*and*

# *TPC Benchmark™C*

# *Full Disclosure Report*

# *Fujitsu DS/90 7000 Series Model 7700H Type III*

# *running*

# *Oracle V7.3*

# *October 1996*

The benchmark results contained in this document were submitted for compliance with version 3.2 of the TPC Benchmark C Standard Specification. The result of that action is to place these benchmark results into the sixty day "under review" status as of October 4, 1996.

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# *Preface*

The TPC Benchmark C was developed by the Transaction Processing Performance Council (TPC). The TPC was founded to define transaction processing benchmarks and to disseminate objective, verifiable performance data to the industry. This full disclosure report is based on the TPC Benchmark C Standard Specifications Version 3.2, released August 27, 1996.

## TPC Benchmark C Overview

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

TPC Benchmark C is an On Line Transaction Processing (OLTP) workload. It is a mixture of read-only and update intensive transactions that simulate the activities found in complex OLTP application environments. It does so by exercising a breadth of system components associated with such environments, which are characterized by:

- The simultaneous execution of multiple transaction types that span a breadth of complexity
- On-line and deferred transaction execution modes
- Multiple on-line terminal sessions
- Moderate system and application execution time
- Significant disk input/output
- Transaction integrity (ACID properties)
- Non-uniform distribution of data access through primary and secondary keys
- Databases consisting of many tables with a wide variety of sizes, attributes, and relationships
- Contention of data access and update

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

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

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

# *Abstract*

## Overview

This report documents the methodology and results of the TPC Benchmark C test conducted by Fujitsu Ltd. and Oracle Corp. on the Fujitsu DS/90 7700H Type III. The operating system used for the benchmark was UXP/DS V20. The DBMS used was Oracle V7.3.

## TPC Benchmark C Metrics

The standard TPC Benchmark C metrics, tpmC (transactions per minute), price per tpmC (five year capital cost per measured tpmC), and the availability date are reported as:

2735.23 tpmC
¥110,341 per tpmC
Available as of March, 1997

## Standard and Executive Summary Statements

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

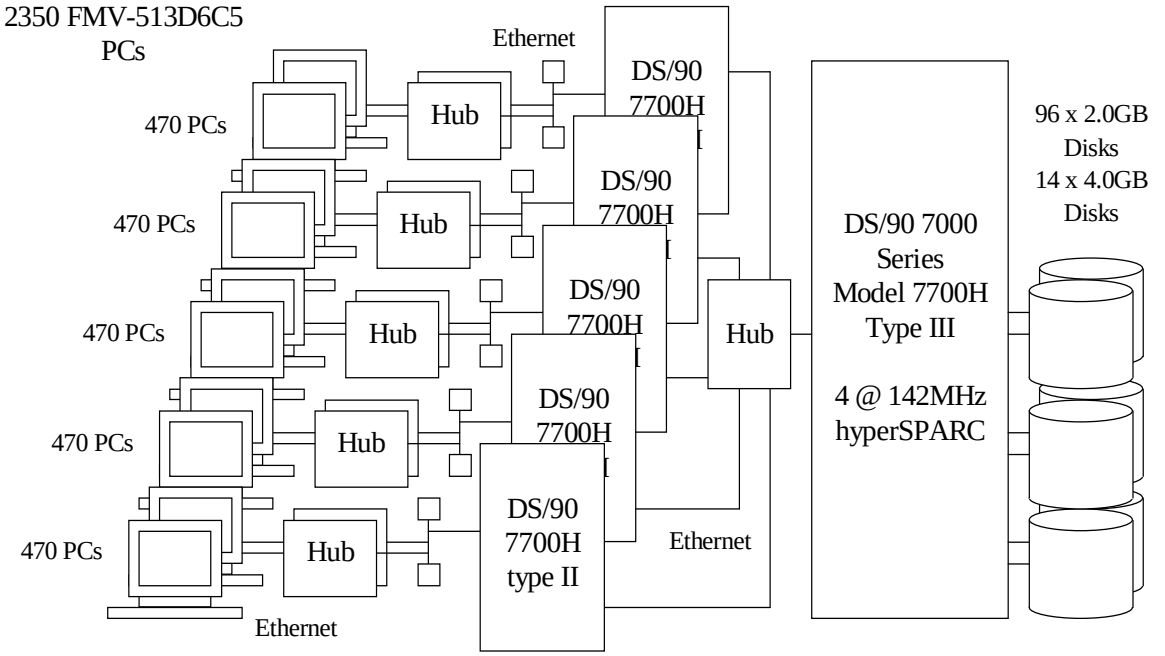
## Auditor

The benchmark configuration, environment and methodology, along with the pricing model used to calculate the cost per tpmC, were audited by Lorna Livingtree of Performance Metrics, Inc. to verify compliance with the relevant TPC specifications.

## Priced Configuration

| FUJITSU ORACLE | Fujitsu DS/90 7000 Series Model 7700H type III C/S with 5 Front-Ends | | TPC-C Rev. 3.2<br>Report Date: Oct. 1996 |
|---|---|---|---|
| Total System Cost | TPC-C Throughput | Price/Performance | Availability Date |
| 301,808,800 Yen | 2735.23 tpmC | 110,341 Yen/tpmC | March 1997 |

| Processors | Database Manager | Operating System | Other Software | Number of Users |
|---|---|---|---|---|
| 4 @ 142MHz hyperSPARC | Oracle7 RDBMS Version 7.3 Japanese Version | UXP/DS Basic Software V20 | TP-Base V20 | 2350 |




| System Components | Qty | Server Description | Qty | Clients Description |
|---|---|---|---|---|
| Processor | 1 | 4 hyperSPARC @ 142MHz | 5 | 2 hyperSPARC @ 142MHz (each client) |
| Cache Memory | | 1MB (each processor) | | 1MB (each processor) |
| Memory | | 1024MB | | 512MB |
| Disk Controller | 1 | SCSI-2 (2 Channel) | 5 | SCSI-2 (1 Channel) |
| | 10 | Wide-SCSI (1 Channel) | | |
| Disks | 96 | 2.0GB Disk | 5 | 1GB Disk |
| | 14 | 4.0GB Disk | | |
| Total GB of Storage | | 248.0GB | | 5GB |
| Terminals | 1 | Console | 5 | Console |

FUJITSU
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# Detailed Pricing information
# DS/90 7700H Type III

TPC-C Rev 3.2

Report Date:

October 4, 1996

| Order Number | Description | Quantity | Unit Price | Extended Price | Maintenance rate/unit* | 5 Years Maintenance |
|---|---|---|---|---|---|---|
| **Server Hardware** | | | | | | |
| F7970C3 | DS/90 7000 model 7700H type III (w/64MB RAM) | 1 | 9,050,000 | 9,050,000 | 37,700 | 2,035,800 |
| F7978SB2 | SBus extention unit | 1 | 900,000 | 900,000 | 4,500 | 243,000 |
| F7952M31 | Additional memory (64MB) | 15 | 864,000 | 12,960,000 | 0 | 0 |
| F7949RA3 | External Cabinet | 4 | 630,000 | 2,520,000 | 3,200 | 691,200 |
| F7949FU2A | External File unit | 19 | 700,000 | 13,300,000 | 3,500 | 3,591,000 |
| F7958HS1 | Wide SCSI-2 adapter | 10 | 250,000 | 2,500,000 | 0 | 0 |
| F7945A5E | Additional Wide-SCSI disk (2.0GB) | 95 | 380,000 | 36,100,000 | 1,900 | 9,747,000 |
| F7973D41A | Additional Wide-SCSI disk (4.0GB) | 14 | 680,000 | 9,520,000 | 3,400 | 2,570,400 |
| F7960A11 | Display unit | 1 | 380,000 | 380,000 | 1,500 | 81,000 |
| DCBL-RCB05 | RS-232 cable | 1 | 16,000 | 16,000 | 0 | 0 |
| F7953A4A | 8mm Tape device | 1 | 840,000 | 840,000 | 4,200 | 226,800 |
| | **Server Hardware Subtotals** | | | 88,086,000 | | 19,186,200 |
| **Server Software** | | | | | | |
| B7831SK3H | UXP/DS Basic Software V20 | 1 | 1,100,000 | 1,100,000 | 220,000 | 1,100,000 |
| | ORACLE7 RDBMS & SQL*Net | 1 | 31,200,000 | 31,200,000 | 6,240,000 | 31,200,000 |
| | **Server Software Subtotals** | | | 32,300,000 | | 32,300,000 |
| **Client Hardware** | | | | | | |
| F7970C5 | DS/90 7000 model 7700H type II (w/ NIC) | 5 | 4,700,000 | 23,500,000 | 19,600 | 5,292,000 |
| F7952M31 | Additional memory (64MB) | 40 | 864,000 | 34,560,000 | 0 | 0 |
| F7930LA2C | 10Mbps LAN adapter | 5 | 100,000 | 500,000 | 0 | 0 |
| F7960A11 | Display unit | 5 | 380,000 | 1,900,000 | 1,500 | 405,000 |
| DCBL-RCB05 | RS-232 cable | 5 | 16,000 | 80,000 | 0 | 0 |
| | **Client Hardware Subtotals** | | | 60,540,000 | | 5,697,000 |
| **Client Software** | | | | | | |
| B7831SK6G | UXP/DS Basic Software V20 | 1 | 740,000 | 740,000 | 220,000 | 1,100,000 |
| B7831UK0G | Additional user license | 4 | 640,000 | 2,560,000 | 220,000 | 4,400,000 |
| D783HZK60 | TP-Base/sdk V20 (1 user) | 1 | 300,000 | 300,000 | 270,600 | 1,353,000 |
| D783HUK62 | TP-Base/rt V20 (8 user) | 1 | 500,000 | 500,000 | 270,600 | 1,353,000 |
| S783HUK02 | Additional user license | 4 | 400,000 | 1,600,000 | 88,000 | 1,760,000 |
| | **Client Software Subtotals** | | | 5,700,000 | | 9,966,000 |
| **User Connectivity** | | | | | | |
| LHBX | Hub units (8ports) ** | 3 | 34,800 | 104,400 | 1,100 | 178,200 |
| LH16XA2 | Hub units (16ports) ** | 165 | 230,000 | 37,950,000 | 1,100 | 9,801,000 |
| | **User Connectivity Subtotals** | | | 38,054,400 | | 9,979,200 |
| | **Totals** | | | 224,680,400 | | 77,128,400 |
| | **5 Year cost** | | | | | 301,808,800 |
| | **tpmC** | | | | | 2735.23 |
| | **Yen / tpmC** | | | | | 110,341 |
| **Notes:** | * DS/90 hardware maintenance rate is monthly rate and DS/90 software maintenance rate is yearly rate. | | | | | |
| | ** 10% or minimum of 2 spares are included. | | | | | |

Notes:
Audited by Performance Metrics, Inc.
Japanese yen prices are not convertible to other currencies at exchange rates.
DS/90 hardware has a 6 month warranty.
Thus to cost 5 years of hardware maintenance, a total of 54 months is calculated.

## Numerical Quantities Summary

## DS/90 7700H Type III  Oracle V7.3

| **MQTH, Computed Maximum Qualified Throughput** | 2735.23 tpmC | | |
|---|---|---|---|
| **Response Times (in seconds)** | **Average** | **90%** | **Max.** |
| New-Order | 1.92 | 3.81 | 24.57 |
| Payment | 1.42 | 3.25 | 24.55 |
| Order-Status | 1.47 | 3.30 | 19.19 |
| Delivery (interactive portion) | 0.09 | 0.21 | 1.10 |
| Delivery (deferred portion) | 1.83 | 3.68 | 22.40 |
| Stock-Level | 2.50 | 4.58 | 24.22 |
| Menu | 0.16 | 0.25 | 3.03 |
| **Transaction Mix, in percent of total transaction** | | | |
| New-Order | | | 44.69 |
| Payment | | | 43.25 |
| Order-Status | | | 4.02 |
| Delivery | | | 4.02 |
| Stock-Level | | | 4.00 |
| **Emulation Delay (in seconds)** | | **Resp. Time** | **Menu** |
| New-Order | | N/A | N/A |
| Payment | | N/A | N/A |
| Order-Status | | N/A | N/A |
| Delivery (interactive) | | N/A | N/A |
| Stock-Level | | N/A | N/A |

| **Keying/Think Times (in seconds)** | **Min.** | | **Average** | | **Max.** | |
|---|---|---|---|---|---|---|
| New-Order | 18.10 | 0.01 | 18.29 | 12.12 | 18.53 | 120.49 |
| Payment | 3.01 | 0.01 | 3.07 | 12.09 | 3.38 | 116.71 |
| Order-Status | 2.01 | 0.01 | 2.05 | 10.49 | 2.15 | 92.30 |
| Delivery (interactive) | 2.03 | 0.01 | 2.07 | 5.14 | 2.16 | 46.88 |
| Stock-Level | 2.02 | 0.01 | 2.07 | 5.19 | 2.18 | 49.12 |

| **Test Duration** | |
|---|---|
| Ramp-up time (seconds) | 2510 |
| Measurement interval | 1800 |
| Transactions during measurement interval | 82,057 |
| Ramp down time | |
| **Checkpointing** | |
| Number of checkpoints | 1 |
| Checkpoint interval | 1800 sec. |
| **Reproducibility Run** | |
| Reported measurement | 2735.23 |
| Reproducibility measurement | 2731.30 |
| | |
| Difference | 3.93 |
| | |

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# *General Items*

## Application Code and Definition Statements

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

Appendix A contains all source code implemented in this benchmark.

## Test Sponsor

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

Fujitsu and Oracle Corp. were joint sponsors of this TPC Benchmark C.

## Parameter Settings

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

- *Database options,*
- *Recover/commit options,*
- *Consistency/locking options*
- *Operating system and application configuration parameter.*

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

Appendix B contains the parameters for the database and the operating system. Appendix C contains the configuration for the transaction monitor.

## Configuration Items

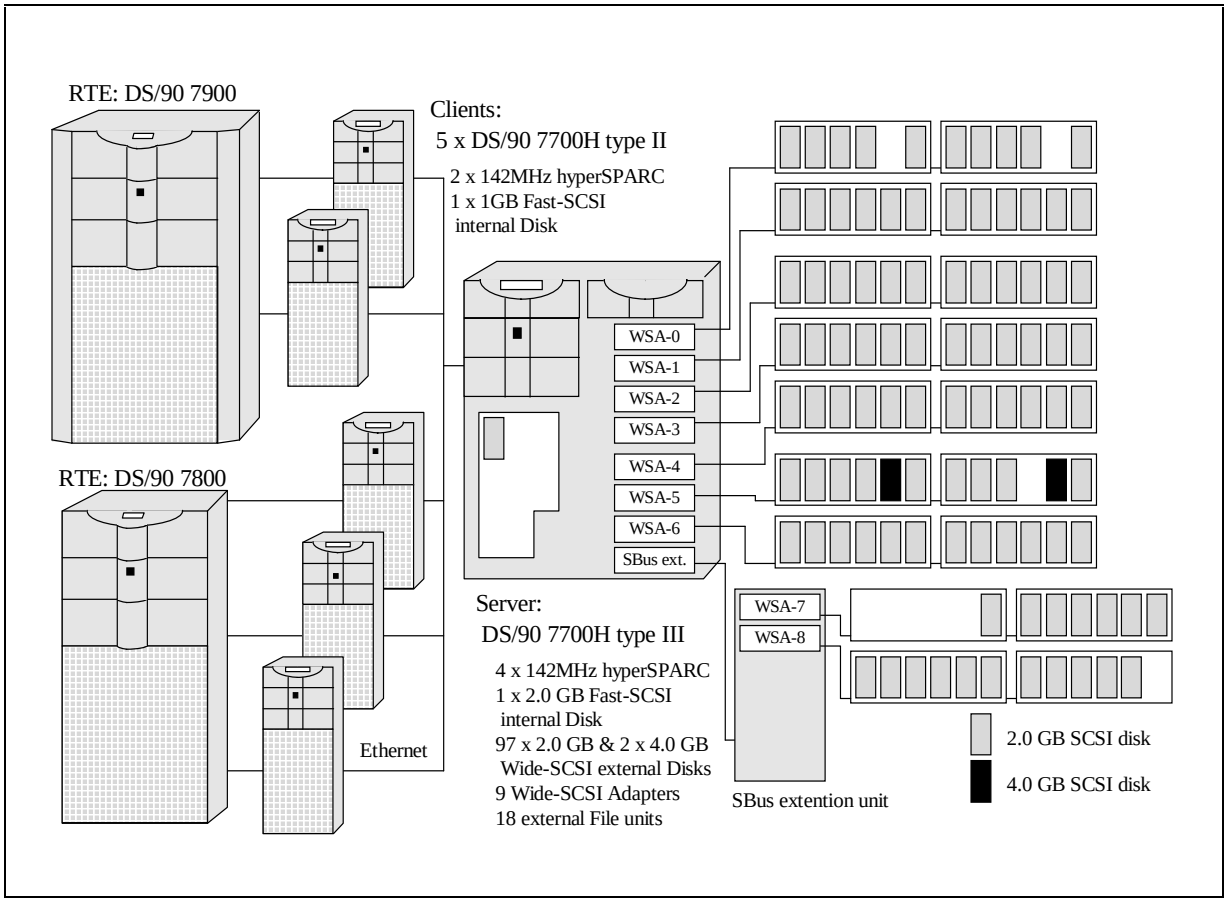
*Diagrams of both measured and priced configurations must be provided, accompanied by a description of the differences.*

The System Under Test (SUT), a DS/90 7700H Type III, is depicted in the following diagrams.

