_STR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curw);
    quit ();
    exit (1);
  }

  if (obndrv (&curw, (text *) ":w_city", -1, (ub1 *) w_city, 21,
          SQLT_STR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curw);
    quit ();
    exit (1);
  }

  if (obndrv (&curw, (text *) ":w_state", -1, (ub1 *) w_state, 2,
          SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curw);
    quit ();
    exit (1);
  }

  if (obndrv (&curw, (text *) ":w_zip", -1, (ub1 *) w_zip, 9,
          SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curw);
    quit ();
    exit (1);
  }

  if (obndrv (&curw, (text *) ":w_tax", -1, (ub1 *) &w_tax, sizeof (w_tax),
          SQLT_FLT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curw);
    quit ();
    exit (1);
  }

  /* district */

  if (obndrv (&curd, (text *) ":d_id", -1, (ub1 *) d_id, sizeof (int),
          SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curd);
    quit ();
    exit (1);
  }

  if (obndrv (&curd, (text *) ":d_w_id", -1, (ub1 *) d_w_id, sizeof (int),
          SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curd);
    quit ();
    exit (1);
  }

  if (obndrv (&curd, (text *) ":d_name", -1, (ub1 *) d_name, 11,
          SQLT_STR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curd);
    quit ();
    exit (1);
  }

  if (obndrv (&curd, (text *) ":d_street_1", -1, (ub1 *) d_street_1, 21,
          SQLT_STR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curd);
    quit ();
    exit (1);
  }

  if (obndrv (&curd, (text *) ":d_street_2", -1, (ub1 *) d_street_2, 21,
          SQLT_STR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curd);
    quit ();
    exit (1);
  }

  if (obndrv (&curd, (text *) ":d_city", -1, (ub1 *) d_city, 21,
          SQLT_STR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curd);
    quit ();
    exit (1);
  }

  if (obndrv (&curd, (text *) ":d_state", -1, (ub1 *) d_state, 2,
          SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curd);
    quit ();
    exit (1);
  }

  if (obndrv (&curd, (text *) ":d_zip", -1, (ub1 *) d_zip, 9,
          SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curd);
    quit ();
    exit (1);
  }

  if (obndrv (&curd, (text *) ":d_tax", -1, (ub1 *) d_tax, sizeof (int),
          SQLT_FLT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curd);
    quit ();
    exit (1);
  }

  /* customer */

  if (obndrv (&curc, (text *) ":c_id", -1, (ub1 *) c_id, sizeof (int),
          SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curc);
    quit ();
    exit (1);
  }

  if (obndrv (&curc, (text *) ":c_d_id", -1, (ub1 *) c_d_id, sizeof (int),
          SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curc);
    quit ();
    exit (1);
  }

  if (obndrv (&curc, (text *) ":c_w_id", -1, (ub1 *) c_w_id, sizeof (int),
          SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curc);
    quit ();
    exit (1);
  }

  if (obndrv (&curc, (text *) ":c_first", -1, (ub1 *) c_first, 17,
          SQLT_STR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curc);
```

```
    quit ();
    exit (1);
  }

  if (obndrv (&curc, (text *) ":c_last", -1, (ub1 *) c_last, 17,
          SQLT_STR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curc);
    quit ();
    exit (1);
  }

  if (obndrv (&curc, (text *) ":c_street_1", -1, (ub1 *) c_street_1, 21,
          SQLT_STR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curc);
    quit ();
    exit (1);
  }

  if (obndrv (&curc, (text *) ":c_street_2", -1, (ub1 *) c_street_2, 21,
          SQLT_STR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curc);
    quit ();
    exit (1);
  }

  if (obndrv (&curc, (text *) ":c_city", -1, (ub1 *) c_city, 21,
          SQLT_STR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curc);
    quit ();
    exit (1);
  }

  if (obndrv (&curc, (text *) ":c_state", -1, (ub1 *) c_state, 2,
          SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curc);
    quit ();
    exit (1);
  }

  if (obndrv (&curc, (text *) ":c_zip", -1, (ub1 *) c_zip, 9,
          SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curc);
    quit ();
    exit (1);
  }

  if (obndrv (&curc, (text *) ":c_phone", -1, (ub1 *) c_phone, 16,
          SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curc);
    quit ();
    exit (1);
  }

  if (obndrv (&curc, (text *) ":c_credit", -1, (ub1 *) c_credit, 2,
          SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curc);
    quit ();
    exit (1);
  }

  if (obndrv (&curc, (text *) ":c_discount", -1, (ub1 *) c_discount,
          sizeof (int), SQLT_FLT, -1, (sb2 *) 0, (text *) 0, -1,
          -1)) {
    errrpt (&tpclda, &curc);
    quit ();
    exit (1);
  }

  if (obndrv (&curc, (text *) ":c_data", -1, (ub1 *) c_data, 501,
          SQLT_STR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curc);
    quit ();
    exit (1);
  }

  /* item */

  if (obndrv (&curi, (text *) ":i_id", -1, (ub1 *) i_id, sizeof (int),
          SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curi);
    quit ();
    exit (1);
  }

  if (obndrv (&curi, (text *) ":i_im_id", -1, (ub1 *) i_im_id, sizeof (int),
          SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curi);
    quit ();
    exit (1);
  }

  if (obndrv (&curi, (text *) ":i_name", -1, (ub1 *) i_name, 25,
          SQLT_STR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curi);
    quit ();
    exit (1);
  }

  if (obndrv (&curi, (text *) ":i_price", -1, (ub1 *) i_price,
          sizeof (int), SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1,
          -1)) {
    errrpt (&tpclda, &curi);
    quit ();
    exit (1);
  }

  if (obndrv (&curi, (text *) ":i_data", -1, (ub1 *) i_data, 51,
          SQLT_STR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curi);
    quit ();
    exit (1);
  }

  /* stock */

  if (obndrv (&curs, (text *) ":s_i_id", -1, (ub1 *) s_i_id, sizeof (int),
          SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curs);
    quit ();
    exit (1);
  }

  if (obndrv (&curs, (text *) ":s_w_id", -1, (ub1 *) s_w_id, sizeof (int),
          SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curs);
    quit ();
    exit (1);
  }

  if (obndrv (&curs, (text *) ":s_quantity", -1, (ub1 *) s_quantity,
          sizeof (int), SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curs);
    quit ();
    exit (1);
  }

  if (obndrv (&curs, (text *) ":s_dist_01", -1, (ub1 *) s_dist_01, 24,
          SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curs);
    quit ();
    exit (1);
  }

  if (obndrv (&curs, (text *) ":s_dist_02", -1, (ub1 *) s_dist_02, 24,
          SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curs);
    quit ();
    exit (1);
  }

  if (obndrv (&curs, (text *) ":s_dist_03", -1, (ub1 *) s_dist_03, 24,
          SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curs);
    quit ();
    exit (1);
  }

  if (obndrv (&curs, (text *) ":s_dist_04", -1, (ub1 *) s_dist_04, 24,
          SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curs);
    quit ();
    exit (1);
  }

  if (obndrv (&curs, (text *) ":s_dist_05", -1, (ub1 *) s_dist_05, 24,
          SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curs);
    quit ();
    exit (1);
  }

  if (obndrv (&curs, (text *) ":s_dist_06", -1, (ub1 *) s_dist_06, 24,
          SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curs);
    quit ();
    exit (1);
  }

  if (obndrv (&curs, (text *) ":s_dist_07", -1, (ub1 *) s_dist_07, 24,
          SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curs);
    quit ();
    exit (1);
  }

  if (obndrv (&curs, (text *) ":s_dist_08", -1, (ub1 *) s_dist_08, 24,
          SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curs);
    quit ();
    exit (1);
  }

  if (obndrv (&curs, (text *) ":s_dist_09", -1, (ub1 *) s_dist_09, 24,
          SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
    errrpt (&tpclda, &curs);
    quit ();
    exit (1);
  }
```

```
if (obndrv (&curs, (text *) ":s_dist_10", -1, (ub1 *) s_dist_10, 24,
          SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curs);
   quit ();
   exit (1);
}

if (obndrv (&curs, (text *) ":s_data", -1, (ub1 *) s_data, 51,
          SQLT_STR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curs);
   quit ();
   exit (1);
}

/* history */

if (obndrv (&curh, (text *) ":h_c_id", -1, (ub1 *) h_c_id, sizeof (int),
          SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curh);
   quit ();
   exit (1);
}

if (obndrv (&curh, (text *) ":h_c_d_id", -1, (ub1 *) h_d_id, sizeof (int),
          SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curh);
   quit ();
   exit (1);
}

if (obndrv (&curh, (text *) ":h_c_w_id", -1, (ub1 *) h_w_id, sizeof (int),
          SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curh);
   quit ();
   exit (1);
}

if (obndrv (&curh, (text *) ":h_d_id", -1, (ub1 *) h_d_id, sizeof (int),
          SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curh);
   quit ();
   exit (1);
}

if (obndrv (&curh, (text *) ":h_w_id", -1, (ub1 *) h_w_id, sizeof (int),
          SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curh);
   quit ();
   exit (1);
}

if (obndrv (&curh, (text *) ":h_data", -1, (ub1 *) h_data, 25,
          SQLT_STR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curh);
   quit ();
   exit (1);
}

/* order_line (delivered) */

if (obndrv (&curol1, (text *) ":ol_o_id", -1, (ub1 *) ol_o_id,
          sizeof (int), SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curol1);
   quit ();
   exit (1);
}

if (obndrv (&curol1, (text *) ":ol_d_id", -1, (ub1 *) ol_d_id,
          sizeof (int), SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curol1);
   quit ();
   exit (1);
}

if (obndrv (&curol1, (text *) ":ol_w_id", -1, (ub1 *) ol_w_id,
          sizeof (int), SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curol1);
   quit ();
   exit (1);
}

if (obndrv (&curol1, (text *) ":ol_number", -1, (ub1 *) ol_number,
    sizeof (int), SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curol1);
   quit ();
   exit (1);
}

if (obndrv (&curol1, (text *) ":ol_i_id", -1, (ub1 *) ol_i_id,
    sizeof (int), SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curol1);
   quit ();
   exit (1);
}

if (obndrv (&curol1, (text *) ":ol_supply_w_id", -1,
          (ub1 *) ol_supply_w_id, sizeof (int), SQLT_INT, -1,
          (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curol1);
   quit ();
   exit (1);
}

if (obndrv (&curol1, (text *) ":ol_dist_info", -1, (ub1 *) ol_dist_info,
          24, SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curol1);
   quit ();
   exit (1);
}

/* order_line (not delivered) */

if (obndrv (&curol2, (text *) ":ol_o_id", -1, (ub1 *) ol_o_id,
          sizeof (int), SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curol2);
   quit ();
   exit (1);
}

if (obndrv (&curol2, (text *) ":ol_d_id", -1, (ub1 *) ol_d_id,
          sizeof (int), SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curol2);
   quit ();
   exit (1);
}

if (obndrv (&curol2, (text *) ":ol_w_id", -1, (ub1 *) ol_w_id,
          sizeof (int), SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curol2);
   quit ();
   exit (1);
}

if (obndrv (&curol2, (text *) ":ol_number", -1, (ub1 *) ol_number,
    sizeof (int), SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curol2);
   quit ();
   exit (1);
}

if (obndrv (&curol2, (text *) ":ol_i_id", -1, (ub1 *) ol_i_id,
    sizeof (int), SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curol2);
   quit ();
   exit (1);
}

if (obndrv (&curol2, (text *) ":ol_supply_w_id", -1,
          (ub1 *) ol_supply_w_id, sizeof (int), SQLT_INT, -1,
          (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curol2);
   quit ();
   exit (1);
}

if (obndrv (&curol2, (text *) ":ol_amount", -1, (ub1 *) ol_amount,
    sizeof (int), SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curol2);
   quit ();
   exit (1);
}

if (obndrv (&curol2, (text *) ":ol_dist_info", -1, (ub1 *) ol_dist_info,
          24, SQLT_CHR, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curol2);
   quit ();
   exit (1);
}

/* orders (delivered) */

if (obndrv (&curo1, (text *) ":o_id", -1, (ub1 *) o_id, sizeof (int),
          SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curo1);
   quit ();
   exit (1);
}

if (obndrv (&curo1, (text *) ":o_d_id", -1, (ub1 *) o_d_id, sizeof (int),
          SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curo1);
   quit ();
   exit (1);
}

if (obndrv (&curo1, (text *) ":o_w_id", -1, (ub1 *) o_w_id, sizeof (int),
          SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curo1);
   quit ();
   exit (1);
}

if (obndrv (&curo1, (text *) ":o_c_id", -1, (ub1 *) o_c_id, sizeof (int),
          SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
   errrpt (&tpclda, &curo1);
   quit ();
   exit (1);
```

```
    }

    if (obndrv (&curo1, (text *) ":o_carrier_id", -1, (ub1 *) o_carrier_id,
        sizeof (int), SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
      errrpt (&tpclda, &curo1);
      quit ();
      exit (1);
    }

    if (obndrv (&curo1, (text *) ":o_ol_cnt", -1, (ub1 *) o_ol_cnt,
        sizeof (int), SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
      errrpt (&tpclda, &curo1);
      quit ();
      exit (1);
    }

    /* orders (not delivered) */

    if (obndrv (&curo2, (text *) ":o_id", -1, (ub1 *) o_id, sizeof (int),
              SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
      errrpt (&tpclda, &curo2);
      quit ();
      exit (1);
    }

    if (obndrv (&curo2, (text *) ":o_d_id", -1, (ub1 *) o_d_id, sizeof (int),
              SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
      errrpt (&tpclda, &curo2);
      quit ();
      exit (1);
    }

    if (obndrv (&curo2, (text *) ":o_w_id", -1, (ub1 *) o_w_id, sizeof (int),
              SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
      errrpt (&tpclda, &curo2);
      quit ();
      exit (1);
    }

    if (obndrv (&curo2, (text *) ":o_c_id", -1, (ub1 *) o_c_id, sizeof (int),
              SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
      errrpt (&tpclda, &curo2);
      quit ();
      exit (1);
    }

    if (obndrv (&curo2, (text *) ":o_ol_cnt", -1, (ub1 *) o_ol_cnt,
              sizeof (int), SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
      errrpt (&tpclda, &curo2);
      quit ();
      exit (1);
    }

    /* new order */

    if (obndrv (&curno, (text *) ":no_o_id", -1, (ub1 *) no_o_id,
              sizeof (int), SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
      errrpt (&tpclda, &curno);
      quit ();
      exit (1);
    }

    if (obndrv (&curno, (text *) ":no_d_id", -1, (ub1 *) no_d_id,
              sizeof (int), SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
      errrpt (&tpclda, &curno);
      quit ();
      exit (1);
    }

    if (obndrv (&curno, (text *) ":no_w_id", -1, (ub1 *) no_w_id,
              sizeof (int), SQLT_INT, -1, (sb2 *) 0, (text *) 0, -1, -1)) {
      errrpt (&tpclda, &curno);
      quit ();
      exit (1);
    }
  }

/*-----------------------------------------------------------------+
| Initialize random number generator                                |
+-----------------------------------------------------------------*/

  srand (SEED);
  srand48 (SEED);
  initperm ();


/*-----------------------------------------------------------------+
| Load the WAREHOUSE table.                                         |
+-----------------------------------------------------------------*/

  if (do_A || do_w) {
    nrows = eware - bware + 1;

    fprintf (stderr, "Loading/generating warehouse: w%d - w%d (%d rows)\n",
             bware, eware, nrows);

    begin_time = gettime ();
    begin_cpu = getcpu ();
    for (loop = bware; loop <= eware; loop++) {

      w_tax = (rand () % 2001);
      randstr (w_name, 6, 10);
      randstr (w_street_1, 10, 20);
      randstr (w_street_2, 10, 20);
      randstr (w_city, 10, 20);
      randstr (str2, 2, 2);
      randnum (num9, 9);
      num9[4] = num9[5] = num9[6] = num9[7] = num9[8] = '1';

      if (gen) {
        printf ("%d 30000000 %6.4f %s %s %s %s %s %s\n", loop, w_tax,
                w_name, w_street_1, w_street_2, w_city, str2, num9);
        fflush (stdout);
      }
      else {
        w_id = loop;
        strncpy (w_state, str2, 2);
        strncpy (w_zip, num9, 9);

        if (oexec (&curw)) {
          errrpt (&tpclda, &curw);
          orol (&tpclda);
          fprintf (stderr, "Aborted at warehouse %d\n", loop);
          quit ();
          exit (1);
        }
        else if (ocom (&tpclda)) {
          errrpt (&tpclda, &tpclda);
          orol (&tpclda);
          fprintf (stderr, "Aborted at warehouse %d\n", loop);
          quit ();
          exit (1);
        }
      }
    }

    end_time = gettime ();
    end_cpu = getcpu ();
    fprintf (stderr, "Done.  %d rows loaded/generated in %10.2f sec. (%10.2f cpu)\n\n",
             nrows, end_time - begin_time, end_cpu - begin_cpu);
  }

/*-----------------------------------------------------------------+
| Load the DISTRICT table.                                          |
+-----------------------------------------------------------------*/

  if (do_A || do_d) {
    nrows = (eware - bware + 1) * DISTFAC;

    fprintf (stderr, "Loading/generating district: w%d - w%d (%d rows)\n",
             bware, eware, nrows);

    begin_time = gettime ();
    begin_cpu = getcpu ();

    dwid = bware - 1;

    for (row = 0; row < nrows; ) {
      dwid++;

      for (i = 0; i < DISTARR; i++, row++) {
        d_tax[i] = (rand () % 2001);
        randstr (d_name[i], 6, 10);
        randstr (d_street_1[i], 10, 20);
        randstr (d_street_2[i], 10, 20);
        randstr (d_city[i], 10, 20);
        randstr (str2, 2, 2);
        randnum (num9, 9);
        num9[4] = num9[5] = num9[6] = num9[7] = num9[8] = '1';

        if (gen) {
          /* printf ("%d %d %s %s %s %s %s %d 30000.0 3001\n",
                  i + 1, dwid, d_name[i], d_street_1[i], d_street_2[i],
                  d_city[i], str2, num9, d_tax[i]); */
                                        /* Reordered columns */
          printf ("%d %d 3000000 %6.4f 3001 %s %s %s %s %s %s\n",
                  i + 1, dwid, d_tax[i], d_name[i], d_street_1[i],
                                        d_street_2[i], d_city[i], str2, num9 );
        }
        else {
          d_id[i] = i + 1;
          d_w_id[i] = dwid;
          strncpy (d_state[i], str2, 2);
          strncpy (d_zip[i], num9, 9);
        }
      }

      if (gen) {
        fflush (stdout);
      }
      else {
        if (oexn (&curd, DISTARR, 0)) {
          errrpt (&tpclda, &curd);
          orol (&tpclda);
          fprintf (stderr, "Aborted at warehouse %d, district 1\n", dwid);
          quit ();
          exit (1);
```

```
        }
        else if (ocom (&tpclda)) {
          errrpt (&tpclda, &tpclda);
          orol (&tpclda);
          fprintf (stderr, "Aborted at warehouse %d, district 1\n", dwid);
          quit ();
          exit (1);
        }
      }
    }

    end_time = gettime ();
    end_cpu = getcpu ();
    fprintf (stderr, "Done.  %d rows loaded/generated in %10.2f sec. (%10.2f cpu)\n\n",
            nrows, end_time - begin_time, end_cpu - begin_cpu);
  }

/*-----------------------------------------------------------------+
| Load the CUSTOMER table.                                          |
+-----------------------------------------------------------------*/

  if (do_A || do_c) {
    nrows = (eware - bware + 1) * CUSTFAC * DISTFAC;

    fprintf (stderr, "Loading/generating customer: w%d - w%d (%d rows)\n   ",
            bware, eware, nrows);

    begin_time = gettime ();
    begin_cpu = getcpu ();

    cid = 0;
    cdid = 1;
    cwid = bware;
    loopcount = 0;

    for (row = 0; row < nrows; ) {
      for (i = 0; i < CUSTARR; i++, row++) {
        cid++;
        if (cid > CUSTFAC) {        /* cycle cust id */
          cid = 1;                  /* cheap mod */
          cdid++;                   /* shift district cycle */
          if (cdid > DISTFAC) {
            cdid = 1;
            cwid++;                 /* shift warehouse cycle */
          }
        }
        c_id[i] = cid;
        c_d_id[i] = cdid;
        c_w_id[i] = cwid;
        if (cid <= 1000)
          randlastname (c_last[i], cid - 1);
        else
          randlastname (c_last[i], NURand (255, 0, 999, CNUM1));
        c_credit[i][1] = 'C';
        if (rand () % 10)
          c_credit[i][0] = 'G';
        else
          c_credit[i][0] = 'B';
        c_discount[i] = (rand () % 5001);
#ifdef FIRSTNAME_WITH_CLAST
        if ((c_id[i] == 1) && (c_d_id[i] == 1) && (c_w_id[i] == 1 ))
          strcpy(c_first[i], firstname_with_clast);
        else
#endif

        randstr (c_first[i], 8, 16);
        randstr (c_street_1[i], 10, 20);
        randstr (c_street_2[i], 10, 20);
        randstr (c_city[i], 10, 20);
        randstr (str2, 2, 2);
        randnum (num9, 9);
        num9[4] = num9[5] = num9[6] = num9[7] = num9[8] = '1';
        randnum (num16, 16);
        randstr (c_data[i], 300, 500);

        if (gen) {
          printf ("%d %d %d %s OE %s %s %s %s %s %s %s %cC 5000000 %6.4f -1000 1000 1 0
%s\n",
                  cid, cdid, cwid, c_first[i], c_last[i],
                  c_street_1[i], c_street_2[i], c_city[i], str2, num9,
                  num16, sdate, c_credit[i][0], c_discount[i], c_data[i]);
        }
        else {
          strncpy (c_state[i], str2, 2);
          strncpy (c_zip[i], num9, 9);
          strncpy (c_phone[i], num16, 16);
        }
      }

      if (gen) {
        fflush (stdout);
      }
      else {
        if (oexn (&curc, CUSTARR, 0)) {
          errrpt (&tpclda, &curc);
          orol (&tpclda);
          fprintf (stderr, "Aborted at w_id %d, d_id %d, c_id %d\n",
                  c_w_id[0], c_d_id[0], c_id[0]);
          quit ();
          exit (1);
        }
        else if (ocom (&tpclda)) {
          errrpt (&tpclda, &tpclda);
          orol (&tpclda);
          fprintf (stderr, "Aborted at w_id %d, d_id %d, c_id %d\n",
                  c_w_id[0], c_d_id[0], c_id[0]);
          quit ();
          exit (1);
        }
      }

      if ((++loopcount) % 50)
        fprintf (stderr, ".");
      else
        fprintf (stderr, " %d rows committed\n   ", row);
    }

    end_time = gettime ();
    end_cpu = getcpu ();
    fprintf (stderr, "Done.  %d rows loaded/generated in %10.2f sec. (%10.2f cpu)\n\n",
            nrows, end_time - begin_time, end_cpu - begin_cpu);
  }


/*-----------------------------------------------------------------+
| Load the ITEM table.                                              |
+-----------------------------------------------------------------*/

  if (do_A || do_i) {
    nrows = ITEMFAC;

    fprintf (stderr, "Loading/generating item: (%d rows)\n   ", nrows);

    begin_time = gettime ();
    begin_cpu = getcpu ();

    loopcount = 0;

    for (row = 0; row < nrows; ) {
      for (i = 0; i < ITEMARR; i++, row++) {
        i_im_id[i] = (rand () % 10000) + 1;
        i_price[i] = ((rand () % 9901) + 100);
        randstr (i_name[i], 14, 24);
        randdatastr (i_data[i], 26, 50);

        if (gen) {
          printf ("%d %d %s %d %s\n", row + 1, i_im_id[i], i_name[i],
                  i_price[i], i_data[i]);
        }
        else {
          i_id[i] = row + 1;
        }
      }

      if (gen) {
        fflush (stdout);
      }
      else {
        if (oexn (&curi, ITEMARR, 0)) {
          errrpt (&tpclda, &curi);
          orol (&tpclda);
          fprintf (stderr, "Aborted at i_id %d\n", i_id[0]);
          quit ();
          exit (1);
        }
        else if (ocom (&tpclda)) {
          errrpt (&tpclda, &tpclda);
          orol (&tpclda);
          fprintf (stderr, "Aborted at i_id %d\n", i_id[0]);
          quit ();
          exit (1);
        }
      }

      if ((++loopcount) % 50)
        fprintf (stderr, ".");
      else
        fprintf (stderr, " %d rows committed\n   ", row);
    }

    end_time = gettime ();
    end_cpu = getcpu ();
    fprintf (stderr, "Done.  %d rows loaded/generated in %10.2f sec. (%10.2f cpu)\n\n",
            nrows, end_time - begin_time, end_cpu - begin_cpu);
  }


/*-----------------------------------------------------------------+
| Load the STOCK table.                                             |
+-----------------------------------------------------------------*/

  if (do_A || do_s) {

    nrows = (eware - bware + 1) * STOCFAC;

    fprintf (stderr, "Loading/generating stock: w%d - w%d (%d rows)\n   ",
            bware, eware, nrows);
```

```
    begin_time = gettime ();
    begin_cpu = getcpu ();

    sid = 0;
    swid = bware;
    loopcount = 0;

    for (row = 0; row < nrows; ) {
      for (i = 0; i < STOCARR; i++, row++) {
        if (++sid > STOCFAC) {        /* cheap mod */
          sid = 1;
          swid++;
        }
        s_quantity[i] = (rand () % 91) + 10;
        randstr (str24[0], 24, 24);
        randstr (str24[1], 24, 24);
        randstr (str24[2], 24, 24);
        randstr (str24[3], 24, 24);
        randstr (str24[4], 24, 24);
        randstr (str24[5], 24, 24);
        randstr (str24[6], 24, 24);
        randstr (str24[7], 24, 24);
        randstr (str24[8], 24, 24);
        randstr (str24[9], 24, 24);
        randdatastr (s_data[i], 26, 50);

        if (gen) {
          printf ("%d %d %d %s %s %s %s %s %s %s %s %s 0 0 0 %s\n",
                  sid, swid, s_quantity[i], str24[0], str24[1], str24[2],
                  str24[3], str24[4], str24[5], str24[6], str24[7],
                  str24[8], str24[9], s_data[i]);
        }
        else {
          s_i_id[i] = sid;
          s_w_id[i] = swid;
          strncpy (s_dist_01[i], str24[0], 24);
          strncpy (s_dist_02[i], str24[1], 24);
          strncpy (s_dist_03[i], str24[2], 24);
          strncpy (s_dist_04[i], str24[3], 24);
          strncpy (s_dist_05[i], str24[4], 24);
          strncpy (s_dist_06[i], str24[5], 24);
          strncpy (s_dist_07[i], str24[6], 24);
          strncpy (s_dist_08[i], str24[7], 24);
          strncpy (s_dist_09[i], str24[8], 24);
          strncpy (s_dist_10[i], str24[9], 24);
        }
      }

      if (gen) {
        fflush (stdout);
      }
      else {
        if (oexn (&curs, STOCARR, 0)) {
          errrpt (&tpclda, &curs);
          orol (&tpclda);
          fprintf (stderr, "Aborted at w_id %d, s_i_id %d\n", s_w_id[0],
                   s_i_id[0]);
          quit ();
          exit (1);
        }
        else if (ocom (&tpclda)) {
          errrpt (&tpclda, &tpclda);
          orol (&tpclda);
          fprintf (stderr, "Aborted at w_id %d, s_i_id %d\n", s_w_id[0],
                   s_i_id[0]);
          quit ();
          exit (1);
        }
      }

      if ((++loopcount) % 50)
        fprintf (stderr, ".");
      else
        fprintf (stderr, " %d rows committed\n   ", row);
    }

    end_time = gettime ();
    end_cpu = getcpu ();
    fprintf (stderr, "Done.  %d rows loaded/generated in %10.2f sec. (%10.2f cpu)\n\n",
             nrows, end_time - begin_time, end_cpu - begin_cpu);
  }

/*----------------------------------------------------------------+
| Load the STOCK table (cluster around s_i_id).                    |
+----------------------------------------------------------------*/

  if (do_S) {

    nrows = (eitem - bitem + 1) * (eware - bware + 1);

    fprintf (stderr, "Loading/generating stock: i%d - i%d, w%d - w%d (%d rows)\n   ",
             bitem, eitem, bware, eware, nrows);

    begin_time = gettime ();
    begin_cpu = getcpu ();

    sid = bitem;
    swid = bware - 1;
    loopcount = 0;

    for (row = 0; row < nrows; ) {
      for (i = 0; i < STOCARR; i++, row++) {
        if (++swid > eware) {        /* cheap mod */
          swid = bware;
          sid++;
        }
        s_quantity[i] = (rand () % 91) + 10;
        randstr (str24[0], 24, 24);
        randstr (str24[1], 24, 24);
        randstr (str24[2], 24, 24);
        randstr (str24[3], 24, 24);
        randstr (str24[4], 24, 24);
        randstr (str24[5], 24, 24);
        randstr (str24[6], 24, 24);
        randstr (str24[7], 24, 24);
        randstr (str24[8], 24, 24);
        randstr (str24[9], 24, 24);
        randdatastr (s_data[i], 26, 50);

        if (gen) {
          printf ("%d %d %d %s %s %s %s %s %s %s %s %s 0 0 0 %s\n",
                  sid, swid, s_quantity[i], str24[0], str24[1], str24[2],
                  str24[3], str24[4], str24[5], str24[6], str24[7],
                  str24[8], str24[9], s_data[i]);
        }
        else {
          s_i_id[i] = sid;
          s_w_id[i] = swid;
          strncpy (s_dist_01[i], str24[0], 24);
          strncpy (s_dist_02[i], str24[1], 24);
          strncpy (s_dist_03[i], str24[2], 24);
          strncpy (s_dist_04[i], str24[3], 24);
          strncpy (s_dist_05[i], str24[4], 24);
          strncpy (s_dist_06[i], str24[5], 24);
          strncpy (s_dist_07[i], str24[6], 24);
          strncpy (s_dist_08[i], str24[7], 24);
          strncpy (s_dist_09[i], str24[8], 24);
          strncpy (s_dist_10[i], str24[9], 24);
        }
      }

      if (gen) {
        fflush (stdout);
      }
      else {
        if (oexn (&curs, STOCARR, 0)) {
          errrpt (&tpclda, &curs);
          orol (&tpclda);
          fprintf (stderr, "Aborted at w_id %d, s_i_id %d\n", s_w_id[0],
                   s_i_id[0]);
          quit ();
          exit (1);
        }
        else if (ocom (&tpclda)) {
          errrpt (&tpclda, &tpclda);
          orol (&tpclda);
          fprintf (stderr, "Aborted at w_id %d, s_i_id %d\n", s_w_id[0],
                   s_i_id[0]);
          quit ();
          exit (1);
        }
      }

      if ((++loopcount) % 50)
        fprintf (stderr, ".");
      else
        fprintf (stderr, " %d rows committed\n   ", row);
    }

    end_time = gettime ();
    end_cpu = getcpu ();
    fprintf (stderr, "Done.  %d rows loaded/generated in %10.2f sec. (%10.2f cpu)\n\n",
             nrows, end_time - begin_time, end_cpu - begin_cpu);
  }

/*----------------------------------------------------------------+
| Load the HISTORY table.                                          |
+----------------------------------------------------------------*/

  if (do_A || do_h) {
    nrows = (eware - bware + 1) * HISTFAC;

    fprintf (stderr, "Loading/generating history: w%d - w%d (%d rows)\n   ",
             bware, eware, nrows);

    begin_time = gettime ();
    begin_cpu = getcpu ();

    cid = 0;
    cdid = 1;
    cwid = bware;
    loopcount = 0;

    for (row = 0; row < nrows; ) {
      for (i = 0; i < HISTARR; i++, row++) {
        cid++;
        if (cid > CUSTFAC) {        /* cycle cust id */
          cid = 1;                  /* cheap mod */
```

```
          cdid++;                /* shift district cycle */
          if (cdid > DISTFAC) {
            cdid = 1;
            cwid++;              /* shift warehouse cycle */
          }
        }
        h_c_id[i] = cid;
        h_d_id[i] = cdid;
        h_w_id[i] = cwid;
        randstr (h_data[i], 12, 24);
        if (gen) {
          printf ("%d %d %d %d %d %s 1000 %s\n", cid, cdid, cwid, cdid,
                  cwid, sdate, h_data[i]);
        }
      }

      if (gen) {
        fflush (stdout);
      }
      else {
        if (oexn (&curh, HISTARR, 0)) {
          errrpt (&tpclda, &curh);
          orol (&tpclda);
          fprintf (stderr, "Aborted at w_id %d, d_id %d, c_id %d\n",
                   h_w_id[0], h_d_id[0], h_c_id[0]);
          quit ();
          exit (1);
        }
        else if (ocom (&tpclda)) {
          errrpt (&tpclda, &tpclda);
          orol (&tpclda);
          fprintf (stderr, "Aborted at w_id %d, d_id %d, c_id %d\n",
                   h_w_id[0], h_d_id[0], h_c_id[0]);
          quit ();
          exit (1);
        }
      }

      if ((++loopcount) % 50)
        fprintf (stderr, ".");
      else
        fprintf (stderr, " %d rows committed\n   ", row);
    }

    end_time = gettime ();
    end_cpu = getcpu ();
    fprintf (stderr, "Done.  %d rows loaded/generated in %10.2f sec. (%10.2f cpu)\n\n",
             nrows, end_time - begin_time, end_cpu - begin_cpu);
  }