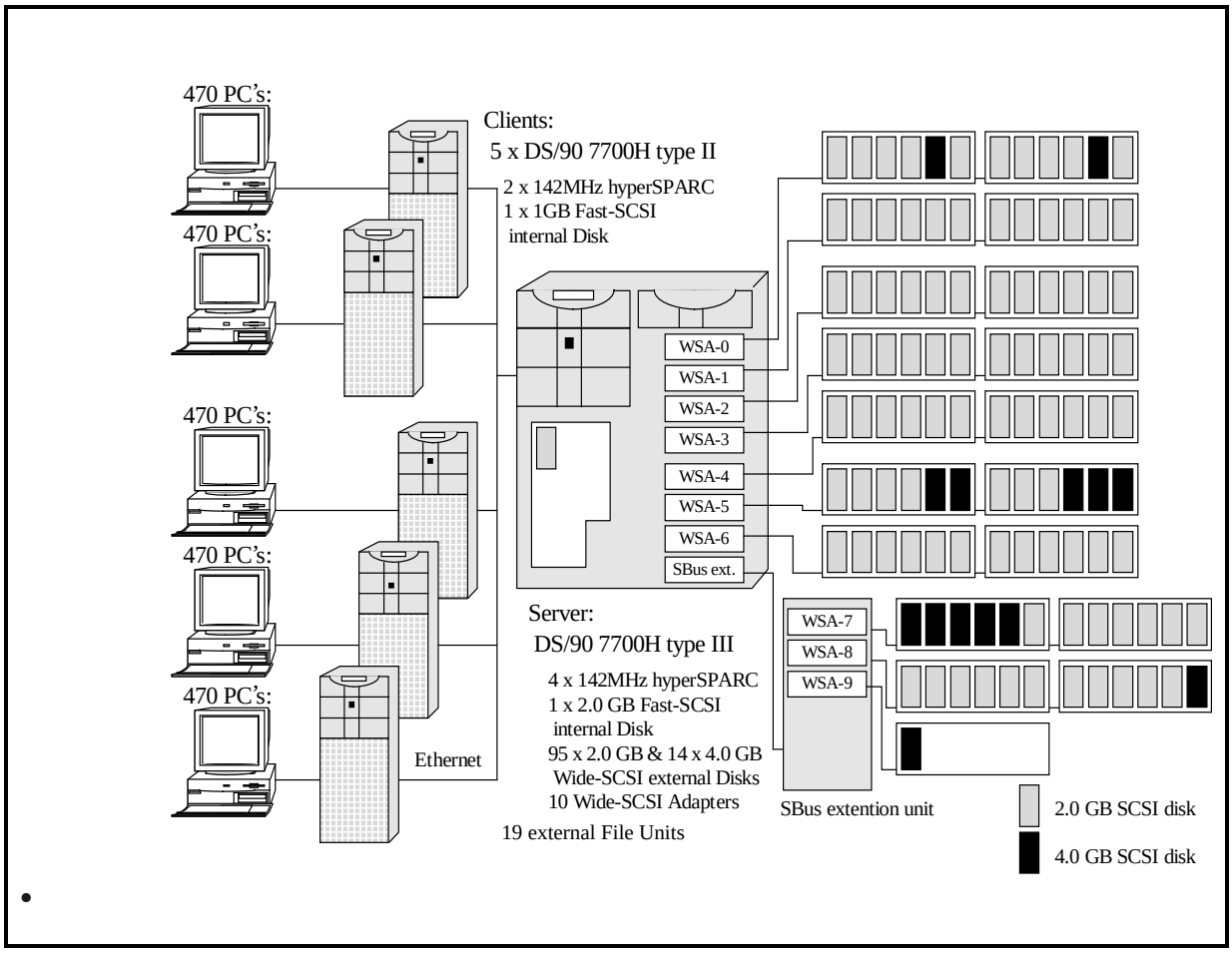
The configuration diagrams for both the tested and priced systems are included on the following pages.

The only difference is the number of disks and the use of the RTE.

**DS/90 7700H Tested Configuration**



**DS/90 7700H Priced Configuration**



# *Clause 1 Related Items*

## 1.1. Table Definitions

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

Appendix E contains the code used to define and load the database tables.

## 1.2. Physical Organization of Database

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

The following table depicts the organization of tables and indices on the disks.

## Distribution of Tables and Logs for DS/90 7700H Type III

| SCSI adapter | Device | TABLE NAME | FILE NAME | SIZE (Mbytes) | DISK CAPACITY |
|---|---|---|---|---|---|
| SA | hd00 | Operating System | | 1008 | 2.0GB |
| | | | swap | 335 | |
| WSA-0 | hd10 | HISTORY | /dev/rdsk/hd1001 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd1002 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd1004 | 183 | |
| | | ORDERS | /dev/rdsk/hd1005 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd1006 | 6 | |
| | hd11 | HISTORY | /dev/rdsk/hd1101 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd1102 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd1104 | 183 | |
| | | ORDERS | /dev/rdsk/hd1105 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd1106 | 6 | |
| | hd12 | HISTORY | /dev/rdsk/hd1201 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd1202 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd1204 | 183 | |
| | | ORDERS | /dev/rdsk/hd1205 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd1206 | 6 | |
| | hd13 | HISTORY | /dev/rdsk/hd1301 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd1302 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd1304 | 183 | |
| | | ORDERS | /dev/rdsk/hd1305 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd1306 | 6 | |
| | hd14 | HISTORY | /dev/rdsk/hd1401 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd1402 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd1404 | 183 | |
| | | ORDERS | /dev/rdsk/hd1405 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd1406 | 6 | |
| | hd15 | ORACLE-SYSTEM | /dev/rdsk/hd1501 | 252 | 2.0GB |
| | | WAREHOUSE | /dev/rdsk/hd1502 | 16 | |
| | | +DISTRICT | /dev/rdsk/hd1502 | | |
| | | ITEM | /dev/rdsk/hd1503 | 20 | |
| | | CUSTOMER INDEX 1 | /dev/rdsk/hd1505 | 498 | |
| | hd20 | HISTORY | /dev/rdsk/hd2001 | 25 | 2.0GB |

| | | | | | |
|---|---|---|---|---|---|
| | | STOCK | /dev/rdsk/hd2002 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd2004 | 183 | |
| | | ORDERS | /dev/rdsk/hd2005 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd2006 | 6 | |
| | hd21 | HISTORY | /dev/rdsk/hd2101 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd2102 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd2104 | 183 | |
| | | ORDERS | /dev/rdsk/hd2105 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd2106 | 6 | |
| | hd22 | HISTORY | /dev/rdsk/hd2201 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd2202 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd2204 | 183 | |
| | | ORDERS | /dev/rdsk/hd2205 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd2206 | 6 | |
| | hd23 | HISTORY | /dev/rdsk/hd2301 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd2302 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd2304 | 183 | |
| | | ORDERS | /dev/rdsk/hd2305 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd2306 | 6 | |
| | hd24 | HISTORY | /dev/rdsk/hd2401 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd2402 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd2404 | 183 | |
| | | ORDERS | /dev/rdsk/hd2405 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd2406 | 6 | |
| | hd25 | STOCK INDEX | /dev/rdsk/hd2501 | 850 | 2.0GB |
| WSA-1 | hd30 | HISTORY | /dev/rdsk/hd3001 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd3002 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd3004 | 183 | |
| | | ORDERS | /dev/rdsk/hd3005 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd3006 | 6 | |
| | hd31 | HISTORY | /dev/rdsk/hd3101 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd3102 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd3104 | 183 | |
| | | ORDERS | /dev/rdsk/hd3105 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd3106 | 6 | |

| | | | | | |
|---|---|---|---|---|---|
| | hd32 | HISTORY | /dev/rdsk/hd3201 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd3202 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd3204 | 183 | |
| | | ORDERS | /dev/rdsk/hd3205 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd3206 | 6 | |
| | hd33 | HISTORY | /dev/rdsk/hd3301 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd3302 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd3304 | 183 | |
| | | ORDERS | /dev/rdsk/hd3305 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd3306 | 6 | |
| | hd34 | ORDER LINE INDEX | /dev/rdsk/hd3401 | 721 | 2.0GB |
| | | NEW ORDER INDEX | /dev/rdsk/hd3402 | 33 | |
| | | ORDER INDEX 1 | /dev/rdsk/hd3403 | 73 | |
| | | CUSTOMER INDEX 2 | /dev/rdsk/hd3405 | 105 | |
| | hd35 | ROLLBACK | /dev/rdsk/hd3501 | 336 | 2.0GB |
| | | TEMP | /dev/rdsk/hd3502 | 728 | |
| | hd40 | HISTORY | /dev/rdsk/hd4001 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd4002 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd4004 | 183 | |
| | | ORDERS | /dev/rdsk/hd4005 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd4006 | 6 | |
| | hd41 | HISTORY | /dev/rdsk/hd4101 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd4102 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd4104 | 183 | |
| | | ORDERS | /dev/rdsk/hd4105 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd4106 | 6 | |
| | hd42 | HISTORY | /dev/rdsk/hd4201 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd4202 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd4204 | 183 | |
| | | ORDERS | /dev/rdsk/hd4205 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd4206 | 6 | |
| | hd43 | HISTORY | /dev/rdsk/hd4301 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd4302 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd4304 | 183 | |
| | | ORDERS | /dev/rdsk/hd4305 | 16 | |

| | | | | | |
|---|---|---|---|---|---|
| | | NEW ORDER | /dev/rdsk/hd4306 | 6 | |
| | hd44 | ORDER LINE INDEX | /dev/rdsk/hd4401 | 721 | 2.0GB |
| | | NEW ORDER INDEX | /dev/rdsk/hd4402 | 33 | |
| | | ORDER INDEX 1 | /dev/rdsk/hd4403 | 73 | |
| | | CUSTOMER INDEX 2 | /dev/rdsk/hd4405 | 105 | |
| | hd45 | ROLLBACK | /dev/rdsk/hd4501 | 43 | 2.0GB |
| | | TEMP | /dev/rdsk/hd4502 | 728 | |
| WSA-2 | hd50 | HISTORY | /dev/rdsk/hd5001 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd5002 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd5004 | 183 | |
| | | ORDERS | /dev/rdsk/hd5005 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd5006 | 6 | |
| | hd51 | HISTORY | /dev/rdsk/hd5101 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd5102 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd5104 | 183 | |
| | | ORDERS | /dev/rdsk/hd5105 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd5106 | 6 | |
| | hd52 | HISTORY | /dev/rdsk/hd5201 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd5202 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd5204 | 183 | |
| | | ORDERS | /dev/rdsk/hd5205 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd5206 | 6 | |
| | hd53 | HISTORY | /dev/rdsk/hd5301 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd5302 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd5304 | 183 | |
| | | ORDERS | /dev/rdsk/hd5305 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd5306 | 6 | |
| | hd54 | ORDER LINE INDEX | /dev/rdsk/hd5401 | 721 | 2.0GB |
| | | NEW ORDER INDEX | /dev/rdsk/hd5402 | 33 | |
| | | ORDER INDEX 1 | /dev/rdsk/hd5403 | 73 | |
| | | CUSTOMER INDEX 2 | /dev/rdsk/hd5405 | 105 | |
| | hd55 | ROLLBACK | /dev/rdsk/hd5501 | 43 | 2.0GB |
| | | TEMP | /dev/rdsk/hd5502 | 728 | |
| | hd60 | HISTORY | /dev/rdsk/hd6001 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd6002 | 251 | |

| | | | | | |
|---|---|---|---|---|---|
| | | CUSTOMER | /dev/rdsk/hd6004 | 183 | |
| | | ORDERS | /dev/rdsk/hd6005 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd6006 | 6 | |
| | hd61 | HISTORY | /dev/rdsk/hd6101 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd6102 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd6104 | 183 | |
| | | ORDERS | /dev/rdsk/hd6105 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd6106 | 6 | |
| | hd62 | HISTORY | /dev/rdsk/hd6201 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd6202 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd6204 | 183 | |
| | | ORDERS | /dev/rdsk/hd6205 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd6206 | 6 | |
| | hd63 | HISTORY | /dev/rdsk/hd6301 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hd6302 | 251 | |
| | | CUSTOMER | /dev/rdsk/hd6304 | 183 | |
| | | ORDERS | /dev/rdsk/hd6305 | 16 | |
| | | NEW ORDER | /dev/rdsk/hd6306 | 6 | |
| | hd64 | ORDER LINE INDEX | /dev/rdsk/hd6401 | 721 | 2.0GB |
| | | NEW ORDER INDEX | /dev/rdsk/hd6402 | 33 | |
| | | ORDER INDEX 1 | /dev/rdsk/hd6403 | 73 | |
| | | CUSTOMER INDEX 2 | /dev/rdsk/hd6405 | 105 | |
| | hd65 | ROLLBACK | /dev/rdsk/hd6501 | 43 | 2.0GB |
| | | TEMP | /dev/rdsk/hd6502 | 728 | |
| WSA-3 | hda10 | HISTORY | /dev/rdsk/hda1001 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda1002 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda1004 | 183 | |
| | | ORDERS | /dev/rdsk/hda1005 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda1006 | 6 | |
| | hda11 | HISTORY | /dev/rdsk/hda1101 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda1102 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda1104 | 183 | |
| | | ORDERS | /dev/rdsk/hda1105 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda1106 | 6 | |
| | hda12 | HISTORY | /dev/rdsk/hda1201 | 25 | 2.0GB |

| | | | | | |
|---|---|---|---|---|---|
| | | STOCK | /dev/rdsk/hda1202 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda1204 | 183 | |
| | | ORDERS | /dev/rdsk/hda1205 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda1206 | 6 | |
| | hda13 | HISTORY | /dev/rdsk/hda1301 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda1302 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda1304 | 183 | |
| | | ORDERS | /dev/rdsk/hda1305 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda1306 | 6 | |
| | hda14 | ORDER LINE INDEX | /dev/rdsk/hda1401 | 721 | 2.0GB |
| | | NEW ORDER INDEX | /dev/rdsk/hda1402 | 33 | |
| | | ORDER INDEX 1 | /dev/rdsk/hda1403 | 73 | |
| | | CUSTOMER INDEX 2 | /dev/rdsk/hda1405 | 105 | |
| | hda15 | ROLLBACK | /dev/rdsk/hda1501 | 43 | 2.0GB |
| | | TEMP | /dev/rdsk/hda1502 | 728 | |
| | hda20 | HISTORY | /dev/rdsk/hda2001 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda2002 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda2004 | 183 | |
| | | ORDERS | /dev/rdsk/hda2005 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda2006 | 6 | |
| | hda21 | HISTORY | /dev/rdsk/hda2101 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda2102 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda2104 | 183 | |
| | | ORDERS | /dev/rdsk/hda2105 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda2106 | 6 | |
| | hda22 | HISTORY | /dev/rdsk/hda2201 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda2202 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda2204 | 183 | |
| | | ORDERS | /dev/rdsk/hda2205 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda2206 | 6 | |
| | hda23 | HISTORY | /dev/rdsk/hda2301 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda2302 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda2304 | 183 | |
| | | ORDERS | /dev/rdsk/hda2305 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda2306 | 6 | |

| | | | | | |
|---|---|---|---|---|---|
| | hda24 | ORDER LINE INDEX | /dev/rdsk/hda2401 | 721 | 2.0GB |
| | | NEW ORDER INDEX | /dev/rdsk/hda2402 | 33 | |
| | | ORDER INDEX 1 | /dev/rdsk/hda2403 | 73 | |
| | | CUSTOMER INDEX 2 | /dev/rdsk/hda2405 | 105 | |
| | hda25 | ROLLBACK | /dev/rdsk/hda2501 | 43 | 2.0GB |
| | | TEMP | /dev/rdsk/hda2502 | 728 | |
| WSA-4 | hda30 | HISTORY | /dev/rdsk/hda3001 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda3002 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda3004 | 183 | |
| | | ORDERS | /dev/rdsk/hda3005 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda3006 | 6 | |
| | hda31 | HISTORY | /dev/rdsk/hda3101 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda3102 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda3104 | 183 | |
| | | ORDERS | /dev/rdsk/hda3105 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda3106 | 6 | |
| | hda32 | HISTORY | /dev/rdsk/hda3201 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda3202 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda3204 | 183 | |
| | | ORDERS | /dev/rdsk/hda3205 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda3206 | 6 | |
| | hda33 | HISTORY | /dev/rdsk/hda3301 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda3302 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda3304 | 183 | |
| | | ORDERS | /dev/rdsk/hda3305 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda3306 | 6 | |
| | hda34 | ORDER LINE INDEX | /dev/rdsk/hda3401 | 721 | 2.0GB |
| | | NEW ORDER INDEX | /dev/rdsk/hda3402 | 33 | |
| | | ORDER INDEX 1 | /dev/rdsk/hda3403 | 73 | |
| | | CUSTOMER INDEX 2 | /dev/rdsk/hda3405 | 105 | |
| | hda35 | ROLLBACK | /dev/rdsk/hda3501 | 43 | 2.0GB |
| | hda40 | HISTORY | /dev/rdsk/hda4001 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda4002 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda4004 | 183 | |
| | | ORDERS | /dev/rdsk/hda4005 | 16 | |

| | | | | | |
|---|---|---|---|---|---|
| | | NEW ORDER | /dev/rdsk/hda4006 | 6 | |
| | hda41 | HISTORY | /dev/rdsk/hda4101 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda4102 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda4104 | 183 | |
| | | ORDERS | /dev/rdsk/hda4105 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda4106 | 6 | |
| | hda42 | HISTORY | /dev/rdsk/hda4201 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda4202 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda4204 | 183 | |
| | | ORDERS | /dev/rdsk/hda4205 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda4206 | 6 | |
| | hda43 | HISTORY | /dev/rdsk/hda4301 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda4302 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda4304 | 183 | |
| | | ORDERS | /dev/rdsk/hda4305 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda4306 | 6 | |
| | hda44 | ORDER LINE INDEX | /dev/rdsk/hda4401 | 721 | 2.0GB |
| | | NEW ORDER INDEX | /dev/rdsk/hda4402 | 33 | |
| | | ORDER INDEX 1 | /dev/rdsk/hda4403 | 73 | |
| | | CUSTOMER INDEX 2 | /dev/rdsk/hda4405 | 105 | |
| WSA-5 | hda50 | HISTORY | /dev/rdsk/hda5001 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda5002 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda5004 | 183 | |
| | | ORDERS | /dev/rdsk/hda5005 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda5006 | 6 | |
| | hda51 | HISTORY | /dev/rdsk/hda5101 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda5102 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda5104 | 183 | |
| | | ORDERS | /dev/rdsk/hda5105 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda5106 | 6 | |
| | hda52 | HISTORY | /dev/rdsk/hda5201 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda5202 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda5204 | 183 | |
| | | ORDERS | /dev/rdsk/hda5205 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda5206 | 6 | |

| | | | | | |
|---|---|---|---|---|---|
| | hda53 | HISTORY | /dev/rdsk/hda5301 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda5302 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda5304 | 183 | |
| | | NEW ORDER | /dev/rdsk/hda5306 | 6 | |
| | hda54 | LOG/GRP1 | /dev/rdsk/hda5401 | 2040 | 4.0GB |
| | hda55 | LOG MIRROR/GRP2 | /dev/rdsk/hda5501 | 2040 | 2.0GB |
| | hda60 | HISTORY | /dev/rdsk/hda6001 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda6002 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda6004 | 183 | |
| | | ORDERS | /dev/rdsk/hda6005 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda6006 | 6 | |
| | hda61 | HISTORY | /dev/rdsk/hda6101 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda6102 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda6104 | 183 | |
| | | ORDERS | /dev/rdsk/hda6105 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda6106 | 6 | |
| | hda62 | HISTORY | /dev/rdsk/hda6201 | 25 | 2.0GB |
| | | STOCK | /dev/rdsk/hda6202 | 251 | |
| | | CUSTOMER | /dev/rdsk/hda6204 | 183 | |
| | | ORDERS | /dev/rdsk/hda6205 | 16 | |
| | | NEW ORDER | /dev/rdsk/hda6206 | 6 | |
| | hda64 | LOG/GRP2 | /dev/rdsk/hda6401 | 2040 | 4.0GB |
| | hda65 | LOG MIRROR/GRP1 | /dev/rdsk/hda6501 | 2040 | 2.0GB |
| WSA-6 | hdb11 | ORDER LINE | /dev/rdsk/hdb1101 | 972 | 2.0GB |
| | hdb12 | ORDER LINE | /dev/rdsk/hdb1201 | 972 | 2.0GB |
| | hdb13 | ORDER LINE | /dev/rdsk/hdb1301 | 972 | 2.0GB |
| | hdb14 | ORDER LINE | /dev/rdsk/hdb1401 | 972 | 2.0GB |
| | hdb15 | ORDER LINE | /dev/rdsk/hdb1501 | 972 | 2.0GB |
| | hdb20 | ORDER LINE | /dev/rdsk/hdb2001 | 972 | 2.0GB |
| | hdb21 | ORDER LINE | /dev/rdsk/hdb2101 | 972 | 2.0GB |
| | hdb22 | ORDER LINE | /dev/rdsk/hdb2201 | 972 | 2.0GB |
| | hdb23 | ORDER LINE | /dev/rdsk/hdb2301 | 972 | 2.0GB |
| | hdb24 | ORDER LINE | /dev/rdsk/hdb2401 | 972 | 2.0GB |
| | hdb25 | ORDER LINE | /dev/rdsk/hdb2501 | 972 | 2.0GB |
| WSA-7 | hdb35 | ORDER INDEX2 | /dev/rdsk/hdb3501 | 61 | 2.0GB |