/*-----------------------------------------------------------------+
| Load the ORDERS and ORDER-LINE table.                            |
+-----------------------------------------------------------------*/

  if (do_A || do_o) {
    nrows = (eware - bware + 1) * ORDEFAC * DISTFAC;

    fprintf (stderr, "Loading/generating orders and order-line: w%d - w%d (%d ord, ~%d ordl)\n   ",
             bware, eware, nrows, nrows * 10);

    begin_time = gettime ();
    begin_cpu = getcpu ();

    cid = 0;
    cdid = 1;
    cwid = bware;
    loopcount = 0;

    for (row = 0; row < nrows; ) {
      for (i = 0; i < ORDEARR; i++, row++) {
        cid++;
        if (cid > ORDEFAC) {        /* cycle cust id */
          cid = 1;                  /* cheap mod */
          cdid++;                   /* shift district cycle */
          if (cdid > DISTFAC) {
            cdid = 1;
            cwid++;                 /* shift warehouse cycle */
          }
        }
        o_carrier_id[i] = rand () % 10 + 1;
        o_ol_cnt[i] = olcnt = rand () % 11 + 5;

        if (gen) {
          if (cid < 2101) {
            printf ("%d %d %d %d %s %d %d 1\n", cid, cdid, cwid,
                    randperm3000[cid - 1], sdate,o_carrier_id[i],
                    o_ol_cnt[i]);
          }
          else {
                          /* set carrierid to 11 instead of null */
            printf ("%d %d %d %d %s 11 %d 1\n", cid, cdid, cwid,
                    randperm3000[cid - 1], sdate, o_ol_cnt[i]);
          }
        }
        else {
          o_id[i] = cid;
          o_d_id[i] = cdid;
          o_w_id[i] = cwid;
          o_c_id[i] = randperm3000[cid - 1];
        }

        for (j = 0; j < o_ol_cnt[i]; j++) {
          ol_i_id[j] = sid = lrand48 () % 100000 + 1;
          if (cid < 2101)
            ol_amount[j] = 0;
          else
            ol_amount[j] = (lrand48 () % 999999 + 1) ;
          randstr (str24[j], 24, 24);

          if (gen) {
            if (cid < 2101) {
              fprintf (olfp, "%d %d %d %d %s %d %d 5 %ld %s\n", cid,
                       cdid, cwid, j + 1, sdate, ol_i_id[j], cwid,
                       ol_amount[j], str24[j]);
            }
            else {
                          /* Insert a default date instead of null date */
              fprintf (olfp, "%d %d %d %d 01-Jan-1811 %d %d 5 %ld %s\n", cid,
                       cdid, cwid, j + 1, ol_i_id[j], cwid,
                       ol_amount[j], str24[j]);
            }
          }
          else {
            ol_o_id[j] = cid;
            ol_d_id[j] = cdid;
            ol_w_id[j] = cwid;
            ol_number[j] = j + 1;
            ol_supply_w_id[j] = cwid;
            strncpy (ol_dist_info[j], str24[j], 24);
          }
        }

        if (gen) {
          fflush (olfp);
        }
        else {
          if (cid < 2101) {
            if (oexn (&curol1, olcnt, 0)) {
              errrpt (&tpclda, &curol1);
              orol (&tpclda);
              fprintf (stderr, "Aborted at w_id %d, d_id %d, o_id %d\n",
                       cwid, cdid, cid);
              quit ();
              exit (1);
            }
            else if (ocom (&tpclda)) {
              errrpt (&tpclda, &tpclda);
              orol (&tpclda);
              fprintf (stderr, "Aborted at w_id %d, d_id %d, o_id %d\n",
                       cwid, cdid, cid);
              quit ();
              exit (1);
            }
          }
          else {
            if (oexn (&curol2, olcnt, 0)) {
              errrpt (&tpclda, &curol2);
              orol (&tpclda);
              fprintf (stderr, "Aborted at w_id %d, d_id %d, o_id %d\n",
                       cwid, cdid, cid);
              quit ();
              exit (1);
            }
            else if (ocom (&tpclda)) {
              errrpt (&tpclda, &tpclda);
              orol (&tpclda);
              fprintf (stderr, "Aborted at w_id %d, d_id %d, o_id %d\n",
                       cwid, cdid, cid);
              quit ();
              exit (1);
            }
          }
        }
      }

      if (gen) {
        fflush (stdout);
      }
      else {
        if (cid < 2101) {
          if (oexn (&curo1, ORDEARR, 0)) {
            errrpt (&tpclda, &curo1);
            orol (&tpclda);
            fprintf (stderr, "Aborted at w_id %d, d_id %d, o_id %d\n   ",
                     cwid, cdid, cid);
            quit ();
            exit (1);
          }
          else if (ocom (&tpclda)) {
            errrpt (&tpclda, &tpclda);
            orol (&tpclda);
            fprintf (stderr, "Aborted at w_id %d, d_id %d, o_id %d\n   ",
                     cwid, cdid, cid);
            quit ();
            exit (1);
          }
        }
        else {
```

```
          if (oexn (&curo2, ORDEARR, 0)) {
            errrpt (&tpclda, &curo2);
            orol (&tpclda);
            fprintf (stderr, "Aborted at w_id %d, d_id %d, o_id %d\n   ",
                    cwid, cdid, cid);
            quit ();
            exit (1);
          }
          else if (ocom (&tpclda)) {
            errrpt (&tpclda, &tpclda);
            orol (&tpclda);
            fprintf (stderr, "Aborted at w_id %d, d_id %d, o_id %d\n   ",
                    cwid, cdid, cid);
            quit ();
            exit (1);
          }
        }
      }

      if ((++loopcount) % 50)
        fprintf (stderr, ".");
      else
        fprintf (stderr, " %d orders committed\n   ", row);
    }

    end_time = gettime ();
    end_cpu = getcpu ();
    fprintf (stderr, "Done.  %d orders loaded/generated in %10.2f sec. (%10.2f cpu)\n\n",
            nrows, end_time - begin_time, end_cpu - begin_cpu);
  }

/*-----------------------------------------------------------------+
| Load the NEW-ORDER table.                                        |
+-----------------------------------------------------------------*/

  if (do_A || do_n) {
    nrows = (eware - bware + 1) * NEWOFAC * DISTFAC;

    fprintf (stderr, "Loading/generating new-order: w%d - w%d (%d rows)\n   ",
            bware, eware, nrows);

    begin_time = gettime ();
    begin_cpu = getcpu ();

    cid = 0;
    cdid = 1;
    cwid = bware;
    loopcount = 0;

    for (row = 0; row < nrows; ) {
      for (i = 0; i < NEWOARR; i++, row++) {
        cid++;
        if (cid > NEWOFAC) {
          cid = 1;
          cdid++;
          if (cdid > DISTFAC) {
            cdid = 1;
            cwid++;
          }
        }

        if (gen) {
          printf ("%d %d %d\n", cid + 2100, cdid, cwid);
        }
        else {
          no_o_id[i] = cid + 2100;
          no_d_id[i] = cdid;
          no_w_id[i] = cwid;
        }
      }

      if (gen) {
        fflush (stdout);
      }
      else {
        if (oexn (&curno, NEWOARR, 0)) {
          errrpt (&tpclda, &curno);
          orol (&tpclda);
          fprintf (stderr, "Aborted at w_id %d, d_id %d, o_id %d\n   ",
                  cwid, cdid, cid + 2100);
          quit ();
          exit (1);
        }
        else if (ocom (&tpclda)) {
          errrpt (&tpclda, &tpclda);
          orol (&tpclda);
          fprintf (stderr, "Aborted at w_id %d, d_id %d, o_id %d\n   ",
                  cwid, cdid, cid + 2100);
          quit ();
          exit (1);
        }
      }

      if ((++loopcount) % 45)
        fprintf (stderr, ".");
      else
        fprintf (stderr, " %d rows committed\n   ", row);
    }

    end_time = gettime ();
    end_cpu = getcpu ();
    fprintf (stderr, "Done.  %d rows loaded/generated in %10.2f sec. (%10.2f cpu)\n\n",
            nrows, end_time - begin_time, end_cpu - begin_cpu);
  }

/*-----------------------------------------------------------------+
| clean up and exit.                                               |
+-----------------------------------------------------------------*/

  if (olfp)
    fclose (olfp);
  if (!gen)
    quit ();
  exit (0);

}



initperm ()

{

  int i;
  int pos;
  int temp;

  /* init randperm3000 */

  for (i = 0; i < 3000; i++)
    randperm3000[i] = i + 1;
  for (i = 3000; i > 0; i--) {
    pos = rand () % i;
    temp = randperm3000[i - 1];
    randperm3000[i - 1] = randperm3000[pos];
    randperm3000[pos] = temp;
  }

}



randstr (str, x, y)

char *str;
int x;
int y;

{

  int i, j;
  int len;

  len = (rand () % (y - x + 1)) + x;
  for (i = 0; i < len; i++) {
    j = rand () % 62;
    if (j < 26)
      str[i] = (char) (j + 'a');
    else if (j < 52)
      str[i] = (char) (j - 26 + 'A');
    else
      str[i] = (char) (j - 52 + '0');
  }
  str[len] = '\0';

}



randdatastr (str, x, y)

char *str;
int x;
int y;

{

  int i, j;
  int len;
  int pos;

  len = (rand () % (y - x + 1)) + x;
  for (i = 0; i < len; i++) {
    j = rand () % 62;
    if (j < 26)
      str[i] = (char) (j + 'a');
    else if (j < 52)
      str[i] = (char) (j - 26 + 'A');
    else
      str[i] = (char) (j - 52 + '0');
  }
  str[len] = '\0';
  if ((rand () % 10) == 0) {
    pos = (rand () % (len - 8));
    str[pos] = 'O';
    str[pos + 1] = 'R';
    str[pos + 2] = 'I';
    str[pos + 3] = 'G';
```

```
    str[pos + 4] = 'I';
    str[pos + 5] = 'N';
    str[pos + 6] = 'A';
    str[pos + 7] = 'L';
  }

}



randnum (str, len)

char *str;
int len;

{

  int i;

  for (i = 0; i < len; i++)
    str[i] = (char) (rand () % 10 + '0');
  str[len] = '\0';

}



randlastname (str, id)

char *str;
int id;

{

  id = id % 1000;
  strcpy (str, lastname[id / 100]);
  strcat (str, lastname[(id / 10) % 10]);
  strcat (str, lastname[id % 10]);

}



NURand (A, x, y, cnum)

int A, x, y, cnum;

{

  int a, b;

  a = lrand48 () % (A + 1);
  b = (lrand48 () % (y - x + 1)) + x;
  return ((((a | b) + cnum) % (y - x + 1)) + x);

}



sysdate (sdate)

char *sdate;

{

  time_t tp;
  struct tm *tmptr;

  time (&tp);
  tmptr = localtime (&tp);
  strftime (sdate, 29, "%d-%b-%Y", tmptr);

}
```

# Appendix D: RTE Scripts

## D.1 RTE Parameters

```
/* For Oracle in the tpccload program C_LAST =1. C-Delta be the difference */
/*between C-LOAD and C-Run. C-Delta must be a value between 65..119 including the */
/* values of 65 and 119 and excluding the value of 96 and 112 */
#define MASTER_NUM1 1
#define MASTER_NUM2 0
#define MASTER_NUM3 0
#define MASTER_NUM4 0
#define MASTER_NUM5 0
#define MASTER_NUM6 0
#define MASTER_NUM7 0
#define MASTER_NUM8 0
#if MASTER_NUM1
MASTER "master1"
#elif MASTER_NUM2
MASTER "master2"
#elif MASTER_NUM3
MASTER "master3"
#elif MASTER_NUM4
MASTER "master4"
#elif MASTER_NUM5
MASTER "master5"
#elif MASTER_NUM6
MASTER "master6"
#elif MASTER_NUM7
MASTER "master7"
#elif MASTER_NUM8
MASTER "master8"
#endif
/*---- SUT ----------------------------------------------------------------*/
SUT="tpcc3"
/*-------------------------------------------------------------------------*/
LASTC=86
MEASUREMENT="1"
WAREHOUSES=32400
/*---- SLAVES -------------------------------------------------------------*/
#if MASTER_NUM1
SLAVES driver1a, driver1b, driver1c, driver1d, driver2a, driver2b, driver2c, driver2d, driver3a, driver3b,
driver3c, driver3d, driver4a, driver4b, driver4c, driver4d, driver5a, driver5b, driver5c, driver5d, driver6a,
driver6b, driver6c, driver6d
#elif MASTER_NUM2
SLAVES driver7a, driver7b, driver7c, driver7d, driver8a, driver8b, driver8c, driver8d, driver9a, driver9b,
driver9c, driver9d, driver10a, driver10b, driver10c, driver10d, driver11a, driver11b, driver11c, driver11d,
driver12a, driver12b, driver12c, driver12d
#elif MASTER_NUM3
SLAVES driver13a, driver13b, driver13c, driver13d, driver14a, driver14b, driver14c, driver14d, driver15a,
driver15b, driver15c, driver15d, driver16a, driver16b, driver16c, driver16d, driver17a, driver17b, driver17c,
driver17d, driver18a, driver18b, driver18c, driver18d
#elif MASTER_NUM4
SLAVES driver19a, driver19b, driver19c, driver19d, driver20a, driver20b, driver20c, driver20d, driver21a,
driver21b, driver21c, driver21d, driver22a, driver22b, driver22c, driver22d, driver23a, driver23b, driver23c,
driver23d, driver24a, driver24b, driver24c, driver24d
#elif MASTER_NUM5
SLAVES driver25a, driver25b, driver25c, driver25d, driver26a, driver26b, driver26c, driver26d, driver27a,
driver27b, driver27c, driver27d, driver28a, driver28b, driver28c, driver28d, driver29a, driver29b, driver29c,
driver29d, driver30a, driver30b, driver30c, driver30d
#elif MASTER_NUM6
SLAVES driver31a, driver31b, driver31c, driver31d, driver32a, driver32b, driver32c, driver32d, driver33a,
driver33b, driver33c, driver33d, driver34a, driver34b, driver34c, driver34d, driver35a, driver35b, driver35c,
driver35d, driver36a, driver36b, driver36c, driver36d
#elif MASTER_NUM7
/*
SLAVES driver37a, driver37b, driver37c, driver37d, driver38a, driver38b, driver38c, driver38d, driver39a,
driver39b, driver39c, driver39d, driver40a, driver40b, driver40c, driver40d, driver41a, driver41b, driver41c,
driver41d, driver42a, driver42b, driver42c, driver42d
*/
SLAVES driver37a, driver37b, driver37c, driver37d, driver38a, driver38b, driver38c, driver38d
#elif MASTER_NUM8
SLAVES driver43a, driver43b, driver43c, driver43d, driver44a, driver44b, driver44c, driver44d, driver45a,
driver45b, driver45c, driver45d, driver46a, driver46b, driver46c, driver46d, driver47a, driver47b, driver47c,
driver47d, driver48a, driver48b, driver48c, driver48d
#endif
/*-------------------------------------------------------------------------*/
/*---- CLIENTS ------------------------------------------------------------*/
#if MASTER_NUM1
MAIN_CLIENT = client1
CLIENT_REAL = "client1 client2 client3"
#elif MASTER_NUM2
MAIN_CLIENT = client4
CLIENT_REAL = "client4 client5 client6"
#elif MASTER_NUM3
MAIN_CLIENT = client7
CLIENT_REAL = "client7 client8 client9"
#elif MASTER_NUM4
MAIN_CLIENT = client10
CLIENT_REAL = "client10 client11 client12"
#elif MASTER_NUM5
MAIN_CLIENT = client13
CLIENT_REAL = "client13 client14 client15"
#elif MASTER_NUM6
MAIN_CLIENT = client16
CLIENT_REAL = "client16 client17 client18"
#elif MASTER_NUM7
MAIN_CLIENT = client19
/*
CLIENT_REAL = "client19 client20 client21"
*/
CLIENT_REAL = "client19"
#elif MASTER_NUM8
MAIN_CLIENT = client22
CLIENT_REAL = "client22 client23 client24"
#endif
/*-------------------------------------------------------------------------*/
/*---- more client stuff --------------------------------------------------*/

#if MASTER_NUM1
CLIENT client1a oracle orif1db
CLIENT client1b oracle orif1db
CLIENT client1c oracle orif1db
CLIENT client1d oracle orif1db
CLIENT client1e oracle orif1db
CLIENT client1f oracle orif1db
CLIENT client1g oracle orif1db
CLIENT client1h oracle orif1db
CLIENT client1i oracle orif1db
CLIENT client1j oracle orif1db
CLIENT client1k oracle orif1db
CLIENT client1l oracle orif1db
CLIENT client1m oracle orif1db
CLIENT client1n oracle orif1db
CLIENT client1o oracle orif1db
CLIENT client1p oracle orif1db
CLIENT client1q oracle orif1db
CLIENT client1r oracle orif1db

CLIENT client2a oracle orif1db
CLIENT client2b oracle orif1db
CLIENT client2c oracle orif1db
CLIENT client2d oracle orif1db
CLIENT client2e oracle orif1db
CLIENT client2f oracle orif1db
CLIENT client2g oracle orif1db
CLIENT client2h oracle orif1db
CLIENT client2i oracle orif1db
CLIENT client2j oracle orif1db
CLIENT client2k oracle orif1db
CLIENT client2l oracle orif1db
CLIENT client2m oracle orif1db
CLIENT client2n oracle orif1db
CLIENT client2o oracle orif1db
CLIENT client2p oracle orif1db
CLIENT client2q oracle orif1db
CLIENT client2r oracle orif1db

CLIENT client3a oracle orif1db
CLIENT client3b oracle orif1db
CLIENT client3c oracle orif1db
CLIENT client3d oracle orif1db
CLIENT client3e oracle orif1db
CLIENT client3f oracle orif1db
CLIENT client3g oracle orif1db
CLIENT client3h oracle orif1db
CLIENT client3i oracle orif1db
CLIENT client3j oracle orif1db
CLIENT client3k oracle orif1db
CLIENT client3l oracle orif1db
CLIENT client3m oracle orif1db
CLIENT client3n oracle orif1db
CLIENT client3o oracle orif1db
CLIENT client3p oracle orif1db
CLIENT client3q oracle orif1db
CLIENT client3r oracle orif1db

#elif MASTER_NUM2
CLIENT client4a oracle orif1db
CLIENT client4b oracle orif1db
CLIENT client4c oracle orif1db
CLIENT client4d oracle orif1db
CLIENT client4e oracle orif1db
CLIENT client4f oracle orif1db
CLIENT client4g oracle orif1db
CLIENT client4h oracle orif1db
CLIENT client4i oracle orif1db
CLIENT client4j oracle orif1db
CLIENT client4k oracle orif1db
CLIENT client4l oracle orif1db
CLIENT client4m oracle orif1db
CLIENT client4n oracle orif1db
CLIENT client4o oracle orif1db
CLIENT client4p oracle orif1db
CLIENT client4q oracle orif1db
CLIENT client4r oracle orif1db

CLIENT client5a oracle orif1db
CLIENT client5b oracle orif1db
CLIENT client5c oracle orif1db
```

```
CLIENT client5d oracle orif1db
CLIENT client5e oracle orif1db
CLIENT client5f oracle orif1db
CLIENT client5g oracle orif1db
CLIENT client5h oracle orif1db
CLIENT client5i oracle orif1db
CLIENT client5j oracle orif1db
CLIENT client5k oracle orif1db
CLIENT client5l oracle orif1db
CLIENT client5m oracle orif1db
CLIENT client5n oracle orif1db
CLIENT client5o oracle orif1db
CLIENT client5p oracle orif1db
CLIENT client5q oracle orif1db
CLIENT client5r oracle orif1db

CLIENT client6a oracle orif1db
CLIENT client6b oracle orif1db
CLIENT client6c oracle orif1db
CLIENT client6d oracle orif1db
CLIENT client6e oracle orif1db
CLIENT client6f oracle orif1db
CLIENT client6g oracle orif1db
CLIENT client6h oracle orif1db
CLIENT client6i oracle orif1db
CLIENT client6j oracle orif1db
CLIENT client6k oracle orif1db
CLIENT client6l oracle orif1db
CLIENT client6m oracle orif1db
CLIENT client6n oracle orif1db
CLIENT client6o oracle orif1db
CLIENT client6p oracle orif1db
CLIENT client6q oracle orif1db
CLIENT client6r oracle orif1db

#elif MASTER_NUM3
CLIENT client7a oracle orif1db
CLIENT client7b oracle orif1db
CLIENT client7c oracle orif1db
CLIENT client7d oracle orif1db
CLIENT client7e oracle orif1db
CLIENT client7f oracle orif1db
CLIENT client7g oracle orif1db
CLIENT client7h oracle orif1db
CLIENT client7i oracle orif1db
CLIENT client7j oracle orif1db
CLIENT client7k oracle orif1db
CLIENT client7l oracle orif1db
CLIENT client7m oracle orif1db
CLIENT client7n oracle orif1db
CLIENT client7o oracle orif1db
CLIENT client7p oracle orif1db
CLIENT client7q oracle orif1db
CLIENT client7r oracle orif1db

CLIENT client8a oracle orif1db
CLIENT client8b oracle orif1db
CLIENT client8c oracle orif1db
CLIENT client8d oracle orif1db
CLIENT client8e oracle orif1db
CLIENT client8f oracle orif1db
CLIENT client8g oracle orif1db
CLIENT client8h oracle orif1db
CLIENT client8i oracle orif1db
CLIENT client8j oracle orif1db
CLIENT client8k oracle orif1db
CLIENT client8l oracle orif1db
CLIENT client8m oracle orif1db
CLIENT client8n oracle orif1db
CLIENT client8o oracle orif1db
CLIENT client8p oracle orif1db
CLIENT client8q oracle orif1db
CLIENT client8r oracle orif1db

CLIENT client9a oracle orif1db
CLIENT client9b oracle orif1db
CLIENT client9c oracle orif1db
CLIENT client9d oracle orif1db
CLIENT client9e oracle orif1db
CLIENT client9f oracle orif1db
CLIENT client9g oracle orif1db
CLIENT client9h oracle orif1db
CLIENT client9i oracle orif1db
CLIENT client9j oracle orif1db
CLIENT client9k oracle orif1db
CLIENT client9l oracle orif1db
CLIENT client9m oracle orif1db
CLIENT client9n oracle orif1db
CLIENT client9o oracle orif1db
CLIENT client9p oracle orif1db
CLIENT client9q oracle orif1db
CLIENT client9r oracle orif1db

#elif MASTER_NUM4
CLIENT client10a oracle orif1db
CLIENT client10b oracle orif1db
CLIENT client10c oracle orif1db
CLIENT client10d oracle orif1db
CLIENT client10e oracle orif1db
CLIENT client10f oracle orif1db
CLIENT client10g oracle orif1db
CLIENT client10h oracle orif1db
CLIENT client10i oracle orif1db
CLIENT client10j oracle orif1db
CLIENT client10k oracle orif1db
CLIENT client10l oracle orif1db
CLIENT client10m oracle orif1db
CLIENT client10n oracle orif1db
CLIENT client10o oracle orif1db
CLIENT client10p oracle orif1db
CLIENT client10q oracle orif1db
CLIENT client10r oracle orif1db

CLIENT client11a oracle orif1db
CLIENT client11b oracle orif1db
CLIENT client11c oracle orif1db
CLIENT client11d oracle orif1db
CLIENT client11e oracle orif1db
CLIENT client11f oracle orif1db
CLIENT client11g oracle orif1db
CLIENT client11h oracle orif1db
CLIENT client11i oracle orif1db
CLIENT client11j oracle orif1db
CLIENT client11k oracle orif1db
CLIENT client11l oracle orif1db
CLIENT client11m oracle orif1db
CLIENT client11n oracle orif1db
CLIENT client11o oracle orif1db
CLIENT client11p oracle orif1db
CLIENT client11q oracle orif1db
CLIENT client11r oracle orif1db

CLIENT client12a oracle orif1db
CLIENT client12b oracle orif1db
CLIENT client12c oracle orif1db
CLIENT client12d oracle orif1db
CLIENT client12e oracle orif1db
CLIENT client12f oracle orif1db
CLIENT client12g oracle orif1db
CLIENT client12h oracle orif1db
CLIENT client12i oracle orif1db
CLIENT client12j oracle orif1db
CLIENT client12k oracle orif1db
CLIENT client12l oracle orif1db
CLIENT client12m oracle orif1db
CLIENT client12n oracle orif1db
CLIENT client12o oracle orif1db
CLIENT client12p oracle orif1db
CLIENT client12q oracle orif1db
CLIENT client12r oracle orif1db

#elif MASTER_NUM5
CLIENT client13a oracle orif1db
CLIENT client13b oracle orif1db
CLIENT client13c oracle orif1db
CLIENT client13d oracle orif1db
CLIENT client13e oracle orif1db
CLIENT client13f oracle orif1db
CLIENT client13g oracle orif1db
CLIENT client13h oracle orif1db
CLIENT client13i oracle orif1db
CLIENT client13j oracle orif1db
CLIENT client13k oracle orif1db
CLIENT client13l oracle orif1db
CLIENT client13m oracle orif1db
CLIENT client13n oracle orif1db
CLIENT client13o oracle orif1db
CLIENT client13p oracle orif1db
CLIENT client13q oracle orif1db
CLIENT client13r oracle orif1db

CLIENT client14a oracle orif1db
CLIENT client14b oracle orif1db
CLIENT client14c oracle orif1db
CLIENT client14d oracle orif1db
CLIENT client14e oracle orif1db
CLIENT client14f oracle orif1db
CLIENT client14g oracle orif1db
CLIENT client14h oracle orif1db
CLIENT client14i oracle orif1db
CLIENT client14j oracle orif1db
CLIENT client14k oracle orif1db
CLIENT client14l oracle orif1db
CLIENT client14m oracle orif1db
CLIENT client14n oracle orif1db
CLIENT client14o oracle orif1db
CLIENT client14p oracle orif1db
CLIENT client14q oracle orif1db
CLIENT client14r oracle orif1db

CLIENT client15a oracle orif1db
CLIENT client15b oracle orif1db
CLIENT client15c oracle orif1db
CLIENT client15d oracle orif1db
CLIENT client15e oracle orif1db
CLIENT client15f oracle orif1db
CLIENT client15g oracle orif1db
CLIENT client15h oracle orif1db
```

```
CLIENT client15i oracle orif1db
CLIENT client15j oracle orif1db
CLIENT client15k oracle orif1db
CLIENT client15l oracle orif1db
CLIENT client15m oracle orif1db
CLIENT client15n oracle orif1db
CLIENT client15o oracle orif1db
CLIENT client15p oracle orif1db
CLIENT client15q oracle orif1db
CLIENT client15r oracle orif1db

#elif MASTER_NUM6
CLIENT client16a oracle orif1db
CLIENT client16b oracle orif1db
CLIENT client16c oracle orif1db
CLIENT client16d oracle orif1db
CLIENT client16e oracle orif1db
CLIENT client16f oracle orif1db
CLIENT client16g oracle orif1db
CLIENT client16h oracle orif1db
CLIENT client16i oracle orif1db
CLIENT client16j oracle orif1db
CLIENT client16k oracle orif1db
CLIENT client16l oracle orif1db
CLIENT client16m oracle orif1db
CLIENT client16n oracle orif1db
CLIENT client16o oracle orif1db
CLIENT client16p oracle orif1db
CLIENT client16q oracle orif1db
CLIENT client16r oracle orif1db

CLIENT client17a oracle orif1db
CLIENT client17b oracle orif1db
CLIENT client17c oracle orif1db
CLIENT client17d oracle orif1db
CLIENT client17e oracle orif1db
CLIENT client17f oracle orif1db
CLIENT client17g oracle orif1db
CLIENT client17h oracle orif1db
CLIENT client17i oracle orif1db
CLIENT client17j oracle orif1db
CLIENT client17k oracle orif1db
CLIENT client17l oracle orif1db
CLIENT client17m oracle orif1db
CLIENT client17n oracle orif1db
CLIENT client17o oracle orif1db
CLIENT client17p oracle orif1db
CLIENT client17q oracle orif1db
CLIENT client17r oracle orif1db

CLIENT client18a oracle orif1db
CLIENT client18b oracle orif1db
CLIENT client18c oracle orif1db
CLIENT client18d oracle orif1db
CLIENT client18e oracle orif1db
CLIENT client18f oracle orif1db
CLIENT client18g oracle orif1db
CLIENT client18h oracle orif1db
CLIENT client18i oracle orif1db
CLIENT client18j oracle orif1db
CLIENT client18k oracle orif1db
CLIENT client18l oracle orif1db
CLIENT client18m oracle orif1db
CLIENT client18n oracle orif1db
CLIENT client18o oracle orif1db
CLIENT client18p oracle orif1db
CLIENT client18q oracle orif1db
CLIENT client18r oracle orif1db

#elif MASTER_NUM7
CLIENT client19a oracle orif1db
CLIENT client19b oracle orif1db
CLIENT client19c oracle orif1db
CLIENT client19d oracle orif1db
CLIENT client19e oracle orif1db
CLIENT client19f oracle orif1db
CLIENT client19g oracle orif1db
CLIENT client19h oracle orif1db
CLIENT client19i oracle orif1db
CLIENT client19j oracle orif1db
CLIENT client19k oracle orif1db
CLIENT client19l oracle orif1db
CLIENT client19m oracle orif1db
CLIENT client19n oracle orif1db
CLIENT client19o oracle orif1db
CLIENT client19p oracle orif1db
CLIENT client19q oracle orif1db
CLIENT client19r oracle orif1db
/*
CLIENT client20a oracle orif1db
CLIENT client20b oracle orif1db
CLIENT client20c oracle orif1db
CLIENT client20d oracle orif1db
CLIENT client20e oracle orif1db
CLIENT client20f oracle orif1db
CLIENT client20g oracle orif1db
CLIENT client20h oracle orif1db
CLIENT client20i oracle orif1db
CLIENT client20j oracle orif1db
CLIENT client20k oracle orif1db
CLIENT client20l oracle orif1db
CLIENT client20m oracle orif1db
CLIENT client20n oracle orif1db
CLIENT client20o oracle orif1db
CLIENT client20p oracle orif1db
CLIENT client20q oracle orif1db
CLIENT client20r oracle orif1db

CLIENT client21a oracle orif1db
CLIENT client21b oracle orif1db
CLIENT client21c oracle orif1db
CLIENT client21d oracle orif1db
CLIENT client21e oracle orif1db
CLIENT client21f oracle orif1db
CLIENT client21g oracle orif1db
CLIENT client21h oracle orif1db
CLIENT client21i oracle orif1db
CLIENT client21j oracle orif1db
CLIENT client21k oracle orif1db
CLIENT client21l oracle orif1db
CLIENT client21m oracle orif1db
CLIENT client21n oracle orif1db
CLIENT client21o oracle orif1db
CLIENT client21p oracle orif1db
CLIENT client21q oracle orif1db
CLIENT client21r oracle orif1db
*/
#elif MASTER_NUM8
CLIENT client22a oracle orif1db
CLIENT client22b oracle orif1db
CLIENT client22c oracle orif1db
CLIENT client22d oracle orif1db
CLIENT client22e oracle orif1db
CLIENT client22f oracle orif1db
CLIENT client22g oracle orif1db
CLIENT client22h oracle orif1db
CLIENT client22i oracle orif1db
CLIENT client22j oracle orif1db
CLIENT client22k oracle orif1db
CLIENT client22l oracle orif1db
CLIENT client22m oracle orif1db
CLIENT client22n oracle orif1db
CLIENT client22o oracle orif1db
CLIENT client22p oracle orif1db
CLIENT client22q oracle orif1db
CLIENT client22r oracle orif1db

CLIENT client23a oracle orif1db
CLIENT client23b oracle orif1db
CLIENT client23c oracle orif1db
CLIENT client23d oracle orif1db
CLIENT client23e oracle orif1db
CLIENT client23f oracle orif1db
CLIENT client23g oracle orif1db
CLIENT client23h oracle orif1db
CLIENT client23i oracle orif1db
CLIENT client23j oracle orif1db
CLIENT client23k oracle orif1db
CLIENT client23l oracle orif1db
CLIENT client23m oracle orif1db
CLIENT client23n oracle orif1db
CLIENT client23o oracle orif1db
CLIENT client23p oracle orif1db
CLIENT client23q oracle orif1db
CLIENT client23r oracle orif1db

CLIENT client24a oracle orif1db
CLIENT client24b oracle orif1db
CLIENT client24c oracle orif1db
CLIENT client24d oracle orif1db
CLIENT client24e oracle orif1db
CLIENT client24f oracle orif1db
CLIENT client24g oracle orif1db
CLIENT client24h oracle orif1db
CLIENT client24i oracle orif1db
CLIENT client24j oracle orif1db
CLIENT client24k oracle orif1db
CLIENT client24l oracle orif1db
CLIENT client24m oracle orif1db
CLIENT client24n oracle orif1db
CLIENT client24o oracle orif1db
CLIENT client24p oracle orif1db
CLIENT client24q oracle orif1db
CLIENT client24r oracle orif1db
#endif
/*-----------------------------------------------------------------------------*/
TELNET telnet 23
SOCKET socket 199703
/*---- Sockets -----------------------------------------------------------*/
#if MASTER_NUM1
SOCKET_NETWORK socket1   6700 driver1a
SOCKET_NETWORK socket2   6701 driver1b
SOCKET_NETWORK socket3   6702 driver1c
SOCKET_NETWORK socket4   6703 driver1d
SOCKET_NETWORK socket5   6704 driver1a
SOCKET_NETWORK socket6   6705 driver1b
SOCKET_NETWORK socket7   6706 driver1c
SOCKET_NETWORK socket8   6707 driver1d
```