| | | | | | |
|---|---|---|---|---|---|
| | hdc10 | STOCK | /dev/rdsk/hdc1001 | 251 | 2.0GB |
| | hdc11 | STOCK | /dev/rdsk/hdc1101 | 251 | 2.0GB |
| | hdc12 | STOCK | /dev/rdsk/hdc1201 | 251 | 2.0GB |
| | hdc13 | STOCK | /dev/rdsk/hdc1301 | 251 | 2.0GB |
| | hdc14 | STOCK | /dev/rdsk/hdc1401 | 251 | 2.0GB |
| | hdc15 | STOCK | /dev/rdsk/hdc1501 | 251 | 2.0GB |
| WSA-8 | hdc20 | STOCK | /dev/rdsk/hdc2001 | 251 | 2.0GB |
| | hdc21 | STOCK | /dev/rdsk/hdc2101 | 251 | 2.0GB |
| | hdc22 | STOCK | /dev/rdsk/hdc2201 | 251 | 2.0GB |
| | hdc24 | STOCK | /dev/rdsk/hdc2401 | 251 | 2.0GB |
| | hdc25 | STOCK | /dev/rdsk/hdc2501 | 251 | 2.0GB |
| | hdc30 | ORDER INDEX2 | /dev/rdsk/hdc3001 | 61 | 2.0GB |
| | hdc31 | ORDER INDEX2 | /dev/rdsk/hdc3101 | 61 | 2.0GB |
| | hdc32 | ORDER INDEX2 | /dev/rdsk/hdc3201 | 61 | 2.0GB |
| | hdc33 | ORDER INDEX2 | /dev/rdsk/hdc3301 | 61 | 2.0GB |
| | hdc34 | ORDER INDEX2 | /dev/rdsk/hdc3401 | 61 | 2.0GB |
| | hdc35 | ORDER INDEX2 | /dev/rdsk/hdc3501 | 61 | 2.0GB |

## 1.3. Insert and Delete Operations

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

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

## 1.4. Partitioning

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

Partitioning was not used on any table in this benchmark.

## 1.5. Replication, Duplication or Additions

*Replication of tables, if used, must be disclosed. Additional and/or duplicated attributes in any table must be disclosed along with a statement on the impact on performance.*

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

# *Clause 2 Related Items*

## 2.1 Random Number Generation

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

The seeds for each user were generated using the unique terminal numbers. Samples of input data were generated, captured and graphed to confirm randomness. In addition, the contents of the database were systematically searched, and randomly sampled by the auditor for patterns that would indicate the random number generator had effected any kind of a discernible pattern. None were found.

## 2.2 Input/Output Screen Layout

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

All screen layouts followed the specifications exactly.

## 2.3 Priced Terminal Feature Verification

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

The terminal attributes were verified by the auditor manually exercising each specification during the onsite audit portion of this benchmark.

## 2.4 Presentation Manager or Intelligent Terminal

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

The PC's in the priced configuration come with Microsoft Windows 95. Presentation is handled by the terminal emulator found in Windows software.

## 2.5 Transaction Statistics

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

**Table 2. 1 Transaction Statistics**

| Statistic | | Value |
|---|---|---|
| New Order | Home warehouse order lines | 99.01% |
| | Remote warehouse order lines | 0.99% |
| | Rolled back transactions | 0.99% |
| | Average items per order | 9.99 |
| Payment | Home warehouse | 85.17% |
| | Remote warehouse | 14.83% |
| | Accessed by last name | 59.91% |
| Order Status | Accessed by last name | 59.90% |
| Delivery | Skipped transactions | none |
| Transaction Mix | New Order | 44.69% |
| | Payment | 43.25% |
| | Order status | 4.02% |
| | Delivery | 4.02% |
| | Stock level | 4.00% |

## 2.6 Queueing Mechanism

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

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

# *Clause 3 Related Items*

## 3.1 Transaction System Properties (ACID)

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

The TPC Benchmark C Standard Specification defines a set of transaction processing system properties that a SUT must support during the execution of the benchmark. Those properties are Atomicity, Consistency, Isolation and Durability (ACID).

This section defines each of those properties, describes the steps taken to ensure that they were present during the test and describes a series of tests done to demonstrate compliance with the specification.

## 3.2 Atomicity

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

### 3.2.1 Completed Transactions

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

A row was randomly selected from the warehouse, district and customer tables, and the balances noted. A payment transaction was started with the same warehouse, district and

customer identifiers and a known amount. The payment transaction was committed and the rows were verified to contain correctly updated balances.

### 3.2.2 Aborted Transactions

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

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

## 3.3 Consistency

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

The benchmark specification requires explicit demonstration of the following four consistency conditions;

- The sum of the district balances in a warehouse is equal to the warehouse balance;
- for each district, the next order id minus one is equal to the maximum order id in the ORDER table and equal to the maximum new order id in the NEW-ORDER table;
- for each district, the maximum order id minus minimum order id in the ORDER table plus one equals the number of rows in the NEW-ORDER table for that district;
- for each district, the sum of the order line counts in the ORDER table equals the number of rows in the ORDER-LINE table for that district.

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

A performance run was completed including a full 30 minutes of steady state and checkpoints.

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

## 3.4 Isolation

*Isolation can be defined in terms of phenomena that can occur during the execution of concurrent transactions. These phenomena are P0 ("Dirty Write"), P1 ("Dirty Read"), P2 ("non-repeatable Read"), and P3 ("Phantom"). The table in Clause 3.4.1 of the TPC-C specifications defines the isolation requirements which must be met by the TPC-C transactions. Sufficient conditions must be enabled at either the system or application level to ensure the required isolation defined above (clause 3.4.1) is obtained.*

The benchmark specification defines nine required tests to be performed to demonstrate that the required levels of transaction isolation are met. These tests, described in Clauses 3.4.2.1 - 3.4.2.9, were all performed and verified as required.

Isolation tests one through nine were executed using shell scripts to issue queries to the database. Each script included timestamps to demonstrate the concurrency of operations. The

results of the queries were captured to files. The captured files were verified by the auditor to demonstrate the required isolation had been met.

For Isolation test seven, case A was followed.

## 3.5 Durability

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

### 3.5.1 Durable Media Failure

#### 3.5.1.1 Loss of Data

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

1. The database was backed up to extra disks.
2. The total number of orders was determined by the sum of D_NEXT_O_ID of all rows in the DISTRICT table giving the beginning count.
3. The RTE was started with 100 users.
4. The test was allowed to run for a minimum of 5 minutes.
5. One of the data disks was powered off by removing it from the cabinet.
6. The RTE was shut down.
7. The data disk was returned to the cabinet, powered back up and reformatted to simulate complete loss of data.
8. Data from the backup disk was copied to it.
9. Oracle was restarted and used the transaction log to roll forward and recover the data from committed transactions.
10. Step 2 was repeated and the difference between the first and second counts was noted.
11. The success file was used to determine the number of NEW-ORDERS successfully returned to the RTE.
12. The counts in step 9 and 10 were compared and the results verified that all committed transactions had been successfully recovered.
13. Data from the success file was used to query the database to demonstrate successful transactions had corresponding rows in the ORDER table, and rolled back transactions did not.

#### 3.5.1.2 Loss of Log

To demonstrate recovery from a permanent failure of durable medium containing Oracle recovery log data the following steps were executed:

1. The total number of orders was determined by the sum of D_NEXT_O_ID of all rows in the DISTRICT table giving the beginning count.
2. The RTE was started with 100 users.
3. The test was allowed to run for a minimum of 6 minutes.
4. One log disk was powered off by removing it from the cabinet.
5. Since the disk was mirrored, processing was not interrupted.
6. The RTE was shut down.
7. The log disk was returned to the cabinet and began normal recovery by synchronizing with its mirror image.
8. Step 2 was repeated and the difference between the first and second counts was noted.
9. The success file was used to determine the number of NEW-ORDERS successfully returned to the RTE.
10. The counts in step 9 and 10 were compared and the results verified that all committed transactions had been successfully recovered.

11. Samples were taken from the RTE files and used to query the database to demonstrate successful transactions had corresponding rows in the ORDER table.

### 3.5.2 Instantaneous Interruption and Loss of Memory

Because loss of power erases the contents of memory, the instantaneous interruption and the loss of memory tests were combined into a single test. This test was executed on a fully scaled database of 235 warehouses under a full load of 2350 users. The following steps were executed:

1. The total number of orders was determined by the sum of D_NEXT_O_ID of all rows in the DISTRICT table giving the beginning count.
2. The RTE was started with 2350 users.
3. The test was allowed to run for a minimum of 5 minutes.
4. The primary power to the processor was shutdown.
5. The RTE was shutdown.
6. Power was restored and the system performed an automatic recovery.
7. Oracle was restarted and performed an automatic recovery .
8. Step 2 was repeated and the difference between the first and second counts was noted.
9. The success file was used to determine the number of NEW-ORDERS successfully returned to the RTE.
10. The counts in step 9 and 10 were compared and the results verified that all committed transactions had been successfully recovered.
11. Data from the success file was used to query the database to demonstrate successful transactions had corresponding rows in the ORDER table, and rolled back transactions did not.

# *Clause 4 Related Items*

## 4.1 Initial Cardinality of Tables

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

**Table 4.1 Number of Rows for Server**

| Table | Occurrences |
|---|---|
| Warehouse | 235 |
| District | 2350 |
| Customer | 7,050,000 |
| History | 7,050,000 |
| Order | 7,050,000 |
| New Order | 2,115,000 |
| Order Line | 70,500,000 |
| Stock | 23,500,000 |
| Item | 100,000 |

## 4.2 Database Layout

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

Section 1.2 of this report details the distribution of database tables across all disks. The code that creates the tables is included in Appendix E.

## 4.3 Type of Database

*A statement must be provided that describes:*

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

Oracle V7.3 is a relational DBMS.

The interface used was Oracle V7.3 stored procedures accessed using the Oracle Call Interface (OCI) embedded in C code.

## 4.4 Database Mapping

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

The database was neither partitioned nor replicated.

## 4.5 180 Day Space

*Details of the 180 day space computations along with proof that the database is configured to sustain 8 hours of growth for the dynamic tables (Order, Order-Line, and History) must be disclosed .*

To calculate the space required to sustain the database log for 8 hours of growth at steady state the following steps were followed:

- The size of the redo log was queried from the Oracle catalog.
- Transactions were started and checkpoints were initiated automatically every 5 minutes.
- The number of new orders in the period between checkpoints was determined.
- The increase in size to the redo logs was divided by the number of transactions, giving bytes used per new order.
- This amount was multiplied by the reported tpm rate times 480 minutes, giving total space needed for 8 hours..
- This required space was mirrored.

For the dynamic tables the following steps were followed:

1. The database was queried for the size of the dynamic tables.
2. The sum of D-NEXT-O-ID was queried from the DISTRICT table.
3. A full performance run was executed.
4. Steps 1 & 2 were repeated.
5. The change in the size of the dynamic tables was divided by the number f new orders in the run giving growth per new order.
6. The number in the previous step was multiplied by the reported tpm rate times 480 minutes.

7. The numbers in steps 1 & 5 were added giving space needed for 8 hours.
8. The space allocated was verified to be larger than the space needed.

The 180 day space requirement is shown in Appendix F.

# *Clause 5 Related Items*

## 5.1 Throughput

*Measured tpmC must be reported.*

| | |
|---|---|
| Measured tpmC | 2735.23 tpmC |
| Price per tpmC | ¥110,341 |

## 5.2 Response Times

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

**Table 5.1 Response Times**

| Type | Average | Maximum | 90th % |
|---|---|---|---|
| New-Order | 1.92 | 24.57 | 3.81 |
| Payment | 1.42 | 24.55 | 3.25 |
| Order-Status | 1.47 | 19.19 | 3.30 |
| Interactive Delivery | 0.09 | 1.10 | 0.21 |
| Deferred Delivery | 1.83 | 22.40 | 3.68 |
| Stock-Level | 2.50 | 24.22 | 4.58 |
| Menu | 0.16 | 3.03 | 0.25 |

## 5.3 Keying and Think Times

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

**Table 5.2 Keying Times**

| Type | Minimum | Average | Maximum |
|---|---|---|---|
| New-Order | 18.10 | 18.29 | 18.53 |
| Payment | 3.01 | 3.07 | 3.38 |
| Order-Status | 2.01 | 2.05 | 2.15 |
| Interactive Delivery | 2.03 | 2.07 | 2.16 |
| Stock-Level | 2.02 | 2.07 | 2.18 |

**Table 5.3 Think Times**

| Type | Minimum | Average | Maximum |
|---|---|---|---|
| New-Order | 0.01 | 12.12 | 120.49 |
| Payment | 0.01 | 12.09 | 116.71 |
| Order-Status | 0.01 | 10.49 | 92.30 |
| Interactive Delivery | 0.01 | 5.14 | 46.88 |
| Stock-Level | 0.01 | 5.19 | 49.12 |

## 5.4 Response Time Frequency Distribution Curves and Other Graphs

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

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

*Think Time frequency distribution curves (see Clause 5.6.3) must be reported the New-Order transaction.*