```
SOCKET_NETWORK socket9   6708 driver1a
SOCKET_NETWORK socket10   6709 driver1b
SOCKET_NETWORK socket11   6710 driver1c
SOCKET_NETWORK socket12   6711 driver1d
SOCKET_NETWORK socket13   6712 driver1a
SOCKET_NETWORK socket14   6713 driver1b
SOCKET_NETWORK socket15   6714 driver1c
SOCKET_NETWORK socket16   6715 driver1d
SOCKET_NETWORK socket17   6716 driver1a
SOCKET_NETWORK socket18   6717 driver1b
SOCKET_NETWORK socket19   6718 driver1c
SOCKET_NETWORK socket20   6719 driver1d
SOCKET_NETWORK socket21   6720 driver1a
SOCKET_NETWORK socket22   6721 driver1b
SOCKET_NETWORK socket23   6722 driver1c
SOCKET_NETWORK socket24   6723 driver1d
SOCKET_NETWORK socket25   6724 driver1a
SOCKET_NETWORK socket26   6725 driver1b
SOCKET_NETWORK socket27   6726 driver1c
SOCKET_NETWORK socket28   6727 driver1d
SOCKET_NETWORK socket29   6728 driver1a
SOCKET_NETWORK socket30   6729 driver1b
SOCKET_NETWORK socket31   6730 driver1c
SOCKET_NETWORK socket32   6731 driver1d
SOCKET_NETWORK socket33   6732 driver1a
SOCKET_NETWORK socket34   6733 driver1b
SOCKET_NETWORK socket35   6734 driver1c
SOCKET_NETWORK socket36   6735 driver1d
SOCKET_NETWORK socket37   6736 driver2a
SOCKET_NETWORK socket38   6737 driver2b
SOCKET_NETWORK socket39   6738 driver2c
SOCKET_NETWORK socket40   6739 driver2d
SOCKET_NETWORK socket41   6740 driver2a
SOCKET_NETWORK socket42   6741 driver2b
SOCKET_NETWORK socket43   6742 driver2c
SOCKET_NETWORK socket44   6743 driver2d
SOCKET_NETWORK socket45   6744 driver2a
SOCKET_NETWORK socket46   6745 driver2b
SOCKET_NETWORK socket47   6746 driver2c
SOCKET_NETWORK socket48   6747 driver2d
SOCKET_NETWORK socket49   6748 driver2a
SOCKET_NETWORK socket50   6749 driver2b
SOCKET_NETWORK socket51   6750 driver2c
SOCKET_NETWORK socket52   6751 driver2d
SOCKET_NETWORK socket53   6752 driver2a
SOCKET_NETWORK socket54   6753 driver2b
SOCKET_NETWORK socket55   6754 driver2c
SOCKET_NETWORK socket56   6755 driver2d
SOCKET_NETWORK socket57   6756 driver2a
SOCKET_NETWORK socket58   6757 driver2b
SOCKET_NETWORK socket59   6758 driver2c
SOCKET_NETWORK socket60   6759 driver2d
SOCKET_NETWORK socket61   6760 driver2a
SOCKET_NETWORK socket62   6761 driver2b
SOCKET_NETWORK socket63   6762 driver2c
SOCKET_NETWORK socket64   6763 driver2d
SOCKET_NETWORK socket65   6764 driver2a
SOCKET_NETWORK socket66   6765 driver2b
SOCKET_NETWORK socket67   6766 driver2c
SOCKET_NETWORK socket68   6767 driver2d
SOCKET_NETWORK socket69   6768 driver2a
SOCKET_NETWORK socket70   6769 driver2b
SOCKET_NETWORK socket71   6770 driver2c
SOCKET_NETWORK socket72   6771 driver2d
SOCKET_NETWORK socket73   6700 driver3a
SOCKET_NETWORK socket74   6701 driver3b
SOCKET_NETWORK socket75   6702 driver3c
SOCKET_NETWORK socket76   6703 driver3d
SOCKET_NETWORK socket77   6704 driver3a
SOCKET_NETWORK socket78   6705 driver3b
SOCKET_NETWORK socket79   6706 driver3c
SOCKET_NETWORK socket80   6707 driver3d
SOCKET_NETWORK socket81   6708 driver3a
SOCKET_NETWORK socket82   6709 driver3b
SOCKET_NETWORK socket83   6710 driver3c
SOCKET_NETWORK socket84   6711 driver3d
SOCKET_NETWORK socket85   6712 driver3a
SOCKET_NETWORK socket86   6713 driver3b
SOCKET_NETWORK socket87   6714 driver3c
SOCKET_NETWORK socket88   6715 driver3d
SOCKET_NETWORK socket89   6716 driver3a
SOCKET_NETWORK socket90   6717 driver3b
SOCKET_NETWORK socket91   6718 driver3c
SOCKET_NETWORK socket92   6719 driver3d
SOCKET_NETWORK socket93   6720 driver3a
SOCKET_NETWORK socket94   6721 driver3b
SOCKET_NETWORK socket95   6722 driver3c
SOCKET_NETWORK socket96   6723 driver3d
SOCKET_NETWORK socket97   6724 driver3a
SOCKET_NETWORK socket98   6725 driver3b
SOCKET_NETWORK socket99   6726 driver3c
SOCKET_NETWORK socket100   6727 driver3d
SOCKET_NETWORK socket101   6728 driver3a
SOCKET_NETWORK socket102   6729 driver3b
SOCKET_NETWORK socket103   6730 driver3c
SOCKET_NETWORK socket104   6731 driver3d
SOCKET_NETWORK socket105   6732 driver3a
SOCKET_NETWORK socket106   6733 driver3b
SOCKET_NETWORK socket107   6734 driver3c
SOCKET_NETWORK socket108   6735 driver3d
SOCKET_NETWORK socket109   6736 driver4a
SOCKET_NETWORK socket110   6737 driver4b
SOCKET_NETWORK socket111   6738 driver4c
SOCKET_NETWORK socket112   6739 driver4d
SOCKET_NETWORK socket113   6740 driver4a
SOCKET_NETWORK socket114   6741 driver4b
SOCKET_NETWORK socket115   6742 driver4c
SOCKET_NETWORK socket116   6743 driver4d
SOCKET_NETWORK socket117   6744 driver4a
SOCKET_NETWORK socket118   6745 driver4b
SOCKET_NETWORK socket119   6746 driver4c
SOCKET_NETWORK socket120   6747 driver4d
SOCKET_NETWORK socket121   6748 driver4a
SOCKET_NETWORK socket122   6749 driver4b
SOCKET_NETWORK socket123   6750 driver4c
SOCKET_NETWORK socket124   6751 driver4d
SOCKET_NETWORK socket125   6752 driver4a
SOCKET_NETWORK socket126   6753 driver4b
SOCKET_NETWORK socket127   6754 driver4c
SOCKET_NETWORK socket128   6755 driver4d
SOCKET_NETWORK socket129   6756 driver4a
SOCKET_NETWORK socket130   6757 driver4b
SOCKET_NETWORK socket131   6758 driver4c
SOCKET_NETWORK socket132   6759 driver4d
SOCKET_NETWORK socket133   6760 driver4a
SOCKET_NETWORK socket134   6761 driver4b
SOCKET_NETWORK socket135   6762 driver4c
SOCKET_NETWORK socket136   6763 driver4d
SOCKET_NETWORK socket137   6764 driver4a
SOCKET_NETWORK socket138   6765 driver4b
SOCKET_NETWORK socket139   6766 driver4c
SOCKET_NETWORK socket140   6767 driver4d
SOCKET_NETWORK socket141   6768 driver4a
SOCKET_NETWORK socket142   6769 driver4b
SOCKET_NETWORK socket143   6770 driver4c
SOCKET_NETWORK socket144   6771 driver4d
SOCKET_NETWORK socket145   6700 driver5a
SOCKET_NETWORK socket146   6701 driver5b
SOCKET_NETWORK socket147   6702 driver5c
SOCKET_NETWORK socket148   6703 driver5d
SOCKET_NETWORK socket149   6704 driver5a
SOCKET_NETWORK socket150   6705 driver5b
SOCKET_NETWORK socket151   6706 driver5c
SOCKET_NETWORK socket152   6707 driver5d
SOCKET_NETWORK socket153   6708 driver5a
SOCKET_NETWORK socket154   6709 driver5b
SOCKET_NETWORK socket155   6710 driver5c
SOCKET_NETWORK socket156   6711 driver5d
SOCKET_NETWORK socket157   6712 driver5a
SOCKET_NETWORK socket158   6713 driver5b
SOCKET_NETWORK socket159   6714 driver5c
SOCKET_NETWORK socket160   6715 driver5d
SOCKET_NETWORK socket161   6716 driver5a
SOCKET_NETWORK socket162   6717 driver5b
SOCKET_NETWORK socket163   6718 driver5c
SOCKET_NETWORK socket164   6719 driver5d
SOCKET_NETWORK socket165   6720 driver5a
SOCKET_NETWORK socket166   6721 driver5b
SOCKET_NETWORK socket167   6722 driver5c
SOCKET_NETWORK socket168   6723 driver5d
SOCKET_NETWORK socket169   6724 driver5a
SOCKET_NETWORK socket170   6725 driver5b
SOCKET_NETWORK socket171   6726 driver5c
SOCKET_NETWORK socket172   6727 driver5d
SOCKET_NETWORK socket173   6728 driver5a
SOCKET_NETWORK socket174   6729 driver5b
SOCKET_NETWORK socket175   6730 driver5c
SOCKET_NETWORK socket176   6731 driver5d
SOCKET_NETWORK socket177   6732 driver5a
SOCKET_NETWORK socket178   6733 driver5b
SOCKET_NETWORK socket179   6734 driver5c
SOCKET_NETWORK socket180   6735 driver5d
SOCKET_NETWORK socket181   6736 driver6a
SOCKET_NETWORK socket182   6737 driver6b
SOCKET_NETWORK socket183   6738 driver6c
SOCKET_NETWORK socket184   6739 driver6d
SOCKET_NETWORK socket185   6740 driver6a
SOCKET_NETWORK socket186   6741 driver6b
SOCKET_NETWORK socket187   6742 driver6c
SOCKET_NETWORK socket188   6743 driver6d
SOCKET_NETWORK socket189   6744 driver6a
SOCKET_NETWORK socket190   6745 driver6b
SOCKET_NETWORK socket191   6746 driver6c
SOCKET_NETWORK socket192   6747 driver6d
SOCKET_NETWORK socket193   6748 driver6a
SOCKET_NETWORK socket194   6749 driver6b
SOCKET_NETWORK socket195   6750 driver6c
SOCKET_NETWORK socket196   6751 driver6d
SOCKET_NETWORK socket197   6752 driver6a
SOCKET_NETWORK socket198   6753 driver6b
SOCKET_NETWORK socket199   6754 driver6c
SOCKET_NETWORK socket200   6755 driver6d
SOCKET_NETWORK socket201   6756 driver6a
SOCKET_NETWORK socket202   6757 driver6b
SOCKET_NETWORK socket203   6758 driver6c
SOCKET_NETWORK socket204   6759 driver6d
SOCKET_NETWORK socket205   6760 driver6a
SOCKET_NETWORK socket206   6761 driver6b
```

```
SOCKET_NETWORK socket207   6762 driver6c
SOCKET_NETWORK socket208   6763 driver6d
SOCKET_NETWORK socket209   6764 driver6a
SOCKET_NETWORK socket210   6765 driver6b
SOCKET_NETWORK socket211   6766 driver6c
SOCKET_NETWORK socket212   6767 driver6d
SOCKET_NETWORK socket213   6768 driver6a
SOCKET_NETWORK socket214   6769 driver6b
SOCKET_NETWORK socket215   6770 driver6c
SOCKET_NETWORK socket216   6771 driver6d
#elif MASTER_NUM2
SOCKET_NETWORK socket217   6700 driver7a
SOCKET_NETWORK socket218   6701 driver7b
SOCKET_NETWORK socket219   6702 driver7c
SOCKET_NETWORK socket220   6703 driver7d
SOCKET_NETWORK socket221   6704 driver7a
SOCKET_NETWORK socket222   6705 driver7b
SOCKET_NETWORK socket223   6706 driver7c
SOCKET_NETWORK socket224   6707 driver7d
SOCKET_NETWORK socket225   6708 driver7a
SOCKET_NETWORK socket226   6709 driver7b
SOCKET_NETWORK socket227   6710 driver7c
SOCKET_NETWORK socket228   6711 driver7d
SOCKET_NETWORK socket229   6712 driver7a
SOCKET_NETWORK socket230   6713 driver7b
SOCKET_NETWORK socket231   6714 driver7c
SOCKET_NETWORK socket232   6715 driver7d
SOCKET_NETWORK socket233   6716 driver7a
SOCKET_NETWORK socket234   6717 driver7b
SOCKET_NETWORK socket235   6718 driver7c
SOCKET_NETWORK socket236   6719 driver7d
SOCKET_NETWORK socket237   6720 driver7a
SOCKET_NETWORK socket238   6721 driver7b
SOCKET_NETWORK socket239   6722 driver7c
SOCKET_NETWORK socket240   6723 driver7d
SOCKET_NETWORK socket241   6724 driver7a
SOCKET_NETWORK socket242   6725 driver7b
SOCKET_NETWORK socket243   6726 driver7c
SOCKET_NETWORK socket244   6727 driver7d
SOCKET_NETWORK socket245   6728 driver7a
SOCKET_NETWORK socket246   6729 driver7b
SOCKET_NETWORK socket247   6730 driver7c
SOCKET_NETWORK socket248   6731 driver7d
SOCKET_NETWORK socket249   6732 driver7a
SOCKET_NETWORK socket250   6733 driver7b
SOCKET_NETWORK socket251   6734 driver7c
SOCKET_NETWORK socket252   6735 driver7d
SOCKET_NETWORK socket253   6736 driver8a
SOCKET_NETWORK socket254   6737 driver8b
SOCKET_NETWORK socket255   6738 driver8c
SOCKET_NETWORK socket256   6739 driver8d
SOCKET_NETWORK socket257   6740 driver8a
SOCKET_NETWORK socket258   6741 driver8b
SOCKET_NETWORK socket259   6742 driver8c
SOCKET_NETWORK socket260   6743 driver8d
SOCKET_NETWORK socket261   6744 driver8a
SOCKET_NETWORK socket262   6745 driver8b
SOCKET_NETWORK socket263   6746 driver8c
SOCKET_NETWORK socket264   6747 driver8d
SOCKET_NETWORK socket265   6748 driver8a
SOCKET_NETWORK socket266   6749 driver8b
SOCKET_NETWORK socket267   6750 driver8c
SOCKET_NETWORK socket268   6751 driver8d
SOCKET_NETWORK socket269   6752 driver8a
SOCKET_NETWORK socket270   6753 driver8b
SOCKET_NETWORK socket271   6754 driver8c
SOCKET_NETWORK socket272   6755 driver8d
SOCKET_NETWORK socket273   6756 driver8a
SOCKET_NETWORK socket274   6757 driver8b
SOCKET_NETWORK socket275   6758 driver8c
SOCKET_NETWORK socket276   6759 driver8d
SOCKET_NETWORK socket277   6760 driver8a
SOCKET_NETWORK socket278   6761 driver8b
SOCKET_NETWORK socket279   6762 driver8c
SOCKET_NETWORK socket280   6763 driver8d
SOCKET_NETWORK socket281   6764 driver8a
SOCKET_NETWORK socket282   6765 driver8b
SOCKET_NETWORK socket283   6766 driver8c
SOCKET_NETWORK socket284   6767 driver8d
SOCKET_NETWORK socket285   6768 driver8a
SOCKET_NETWORK socket286   6769 driver8b
SOCKET_NETWORK socket287   6770 driver8c
SOCKET_NETWORK socket288   6771 driver8d
SOCKET_NETWORK socket289   6700 driver9a
SOCKET_NETWORK socket290   6701 driver9b
SOCKET_NETWORK socket291   6702 driver9c
SOCKET_NETWORK socket292   6703 driver9d
SOCKET_NETWORK socket293   6704 driver9a
SOCKET_NETWORK socket294   6705 driver9b
SOCKET_NETWORK socket295   6706 driver9c
SOCKET_NETWORK socket296   6707 driver9d
SOCKET_NETWORK socket297   6708 driver9a
SOCKET_NETWORK socket298   6709 driver9b
SOCKET_NETWORK socket299   6710 driver9c
SOCKET_NETWORK socket300   6711 driver9d
SOCKET_NETWORK socket301   6712 driver9a
SOCKET_NETWORK socket302   6713 driver9b
SOCKET_NETWORK socket303   6714 driver9c
SOCKET_NETWORK socket304   6715 driver9d
SOCKET_NETWORK socket305   6716 driver9a
SOCKET_NETWORK socket306   6717 driver9b
SOCKET_NETWORK socket307   6718 driver9c
SOCKET_NETWORK socket308   6719 driver9d
SOCKET_NETWORK socket309   6720 driver9a
SOCKET_NETWORK socket310   6721 driver9b
SOCKET_NETWORK socket311   6722 driver9c
SOCKET_NETWORK socket312   6723 driver9d
SOCKET_NETWORK socket313   6724 driver9a
SOCKET_NETWORK socket314   6725 driver9b
SOCKET_NETWORK socket315   6726 driver9c
SOCKET_NETWORK socket316   6727 driver9d
SOCKET_NETWORK socket317   6728 driver9a
SOCKET_NETWORK socket318   6729 driver9b
SOCKET_NETWORK socket319   6730 driver9c
SOCKET_NETWORK socket320   6731 driver9d
SOCKET_NETWORK socket321   6732 driver9a
SOCKET_NETWORK socket322   6733 driver9b
SOCKET_NETWORK socket323   6734 driver9c
SOCKET_NETWORK socket324   6735 driver9d
SOCKET_NETWORK socket325   6736 driver10a
SOCKET_NETWORK socket326   6737 driver10b
SOCKET_NETWORK socket327   6738 driver10c
SOCKET_NETWORK socket328   6739 driver10d
SOCKET_NETWORK socket329   6740 driver10a
SOCKET_NETWORK socket330   6741 driver10b
SOCKET_NETWORK socket331   6742 driver10c
SOCKET_NETWORK socket332   6743 driver10d
SOCKET_NETWORK socket333   6744 driver10a
SOCKET_NETWORK socket334   6745 driver10b
SOCKET_NETWORK socket335   6746 driver10c
SOCKET_NETWORK socket336   6747 driver10d
SOCKET_NETWORK socket337   6748 driver10a
SOCKET_NETWORK socket338   6749 driver10b
SOCKET_NETWORK socket339   6750 driver10c
SOCKET_NETWORK socket340   6751 driver10d
SOCKET_NETWORK socket341   6752 driver10a
SOCKET_NETWORK socket342   6753 driver10b
SOCKET_NETWORK socket343   6754 driver10c
SOCKET_NETWORK socket344   6755 driver10d
SOCKET_NETWORK socket345   6756 driver10a
SOCKET_NETWORK socket346   6757 driver10b
SOCKET_NETWORK socket347   6758 driver10c
SOCKET_NETWORK socket348   6759 driver10d
SOCKET_NETWORK socket349   6760 driver10a
SOCKET_NETWORK socket350   6761 driver10b
SOCKET_NETWORK socket351   6762 driver10c
SOCKET_NETWORK socket352   6763 driver10d
SOCKET_NETWORK socket353   6764 driver10a
SOCKET_NETWORK socket354   6765 driver10b
SOCKET_NETWORK socket355   6766 driver10c
SOCKET_NETWORK socket356   6767 driver10d
SOCKET_NETWORK socket357   6768 driver10a
SOCKET_NETWORK socket358   6769 driver10b
SOCKET_NETWORK socket359   6770 driver10c
SOCKET_NETWORK socket360   6771 driver10d
SOCKET_NETWORK socket361   6700 driver11a
SOCKET_NETWORK socket362   6701 driver11b
SOCKET_NETWORK socket363   6702 driver11c
SOCKET_NETWORK socket364   6703 driver11d
SOCKET_NETWORK socket365   6704 driver11a
SOCKET_NETWORK socket366   6705 driver11b
SOCKET_NETWORK socket367   6706 driver11c
SOCKET_NETWORK socket368   6707 driver11d
SOCKET_NETWORK socket369   6708 driver11a
SOCKET_NETWORK socket370   6709 driver11b
SOCKET_NETWORK socket371   6710 driver11c
SOCKET_NETWORK socket372   6711 driver11d
SOCKET_NETWORK socket373   6712 driver11a
SOCKET_NETWORK socket374   6713 driver11b
SOCKET_NETWORK socket375   6714 driver11c
SOCKET_NETWORK socket376   6715 driver11d
SOCKET_NETWORK socket377   6716 driver11a
SOCKET_NETWORK socket378   6717 driver11b
SOCKET_NETWORK socket379   6718 driver11c
SOCKET_NETWORK socket380   6719 driver11d
SOCKET_NETWORK socket381   6720 driver11a
SOCKET_NETWORK socket382   6721 driver11b
SOCKET_NETWORK socket383   6722 driver11c
SOCKET_NETWORK socket384   6723 driver11d
SOCKET_NETWORK socket385   6724 driver11a
SOCKET_NETWORK socket386   6725 driver11b
SOCKET_NETWORK socket387   6726 driver11c
SOCKET_NETWORK socket388   6727 driver11d
SOCKET_NETWORK socket389   6728 driver11a
SOCKET_NETWORK socket390   6729 driver11b
SOCKET_NETWORK socket391   6730 driver11c
SOCKET_NETWORK socket392   6731 driver11d
SOCKET_NETWORK socket393   6732 driver11a
SOCKET_NETWORK socket394   6733 driver11b
SOCKET_NETWORK socket395   6734 driver11c
SOCKET_NETWORK socket396   6735 driver11d
SOCKET_NETWORK socket397   6736 driver12a
SOCKET_NETWORK socket398   6737 driver12b
SOCKET_NETWORK socket399   6738 driver12c
SOCKET_NETWORK socket400   6739 driver12d
SOCKET_NETWORK socket401   6740 driver12a
SOCKET_NETWORK socket402   6741 driver12b
SOCKET_NETWORK socket403   6742 driver12c
```

```
SOCKET_NETWORK socket404   6743 driver12d
SOCKET_NETWORK socket405   6744 driver12a
SOCKET_NETWORK socket406   6745 driver12b
SOCKET_NETWORK socket407   6746 driver12c
SOCKET_NETWORK socket408   6747 driver12d
SOCKET_NETWORK socket409   6748 driver12a
SOCKET_NETWORK socket410   6749 driver12b
SOCKET_NETWORK socket411   6750 driver12c
SOCKET_NETWORK socket412   6751 driver12d
SOCKET_NETWORK socket413   6752 driver12a
SOCKET_NETWORK socket414   6753 driver12b
SOCKET_NETWORK socket415   6754 driver12c
SOCKET_NETWORK socket416   6755 driver12d
SOCKET_NETWORK socket417   6756 driver12a
SOCKET_NETWORK socket418   6757 driver12b
SOCKET_NETWORK socket419   6758 driver12c
SOCKET_NETWORK socket420   6759 driver12d
SOCKET_NETWORK socket421   6760 driver12a
SOCKET_NETWORK socket422   6761 driver12b
SOCKET_NETWORK socket423   6762 driver12c
SOCKET_NETWORK socket424   6763 driver12d
SOCKET_NETWORK socket425   6764 driver12a
SOCKET_NETWORK socket426   6765 driver12b
SOCKET_NETWORK socket427   6766 driver12c
SOCKET_NETWORK socket428   6767 driver12d
SOCKET_NETWORK socket429   6768 driver12a
SOCKET_NETWORK socket430   6769 driver12b
SOCKET_NETWORK socket431   6770 driver12c
SOCKET_NETWORK socket432   6771 driver12d
#elif MASTER_NUM3
SOCKET_NETWORK socket433   6700 driver13a
SOCKET_NETWORK socket434   6701 driver13b
SOCKET_NETWORK socket435   6702 driver13c
SOCKET_NETWORK socket436   6703 driver13d
SOCKET_NETWORK socket437   6704 driver13a
SOCKET_NETWORK socket438   6705 driver13b
SOCKET_NETWORK socket439   6706 driver13c
SOCKET_NETWORK socket440   6707 driver13d
SOCKET_NETWORK socket441   6708 driver13a
SOCKET_NETWORK socket442   6709 driver13b
SOCKET_NETWORK socket443   6710 driver13c
SOCKET_NETWORK socket444   6711 driver13d
SOCKET_NETWORK socket445   6712 driver13a
SOCKET_NETWORK socket446   6713 driver13b
SOCKET_NETWORK socket447   6714 driver13c
SOCKET_NETWORK socket448   6715 driver13d
SOCKET_NETWORK socket449   6716 driver13a
SOCKET_NETWORK socket450   6717 driver13b
SOCKET_NETWORK socket451   6718 driver13c
SOCKET_NETWORK socket452   6719 driver13d
SOCKET_NETWORK socket453   6720 driver13a
SOCKET_NETWORK socket454   6721 driver13b
SOCKET_NETWORK socket455   6722 driver13c
SOCKET_NETWORK socket456   6723 driver13d
SOCKET_NETWORK socket457   6724 driver13a
SOCKET_NETWORK socket458   6725 driver13b
SOCKET_NETWORK socket459   6726 driver13c
SOCKET_NETWORK socket460   6727 driver13d
SOCKET_NETWORK socket461   6728 driver13a
SOCKET_NETWORK socket462   6729 driver13b
SOCKET_NETWORK socket463   6730 driver13c
SOCKET_NETWORK socket464   6731 driver13d
SOCKET_NETWORK socket465   6732 driver13a
SOCKET_NETWORK socket466   6733 driver13b
SOCKET_NETWORK socket467   6734 driver13c
SOCKET_NETWORK socket468   6735 driver13d
SOCKET_NETWORK socket469   6736 driver14a
SOCKET_NETWORK socket470   6737 driver14b
SOCKET_NETWORK socket471   6738 driver14c
SOCKET_NETWORK socket472   6739 driver14d
SOCKET_NETWORK socket473   6740 driver14a
SOCKET_NETWORK socket474   6741 driver14b
SOCKET_NETWORK socket475   6742 driver14c
SOCKET_NETWORK socket476   6743 driver14d
SOCKET_NETWORK socket477   6744 driver14a
SOCKET_NETWORK socket478   6745 driver14b
SOCKET_NETWORK socket479   6746 driver14c
SOCKET_NETWORK socket480   6747 driver14d
SOCKET_NETWORK socket481   6748 driver14a
SOCKET_NETWORK socket482   6749 driver14b
SOCKET_NETWORK socket483   6750 driver14c
SOCKET_NETWORK socket484   6751 driver14d
SOCKET_NETWORK socket485   6752 driver14a
SOCKET_NETWORK socket486   6753 driver14b
SOCKET_NETWORK socket487   6754 driver14c
SOCKET_NETWORK socket488   6755 driver14d
SOCKET_NETWORK socket489   6756 driver14a
SOCKET_NETWORK socket490   6757 driver14b
SOCKET_NETWORK socket491   6758 driver14c
SOCKET_NETWORK socket492   6759 driver14d
SOCKET_NETWORK socket493   6760 driver14a
SOCKET_NETWORK socket494   6761 driver14b
SOCKET_NETWORK socket495   6762 driver14c
SOCKET_NETWORK socket496   6763 driver14d
SOCKET_NETWORK socket497   6764 driver14a
SOCKET_NETWORK socket498   6765 driver14b
SOCKET_NETWORK socket499   6766 driver14c
SOCKET_NETWORK socket500   6767 driver14d
SOCKET_NETWORK socket501   6768 driver14a
SOCKET_NETWORK socket502   6769 driver14b
SOCKET_NETWORK socket503   6770 driver14c
SOCKET_NETWORK socket504   6771 driver14d
SOCKET_NETWORK socket505   6700 driver15a
SOCKET_NETWORK socket506   6701 driver15b
SOCKET_NETWORK socket507   6702 driver15c
SOCKET_NETWORK socket508   6703 driver15d
SOCKET_NETWORK socket509   6704 driver15a
SOCKET_NETWORK socket510   6705 driver15b
SOCKET_NETWORK socket511   6706 driver15c
SOCKET_NETWORK socket512   6707 driver15d
SOCKET_NETWORK socket513   6708 driver15a
SOCKET_NETWORK socket514   6709 driver15b
SOCKET_NETWORK socket515   6710 driver15c
SOCKET_NETWORK socket516   6711 driver15d
SOCKET_NETWORK socket517   6712 driver15a
SOCKET_NETWORK socket518   6713 driver15b
SOCKET_NETWORK socket519   6714 driver15c
SOCKET_NETWORK socket520   6715 driver15d
SOCKET_NETWORK socket521   6716 driver15a
SOCKET_NETWORK socket522   6717 driver15b
SOCKET_NETWORK socket523   6718 driver15c
SOCKET_NETWORK socket524   6719 driver15d
SOCKET_NETWORK socket525   6720 driver15a
SOCKET_NETWORK socket526   6721 driver15b
SOCKET_NETWORK socket527   6722 driver15c
SOCKET_NETWORK socket528   6723 driver15d
SOCKET_NETWORK socket529   6724 driver15a
SOCKET_NETWORK socket530   6725 driver15b
SOCKET_NETWORK socket531   6726 driver15c
SOCKET_NETWORK socket532   6727 driver15d
SOCKET_NETWORK socket533   6728 driver15a
SOCKET_NETWORK socket534   6729 driver15b
SOCKET_NETWORK socket535   6730 driver15c
SOCKET_NETWORK socket536   6731 driver15d
SOCKET_NETWORK socket537   6732 driver15a
SOCKET_NETWORK socket538   6733 driver15b
SOCKET_NETWORK socket539   6734 driver15c
SOCKET_NETWORK socket540   6735 driver15d
SOCKET_NETWORK socket541   6736 driver16a
SOCKET_NETWORK socket542   6737 driver16b
SOCKET_NETWORK socket543   6738 driver16c
SOCKET_NETWORK socket544   6739 driver16d
SOCKET_NETWORK socket545   6740 driver16a
SOCKET_NETWORK socket546   6741 driver16b
SOCKET_NETWORK socket547   6742 driver16c
SOCKET_NETWORK socket548   6743 driver16d
SOCKET_NETWORK socket549   6744 driver16a
SOCKET_NETWORK socket550   6745 driver16b
SOCKET_NETWORK socket551   6746 driver16c
SOCKET_NETWORK socket552   6747 driver16d
SOCKET_NETWORK socket553   6748 driver16a
SOCKET_NETWORK socket554   6749 driver16b
SOCKET_NETWORK socket555   6750 driver16c
SOCKET_NETWORK socket556   6751 driver16d
SOCKET_NETWORK socket557   6752 driver16a
SOCKET_NETWORK socket558   6753 driver16b
SOCKET_NETWORK socket559   6754 driver16c
SOCKET_NETWORK socket560   6755 driver16d
SOCKET_NETWORK socket561   6756 driver16a
SOCKET_NETWORK socket562   6757 driver16b
SOCKET_NETWORK socket563   6758 driver16c
SOCKET_NETWORK socket564   6759 driver16d
SOCKET_NETWORK socket565   6760 driver16a
SOCKET_NETWORK socket566   6761 driver16b
SOCKET_NETWORK socket567   6762 driver16c
SOCKET_NETWORK socket568   6763 driver16d
SOCKET_NETWORK socket569   6764 driver16a
SOCKET_NETWORK socket570   6765 driver16b
SOCKET_NETWORK socket571   6766 driver16c
SOCKET_NETWORK socket572   6767 driver16d
SOCKET_NETWORK socket573   6768 driver16a
SOCKET_NETWORK socket574   6769 driver16b
SOCKET_NETWORK socket575   6770 driver16c
SOCKET_NETWORK socket576   6771 driver16d
SOCKET_NETWORK socket577   6700 driver17a
SOCKET_NETWORK socket578   6701 driver17b
SOCKET_NETWORK socket579   6702 driver17c
SOCKET_NETWORK socket580   6703 driver17d
SOCKET_NETWORK socket581   6704 driver17a
SOCKET_NETWORK socket582   6705 driver17b
SOCKET_NETWORK socket583   6706 driver17c
SOCKET_NETWORK socket584   6707 driver17d
SOCKET_NETWORK socket585   6708 driver17a
SOCKET_NETWORK socket586   6709 driver17b
SOCKET_NETWORK socket587   6710 driver17c
SOCKET_NETWORK socket588   6711 driver17d
SOCKET_NETWORK socket589   6712 driver17a
SOCKET_NETWORK socket590   6713 driver17b
SOCKET_NETWORK socket591   6714 driver17c
SOCKET_NETWORK socket592   6715 driver17d
SOCKET_NETWORK socket593   6716 driver17a
SOCKET_NETWORK socket594   6717 driver17b
SOCKET_NETWORK socket595   6718 driver17c
SOCKET_NETWORK socket596   6719 driver17d
SOCKET_NETWORK socket597   6720 driver17a
SOCKET_NETWORK socket598   6721 driver17b
SOCKET_NETWORK socket599   6722 driver17c
SOCKET_NETWORK socket600   6723 driver17d
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SOCKET_NETWORK socket601   6724 driver17a
SOCKET_NETWORK socket602   6725 driver17b
SOCKET_NETWORK socket603   6726 driver17c
SOCKET_NETWORK socket604   6727 driver17d
SOCKET_NETWORK socket605   6728 driver17a
SOCKET_NETWORK socket606   6729 driver17b
SOCKET_NETWORK socket607   6730 driver17c
SOCKET_NETWORK socket608   6731 driver17d
SOCKET_NETWORK socket609   6732 driver17a
SOCKET_NETWORK socket610   6733 driver17b
SOCKET_NETWORK socket611   6734 driver17c
SOCKET_NETWORK socket612   6735 driver17d
SOCKET_NETWORK socket613   6736 driver18a
SOCKET_NETWORK socket614   6737 driver18b
SOCKET_NETWORK socket615   6738 driver18c
SOCKET_NETWORK socket616   6739 driver18d
SOCKET_NETWORK socket617   6740 driver18a
SOCKET_NETWORK socket618   6741 driver18b
SOCKET_NETWORK socket619   6742 driver18c
SOCKET_NETWORK socket620   6743 driver18d
SOCKET_NETWORK socket621   6744 driver18a
SOCKET_NETWORK socket622   6745 driver18b
SOCKET_NETWORK socket623   6746 driver18c
SOCKET_NETWORK socket624   6747 driver18d
SOCKET_NETWORK socket625   6748 driver18a
SOCKET_NETWORK socket626   6749 driver18b
SOCKET_NETWORK socket627   6750 driver18c
SOCKET_NETWORK socket628   6751 driver18d
SOCKET_NETWORK socket629   6752 driver18a
SOCKET_NETWORK socket630   6753 driver18b
SOCKET_NETWORK socket631   6754 driver18c
SOCKET_NETWORK socket632   6755 driver18d
SOCKET_NETWORK socket633   6756 driver18a
SOCKET_NETWORK socket634   6757 driver18b
SOCKET_NETWORK socket635   6758 driver18c
SOCKET_NETWORK socket636   6759 driver18d
SOCKET_NETWORK socket637   6760 driver18a
SOCKET_NETWORK socket638   6761 driver18b
SOCKET_NETWORK socket639   6762 driver18c
SOCKET_NETWORK socket640   6763 driver18d
SOCKET_NETWORK socket641   6764 driver18a
SOCKET_NETWORK socket642   6765 driver18b
SOCKET_NETWORK socket643   6766 driver18c
SOCKET_NETWORK socket644   6767 driver18d
SOCKET_NETWORK socket645   6768 driver18a
SOCKET_NETWORK socket646   6769 driver18b
SOCKET_NETWORK socket647   6770 driver18c
SOCKET_NETWORK socket648   6771 driver18d
#elif MASTER_NUM4
SOCKET_NETWORK socket649   6700 driver19a
SOCKET_NETWORK socket650   6701 driver19b
SOCKET_NETWORK socket651   6702 driver19c
SOCKET_NETWORK socket652   6703 driver19d
SOCKET_NETWORK socket653   6704 driver19a
SOCKET_NETWORK socket654   6705 driver19b
SOCKET_NETWORK socket655   6706 driver19c
SOCKET_NETWORK socket656   6707 driver19d
SOCKET_NETWORK socket657   6708 driver19a
SOCKET_NETWORK socket658   6709 driver19b
SOCKET_NETWORK socket659   6710 driver19c
SOCKET_NETWORK socket660   6711 driver19d
SOCKET_NETWORK socket661   6712 driver19a
SOCKET_NETWORK socket662   6713 driver19b
SOCKET_NETWORK socket663   6714 driver19c
SOCKET_NETWORK socket664   6715 driver19d
SOCKET_NETWORK socket665   6716 driver19a
SOCKET_NETWORK socket666   6717 driver19b
SOCKET_NETWORK socket667   6718 driver19c
SOCKET_NETWORK socket668   6719 driver19d
SOCKET_NETWORK socket669   6720 driver19a
SOCKET_NETWORK socket670   6721 driver19b
SOCKET_NETWORK socket671   6722 driver19c
SOCKET_NETWORK socket672   6723 driver19d
SOCKET_NETWORK socket673   6724 driver19a
SOCKET_NETWORK socket674   6725 driver19b
SOCKET_NETWORK socket675   6726 driver19c
SOCKET_NETWORK socket676   6727 driver19d
SOCKET_NETWORK socket677   6728 driver19a
SOCKET_NETWORK socket678   6729 driver19b
SOCKET_NETWORK socket679   6730 driver19c
SOCKET_NETWORK socket680   6731 driver19d
SOCKET_NETWORK socket681   6732 driver19a
SOCKET_NETWORK socket682   6733 driver19b
SOCKET_NETWORK socket683   6734 driver19c
SOCKET_NETWORK socket684   6735 driver19d
SOCKET_NETWORK socket685   6736 driver20a
SOCKET_NETWORK socket686   6737 driver20b
SOCKET_NETWORK socket687   6738 driver20c
SOCKET_NETWORK socket688   6739 driver20d
SOCKET_NETWORK socket689   6740 driver20a
SOCKET_NETWORK socket690   6741 driver20b
SOCKET_NETWORK socket691   6742 driver20c
SOCKET_NETWORK socket692   6743 driver20d
SOCKET_NETWORK socket693   6744 driver20a
SOCKET_NETWORK socket694   6745 driver20b
SOCKET_NETWORK socket695   6746 driver20c
SOCKET_NETWORK socket696   6747 driver20d
SOCKET_NETWORK socket697   6748 driver20a
SOCKET_NETWORK socket698   6749 driver20b
SOCKET_NETWORK socket699   6750 driver20c
SOCKET_NETWORK socket700   6751 driver20d
SOCKET_NETWORK socket701   6752 driver20a
SOCKET_NETWORK socket702   6753 driver20b
SOCKET_NETWORK socket703   6754 driver20c
SOCKET_NETWORK socket704   6755 driver20d
SOCKET_NETWORK socket705   6756 driver20a
SOCKET_NETWORK socket706   6757 driver20b
SOCKET_NETWORK socket707   6758 driver20c
SOCKET_NETWORK socket708   6759 driver20d
SOCKET_NETWORK socket709   6760 driver20a
SOCKET_NETWORK socket710   6761 driver20b
SOCKET_NETWORK socket711   6762 driver20c
SOCKET_NETWORK socket712   6763 driver20d
SOCKET_NETWORK socket713   6764 driver20a
SOCKET_NETWORK socket714   6765 driver20b
SOCKET_NETWORK socket715   6766 driver20c
SOCKET_NETWORK socket716   6767 driver20d
SOCKET_NETWORK socket717   6768 driver20a
SOCKET_NETWORK socket718   6769 driver20b
SOCKET_NETWORK socket719   6770 driver20c
SOCKET_NETWORK socket720   6771 driver20d
SOCKET_NETWORK socket721   6700 driver21a
SOCKET_NETWORK socket722   6701 driver21b
SOCKET_NETWORK socket723   6702 driver21c
SOCKET_NETWORK socket724   6703 driver21d
SOCKET_NETWORK socket725   6704 driver21a
SOCKET_NETWORK socket726   6705 driver21b
SOCKET_NETWORK socket727   6706 driver21c
SOCKET_NETWORK socket728   6707 driver21d
SOCKET_NETWORK socket729   6708 driver21a
SOCKET_NETWORK socket730   6709 driver21b
SOCKET_NETWORK socket731   6710 driver21c
SOCKET_NETWORK socket732   6711 driver21d
SOCKET_NETWORK socket733   6712 driver21a
SOCKET_NETWORK socket734   6713 driver21b
SOCKET_NETWORK socket735   6714 driver21c
SOCKET_NETWORK socket736   6715 driver21d
SOCKET_NETWORK socket737   6716 driver21a
SOCKET_NETWORK socket738   6717 driver21b
SOCKET_NETWORK socket739   6718 driver21c
SOCKET_NETWORK socket740   6719 driver21d
SOCKET_NETWORK socket741   6720 driver21a
SOCKET_NETWORK socket742   6721 driver21b
SOCKET_NETWORK socket743   6722 driver21c
SOCKET_NETWORK socket744   6723 driver21d
SOCKET_NETWORK socket745   6724 driver21a
SOCKET_NETWORK socket746   6725 driver21b
SOCKET_NETWORK socket747   6726 driver21c
SOCKET_NETWORK socket748   6727 driver21d
SOCKET_NETWORK socket749   6728 driver21a
SOCKET_NETWORK socket750   6729 driver21b
SOCKET_NETWORK socket751   6730 driver21c
SOCKET_NETWORK socket752   6731 driver21d
SOCKET_NETWORK socket753   6732 driver21a
SOCKET_NETWORK socket754   6733 driver21b
SOCKET_NETWORK socket755   6734 driver21c
SOCKET_NETWORK socket756   6735 driver21d
SOCKET_NETWORK socket757   6736 driver22a
SOCKET_NETWORK socket758   6737 driver22b
SOCKET_NETWORK socket759   6738 driver22c
SOCKET_NETWORK socket760   6739 driver22d
SOCKET_NETWORK socket761   6740 driver22a
SOCKET_NETWORK socket762   6741 driver22b
SOCKET_NETWORK socket763   6742 driver22c
SOCKET_NETWORK socket764   6743 driver22d
SOCKET_NETWORK socket765   6744 driver22a
SOCKET_NETWORK socket766   6745 driver22b
SOCKET_NETWORK socket767   6746 driver22c
SOCKET_NETWORK socket768   6747 driver22d
SOCKET_NETWORK socket769   6748 driver22a
SOCKET_NETWORK socket770   6749 driver22b
SOCKET_NETWORK socket771   6750 driver22c
SOCKET_NETWORK socket772   6751 driver22d
SOCKET_NETWORK socket773   6752 driver22a
SOCKET_NETWORK socket774   6753 driver22b
SOCKET_NETWORK socket775   6754 driver22c
SOCKET_NETWORK socket776   6755 driver22d
SOCKET_NETWORK socket777   6756 driver22a
SOCKET_NETWORK socket778   6757 driver22b
SOCKET_NETWORK socket779   6758 driver22c
SOCKET_NETWORK socket780   6759 driver22d
SOCKET_NETWORK socket781   6760 driver22a
SOCKET_NETWORK socket782   6761 driver22b
SOCKET_NETWORK socket783   6762 driver22c
SOCKET_NETWORK socket784   6763 driver22d
SOCKET_NETWORK socket785   6764 driver22a
SOCKET_NETWORK socket786   6765 driver22b
SOCKET_NETWORK socket787   6766 driver22c
SOCKET_NETWORK socket788   6767 driver22d
SOCKET_NETWORK socket789   6768 driver22a
SOCKET_NETWORK socket790   6769 driver22b
SOCKET_NETWORK socket791   6770 driver22c
SOCKET_NETWORK socket792   6771 driver22d
SOCKET_NETWORK socket793   6700 driver23a
SOCKET_NETWORK socket794   6701 driver23b
SOCKET_NETWORK socket795   6702 driver23c
SOCKET_NETWORK socket796   6703 driver23d
SOCKET_NETWORK socket797   6704 driver23a
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SOCKET_NETWORK socket798   6705 driver23b
SOCKET_NETWORK socket799   6706 driver23c
SOCKET_NETWORK socket800   6707 driver23d
SOCKET_NETWORK socket801   6708 driver23a
SOCKET_NETWORK socket802   6709 driver23b
SOCKET_NETWORK socket803   6710 driver23c
SOCKET_NETWORK socket804   6711 driver23d
SOCKET_NETWORK socket805   6712 driver23a
SOCKET_NETWORK socket806   6713 driver23b
SOCKET_NETWORK socket807   6714 driver23c
SOCKET_NETWORK socket808   6715 driver23d
SOCKET_NETWORK socket809   6716 driver23a
SOCKET_NETWORK socket810   6717 driver23b
SOCKET_NETWORK socket811   6718 driver23c
SOCKET_NETWORK socket812   6719 driver23d
SOCKET_NETWORK socket813   6720 driver23a
SOCKET_NETWORK socket814   6721 driver23b
SOCKET_NETWORK socket815   6722 driver23c
SOCKET_NETWORK socket816   6723 driver23d
SOCKET_NETWORK socket817   6724 driver23a
SOCKET_NETWORK socket818   6725 driver23b
SOCKET_NETWORK socket819   6726 driver23c
SOCKET_NETWORK socket820   6727 driver23d
SOCKET_NETWORK socket821   6728 driver23a
SOCKET_NETWORK socket822   6729 driver23b
SOCKET_NETWORK socket823   6730 driver23c
SOCKET_NETWORK socket824   6731 driver23d
SOCKET_NETWORK socket825   6732 driver23a
SOCKET_NETWORK socket826   6733 driver23b
SOCKET_NETWORK socket827   6734 driver23c
SOCKET_NETWORK socket828   6735 driver23d
SOCKET_NETWORK socket829   6736 driver24a
SOCKET_NETWORK socket830   6737 driver24b
SOCKET_NETWORK socket831   6738 driver24c
SOCKET_NETWORK socket832   6739 driver24d
SOCKET_NETWORK socket833   6740 driver24a
SOCKET_NETWORK socket834   6741 driver24b
SOCKET_NETWORK socket835   6742 driver24c
SOCKET_NETWORK socket836   6743 driver24d
SOCKET_NETWORK socket837   6744 driver24a
SOCKET_NETWORK socket838   6745 driver24b
SOCKET_NETWORK socket839   6746 driver24c
SOCKET_NETWORK socket840   6747 driver24d
SOCKET_NETWORK socket841   6748 driver24a
SOCKET_NETWORK socket842   6749 driver24b
SOCKET_NETWORK socket843   6750 driver24c
SOCKET_NETWORK socket844   6751 driver24d
SOCKET_NETWORK socket845   6752 driver24a
SOCKET_NETWORK socket846   6753 driver24b
SOCKET_NETWORK socket847   6754 driver24c
SOCKET_NETWORK socket848   6755 driver24d
SOCKET_NETWORK socket849   6756 driver24a
SOCKET_NETWORK socket850   6757 driver24b
SOCKET_NETWORK socket851   6758 driver24c
SOCKET_NETWORK socket852   6759 driver24d
SOCKET_NETWORK socket853   6760 driver24a
SOCKET_NETWORK socket854   6761 driver24b
SOCKET_NETWORK socket855   6762 driver24c
SOCKET_NETWORK socket856   6763 driver24d
SOCKET_NETWORK socket857   6764 driver24a
SOCKET_NETWORK socket858   6765 driver24b
SOCKET_NETWORK socket859   6766 driver24c
SOCKET_NETWORK socket860   6767 driver24d
SOCKET_NETWORK socket861   6768 driver24a
SOCKET_NETWORK socket862   6769 driver24b
SOCKET_NETWORK socket863   6770 driver24c
SOCKET_NETWORK socket864   6771 driver24d

#elif MASTER_NUM5
SOCKET_NETWORK socket865   6700 driver25a
SOCKET_NETWORK socket866   6701 driver25b
SOCKET_NETWORK socket867   6702 driver25c
SOCKET_NETWORK socket868   6703 driver25d
SOCKET_NETWORK socket869   6704 driver25a
SOCKET_NETWORK socket870   6705 driver25b
SOCKET_NETWORK socket871   6706 driver25c
SOCKET_NETWORK socket872   6707 driver25d
SOCKET_NETWORK socket873   6708 driver25a
SOCKET_NETWORK socket874   6709 driver25b
SOCKET_NETWORK socket875   6710 driver25c
SOCKET_NETWORK socket876   6711 driver25d
SOCKET_NETWORK socket877   6712 driver25a
SOCKET_NETWORK socket878   6713 driver25b
SOCKET_NETWORK socket879   6714 driver25c
SOCKET_NETWORK socket880   6715 driver25d
SOCKET_NETWORK socket881   6716 driver25a
SOCKET_NETWORK socket882   6717 driver25b
SOCKET_NETWORK socket883   6718 driver25c
SOCKET_NETWORK socket884   6719 driver25d
SOCKET_NETWORK socket885   6720 driver25a
SOCKET_NETWORK socket886   6721 driver25b
SOCKET_NETWORK socket887   6722 driver25c
SOCKET_NETWORK socket888   6723 driver25d
SOCKET_NETWORK socket889   6724 driver25a
SOCKET_NETWORK socket890   6725 driver25b
SOCKET_NETWORK socket891   6726 driver25c
SOCKET_NETWORK socket892   6727 driver25d
SOCKET_NETWORK socket893   6728 driver25a
SOCKET_NETWORK socket894   6729 driver25b
SOCKET_NETWORK socket895   6730 driver25c
SOCKET_NETWORK socket896   6731 driver25d
SOCKET_NETWORK socket897   6732 driver25a
SOCKET_NETWORK socket898   6733 driver25b
SOCKET_NETWORK socket899   6734 driver25c
SOCKET_NETWORK socket900   6735 driver25d
SOCKET_NETWORK socket901   6736 driver26a
SOCKET_NETWORK socket902   6737 driver26b
SOCKET_NETWORK socket903   6738 driver26c
SOCKET_NETWORK socket904   6739 driver26d
SOCKET_NETWORK socket905   6740 driver26a
SOCKET_NETWORK socket906   6741 driver26b
SOCKET_NETWORK socket907   6742 driver26c
SOCKET_NETWORK socket908   6743 driver26d
SOCKET_NETWORK socket909   6744 driver26a
SOCKET_NETWORK socket910   6745 driver26b
SOCKET_NETWORK socket911   6746 driver26c
SOCKET_NETWORK socket912   6747 driver26d
SOCKET_NETWORK socket913   6748 driver26a
SOCKET_NETWORK socket914   6749 driver26b
SOCKET_NETWORK socket915   6750 driver26c
SOCKET_NETWORK socket916   6751 driver26d
SOCKET_NETWORK socket917   6752 driver26a
SOCKET_NETWORK socket918   6753 driver26b
SOCKET_NETWORK socket919   6754 driver26c
SOCKET_NETWORK socket920   6755 driver26d
SOCKET_NETWORK socket921   6756 driver26a
SOCKET_NETWORK socket922   6757 driver26b
SOCKET_NETWORK socket923   6758 driver26c
SOCKET_NETWORK socket924   6759 driver26d
SOCKET_NETWORK socket925   6760 driver26a
SOCKET_NETWORK socket926   6761 driver26b
SOCKET_NETWORK socket927   6762 driver26c
SOCKET_NETWORK socket928   6763 driver26d
SOCKET_NETWORK socket929   6764 driver26a
SOCKET_NETWORK socket930   6765 driver26b
SOCKET_NETWORK socket931   6766 driver26c
SOCKET_NETWORK socket932   6767 driver26d
SOCKET_NETWORK socket933   6768 driver26a
SOCKET_NETWORK socket934   6769 driver26b
SOCKET_NETWORK socket935   6770 driver26c
SOCKET_NETWORK socket936   6771 driver26d
SOCKET_NETWORK socket937   6700 driver27a
SOCKET_NETWORK socket938   6701 driver27b
SOCKET_NETWORK socket939   6702 driver27c
SOCKET_NETWORK socket940   6703 driver27d
SOCKET_NETWORK socket941   6704 driver27a
SOCKET_NETWORK socket942   6705 driver27b
SOCKET_NETWORK socket943   6706 driver27c
SOCKET_NETWORK socket944   6707 driver27d
SOCKET_NETWORK socket945   6708 driver27a
SOCKET_NETWORK socket946   6709 driver27b
SOCKET_NETWORK socket947   6710 driver27c
SOCKET_NETWORK socket948   6711 driver27d
SOCKET_NETWORK socket949   6712 driver27a
SOCKET_NETWORK socket950   6713 driver27b
SOCKET_NETWORK socket951   6714 driver27c
SOCKET_NETWORK socket952   6715 driver27d
SOCKET_NETWORK socket953   6716 driver27a
SOCKET_NETWORK socket954   6717 driver27b
SOCKET_NETWORK socket955   6718 driver27c
SOCKET_NETWORK socket956   6719 driver27d
SOCKET_NETWORK socket957   6720 driver27a
SOCKET_NETWORK socket958   6721 driver27b
SOCKET_NETWORK socket959   6722 driver27c
SOCKET_NETWORK socket960   6723 driver27d
SOCKET_NETWORK socket961   6724 driver27a
SOCKET_NETWORK socket962   6725 driver27b
SOCKET_NETWORK socket963   6726 driver27c
SOCKET_NETWORK socket964   6727 driver27d
SOCKET_NETWORK socket965   6728 driver27a
SOCKET_NETWORK socket966   6729 driver27b
SOCKET_NETWORK socket967   6730 driver27c
SOCKET_NETWORK socket968   6731 driver27d
SOCKET_NETWORK socket969   6732 driver27a
SOCKET_NETWORK socket970   6733 driver27b
SOCKET_NETWORK socket971   6734 driver27c
SOCKET_NETWORK socket972   6735 driver27d
SOCKET_NETWORK socket973   6736 driver28a
SOCKET_NETWORK socket974   6737 driver28b
SOCKET_NETWORK socket975   6738 driver28c
SOCKET_NETWORK socket976   6739 driver28d
SOCKET_NETWORK socket977   6740 driver28a
SOCKET_NETWORK socket978   6741 driver28b
SOCKET_NETWORK socket979   6742 driver28c
SOCKET_NETWORK socket980   6743 driver28d
SOCKET_NETWORK socket981   6744 driver28a
SOCKET_NETWORK socket982   6745 driver28b
SOCKET_NETWORK socket983   6746 driver28c
SOCKET_NETWORK socket984   6747 driver28d
SOCKET_NETWORK socket985   6748 driver28a
SOCKET_NETWORK socket986   6749 driver28b
SOCKET_NETWORK socket987   6750 driver28c
SOCKET_NETWORK socket988   6751 driver28d
SOCKET_NETWORK socket989   6752 driver28a
SOCKET_NETWORK socket990   6753 driver28b
SOCKET_NETWORK socket991   6754 driver28c
SOCKET_NETWORK socket992   6755 driver28d
SOCKET_NETWORK socket993   6756 driver28a
```

```
SOCKET_NETWORK socket994   6757 driver28b
SOCKET_NETWORK socket995   6758 driver28c
SOCKET_NETWORK socket996   6759 driver28d
SOCKET_NETWORK socket997   6760 driver28a
SOCKET_NETWORK socket998   6761 driver28b
SOCKET_NETWORK socket999   6762 driver28c
SOCKET_NETWORK socket1000  6763 driver28d
SOCKET_NETWORK socket1001  6764 driver28a
SOCKET_NETWORK socket1002  6765 driver28b
SOCKET_NETWORK socket1003  6766 driver28c
SOCKET_NETWORK socket1004  6767 driver28d
SOCKET_NETWORK socket1005  6768 driver28a
SOCKET_NETWORK socket1006  6769 driver28b
SOCKET_NETWORK socket1007  6770 driver28c
SOCKET_NETWORK socket1008  6771 driver28d
SOCKET_NETWORK socket1009  6700 driver29a
SOCKET_NETWORK socket1010  6701 driver29b
SOCKET_NETWORK socket1011  6702 driver29c
SOCKET_NETWORK socket1012  6703 driver29d
SOCKET_NETWORK socket1013  6704 driver29a
SOCKET_NETWORK socket1014  6705 driver29b
SOCKET_NETWORK socket1015  6706 driver29c
SOCKET_NETWORK socket1016  6707 driver29d
SOCKET_NETWORK socket1017  6708 driver29a
SOCKET_NETWORK socket1018  6709 driver29b
SOCKET_NETWORK socket1019  6710 driver29c
SOCKET_NETWORK socket1020  6711 driver29d
SOCKET_NETWORK socket1021  6712 driver29a
SOCKET_NETWORK socket1022  6713 driver29b
SOCKET_NETWORK socket1023  6714 driver29c
SOCKET_NETWORK socket1024  6715 driver29d
SOCKET_NETWORK socket1025  6716 driver29a
SOCKET_NETWORK socket1026  6717 driver29b
SOCKET_NETWORK socket1027  6718 driver29c
SOCKET_NETWORK socket1028  6719 driver29d
SOCKET_NETWORK socket1029  6720 driver29a
SOCKET_NETWORK socket1030  6721 driver29b
SOCKET_NETWORK socket1031  6722 driver29c
SOCKET_NETWORK socket1032  6723 driver29d
SOCKET_NETWORK socket1033  6724 driver29a
SOCKET_NETWORK socket1034  6725 driver29b
SOCKET_NETWORK socket1035  6726 driver29c
SOCKET_NETWORK socket1036  6727 driver29d
SOCKET_NETWORK socket1037  6728 driver29a
SOCKET_NETWORK socket1038  6729 driver29b
SOCKET_NETWORK socket1039  6730 driver29c
SOCKET_NETWORK socket1040  6731 driver29d
SOCKET_NETWORK socket1041  6732 driver29a
SOCKET_NETWORK socket1042  6733 driver29b
SOCKET_NETWORK socket1043  6734 driver29c
SOCKET_NETWORK socket1044  6735 driver29d
SOCKET_NETWORK socket1045  6736 driver30a
SOCKET_NETWORK socket1046  6737 driver30b
SOCKET_NETWORK socket1047  6738 driver30c
SOCKET_NETWORK socket1048  6739 driver30d
SOCKET_NETWORK socket1049  6740 driver30a
SOCKET_NETWORK socket1050  6741 driver30b
SOCKET_NETWORK socket1051  6742 driver30c
SOCKET_NETWORK socket1052  6743 driver30d
SOCKET_NETWORK socket1053  6744 driver30a
SOCKET_NETWORK socket1054  6745 driver30b
SOCKET_NETWORK socket1055  6746 driver30c
SOCKET_NETWORK socket1056  6747 driver30d
SOCKET_NETWORK socket1057  6748 driver30a
SOCKET_NETWORK socket1058  6749 driver30b
SOCKET_NETWORK socket1059  6750 driver30c
SOCKET_NETWORK socket1060  6751 driver30d
SOCKET_NETWORK socket1061  6752 driver30a
SOCKET_NETWORK socket1062  6753 driver30b
SOCKET_NETWORK socket1063  6754 driver30c
SOCKET_NETWORK socket1064  6755 driver30d
SOCKET_NETWORK socket1065  6756 driver30a
SOCKET_NETWORK socket1066  6757 driver30b
SOCKET_NETWORK socket1067  6758 driver30c
SOCKET_NETWORK socket1068  6759 driver30d
SOCKET_NETWORK socket1069  6760 driver30a
SOCKET_NETWORK socket1070  6761 driver30b
SOCKET_NETWORK socket1071  6762 driver30c
SOCKET_NETWORK socket1072  6763 driver30d
SOCKET_NETWORK socket1073  6764 driver30a
SOCKET_NETWORK socket1074  6765 driver30b
SOCKET_NETWORK socket1075  6766 driver30c
SOCKET_NETWORK socket1076  6767 driver30d
SOCKET_NETWORK socket1077  6768 driver30a
SOCKET_NETWORK socket1078  6769 driver30b
SOCKET_NETWORK socket1079  6770 driver30c
SOCKET_NETWORK socket1080  6771 driver30d
#elif MASTER_NUM6
SOCKET_NETWORK socket1081  6700 driver31a
SOCKET_NETWORK socket1082  6701 driver31b
SOCKET_NETWORK socket1083  6702 driver31c
SOCKET_NETWORK socket1084  6703 driver31d
SOCKET_NETWORK socket1085  6704 driver31a
SOCKET_NETWORK socket1086  6705 driver31b
SOCKET_NETWORK socket1087  6706 driver31c
SOCKET_NETWORK socket1088  6707 driver31d
SOCKET_NETWORK socket1089  6708 driver31a
SOCKET_NETWORK socket1090  6709 driver31b
SOCKET_NETWORK socket1091  6710 driver31c
SOCKET_NETWORK socket1092  6711 driver31d
SOCKET_NETWORK socket1093  6712 driver31a
SOCKET_NETWORK socket1094  6713 driver31b
SOCKET_NETWORK socket1095  6714 driver31c
SOCKET_NETWORK socket1096  6715 driver31d
SOCKET_NETWORK socket1097  6716 driver31a
SOCKET_NETWORK socket1098  6717 driver31b
SOCKET_NETWORK socket1099  6718 driver31c
SOCKET_NETWORK socket1100  6719 driver31d
SOCKET_NETWORK socket1101  6720 driver31a
SOCKET_NETWORK socket1102  6721 driver31b
SOCKET_NETWORK socket1103  6722 driver31c
SOCKET_NETWORK socket1104  6723 driver31d
SOCKET_NETWORK socket1105  6724 driver31a
SOCKET_NETWORK socket1106  6725 driver31b
SOCKET_NETWORK socket1107  6726 driver31c
SOCKET_NETWORK socket1108  6727 driver31d
SOCKET_NETWORK socket1109  6728 driver31a
SOCKET_NETWORK socket1110  6729 driver31b
SOCKET_NETWORK socket1111  6730 driver31c
SOCKET_NETWORK socket1112  6731 driver31d
SOCKET_NETWORK socket1113  6732 driver31a
SOCKET_NETWORK socket1114  6733 driver31b
SOCKET_NETWORK socket1115  6734 driver31c
SOCKET_NETWORK socket1116  6735 driver31d
SOCKET_NETWORK socket1117  6736 driver32a
SOCKET_NETWORK socket1118  6737 driver32b
SOCKET_NETWORK socket1119  6738 driver32c
SOCKET_NETWORK socket1120  6739 driver32d
SOCKET_NETWORK socket1121  6740 driver32a
SOCKET_NETWORK socket1122  6741 driver32b
SOCKET_NETWORK socket1123  6742 driver32c
SOCKET_NETWORK socket1124  6743 driver32d
SOCKET_NETWORK socket1125  6744 driver32a
SOCKET_NETWORK socket1126  6745 driver32b
SOCKET_NETWORK socket1127  6746 driver32c
SOCKET_NETWORK socket1128  6747 driver32d
SOCKET_NETWORK socket1129  6748 driver32a
SOCKET_NETWORK socket1130  6749 driver32b
SOCKET_NETWORK socket1131  6750 driver32c
SOCKET_NETWORK socket1132  6751 driver32d
SOCKET_NETWORK socket1133  6752 driver32a
SOCKET_NETWORK socket1134  6753 driver32b
SOCKET_NETWORK socket1135  6754 driver32c
SOCKET_NETWORK socket1136  6755 driver32d
SOCKET_NETWORK socket1137  6756 driver32a
SOCKET_NETWORK socket1138  6757 driver32b
SOCKET_NETWORK socket1139  6758 driver32c
SOCKET_NETWORK socket1140  6759 driver32d
SOCKET_NETWORK socket1141  6760 driver32a
SOCKET_NETWORK socket1142  6761 driver32b
SOCKET_NETWORK socket1143  6762 driver32c
SOCKET_NETWORK socket1144  6763 driver32d
SOCKET_NETWORK socket1145  6764 driver32a
SOCKET_NETWORK socket1146  6765 driver32b
SOCKET_NETWORK socket1147  6766 driver32c
SOCKET_NETWORK socket1148  6767 driver32d
SOCKET_NETWORK socket1149  6768 driver32a
SOCKET_NETWORK socket1150  6769 driver32b
SOCKET_NETWORK socket1151  6770 driver32c
SOCKET_NETWORK socket1152  6771 driver32d
SOCKET_NETWORK socket1153  6700 driver33a
SOCKET_NETWORK socket1154  6701 driver33b
SOCKET_NETWORK socket1155  6702 driver33c
SOCKET_NETWORK socket1156  6703 driver33d
SOCKET_NETWORK socket1157  6704 driver33a
SOCKET_NETWORK socket1158  6705 driver33b
SOCKET_NETWORK socket1159  6706 driver33c
SOCKET_NETWORK socket1160  6707 driver33d
SOCKET_NETWORK socket1161  6708 driver33a
SOCKET_NETWORK socket1162  6709 driver33b
SOCKET_NETWORK socket1163  6710 driver33c
SOCKET_NETWORK socket1164  6711 driver33d
SOCKET_NETWORK socket1165  6712 driver33a
SOCKET_NETWORK socket1166  6713 driver33b
SOCKET_NETWORK socket1167  6714 driver33c
SOCKET_NETWORK socket1168  6715 driver33d
SOCKET_NETWORK socket1169  6716 driver33a
SOCKET_NETWORK socket1170  6717 driver33b
SOCKET_NETWORK socket1171  6718 driver33c
SOCKET_NETWORK socket1172  6719 driver33d
SOCKET_NETWORK socket1173  6720 driver33a
SOCKET_NETWORK socket1174  6721 driver33b
SOCKET_NETWORK socket1175  6722 driver33c
SOCKET_NETWORK socket1176  6723 driver33d
SOCKET_NETWORK socket1177  6724 driver33a
SOCKET_NETWORK socket1178  6725 driver33b
SOCKET_NETWORK socket1179  6726 driver33c
SOCKET_NETWORK socket1180  6727 driver33d
SOCKET_NETWORK socket1181  6728 driver33a
SOCKET_NETWORK socket1182  6729 driver33b
SOCKET_NETWORK socket1183  6730 driver33c
SOCKET_NETWORK socket1184  6731 driver33d
SOCKET_NETWORK socket1185  6732 driver33a
SOCKET_NETWORK socket1186  6733 driver33b
SOCKET_NETWORK socket1187  6734 driver33c
SOCKET_NETWORK socket1188  6735 driver33d
SOCKET_NETWORK socket1189  6736 driver34a
SOCKET_NETWORK socket1190  6737 driver34b
```

```
SOCKET_NETWORK socket1191  6738 driver34c
SOCKET_NETWORK socket1192  6739 driver34d
SOCKET_NETWORK socket1193  6740 driver34a
SOCKET_NETWORK socket1194  6741 driver34b
SOCKET_NETWORK socket1195  6742 driver34c
SOCKET_NETWORK socket1196  6743 driver34d
SOCKET_NETWORK socket1197  6744 driver34a
SOCKET_NETWORK socket1198  6745 driver34b
SOCKET_NETWORK socket1199  6746 driver34c
SOCKET_NETWORK socket1200  6747 driver34d
SOCKET_NETWORK socket1201  6748 driver34a
SOCKET_NETWORK socket1202  6749 driver34b
SOCKET_NETWORK socket1203  6750 driver34c
SOCKET_NETWORK socket1204  6751 driver34d
SOCKET_NETWORK socket1205  6752 driver34a
SOCKET_NETWORK socket1206  6753 driver34b
SOCKET_NETWORK socket1207  6754 driver34c
SOCKET_NETWORK socket1208  6755 driver34d
SOCKET_NETWORK socket1209  6756 driver34a
SOCKET_NETWORK socket1210  6757 driver34b
SOCKET_NETWORK socket1211  6758 driver34c
SOCKET_NETWORK socket1212  6759 driver34d
SOCKET_NETWORK socket1213  6760 driver34a
SOCKET_NETWORK socket1214  6761 driver34b
SOCKET_NETWORK socket1215  6762 driver34c
SOCKET_NETWORK socket1216  6763 driver34d
SOCKET_NETWORK socket1217  6764 driver34a
SOCKET_NETWORK socket1218  6765 driver34b
SOCKET_NETWORK socket1219  6766 driver34c
SOCKET_NETWORK socket1220  6767 driver34d
SOCKET_NETWORK socket1221  6768 driver34a
SOCKET_NETWORK socket1222  6769 driver34b
SOCKET_NETWORK socket1223  6770 driver34c
SOCKET_NETWORK socket1224  6771 driver34d

SOCKET_NETWORK socket1225  6700 driver35a
SOCKET_NETWORK socket1226  6701 driver35b
SOCKET_NETWORK socket1227  6702 driver35c
SOCKET_NETWORK socket1228  6703 driver35d
SOCKET_NETWORK socket1229  6704 driver35a
SOCKET_NETWORK socket1230  6705 driver35b
SOCKET_NETWORK socket1231  6706 driver35c
SOCKET_NETWORK socket1232  6707 driver35d
SOCKET_NETWORK socket1233  6708 driver35a
SOCKET_NETWORK socket1234  6709 driver35b
SOCKET_NETWORK socket1235  6710 driver35c
SOCKET_NETWORK socket1236  6711 driver35d
SOCKET_NETWORK socket1237  6712 driver35a
SOCKET_NETWORK socket1238  6713 driver35b
SOCKET_NETWORK socket1239  6714 driver35c
SOCKET_NETWORK socket1240  6715 driver35d
SOCKET_NETWORK socket1241  6716 driver35a
SOCKET_NETWORK socket1242  6717 driver35b
SOCKET_NETWORK socket1243  6718 driver35c
SOCKET_NETWORK socket1244  6719 driver35d
SOCKET_NETWORK socket1245  6720 driver35a
SOCKET_NETWORK socket1246  6721 driver35b
SOCKET_NETWORK socket1247  6722 driver35c
SOCKET_NETWORK socket1248  6723 driver35d
SOCKET_NETWORK socket1249  6724 driver35a
SOCKET_NETWORK socket1250  6725 driver35b
SOCKET_NETWORK socket1251  6726 driver35c
SOCKET_NETWORK socket1252  6727 driver35d
SOCKET_NETWORK socket1253  6728 driver35a
SOCKET_NETWORK socket1254  6729 driver35b
SOCKET_NETWORK socket1255  6730 driver35c
SOCKET_NETWORK socket1256  6731 driver35d
SOCKET_NETWORK socket1257  6732 driver35a
SOCKET_NETWORK socket1258  6733 driver35b
SOCKET_NETWORK socket1259  6734 driver35c
SOCKET_NETWORK socket1260  6735 driver35d
SOCKET_NETWORK socket1261  6736 driver36a
SOCKET_NETWORK socket1262  6737 driver36b
SOCKET_NETWORK socket1263  6738 driver36c
SOCKET_NETWORK socket1264  6739 driver36d
SOCKET_NETWORK socket1265  6740 driver36a
SOCKET_NETWORK socket1266  6741 driver36b
SOCKET_NETWORK socket1267  6742 driver36c
SOCKET_NETWORK socket1268  6743 driver36d
SOCKET_NETWORK socket1269  6744 driver36a
SOCKET_NETWORK socket1270  6745 driver36b
SOCKET_NETWORK socket1271  6746 driver36c
SOCKET_NETWORK socket1272  6747 driver36d
SOCKET_NETWORK socket1273  6748 driver36a
SOCKET_NETWORK socket1274  6749 driver36b
SOCKET_NETWORK socket1275  6750 driver36c
SOCKET_NETWORK socket1276  6751 driver36d
SOCKET_NETWORK socket1277  6752 driver36a
SOCKET_NETWORK socket1278  6753 driver36b
SOCKET_NETWORK socket1279  6754 driver36c
SOCKET_NETWORK socket1280  6755 driver36d
SOCKET_NETWORK socket1281  6756 driver36a
SOCKET_NETWORK socket1282  6757 driver36b
SOCKET_NETWORK socket1283  6758 driver36c
SOCKET_NETWORK socket1284  6759 driver36d
SOCKET_NETWORK socket1285  6760 driver36a
SOCKET_NETWORK socket1286  6761 driver36b
SOCKET_NETWORK socket1287  6762 driver36c
SOCKET_NETWORK socket1288  6763 driver36d
SOCKET_NETWORK socket1289  6764 driver36a
SOCKET_NETWORK socket1290  6765 driver36b
SOCKET_NETWORK socket1291  6766 driver36c
SOCKET_NETWORK socket1292  6767 driver36d
SOCKET_NETWORK socket1293  6768 driver36a
SOCKET_NETWORK socket1294  6769 driver36b
SOCKET_NETWORK socket1295  6770 driver36c
SOCKET_NETWORK socket1296  6771 driver36d
#elif MASTER_NUM7
SOCKET_NETWORK socket1297  6700 driver37a
SOCKET_NETWORK socket1298  6701 driver37b
SOCKET_NETWORK socket1299  6702 driver37c
SOCKET_NETWORK socket1300  6703 driver37d
SOCKET_NETWORK socket1301  6704 driver37a
SOCKET_NETWORK socket1302  6705 driver37b
SOCKET_NETWORK socket1303  6706 driver37c
SOCKET_NETWORK socket1304  6707 driver37d
SOCKET_NETWORK socket1305  6708 driver37a
SOCKET_NETWORK socket1306  6709 driver37b
SOCKET_NETWORK socket1307  6710 driver37c
SOCKET_NETWORK socket1308  6711 driver37d
SOCKET_NETWORK socket1309  6712 driver37a
SOCKET_NETWORK socket1310  6713 driver37b
SOCKET_NETWORK socket1311  6714 driver37c
SOCKET_NETWORK socket1312  6715 driver37d
SOCKET_NETWORK socket1313  6716 driver37a
SOCKET_NETWORK socket1314  6717 driver37b
SOCKET_NETWORK socket1315  6718 driver37c
SOCKET_NETWORK socket1316  6719 driver37d
SOCKET_NETWORK socket1317  6720 driver37a
SOCKET_NETWORK socket1318  6721 driver37b
SOCKET_NETWORK socket1319  6722 driver37c
SOCKET_NETWORK socket1320  6723 driver37d
SOCKET_NETWORK socket1321  6724 driver37a
SOCKET_NETWORK socket1322  6725 driver37b
SOCKET_NETWORK socket1323  6726 driver37c
SOCKET_NETWORK socket1324  6727 driver37d
SOCKET_NETWORK socket1325  6728 driver37a
SOCKET_NETWORK socket1326  6729 driver37b
SOCKET_NETWORK socket1327  6730 driver37c
SOCKET_NETWORK socket1328  6731 driver37d
SOCKET_NETWORK socket1329  6732 driver37a
SOCKET_NETWORK socket1330  6733 driver37b
SOCKET_NETWORK socket1331  6734 driver37c
SOCKET_NETWORK socket1332  6735 driver37d
SOCKET_NETWORK socket1333  6736 driver38a
SOCKET_NETWORK socket1334  6737 driver38b
SOCKET_NETWORK socket1335  6738 driver38c
SOCKET_NETWORK socket1336  6739 driver38d
SOCKET_NETWORK socket1337  6740 driver38a
SOCKET_NETWORK socket1338  6741 driver38b
SOCKET_NETWORK socket1339  6742 driver38c
SOCKET_NETWORK socket1340  6743 driver38d
SOCKET_NETWORK socket1341  6744 driver38a
SOCKET_NETWORK socket1342  6745 driver38b
SOCKET_NETWORK socket1343  6746 driver38c
SOCKET_NETWORK socket1344  6747 driver38d
SOCKET_NETWORK socket1345  6748 driver38a
SOCKET_NETWORK socket1346  6749 driver38b
SOCKET_NETWORK socket1347  6750 driver38c
SOCKET_NETWORK socket1348  6751 driver38d
SOCKET_NETWORK socket1349  6752 driver38a
SOCKET_NETWORK socket1350  6753 driver38b
SOCKET_NETWORK socket1351  6754 driver38c
SOCKET_NETWORK socket1352  6755 driver38d
SOCKET_NETWORK socket1353  6756 driver38a
SOCKET_NETWORK socket1354  6757 driver38b
SOCKET_NETWORK socket1355  6758 driver38c
SOCKET_NETWORK socket1356  6759 driver38d
SOCKET_NETWORK socket1357  6760 driver38a
SOCKET_NETWORK socket1358  6761 driver38b
SOCKET_NETWORK socket1359  6762 driver38c
SOCKET_NETWORK socket1360  6763 driver38d
SOCKET_NETWORK socket1361  6764 driver38a
SOCKET_NETWORK socket1362  6765 driver38b
SOCKET_NETWORK socket1363  6766 driver38c
SOCKET_NETWORK socket1364  6767 driver38d
SOCKET_NETWORK socket1365  6768 driver38a
SOCKET_NETWORK socket1366  6769 driver38b
SOCKET_NETWORK socket1367  6770 driver38c
SOCKET_NETWORK socket1368  6771 driver38d
/*
SOCKET_NETWORK socket1369  6700 driver39a
SOCKET_NETWORK socket1370  6701 driver39b
SOCKET_NETWORK socket1371  6702 driver39c
SOCKET_NETWORK socket1372  6703 driver39d
SOCKET_NETWORK socket1373  6704 driver39a
SOCKET_NETWORK socket1374  6705 driver39b
SOCKET_NETWORK socket1375  6706 driver39c
SOCKET_NETWORK socket1376  6707 driver39d
SOCKET_NETWORK socket1377  6708 driver39a
SOCKET_NETWORK socket1378  6709 driver39b
SOCKET_NETWORK socket1379  6710 driver39c
SOCKET_NETWORK socket1380  6711 driver39d
SOCKET_NETWORK socket1381  6712 driver39a
SOCKET_NETWORK socket1382  6713 driver39b
SOCKET_NETWORK socket1383  6714 driver39c
SOCKET_NETWORK socket1384  6715 driver39d
SOCKET_NETWORK socket1385  6716 driver39a
```