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

**Figure 5.1: New Order Response Time Distribution**

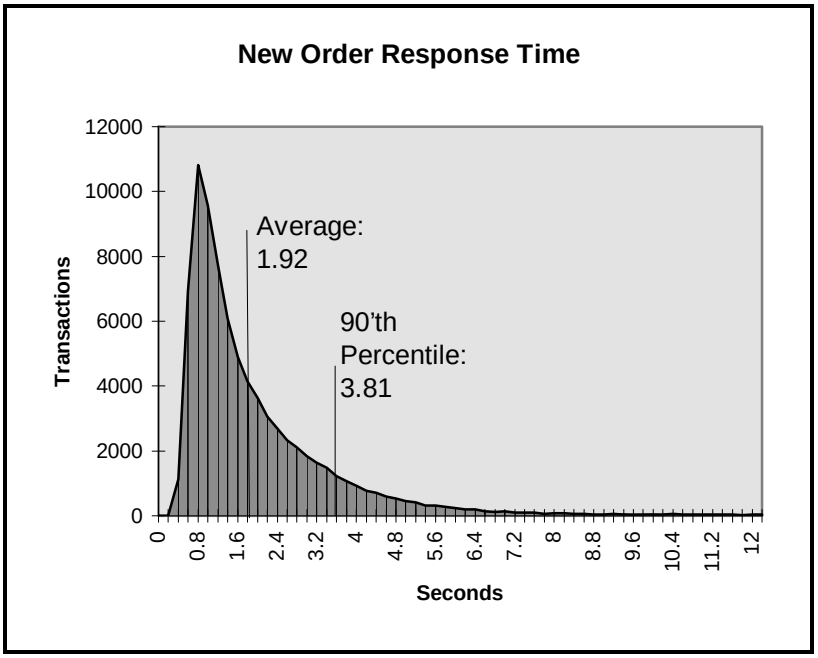



**Figure 5.2: Payment Response Time Distribution**

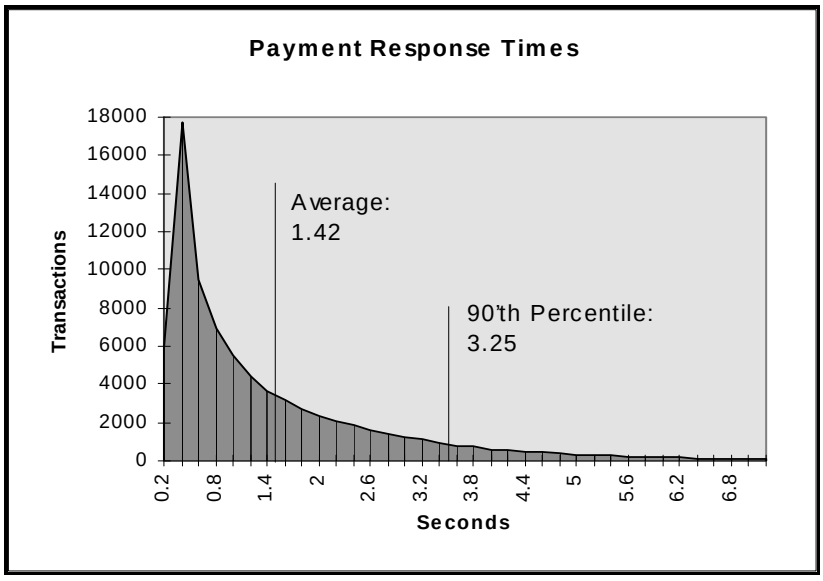


**Figure 5.3: Order Status Response Time Distribution**

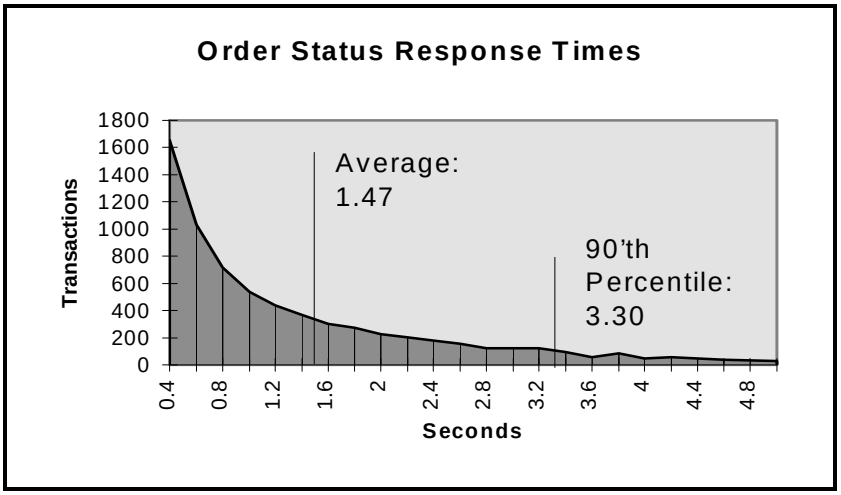



**Figure 5.4: Delivery Response Time Distribution**

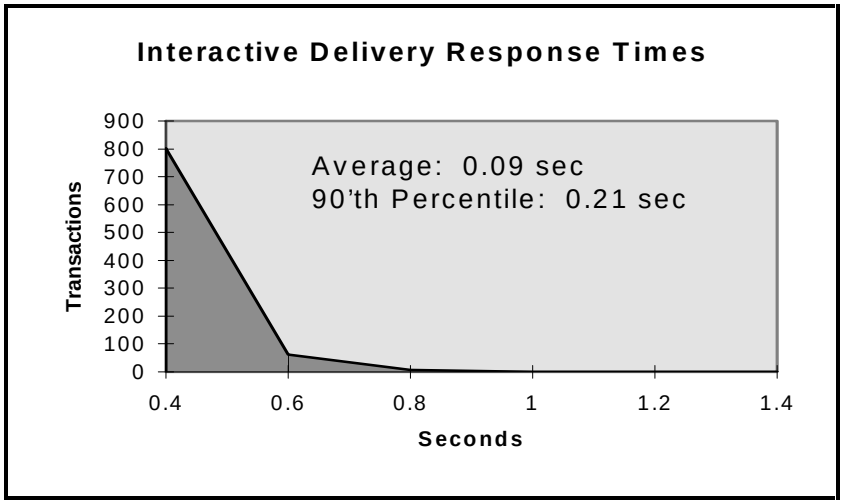


**Figure 5.5: Stock Level Response Time Distribution**

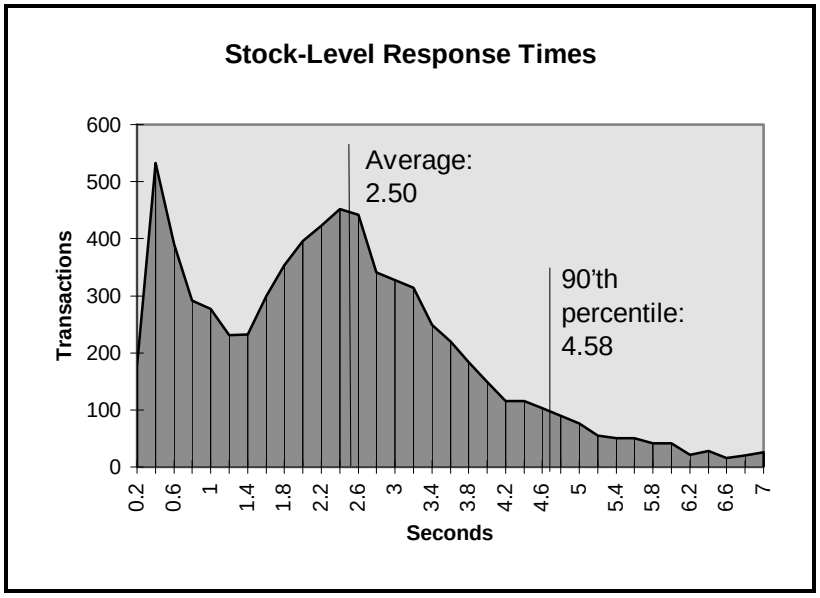



**Figure 5.6: New Order Think Time Frequency Distribution**

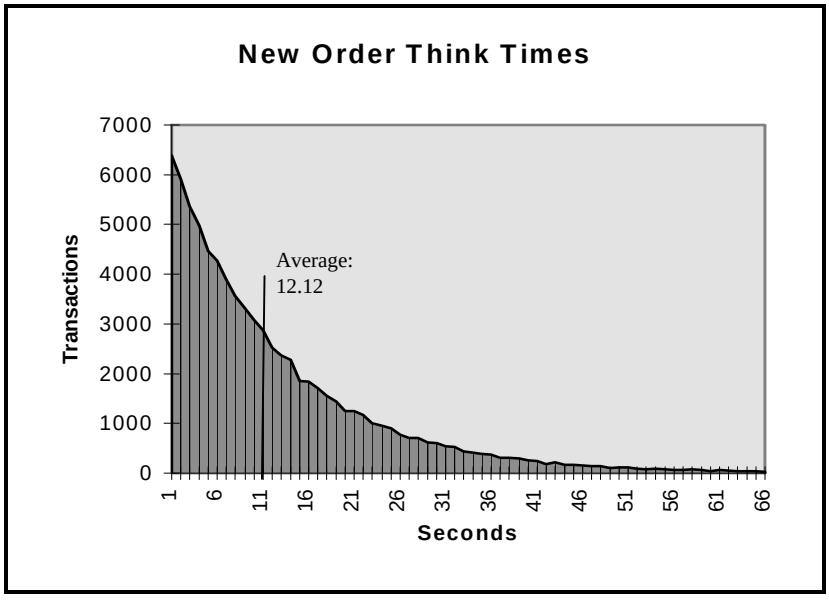


**Figure 5.7: Response time versus Throughput**

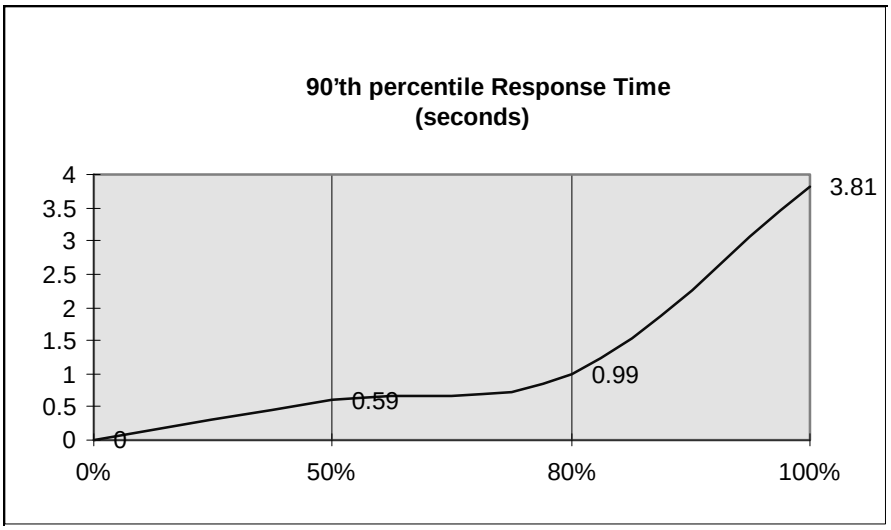
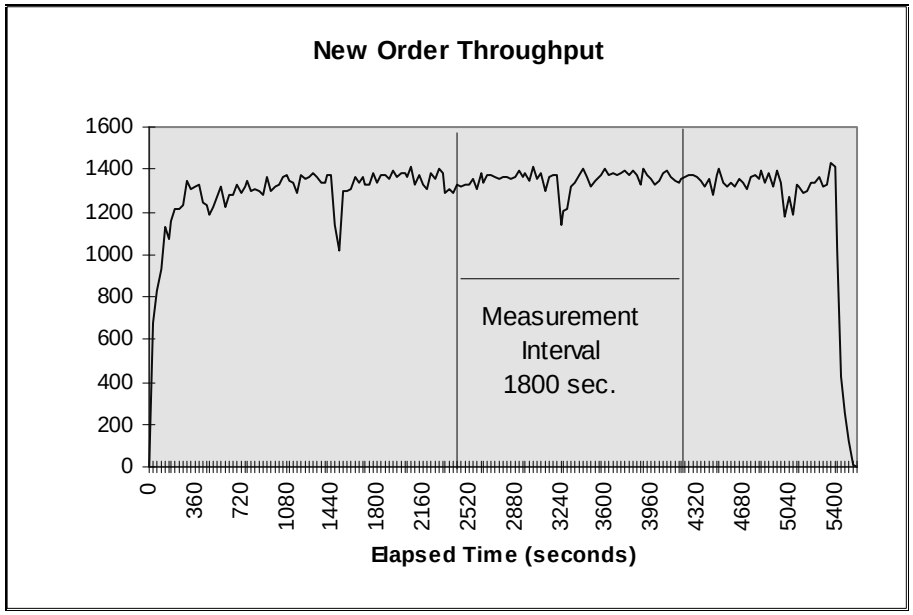



**Figure 5.8: New Order Sustained Throughput**



## 5.5 Steady State Determination

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

Steady state was determined using real time monitor utilities from both the operating system and the RTE. The throughput and response time behavior were determined by examining data reported for each 30-second interval over the duration of the measured run. Steady state was further confirmed by the throughput data collected during the run and graphed in Figure 5.8.

## 5.6 Work Performed During Steady State

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

The Oracle logical log is mirrored. To perform checkpoints at specific intervals, we set Oracle7's checkpoint interval to the maximum allowable value and wrote a script to schedule multiple log switches at specific intervals, which forced checkpoints to occur. Oracle automatically logs all checkpoints to an alert file on the server. The scripts included a wait time between each checkpoint equal to the measurement interval, which was 30 minutes. The checkpoint script was started manually after the RTE had all users logged in and sending transactions. At each checkpoint, Oracle7 wrote to disk all buffer pages that had been updated but not yet physically written to disk. The positioning of the checkpoint was verified to be clear of the guard zones and depicted on the graph in Figure 5.8.

For the priced system, the logical log space for an 8-hour period is priced.

### Serializable Transactions:

Oracle7 supports serializable transaction isolation in full compliance with the SQL92 and TPC-C requirements. This is implemented by extending multiple concurrency control mechanisms long supported by Oracle.

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

Beginning with Oracle7 release 7.3, a transaction may request a higher degree of isolation with the command SET TRANSACTION ISOLATION LEVEL SERIALIZABLE as defined in SQL92. This command will prevent read/write and write/write conflicts that would cause serializability failures.

A session can establish this mode as its default mode, so the SET TRANSACTION command need not be issued in each transaction.

Oracle implements SERIALIZABLE mode by extending the scope of read consistency from individual query to the entire transaction itself. ALL reads by serializable transactions are therefore repeatable, as the transaction will access prior versions of data changed (or deleted) by other transactions after the start of serializable transactions. Thus, a serializable transaction sees a fixed snapshot of the database, established at the beginning of the transaction.

To ensure proper isolation, a serializable transaction cannot modify the rows that that were changed by other transactions after the beginning of a serializable transaction, or an update (or delete) statement will fail with error ORA_08177: "cannot serialize access" and the statement will rollback.

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

## 5.7 Reproducibility

*A description of the method used to determine the reproducibility of the measurement results must be reported.*

The measurement procedure was repeated and the throughput verified to be within 2% of the reported measurement.

## 5.8 Measurement Period Duration

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

The reported measured interval was exactly 30 minutes long.

## 5.9 Regulation of Transaction Mix

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

The RTE used the a weighted distribution to control the transaction mix, and could not be adjusted during the run.

## 5.10 Transaction Statistics

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

Table 5.1.: Transaction Statistics

| Statistics | | Value |
|---|---|---|
| TRANSACTION MIX | NEW ORDER | 44.69% |
| | PAYMENT | 43.25% |
| | ORDER STATUS | 4.02% |
| | DELIVERY | 4.02% |
| | STOCK LEVEL | 4.00% |
| New Order | Home warehouse order lines | 99.01% |
| | Remote warehouse order lines | 0.99% |
| | Rolled back transactions | 0.99% |
| | Average items per order | 9.99% |
| Payment | Home warehouse | 85.17% |
| | Remote warehouse | 14.83% |
| | Accessed by last name | 59.91% |
| Order Status | Accessed by last name | 59.90% |
| Delivery | Skipped transactions | 0 |

## 5.11 Checkpoint Count and Location

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

One checkpoint was recorded before the measured window opened and another checkpoint was started 490 seconds inside the measured window. Both checkpoints were clear of the guard zone. Checkpoints were started exactly 30 minutes apart.

# *Clause 6 Related Items*

## 6.1 RTE Descriptions

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

The RTE used was developed at Fujitsu Limited and is proprietary. It consists of an RTE management process as shown in Appendix C, which forks off the individual RTE processes and controls the run. After the run completes, a separate report generator program collects all the log files and generates the final statistics of a run.

Inputs to the RTE include the names of the RTE machine to run, client machines to attach to, the database scale, the ramp-up, measurement and ramp-down times. These come from the configuration script file for the RTE management process.

## 6.2 Emulated Components

*It must be demonstrated that the functionality and performance of the components being emulated in the Driver System are equivalent to the priced system. The results of the test described in Clause 6.6.3.4 must be disclosed.*

There were no emulated components in the benchmark configuration other than the emulated users' workstations.

## 6.3 Functional Diagrams

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

The driver system performed the data generation and input functions of the display device. It also captured the input and output data and timestamps for post-processing of the reported metrics. No other functionality was included on the driver system

The abstract at the beginning of this report contains detailed diagrams of both the benchmark configuration and the priced configuration, including the driver system.

## 6.4 Networks

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

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

The abstract at the beginning of this report contains detailed diagrams of the 10 MBPS Ethernet LAN used in the tested and priced configurations.

## 6.5 Operator Intervention

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

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

# *Clause 7 Related Items*

## 7.1 System Pricing

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

*The total 5 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.*

A detailed price list is included in the abstract at the beginning of this report.

## 7.2 Availability, Throughput, and Price Performance

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

All hardware components are available as of the publication date of this report. Oracle V7.3 will be available no later than March, 1997.

## 7.3 Throughput and Price Performance

*A statement of the measured tpmC as well as the respective calculations for the 5-year pricing, price/performance (price/tpmC), and the availability date must be included.*

| | |
|---|---|
| •**Maximum Qualified Throughput:** | •**2735.23 tpmC** |
| •**Price per tpmC** | •**¥110,341** |
| •**Available** | •**March, 1997** |

## 7.4 Country Specific Pricing

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

This system is being priced for Japan.

## 7.5 Usage Pricing

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

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

Oracle support pricing is based on support from Oracle in Japan.

# *Clause 9 Related Items*

## 9.1 Auditor's Report

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

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

Performance Metrics, Inc.
2229 Benita Dr. Suite 101
Rancho Cordova, CA
(phone) 916/635-2822
(fax) 916/858-0109

## 9.2 Availability of the Full Disclosure Report

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

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

Transaction Processing Performance Council
c/o Shanley Public Relations
777 North First Street, Suite 6000
San Jose, CA 95112-6311
408/295-8894

# *Appendix A: Client Source Code*

Makefile

```
#
#               Makefile for test
#
#               Version         Beta2           1995/03/14
#

ORACLE_HOME             = /oracle
SOURCE_DIR              =
$(ORACLE_HOME)/bench/tpc/tpcc/TUX_source
ORACLE_INC              =
$(ORACLE_HOME)/rdbms/demo
TUXEDO_INC              = $(ROOTDIR)/include

MV              = mv
LN              = ln -s
RM              = rm -f
CC              = /usr/ccs/bin/cc
#CC             = /usr/local/bin/gcc

LIBS            = /usr/ccs/lib/libcurses.a
# LIBS          = -lncurses
# MAPOPTION             = -Wl,-M,mapfile
MAPOPTION               =
INCLUDEDIR              = -I. -I${SOURCE_DIR} -
I${ORACLE_INC} -I${TUXEDO_INC} -
I/usr/include/ncurses
# CCFLAGSDEFAULT        = -s $(INCLUDEDIR) -O -K
4 -K TMS -K INF -DDUR
###CFLAGSDEFAULT = -s $(INCLUDEDIR) -O -K 3 -
K TMS -K INF -DDUR
CCFLAGSDEFAULT          = -s $(INCLUDEDIR) -O -K
3  -K TMS -K INF -DDUR
#CCFLAGSDEFAULT         = $(INCLUDEDIR) -s -O -K
4 -Kinline2  -K TMS -K INF -Kpic -DDUR
#CCFLAGSDEFAULT         = $(INCLUDEDIR) -s -O -K
4
# CCFLAGSDEFAULT        = $(INCLUDEDIR) -s -O -K
4 -K TMS
# CCFLAGSDEFAULT        = $(INCLUDEDIR) -s -O -K
4 -K TMS -DDEBUG=50
# CCFLAGSDEFAULT        = $(INCLUDEDIR) -s -
DDEBUG=50 -O -g


all             : normal

scrtest         :
                make
                CCFLAGS='$(CCFLAGSDEFAULT)
$(MAPOPTION) -DSCRTEST' \
                        BLDCLI=$(CC) \
                        BLDFIN= \
                        BLDFOUT= \
                        BLDLIB='$(LIBS)' \
                        Tc

2cpu            :
                make
                CCFLAGS='$(CCFLAGSDEFAULT)
$(MAPOPTION) -DCPU2' \
                BLDCLI='${ROOTDIR}/bin/buildclient -v' \
                        BLDFIN='-f "' \
                        BLDFOUT='"' \
                        BLDLIB='-l $(LIBS)' \
                        Tc

normal          :
                make
                CCFLAGS='$(CCFLAGSDEFAULT)
$(MAPOPTION)' \

                BLDCLI='${ROOTDIR}/bin/buildclient -v' \
                        BLDFIN='-f "' \
                        BLDFOUT='"' \
                        BLDLIB='-l $(LIBS)' \
                        Tc

Tc              : Tc.c frame.o ui.o dummy.o
                $(BLDCLI) -o Tc \
                        $(BLDFIN) $(CCFLAGS)
Tc.c frame.o ui.o dummy.o $(BLDFOUT) \
                        $(BLDLIB)

frame.o: frame.c
                $(CC) -c $(CCFLAGS) frame.c

ui.o            : ui.c
                $(CC) -c $(CCFLAGS) ui.c

dummy.o         : dummy.c
                $(CC) -c $(CCFLAGS) $<

version.o : version.c
                -$(RM) version.c
                echo '#define DATE "\c' > version.c
                date >> version.c
                echo '"' >> version.c

clean           :
                -$(RM) Tc *.o


ui.h
/*
                ui.h : Header of low level screen
operation library

                Version         Beta            1995/02/24
                Version         Beta2           1995/03/06
*/


#ifndef _UI_H_
#define _UI_H_

#include <errno.h>
#include <stdio.h>
#include <stdlib.h>
#include <fcntl.h>
#include <string.h>
#include <unistd.h>
#include <sys/types.h>
#include <stdarg.h>

#ifndef __linux__
# include <sys/debug.h>
#endif

#ifdef __linux__
# include <ncurses/curses.h>
#else
# include <curses.h>
#endif

#define         BS                      8
#define TAB             9
#define         LF                      10
#define CR              13
#define ESC             27
#define DEL             127

#define UI_NOBORDER     1
#define WIN_NOBORDER            1

#define BW_BASE                         A_NORMAL
#define BW_STATUS       A_NORMAL
#define BW_MENU                         A_NORMAL
#define BW_MENUBORDER           A_NORMAL
#define BW_LININP       A_NORMAL
#define BW_LININPBORDER         A_NORMAL
#define BW_FRAME        A_NORMAL
#define BW_FRAMEBORDER          A_NORMAL
#define BW_RO_FIELD     A_UNDERLINE
#define BW_NE_FIELD     A_UNDERLINE
#define BW_ACTION_FIELD
                A_UNDERLINE
#define BW_NORMAL_FIELD
                A_STANDOUT
#define BW_DIBOX        A_NORMAL
#define BW_DIBORDER     A_NORMAL
#define BW_SCRLBOX      A_NORMAL
#define BW_SCRLBORDER           A_NORMAL

#ifdef USECOLOUR
#define COL_KOG                 11
#define COL_KOY                 12
#define COL_KOC                 13
#define COL_KOW                 14
#define COL_ROY                 15
#define COL_YOK                 16
#define COL_YOR                 17
#define COL_YOB                 18
#define COL_BOC                 19
#define COL_BOW                 20
#define COL_COK                 21
#define COL_COB                 22
#define COL_WOR                 23
#define COL_WOG                 24
#define COL_WOB                 25

#define COL_BASE
                COLOR_PAIR(COL_COK)
#define COL_STATUS
                COLOR_PAIR(COL_YOK)
#define COL_MENU
                COLOR_PAIR(COL_WOB)
#define COL_MENUBORDER
                COLOR_PAIR(COL_COB)
#define COL_LININP
                COLOR_PAIR(COL_WOB)
#define COL_LININPBORDER
                COLOR_PAIR(COL_BOC)
#define COL_FRAME
                COLOR_PAIR(COL_WOB)
#define COL_FRAMEBORDER
                COLOR_PAIR(COL_COB)
#define COL_RO_FIELD
                COLOR_PAIR(COL_WOR)
#define COL_NE_FIELD
                COLOR_PAIR(COL_COB) |
A_UNDERLINE
#define COL_ACTION_FIELD
                COLOR_PAIR(COL_YOR)
#define COL_NORMAL_FIELD
                COLOR_PAIR(COL_KOW)
#define COL_DIBOX
                COLOR_PAIR(COL_WOR)
#define COL_DIBORDER
                COLOR_PAIR(COL_WOR)
```

```
#define COL_SCRLBOX
        COLOR_PAIR(COL_WOB)
#define COL_SCRLBORDER
        COLOR_PAIR(COL_COB)
#endif

#define F_RJ                    1
#define F_RO                    2
#define F_ACTION        4
#define F_VALUE                 8
#define F_START                 16
#define F_NE                    32
#define F_PTR                   64

#define refreshScreen()
        refreshWin(stdscr)
#define refreshWin( win )  { \

        touchwin( win ); \

        wrefresh( win ); \
                                        }



WINDOW *initScreen( char *, int );
void closeScreen( void );
WINDOW *createWindow( int, int, int, int, char *, int,
long, long );
WINDOW *createDaughter( WINDOW *, int, int, int, int,
char *, int, long, long );
int mapWindow( WINDOW * );
int closeWindow( WINDOW * );
int getString( WINDOW *, char *, size_t );
int getfield( WINDOW *, int, int, char *, int, char *, void
(*)(), int );
void printfield( WINDOW *, int, int, char *, char *, int,
int );
void changestatus( char * );
void drawbox( WINDOW *, int, int, int, int );
void centrewin( int *, int *, int, int );
void fatalerror( char * );
int format( int, char *, char *, int, char * );
int triggerkey( char , char ** );
void nrefresh( int, ... );
void hpercbar( WINDOW *, int, int, int, int );
void vpercbar( WINDOW *, int, int, int, int );
void dpercbar( WINDOW *, int, int, int, int, int );
void hstackbar( WINDOW *, int, int, int, char *, ... );
void vstackbar( WINDOW *, int, int, int, char *, ... );



extern long   ATTR_BASE, ATTR_STATUS,
ATTR_MENU, ATTR_MENUBORDER,
                ATTR_LININP,
ATTR_LININPBORDER, ATTR_FRAME,
ATTR_FRAMEBORDER,
                ATTR_RO_FIELD,
ATTR_NE_FIELD, ATTR_ACTION_FIELD,
                ATTR_NORMAL_FIELD,
ATTR_DIBOX, ATTR_DIBORDER, ATTR_SCRLBOX,
                ATTR_SCRLBORDER;

#endif



ui.c
/*
        ui.c : Module for low level screen
operation

        Version     Beta        1995/02/24
        Version     Beta2       1995/03/06
        Version     Beta3       1995/06/28
        Version     Beta4       1996/07/05
*/



#include    <stdio.h>
#include    <time.h>
#ifdef      __linux__
# include   <ncurses/curses.h>
#else
# include   <curses.h>
#endif
#include    "ui.h"
#include    "cwalib.h"
#include    "frame.h"


long        ATTR_BASE, ATTR_STATUS,
ATTR_MENU, ATTR_MENUBORDER, ATTR_LININP,
        ATTR_LININPBORDER, ATTR_FRAME,
ATTR_FRAMEBORDER, ATTR_RO_FIELD,
        ATTR_NE_FIELD,
ATTR_ACTION_FIELD, ATTR_NORMAL_FIELD,
ATTR_DIBOX,
        ATTR_DIBORDER, ATTR_SCRLBOX,
ATTR_SCRLBORDER;

#ifdef      DUR
extern      DataField     neworder_data;
#endif


void setup_attrs( void );
void ctrlC_handler( int );
void printfield ( WINDOW *, int, int, char *, char *, int,
int );
void display_fields( WINDOW *, int, TextField *,
DataField * );
void queryframe( WINDOW *, int, TextField *,
DataField * );


/* Open curses and setup */

WINDOW *initScreen( char *title, int flags )
{
        int             len = ( int )strlen( title );

        initscr();
        savetty();
        setup_attrs();
        cbreak();
        noecho();
        nonl();
#ifndef                 __linux__
        intrflush( stdscr, FALSE );
#endif
        keypad( stdscr, TRUE );
        nodelay( stdscr, FALSE );
        leaveok( stdscr, FALSE );

        if ( !( flags & WIN_NOBORDER ) )
        {
                drawbox( stdscr, 0, 0,
LINES-1, COLS );
        }
        else
        {
                len = 0;
        }

        if ( len > 0 )
        {
                move( 0, (COLS/2)-
((len+2)/2) );
                printw( " %s ", title );
        }
        refreshScreen();
}



/* Setup the attributes used for the UI depending if
we're on */

void setup_attrs()
{
#ifdef USECOLOUR
        if ( has_colors() )
        {
                start_color();

                init_pair( COL_KOG,
COLOR_BLACK, COLOR_GREEN );
                init_pair( COL_KOY,
COLOR_BLACK, COLOR_YELLOW );
                init_pair( COL_KOC,
COLOR_BLACK, COLOR_CYAN );
                init_pair( COL_KOW,
COLOR_BLACK, COLOR_WHITE );
                init_pair( COL_ROY,
COLOR_RED, COLOR_YELLOW );
                init_pair( COL_YOK,
COLOR_YELLOW, COLOR_BLACK );
                init_pair( COL_YOR,
COLOR_YELLOW, COLOR_RED );
                init_pair( COL_YOB,
COLOR_YELLOW, COLOR_BLUE );
                init_pair( COL_BOC,
COLOR_BLUE, COLOR_CYAN );
                init_pair( COL_BOW,
COLOR_BLUE, COLOR_WHITE );
                init_pair( COL_COB,
COLOR_CYAN, COLOR_BLUE );
                init_pair( COL_COK,
COLOR_CYAN, COLOR_BLACK );
                init_pair( COL_WOR,
COLOR_WHITE, COLOR_RED );
                init_pair( COL_WOG,
COLOR_WHITE, COLOR_GREEN );
                init_pair( COL_WOB,
COLOR_WHITE, COLOR_BLUE );

                ATTR_BASE
        = COL_BASE;
                ATTR_STATUS
        = COL_STATUS;
                ATTR_MENU
        = COL_MENU;
                ATTR_MENUBORDER
        = COL_MENUBORDER;
                ATTR_LININP
        = COL_LININP;
                ATTR_LININPBORDER   =
COL_LININPBORDER;
                ATTR_FRAME
        = COL_FRAME;
                ATTR_FRAMEBORDER  =
COL_FRAMEBORDER;
                ATTR_RO_FIELD
        = COL_RO_FIELD;
                ATTR_NE_FIELD
        = COL_NE_FIELD;
                ATTR_ACTION_FIELD    =
COL_ACTION_FIELD;
                ATTR_NORMAL_FIELD   =
COL_NORMAL_FIELD;
                ATTR_DIBOX
        = COL_DIBOX;
                ATTR_DIBORDER
        = COL_DIBORDER;
                ATTR_SCRLBOX
        = COL_SCRLBOX;
```

```
                ATTR_SCRLBORDER
        = COL_SCRLBORDER;
        }
        else
#endif
        {
                ATTR_BASE
        = BW_BASE;
                ATTR_STATUS
        = BW_STATUS;
                ATTR_MENU
        = BW_MENU;
                ATTR_MENUBORDER
        = BW_MENUBORDER;
                ATTR_LININP
        = BW_LININP;
                ATTR_LININPBORDER   =
BW_LININPBORDER;
                ATTR_FRAME
        = BW_FRAME;
                ATTR_FRAMEBORDER   =
BW_FRAMEBORDER;
                ATTR_RO_FIELD
        = BW_RO_FIELD;
                ATTR_NE_FIELD
        = BW_NE_FIELD;
                ATTR_ACTION_FIELD    =
BW_ACTION_FIELD;
                ATTR_NORMAL_FIELD   =
BW_NORMAL_FIELD;
                ATTR_DIBOX
        = BW_DIBOX;
                ATTR_DIBORDER
        = BW_DIBORDER;
                ATTR_SCRLBOX
        = BW_SCRLBOX;
                ATTR_SCRLBORDER
        = BW_SCRLBORDER;
        }

        attrset( ATTR_BASE );
#ifndef         __linux__
        bkgd( ATTR_BASE );
#endif
}



/* Clear the screen and close curses */

void closeScreen()
{
        slk_clear();
        clear();
        refresh();
        resetty();
        endwin();
}



/* Create a window with a border and title */

WINDOW *createWindow( int row, int col, int height,
int width, char *title,
                                int flags, long
wattr, long fattr )
{
        WINDOW  *win;
        char    buf[80];
        int     len;


        win = newwin( height, width, row, col );
        leaveok( stdscr, TRUE );
#ifndef         __linux__
        wbkgd( win, wattr );
#endif

        if ( !( flags & WIN_NOBORDER ) )
        {
                wattrset( win, fattr );
                box( win, ACS_VLINE,
ACS_HLINE );
                len = ( int )strlen( title );
        }
        else
        {
                len = 0;
        }

        wattrset( win, wattr );

        keypad( win, TRUE );
#ifndef         __linux__
        intrflush( win, FALSE );
#endif
        nodelay( win, FALSE );

        if ( len > 0 )
        {
                sprintf( buf, " %s ", title );
                wmove( win, 0, (width/2)-(
(len+2)/2) );
                waddstr( win, buf );
        }

        return win;
}



/* Create a daughter window */

WINDOW *createDaughter( WINDOW *parent, int row,
int col, int height,
                int width, char *title, int
flags, long wattr, long fattr )
{
        WINDOW  *win;
        char    buf[80];
        int     len, parrow, parcol;


        /* Start of FUB code */

        getbegyx( parent, parrow, parcol );
        win = newwin( height, width, parrow +
row, parcol + col );

        /* End of FUB code */


#ifndef         __linux__
        wbkgd( win, wattr );
#endif

        if ( !( flags & WIN_NOBORDER) )
        {
                wattrset( win, fattr );
                box( win, ACS_VLINE,
ACS_HLINE );
                len = ( int )strlen( title );
        }
        else
        {
                len = 0;
        }

        wattrset( win, wattr );

        keypad( win, TRUE );
#ifndef         __linux__
        intrflush( win, FALSE );
#endif
        nodelay( win, FALSE );

        if ( len > 0 )
        {
                sprintf( buf, " %s ", title );
                wmove( win, 0, (width/2)-
((len+2)/2));
                waddstr( win, buf );
        }

        return win;
}



/* Close a window */

int closeWindow ( WINDOW *win )
{
        wclear( win );
        delwin( win );
}



/* Get a field according to the format     */

int getfield( WINDOW *win, int row, int col, char *buf,
int flags, char *fmt,
                void (*actionfunc)( ), int fldn
)
{
        int     i, p, k, blen, dlen;
        bool    exitflag = FALSE;
        bool    valid;
        char    choices[80], buf2[80];

        blen = strlen( buf );
        p = dlen = blen;

        wmove( win, row, col );
        printfield( win, row, col, fmt, buf, p, flags
);

        while ( !exitflag )
        {
                wrefresh( win );
                k = wgetch( win );

                debugmsg( ( stderr, "%d
%x\n", k, k ) );

                switch( k )
                {
                case KEY_UP :
                case KEY_DOWN :
                case ESC :
                case LF :
                case CR :
                case TAB :
                        exitflag =
TRUE;
                        break;

                case KEY_LEFT :
                /* ¥«¡½¥½ë¤ò°¸¤Ø¡£ */
                        if ( ( p > 0 ) &&
                                        !(
( flags & F_ACTION ) || ( flags & F_RO ) ) )
                        {

        p--;
                        }
```

```
                                        break;

                                case KEY_RIGHT :
                /* ¥«¡¼¥½¥ë¤ò±¦¤Ø¡£ */
                                        if ( ( p < blen )
&&
                                                                !(
( flags & F_ACTION ) || ( flags & F_RO ) ) )
                                        {

                p++;
                                        }
                                        break;

                                /* case TERMBS : */
                                case BS :
                                case KEY_BACKSPACE :
                /* ¥Ð¥Ã¥¯¥¹¥Ú¡¼¥¹¡£ */
                                        if ( ( p > 0 ) &&
                                                                !(
( flags & F_ACTION ) || ( flags & F_RO ) ) )
                                        {

                p--;

                for ( i = p; buf[i] != 0; i++ )
                                                                {

                buf[i] = buf[i+1];
                                                                }

                blen--;
                                        }
                                        break;

                                /* case CONSOLEBS : */
                                case DEL :