```
SOCKET_NETWORK socket1386   6717 driver39b
SOCKET_NETWORK socket1387   6718 driver39c
SOCKET_NETWORK socket1388   6719 driver39d
SOCKET_NETWORK socket1389   6720 driver39a
SOCKET_NETWORK socket1390   6721 driver39b
SOCKET_NETWORK socket1391   6722 driver39c
SOCKET_NETWORK socket1392   6723 driver39d
SOCKET_NETWORK socket1393   6724 driver39a
SOCKET_NETWORK socket1394   6725 driver39b
SOCKET_NETWORK socket1395   6726 driver39c
SOCKET_NETWORK socket1396   6727 driver39d
SOCKET_NETWORK socket1397   6728 driver39a
SOCKET_NETWORK socket1398   6729 driver39b
SOCKET_NETWORK socket1399   6730 driver39c
SOCKET_NETWORK socket1400   6731 driver39d
SOCKET_NETWORK socket1401   6732 driver39a
SOCKET_NETWORK socket1402   6733 driver39b
SOCKET_NETWORK socket1403   6734 driver39c
SOCKET_NETWORK socket1404   6735 driver39d
SOCKET_NETWORK socket1405   6736 driver40a
SOCKET_NETWORK socket1406   6737 driver40b
SOCKET_NETWORK socket1407   6738 driver40c
SOCKET_NETWORK socket1408   6739 driver40d
SOCKET_NETWORK socket1409   6740 driver40a
SOCKET_NETWORK socket1410   6741 driver40b
SOCKET_NETWORK socket1411   6742 driver40c
SOCKET_NETWORK socket1412   6743 driver40d
SOCKET_NETWORK socket1413   6744 driver40a
SOCKET_NETWORK socket1414   6745 driver40b
SOCKET_NETWORK socket1415   6746 driver40c
SOCKET_NETWORK socket1416   6747 driver40d
SOCKET_NETWORK socket1417   6748 driver40a
SOCKET_NETWORK socket1418   6749 driver40b
SOCKET_NETWORK socket1419   6750 driver40c
SOCKET_NETWORK socket1420   6751 driver40d
SOCKET_NETWORK socket1421   6752 driver40a
SOCKET_NETWORK socket1422   6753 driver40b
SOCKET_NETWORK socket1423   6754 driver40c
SOCKET_NETWORK socket1424   6755 driver40d
SOCKET_NETWORK socket1425   6756 driver40a
SOCKET_NETWORK socket1426   6757 driver40b
SOCKET_NETWORK socket1427   6758 driver40c
SOCKET_NETWORK socket1428   6759 driver40d
SOCKET_NETWORK socket1429   6760 driver40a
SOCKET_NETWORK socket1430   6761 driver40b
SOCKET_NETWORK socket1431   6762 driver40c
SOCKET_NETWORK socket1432   6763 driver40d
SOCKET_NETWORK socket1433   6764 driver40a
SOCKET_NETWORK socket1434   6765 driver40b
SOCKET_NETWORK socket1435   6766 driver40c
SOCKET_NETWORK socket1436   6767 driver40d
SOCKET_NETWORK socket1437   6768 driver40a
SOCKET_NETWORK socket1438   6769 driver40b
SOCKET_NETWORK socket1439   6770 driver40c
SOCKET_NETWORK socket1440   6771 driver40d
SOCKET_NETWORK socket1441   6700 driver41a
SOCKET_NETWORK socket1442   6701 driver41b
SOCKET_NETWORK socket1443   6702 driver41c
SOCKET_NETWORK socket1444   6703 driver41d
SOCKET_NETWORK socket1445   6704 driver41a
SOCKET_NETWORK socket1446   6705 driver41b
SOCKET_NETWORK socket1447   6706 driver41c
SOCKET_NETWORK socket1448   6707 driver41d
SOCKET_NETWORK socket1449   6708 driver41a
SOCKET_NETWORK socket1450   6709 driver41b
SOCKET_NETWORK socket1451   6710 driver41c
SOCKET_NETWORK socket1452   6711 driver41d
SOCKET_NETWORK socket1453   6712 driver41a
SOCKET_NETWORK socket1454   6713 driver41b
SOCKET_NETWORK socket1455   6714 driver41c
SOCKET_NETWORK socket1456   6715 driver41d
SOCKET_NETWORK socket1457   6716 driver41a
SOCKET_NETWORK socket1458   6717 driver41b
SOCKET_NETWORK socket1459   6718 driver41c
SOCKET_NETWORK socket1460   6719 driver41d
SOCKET_NETWORK socket1461   6720 driver41a
SOCKET_NETWORK socket1462   6721 driver41b
SOCKET_NETWORK socket1463   6722 driver41c
SOCKET_NETWORK socket1464   6723 driver41d
SOCKET_NETWORK socket1465   6724 driver41a
SOCKET_NETWORK socket1466   6725 driver41b
SOCKET_NETWORK socket1467   6726 driver41c
SOCKET_NETWORK socket1468   6727 driver41d
SOCKET_NETWORK socket1469   6728 driver41a
SOCKET_NETWORK socket1470   6729 driver41b
SOCKET_NETWORK socket1471   6730 driver41c
SOCKET_NETWORK socket1472   6731 driver41d
SOCKET_NETWORK socket1473   6732 driver41a
SOCKET_NETWORK socket1474   6733 driver41b
SOCKET_NETWORK socket1475   6734 driver41c
SOCKET_NETWORK socket1476   6735 driver41d
SOCKET_NETWORK socket1477   6736 driver42a
SOCKET_NETWORK socket1478   6737 driver42b
SOCKET_NETWORK socket1479   6738 driver42c
SOCKET_NETWORK socket1480   6739 driver42d
SOCKET_NETWORK socket1481   6740 driver42a
SOCKET_NETWORK socket1482   6741 driver42b
SOCKET_NETWORK socket1483   6742 driver42c
SOCKET_NETWORK socket1484   6743 driver42d
SOCKET_NETWORK socket1485   6744 driver42a
SOCKET_NETWORK socket1486   6745 driver42b
SOCKET_NETWORK socket1487   6746 driver42c
SOCKET_NETWORK socket1488   6747 driver42d
SOCKET_NETWORK socket1489   6748 driver42a
SOCKET_NETWORK socket1490   6749 driver42b
SOCKET_NETWORK socket1491   6750 driver42c
SOCKET_NETWORK socket1492   6751 driver42d
SOCKET_NETWORK socket1493   6752 driver42a
SOCKET_NETWORK socket1494   6753 driver42b
SOCKET_NETWORK socket1495   6754 driver42c
SOCKET_NETWORK socket1496   6755 driver42d
SOCKET_NETWORK socket1497   6756 driver42a
SOCKET_NETWORK socket1498   6757 driver42b
SOCKET_NETWORK socket1499   6758 driver42c
SOCKET_NETWORK socket1500   6759 driver42d
SOCKET_NETWORK socket1501   6760 driver42a
SOCKET_NETWORK socket1502   6761 driver42b
SOCKET_NETWORK socket1503   6762 driver42c
SOCKET_NETWORK socket1504   6763 driver42d
SOCKET_NETWORK socket1505   6764 driver42a
SOCKET_NETWORK socket1506   6765 driver42b
SOCKET_NETWORK socket1507   6766 driver42c
SOCKET_NETWORK socket1508   6767 driver42d
SOCKET_NETWORK socket1509   6768 driver42a
SOCKET_NETWORK socket1510   6769 driver42b
SOCKET_NETWORK socket1511   6770 driver42c
SOCKET_NETWORK socket1512   6771 driver42d
*/
#elif MASTER_NUM8
SOCKET_NETWORK socket1513   6700 driver43a
SOCKET_NETWORK socket1514   6701 driver43b
SOCKET_NETWORK socket1515   6702 driver43c
SOCKET_NETWORK socket1516   6703 driver43d
SOCKET_NETWORK socket1517   6704 driver43a
SOCKET_NETWORK socket1518   6705 driver43b
SOCKET_NETWORK socket1519   6706 driver43c
SOCKET_NETWORK socket1520   6707 driver43d
SOCKET_NETWORK socket1521   6708 driver43a
SOCKET_NETWORK socket1522   6709 driver43b
SOCKET_NETWORK socket1523   6710 driver43c
SOCKET_NETWORK socket1524   6711 driver43d
SOCKET_NETWORK socket1525   6712 driver43a
SOCKET_NETWORK socket1526   6713 driver43b
SOCKET_NETWORK socket1527   6714 driver43c
SOCKET_NETWORK socket1528   6715 driver43d
SOCKET_NETWORK socket1529   6716 driver43a
SOCKET_NETWORK socket1530   6717 driver43b
SOCKET_NETWORK socket1531   6718 driver43c
SOCKET_NETWORK socket1532   6719 driver43d
SOCKET_NETWORK socket1533   6720 driver43a
SOCKET_NETWORK socket1534   6721 driver43b
SOCKET_NETWORK socket1535   6722 driver43c
SOCKET_NETWORK socket1536   6723 driver43d
SOCKET_NETWORK socket1537   6724 driver43a
SOCKET_NETWORK socket1538   6725 driver43b
SOCKET_NETWORK socket1539   6726 driver43c
SOCKET_NETWORK socket1540   6727 driver43d
SOCKET_NETWORK socket1541   6728 driver43a
SOCKET_NETWORK socket1542   6729 driver43b
SOCKET_NETWORK socket1543   6730 driver43c
SOCKET_NETWORK socket1544   6731 driver43d
SOCKET_NETWORK socket1545   6732 driver43a
SOCKET_NETWORK socket1546   6733 driver43b
SOCKET_NETWORK socket1547   6734 driver43c
SOCKET_NETWORK socket1548   6735 driver43d
SOCKET_NETWORK socket1549   6736 driver44a
SOCKET_NETWORK socket1550   6737 driver44b
SOCKET_NETWORK socket1551   6738 driver44c
SOCKET_NETWORK socket1552   6739 driver44d
SOCKET_NETWORK socket1553   6740 driver44a
SOCKET_NETWORK socket1554   6741 driver44b
SOCKET_NETWORK socket1555   6742 driver44c
SOCKET_NETWORK socket1556   6743 driver44d
SOCKET_NETWORK socket1557   6744 driver44a
SOCKET_NETWORK socket1558   6745 driver44b
SOCKET_NETWORK socket1559   6746 driver44c
SOCKET_NETWORK socket1560   6747 driver44d
SOCKET_NETWORK socket1561   6748 driver44a
SOCKET_NETWORK socket1562   6749 driver44b
SOCKET_NETWORK socket1563   6750 driver44c
SOCKET_NETWORK socket1564   6751 driver44d
SOCKET_NETWORK socket1565   6752 driver44a
SOCKET_NETWORK socket1566   6753 driver44b
SOCKET_NETWORK socket1567   6754 driver44c
SOCKET_NETWORK socket1568   6755 driver44d
SOCKET_NETWORK socket1569   6756 driver44a
SOCKET_NETWORK socket1570   6757 driver44b
SOCKET_NETWORK socket1571   6758 driver44c
SOCKET_NETWORK socket1572   6759 driver44d
SOCKET_NETWORK socket1573   6760 driver44a
SOCKET_NETWORK socket1574   6761 driver44b
SOCKET_NETWORK socket1575   6762 driver44c
SOCKET_NETWORK socket1576   6763 driver44d
SOCKET_NETWORK socket1577   6764 driver44a
SOCKET_NETWORK socket1578   6765 driver44b
SOCKET_NETWORK socket1579   6766 driver44c
SOCKET_NETWORK socket1580   6767 driver44d
SOCKET_NETWORK socket1581   6768 driver44a
```

```
SOCKET_NETWORK socket1582   6769 driver44b
SOCKET_NETWORK socket1583   6770 driver44c
SOCKET_NETWORK socket1584   6771 driver44d
SOCKET_NETWORK socket1585   6700 driver45a
SOCKET_NETWORK socket1586   6701 driver45b
SOCKET_NETWORK socket1587   6702 driver45c
SOCKET_NETWORK socket1588   6703 driver45d
SOCKET_NETWORK socket1589   6704 driver45a
SOCKET_NETWORK socket1590   6705 driver45b
SOCKET_NETWORK socket1591   6706 driver45c
SOCKET_NETWORK socket1592   6707 driver45d
SOCKET_NETWORK socket1593   6708 driver45a
SOCKET_NETWORK socket1594   6709 driver45b
SOCKET_NETWORK socket1595   6710 driver45c
SOCKET_NETWORK socket1596   6711 driver45d
SOCKET_NETWORK socket1597   6712 driver45a
SOCKET_NETWORK socket1598   6713 driver45b
SOCKET_NETWORK socket1599   6714 driver45c
SOCKET_NETWORK socket1600   6715 driver45d
SOCKET_NETWORK socket1601   6716 driver45a
SOCKET_NETWORK socket1602   6717 driver45b
SOCKET_NETWORK socket1603   6718 driver45c
SOCKET_NETWORK socket1604   6719 driver45d
SOCKET_NETWORK socket1605   6720 driver45a
SOCKET_NETWORK socket1606   6721 driver45b
SOCKET_NETWORK socket1607   6722 driver45c
SOCKET_NETWORK socket1608   6723 driver45d
SOCKET_NETWORK socket1609   6724 driver45a
SOCKET_NETWORK socket1610   6725 driver45b
SOCKET_NETWORK socket1611   6726 driver45c
SOCKET_NETWORK socket1612   6727 driver45d
SOCKET_NETWORK socket1613   6728 driver45a
SOCKET_NETWORK socket1614   6729 driver45b
SOCKET_NETWORK socket1615   6730 driver45c
SOCKET_NETWORK socket1616   6731 driver45d
SOCKET_NETWORK socket1617   6732 driver45a
SOCKET_NETWORK socket1618   6733 driver45b
SOCKET_NETWORK socket1619   6734 driver45c
SOCKET_NETWORK socket1620   6735 driver45d
SOCKET_NETWORK socket1621   6736 driver46a
SOCKET_NETWORK socket1622   6737 driver46b
SOCKET_NETWORK socket1623   6738 driver46c
SOCKET_NETWORK socket1624   6739 driver46d
SOCKET_NETWORK socket1625   6740 driver46a
SOCKET_NETWORK socket1626   6741 driver46b
SOCKET_NETWORK socket1627   6742 driver46c
SOCKET_NETWORK socket1628   6743 driver46d
SOCKET_NETWORK socket1629   6744 driver46a
SOCKET_NETWORK socket1630   6745 driver46b
SOCKET_NETWORK socket1631   6746 driver46c
SOCKET_NETWORK socket1632   6747 driver46d
SOCKET_NETWORK socket1633   6748 driver46a
SOCKET_NETWORK socket1634   6749 driver46b
SOCKET_NETWORK socket1635   6750 driver46c
SOCKET_NETWORK socket1636   6751 driver46d
SOCKET_NETWORK socket1637   6752 driver46a
SOCKET_NETWORK socket1638   6753 driver46b
SOCKET_NETWORK socket1639   6754 driver46c
SOCKET_NETWORK socket1640   6755 driver46d
SOCKET_NETWORK socket1641   6756 driver46a
SOCKET_NETWORK socket1642   6757 driver46b
SOCKET_NETWORK socket1643   6758 driver46c
SOCKET_NETWORK socket1644   6759 driver46d
SOCKET_NETWORK socket1645   6760 driver46a
SOCKET_NETWORK socket1646   6761 driver46b
SOCKET_NETWORK socket1647   6762 driver46c
SOCKET_NETWORK socket1648   6763 driver46d
SOCKET_NETWORK socket1649   6764 driver46a
SOCKET_NETWORK socket1650   6765 driver46b
SOCKET_NETWORK socket1651   6766 driver46c
SOCKET_NETWORK socket1652   6767 driver46d
SOCKET_NETWORK socket1653   6768 driver46a
SOCKET_NETWORK socket1654   6769 driver46b
SOCKET_NETWORK socket1655   6770 driver46c
SOCKET_NETWORK socket1656   6771 driver46d
SOCKET_NETWORK socket1657   6700 driver47a
SOCKET_NETWORK socket1658   6701 driver47b
SOCKET_NETWORK socket1659   6702 driver47c
SOCKET_NETWORK socket1660   6703 driver47d
SOCKET_NETWORK socket1661   6704 driver47a
SOCKET_NETWORK socket1662   6705 driver47b
SOCKET_NETWORK socket1663   6706 driver47c
SOCKET_NETWORK socket1664   6707 driver47d
SOCKET_NETWORK socket1665   6708 driver47a
SOCKET_NETWORK socket1666   6709 driver47b
SOCKET_NETWORK socket1667   6710 driver47c
SOCKET_NETWORK socket1668   6711 driver47d
SOCKET_NETWORK socket1669   6712 driver47a
SOCKET_NETWORK socket1670   6713 driver47b
SOCKET_NETWORK socket1671   6714 driver47c
SOCKET_NETWORK socket1672   6715 driver47d
SOCKET_NETWORK socket1673   6716 driver47a
SOCKET_NETWORK socket1674   6717 driver47b
SOCKET_NETWORK socket1675   6718 driver47c
SOCKET_NETWORK socket1676   6719 driver47d
SOCKET_NETWORK socket1677   6720 driver47a
SOCKET_NETWORK socket1678   6721 driver47b
SOCKET_NETWORK socket1679   6722 driver47c
SOCKET_NETWORK socket1680   6723 driver47d
SOCKET_NETWORK socket1681   6724 driver47a
SOCKET_NETWORK socket1682   6725 driver47b
SOCKET_NETWORK socket1683   6726 driver47c
SOCKET_NETWORK socket1684   6727 driver47d
SOCKET_NETWORK socket1685   6728 driver47a
SOCKET_NETWORK socket1686   6729 driver47b
SOCKET_NETWORK socket1687   6730 driver47c
SOCKET_NETWORK socket1688   6731 driver47d
SOCKET_NETWORK socket1689   6732 driver47a
SOCKET_NETWORK socket1690   6733 driver47b
SOCKET_NETWORK socket1691   6734 driver47c
SOCKET_NETWORK socket1692   6735 driver47d
SOCKET_NETWORK socket1693   6736 driver48a
SOCKET_NETWORK socket1694   6737 driver48b
SOCKET_NETWORK socket1695   6738 driver48c
SOCKET_NETWORK socket1696   6739 driver48d
SOCKET_NETWORK socket1697   6740 driver48a
SOCKET_NETWORK socket1698   6741 driver48b
SOCKET_NETWORK socket1699   6742 driver48c
SOCKET_NETWORK socket1700   6743 driver48d
SOCKET_NETWORK socket1701   6744 driver48a
SOCKET_NETWORK socket1702   6745 driver48b
SOCKET_NETWORK socket1703   6746 driver48c
SOCKET_NETWORK socket1704   6747 driver48d
SOCKET_NETWORK socket1705   6748 driver48a
SOCKET_NETWORK socket1706   6749 driver48b
SOCKET_NETWORK socket1707   6750 driver48c
SOCKET_NETWORK socket1708   6751 driver48d
SOCKET_NETWORK socket1709   6752 driver48a
SOCKET_NETWORK socket1710   6753 driver48b
SOCKET_NETWORK socket1711   6754 driver48c
SOCKET_NETWORK socket1712   6755 driver48d
SOCKET_NETWORK socket1713   6756 driver48a
SOCKET_NETWORK socket1714   6757 driver48b
SOCKET_NETWORK socket1715   6758 driver48c
SOCKET_NETWORK socket1716   6759 driver48d
SOCKET_NETWORK socket1717   6760 driver48a
SOCKET_NETWORK socket1718   6761 driver48b
SOCKET_NETWORK socket1719   6762 driver48c
SOCKET_NETWORK socket1720   6763 driver48d
SOCKET_NETWORK socket1721   6764 driver48a
SOCKET_NETWORK socket1722   6765 driver48b
SOCKET_NETWORK socket1723   6766 driver48c
SOCKET_NETWORK socket1724   6767 driver48d
SOCKET_NETWORK socket1725   6768 driver48a
SOCKET_NETWORK socket1726   6769 driver48b
SOCKET_NETWORK socket1727   6770 driver48c
SOCKET_NETWORK socket1728   6771 driver48d

#endif
/*---------------------------------------------------------------------------*/
OUTPUTNAME="regattaH"
CPU=32
#if 1
BEGIN_WAIT=5:00
RAMPUP=42:30
RUNTIME=120:00
RAMPDOWN_WAIT=5:00
RAMPDOWN=17:00
#else
BEGIN_WAIT=5:00
RAMPUP=10:00
RUNTIME=30:00
RAMPDOWN_WAIT=5:00
RAMPDOWN=17:00
#endif
INTERVAL=1:00 /* Interval to calculate mix from */
LOGIN_MAX_LOAD = 4
LOGIN_BEGIN = 0 /* skip login state if set to 1 */
NOBEGIN = 1
KEYSTROKE_PACKET_SIZE = 0
MAX_CONCURRENT_SPAWN = 10
SPAWN_COUNT = 4
MIN_PORT = 8088
MAX_PORT = 8089
/* User variables. Think, Emulex Delay, %desired, %min, %max */
#if 1 /* Testing */
NEWORDER = "12.02, 0, 0"
PAYMENT = "12.02, 0, 0, 43.02, 43.02, 43.02 "
ORDSTAT = "10.01, 0, 0, 4.02, 4.02, 4.02 "
DELIVERY = "05.02, 0, 0, 4.02, 4.02, 4.02 "
STOCKLEV = "05.02, 0, 0, 4.02, 4.02, 4.02 "
#elif 0 /* From rteparams.null */
NEWORDER = "12.25, 0.42, 0.38"
PAYMENT = "12.25, 0.19, 0.23, 43.2, 41.1, 45.3 "
ORDSTAT = "10.50, 0.39, 0.21, 4.1, 3.9, 4.3 "
DELIVERY = "05.5, 0.19, 0.15, 4.1, 3.9, 4.3 "
STOCKLEV = "05.5, 0.25, 0.18, 4.1, 3.9, 4.3 "
#elif 0 /* From Pookeepsie */
NEWORDER = "16.25, 0.42, 0.38"
PAYMENT = "16.25, 0.19, 0.23, 43.15, 43.15, 43.15 "
ORDSTAT = "14.50, 0.39, 0.21, 4.03, 4.03, 4.03 "
DELIVERY = "09.50, 0.19, 0.15, 4.03, 4.03, 4.03 "
STOCKLEV = "09.50, 0.25, 0.18, 4.03, 4.03, 4.03 "
#endif
/*---- Starting users on sockets ---------------------------------------------*/
#if MASTER_NUM1
START_RANGE client1a socket1 230 0-23
START_RANGE client1b socket2 240 23-47
```

```
START_RANGE client1c socket3 240 47-71
START_RANGE client1d socket4 230 71-94
START_RANGE client1e socket5 240 94-118
START_RANGE client1f socket6 240 118-142
START_RANGE client1g socket7 230 142-165
START_RANGE client1h socket8 240 165-189
START_RANGE client1i socket9 240 189-213
START_RANGE client1a socket10 230 213-236
START_RANGE client1b socket11 240 236-260
START_RANGE client1c socket12 240 260-284
START_RANGE client1d socket13 230 284-307
START_RANGE client1e socket14 240 307-331
START_RANGE client1f socket15 240 331-355
START_RANGE client1g socket16 230 355-378
START_RANGE client1h socket17 240 378-402
START_RANGE client1i socket18 240 402-426
START_RANGE client1a socket19 230 426-449
START_RANGE client1b socket20 240 449-473
START_RANGE client1c socket21 240 473-497
START_RANGE client1d socket22 240 497-521
START_RANGE client1e socket23 230 521-544
START_RANGE client1f socket24 240 544-568
START_RANGE client1g socket25 240 568-592
START_RANGE client1h socket26 230 592-615
START_RANGE client1i socket27 240 615-639
START_RANGE client1a socket28 240 639-663
START_RANGE client1b socket29 230 663-686
START_RANGE client1c socket30 240 686-710
START_RANGE client1d socket31 240 710-734
START_RANGE client1e socket32 230 734-757
START_RANGE client1f socket33 240 757-781
START_RANGE client1g socket34 240 781-805
START_RANGE client1h socket35 230 805-828
START_RANGE client1i socket36 240 828-852

START_RANGE client1j socket37 240 852-876
START_RANGE client1k socket38 230 876-899
START_RANGE client1l socket39 240 899-923
START_RANGE client1m socket40 240 923-947
START_RANGE client1n socket41 240 947-971
START_RANGE client1o socket42 230 971-994
START_RANGE client1p socket43 240 994-1018
START_RANGE client1q socket44 240 1018-1042
START_RANGE client1r socket45 230 1042-1065
START_RANGE client1j socket46 240 1065-1089
START_RANGE client1k socket47 240 1089-1113
START_RANGE client1l socket48 230 1113-1136
START_RANGE client1m socket49 240 1136-1160
START_RANGE client1n socket50 240 1160-1184
START_RANGE client1o socket51 230 1184-1207
START_RANGE client1p socket52 240 1207-1231
START_RANGE client1q socket53 240 1231-1255
START_RANGE client1r socket54 230 1255-1278
START_RANGE client1j socket55 240 1278-1302
START_RANGE client1k socket56 240 1302-1326
START_RANGE client1l socket57 230 1326-1349
START_RANGE client1m socket58 240 1349-1373
START_RANGE client1n socket59 240 1373-1397
START_RANGE client1o socket60 240 1397-1421
START_RANGE client1p socket61 230 1421-1444
START_RANGE client1q socket62 240 1444-1468
START_RANGE client1r socket63 240 1468-1492
START_RANGE client1j socket64 230 1492-1515
START_RANGE client1k socket65 240 1515-1539
START_RANGE client1l socket66 240 1539-1563
START_RANGE client1m socket67 230 1563-1586
START_RANGE client1n socket68 240 1586-1610
START_RANGE client1o socket69 240 1610-1634
START_RANGE client1p socket70 230 1634-1657
START_RANGE client1q socket71 240 1657-1681
START_RANGE client1r socket72 240 1681-1705

START_RANGE client2a socket73 230 1705-1728
START_RANGE client2b socket74 240 1728-1752
START_RANGE client2c socket75 240 1752-1776
START_RANGE client2d socket76 230 1776-1799
START_RANGE client2e socket77 240 1799-1823
START_RANGE client2f socket78 240 1823-1847
START_RANGE client2g socket79 240 1847-1871
START_RANGE client2h socket80 230 1871-1894
START_RANGE client2i socket81 240 1894-1918
START_RANGE client2a socket82 240 1918-1942
START_RANGE client2b socket83 230 1942-1965
START_RANGE client2c socket84 240 1965-1989
START_RANGE client2d socket85 240 1989-2013
START_RANGE client2e socket86 230 2013-2036
START_RANGE client2f socket87 240 2036-2060
START_RANGE client2g socket88 240 2060-2084
START_RANGE client2h socket89 230 2084-2107
START_RANGE client2i socket90 240 2107-2131
START_RANGE client2a socket91 240 2131-2155
START_RANGE client2b socket92 230 2155-2178
START_RANGE client2c socket93 240 2178-2202
START_RANGE client2d socket94 240 2202-2226
START_RANGE client2e socket95 230 2226-2249
START_RANGE client2f socket96 240 2249-2273
START_RANGE client2g socket97 240 2273-2297
START_RANGE client2h socket98 240 2297-2321
START_RANGE client2i socket99 230 2321-2344
START_RANGE client2a socket100 240 2344-2368
START_RANGE client2b socket101 240 2368-2392
START_RANGE client2c socket102 230 2392-2415
START_RANGE client2d socket103 240 2415-2439
START_RANGE client2e socket104 240 2439-2463
START_RANGE client2f socket105 230 2463-2486
START_RANGE client2g socket106 240 2486-2510
START_RANGE client2h socket107 240 2510-2534
START_RANGE client2i socket108 230 2534-2557

START_RANGE client2j socket109 240 2557-2581
START_RANGE client2k socket110 240 2581-2605
START_RANGE client2l socket111 230 2605-2628
START_RANGE client2m socket112 240 2628-2652
START_RANGE client2n socket113 240 2652-2676
START_RANGE client2o socket114 230 2676-2699
START_RANGE client2p socket115 240 2699-2723
START_RANGE client2q socket116 240 2723-2747
START_RANGE client2r socket117 240 2747-2771
START_RANGE client2j socket118 230 2771-2794
START_RANGE client2k socket119 240 2794-2818
START_RANGE client2l socket120 240 2818-2842
START_RANGE client2m socket121 230 2842-2865
START_RANGE client2n socket122 240 2865-2889
START_RANGE client2o socket123 240 2889-2913
START_RANGE client2p socket124 230 2913-2936
START_RANGE client2q socket125 240 2936-2960
START_RANGE client2r socket126 240 2960-2984
START_RANGE client2j socket127 230 2984-3007
START_RANGE client2k socket128 240 3007-3031
START_RANGE client2l socket129 240 3031-3055
START_RANGE client2m socket130 230 3055-3078
START_RANGE client2n socket131 240 3078-3102
START_RANGE client2o socket132 240 3102-3126
START_RANGE client2p socket133 230 3126-3149
START_RANGE client2q socket134 240 3149-3173
START_RANGE client2r socket135 240 3173-3197
START_RANGE client2j socket136 240 3197-3221
START_RANGE client2k socket137 230 3221-3244
START_RANGE client2l socket138 240 3244-3268
START_RANGE client2m socket139 240 3268-3292
START_RANGE client2n socket140 230 3292-3315
START_RANGE client2o socket141 240 3315-3339
START_RANGE client2p socket142 240 3339-3363
START_RANGE client2q socket143 230 3363-3386
START_RANGE client2r socket144 240 3386-3410

START_RANGE client3a socket145 240 3410-3434
START_RANGE client3b socket146 230 3434-3457
START_RANGE client3c socket147 240 3457-3481
START_RANGE client3d socket148 240 3481-3505
START_RANGE client3e socket149 230 3505-3528
START_RANGE client3f socket150 240 3528-3552
START_RANGE client3g socket151 240 3552-3576
START_RANGE client3h socket152 230 3576-3599
START_RANGE client3i socket153 240 3599-3623
START_RANGE client3a socket154 240 3623-3647
START_RANGE client3b socket155 240 3647-3671
START_RANGE client3c socket156 230 3671-3694
START_RANGE client3d socket157 240 3694-3718
START_RANGE client3e socket158 240 3718-3742
START_RANGE client3f socket159 230 3742-3765
START_RANGE client3g socket160 240 3765-3789
START_RANGE client3h socket161 240 3789-3813
START_RANGE client3i socket162 230 3813-3836
START_RANGE client3a socket163 240 3836-3860
START_RANGE client3b socket164 240 3860-3884
START_RANGE client3c socket165 230 3884-3907
START_RANGE client3d socket166 240 3907-3931
START_RANGE client3e socket167 240 3931-3955
START_RANGE client3f socket168 230 3955-3978
START_RANGE client3g socket169 240 3978-4002
START_RANGE client3h socket170 240 4002-4026
START_RANGE client3i socket171 230 4026-4049
START_RANGE client3a socket172 240 4049-4073
START_RANGE client3b socket173 240 4073-4097
START_RANGE client3c socket174 240 4097-4121
START_RANGE client3d socket175 230 4121-4144
START_RANGE client3e socket176 240 4144-4168
START_RANGE client3f socket177 240 4168-4192
START_RANGE client3g socket178 230 4192-4215
START_RANGE client3h socket179 240 4215-4239
START_RANGE client3i socket180 240 4239-4263

START_RANGE client3j socket181 230 4263-4286
START_RANGE client3k socket182 240 4286-4310
START_RANGE client3l socket183 240 4310-4334
START_RANGE client3m socket184 230 4334-4357
START_RANGE client3n socket185 240 4357-4381
START_RANGE client3o socket186 240 4381-4405
START_RANGE client3p socket187 230 4405-4428
START_RANGE client3q socket188 240 4428-4452
START_RANGE client3r socket189 240 4452-4476
START_RANGE client3j socket190 230 4476-4499
START_RANGE client3k socket191 240 4499-4523
START_RANGE client3l socket192 240 4523-4547
START_RANGE client3m socket193 240 4547-4571
START_RANGE client3n socket194 230 4571-4594
START_RANGE client3o socket195 240 4594-4618
```

```
START_RANGE client3p socket196 240 4618-4642
START_RANGE client3q socket197 230 4642-4665
START_RANGE client3r socket198 240 4665-4689
START_RANGE client3j socket199 240 4689-4713
START_RANGE client3k socket200 230 4713-4736
START_RANGE client3l socket201 240 4736-4760
START_RANGE client3m socket202 240 4760-4784
START_RANGE client3n socket203 230 4784-4807
START_RANGE client3o socket204 240 4807-4831
START_RANGE client3p socket205 240 4831-4855
START_RANGE client3q socket206 230 4855-4878
START_RANGE client3r socket207 240 4878-4902
START_RANGE client3j socket208 240 4902-4926
START_RANGE client3k socket209 230 4926-4949
START_RANGE client3l socket210 240 4949-4973
START_RANGE client3m socket211 240 4973-4997
START_RANGE client3n socket212 240 4997-5021
START_RANGE client3o socket213 230 5021-5044
START_RANGE client3p socket214 240 5044-5068
START_RANGE client3q socket215 240 5068-5092
START_RANGE client3r socket216 230 5092-5115

#elif MASTER_NUM2
START_RANGE client4a socket217 240 5115-5139
START_RANGE client4b socket218 240 5139-5163
START_RANGE client4c socket219 230 5163-5186
START_RANGE client4d socket220 240 5186-5210
START_RANGE client4e socket221 240 5210-5234
START_RANGE client4f socket222 230 5234-5257
START_RANGE client4g socket223 240 5257-5281
START_RANGE client4h socket224 240 5281-5305
START_RANGE client4i socket225 230 5305-5328
START_RANGE client4a socket226 240 5328-5352
START_RANGE client4b socket227 240 5352-5376
START_RANGE client4c socket228 230 5376-5399
START_RANGE client4d socket229 240 5399-5423
START_RANGE client4e socket230 240 5423-5447
START_RANGE client4f socket231 240 5447-5471
START_RANGE client4g socket232 230 5471-5494
START_RANGE client4h socket233 240 5494-5518
START_RANGE client4i socket234 240 5518-5542
START_RANGE client4a socket235 230 5542-5565
START_RANGE client4b socket236 240 5565-5589
START_RANGE client4c socket237 240 5589-5613
START_RANGE client4d socket238 230 5613-5636
START_RANGE client4e socket239 240 5636-5660
START_RANGE client4f socket240 240 5660-5684
START_RANGE client4g socket241 230 5684-5707
START_RANGE client4h socket242 240 5707-5731
START_RANGE client4i socket243 240 5731-5755
START_RANGE client4a socket244 230 5755-5778
START_RANGE client4b socket245 240 5778-5802
START_RANGE client4c socket246 240 5802-5826
START_RANGE client4d socket247 230 5826-5849
START_RANGE client4e socket248 240 5849-5873
START_RANGE client4f socket249 240 5873-5897
START_RANGE client4g socket250 240 5897-5921
START_RANGE client4h socket251 230 5921-5944
START_RANGE client4i socket252 240 5944-5968

START_RANGE client4j socket253 240 5968-5992
START_RANGE client4k socket254 230 5992-6015
START_RANGE client4l socket255 240 6015-6039
START_RANGE client4m socket256 240 6039-6063
START_RANGE client4n socket257 230 6063-6086
START_RANGE client4o socket258 240 6086-6110
START_RANGE client4p socket259 240 6110-6134
START_RANGE client4q socket260 230 6134-6157
START_RANGE client4r socket261 240 6157-6181
START_RANGE client4j socket262 240 6181-6205
START_RANGE client4k socket263 230 6205-6228
START_RANGE client4l socket264 240 6228-6252
START_RANGE client4m socket265 240 6252-6276
START_RANGE client4n socket266 230 6276-6299
START_RANGE client4o socket267 240 6299-6323
START_RANGE client4p socket268 240 6323-6347
START_RANGE client4q socket269 240 6347-6371
START_RANGE client4r socket270 230 6371-6394
START_RANGE client4j socket271 240 6394-6418
START_RANGE client4k socket272 240 6418-6442
START_RANGE client4l socket273 230 6442-6465
START_RANGE client4m socket274 240 6465-6489
START_RANGE client4n socket275 240 6489-6513
START_RANGE client4o socket276 230 6513-6536
START_RANGE client4p socket277 240 6536-6560
START_RANGE client4q socket278 240 6560-6584
START_RANGE client4r socket279 230 6584-6607
START_RANGE client4j socket280 240 6607-6631
START_RANGE client4k socket281 240 6631-6655
START_RANGE client4l socket282 230 6655-6678
START_RANGE client4m socket283 240 6678-6702
START_RANGE client4n socket284 240 6702-6726
START_RANGE client4o socket285 230 6726-6749
START_RANGE client4p socket286 240 6749-6773
START_RANGE client4q socket287 240 6773-6797
START_RANGE client4r socket288 240 6797-6821

START_RANGE client5a socket289 230 6821-6844
START_RANGE client5b socket290 240 6844-6868
START_RANGE client5c socket291 240 6868-6892
START_RANGE client5d socket292 230 6892-6915
START_RANGE client5e socket293 240 6915-6939
START_RANGE client5f socket294 240 6939-6963
START_RANGE client5g socket295 230 6963-6986
START_RANGE client5h socket296 240 6986-7010
START_RANGE client5i socket297 240 7010-7034
START_RANGE client5a socket298 230 7034-7057
START_RANGE client5b socket299 240 7057-7081
START_RANGE client5c socket300 240 7081-7105
START_RANGE client5d socket301 230 7105-7128
START_RANGE client5e socket302 240 7128-7152
START_RANGE client5f socket303 240 7152-7176
START_RANGE client5g socket304 230 7176-7199
START_RANGE client5h socket305 240 7199-7223
START_RANGE client5i socket306 240 7223-7247
START_RANGE client5a socket307 240 7247-7271
START_RANGE client5b socket308 230 7271-7294
START_RANGE client5c socket309 240 7294-7318
START_RANGE client5d socket310 240 7318-7342
START_RANGE client5e socket311 230 7342-7365
START_RANGE client5f socket312 240 7365-7389
START_RANGE client5g socket313 240 7389-7413
START_RANGE client5h socket314 230 7413-7436
START_RANGE client5i socket315 240 7436-7460
START_RANGE client5a socket316 240 7460-7484
START_RANGE client5b socket317 230 7484-7507
START_RANGE client5c socket318 240 7507-7531
START_RANGE client5d socket319 240 7531-7555
START_RANGE client5e socket320 230 7555-7578
START_RANGE client5f socket321 240 7578-7602
START_RANGE client5g socket322 240 7602-7626
START_RANGE client5h socket323 230 7626-7649
START_RANGE client5i socket324 240 7649-7673

START_RANGE client5j socket325 240 7673-7697
START_RANGE client5k socket326 240 7697-7721
START_RANGE client5l socket327 230 7721-7744
START_RANGE client5m socket328 240 7744-7768
START_RANGE client5n socket329 240 7768-7792
START_RANGE client5o socket330 230 7792-7815
START_RANGE client5p socket331 240 7815-7839
START_RANGE client5q socket332 240 7839-7863
START_RANGE client5r socket333 230 7863-7886
START_RANGE client5j socket334 240 7886-7910
START_RANGE client5k socket335 240 7910-7934
START_RANGE client5l socket336 230 7934-7957
START_RANGE client5m socket337 240 7957-7981
START_RANGE client5n socket338 240 7981-8005
START_RANGE client5o socket339 230 8005-8028
START_RANGE client5p socket340 240 8028-8052
START_RANGE client5q socket341 240 8052-8076
START_RANGE client5r socket342 230 8076-8099
START_RANGE client5j socket343 240 8099-8123
START_RANGE client5k socket344 240 8123-8147
START_RANGE client5l socket345 240 8147-8171
START_RANGE client5m socket346 230 8171-8194
START_RANGE client5n socket347 240 8194-8218
START_RANGE client5o socket348 240 8218-8242
START_RANGE client5p socket349 230 8242-8265
START_RANGE client5q socket350 240 8265-8289
START_RANGE client5r socket351 240 8289-8313
START_RANGE client5j socket352 230 8313-8336
START_RANGE client5k socket353 240 8336-8360
START_RANGE client5l socket354 240 8360-8384
START_RANGE client5m socket355 230 8384-8407
START_RANGE client5n socket356 240 8407-8431
START_RANGE client5o socket357 240 8431-8455
START_RANGE client5p socket358 230 8455-8478
START_RANGE client5q socket359 240 8478-8502
START_RANGE client5r socket360 240 8502-8526

START_RANGE client6a socket361 230 8526-8549
START_RANGE client6b socket362 240 8549-8573
START_RANGE client6c socket363 240 8573-8597
START_RANGE client6d socket364 240 8597-8621
START_RANGE client6e socket365 230 8621-8644
START_RANGE client6f socket366 240 8644-8668
START_RANGE client6g socket367 240 8668-8692
START_RANGE client6h socket368 230 8692-8715
START_RANGE client6i socket369 240 8715-8739
START_RANGE client6a socket370 240 8739-8763
START_RANGE client6b socket371 230 8763-8786
START_RANGE client6c socket372 240 8786-8810
START_RANGE client6d socket373 240 8810-8834
START_RANGE client6e socket374 230 8834-8857
START_RANGE client6f socket375 240 8857-8881
START_RANGE client6g socket376 240 8881-8905
START_RANGE client6h socket377 230 8905-8928
START_RANGE client6i socket378 240 8928-8952
START_RANGE client6a socket379 240 8952-8976
START_RANGE client6b socket380 230 8976-8999
START_RANGE client6c socket381 240 8999-9023
START_RANGE client6d socket382 240 9023-9047
START_RANGE client6e socket383 240 9047-9071
START_RANGE client6f socket384 230 9071-9094
START_RANGE client6g socket385 240 9094-9118
START_RANGE client6h socket386 240 9118-9142
START_RANGE client6i socket387 230 9142-9165
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START_RANGE client6a socket388 240 9165-9189
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START_RANGE client6c socket390 230 9213-9236
START_RANGE client6d socket391 240 9236-9260
START_RANGE client6e socket392 240 9260-9284
START_RANGE client6f socket393 230 9284-9307
START_RANGE client6g socket394 240 9307-9331
START_RANGE client6h socket395 240 9331-9355
START_RANGE client6i socket396 230 9355-9378

START_RANGE client6j socket397 240 9378-9402
START_RANGE client6k socket398 240 9402-9426
START_RANGE client6l socket399 230 9426-9449
START_RANGE client6m socket400 240 9449-9473
START_RANGE client6n socket401 240 9473-9497
START_RANGE client6o socket402 240 9497-9521
START_RANGE client6p socket403 230 9521-9544
START_RANGE client6q socket404 240 9544-9568
START_RANGE client6r socket405 240 9568-9592
START_RANGE client6j socket406 230 9592-9615
START_RANGE client6k socket407 240 9615-9639
START_RANGE client6l socket408 240 9639-9663
START_RANGE client6m socket409 230 9663-9686
START_RANGE client6n socket410 240 9686-9710
START_RANGE client6o socket411 240 9710-9734
START_RANGE client6p socket412 230 9734-9757
START_RANGE client6q socket413 240 9757-9781
START_RANGE client6r socket414 240 9781-9805
START_RANGE client6j socket415 230 9805-9828
START_RANGE client6k socket416 240 9828-9852
START_RANGE client6l socket417 240 9852-9876
START_RANGE client6m socket418 230 9876-9899
START_RANGE client6n socket419 240 9899-9923
START_RANGE client6o socket420 240 9923-9947
START_RANGE client6p socket421 240 9947-9971
START_RANGE client6q socket422 230 9971-9994
START_RANGE client6r socket423 240 9994-10018
START_RANGE client6j socket424 240 10018-10042
START_RANGE client6k socket425 230 10042-10065
START_RANGE client6l socket426 240 10065-10089
START_RANGE client6m socket427 240 10089-10113
START_RANGE client6n socket428 230 10113-10136
START_RANGE client6o socket429 240 10136-10160
START_RANGE client6p socket430 240 10160-10184
START_RANGE client6q socket431 230 10184-10207
START_RANGE client6r socket432 240 10207-10231

#elif MASTER_NUM3
START_RANGE client7a socket433 240 10231-10255
START_RANGE client7b socket434 230 10255-10278
START_RANGE client7c socket435 240 10278-10302
START_RANGE client7d socket436 240 10302-10326
START_RANGE client7e socket437 230 10326-10349
START_RANGE client7f socket438 240 10349-10373
START_RANGE client7g socket439 240 10373-10397
START_RANGE client7h socket440 240 10397-10421
START_RANGE client7i socket441 230 10421-10444
START_RANGE client7a socket442 240 10444-10468
START_RANGE client7b socket443 240 10468-10492
START_RANGE client7c socket444 230 10492-10515
START_RANGE client7d socket445 240 10515-10539
START_RANGE client7e socket446 240 10539-10563
START_RANGE client7f socket447 230 10563-10586
START_RANGE client7g socket448 240 10586-10610
START_RANGE client7h socket449 240 10610-10634
START_RANGE client7i socket450 230 10634-10657
START_RANGE client7a socket451 240 10657-10681
START_RANGE client7b socket452 240 10681-10705
START_RANGE client7c socket453 230 10705-10728
START_RANGE client7d socket454 240 10728-10752
START_RANGE client7e socket455 240 10752-10776
START_RANGE client7f socket456 230 10776-10799
START_RANGE client7g socket457 240 10799-10823
START_RANGE client7h socket458 240 10823-10847
START_RANGE client7i socket459 240 10847-10871
START_RANGE client7a socket460 230 10871-10894
START_RANGE client7b socket461 240 10894-10918
START_RANGE client7c socket462 240 10918-10942
START_RANGE client7d socket463 230 10942-10965
START_RANGE client7e socket464 240 10965-10989
START_RANGE client7f socket465 240 10989-11013
START_RANGE client7g socket466 230 11013-11036
START_RANGE client7h socket467 240 11036-11060
START_RANGE client7i socket468 240 11060-11084

START_RANGE client7j socket469 230 11084-11107
START_RANGE client7k socket470 240 11107-11131
START_RANGE client7l socket471 240 11131-11155
START_RANGE client7m socket472 230 11155-11178
START_RANGE client7n socket473 240 11178-11202
START_RANGE client7o socket474 240 11202-11226
START_RANGE client7p socket475 230 11226-11249
START_RANGE client7q socket476 240 11249-11273
START_RANGE client7r socket477 240 11273-11297
START_RANGE client7j socket478 240 11297-11321
START_RANGE client7k socket479 230 11321-11344
START_RANGE client7l socket480 240 11344-11368
START_RANGE client7m socket481 240 11368-11392
START_RANGE client7n socket482 230 11392-11415
START_RANGE client7o socket483 240 11415-11439
START_RANGE client7p socket484 240 11439-11463
START_RANGE client7q socket485 230 11463-11486
START_RANGE client7r socket486 240 11486-11510
START_RANGE client7j socket487 240 11510-11534
START_RANGE client7k socket488 230 11534-11557
START_RANGE client7l socket489 240 11557-11581
START_RANGE client7m socket490 240 11581-11605
START_RANGE client7n socket491 230 11605-11628
START_RANGE client7o socket492 240 11628-11652
START_RANGE client7p socket493 240 11652-11676
START_RANGE client7q socket494 230 11676-11699
START_RANGE client7r socket495 240 11699-11723
START_RANGE client7j socket496 240 11723-11747
START_RANGE client7k socket497 240 11747-11771
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START_RANGE client7m socket499 240 11794-11818
START_RANGE client7n socket500 240 11818-11842
START_RANGE client7o socket501 230 11842-11865
START_RANGE client7p socket502 240 11865-11889
START_RANGE client7q socket503 240 11889-11913
START_RANGE client7r socket504 230 11913-11936

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START_RANGE client8b socket506 240 11960-11984
START_RANGE client8c socket507 230 11984-12007
START_RANGE client8d socket508 240 12007-12031
START_RANGE client8e socket509 240 12031-12055
START_RANGE client8f socket510 230 12055-12078
START_RANGE client8g socket511 240 12078-12102
START_RANGE client8h socket512 240 12102-12126
START_RANGE client8i socket513 230 12126-12149
START_RANGE client8a socket514 240 12149-12173
START_RANGE client8b socket515 240 12173-12197
START_RANGE client8c socket516 240 12197-12221
START_RANGE client8d socket517 230 12221-12244
START_RANGE client8e socket518 240 12244-12268
START_RANGE client8f socket519 240 12268-12292
START_RANGE client8g socket520 230 12292-12315
START_RANGE client8h socket521 240 12315-12339
START_RANGE client8i socket522 240 12339-12363
START_RANGE client8a socket523 230 12363-12386
START_RANGE client8b socket524 240 12386-12410
START_RANGE client8c socket525 240 12410-12434
START_RANGE client8d socket526 230 12434-12457
START_RANGE client8e socket527 240 12457-12481
START_RANGE client8f socket528 240 12481-12505
START_RANGE client8g socket529 230 12505-12528
START_RANGE client8h socket530 240 12528-12552
START_RANGE client8i socket531 240 12552-12576
START_RANGE client8a socket532 230 12576-12599
START_RANGE client8b socket533 240 12599-12623
START_RANGE client8c socket534 240 12623-12647
START_RANGE client8d socket535 240 12647-12671
START_RANGE client8e socket536 230 12671-12694
START_RANGE client8f socket537 240 12694-12718
START_RANGE client8g socket538 240 12718-12742
START_RANGE client8h socket539 230 12742-12765
START_RANGE client8i socket540 240 12765-12789

START_RANGE client8j socket541 240 12789-12813
START_RANGE client8k socket542 230 12813-12836
START_RANGE client8l socket543 240 12836-12860
START_RANGE client8m socket544 240 12860-12884
START_RANGE client8n socket545 230 12884-12907
START_RANGE client8o socket546 240 12907-12931
START_RANGE client8p socket547 240 12931-12955
START_RANGE client8q socket548 230 12955-12978
START_RANGE client8r socket549 240 12978-13002
START_RANGE client8j socket550 240 13002-13026
START_RANGE client8k socket551 230 13026-13049
START_RANGE client8l socket552 240 13049-13073
START_RANGE client8m socket553 240 13073-13097
START_RANGE client8n socket554 240 13097-13121
START_RANGE client8o socket555 230 13121-13144
START_RANGE client8p socket556 240 13144-13168
START_RANGE client8q socket557 240 13168-13192
START_RANGE client8r socket558 230 13192-13215
START_RANGE client8j socket559 240 13215-13239
START_RANGE client8k socket560 240 13239-13263
START_RANGE client8l socket561 230 13263-13286
START_RANGE client8m socket562 240 13286-13310
START_RANGE client8n socket563 240 13310-13334
START_RANGE client8o socket564 230 13334-13357
START_RANGE client8p socket565 240 13357-13381
START_RANGE client8q socket566 240 13381-13405
START_RANGE client8r socket567 230 13405-13428
START_RANGE client8j socket568 240 13428-13452
START_RANGE client8k socket569 240 13452-13476
START_RANGE client8l socket570 230 13476-13499
START_RANGE client8m socket571 240 13499-13523
START_RANGE client8n socket572 240 13523-13547
START_RANGE client8o socket573 240 13547-13571
START_RANGE client8p socket574 230 13571-13594
START_RANGE client8q socket575 240 13594-13618
START_RANGE client8r socket576 240 13618-13642

START_RANGE client9a socket577 230 13642-13665
START_RANGE client9b socket578 240 13665-13689
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START_RANGE client9c socket579 240 13689-13713
START_RANGE client9d socket580 230 13713-13736
START_RANGE client9e socket581 240 13736-13760
START_RANGE client9f socket582 240 13760-13784
START_RANGE client9g socket583 230 13784-13807
START_RANGE client9h socket584 240 13807-13831
START_RANGE client9i socket585 240 13831-13855
START_RANGE client9a socket586 230 13855-13878
START_RANGE client9b socket587 240 13878-13902
START_RANGE client9c socket588 240 13902-13926
START_RANGE client9d socket589 230 13926-13949
START_RANGE client9e socket590 240 13949-13973
START_RANGE client9f socket591 240 13973-13997
START_RANGE client9g socket592 240 13997-14021
START_RANGE client9h socket593 230 14021-14044
START_RANGE client9i socket594 240 14044-14068
START_RANGE client9a socket595 240 14068-14092
START_RANGE client9b socket596 230 14092-14115
START_RANGE client9c socket597 240 14115-14139
START_RANGE client9d socket598 240 14139-14163
START_RANGE client9e socket599 230 14163-14186
START_RANGE client9f socket600 240 14186-14210
START_RANGE client9g socket601 240 14210-14234
START_RANGE client9h socket602 230 14234-14257
START_RANGE client9i socket603 240 14257-14281
START_RANGE client9a socket604 240 14281-14305
START_RANGE client9b socket605 230 14305-14328
START_RANGE client9c socket606 240 14328-14352
START_RANGE client9d socket607 240 14352-14376
START_RANGE client9e socket608 230 14376-14399
START_RANGE client9f socket609 240 14399-14423
START_RANGE client9g socket610 240 14423-14447
START_RANGE client9h socket611 240 14447-14471
START_RANGE client9i socket612 230 14471-14494

START_RANGE client9j socket613 240 14494-14518
START_RANGE client9k socket614 240 14518-14542
START_RANGE client9l socket615 230 14542-14565
START_RANGE client9m socket616 240 14565-14589
START_RANGE client9n socket617 240 14589-14613
START_RANGE client9o socket618 230 14613-14636
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START_RANGE client9q socket620 240 14660-14684
START_RANGE client9r socket621 230 14684-14707
START_RANGE client9j socket622 240 14707-14731
START_RANGE client9k socket623 240 14731-14755
START_RANGE client9l socket624 230 14755-14778
START_RANGE client9m socket625 240 14778-14802
START_RANGE client9n socket626 240 14802-14826
START_RANGE client9o socket627 230 14826-14849
START_RANGE client9p socket628 240 14849-14873
START_RANGE client9q socket629 240 14873-14897
START_RANGE client9r socket630 240 14897-14921
START_RANGE client9j socket631 230 14921-14944
START_RANGE client9k socket632 240 14944-14968
START_RANGE client9l socket633 240 14968-14992
START_RANGE client9m socket634 230 14992-15015
START_RANGE client9n socket635 240 15015-15039
START_RANGE client9o socket636 240 15039-15063
START_RANGE client9p socket637 230 15063-15086
START_RANGE client9q socket638 240 15086-15110
START_RANGE client9r socket639 240 15110-15134
START_RANGE client9j socket640 230 15134-15157
START_RANGE client9k socket641 240 15157-15181
START_RANGE client9l socket642 240 15181-15205
START_RANGE client9m socket643 230 15205-15228
START_RANGE client9n socket644 240 15228-15252
START_RANGE client9o socket645 240 15252-15276
START_RANGE client9p socket646 230 15276-15299
START_RANGE client9q socket647 240 15299-15323
START_RANGE client9r socket648 240 15323-15347

#elif MASTER_NUM4
START_RANGE client10a socket649 240 15347-15371
START_RANGE client10b socket650 230 15371-15394
START_RANGE client10c socket651 240 15394-15418
START_RANGE client10d socket652 240 15418-15442
START_RANGE client10e socket653 230 15442-15465
START_RANGE client10f socket654 240 15465-15489
START_RANGE client10g socket655 240 15489-15513
START_RANGE client10h socket656 230 15513-15536
START_RANGE client10i socket657 240 15536-15560
START_RANGE client10a socket658 240 15560-15584
START_RANGE client10b socket659 230 15584-15607
START_RANGE client10c socket660 240 15607-15631
START_RANGE client10d socket661 240 15631-15655
START_RANGE client10e socket662 230 15655-15678
START_RANGE client10f socket663 240 15678-15702
START_RANGE client10g socket664 240 15702-15726
START_RANGE client10h socket665 230 15726-15749
START_RANGE client10i socket666 240 15749-15773
START_RANGE client10a socket667 240 15773-15797
START_RANGE client10b socket668 240 15797-15821
START_RANGE client10c socket669 230 15821-15844
START_RANGE client10d socket670 240 15844-15868
START_RANGE client10e socket671 240 15868-15892
START_RANGE client10f socket672 230 15892-15915
START_RANGE client10g socket673 240 15915-15939
START_RANGE client10h socket674 240 15939-15963
START_RANGE client10i socket675 230 15963-15986
START_RANGE client10a socket676 240 15986-16010
START_RANGE client10b socket677 240 16010-16034
START_RANGE client10c socket678 230 16034-16057
START_RANGE client10d socket679 240 16057-16081
START_RANGE client10e socket680 240 16081-16105
START_RANGE client10f socket681 230 16105-16128
START_RANGE client10g socket682 240 16128-16152
START_RANGE client10h socket683 240 16152-16176
START_RANGE client10i socket684 230 16176-16199

START_RANGE client10j socket685 240 16199-16223
START_RANGE client10k socket686 240 16223-16247
START_RANGE client10l socket687 240 16247-16271
START_RANGE client10m socket688 230 16271-16294
START_RANGE client10n socket689 240 16294-16318
START_RANGE client10o socket690 240 16318-16342
START_RANGE client10p socket691 230 16342-16365
START_RANGE client10q socket692 240 16365-16389
START_RANGE client10r socket693 240 16389-16413
START_RANGE client10j socket694 230 16413-16436
START_RANGE client10k socket695 240 16436-16460
START_RANGE client10l socket696 240 16460-16484
START_RANGE client10m socket697 230 16484-16507
START_RANGE client10n socket698 240 16507-16531
START_RANGE client10o socket699 240 16531-16555
START_RANGE client10p socket700 230 16555-16578
START_RANGE client10q socket701 240 16578-16602
START_RANGE client10r socket702 240 16602-16626
START_RANGE client10j socket703 230 16626-16649
START_RANGE client10k socket704 240 16649-16673
START_RANGE client10l socket705 240 16673-16697
START_RANGE client10m socket706 240 16697-16721
START_RANGE client10n socket707 230 16721-16744
START_RANGE client10o socket708 240 16744-16768
START_RANGE client10p socket709 240 16768-16792
START_RANGE client10q socket710 230 16792-16815
START_RANGE client10r socket711 240 16815-16839
START_RANGE client10j socket712 240 16839-16863
START_RANGE client10k socket713 230 16863-16886
START_RANGE client10l socket714 240 16886-16910
START_RANGE client10m socket715 240 16910-16934
START_RANGE client10n socket716 230 16934-16957
START_RANGE client10o socket717 240 16957-16981
START_RANGE client10p socket718 240 16981-17005
START_RANGE client10q socket719 230 17005-17028
START_RANGE client10r socket720 240 17028-17052

START_RANGE client11a socket721 240 17052-17076
START_RANGE client11b socket722 230 17076-17099
START_RANGE client11c socket723 240 17099-17123
START_RANGE client11d socket724 240 17123-17147
START_RANGE client11e socket725 240 17147-17171
START_RANGE client11f socket726 230 17171-17194
START_RANGE client11g socket727 240 17194-17218
START_RANGE client11h socket728 240 17218-17242
START_RANGE client11i socket729 230 17242-17265
START_RANGE client11a socket730 240 17265-17289
START_RANGE client11b socket731 240 17289-17313
START_RANGE client11c socket732 230 17313-17336
START_RANGE client11d socket733 240 17336-17360
START_RANGE client11e socket734 240 17360-17384
START_RANGE client11f socket735 230 17384-17407
START_RANGE client11g socket736 240 17407-17431
START_RANGE client11h socket737 240 17431-17455
START_RANGE client11i socket738 230 17455-17478
START_RANGE client11a socket739 240 17478-17502
START_RANGE client11b socket740 240 17502-17526
START_RANGE client11c socket741 230 17526-17549
START_RANGE client11d socket742 240 17549-17573
START_RANGE client11e socket743 240 17573-17597
START_RANGE client11f socket744 240 17597-17621
START_RANGE client11g socket745 230 17621-17644
START_RANGE client11h socket746 240 17644-17668
START_RANGE client11i socket747 240 17668-17692
START_RANGE client11a socket748 230 17692-17715
START_RANGE client11b socket749 240 17715-17739
START_RANGE client11c socket750 240 17739-17763
START_RANGE client11d socket751 230 17763-17786
START_RANGE client11e socket752 240 17786-17810
START_RANGE client11f socket753 240 17810-17834
START_RANGE client11g socket754 230 17834-17857
START_RANGE client11h socket755 240 17857-17881
START_RANGE client11i socket756 240 17881-17905

START_RANGE client11j socket757 230 17905-17928
START_RANGE client11k socket758 240 17928-17952
START_RANGE client11l socket759 240 17952-17976
START_RANGE client11m socket760 230 17976-17999
START_RANGE client11n socket761 240 17999-18023
START_RANGE client11o socket762 240 18023-18047
START_RANGE client11p socket763 240 18047-18071
START_RANGE client11q socket764 230 18071-18094
START_RANGE client11r socket765 240 18094-18118
START_RANGE client11j socket766 240 18118-18142
START_RANGE client11k socket767 230 18142-18165
START_RANGE client11l socket768 240 18165-18189
START_RANGE client11m socket769 240 18189-18213
START_RANGE client11n socket770 230 18213-18236
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START_RANGE client11o socket771 240 18236-18260
START_RANGE client11p socket772 240 18260-18284
START_RANGE client11q socket773 230 18284-18307
START_RANGE client11r socket774 240 18307-18331
START_RANGE client11j socket775 240 18331-18355
START_RANGE client11k socket776 230 18355-18378
START_RANGE client11l socket777 240 18378-18402
START_RANGE client11m socket778 240 18402-18426
START_RANGE client11n socket779 230 18426-18449
START_RANGE client11o socket780 240 18449-18473
START_RANGE client11p socket781 240 18473-18497
START_RANGE client11q socket782 240 18497-18521
START_RANGE client11r socket783 230 18521-18544
START_RANGE client11j socket784 240 18544-18568
START_RANGE client11k socket785 240 18568-18592
START_RANGE client11l socket786 230 18592-18615
START_RANGE client11m socket787 240 18615-18639
START_RANGE client11n socket788 240 18639-18663
START_RANGE client11o socket789 230 18663-18686
START_RANGE client11p socket790 240 18686-18710
START_RANGE client11q socket791 240 18710-18734
START_RANGE client11r socket792 230 18734-18757

START_RANGE client12a socket793 240 18757-18781
START_RANGE client12b socket794 240 18781-18805
START_RANGE client12c socket795 230 18805-18828
START_RANGE client12d socket796 240 18828-18852
START_RANGE client12e socket797 240 18852-18876
START_RANGE client12f socket798 230 18876-18899
START_RANGE client12g socket799 240 18899-18923
START_RANGE client12h socket800 240 18923-18947
START_RANGE client12i socket801 240 18947-18971
START_RANGE client12a socket802 230 18971-18994
START_RANGE client12b socket803 240 18994-19018
START_RANGE client12c socket804 240 19018-19042
START_RANGE client12d socket805 230 19042-19065
START_RANGE client12e socket806 240 19065-19089
START_RANGE client12f socket807 240 19089-19113
START_RANGE client12g socket808 230 19113-19136
START_RANGE client12h socket809 240 19136-19160
START_RANGE client12i socket810 240 19160-19184
START_RANGE client12a socket811 230 19184-19207
START_RANGE client12b socket812 240 19207-19231
START_RANGE client12c socket813 240 19231-19255
START_RANGE client12d socket814 230 19255-19278
START_RANGE client12e socket815 240 19278-19302
START_RANGE client12f socket816 240 19302-19326
START_RANGE client12g socket817 230 19326-19349
START_RANGE client12h socket818 240 19349-19373
START_RANGE client12i socket819 240 19373-19397
START_RANGE client12a socket820 240 19397-19421
START_RANGE client12b socket821 230 19421-19444
START_RANGE client12c socket822 240 19444-19468
START_RANGE client12d socket823 240 19468-19492
START_RANGE client12e socket824 230 19492-19515
START_RANGE client12f socket825 240 19515-19539
START_RANGE client12g socket826 240 19539-19563
START_RANGE client12h socket827 230 19563-19586
START_RANGE client12i socket828 240 19586-19610

START_RANGE client12j socket829 240 19610-19634
START_RANGE client12k socket830 230 19634-19657
START_RANGE client12l socket831 240 19657-19681
START_RANGE client12m socket832 240 19681-19705
START_RANGE client12n socket833 230 19705-19728
START_RANGE client12o socket834 240 19728-19752
START_RANGE client12p socket835 240 19752-19776
START_RANGE client12q socket836 230 19776-19799
START_RANGE client12r socket837 240 19799-19823
START_RANGE client12j socket838 240 19823-19847
START_RANGE client12k socket839 240 19847-19871
START_RANGE client12l socket840 230 19871-19894
START_RANGE client12m socket841 240 19894-19918
START_RANGE client12n socket842 240 19918-19942
START_RANGE client12o socket843 230 19942-19965
START_RANGE client12p socket844 240 19965-19989
START_RANGE client12q socket845 240 19989-20013
START_RANGE client12r socket846 230 20013-20036
START_RANGE client12j socket847 240 20036-20060
START_RANGE client12k socket848 240 20060-20084
START_RANGE client12l socket849 230 20084-20107
START_RANGE client12m socket850 240 20107-20131
START_RANGE client12n socket851 240 20131-20155
START_RANGE client12o socket852 230 20155-20178
START_RANGE client12p socket853 240 20178-20202
START_RANGE client12q socket854 240 20202-20226
START_RANGE client12r socket855 230 20226-20249
START_RANGE client12j socket856 240 20249-20273
START_RANGE client12k socket857 240 20273-20297
START_RANGE client12l socket858 240 20297-20321
START_RANGE client12m socket859 230 20321-20344
START_RANGE client12n socket860 240 20344-20368
START_RANGE client12o socket861 240 20368-20392
START_RANGE client12p socket862 230 20392-20415
START_RANGE client12q socket863 240 20415-20439
START_RANGE client12r socket864 240 20439-20463

#elif MASTER_NUM5
START_RANGE client13a socket865 230 20463-20486
START_RANGE client13b socket866 240 20486-20510
START_RANGE client13c socket867 240 20510-20534
START_RANGE client13d socket868 230 20534-20557
START_RANGE client13e socket869 240 20557-20581
START_RANGE client13f socket870 240 20581-20605
START_RANGE client13g socket871 230 20605-20628
START_RANGE client13h socket872 240 20628-20652
START_RANGE client13i socket873 240 20652-20676
START_RANGE client13a socket874 230 20676-20699
START_RANGE client13b socket875 240 20699-20723
START_RANGE client13c socket876 240 20723-20747
START_RANGE client13d socket877 240 20747-20771
START_RANGE client13e socket878 230 20771-20794
START_RANGE client13f socket879 240 20794-20818
START_RANGE client13g socket880 240 20818-20842
START_RANGE client13h socket881 230 20842-20865
START_RANGE client13i socket882 240 20865-20889
START_RANGE client13a socket883 240 20889-20913
START_RANGE client13b socket884 230 20913-20936
START_RANGE client13c socket885 240 20936-20960
START_RANGE client13d socket886 240 20960-20984
START_RANGE client13e socket887 230 20984-21007
START_RANGE client13f socket888 240 21007-21031
START_RANGE client13g socket889 240 21031-21055
START_RANGE client13h socket890 230 21055-21078
START_RANGE client13i socket891 240 21078-21102
START_RANGE client13a socket892 240 21102-21126
START_RANGE client13b socket893 230 21126-21149
START_RANGE client13c socket894 240 21149-21173
START_RANGE client13d socket895 240 21173-21197
START_RANGE client13e socket896 240 21197-21221
START_RANGE client13f socket897 230 21221-21244
START_RANGE client13g socket898 240 21244-21268
START_RANGE client13h socket899 240 21268-21292
START_RANGE client13i socket900 230 21292-21315