                /* °ìÊ¸»ú°ì½ü¡£ */
                                        if ( ( p >= 0 )
&&
                                                                !(
( flags & F_ACTION ) || ( flags & F_RO ) ) )
                                        {

                for ( i = p; buf[i] != 0; i++ )
                                                                {

                buf[i] = buf[i+1];
                                                                }

                blen--;
                                        }
                                        break;

                                default :
                                        if ( ( flags &
F_ACTION ) && ( k == ' ' ) )
                                        {

                (*actionfunc)( fldn );
                                        }
                                        else
                                        {
                                                                if
( isprint( k ) && !( flags & F_RO ) )
                                                                {

                /* °ìÃÖ p ¤ËÊ¸»ú k ¤òÁÞÆþ¤¹¤ë¡£ */


                for( i = blen; i >= p ; i-- )

                {

                                buf[i+1] = buf[i];

                }

                buf[p++] = ( char )k;

                blen++;


                if ( format( flags, fmt, buf, p, buf2 )

                                == -1 )

                {

                                /* Ê¸»ú k
¤¬ÉÔÅ¬Åö¤ÊÊ¸»ú¤Ê¤é¡¢

                                                                ºî½ü¤¹¤ë¡£ */

                                p--;


                                for ( i = p; buf[i] != 0; i++ )

                                {

                                                buf[i] =
buf[i+1];

                                }

                                blen--;

                }
                                                                }
                                                break;
                                }

                                printfield( win, row, col, fmt,
buf, p, flags );
                }

                k <<= 1;
                if ( p != dlen ) {
                                k += 1;
                }

                debugmsg( ( stderr, "Key = 0x%X(%d)
flag = %d\n",
                                k >> 1, k >> 1,  k & 1 ) );

                return          k;
}



/* print a field according to the format */

void printfield( WINDOW *win, int row, int col, char
*fmt, char *buf,
                                                int curp, int
flags )
{
                int             p, i, l = strlen( buf );
                char            buf2[80];
                long            attr;


                wmove( win, row, col );

                if ( flags & F_NE )
                {
                                wattrset( win,
ATTR_NE_FIELD );
                }
                else if ( flags & F_ACTION )
                {
                                wattrset( win,
ATTR_ACTION_FIELD );
                }
                else if ( flags & F_RO )
                {
                                wattrset( win,
ATTR_RO_FIELD );
                }
                else
                {
                                wattrset( win,
ATTR_NORMAL_FIELD );
                }

                if ( ( p = format( flags, fmt, buf, curp, buf2
) ) == -1 )
                {
                                for( i = 0; i < ( int )strlen( fmt
); i++ )
                                {
                                                waddch( win,
'*' );
                                }

                                debugmsg( ( stderr,
"printfield(Invalid form) : %s %s -> ***\n",
                                                fmt, buf ) );
                }
                else
                {
                                waddstr( win, buf2 );
                }

                wmove( win, row, col+p );
}



/* Change the status line in the main window */

void changestatus( char *status )
{
                int             len = strlen( status );
                long            attr;

                move( LINES-1, (COLS/2)-(len/2) );
                attr = getattrs( stdscr );

                attrset( ATTR_STATUS );
                deleteln();
                addstr( status );
                attrset( attr );

                refresh();
}



/* Draw a box */

void drawbox( WINDOW *win, int row, int col, int
height, int width )
{
                wmove( win, row, col );
                waddch( win, ACS_ULCORNER );
                wmove( win, row, col+1 );
                whline( win, ACS_HLINE, width-2 );
                wmove( win, row, col+width-1 );
                waddch( win, ACS_URCORNER );

                wmove( win, row+height-1, col );
                waddch( win, ACS_LLCORNER );
                wmove( win, row+height-1, col+1 );
                whline( win, ACS_HLINE, width-2 );
```

```
		wmove( win, row+height-1, col+width-1 );
		waddch( win, ACS_LRCORNER );

		wmove( win, row+1, col );
		wvline( win, ACS_VLINE, height-2 );
		wmove( win, row+1, col+width-1 );
		wvline( win, ACS_VLINE, height-2 );
}



/* Calculate the rc coords for a centred window */

void centrewin( int *row, int *col, int rows, int cols )
{
		if ( *row == -1 )
		{
			*row = ( (LINES/2)-
((rows+2)/2) ) - 1;
		}
		if ( *col == -1 )
		{
			*col = ( (COLS/2)-
((cols+4)/2) ) - 1;
		}
}



/* Format data according to fmt, and send back in out
*/

int format( int flags, char *fmt, char *data, int realcurp,
char *out )
{
		bool		endofdata = FALSE;
		int		i = 0;
		/* fmt Ãæ¤Î¸½ºßÃíÌÜ¤·¤Æ¤¤¤ë

		  Ê¸»ú¤ò»Ø¤¹ pointer */
		int		j = 0;
		/* data Ãæ¤Î¸½ºßÃíÌÜ¤·¤Æ¤¤¤ë

		  Ê¸»ú¤ò»Ø¤¹ pointer */
		int		len = strlen( fmt );
		int		curp = len;
		/* out Ãæ¤Î¥«¡¼¥½¥ë°ÌÃÖ */
		int		minusp = -1;
		/* '-' µ-³æ¤Î°ÌÃÖ (^^;; */


		if ( flags & F_RJ )
		{
			/*
É½¼¨¤ò±¦µí¤á¤Ç¹Ô¤Ê¤¦¾¡ç¡¢¥Ç¡¼¥¿¤Î¸å¤í¤«¤é½èÍ
ý¤·¤Æ¤¤¤¯¡£ */

			i = len-1;
			out[len] = 0;
			j = strlen( data )-1;
		}

		for( ; fmt[i] != 0; flags & F_RJ ? i-- : i++ )
		{
			/* data
¤¬¤Ê¤¯¤Ê¤ì¤Ð¡¢½ªÎ¥Õ¥é¥°¤òÎ©¤Æ¤ë¡£ */
			/*
½çÈÖ¤ò´¹¤¨¤Ê¤¤¤È¡¢segmentation fault ¤¹¤ë? */

			if ( ( data[j] == 0 ) || ( ( flags
& F_RJ ) && j < 0 ) )
			{
				endofdata =
TRUE;
			}

			if ( ( fmt[i] == 'X' ) || ( fmt[i]
== '9' )
				|| ( fmt[i] == 'n'
) )
			{
				if ( !endofdata
)
				{
					if
( ( fmt[i] == 'X' )
		|| ( ( fmt[i] == '9' )
			&& isdigit( data[j] ) )
		|| ( ( fmt[i] == 'n' )
			&& isdigit( data[j] ) ) )
					{
		/*
¸Æ¤Ó½Ð¤µ¤ì¤¿¾þÅÀ¤Ç¤Î¥«¡¼¥½¥ë°ÌÃÖ¤ò¡¢
		  ½ñ¼°ÊÑ´¹¸å¤Î¥«¡¼¥½¥ë°ÌÃÖ¤ËÊÑ´¹¡£
*/

		if ( j == realcurp )
		{
			curp = i;
		}

		out[i] = data[flags & F_RJ ? j-- : j++];
					}
		else if ( data[j] == '-' )
					{
		/* Ê¸»ú¤Çï¤Ê¯¡¤Éé¹æ¤È¤·¤Æ¤Î '-' */

		if ( minusp == -1 )
		{
			/* '-' ¤ò¸¡½Ð¤·¤¿¤Î¤Çµ·Ï¿¡¥
			  ¼Âºý¤Î½ñ¤-³þ¤ß¤Ï 'M' ¤ò
			  ¸¡½Ð¤·¤Æ¤«¤é */

			if ( fmt[i] == '9' )
			{
				out[i] = '0';
			}
			else
			{
				/* 'n' ¤Î»þ */

				out[i] = ' ';
			}
			minusp = -2;
		}
		else
		{
			/* 'M'
¤Ï´û¤Ë¸¡½Ð¤·¤Æ¤¤¤ë¤Î¤Ç¡¤
			  '-' ¤ò½ÐÎÏ¤¹¤ë¡¥ */

			out[minusp] = '-';
			minusp = -1;
		}
		( flags & F_RJ ) ? j-- : j++;
					}
		else
					{
		return -1;
					}
				}
				else
				{
		/* ½ñ¤-³þ¤ó¤ÀÊ¸»ú¿ô =
¸½ºß¤Î¥«¡¼¥½¥ë°ÌÃÖ¤ò
¥»¥Ã¥È¡£±¦µí¤á¤Î»þ¤Ï¡¢out ¤Î°Ç¸å¤Î°ÌÃÖ¤ò
¥»¥Ã¥È¡£ */

					if
( ( curp == len ) && !( flags & F_RJ ) )
					{
		curp = i;
					}

		/*
¥Ç¡¼¥¿Æþ¤Ã¤Æ¤¤¤Ê¤¤³¤í¤ò¡¢fmt
¤Ë½¾¤Ã¤Æ
padding */

		switch( fmt[i] )
					{
		case 'X':
		out[i] = ' ';
		break;
		case '9':
		out[i] = '0';
		break;
		case 'n':
		out[i] = ' ';
		break;
					}
				}
			}
```

```
                        else if ( fmt[i] == 'M' )
                        {
                                switch (
minusp )
                                {
                                case -1 :

                /* '-' ¤ò¸¡½Ð¤·¤¿¤é¡¤'-'
¤ò½ÐÎÏ¤Ç¤-¤ë¤è¤¦¤Ë¡¤

°ÌÃÖ¤òÊÝÂ¸¡¥²³¾¤Ë¶õÇò¤ò½ÐÎÏ¡¥ */


                out[i] = ' ';

                minusp = i;

                break;
                                case -2 :

                /* '-' ¤¬´û¤Ë¸¡½Ð¤µ¤ì¤Æ¤¤¤ë¤Î¤Ç¡¤'-'
¤ò½ÐÎÏ¡¥

¥Õ¥é¥°¤ò½é´ü²½¤¹¤ë¡¥ */


                out[i] = '-';

                minusp = -1;

                break;
                                default :

                /* Ê£¿ô¤Î 'M' ¤¬½Ð¤ë¤³¤È¤ï¤Ê¤¤¡¥

(°ì¤Ä¤Î¿ô»ú¤ËÉé¹æ¤ïÂ¿¯¤Æ°ì¤Ä) */


                return -1;
                                }
                        }
                        else
                        {
                                out[i] = fmt[i];
                        }
                }

                if ( minusp == -2 )
                {
                        /* '-'
¤ò¸¡½Ð¤·¤¿¤¬¡¤½èÍý¤µ¤ì¤Æ¤¤¤Ê¤¤ */

                        return -1;
                }
                if ( !( flags & F_RJ ) && ( data[j] != 0 ) )
                {
                        return -1;
                }
                if ( ( flags & F_RJ ) && ( j != -1 ) )
                {
                        return -1;
                }
                if ( !( flags & F_RJ ) )
                {
                        out[i] = 0;
                }

                /* ºÇ½ªÅª¤Ê out
Ãæ¤Î¥«¡¼¥½¥ë°ÌÃÖ¤òÊÖ¤¹¡£ */

                return curp;
}


#if 0
```

```
/* Return menu option chceen from a trigger key */

int triggerkey( char k, char **l )
{
        int             i;


        k = toupper( k );

        for( i = 0; l[i] != 0; i++ )
        {
                if ( k == firstcap( l[i] ) )
                {
                        return i;
                }
        }

        return -1;
}

#endif



/* Refresh several windows at a time with no flicker */

void nrefresh( int n, ... )
{
        va_list         l;
        WINDOW          *win;
        int             i;


        va_start( l, n );
        for ( i = 0; i < n; i++ )
        {
                win = va_arg( l, WINDOW *
);
                touchwin( win );
                wnoutrefresh( win );
        }
        va_end( l );

        doupdate();
}



/* Horizontal percenttape bar */

void hpercbar( WINDOW *win, int row, int col, int len,
int value )
{
        int             barlen = len - 4;
        int             i, p = ( int )( ( ( float
)value/100.0 )*barlen );


        wmove( win, row, col );
        wprintw( win, "%3d ", value );

        for( i = 0; i < barlen; i++ )
        {
                if ( i < p )
                {
                        waddch( win,
ACS_BLOCK );
                }
                else
                {
                        waddch( win,
ACS_CKBOARD );
                }
        }
}
```

```
/* Vertical percentage bar */

void vpercbar( WINDOW *win, int row, int col, int len,
int value )
{
        int             barlen = len-1;
        float           p1, p2, p3, scale = 100.0/(
float )barlen;
        int             i;


        wmove( win, row, col );

        if ( value == 100 )
        {
                waddstr( win, "**" );
        }
        else
        {
                wprintw( win, "%2d", value
);
        }

        for( i = 0; i < barlen; i++ )
        {
                p1 = scale*(float)(i+1);
                p2 = p1 - (scale/2);
                p3 = p1 - scale;

                wmove( win, (row-i) - 1,
col+1 );

                if ( value <= p3 )
                {
                        waddch( win,
ACS_CKBOARD );
                }
                else if ( value <= p2 )
                {
                        waddch( win,
'.' );
                }
                else
                {
                        waddch( win,
':' );
                }
        }
}

 /* Double percentage bar */
void dpercbar( WINDOW *win, int row , int col, int len,
int v1, int v2)
{
        int             barlen = len-1;
        float           p1, p2, p3, scale =
100.0/(float)barlen;
        int             i;


        wmove( win, row, col );

        if ( v1 == 100 )
        {
                waddstr( win, "**" );
        }
        else
        {
                wprintw( win, "%2d", v1 );
        }

        waddch( win, '/' );
```

```
        if ( v2 == 100 )
        {
                waddstr( win, "**" );
        }
        else
        {
                wprintw( win, "%-2d", v2 );
        }

        for( i = 0; i < barlen; i++ )
        {
                p1 = scale*(float)(i+1);
                p2 = p1 - (scale/2);
                p3 = p1 - scale;

                wmove( win, (row-i)-1, col+1
);

                if ( v1 <= p3 )
                {
                        waddch( win,
ACS_CKBOARD );
                }
                else if ( v1 <= p2 )
                {
                        waddch( win,
'.' );
                }
                else
                {
                        waddch( win,
':' );
                }

                waddch( win, ' ' );

                if ( p2 <= p3 )
                {
                        waddch( win,
ACS_CKBOARD );
                }
                else if ( v2 <= p2 )
                {
                        waddch( win,
'.' );
                }
                else
                {
                        waddch( win,
':' );
                }
        }
}



/*  Vertical stacking bar */

void vstackbar( WINDOW *win, int row, int col, int len,
char *icons, ... )
{
        va_list     l;
        float       scale = 100.0/(float)len;
        float       tot = 0;
        int         value, i, nicons = strlen(
icons), n = 0;
        char        c;

        va_start( l, icons );
        wmove( win, row, col );

        value = va_arg( l, int );

        for( i = 0; i < len; )
        {
                if ( n >= nicons )
                {
                        wmove( win,
(row-i)-1, col );
                        waddch( win,
ACS_CKBOARD );
                        i++;
                }
                else if ( tot < value )
                {
                        wmove( win,
(row-i)-1, col );
                        waddch( win,
icons[n] );
                        tot += scale;
                        i++;
                }
                else
                {
                        n++;
                        tot = 0;

                        if ( n < nicons
)
                        {
        value = va_arg( l, int );
                        }
                }

        va_end( l );
}



/* Horizontal stacking bar */

void hstackbar( WINDOW *win, int row, int col, int len,
char *icons, ... )
{
        va_list     l;
        float       scale = 100.0/(float)len;
        float       tot = 0;
        int         value, i, nicons = strlen(
icons ), n = 0;
        char        c;

        va_start( l, icons );
        wmove( win, row, col );

        value = va_arg( l, int );

        for( i = 0; i < len; )
        {
                if ( n >= nicons )
                {
                        waddch( win,
ACS_CKBOARD );
                        i++;
                }
                else if ( tot < value )
                {
                        waddch( win,
icons[n] );
                        tot += scale;
                        i++;
                }
                else
                {
                        n++;
                        tot = 0;

                        if ( n < nicons
)
                        {
                value = va_arg( l, int );
                                }
                        }
        }

        va_end( l );
}



void display_fields( WINDOW *win, int mode,
TextField *tf, DataField *df )
{
        int         i;
        char        *data;


        debugmsg( ( stderr, "display_fields() is
called.\n" ) );

#ifdef      DUR
        if ( df == &neworder_data ) {
                wattrset( win,
A_UNDERLINE );
                wmove( win, 3, 9 );
                waddstr( win, "ber:
_______ " );
        }
#endif
        for ( i = 0; !eos( df[i] ); i++ )
        {
                if ( df[i].type & F_PTR )
                {
                        data =
df[i].x.dptr;
                }
                else
                {
                        data =
df[i].x.data;
                }
                printfield( win, df[i].row,
df[i].col, df[i].fmt, data, -1,
                        df[i].type );
        }

        wattrset( win, ATTR_BASE );
        wrefresh( win );

#ifdef      DUR
        if ( df == &neworder_data ) {
                wmove( win, 3, 9 );
                waddstr( win, "ber: " );
                wrefresh( win );
        }
#endif
}



void queryframe( WINDOW *win, int mode, TextField
*tf, DataField *df )
{
        int         i, j;
        int         exitflag = FALSE;
        int         writtenflag = FALSE;
        int         start;
        char        *data;
        int         key;


        debugmsg( ( stderr, "queryframe() is
called.\n" ) );
        debugmsg( ( stderr, "%d %d: %d %d\n",
(*tf).row, (*tf).col,
```

```
                (*df).row, (*df).col ) );

        if ( mode & FR_RETRY )
        {
                /* some field is filled with
data */

                writtenflag = TRUE;