START_RANGE client13j socket901 240 21315-21339
START_RANGE client13k socket902 240 21339-21363
START_RANGE client13l socket903 230 21363-21386
START_RANGE client13m socket904 240 21386-21410
START_RANGE client13n socket905 240 21410-21434
START_RANGE client13o socket906 230 21434-21457
START_RANGE client13p socket907 240 21457-21481
START_RANGE client13q socket908 240 21481-21505
START_RANGE client13r socket909 230 21505-21528
START_RANGE client13j socket910 240 21528-21552
START_RANGE client13k socket911 240 21552-21576
START_RANGE client13l socket912 230 21576-21599
START_RANGE client13m socket913 240 21599-21623
START_RANGE client13n socket914 240 21623-21647
START_RANGE client13o socket915 240 21647-21671
START_RANGE client13p socket916 230 21671-21694
START_RANGE client13q socket917 240 21694-21718
START_RANGE client13r socket918 240 21718-21742
START_RANGE client13j socket919 230 21742-21765
START_RANGE client13k socket920 240 21765-21789
START_RANGE client13l socket921 240 21789-21813
START_RANGE client13m socket922 230 21813-21836
START_RANGE client13n socket923 240 21836-21860
START_RANGE client13o socket924 240 21860-21884
START_RANGE client13p socket925 230 21884-21907
START_RANGE client13q socket926 240 21907-21931
START_RANGE client13r socket927 240 21931-21955
START_RANGE client13j socket928 230 21955-21978
START_RANGE client13k socket929 240 21978-22002
START_RANGE client13l socket930 240 22002-22026
START_RANGE client13m socket931 230 22026-22049
START_RANGE client13n socket932 240 22049-22073
START_RANGE client13o socket933 240 22073-22097
START_RANGE client13p socket934 240 22097-22121
START_RANGE client13q socket935 230 22121-22144
START_RANGE client13r socket936 240 22144-22168

START_RANGE client14a socket937 240 22168-22192
START_RANGE client14b socket938 230 22192-22215
START_RANGE client14c socket939 240 22215-22239
START_RANGE client14d socket940 240 22239-22263
START_RANGE client14e socket941 230 22263-22286
START_RANGE client14f socket942 240 22286-22310
START_RANGE client14g socket943 240 22310-22334
START_RANGE client14h socket944 230 22334-22357
START_RANGE client14i socket945 240 22357-22381
START_RANGE client14a socket946 240 22381-22405
START_RANGE client14b socket947 230 22405-22428
START_RANGE client14c socket948 240 22428-22452
START_RANGE client14d socket949 240 22452-22476
START_RANGE client14e socket950 230 22476-22499
START_RANGE client14f socket951 240 22499-22523
START_RANGE client14g socket952 240 22523-22547
START_RANGE client14h socket953 240 22547-22571
START_RANGE client14i socket954 230 22571-22594
START_RANGE client14a socket955 240 22594-22618
START_RANGE client14b socket956 240 22618-22642
START_RANGE client14c socket957 230 22642-22665
START_RANGE client14d socket958 240 22665-22689
START_RANGE client14e socket959 240 22689-22713
START_RANGE client14f socket960 230 22713-22736
START_RANGE client14g socket961 240 22736-22760
START_RANGE client14h socket962 240 22760-22784
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START_RANGE client14i socket963 230 22784-22807
START_RANGE client14a socket964 240 22807-22831
START_RANGE client14b socket965 240 22831-22855
START_RANGE client14c socket966 230 22855-22878
START_RANGE client14d socket967 240 22878-22902
START_RANGE client14e socket968 240 22902-22926
START_RANGE client14f socket969 230 22926-22949
START_RANGE client14g socket970 240 22949-22973
START_RANGE client14h socket971 240 22973-22997
START_RANGE client14i socket972 240 22997-23021

START_RANGE client14j socket973 230 23021-23044
START_RANGE client14k socket974 240 23044-23068
START_RANGE client14l socket975 240 23068-23092
START_RANGE client14m socket976 230 23092-23115
START_RANGE client14n socket977 240 23115-23139
START_RANGE client14o socket978 240 23139-23163
START_RANGE client14p socket979 230 23163-23186
START_RANGE client14q socket980 240 23186-23210
START_RANGE client14r socket981 240 23210-23234
START_RANGE client14j socket982 230 23234-23257
START_RANGE client14k socket983 240 23257-23281
START_RANGE client14l socket984 240 23281-23305
START_RANGE client14m socket985 230 23305-23328
START_RANGE client14n socket986 240 23328-23352
START_RANGE client14o socket987 240 23352-23376
START_RANGE client14p socket988 230 23376-23399
START_RANGE client14q socket989 240 23399-23423
START_RANGE client14r socket990 240 23423-23447
START_RANGE client14j socket991 240 23447-23471
START_RANGE client14k socket992 230 23471-23494
START_RANGE client14l socket993 240 23494-23518
START_RANGE client14m socket994 240 23518-23542
START_RANGE client14n socket995 230 23542-23565
START_RANGE client14o socket996 240 23565-23589
START_RANGE client14p socket997 240 23589-23613
START_RANGE client14q socket998 230 23613-23636
START_RANGE client14r socket999 240 23636-23660
START_RANGE client14j socket1000 240 23660-23684
START_RANGE client14k socket1001 230 23684-23707
START_RANGE client14l socket1002 240 23707-23731
START_RANGE client14m socket1003 240 23731-23755
START_RANGE client14n socket1004 230 23755-23778
START_RANGE client14o socket1005 240 23778-23802
START_RANGE client14p socket1006 240 23802-23826
START_RANGE client14q socket1007 230 23826-23849
START_RANGE client14r socket1008 240 23849-23873

START_RANGE client15a socket1009 240 23873-23897
START_RANGE client15b socket1010 240 23897-23921
START_RANGE client15c socket1011 230 23921-23944
START_RANGE client15d socket1012 240 23944-23968
START_RANGE client15e socket1013 240 23968-23992
START_RANGE client15f socket1014 230 23992-24015
START_RANGE client15g socket1015 240 24015-24039
START_RANGE client15h socket1016 240 24039-24063
START_RANGE client15i socket1017 230 24063-24086
START_RANGE client15a socket1018 240 24086-24110
START_RANGE client15b socket1019 240 24110-24134
START_RANGE client15c socket1020 230 24134-24157
START_RANGE client15d socket1021 240 24157-24181
START_RANGE client15e socket1022 240 24181-24205
START_RANGE client15f socket1023 230 24205-24228
START_RANGE client15g socket1024 240 24228-24252
START_RANGE client15h socket1025 240 24252-24276
START_RANGE client15i socket1026 230 24276-24299
START_RANGE client15a socket1027 240 24299-24323
START_RANGE client15b socket1028 240 24323-24347
START_RANGE client15c socket1029 240 24347-24371
START_RANGE client15d socket1030 230 24371-24394
START_RANGE client15e socket1031 240 24394-24418
START_RANGE client15f socket1032 240 24418-24442
START_RANGE client15g socket1033 230 24442-24465
START_RANGE client15h socket1034 240 24465-24489
START_RANGE client15i socket1035 240 24489-24513
START_RANGE client15a socket1036 230 24513-24536
START_RANGE client15b socket1037 240 24536-24560
START_RANGE client15c socket1038 240 24560-24584
START_RANGE client15d socket1039 230 24584-24607
START_RANGE client15e socket1040 240 24607-24631
START_RANGE client15f socket1041 240 24631-24655
START_RANGE client15g socket1042 230 24655-24678
START_RANGE client15h socket1043 240 24678-24702
START_RANGE client15i socket1044 240 24702-24726

START_RANGE client15j socket1045 230 24726-24749
START_RANGE client15k socket1046 240 24749-24773
START_RANGE client15l socket1047 240 24773-24797
START_RANGE client15m socket1048 240 24797-24821
START_RANGE client15n socket1049 230 24821-24844
START_RANGE client15o socket1050 240 24844-24868
START_RANGE client15p socket1051 240 24868-24892
START_RANGE client15q socket1052 230 24892-24915
START_RANGE client15r socket1053 240 24915-24939
START_RANGE client15j socket1054 240 24939-24963
START_RANGE client15k socket1055 230 24963-24986
START_RANGE client15l socket1056 240 24986-25010
START_RANGE client15m socket1057 240 25010-25034
START_RANGE client15n socket1058 230 25034-25057
START_RANGE client15o socket1059 240 25057-25081
START_RANGE client15p socket1060 240 25081-25105
START_RANGE client15q socket1061 230 25105-25128
START_RANGE client15r socket1062 240 25128-25152
START_RANGE client15j socket1063 240 25152-25176
START_RANGE client15k socket1064 230 25176-25199
START_RANGE client15l socket1065 240 25199-25223
START_RANGE client15m socket1066 240 25223-25247
START_RANGE client15n socket1067 240 25247-25271
START_RANGE client15o socket1068 230 25271-25294
START_RANGE client15p socket1069 240 25294-25318
START_RANGE client15q socket1070 240 25318-25342
START_RANGE client15r socket1071 230 25342-25365
START_RANGE client15j socket1072 240 25365-25389
START_RANGE client15k socket1073 240 25389-25413
START_RANGE client15l socket1074 230 25413-25436
START_RANGE client15m socket1075 240 25436-25460
START_RANGE client15n socket1076 240 25460-25484
START_RANGE client15o socket1077 230 25484-25507
START_RANGE client15p socket1078 240 25507-25531
START_RANGE client15q socket1079 240 25531-25555
START_RANGE client15r socket1080 230 25555-25578

#elif MASTER_NUM6
START_RANGE client16a socket1081 240 25578-25602
START_RANGE client16b socket1082 240 25602-25626
START_RANGE client16c socket1083 230 25626-25649
START_RANGE client16d socket1084 240 25649-25673
START_RANGE client16e socket1085 240 25673-25697
START_RANGE client16f socket1086 240 25697-25721
START_RANGE client16g socket1087 230 25721-25744
START_RANGE client16h socket1088 240 25744-25768
START_RANGE client16i socket1089 240 25768-25792
START_RANGE client16a socket1090 230 25792-25815
START_RANGE client16b socket1091 240 25815-25839
START_RANGE client16c socket1092 240 25839-25863
START_RANGE client16d socket1093 230 25863-25886
START_RANGE client16e socket1094 240 25886-25910
START_RANGE client16f socket1095 240 25910-25934
START_RANGE client16g socket1096 230 25934-25957
START_RANGE client16h socket1097 240 25957-25981
START_RANGE client16i socket1098 240 25981-26005
START_RANGE client16a socket1099 230 26005-26028
START_RANGE client16b socket1100 240 26028-26052
START_RANGE client16c socket1101 240 26052-26076
START_RANGE client16d socket1102 230 26076-26099
START_RANGE client16e socket1103 240 26099-26123
START_RANGE client16f socket1104 240 26123-26147
START_RANGE client16g socket1105 240 26147-26171
START_RANGE client16h socket1106 230 26171-26194
START_RANGE client16i socket1107 240 26194-26218
START_RANGE client16a socket1108 240 26218-26242
START_RANGE client16b socket1109 230 26242-26265
START_RANGE client16c socket1110 240 26265-26289
START_RANGE client16d socket1111 240 26289-26313
START_RANGE client16e socket1112 230 26313-26336
START_RANGE client16f socket1113 240 26336-26360
START_RANGE client16g socket1114 240 26360-26384
START_RANGE client16h socket1115 230 26384-26407
START_RANGE client16i socket1116 240 26407-26431

START_RANGE client16j socket1117 240 26431-26455
START_RANGE client16k socket1118 230 26455-26478
START_RANGE client16l socket1119 240 26478-26502
START_RANGE client16m socket1120 240 26502-26526
START_RANGE client16n socket1121 230 26526-26549
START_RANGE client16o socket1122 240 26549-26573
START_RANGE client16p socket1123 240 26573-26597
START_RANGE client16q socket1124 240 26597-26621
START_RANGE client16r socket1125 230 26621-26644
START_RANGE client16j socket1126 240 26644-26668
START_RANGE client16k socket1127 240 26668-26692
START_RANGE client16l socket1128 230 26692-26715
START_RANGE client16m socket1129 240 26715-26739
START_RANGE client16n socket1130 240 26739-26763
START_RANGE client16o socket1131 230 26763-26786
START_RANGE client16p socket1132 240 26786-26810
START_RANGE client16q socket1133 240 26810-26834
START_RANGE client16r socket1134 230 26834-26857
START_RANGE client16j socket1135 240 26857-26881
START_RANGE client16k socket1136 240 26881-26905
START_RANGE client16l socket1137 230 26905-26928
START_RANGE client16m socket1138 240 26928-26952
START_RANGE client16n socket1139 240 26952-26976
START_RANGE client16o socket1140 230 26976-26999
START_RANGE client16p socket1141 240 26999-27023
START_RANGE client16q socket1142 240 27023-27047
START_RANGE client16r socket1143 240 27047-27071
START_RANGE client16j socket1144 230 27071-27094
START_RANGE client16k socket1145 240 27094-27118
START_RANGE client16l socket1146 240 27118-27142
START_RANGE client16m socket1147 230 27142-27165
START_RANGE client16n socket1148 240 27165-27189
START_RANGE client16o socket1149 240 27189-27213
START_RANGE client16p socket1150 230 27213-27236
START_RANGE client16q socket1151 240 27236-27260
START_RANGE client16r socket1152 240 27260-27284

START_RANGE client17a socket1153 230 27284-27307
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START_RANGE client17b socket1154 240 27307-27331
START_RANGE client17c socket1155 240 27331-27355
START_RANGE client17d socket1156 230 27355-27378
START_RANGE client17e socket1157 240 27378-27402
START_RANGE client17f socket1158 240 27402-27426
START_RANGE client17g socket1159 230 27426-27449
START_RANGE client17h socket1160 240 27449-27473
START_RANGE client17i socket1161 240 27473-27497
START_RANGE client17a socket1162 240 27497-27521
START_RANGE client17b socket1163 230 27521-27544
START_RANGE client17c socket1164 240 27544-27568
START_RANGE client17d socket1165 240 27568-27592
START_RANGE client17e socket1166 230 27592-27615
START_RANGE client17f socket1167 240 27615-27639
START_RANGE client17g socket1168 240 27639-27663
START_RANGE client17h socket1169 230 27663-27686
START_RANGE client17i socket1170 240 27686-27710
START_RANGE client17a socket1171 240 27710-27734
START_RANGE client17b socket1172 230 27734-27757
START_RANGE client17c socket1173 240 27757-27781
START_RANGE client17d socket1174 240 27781-27805
START_RANGE client17e socket1175 230 27805-27828
START_RANGE client17f socket1176 240 27828-27852
START_RANGE client17g socket1177 240 27852-27876
START_RANGE client17h socket1178 230 27876-27899
START_RANGE client17i socket1179 240 27899-27923
START_RANGE client17a socket1180 240 27923-27947
START_RANGE client17b socket1181 240 27947-27971
START_RANGE client17c socket1182 230 27971-27994
START_RANGE client17d socket1183 240 27994-28018
START_RANGE client17e socket1184 240 28018-28042
START_RANGE client17f socket1185 230 28042-28065
START_RANGE client17g socket1186 240 28065-28089
START_RANGE client17h socket1187 240 28089-28113
START_RANGE client17i socket1188 230 28113-28136

START_RANGE client17j socket1189 240 28136-28160
START_RANGE client17k socket1190 240 28160-28184
START_RANGE client17l socket1191 230 28184-28207
START_RANGE client17m socket1192 240 28207-28231
START_RANGE client17n socket1193 240 28231-28255
START_RANGE client17o socket1194 230 28255-28278
START_RANGE client17p socket1195 240 28278-28302
START_RANGE client17q socket1196 240 28302-28326
START_RANGE client17r socket1197 230 28326-28349
START_RANGE client17j socket1198 240 28349-28373
START_RANGE client17k socket1199 240 28373-28397
START_RANGE client17l socket1200 240 28397-28421
START_RANGE client17m socket1201 230 28421-28444
START_RANGE client17n socket1202 240 28444-28468
START_RANGE client17o socket1203 240 28468-28492
START_RANGE client17p socket1204 230 28492-28515
START_RANGE client17q socket1205 240 28515-28539
START_RANGE client17r socket1206 240 28539-28563
START_RANGE client17j socket1207 230 28563-28586
START_RANGE client17k socket1208 240 28586-28610
START_RANGE client17l socket1209 240 28610-28634
START_RANGE client17m socket1210 230 28634-28657
START_RANGE client17n socket1211 240 28657-28681
START_RANGE client17o socket1212 240 28681-28705
START_RANGE client17p socket1213 230 28705-28728
START_RANGE client17q socket1214 240 28728-28752
START_RANGE client17r socket1215 240 28752-28776
START_RANGE client17j socket1216 230 28776-28799
START_RANGE client17k socket1217 240 28799-28823
START_RANGE client17l socket1218 240 28823-28847
START_RANGE client17m socket1219 240 28847-28871
START_RANGE client17n socket1220 230 28871-28894
START_RANGE client17o socket1221 240 28894-28918
START_RANGE client17p socket1222 240 28918-28942
START_RANGE client17q socket1223 230 28942-28965
START_RANGE client17r socket1224 240 28965-28989

START_RANGE client18a socket1225 240 28989-29013
START_RANGE client18b socket1226 230 29013-29036
START_RANGE client18c socket1227 240 29036-29060
START_RANGE client18d socket1228 240 29060-29084
START_RANGE client18e socket1229 230 29084-29107
START_RANGE client18f socket1230 240 29107-29131
START_RANGE client18g socket1231 240 29131-29155
START_RANGE client18h socket1232 230 29155-29178
START_RANGE client18i socket1233 240 29178-29202
START_RANGE client18a socket1234 240 29202-29226
START_RANGE client18b socket1235 230 29226-29249
START_RANGE client18c socket1236 240 29249-29273
START_RANGE client18d socket1237 240 29273-29297
START_RANGE client18e socket1238 240 29297-29321
START_RANGE client18f socket1239 230 29321-29344
START_RANGE client18g socket1240 240 29344-29368
START_RANGE client18h socket1241 240 29368-29392
START_RANGE client18i socket1242 230 29392-29415
START_RANGE client18a socket1243 240 29415-29439
START_RANGE client18b socket1244 240 29439-29463
START_RANGE client18c socket1245 230 29463-29486
START_RANGE client18d socket1246 240 29486-29510
START_RANGE client18e socket1247 240 29510-29534
START_RANGE client18f socket1248 230 29534-29557
START_RANGE client18g socket1249 240 29557-29581
START_RANGE client18h socket1250 240 29581-29605
START_RANGE client18i socket1251 230 29605-29628
START_RANGE client18a socket1252 240 29628-29652
START_RANGE client18b socket1253 240 29652-29676
START_RANGE client18c socket1254 230 29676-29699
START_RANGE client18d socket1255 240 29699-29723
START_RANGE client18e socket1256 240 29723-29747
START_RANGE client18f socket1257 240 29747-29771
START_RANGE client18g socket1258 230 29771-29794
START_RANGE client18h socket1259 240 29794-29818
START_RANGE client18i socket1260 240 29818-29842

START_RANGE client18j socket1261 230 29842-29865
START_RANGE client18k socket1262 240 29865-29889
START_RANGE client18l socket1263 240 29889-29913
START_RANGE client18m socket1264 230 29913-29936
START_RANGE client18n socket1265 240 29936-29960
START_RANGE client18o socket1266 240 29960-29984
START_RANGE client18p socket1267 230 29984-30007
START_RANGE client18q socket1268 240 30007-30031
START_RANGE client18r socket1269 240 30031-30055
START_RANGE client18j socket1270 230 30055-30078
START_RANGE client18k socket1271 240 30078-30102
START_RANGE client18l socket1272 240 30102-30126
START_RANGE client18m socket1273 230 30126-30149
START_RANGE client18n socket1274 240 30149-30173
START_RANGE client18o socket1275 240 30173-30197
START_RANGE client18p socket1276 240 30197-30221
START_RANGE client18q socket1277 230 30221-30244
START_RANGE client18r socket1278 240 30244-30268
START_RANGE client18j socket1279 240 30268-30292
START_RANGE client18k socket1280 230 30292-30315
START_RANGE client18l socket1281 240 30315-30339
START_RANGE client18m socket1282 240 30339-30363
START_RANGE client18n socket1283 230 30363-30386
START_RANGE client18o socket1284 240 30386-30410
START_RANGE client18p socket1285 240 30410-30434
START_RANGE client18q socket1286 230 30434-30457
START_RANGE client18r socket1287 240 30457-30481
START_RANGE client18j socket1288 240 30481-30505
START_RANGE client18k socket1289 230 30505-30528
START_RANGE client18l socket1290 240 30528-30552
START_RANGE client18m socket1291 240 30552-30576
START_RANGE client18n socket1292 230 30576-30599
START_RANGE client18o socket1293 240 30599-30623
START_RANGE client18p socket1294 240 30623-30647
START_RANGE client18q socket1295 240 30647-30671
START_RANGE client18r socket1296 230 30671-30694

#elif MASTER_NUM7
START_RANGE client19a socket1297 240 30694-30718
START_RANGE client19b socket1298 240 30718-30742
START_RANGE client19c socket1299 230 30742-30765
START_RANGE client19d socket1300 240 30765-30789
START_RANGE client19e socket1301 240 30789-30813
START_RANGE client19f socket1302 230 30813-30836
START_RANGE client19g socket1303 240 30836-30860
START_RANGE client19h socket1304 240 30860-30884
START_RANGE client19i socket1305 230 30884-30907
START_RANGE client19a socket1306 240 30907-30931
START_RANGE client19b socket1307 240 30931-30955
START_RANGE client19c socket1308 230 30955-30978
START_RANGE client19d socket1309 240 30978-31002
START_RANGE client19e socket1310 240 31002-31026
START_RANGE client19f socket1311 230 31026-31049
START_RANGE client19g socket1312 240 31049-31073
START_RANGE client19h socket1313 240 31073-31097
START_RANGE client19i socket1314 240 31097-31121
START_RANGE client19a socket1315 230 31121-31144
START_RANGE client19b socket1316 240 31144-31168
START_RANGE client19c socket1317 240 31168-31192
START_RANGE client19d socket1318 230 31192-31215
START_RANGE client19e socket1319 240 31215-31239
START_RANGE client19f socket1320 240 31239-31263
START_RANGE client19g socket1321 230 31263-31286
START_RANGE client19h socket1322 240 31286-31310
START_RANGE client19i socket1323 240 31310-31334
START_RANGE client19a socket1324 230 31334-31357
START_RANGE client19b socket1325 240 31357-31381
START_RANGE client19c socket1326 240 31381-31405
START_RANGE client19d socket1327 230 31405-31428
START_RANGE client19e socket1328 240 31428-31452
START_RANGE client19f socket1329 240 31452-31476
START_RANGE client19g socket1330 230 31476-31499
START_RANGE client19h socket1331 240 31499-31523
START_RANGE client19i socket1332 240 31523-31547

START_RANGE client19j socket1333 240 31547-31571
START_RANGE client19k socket1334 230 31571-31594
START_RANGE client19l socket1335 240 31594-31618
START_RANGE client19m socket1336 240 31618-31642
START_RANGE client19n socket1337 230 31642-31665
START_RANGE client19o socket1338 240 31665-31689
START_RANGE client19p socket1339 240 31689-31713
START_RANGE client19q socket1340 230 31713-31736
START_RANGE client19r socket1341 240 31736-31760
START_RANGE client19j socket1342 240 31760-31784
START_RANGE client19k socket1343 230 31784-31807
START_RANGE client19l socket1344 240 31807-31831
START_RANGE client19m socket1345 240 31831-31855
```

```
START_RANGE client19n socket1346 230 31855-31878
START_RANGE client19o socket1347 240 31878-31902
START_RANGE client19p socket1348 240 31902-31926
START_RANGE client19q socket1349 230 31926-31949
START_RANGE client19r socket1350 240 31949-31973
START_RANGE client19j socket1351 240 31973-31997
START_RANGE client19k socket1352 240 31997-32021
START_RANGE client19l socket1353 230 32021-32044
START_RANGE client19m socket1354 240 32044-32068
START_RANGE client19n socket1355 240 32068-32092
START_RANGE client19o socket1356 230 32092-32115
START_RANGE client19p socket1357 240 32115-32139
START_RANGE client19q socket1358 240 32139-32163
START_RANGE client19r socket1359 230 32163-32186
START_RANGE client19j socket1360 240 32186-32210
START_RANGE client19k socket1361 240 32210-32234
START_RANGE client19l socket1362 230 32234-32257
START_RANGE client19m socket1363 240 32257-32281
START_RANGE client19n socket1364 240 32281-32305
START_RANGE client19o socket1365 230 32305-32328
START_RANGE client19p socket1366 240 32328-32352
START_RANGE client19q socket1367 240 32352-32376
START_RANGE client19r socket1368 240 32376-32400
#endif
/*-----------------------------------------------------------------------*/
#define TES_FLAG_TRACE 0x00000010
#define TES_FLAG_KEYSTROKE_TIME 0x00000200
#define TES_FLAG_LOCAL_LOG 0x00000400
#define TES_FLAG_LOCAL_TRACE 0x00000800
#define TES_FLAG_LOCAL_IPRINT 0x00004000
#if 0
/* SETFLAG ALL TES_FLAG_TRACE */
SETFLAG ALL TES_FLAG_LOCAL_TRACE
SETFLAG ALL TES_FLAG_LOCAL_IPRINT
#endif
#if 0
SETFLAG client1a telnet 1 TES_FLAG_KEYSTROKE_TIME
#endif
```

## D.2 user_master.C

```
/*****************************************************************************/
/* user_master.C                                  Audit: 05/30/96 */
/*****************************************************************************/

static char *rcsid="$Id: user_master.C,v 1.1 1999/02/22 06:31:05 channui Exp $";

#include <iostream.h>
#include <stdio.h>
#include <string.h>
#include <stdlib.h>
#include <unistd.h>
#define _H_CUR01
#include <cur00.h>
#undef _H_CUR01
extern "C" {
#include "data/cur01.h"
int wrefresh (WINDOW *);
int wclrtoeol(WINDOW *);
int setupterm(char*,FILE*,int*);
int nodelay(int);
int keypad(int);
int wgetch(WINDOW *);
}
#include "data/rte.h"
#include "data/Stats.h"
#include "data/misc.h"
#include "user_tpcc.h"

struct header_s {
   int slave;
   int num;
   int type;
   int num_timestamps;
   int user_data_length;
   int data_type;
};


char *get_variable(char *name);
int get_variable(char *name, int *number);
int send_global_data(void);
int make_ratios (double *buffer);
extern int ramp_up_complete;
extern int interval_start_time, interval_stop_time;
extern "C" int strcasecmp(char *s1, char *s2);
extern "C" int strncasecmp(char *s1, char *s2, int n);

struct UserSpawnData {
   int Warehouse;
   int District;
};

/* user_master.C */
int user_statistics_print(void);
// int user_spawn(int *length, char *buffer);
int user_spawn(int min, int max, int number, int *length, char *buffer);
int user_finished(int length, char *buffer);

extern SlaveStatus slave_status[MAX_SLAVES];

extern Stats status[MAX_TRAN_TYPE][MAX_TIMES];
extern WINDOW *statistics_win;
extern UserGlobal *shmglobal;

/* Transaction mix parameters */
double ratio_desired[6], ratio_min[6], ratio_max[6], ratio_range[6];
char *ratio_names[] = { "RTE", "NEWORDER", "PAYMENT", "ORDSTAT", "DELIVERY",
                        "STOCKLEV", NULL };
char *Status_Names[] = {"Menu", "Keying", "Response", "Think"};


char *transaction_names[] = { "RTE", "New Order", "Payment", "Order Stat",
                        "Delivery", "Stock Level", NULL };

static int current_status = 2, status_needs_refresh = 1;

int user_statistics_print(void) {
   int i;
   static int count = 0;
   double ratios[6];
   if (status_needs_refresh) {
                count = 0;
                status_needs_refresh = 0;
                wmove   (statistics_win, 0, 0);
                wprintw (statistics_win, "%11s %8s %8s %8s %8s %8s %6s %6s %6s",
                                Status_Names[current_status], "90%", "Avg", "Min", "Max",
                                "Samples", "Ratio", "Mix", "Think");
   }
   make_ratios(ratios);


   for (i = 1; i <= 5; i++) {
                /* The reason we do this is because calculating the percentiles
                  is expensive */
                if (count % 10 == 0) {
                   wmove   (statistics_win, i, 0);
                   wprintw (statistics_win, "%11s %8.2f",
                                   transaction_names[i], status[i][current_status].ninety()/1000.0);
                   count = 0;
                }
                wmove   (statistics_win, i, 21);
                wprintw (statistics_win, "%8.2f %8.2f %8.2f %8d %6.2f %6.2f %6.2f",
                                status[i][current_status].average()/1000.0,
                                status[i][current_status].min()/1000.0,
                                status[i][current_status].max()/1000.0,
                                status[i][current_status].samples(),
                                ratios[i], shmglobal->chances[i],
                                status[i][3].average()/1000.0);
   }
   wmove   (statistics_win, 7, 0);

   extern int runtime_counts[MAX_TRAN_TYPE];
   extern int begin_time, ramp_up, run_time;
   int start = interval_start_time;
   int stop  = interval_stop_time;
   double interval = ((double)(stop-start) / (1000*60));
   double samples = status[1][2].samples();
   if (interval <= 0 || samples <= 0) {
                wprintw (statistics_win, "TPM-C: %7s / ", "-------");
   } else {
                wprintw (statistics_win, "TPM-C: %7.2f / ", samples/interval);
   }
   samples = runtime_counts[1];
   if (samples > 0) {
                start = begin_time+((ramp_up>=0)?ramp_up:0);
                if (run_time > 0 && stop > begin_time + ramp_up + run_time) {
                   stop = begin_time + ramp_up + run_time;
                }
                interval = (double)(stop - start)/(1000.0*60.0);
                wprintw (statistics_win, "%7.2f", samples/interval);
   } else {
                wprintw (statistics_win, "-------");
   }

   count++;
   return RTE_OK;
}

extern int login_begin;
int login_max_load;

#ifdef WHSEARRAYDBG
int outofboundwarn;
#endif
extern int min_warehouse;
extern int max_warehouse;

const int MAX_WAREHOUSES=100000;
/* All of this 10 stuff is district size.  Should be a constant.
   Maybe fix that later */
int num_warehouses = -1;
int warehouses[MAX_WAREHOUSES*10];
int user_spawn(int min, int max, int number, int *length, char *buffer) {
```

```
//int user_spawn(int number, int *length, char *buffer) {
   int i, min_index;
   int adj_wh = num_warehouses;                                    // adjusted warehouse number
   UserSpawnData *ptr = (UserSpawnData *)buffer;
   *length = sizeof(*ptr);

//    min_index = 0;
//    for (i = 1; i < (num_warehouses)*10 && i < MAX_WAREHOUSES*10; i++) {
//
//  if both min and max are zero, running START, otherwise running
//                START_RANGE.  Must also determine what the ending warehouse number
//                will be for said range
//

                if (min ==0 && max == 0) {
                                min++;
                                min_index =  0 ;
                } else {
                                adj_wh = max;   // inclusive range of wh-s
                                min = min * 10;
                                min_index = min;
                }
   for (i = min ; i < (adj_wh)*10 && i < ((MAX_WAREHOUSES+min_warehouse)*10); i++) {
                if (warehouses[i - (min_warehouse*10)] < warehouses[min_index - (min_warehouse*10)]) {
                    min_index = i;
                }
   }

   ptr->Warehouse = min_index / 10 + 1;
   ptr->District  = min_index % 10 + 1;
#ifdef WHSEARRAYDBG
   if ((min_index - (min_warehouse*10) < 0) || (min_index - (min_warehouse*10) >=
(MAX_WAREHOUSES*10))) {
    if (outofboundwarn) {
                iprint (IPRINT_INFO, "(spawn) Out of range warehouse number %d, (%d-%d (start) = %d
(rel. num)\n",
                                min_index, min_index, min_warehouse, min_index - (min_warehouse*10));
                outofboundwarn=0;
    }
   }
#endif

   warehouses[min_index - (min_warehouse*10)]++;
/*    iprint (IPRINT_INFO, "Driver for Warehouse %d, District %d started.  warehouses[%d]++ = %d\n",
         ptr->Warehouse, ptr->District, min_index, warehouses[min_index - (min_warehouse*10)]); */
   return RTE_OK;
}

int user_finished(int length, char *buffer) {
   UserSpawnData *ptr = (UserSpawnData *)buffer;
   int temp = (ptr->Warehouse-1)*10+ptr->District-1;

#ifdef WHSEARRAYDBG
   if ((temp - min_warehouse*10 < 0) || (temp - min_warehouse*10 >= MAX_WAREHOUSES*10)) {
    if (outofboundwarn) {
                iprint (IPRINT_INFO, "(finish) Out of range warehouse number %d, (%d-%d (start) = %d
(rel. num)\n",
                                min_index, min_index, min_warehouse, min_index - (min_warehouse*10));
                outofboundwarn=0;
    }
   }
#endif

   warehouses[temp - (min_warehouse*10)]--;
/*    iprint (IPRINT_INFO, "Driver for Warehouse %d, District %d died.  warehouses[%d]-- = %d\n",
         ptr->Warehouse, ptr->District, temp, warehouses[temp - (min_warehouse*10)]); */
   return RTE_OK;
}


double limit(double min, double max, double val) {
   if (val < min)
                return min;
   if (val > max)
                return max;
   return val;
}


int make_ratios (double *buffer) {
   int neword   = status[NEWORDER][0].samples();
   int payment  = status[PAYMENT] [0].samples();
   int ordstat  = status[ORDSTAT] [0].samples();
   int delivery = status[DELIVERY][0].samples();
   int stocklev = status[STOCKLEV][0].samples();
   int total    = neword + payment + ordstat + delivery + stocklev;
   int i;

   if (total == 0) {
                buffer[NEWORDER] = 100.0;
                for (i = 2; i < 6; i++) {
                    buffer[i] = ratio_desired[i];
                    buffer[NEWORDER] -= buffer[i];
                }
                return 0;
   }

   buffer[PAYMENT]  = (double)payment  / (double)total * 100.0;
   buffer[ORDSTAT]  = (double)ordstat  / (double)total * 100.0;
   buffer[DELIVERY] = (double)delivery / (double)total * 100.0;
   buffer[STOCKLEV] = (double)stocklev / (double)total * 100.0;
   buffer[NEWORDER] = 100.0- buffer[PAYMENT] - buffer[ORDSTAT] -
                                                    buffer[DELIVERY] - buffer[STOCKLEV];

   return total;
}

int user_global_update(int *length, char *buffer) {
   UserGlobal *shmglobal = (UserGlobal *)buffer;
   static double last[6];
   static last_test_state = 0;
   static int users_last=-1;
   double ratios[6];
   double current[6];
   int i, different = 0;
   int desired = 0;
   int host_busy, all_zero;

   *length = sizeof(*shmglobal);

   make_ratios(ratios);

   /* Calculate ratios we want for next time */
   /* Note: we just keep on with the desired values until ramp-up is complete
         this at least starts us out without any humps or spikes in the
                graph */
   if (ramp_up_complete) {
                current[NEWORDER] = 100.0;
                for (i = 2; i < 6; i++) {
                    if (ratio_desired[i] > ratios[i]) {
                                current[i] = ratio_max[i];
                    } else {
                                current[i] = 2*ratio_desired[i] - ratios[i];
                                if (current[i] < ratio_min[i])
                                    current[i] = ratio_min[i];
                    }
                    current[NEWORDER] -= current[i];
                }
   } else {
                for (i = 1; i < 6; i++) {
                    current[i] = ratio_desired[i];
                }
   }

   /* Add up all the users */
   /* This needs to be changed to be more transparent */
   shmglobal->total_users = 0;
   for (i = 0; i < MAX_SLAVES; i++) {
                shmglobal->total_users += slave_status[i].active;
                desired              += slave_status[i].desired;
   }
   /* Count up number of warehouses we WANT to have */
   if (num_warehouses < 0) {
                num_warehouses = (desired-1)/10+1;
   }
   shmglobal->max_warehouses = num_warehouses;

   host_busy = 0;
   all_zero = 1;
   for (i = 1; i <= 5; i++) {
                if (status[i][current_status].average() != 0) {
                    all_zero = 0;
                }
                if ( status[i][current_status].average()/1000.0 > login_max_load ) {
                    host_busy = 1;
                }
   }
   if (shmglobal->host_busy && all_zero) {
                host_busy = 1;
   }

   if (host_busy != shmglobal->host_busy) {
                shmglobal->host_busy = host_busy;
                different = 1;
   }

   for (i = 2; i < 6; i++) {
                if (current[i] != last[i])
                    different = 1;
   }

   if (last_test_state != shmglobal->test_state) {
                different = 1;
                last_test_state = shmglobal->test_state;
   }

   // Don't send if it's the same as last time
   if ( !different && shmglobal->total_users == users_last ) {
                return RTE_ERROR;
   }

   users_last = shmglobal->total_users;
   for (i = 1; i < 6; i++) {
                shmglobal->chances[i] = last[i] = current[i];
   }

   return RTE_OK;
}
```

```
int user_isbusy() {
    return shmglobal->host_busy;
}


int parse_array(char *string, int max, int *buffer) {
    int i, rc;
    char *ptr;
    char *temp = strdup(string);
    ptr = strtok(temp, ",");
    for (i = 0; ptr && i < max; i++) {
                rc = sscanf(ptr, "%d", &buffer[i]);
                if (rc < 1) {
                    free(temp);
                    return i;
                }
                ptr = strtok(NULL, ",");
    }
    free(temp);
    return i;
}

int parse_array(char *string, int max, double *buffer) {
    int i, rc;
    char *ptr;
    char *temp = strdup(string);
    ptr = strtok(temp, ",");
    for (i = 0; ptr && i < max; i++) {
                rc = sscanf(ptr, "%lf", &buffer[i]);
                if (rc < 1) {
                    free(temp);
                    return i;
                }
                ptr = strtok(NULL, ",");
    }
    free(temp);
    return i;
}


int user_init() {
    double  dbuffer[32];
    int   rc, i;
    char *ptr;

    if (get_variable("KEYSTROKE_SLEEP", &shmglobal->keystroke_sleep) != RTE_OK) {
                shmglobal->keystroke_sleep = 0;
    }
    if (get_variable("LOGIN_TIMEOUT", &shmglobal->login_timeout) != RTE_OK) {
                shmglobal->login_timeout = 120; /* 2 minutes */
    }
    if (get_variable("KEYSTROKE_PACKET_SIZE", &shmglobal->keystroke_packet_size) != RTE_OK) {
                shmglobal->keystroke_packet_size = 0;
    }
    shmglobal->login_timeout *= 1000;
    if (get_variable("LOGIN_MAX_LOAD", &login_max_load) != RTE_OK) {
                login_max_load = 2;
    }
    if (get_variable("WAREHOUSES", &num_warehouses) != RTE_OK) {
                num_warehouses = -1;
    }
    if (get_variable("LASTC", &shmglobal->lastc) != RTE_OK) {
                shmglobal->lastc = 193; /* 2 minutes */
    }
    iprint(IPRINT_INFO, "Login Timeout = %s\n",
                  mstoa_withfrac(shmglobal->login_timeout, 0));
    iprint(IPRINT_INFO, "Keystroke Sleep = %s\n",
                  mstoa_withfrac(shmglobal->keystroke_sleep*1000, 0));
    iprint(IPRINT_INFO, "Keystroke Packet Size= %d\n", shmglobal->keystroke_packet_size);
    if (num_warehouses >= 0) {
                iprint(IPRINT_INFO, "Fixed Warehouses to = %d\n", num_warehouses);
    }

    if (!(ptr = get_variable("NEWORDER"))) {
                iprint_error ("Error. NEWORDER variable not found\n");
                exit (1);
    }
    if (parse_array(ptr, 3, dbuffer)!=3) {
                iprint_error ("Error. NEWORDER should be think, emulex_menu, emulex_response");
                exit (1);
    }
    shmglobal->think          [NEWORDER] = dbuffer[0];
    shmglobal->emulex_menu    [NEWORDER] = dbuffer[1];
    shmglobal->emulex_response[NEWORDER] = dbuffer[2];
    shmglobal->test_state = 0;

    for (i = 2; i < 6; i++) {
                if (!(ptr = get_variable(ratio_names[i])) ||
                    (parse_array(ptr, 6, dbuffer)!=6)) {
                    iprint(__FILE__, __LINE__, IPRINT_ERROR,
                          "Error. %s should be think, emulex_menu, emulex_response, desired, min, max",
                                  ratio_names[i]);
                    exit (1);
                }
                shmglobal->think[i]           = dbuffer[0];
                shmglobal->emulex_menu[i]     = dbuffer[1];
                shmglobal->emulex_response[i] = dbuffer[2];
                ratio_desired[i]              = dbuffer[3];
                ratio_min[i]                  = dbuffer[4];
                ratio_max[i]                  = dbuffer[5];
                ratio_range[i]                = ratio_max[i]-ratio_min[i];
    }

    for (i=0; i < (MAX_WAREHOUSES*10); i++) {
      warehouses[i] = 0;
    }

#ifdef WHSEARRAYDBG
    outofboundwarn=1;
#endif

    return RTE_OK;
}

int user_extra_data(header_s *header) {
    int i;
    int num_timestamps;

    if (header->data_type != RTE_ITEM_KEYSTROKE_TIMES)
                return RTE_OK;
    int *times = (int *)((char *)header+sizeof(struct header_s));
    num_timestamps = header->user_data_length / 4 - 1;

    iprint (IPRINT_TRACE, "Keystroke times = ");
    for (i = 0 ; i < num_timestamps; i++) {
                iprint (IPRINT_TRACE, "%d ", times[i]);
    }
    iprint (IPRINT_TRACE, "\n", times[i]);

    return RTE_OK;
}

int user_process_command(char *command) {
    char buffer[256], *ptr;
    int i, found, len;
    strncpy (buffer, command, 256);
    ptr = strtok (buffer, " \t");
    found = 0;
    printf ("user_process_command('%s')\n",ptr);
    if (!strcasecmp (ptr, "pause")) {
                shmglobal->test_state = 1;
    } else if (!strcasecmp (ptr, "warmup")) {
                shmglobal->test_state = 2;
    } else if (!strcasecmp (ptr, "notest")) {
                shmglobal->test_state = 0;
    } else if (!strcasecmp (ptr, "login_max_load?")) {
                iprint (IPRINT_WARNING, "Current LOGIN_MAX_LOAD = %d\n", login_max_load);
    } else if (!strncasecmp (command, "login_max_load=",15)) {
                login_max_load=atoi(command+15);
                iprint (IPRINT_WARNING, "Set LOGIN_MAX_LOAD = %d\n", login_max_load);
    } else if (!strcasecmp (ptr, "display")) {
       while (ptr && (ptr = strtok(NULL, " \t"))) {
          if (*ptr == '\0')
             continue;
          for (i = 0; i < 5; i++) {
             len = min(strlen(Status_Names[i]), strlen(ptr));
             if (!strncasecmp (ptr, Status_Names[i], len)) {
                status_needs_refresh = found = 1;
                current_status = i;
                return RTE_OK;
             }
          }
          iprint (IPRINT_WARNING, "Unknown type to display: %s\n", ptr);
       }
    } else {
                iprint (IPRINT_WARNING, "Unknown Command: '%s'\n", command);
                return RTE_ERROR;
    }
    return RTE_OK;
}

int transaction_process () {
    return RTE_OK;
}

int user_begin() {
    return RTE_OK;
}

/*
void user_make_header(char *buffer) {
    int i;
    struct user_data_header *data = (struct user_data_header *)buffer;
}
*/
```

## D.3 user_slave.C

```
 /*****************************************************************************/
/* user_slave.C                                  Audit: 05/30/96 */
/*****************************************************************************/

static char *rcsid="$Id: user_slave.C,v 1.1 1999/02/22 06:31:06 channui Exp $";
```

```
/*****************************************************************************/
/***                TPCC FILE FOR ALL USERS                          ***/
/*****************************************************************************/
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <string.h>
#include <sys/time.h>
#include "rte_slave.h"
#include "user_tpcc.h"

/* This MUST match the corresponding one in client's inout.h file! */
#define TRIGGER "\021"
//#define NOSLEEP
// Increased EXPECT_TIMEOUT from 600000 - oz 10/20/97
#define EXPECT_TIMEOUT 6000000
#define KEYWAIT_FUDGE  5000

extern SHM_Slave *shm;
extern TableEntrySlave *shmentry;
extern DriverStatus    *status;
extern echo_trace(char *);
extern echo_trace();
extern char *expect_save;

const char *SQL_TPERRNO_MESSAGE = "tperrno";
const char *SQL_RTN_MESSAGE =     "rtn:";
const char *SQL_FATAL_MESSAGE =   "SQL Fatal Error";
const char *ROLLBACK_MESSAGE =    "Item number is not valid";

int            WHSEID;                          /* warehouse number for each users */

/*****************************************************************************/
/* The "uniform()" function has range of the absolute value of the       */
/* difference between the min. and the max values upto 2147483647.      */
/*****************************************************************************/
/*-----------------------------------------------------------*/
/* NURand                                                    */
/*-----------------------------------------------------------*/
/* A: 255 for C_LAST, 1023 for C_ID, 8191 for OL_I_ID   */
/* x: 0 for C_LAST, 1 for C_ID and OL_I_ID              */
/* y: 999 for C_LAST, 3000 for C_ID, 100000 for OL_I_ID */
/*-----------------------------------------------------------*/
long
NURand(int A, int x, int y, long cval)
{
   return ((((long) uniform((long) 0, (long) A) | (long) uniform((long) x, (long) y)) + cval) % (y - x + 1)) + x;
}

/*-----------------------------------------------------------*/
/* getname                                                   */
/*-----------------------------------------------------------*/
/* generates a random number from 0 to 999 inclusive    */
/* a random name is generated by associating a random   */
/* string with each digit of the generated number       */
/* three strings are concatenated to generate lastname  */
/*-----------------------------------------------------------*/
char          *
getname()
{
   char          *last_name_parts[] =
   {
   "BAR",
   "OUGHT",
   "ABLE",
   "PRI",
   "PRES",
   "ESE",
   "ANTI",
   "CALLY",
   "ATION",
   "EING"
   };
   static char    lastname[128];
   int            random_num;

#if 1
   random_num = NURand(255, 0, 999, shmglobal->lastc);
#else
   random_num = NURand(255, 0, 999, LASTC);
#endif
   strcpy(lastname, last_name_parts[random_num / 100]);
   random_num %= 100;
   strcat(lastname, last_name_parts[random_num / 10]);
   random_num %= 10;
   strcat(lastname, last_name_parts[random_num]);
   return (lastname);
}

typedef struct gen_tran_s {
   int invalid;
   void *data;
   long len;
   long keywait;
   long type;
   char *menu;
   char *request;
} gen_tran_t;

int generic_transaction( gen_tran_t *data ) {
   char buffer[2048];
   static int consecutive_errs = 0;
   int rc;
   set_typing_delay(0);
   iprint(IPRINT_TRACE, "> generic_transaction sleep (%d) type(%d) *data (%d)\n",
data->type,data->menu,data);
#ifndef NOSLEEP
   if (shmglobal->test_state == 0)
                transaction_sleep_do();
#endif

#ifdef EXPECT_TIMEOUT
   int timeout = EXPECT_TIMEOUT;
#else
   int timeout = 0;
#endif

   // Start the transaction (MENU)
   iprint(IPRINT_TRACE, "> generic_transaction start (%d)\n", data->type);
   transaction_start(data->type, data->len, data->data);

   iprint(IPRINT_TRACE, "> transmit data->menu: (%s)\n",data->menu);
   transmit(data->menu);
   echo_trace ("Waiting for Menu");
   if (expect(TRIGGER, timeout) == ERROR) {
                iprint (IPRINT_ERROR, "Slave %d: Failed to receive %s screen\n",
                      shmentry->num, data->menu);
                return (ERROR);
   }
#ifndef NOSLEEP
   usleep(shmglobal->emulex_menu[data->type]*1000000.0+0.9);
#endif

   // Send our request (KEYING)
   transaction_mark(WHERE_NOW);
   echo_trace ("Keying");

#ifndef NOSLEEP
   usleep(data->keywait*1000000+KEYWAIT_FUDGE); // Keying delay
#endif
   // Wait for response (RESPONSE)
   transaction_mark(WHERE_NOW);

   iprint(IPRINT_TRACE, "> transmit data->request\n");
   transmit(data->request);

   echo_trace ("Wait for Response");
   if (expect(TRIGGER, timeout) == ERROR) {
                iprint (IPRINT_ERROR, "Slave %d: Failed to receive %s response\n",
                              shmentry->num, data->menu);
                return (ERROR);
   }
#ifndef NOSLEEP
   usleep(shmglobal->emulex_response[data->type]*1000000.0+0.9);
#endif

   // Look for errors and set our think time (THINK)
   transaction_mark(WHERE_NOW);
   if (expect_after_match ("ERROR: ")) {
                data->invalid = 1;
                iprint (IPRINT_ERROR, "Slave %d: %s found '%s'\n",
                      shmentry->num, data->menu, "ERROR:");
                // Very dangerous, keep going rather than exiting...
                return RTE_ERROR;
                // Check for consecutive errors and if there are more than
                // 4 of them exit - allow for transient errors to make
                // tuning and testing easier   -oz
                // In either case the transaction is marked as invalid and
                // will be reported as an error by the analyze program.
                // if (consecutive_errs++ > 4)
                //    return RTE_ERROR;
   } else {
                consecutive_errs = 0;
   }
   echo_trace ("Thinking");
   transaction_sleep_set(neg_exp_4(shmglobal->think[data->type])*1000.0);
   iprint(IPRINT_TRACE, "< generic_transaction finish\n");
   return (RTE_OK);
}

/*****************************************************************************/
/***                Delivery Transaction                          ***/
/*****************************************************************************/
int
Delivery()
{
   static struct delivery_struct delivery, delivery_new;
   int            rc;
   char           *ptr;
   char           buffer[256];
   gen_tran_t     tran;

   tran.invalid = 0;
   tran.data    = &delivery;
   tran.len     = sizeof(delivery);
   tran.keywait = 2;
   tran.type    = DELIVERY;
```

```
   tran.menu    = "4";
   tran.request = buffer;

   // Set up all data for new transactions
   delivery_new.carrier = uniform(1, 10);      // carrier # 1 to 10

   // Now create the actual request
   ptr = buffer;
   ptr += sprintf(ptr, "%d\n", delivery_new.carrier);

   // Go do the transaction
   rc = generic_transaction(&tran);
   delivery        = delivery_new;
   delivery.invalid = tran.invalid;

   return (rc);
}

/*****************************************************************************/
/***                New Order Transaction                          ***/
/*****************************************************************************/
int NewOrder() {
   static struct neword_struct neword, neword_new;
   int            i, rc, whses, low_whse=1;
   char           buffer[2048];
   char           *ptr;
   const char     *ptr2;
   gen_tran_t     tran;

   tran.invalid = 0;
   tran.data    = &neword;
   tran.len     = sizeof(neword);
   tran.keywait = 18;
   tran.type    = NEWORDER;
   tran.menu    = "1";
   tran.request = buffer;

   neword_new.rollback=0;

   /*** SECTION TO DETERMINE ROLLBACK TRANSACTION FOR 1% OF NEW ORDERS ***/
   neword_new.did = uniform(1, 10);                    // district number
   neword_new.cid = NURand(1023, 1, 3000, CUSTC);    // customer # 1 to 3000
   neword_new.nloop = uniform(5, 15);        // number of items to order (5-15)
   neword_new.olremote=0;   // find total number of remote order-lines

   whses = shmglobal->max_warehouses;

   for (i = 0; i < neword_new.nloop; i++) {
                  // Warehouse Number
                  neword_new.item[i].olswid = WHSEID;
                  if (whses > 1 && (uniform(0.0, 100.0) < 1.0)) {
                     /* for 1% of items (if * uniform()==0) */
                     /* Generate a uniform whse number that's different from WHSEID */
                     neword_new.item[i].olswid =
                                 (long) uniform((long) low_whse, (long)whses-1);
                     if (neword_new.item[i].olswid >= WHSEID)
                                 neword_new.item[i].olswid++;
                     neword_new.olremote++;  // find total number of remote order-lines
                  }
                  // Item number 1-100000
                  neword_new.item[i].oliid = NURand(8191, 1, 100000, ITEMC);
                  // Quantity 1-10
                  neword_new.item[i].olquantity = uniform(1, 10);
   }                                                                  /* end of for n_loop */
   // We occasionally force a transaction to have invalid data to force a
   // rollback
   if (uniform(1, 5000) <= 50)
                  neword_new.item[neword_new.nloop-1].oliid = 999999;

   neword_new.oremote = (neword_new.olremote > 0);

   // Now create the actual request
   ptr = buffer;
   ptr += sprintf(ptr, "%d\t%d", neword_new.did, neword_new.cid);
   for (i = 0; i < neword_new.nloop; i++) {
                  ptr += sprintf(ptr, "\t%d\t%d\t%d",
                                          neword_new.item[i].olswid,
                                          neword_new.item[i].oliid,
                                          neword_new.item[i].olquantity);
   }
   ptr += sprintf(ptr, "\n");

   // Go do the transaction
   rc = generic_transaction(&tran);
   neword         = neword_new;
   neword.invalid = tran.invalid;

   // Check for a rollback
   if (expect_after_match (ROLLBACK_MESSAGE)) {
                  neword.rollback=1;
                  echo_trace ("Found rollback!\n");
   }

   // Grab the orderID from the
   if (!(ptr2 = expect_after_match("\033[6;15H"))) {
                  echo_trace ("Didn't find order-id for neworder");
                  iprint (IPRINT_ERROR, "Neworder didn't have Order-ID");
                  neword.oid = -1;
   } else {
                  neword.oid = atoi(ptr2+8);
   }

   // This is really not useful since we aren't going to be sending individual
   // keystrokes anymore
   if (shmentry->flags & TES_FLAG_KEYSTROKE_TIME) {
                  log_data(RTE_ITEM_KEYSTROKE_TIMES,
keystroke_length*sizeof(int),keystroke_times);
   }

   return (rc);
}


/*****************************************************************************/
/***                Order Status Transaction                       ***/
/*****************************************************************************/
int OrderStatus() {
   static struct ordstat_struct ordstat, ordstat_new;
   char           buffer[2048];
   int            rc;
   char           *ptr;
   gen_tran_t     tran;

   tran.invalid = 0;
   tran.data    = &ordstat;
   tran.len     = sizeof(ordstat);
   tran.keywait = 2;
   tran.type    = ORDSTAT;
   tran.menu    = "3";
   tran.request = buffer;

   // Set up all data for new transactions
   ordstat_new.did = uniform(1, 10);            /* district number 1 to 10 */
   if (uniform(1, 100) <= 60) {/* for 60% of transactions */
                  char *tmp = getname();
                  strcpy(ordstat_new.clast, tmp);                    /* by customer last name */
                  if (ordstat_new.clast[0] < 'A' || ordstat_new.clast[0] > 'Z') {
                     iprint (IPRINT_ERROR,
                        "ASSERTION: OrderStatus getname() returns invalid name! '%s'\n",
                                 ordstat_new.clast);
                     return RTE_ERROR;
                  }
                  ordstat_new.byname = 1;
                  ordstat_new.cid = 0;
   } else {
                  ordstat_new.cid = NURand(1023, 1, 3000, CUSTC);          /* cust. # 1 to 3000 */
                  ordstat_new.byname = 0;
                  ordstat_new.clast[0] = (char) NULL;
   }

   // Now create the actual request
   ptr = buffer;
   ptr += sprintf(ptr, "%d\t", ordstat_new.did);
   if (ordstat_new.byname) {
                  ptr += sprintf(ptr, "\t%s\n", ordstat_new.clast);
   } else {
                  ptr += sprintf(ptr, "%d\n", ordstat_new.cid);
   }

   // Go do the transaction
   rc = generic_transaction(&tran);
   ordstat        = ordstat_new;
   ordstat.invalid = tran.invalid;

   return (rc);
}

/*****************************************************************************/
/***                Payment Transaction                            ***/
/*****************************************************************************/
int
Payment()
{
   static struct payment_struct payment, payment_new;
   int            dollars, cents, rc, whses, low_whse = 1;
   char           buffer[2048];
   char           *ptr;
   gen_tran_t     tran;

   tran.invalid = 0;
   tran.data    = &payment;
   tran.len     = sizeof(payment);
   tran.keywait = 3;
   tran.type    = PAYMENT;
   tran.menu    = "2";
   tran.request = buffer;

   payment_new.did = uniform(1, 10);          /* district number 1 to 10 */
   if (uniform(1, 100) <= 60) {/* for 60% of transactions */
                  strncpy(payment_new.clast, getname(), 17);    // by customer last name
                  if (payment_new.clast[0] < 'A' || payment_new.clast[0] > 'Z') {
                     iprint (IPRINT_ERROR,
                        "ASSERTION: payment_new getname() returns invalid name! '%s'\n",
                                 payment_new.clast);
                     return RTE_ERROR;
                  }
                  payment_new.byname = 1;
                  payment_new.cid = 0;
```

```
  } else {
                payment_new.cid = NURand(1023, 1, 3000, CUSTC);        /* cust. # 1 to 3000 */
                payment_new.byname = 0;
                payment_new.clast[0] = (char) NULL;
  }

  whses = shmglobal->max_warehouses;

  if (whses < 2 || uniform(1, 100) <= 85) {/* for 85 % of transactions */
                payment_new.cwid = WHSEID;
                payment_new.cdid = payment_new.did;
                payment_new.remote = 0;
  } else {                                  /* for 15 % of transactions */
                payment_new.cwid = (long) uniform((long)low_whse, (long) whses-1);
                if (payment_new.cwid >= WHSEID)
                   payment_new.cwid++;

                payment_new.remote = 1;
                payment_new.cdid = uniform(1, 10);            /* district 1 to 10 */
  }

  dollars = uniform(1, 5000); /* dollar amt = 1 to 5000 */
  if (dollars == 5000)
                cents = 0;
  else
                cents = uniform(0, 99);

  payment_new.amount = ((double) dollars) + ((double) cents) / 100.0;

  // Now create the actual request
  ptr = buffer;
  ptr += sprintf(ptr, "%d\t", payment_new.did);
  if (payment_new.byname) {
                ptr += sprintf(ptr, "\t%s\t", payment_new.clast);
  } else {
                ptr += sprintf(ptr, "%d\t\t", payment_new.cid);
  }
  ptr += sprintf(ptr, "%d\t%d\t", payment_new.cwid, payment_new.cdid);
  ptr += sprintf(ptr, "%d.%02.2d\n", dollars, cents);

  // Go do the transaction

  rc = generic_transaction(&tran);
  payment        = payment_new;
  payment.invalid = tran.invalid;

  return (rc);
}

/*****************************************************************************/
/***                Stock Level Transaction                        ***/
/*****************************************************************************/
int
StockLevel()
{
  static struct stocklev_struct stocklevel, stocklevel_new;
  char           buffer[2048];
  int            rc;
  char          *ptr;
  gen_tran_t      tran;

  tran.invalid = 0;
  tran.data    = &stocklevel;
  tran.len     = sizeof(stocklevel);
  tran.keywait = 2;
  tran.type    = STOCKLEV;
  tran.menu    = "5";
  tran.request = buffer;

  stocklevel_new.invalid = 0;
  stocklevel_new.threshold = uniform(10, 20);                /* uniform no. between 10 and
                                                                                                  * 20 */
  // Now create the actual request
  ptr = buffer;
  ptr += sprintf(ptr, "%d\n", stocklevel_new.threshold);

  // Go do the transaction
  rc = generic_transaction(&tran);
  stocklevel        = stocklevel_new;
  stocklevel.invalid = tran.invalid;

  return (rc);
}


/*****************************************************************************/
/***  MAIN()                                                  ***/
/*****************************************************************************/
int
user_transaction()
{
  char           logout[32];
  double          ntask;
  int            resp;
  static int task = 0;

  if (shmentry->flags & TES_FLAG_KEYSTROKE_TIME) {
                int rc;
                /* Wait for specified period of time */
                sleep (shmglobal->keystroke_sleep);
                /* Quit after one transaction */
                shm->lock(shmentry->pid);
                shmentry->flags |= TES_FLAG_DIE;
                shm->unlock(shmentry->pid);
                rc = NewOrder();
                iprint (IPRINT_INFO, "Slave %d: Keystroke timing setting die flag\n", shmentry->num);
                return rc;
  }

#if 1
  switch (shmglobal->test_state) {
  case 0: // Normal
                break;
  case 1: // pause
                sleep (1);
                return RTE_OK;
  case 2: // warmup
                switch(task++) {
                case 0: return Delivery();
                case 1: return OrderStatus();
                case 2: return Payment();
                case 3: return StockLevel();
                case 4: task = 0; return NewOrder();
                }
  }
  /*****************************************************************************/
  /***  CHOOSE ONE OF THE TRANSACTIONS                                  ***/
  /*****************************************************************************/
  ntask = (double) uniform(0.0, 100.0);
  if (ntask <= shmglobal->chances[DELIVERY]) {
                return Delivery();
  }
  ntask -= shmglobal->chances[DELIVERY];
  if (ntask <= shmglobal->chances[ORDSTAT]) {
                return OrderStatus();
  }
  ntask -= shmglobal->chances[ORDSTAT];
  if (ntask <= shmglobal->chances[PAYMENT]) {
                return Payment();
  }
  ntask -= shmglobal->chances[PAYMENT];
  if (ntask <= shmglobal->chances[STOCKLEV]) {
                return StockLevel();
  }
  return NewOrder();
#else
  // this code should be shared between all of the users on a slave
  // int the best case it should be shared between all of the slaves,
  // but that would be too costly.
  // for now it is done on a per user basis.  If this thing is ever
  // modified to be threaded then it will probably go to the per-process
  // basis.  Although with shared memory, it would be possible to go to
  // per-slave.  Actually, before this code is put into use it must be
  // fixed up to share across processes.  Right now it will take, on average,
  // 22 minutes for one user to just key in the 100 entries.

  // use a card deck with no replacement to fulfill the requirements
  {
                int deck[100], count=-1, i, size=1, tmp;
                // lock deck
                if (count < 0) {
                   // deck is empty fill it up
                   count = 0;
                   for (i = 0; i < 43 * size; i++) {
                                deck[count++] = Payment;
                   }
                   for (i = 0; i < 4 * size; i++) {
                                deck[count++] = StockLevel;
                   }
                   for (i = 0; i < 4 * size; i++) {
                                deck[count++] = OrderStatus;
                   }
                   for (i = 0; i < 4 * size; i++) {
                                deck[count++] = Delivery;
                   }
                   for (; count < 100 * size; i++) {
                                deck[count++] = NewOrder;
                   }
                   // randomize the deck
                   for (i = 0; i < 100 * size; i++) {
                                int tmp;
                                int pick = uniform(i+1, 100);
                                tmp = deck[i];
                                deck[i] = deck[pick];
                                deck[pick] = tmp;
                   }
                }
                tmp = deck[count--];
                // unlock deck
                switch(tmp) {
                case Delivery:    return Delivery();
                case OrderStatus: return OrderStatus();
                case Payment:     return Payment();
                case StockLevel:  return StockLevel();
                case NewOrder:    return NewOrder();
                }
  }
#endif
```

```
#if 0
   if (resp != RTE_OK) {                        /* logoff if response is not correct */
                strcpy(logout, "9\n");          /* menu option 9 */
                transmit(logout);
                resp = expect("tpcc_cstux_inf:");
                return (ERROR);
   } else
                return (RTE_OK);
#endif
}                                                       /* end of main */

int user_parameter_change(void) {
   #if 0
   int i;
   iprint(IPRINT_TRACE, "Slave %d: total_users = %d\n", shmentry->num);
   iprint(IPRINT_TRACE, "Slave %d: chances     = ", shmentry->num);
   for (i = 0; i < MAX_TRAN_TYPE; i++)
                iprint(IPRINT_TRACE, "%6.2f ", shmglobal->chances[i]);
   iprint(IPRINT_TRACE, "\nSlave %d: think       = ", shmentry->num);
   for (i = 0; i < MAX_TRAN_TYPE; i++)
                iprint(IPRINT_TRACE, "%6.2f ", shmglobal->think[i]);
   iprint(IPRINT_TRACE, "\n");
   #endif
   return RTE_OK;
}

int user_login(char *user, char *password, void *data) {
   UserLocal *localdata = (UserLocal *)data;
   int rc;
   int timeout_value = shmglobal->login_timeout;
   char buffer[32];
   set_typing_delay(0);

   rc = expect   (TRIGGER, timeout_value);
   if (rc == RTE_ERROR) {
                iprint (IPRINT_ERROR, "Slave %d: didn't find Warehouse prompt\n", shmentry->num);
   }
   sprintf(buffer, "%d\t%d\n", localdata->Warehouse, localdata->District);
   transmit(buffer);
   iprint (IPRINT_TRACE, "Slave %d: Warehouse=%d, District=%d, pid=%d\n", shmentry->num,
localdata->Warehouse, localdata->District, getpid());

   rc = expect (TRIGGER, timeout_value);
   if (rc != RTE_OK) {
      iprint (IPRINT_ERROR, "Slave %d: Failed logging in\n", shmentry->num);
                return RTE_ERROR;
   }
   return RTE_OK;
}

int user_init () {
   extern int expect_save_active;
   WHSEID = shmlocal->Warehouse;

   status->max_transmit =  shmglobal->keystroke_packet_size;
   expect_save_active = 1;
   return RTE_OK;
}

int user_logout () {
   transmit("9");
   iprint (IPRINT_TRACE, "Slave %d: Warehouse=%d, District=%d\n", shmentry->num,
shmlocal->Warehouse, shmlocal->District);
   return RTE_OK;
}

int user_cleanup () {
   transaction_sleep_do();
   transaction_start(0, 0, NULL); // Just something to clear out the buffer...
   return RTE_OK;
}

int user_spawn_ok() {
   int rc, hb;
   hb = ((UserGlobal *)(shm->global_data))->host_busy;
   rc = hb?RTE_ERROR:RTE_OK;
   return rc;
}
```

## D.4 user_tpcc.h

```
/*****************************************************************************/
/* user_tpcc.h                                  Audit: 05/30/96 */
/*****************************************************************************/

/* $Id: user_tpcc.h,v 1.1 1999/02/22 06:31:06 channui Exp $ */

#ifndef USER_TPCC_H
#define USER_TPCC_H

#include "data/rte_common.h"

/*****************************************************************************/
/***   run-time constant for customer last name from 0 to 255,          ***/
/***   run-time constant for customer id from 0 to 1023,                ***/
/***   run-time constant for item id from 0 to 8191.                    ***/
/*****************************************************************************/
/* #define       LASTC         117 */
/* Change for 3.1 */
#define          LASTC         193
#define          CUSTC         319
#define          ITEMC         3849

/*****************************************************************************/
/***   response type
***/
/*****************************************************************************/
/* #define OK  1  */
/* #define ERROR               -1 */

/*****************************************************************************/
/***   transaction type
***/
/*****************************************************************************/
#define          NEWORDER 1
#define          PAYMENT                    2
#define          ORDSTAT                    3
#define          DELIVERY   4
#define          STOCKLEV   5

/*****************************************************************************/
/***   transaction structures
***/
/*****************************************************************************/
struct neword_struct {
   char          invalid;        /* transaction completed sucessfully */
   long          did;
   long          cid;
   long          oid;      /* Order-ID returned from client */
   long          nloop;          /* number of order line, avg = 15 */
   char          oremote;        /* 1 for remote order, 10% */
   long          olremote;       /* number of remote order line, 1% */
   char          rollback;       /* actually saw rollback text on screen */
   struct items_struct {
                 long          olswid;
                 long          oliid;
                 long          olquantity;
   } item[15];
};

struct payment_struct {
   char          invalid;        /* transaction completed sucessfully */
   long did;
   long cid;
   long cwid;
   long cdid;
   char clast[17];
   double amount;
   char byname;                                         /* 1 for by last name, 0 for by id */
   char remote;                                         /* 1 for remote wardhouse, 0 otherwise */
};

struct ordstat_struct {
   char          invalid;        /* transaction completed sucessfully */
   long did;
   long cid;
   char clast[17];
   char byname;                                         /* 1 for by last name, 0 for by id */
};

struct delivery_struct {
   char          invalid;        /* transaction completed sucessfully */
   char carrier;
};

struct stocklev_struct {
   char          invalid;        /* transaction completed sucessfully */
   long threshold;
};

struct generic_struct {
   char          invalid;        /* transaction completed sucessfully */
};

typedef union transaction_info {
   char   invalid;
   struct generic_struct  generic;
   struct neword_struct   neword;
   struct payment_struct  payment;
   struct ordstat_struct  ordstat;
   struct delivery_struct delivery;
   struct stocklev_struct stocklev;
} transaction_info;

struct UserGlobal {
   int total_users;
   int max_warehouses;
   int keystroke_sleep;
   int login_timeout;
   int keystroke_packet_size;
   int lastc;
   int test_state;
   int host_busy;
```

```
    double chances[MAX_TRAN_TYPE];
    double think[MAX_TRAN_TYPE];
    double emulex_response[MAX_TRAN_TYPE];
    double emulex_menu    [MAX_TRAN_TYPE];
};

struct UserLocal {
    int Warehouse;
    int District;
};

/*
struct user_data_header {
};
*/

extern struct UserGlobal *shmglobal;
extern struct UserLocal  *shmlocal;

#endif
```

# APPENDIX E: Third Party Quotes

http://www.buynetgear.com/product.asp?sku=1039336

**FS108NA 10/100 8PORT DUAL SPEED SWITCH RJ45 W/ UPLINKBUTTON**

**Part Number : FS108NA**
**In Stock : NO**
**Platform : PC Hardware**
**Media : Peripherals**

**Price: $84.99**

BuyNow

**Description:**

Eight port Workgroup Fast Ethernet Switch which improves Network traffic by Segmentation. The FS108 Fast Ethernet Switch brings the 100 Mbps switching technology in a compact form factor to the small office marketplace at an aggressive price. This switch segments the network into smaller, connected subnets for improved performance, enabling the most demanding multimedia and imaging applications. Since each port is auto-speed-sensing, individual subnets or directly attached servers can easily be upgraded from 10 to 100 Mbps.

**Features:**

- Enhance productivity and network reliability by segmenting the workgroup into smaller units. Eight auto-sensing UTP ports One speed-sensing UTP port selectable between Normal or Uplink connection. Stores up to 4,096 MAC addresses per system. Filtering and Forwarding Rates. 14,800 packets per second for 10 Mbps ports 148,000 packets per second for 100 Mbps ports Half/full duplex switch.