        }

        wattrset( win, ATTR_BASE );

        for ( i = 0; !eos( tf[i] ); i++ )
        {
                mvwaddstr( win, tf[i].row,
tf[i].col, tf[i].text );

                debugmsg( ( stderr, "%s\n",
tf[i].text ) );
        }

        for ( i = 0; !eos( df[i] ); i++ )
        {
                if ( df[i].type & F_PTR )
                {
                        data =
df[i].x.dptr;
                }
                else
                {
                        data =
df[i].x.data;
                }

                printfield( win, df[i].row,
df[i].col, df[i].fmt, data, -1,
                        df[i].type );

                if ( df[i].type & F_START )
                {
                        start = i;
                }
        }

        wmove( win, df[start].row, df[start].col );
        wrefresh( win );


        i = start;
        while ( exitflag != TRUE )
        {
                if ( df[i].type & F_PTR )
                {
                        data =
df[i].x.dptr;
                }
                else
                {
                        data =
df[i].x.data;
                }

                key = getfield( win, df[i].row,
df[i].col, data, df[i].type,
                        df[i].fmt,
df[i].actionf, 0 );

                if ( ( writtenflag == FALSE )
&& ( key & 1 ) )
                {
                        writtenflag =
TRUE;
                }

                switch( key >> 1 ) {
                case KEY_UP:
                        j = i-1;
                        while ( j >= 0 )
                        {
                                if
( df[j].type & F_RO )
                                {

        j--;
#if defined( DEBUG ) && ( DEBUG > 20 )

        fprintf( stderr, "up %d\n", j );
#endif
                                }

        else
                                {

        i = j;
#if defined( DEBUG ) && ( DEBUG > 20 )

        fprintf( stderr, "UP %d\n", i );
#endif

        break;
                                }
                        }
                        break;

                case TAB:
                case KEY_DOWN:
                        j = i+1;
                        while ( !eos(
df[j] ) )
                        {
                                if
( df[j].type & F_RO )
                                {

        j++;
#if defined( DEBUG ) && ( DEBUG > 20 )

        fprintf( stderr, "down %d\n", j );
#endif
                                }

        else
                                {

        i = j;
#if defined( DEBUG ) && ( DEBUG > 20 )

        fprintf( stderr, "DOWN %d\n", i );
#endif

        break;
                                }
                        }
                        break;

                case ESC:
                        break;

                case CR:
                case LF:
                default :
                        if ( writtenflag
== TRUE )
                        {

        exitflag = TRUE;
                        }
                        break;
                }
        }

        wrefresh( win );

#if 0
        touchwin( win );
        wnoutrefresh( win );
        doupdate();
#endif

}

frame.h
/*
        frame.h :

        Version     Beta        1995/02/23
        Version     Beta2       1995/03/06
        Version     0.99        1996/09/02
        Version     0.99a       1996/09/04
        Memory improvement
*/


#ifndef _FRAME_H_
#define _FRAME_H_

#define     FIELDMAXSIZ         51


typedef enum
{
        Eos, Text, Data
} Ftypes;

typedef struct
{
        int         row;
        int         col;
        char        text[FIELDMAXSIZ+1];
} TextField;

typedef struct
{
        int         row;
        int         col;

        union
        {
                char
        data[FIELDMAXSIZ+1];
                char        *dptr;
        } x;

        int         type;
        char        fmt[FIELDMAXSIZ+1];
        void        (*actionf)(int);
        void        (*valuef)(int);
} DataField;



#define FR_FULLSCREEN           1
#define FR_RETRY    2
#define     FR_OPERATION        4

#define     eos( x )    ( x.row == -1 )

/*

#define     clrp( fld )             { \

        fld.type &= ~F_PTR; \
                                                }
#define     setp( fld, str ){ \

        fld.type |= F_PTR; \

        fld.x.dptr = str; \
```

```
                                                        }
#define     setpnclr( fld, str )        { \

            fld.type |= F_PTR; \

            str[0] = 0; \

            fld.x.dptr = str; \
                                                        }

*/

#endif      /* _FRAME_H_ */


frame.c
/*
            frame.c : module to define user-interface
data structures.

            Version     Beta        1995/02/22
            Version     Beta2       1995/03/06
            Version Beta3           1995/03/15
            Version     Beta5       1995/06/23
            Version     Beta6       1995/06/28
*/


#include "ui.h"
#include "frame.h"



/***************************************/

TextField delivery_text[] =
{
            { 0, 37, "Delivery" },
            { 1, 0, "Warehouse:" },
            { 3, 0, "Carrier Number:" },
            { 5, 0, "Execution Status:" },
            { -1, -1, 0 }
};

DataField delivery_data[] =
{
            { 1, 11, "", F_RO|F_NE|F_RJ, "nnnn", 0,
0 },
            { 3, 16, "", F_START|F_RJ, "nn", 0, 0 },
            { 5, 18, "", F_RO|F_NE|F_PTR,
"XXXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },
            { -1, -1, 0, 0, 0, 0, 0 }
};

/***************************************/

TextField stocklvl_text[] =
{
            { 0, 34, "Stock-Level" },
            { 1, 0, "Warehouse:" },
            { 1, 18, "District:" },
            { 3, 0, "Stock Level Threshold:" },
            { 5, 0, "low stock:" },
            { -1, -1, 0 }
};

DataField stocklvl_data[] =
{
            { 1, 11, "", F_RO|F_NE|F_RJ, "nnnn", 0,
0 },
            { 1, 28, "", F_RO|F_NE|F_RJ, "nn", 0, 0 },
            { 3, 23, "", F_START|F_RJ, "n9", 0, 0 },
            { 5, 11, "", F_RO|F_NE|F_RJ, "nnn", 0, 0
},
            { -1, -1, 0, 0, 0, 0, 0 }
};

/***************************************/

TextField payment_text[] =
{
            { 0, 37, "Payment" },
            { 1, 0, "Date:" },
            { 3, 0, "Warehouse:" },
            { 3, 41, "District:" },

            { 8, 0, "Customer:" },
            { 8, 16, "Cust-Warehouse:" },
            { 8, 38, "Cust-District:" },
            { 9, 0, "Name:" },
            { 9, 49, "Since:" },
            { 10, 49, "Credit:" },
            { 11, 49, "%Disc:" },
            { 12, 49, "Phone:" },
            { 14, 0, "Amount Paid:" },
            { 14, 36, "New Cust-Balance:" },
            { 15, 0, "Credit Limit:" },

            { 17, 0, "Cust-Data:" },
            { -1, -1, 0 }
};

DataField payment_data[] =
{
            { 1, 6, "", F_RO|F_NE, "X9-X9-9999
n9:99:99", 0, 0 },

                                    /* H_DATE */
            { 3, 11, "", F_RO|F_NE|F_RJ, "nnnn", 0,
0 },

                                    /* W_ID */
            { 3, 51, "", F_START|F_RJ, "nn", 0, 0 },

                                    /* D_ID */
            { 4, 0, "", F_RO|F_NE|F_PTR,
"XXXXXXXXXXXXXXXXXXXX", 0, 0 },

                                    /*
W_STREET_1 */
            { 4, 41, "", F_RO|F_NE|F_PTR,
"XXXXXXXXXXXXXXXXXXXX", 0, 0 },

                                    /*
D_STREET_1 */
            { 5, 0, "", F_RO|F_NE|F_PTR,
"XXXXXXXXXXXXXXXXXXXX", 0, 0 },

                                    /*
W_STREET_2 */
            { 5, 41, "", F_RO|F_NE|F_PTR,
"XXXXXXXXXXXXXXXXXXXX", 0, 0 },

                                    /*
D_STREET_2 */
            { 6, 0, "", F_RO|F_NE|F_PTR,
"XXXXXXXXXXXXXXXXXXXX", 0, 0 },

                                    /* W_CITY */
            { 6, 21, "", F_RO|F_NE|F_PTR, "XX", 0,
0 },

                                    /* W_STATE
*/
            { 6, 24, "", F_RO|F_NE|F_PTR, "XXXXX-
XXXX", 0, 0 },

                                    /* W_ZIP */
            { 6, 41, "", F_RO|F_NE|F_PTR,
"XXXXXXXXXXXXXXXXXXXX", 0, 0 },

                                    /* D_CITY */
            { 6, 62, "", F_RO|F_NE|F_PTR, "XX", 0,
0 },

                                    /* D_STATE */
            { 6, 65, "", F_RO|F_NE|F_PTR, "XXXXX-
XXXX", 0, 0 },

                                    /* D_ZIP */

            { 8, 10, "", F_RJ, "nnnn", 0, 0 },

                                    /* C_ID */
            { 8, 32, "", F_RJ, "nnnn", 0, 0 },

                                    /* C_W_ID */
            { 8, 53, "", F_RJ, "nn", 0, 0 },

                                    /* C_D_ID */
            { 9, 8, "", F_RO|F_NE|F_PTR,
"XXXXXXXXXXXXXXXX", 0, 0 },

                                    /* C_FIRST */
            { 9, 25, "", F_RO|F_NE|F_PTR, "XX", 0,
0 },

                                    /* C_MIDDLE
*/
            { 9, 28, "", F_PTR,
"XXXXXXXXXXXXXXXX", 0, 0 },

                                    /* C_LAST */
            { 9, 57, "", F_RO|F_NE, "X9-X9-9999", 0,
0 },

                                    /* C_SINCE */
            { 10, 8, "", F_RO|F_NE|F_PTR,
"XXXXXXXXXXXXXXXXXXXX", 0, 0 },

                                    /*
C_STREET_1 */
            { 10, 57, "", F_RO|F_NE|F_PTR|F_RJ,
"XX", 0, 0 },

                                    /* C_CREDIT
*/
            { 11, 8, "", F_RO|F_NE|F_PTR,
"XXXXXXXXXXXXXXXXXXXX", 0, 0 },

                                    /*
C_STREET_2 */
            { 11, 57, "", F_RO|F_NE|F_RJ, "n9.99",
0, 0 },

                                    /*
C_DISCOUNT */
            { 12, 8, "", F_RO|F_NE|F_PTR,
"XXXXXXXXXXXXXXXXXXXX", 0, 0 },

                                    /* C_CITY */
            { 12, 29, "", F_RO|F_NE|F_PTR, "XX", 0,
0 },

                                    /* C_STATE */
            { 12, 32, "", F_RO|F_NE|F_PTR,
"XXXXX-XXXX", 0, 0 },

                                    /* C_ZIP */
            { 12, 57, "", F_NE|F_RO|F_PTR,
"XXXXXX-XXX-XXX-XXXX", 0, 0 },

                                    /* C_PHONE
*/
            { 14, 22, "", F_RJ, "$nnn9.99", 0, 0 },

                                    /*
H_AMOUNT */
```

```
		{ 14, 54, "", F_RO|F_NE|F_RJ,
"$Mnnnnnnnnn9.99", 0, 0 },

					/*
C_BALANCE */
		{ 15, 16, "", F_RO|F_NE|F_RJ,
"$nnnnnnnnn9.99", 0, 0 },

					/*
C_CREDIT_LIM */

		{ 17, 11, "", F_RO|F_NE,

		"XXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },
		{ 18, 11, "", F_RO|F_NE,

		"XXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },
		{ 19, 11, "", F_RO|F_NE,

		"XXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },
		{ 20, 11, "", F_RO|F_NE,

		"XXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },
		{ -1, -1, 0, 0, 0, 0, 0 }
};

/*************************************/

TextField orderstat_text[] =
{
		{ 0, 34, "Order-Status" },
		{ 1, 0, "Warehouse:" },
		{ 1, 18, "District:" },
		{ 2, 0, "Customer:" },
		{ 2, 17, "Name:" },
		{ 3, 0, "Cust-Balance:" },
		{ 5, 0, "Order-Number:" },
		{ 5, 25, "Entry-Date:" },
		{ 5, 59, "Carrier-Number:" },

		{ 6, 0, "Supply-W" },
		{ 6, 13, "Item-Id" },
		{ 6, 24, "Qty" },
		{ 6, 32, "Amount" },
		{ 6, 44, "Delivery-Date" },
		{ -1, -1, 0 }
};

DataField orderstat_data[] =
{
		{ 1, 11, "", F_NE|F_RO|F_RJ, "nnnn", 0,
0 },

					/* W_ID */
		{ 1, 28, "", F_START|F_RJ, "nn", 0, 0 },

					/* D_ID */
		{ 2, 10, "", F_RJ, "nnnn", 0, 0 },

					/* C_ID */
		{ 2, 23, "", F_NE|F_RO|F_PTR,
"XXXXXXXXXXXXXXXX", 0, 0 },

					/* C_FIRST */
		{ 2, 40, "", F_NE|F_RO|F_PTR, "XX", 0,
0 },

					/* C_MIDDLE
*/
		{ 2, 43, "", F_PTR,
"XXXXXXXXXXXXXXXX", 0, 0 },

					/* C_LAST */
		{ 3, 14, "", F_NE|F_RO|F_RJ,
"$Mnnnnnn9.99", 0, 0 },

					/*
C_BALANCE */

		{ 5, 14, "", F_NE|F_RO|F_RJ,
"nnnnnnnn", 0, 0 },

					/* O_ID */
		{ 5, 37, "", F_NE|F_RO, "X9-X9-9999
X9:99:99", 0, 0 },

					/*
O_ENTRY_D */
		{ 5, 75, "", F_NE|F_RO|F_RJ, "nn", 0, 0 },

					/*
O_CARRIER_ID */

		{ 7, 2, "", F_NE|F_RO|F_RJ, "nnnn", 0, 0
},

					/*
OL_SUPPLY_W_ID_1 */
		{ 7, 13, "", F_NE|F_RO|F_RJ, "nnnnnn",
0, 0 },

					/* OL_I_ID_1
*/
		{ 7, 24, "", F_NE|F_RO|F_RJ, "n9", 0, 0 },

					/*
OL_QUANTITY */
		{ 7, 31, "", F_NE|F_RO|F_RJ,
"$nnnn9.99", 0, 0 },

					/*
OL_AMOUNT */
		{ 7, 46, "", F_NE|F_RO, "X9-X9-9999", 0,
0 },

					/*
OL_DELIVERY_D_1 */

		{ 8, 2, "", F_NE|F_RO|F_RJ, "nnnn", 0, 0
},

					/*
OL_SUPPLY_W_ID_2 */
		{ 8, 13, "", F_NE|F_RO|F_RJ, "nnnnnn",
0, 0 },

					/* OL_L_ID_2
*/
		{ 8, 24, "", F_NE|F_RO|F_RJ, "n9", 0, 0 },

					/*
OL_QUANTITY_2 */
		{ 8, 31, "", F_NE|F_RO|F_RJ,
"$nnnn9.99", 0, 0 },

					/*
OL_AMOUNT_2 */
		{ 8, 46, "", F_NE|F_RO, "X9-X9-9999", 0,
0 },

					/*
OL_DELIVERY_D_2 */

		{ 9, 2, "", F_NE|F_RO|F_RJ, "nnnn", 0, 0
},

					/*
OL_SUPPLY_W_ID_3 */
		{ 9, 13, "", F_NE|F_RO|F_RJ, "nnnnnn",
0, 0 },

					/* OL_I_ID_1
*/
		{ 9, 24, "", F_NE|F_RO|F_RJ, "n9", 0, 0 },

					/*
OL_QUANTITY_3 */
		{ 9, 31, "", F_NE|F_RO|F_RJ,
"$nnnn9.99", 0, 0 },

					/*
OL_AMOUNT_3 */
		{ 9, 46, "", F_NE|F_RO, "X9-X9-9999", 0,
0 },

					/*
OL_DELIVERY_D_3 */

		{ 10, 2, "", F_NE|F_RO|F_RJ, "nnnn", 0,
0 },

					/*
OL_SUPPLY_W_ID_4 */
		{ 10, 13, "", F_NE|F_RO|F_RJ, "nnnnnn",
0, 0 },

					/* OL_L_ID_4
*/
		{ 10, 24, "", F_NE|F_RO|F_RJ, "n9", 0, 0
},

					/*
OL_QUANTITY_4 */
		{ 10, 31, "", F_NE|F_RO|F_RJ,
"$nnnn9.99", 0, 0 },

					/*
OL_AMOUNT_4 */
		{ 10, 46, "", F_NE|F_RO, "X9-X9-9999",
0, 0 },

					/*
OL_DELIVERY_D_4 */

		{ 11, 2, "", F_NE|F_RO|F_RJ, "nnnn", 0,
0 },

					/*
OL_SUPPLY_W_ID_5 */
		{ 11, 13, "", F_NE|F_RO|F_RJ, "nnnnnn",
0, 0 },

					/* OL_I_ID_5
*/
		{ 11, 24, "", F_NE|F_RO|F_RJ, "n9", 0, 0
},

					/*
OL_QUANTITY_5 */
		{ 11, 31, "", F_NE|F_RO|F_RJ,
"$nnnn9.99", 0, 0 },

					/*
OL_AMOUNT_5 */
		{ 11, 46, "", F_NE|F_RO, "X9-X9-9999",
0, 0 },

					/*
OL_DELIVERY_D_5 */
```

```
		{ 12, 2, "", F_NE|F_RO|F_RJ, "nnnn", 0,
0 },

					/*
OL_SUPPLY_W_ID_6 */
		{ 12, 13, "", F_NE|F_RO|F_RJ, "nnnnnn",
0, 0 },

					/* OL_L_ID_6
*/
		{ 12, 24, "", F_NE|F_RO|F_RJ, "n9", 0, 0
},

					/*
OL_QUANTITY_6 */
		{ 12, 31, "", F_NE|F_RO|F_RJ,
"$nnnn9.99", 0, 0 },

					/*
OL_AMOUNT_6 */
		{ 12, 46, "", F_NE|F_RO, "X9-X9-9999",
0, 0 },

					/*
OL_DELIVERY_D_6 */

		{ 13, 2, "", F_NE|F_RO|F_RJ, "nnnn", 0,
0 },

					/*
OL_SUPPLY_W_ID_7 */
		{ 13, 13, "", F_NE|F_RO|F_RJ, "nnnnnn",
0, 0 },

					/* OL_I_ID_7
*/
		{ 13, 24, "", F_NE|F_RO|F_RJ, "n9", 0, 0
},

					/*
OL_QUANTITY_7 */
		{ 13, 31, "", F_NE|F_RO|F_RJ,
"$nnnn9.99", 0, 0 },

					/*
OL_AMOUNT_7 */
		{ 13, 46, "", F_NE|F_RO, "X9-X9-9999",
0, 0 },

					/*
OL_DELIVERY_D_7 */

		{ 14, 2, "", F_NE|F_RO|F_RJ, "nnnn", 0,
0 },

					/*
OL_SUPPLY_W_ID_8 */
		{ 14, 13, "", F_NE|F_RO|F_RJ, "nnnnnn",
0, 0 },

					/* OL_L_ID_8
*/
		{ 14, 24, "", F_NE|F_RO|F_RJ, "n9", 0, 0
},

					/*
OL_QUANTITY_8 */
		{ 14, 31, "", F_NE|F_RO|F_RJ,
"$nnnn9.99", 0, 0 },

					/*
OL_AMOUNT_8 */
		{ 14, 46, "", F_NE|F_RO, "X9-X9-9999",
0, 0 },

					/*
OL_DELIVERY_D_8 */

		{ 15, 2, "", F_NE|F_RO|F_RJ, "nnnn", 0,
0 },

					/*
OL_SUPPLY_W_ID_9 */
		{ 15, 13, "", F_NE|F_RO|F_RJ, "nnnnnn",
0, 0 },

					/* OL_I_ID_9
*/
		{ 15, 24, "", F_NE|F_RO|F_RJ, "n9", 0, 0
},

					/*
OL_QUANTITY_9 */
		{ 15, 31, "", F_NE|F_RO|F_RJ,
"$nnnn9.99", 0, 0 },

					/*
OL_AMOUNT_9 */
		{ 15, 46, "", F_NE|F_RO, "X9-X9-9999",
0, 0 },

					/*
OL_DELIVERY_D_9 */

		{ 16, 2, "", F_NE|F_RO|F_RJ, "nnnn", 0,
0 },

					/*
OL_SUPPLY_W_ID_10 */
		{ 16, 13, "", F_NE|F_RO|F_RJ, "nnnnnn",
0, 0 },

					/*
OL_L_ID_10 */
		{ 16, 24, "", F_NE|F_RO|F_RJ, "n9", 0, 0
},

					/*
OL_QUANTITY_10 */
		{ 16, 31, "", F_NE|F_RO|F_RJ,
"$nnnn9.99", 0, 0 },

					/*
OL_AMOUNT_10 */
		{ 16, 46, "", F_NE|F_RO, "X9-X9-9999",
0, 0 },

					/*
OL_DELIVERY_D_10 */

		{ 17, 2, "", F_NE|F_RO|F_RJ, "nnnn", 0,
0 },

					/*
OL_SUPPLY_W_ID_11 */
		{ 17, 13, "", F_NE|F_RO|F_RJ, "nnnnnn",
0, 0 },

					/* OL_I_ID_11
*/
		{ 17, 24, "", F_NE|F_RO|F_RJ, "n9", 0, 0
},

					/*
OL_QUANTITY_11 */
		{ 17, 31, "", F_NE|F_RO|F_RJ,
"$nnnn9.99", 0, 0 },

					/*
OL_AMOUNT_11 */
		{ 17, 46, "", F_NE|F_RO, "X9-X9-9999",
0, 0 },

					/*
OL_DELIVERY_D_11 */

		{ 18, 2, "", F_NE|F_RO|F_RJ, "nnnn", 0,
0 },

					/*
OL_SUPPLY_W_ID_12 */
		{ 18, 13, "", F_NE|F_RO|F_RJ, "nnnnnn",
0, 0 },

					/*
OL_L_ID_12 */
		{ 18, 24, "", F_NE|F_RO|F_RJ, "n9", 0, 0
},

					/*
OL_QUANTITY_12 */
		{ 18, 31, "", F_NE|F_RO|F_RJ,
"$nnnn9.99", 0, 0 },

					/*
OL_AMOUNT_12 */
		{ 18, 46, "", F_NE|F_RO, "X9-X9-9999",
0, 0 },

					/*
OL_DELIVERY_D_12 */

		{ 19, 2, "", F_NE|F_RO|F_RJ, "nnnn", 0,
0 },

					/*
OL_SUPPLY_W_ID_13 */
		{ 19, 13, "", F_NE|F_RO|F_RJ, "nnnnnn",
0, 0 },

					/*
OL_L_ID_13 */
		{ 19, 24, "", F_NE|F_RO|F_RJ, "n9", 0, 0
},

					/*
OL_QUANTITY_13 */
		{ 19, 31, "", F_NE|F_RO|F_RJ,
"$nnnn9.99", 0, 0 },

					/*
OL_AMOUNT_13 */
		{ 19, 46, "", F_NE|F_RO, "X9-X9-9999",
0, 0 },

					/*
OL_DELIVERY_D_13 */

		{ 20, 2, "", F_NE|F_RO|F_RJ, "nnnn", 0,
0 },

					/*
OL_SUPPLY_W_ID_14 */
		{ 20, 13, "", F_NE|F_RO|F_RJ, "nnnnnn",
0, 0 },

					/* OL_I_ID_14
*/
		{ 20, 24, "", F_NE|F_RO|F_RJ, "n9", 0, 0
},

					/*
OL_QUANTITY14 */
		{ 20, 31, "", F_NE|F_RO|F_RJ,
"$nnnn9.99", 0, 0 },
```

```
                                        /*
OL_AMOUNT_14 */
                { 20, 46, "", F_NE|F_RO, "X9-X9-9999",
0, 0 },

                                        /*
OL_DELIVERY_D_14 */

                { 21, 2, "", F_NE|F_RO|F_RJ, "nnnn", 0,
0 },

                                        /*
OL_SUPPLY_W_ID_15 */
                { 21, 13, "", F_NE|F_RO|F_RJ, "nnnnnn",
0, 0 },

                                        /*
OL_L_ID_15 */
                { 21, 24, "", F_NE|F_RO|F_RJ, "n9", 0, 0
},

                                        /*
OL_QUANTITY_15 */
                { 21, 31, "", F_NE|F_RO|F_RJ,
"$nnnn9.99", 0, 0 },

                                        /*
OL_AMOUNT_15 */
                { 21, 46, "", F_NE|F_RO, "X9-X9-9999",
0, 0 },

                                        /*
OL_DELIVERY_D_15 */
                { -1, -1, 0, 0, 0, 0, 0 }
};

/****************************************/

TextField neworder_text[]=
{
                { 0, 35, "New Order" },
                { 1, 0, "Warehouse:" },
                { 1, 18, "District:" },
                { 1, 54, "Date:" },
                { 2, 0, "Customer:" },
                { 2, 18, "Name:" },
                { 2, 43, "Credit:" },
                { 2, 56, "%Disc:" },
                { 3, 0, "Order number:" },
                { 3, 24, "Number of Lines:" },
                { 3, 51, "W_tax:" },
                { 3, 66, "D_tax:" },

                { 5, 1, "Supp_W" },
                { 5, 9, "Item_id" },
                { 5, 18, "Item Name" },
                { 5, 44, "Qty" },
                { 5, 49, "Stock" },
                { 5, 56, "B/G" },
                { 5, 61, "Price" },
                { 5, 70, "Amount" },

                { 21, 0, "Execution Status:" },
                { 21, 61, "Total:" },
                { -1, -1, 0 }
};

DataField neworder_data[] =
{
                { 1, 11, "", F_NE|F_RO|F_RJ, "nnnn", 0,
0 },

                                        /* W_ID */
                { 1, 28, "", F_START|F_RJ, "nn", 0, 0 },

                                        /* D_ID */
                { 1, 60, "", F_NE|F_RO, "X9-X9-9999
n9:99:99", 0, 0 },

                                        /*
O_ENTRY_D */
                { 2, 11, "", F_RJ, "nnnn", 0, 0 },

                                        /* C_ID */
                { 2, 24, "", F_NE|F_RO|F_PTR,
"XXXXXXXXXXXXXXXX", 0, 0 },

                                        /* C_LAST */
                { 2, 51, "", F_NE|F_RO|F_PTR|F_RJ,
"XX", 0, 0 },

                                        /* C_CREDIT
*/
                { 2, 63, "", F_NE|F_RO|F_RJ|F_RJ,
"n9.99", 0, 0 },

                                        /*
C_DISCOUNT */
                { 3, 14, "", F_NE|F_RO|F_RJ,
"nnnnnnnn", 0, 0 },

                                        /* O_ID */
                { 3, 41, "", F_NE|F_RO|F_RJ, "n9", 0, 0 },

                                        /* O_OL_CNT
*/
                { 3, 58, "", F_NE|F_RO|F_RJ, "n9.99", 0,
0 },

                                        /* W_TAX */
                { 3, 73, "", F_NE|F_RO|F_RJ, "n9.99", 0,
0 },

                                        /* D_TAX */

                { 6, 2, "", F_RJ, "nnnn", 0, 0 },

                                        /*
OL_SUPPLY_W_ID_1 */
                { 6, 9, "", F_RJ, "nnnnnn", 0, 0 },

                                        /* OL_I_ID_1
*/
                { 6, 18, "", F_NE|F_RO|F_PTR,
"XXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },

                                        /* I_NAME_1
*/
                { 6, 44, "", F_RJ, "n9", 0, 0 },

                                        /*
OL_QUANTITY_1 */
                { 6, 50, "", F_NE|F_RO|F_RJ, "nn9", 0, 0
},

                                        /*
S_QUANTITY_1 */
                { 6, 57, "", F_NE|F_RO|F_RJ, "X", 0, 0 },

                                        /*
BRAND_GENERIC_1 */
                { 6, 61, "", F_NE|F_RO|F_RJ, "$nn9.99",
0, 0 },

                                        /* I_PRICE_1
*/
                { 6, 70, "", F_NE|F_RO|F_RJ,
"$nnn9.99", 0, 0 },

                                        /*
OL_AMOUNT_1 */

                { 7, 2, "", F_RJ, "nnnn", 0, 0 },

                                        /*
OL_SUPPLY_W_ID_2 */
                { 7, 9, "", F_RJ, "nnnnnn", 0, 0 },

                                        /* OL_I_ID_2
*/
                { 7, 18, "", F_NE|F_RO|F_PTR,
"XXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },

                                        /* I_NAME_2
*/
                { 7, 44, "", F_RJ, "n9", 0, 0 },

                                        /*
OL_QUANTITY_2 */
                { 7, 50, "", F_NE|F_RO|F_RJ, "nn9", 0, 0
},

                                        /*
S_QUANTITY_2 */
                { 7, 57, "", F_NE|F_RO|F_RJ, "X", 0, 0 },

                                        /*
BRAND_GENERIC_2 */
                { 7, 61, "", F_NE|F_RO|F_RJ, "$nn9.99",
0, 0 },

                                        /* I_PRICE_2
*/
                { 7, 70, "", F_NE|F_RO|F_RJ,
"$nnn9.99", 0, 0 },

                                        /*
OL_AMOUNT_2 */

                { 8, 2, "", F_RJ, "nnnn", 0, 0 },

                                        /*
OL_SUPPLY_W_ID_3 */
                { 8, 9, "", F_RJ, "nnnnnn", 0, 0 },

                                        /* OL_I_ID_3
*/
                { 8, 18, "", F_NE|F_RO|F_PTR,
"XXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },

                                        /* I_NAME_3
*/
                { 8, 44, "", F_RJ, "n9", 0, 0 },

                                        /*
OL_QUANTITY_3 */
                { 8, 50, "", F_NE|F_RO|F_RJ, "nn9", 0, 0
},

                                        /*
S_QUANTITY_3 */
                { 8, 57, "", F_NE|F_RO|F_RJ, "X", 0, 0 },

                                        /*
BRAND_GENERIC_3 */
                { 8, 61, "", F_NE|F_RO|F_RJ, "$nn9.99",
0, 0 },

                                        /* I_PRICE_3
*/
                { 8, 70, "", F_NE|F_RO|F_RJ,
"$nnn9.99", 0, 0 },
```

```
                        /*
OL_AMOUNT_3 */

                { 9, 2, "", F_RJ, "nnnn", 0, 0 },

                        /*
OL_SUPPLY_W_ID_4 */
                { 9, 9, "", F_RJ, "nnnnnn", 0, 0 },

                        /* OL_I_ID_4
*/
                { 9, 18, "", F_NE|F_RO|F_PTR,
"XXXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },

                        /* I_NAME_4
*/
                { 9, 44, "", F_RJ, "n9", 0, 0 },

                        /*
OL_QUANTITY_4 */
                { 9, 50, "", F_NE|F_RO|F_RJ, "nn9", 0, 0
},

                        /*
S_QUANTITY_4 */
                { 9, 57, "", F_NE|F_RO|F_RJ, "X", 0, 0 },

                        /*
BRAND_GENERIC_4 */
                { 9, 61, "", F_NE|F_RO|F_RJ, "$nn9.99",
0, 0 },

                        /* I_PRICE_4
*/
                { 9, 70, "", F_NE|F_RO|F_RJ,
"$nnn9.99", 0, 0 },

                        /*
OL_AMOUNT_4 */

                { 10, 2, "", F_RJ, "nnnn", 0, 0 },

                        /*
OL_SUPPLY_W_ID_5 */
                { 10, 9, "", F_RJ, "nnnnnn", 0, 0 },

                        /* OL_I_ID_5
*/
                { 10, 18, "", F_NE|F_RO|F_PTR,
"XXXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },

                        /* I_NAME_5
*/
                { 10, 44, "", F_RJ, "n9", 0, 0 },

                        /*
OL_QUANTITY_5 */
                { 10, 50, "", F_NE|F_RO|F_RJ, "nn9", 0,
0 },

                        /*
S_QUANTITY_5 */
                { 10, 57, "", F_NE|F_RO|F_RJ, "X", 0, 0
},

                        /*
BRAND_GENERIC_5 */
                { 10, 61, "", F_NE|F_RO|F_RJ,
"$nn9.99", 0, 0 },

                        /* I_PRICE_5
*/
                { 10, 70, "", F_NE|F_RO|F_RJ,
"$nnn9.99", 0, 0 },

                        /*
OL_AMOUNT_5 */

                { 11, 2, "", F_RJ, "nnnn", 0, 0 },

                        /*
OL_SUPPLY_W_ID_6 */
                { 11, 9, "", F_RJ, "nnnnnn", 0, 0 },

                        /* OL_I_ID_6
*/
                { 11, 18, "", F_NE|F_RO|F_PTR,
"XXXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },

                        /* I_NAME_6
*/
                { 11, 44, "", F_RJ, "n9", 0, 0 },

                        /*
OL_QUANTITY_6 */
                { 11, 50, "", F_NE|F_RO|F_RJ, "nn9", 0,
0 },

                        /*
S_QUANTITY_6 */
                { 11, 57, "", F_NE|F_RO|F_RJ, "X", 0, 0
},

                        /*
BRAND_GENERIC_6 */
                { 11, 61, "", F_NE|F_RO|F_RJ,
"$nn9.99", 0, 0 },

                        /* I_PRICE_6
*/
                { 11, 70, "", F_NE|F_RO|F_RJ,
"$nnn9.99", 0, 0 },

                        /*
OL_AMOUNT_6 */

                { 12, 2, "", F_RJ, "nnnn", 0, 0 },

                        /*
OL_SUPPLY_W_ID_7 */
                { 12, 9, "", F_RJ, "nnnnnn", 0, 0 },

                        /* OL_I_ID_7
*/
                { 12, 18, "", F_NE|F_RO|F_PTR,
"XXXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },

                        /* I_NAME_7
*/
                { 12, 44, "", F_RJ, "n9", 0, 0 },

                        /*
OL_QUANTITY_7 */
                { 12, 50, "", F_NE|F_RO|F_RJ, "nn9", 0,
0 },

                        /*
S_QUANTITY_7 */
                { 12, 57, "", F_NE|F_RO|F_RJ, "X", 0, 0
},

                        /*
BRAND_GENERIC_7 */
                { 12, 61, "", F_NE|F_RO|F_RJ,
"$nn9.99", 0, 0 },

                        /* I_PRICE_7
*/
                { 12, 70, "", F_NE|F_RO|F_RJ,
"$nnn9.99", 0, 0 },

                        /*
OL_AMOUNT_7 */

                { 13, 2, "", F_RJ, "nnnn", 0, 0 },

                        /*
OL_SUPPLY_W_ID_8 */
                { 13, 9, "", F_RJ, "nnnnnn", 0, 0 },

                        /* OL_I_ID_8
*/
                { 13, 18, "", F_NE|F_RO|F_PTR,
"XXXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },

                        /* I_NAME_8
*/
                { 13, 44, "", F_RJ, "n9", 0, 0 },

                        /*
OL_QUANTITY_8 */
                { 13, 50, "", F_NE|F_RO|F_RJ, "nn9", 0,
0 },

                        /*
S_QUANTITY_8 */
                { 13, 57, "", F_NE|F_RO|F_RJ, "X", 0, 0
},

                        /*
BRAND_GENERIC_8 */
                { 13, 61, "", F_NE|F_RO|F_RJ,
"$nn9.99", 0, 0 },

                        /* I_PRICE_8
*/
                { 13, 70, "", F_NE|F_RO|F_RJ,
"$nnn9.99", 0, 0 },

                        /*
OL_AMOUNT_8 */

                { 14, 2, "", F_RJ, "nnnn", 0, 0 },

                        /*
OL_SUPPLY_W_ID_9 */
                { 14, 9, "", F_RJ, "nnnnnn", 0, 0 },

                        /* OL_I_ID_9
*/
                { 14, 18, "", F_NE|F_RO|F_PTR,
"XXXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },

                        /* I_NAME_9
*/
                { 14, 44, "", F_RJ, "n9", 0, 0 },

                        /*
OL_QUANTITY_9 */
                { 14, 50, "", F_NE|F_RO|F_RJ, "nn9", 0,
0 },

                        /*
S_QUANTITY_9 */
                { 14, 57, "", F_NE|F_RO|F_RJ, "X", 0, 0
},

                        /*
BRAND_GENERIC_9 */
                { 14, 61, "", F_NE|F_RO|F_RJ,
"$nn9.99", 0, 0 },

                        /* I_PRICE_9
*/
                { 14, 70, "", F_NE|F_RO|F_RJ,
"$nnn9.99", 0, 0 },
```

```
                        /*
OL_AMOUNT_9 */

                { 15, 2, "", F_RJ, "nnnn", 0, 0 },

                        /*
OL_SUPPLY_W_ID_10 */
                { 15, 9, "", F_RJ, "nnnnnn", 0, 0 },

                        /* OL_I_ID_10
*/
                { 15, 18, "", F_NE|F_RO|F_PTR,
"XXXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },

                        /* I_NAME_10
*/
                { 15, 44, "", F_RJ, "n9", 0, 0 },

                        /*
OL_QUANTITY_10 */
                { 15, 50, "", F_NE|F_RO|F_RJ, "nn9", 0,
0 },

                        /*
S_QUANTITY_10 */
                { 15, 57, "", F_NE|F_RO|F_RJ, "X", 0, 0
},

                        /*
BRAND_GENERIC_10 */
                { 15, 61, "", F_NE|F_RO|F_RJ,
"$nn9.99", 0, 0 },

                        /* I_PRICE_10
*/
                { 15, 70, "", F_NE|F_RO|F_RJ,
"$nnn9.99", 0, 0 },

                        /*
OL_AMOUNT_10 */

                { 16, 2, "", F_RJ, "nnnn", 0, 0 },

                        /*
OL_SUPPLY_W_ID_11 */
                { 16, 9, "", F_RJ, "nnnnnn", 0, 0 },

                        /* OL_I_ID_11
*/
                { 16, 18, "", F_NE|F_RO|F_PTR,
"XXXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },

                        /* I_NAME_11
*/
                { 16, 44, "", F_RJ, "n9", 0, 0 },

                        /*
OL_QUANTITY_11 */
                { 16, 50, "", F_NE|F_RO|F_RJ, "nn9", 0,
0 },

                        /*
S_QUANTITY_11 */
                { 16, 57, "", F_NE|F_RO|F_RJ, "X", 0, 0
},

                        /*
BRAND_GENERIC_11 */
                { 16, 61, "", F_NE|F_RO|F_RJ,
"$nn9.99", 0, 0 },

                        /* I_PRICE_11
*/
                { 16, 70, "", F_NE|F_RO|F_RJ,
"$nnn9.99", 0, 0 },

                        /*
OL_AMOUNT_11 */

                { 17, 2, "", F_RJ, "nnnn", 0, 0 },

                        /*
OL_SUPPLY_W_ID_12 */
                { 17, 9, "", F_RJ, "nnnnnn", 0, 0 },

                        /* OL_I_ID_12
*/
                { 17, 18, "", F_NE|F_RO|F_PTR,
"XXXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },

                        /* I_NAME_12
*/
                { 17, 44, "", F_RJ, "n9", 0, 0 },

                        /*
OL_QUANTITY_12 */
                { 17, 50, "", F_NE|F_RO|F_RJ, "nn9", 0,
0 },

                        /*
S_QUANTITY_12 */
                { 17, 57, "", F_NE|F_RO|F_RJ, "X", 0, 0
},

                        /*
BRAND_GENERIC_12 */
                { 17, 61, "", F_NE|F_RO|F_RJ,
"$nn9.99", 0, 0 },

                        /* I_PRICE_12
*/
                { 17, 70, "", F_NE|F_RO|F_RJ,
"$nnn9.99", 0, 0 },

                        /*
OL_AMOUNT_12 */

                { 18, 2, "", F_RJ, "nnnn", 0, 0 },

                        /*
OL_SUPPLY_W_ID_13 */
                { 18, 9, "", F_RJ, "nnnnnn", 0, 0 },

                        /* OL_I_ID_13
*/
                { 18, 18, "", F_NE|F_RO|F_PTR,
"XXXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },

                        /* I_NAME_13
*/
                { 18, 44, "", F_RJ, "n9", 0, 0 },

                        /*
OL_QUANTITY_13 */
                { 18, 50, "", F_NE|F_RO|F_RJ, "nn9", 0,
0 },

                        /*
S_QUANTITY_13 */
                { 18, 57, "", F_NE|F_RO|F_RJ, "X", 0, 0
},

                        /*
BRAND_GENERIC_13 */
                { 18, 61, "", F_NE|F_RO|F_RJ,
"$nn9.99", 0, 0 },

                        /* I_PRICE_13
*/
                { 18, 70, "", F_NE|F_RO|F_RJ,
"$nnn9.99", 0, 0 },

                        /*
OL_AMOUNT_13 */

                { 19, 2, "", F_RJ, "nnnn", 0, 0 },

                        /*
OL_SUPPLY_W_ID_14 */
                { 19, 9, "", F_RJ, "nnnnnn", 0, 0 },

                        /* OL_I_ID_14
*/
                { 19, 18, "", F_NE|F_RO|F_PTR,
"XXXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },

                        /* I_NAME_14
*/
                { 19, 44, "", F_RJ, "n9", 0, 0 },

                        /*
OL_QUANTITY_14 */
                { 19, 50, "", F_NE|F_RO|F_RJ, "nn9", 0,
0 },

                        /*
S_QUANTITY_14 */
                { 19, 57, "", F_NE|F_RO|F_RJ, "X", 0, 0
},

                        /*
BRAND_GENERIC_14 */
                { 19, 61, "", F_NE|F_RO|F_RJ,
"$nn9.99", 0, 0 },

                        /* I_PRICE_14
*/
                { 19, 70, "", F_NE|F_RO|F_RJ,
"$nnn9.99", 0, 0 },

                        /*
OL_AMOUNT_14 */

                { 20, 2, "", F_RJ, "nnnn", 0, 0 },

                        /*
OL_SUPPLY_W_ID_15 */
                { 20, 9, "", F_RJ, "nnnnnn", 0, 0 },

                        /* OL_I_ID_15
*/
                { 20, 18, "", F_NE|F_RO|F_PTR,
"XXXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },

                        /* I_NAME_15
*/
                { 20, 44, "", F_RJ, "n9", 0, 0 },

                        /*
OL_QUANTITY_15 */
                { 20, 50, "", F_NE|F_RO|F_RJ, "nn9", 0,
0 },

                        /*
S_QUANTITY_15 */
                { 20, 57, "", F_NE|F_RO|F_RJ, "X", 0, 0
},

                        /*
BRAND_GENERIC_15 */
                { 20, 61, "", F_NE|F_RO|F_RJ,
"$nn9.99", 0, 0 },

                        /* I_PRICE_15
*/
                { 20, 70, "", F_NE|F_RO|F_RJ,
"$nnn9.99", 0, 0 },
```

```
                                        /*
OL_AMOUNT_15 */

        { 21, 18, "", F_NE|F_RO|F_PTR,
"XXXXXXXXXXXXXXXXXXXXXXXXX", 0, 0 },

                                        /*
EXEC_STAT */
        { 21, 69, "", F_NE|F_RO|F_RJ,
"$nnnn9.99", 0, 0 },

                                        /*
TOTAL_AMOUNT */
        { -1, -1, 0, 0, 0, 0, 0 }
};
```

cwalib.h

```
/*
        cwalib.h :

        Version     Beta        1995/02/23
        Version     Beta2       1995/03/06
*/


#ifndef _CWALIB_H_
#define _CWALIB_H_

#include <stdio.h>
#include <errno.h>



#if !defined( TRUE ) && !defined( FALSE ) &&
!defined( bool )
typedef enum
{
        FALSE, TRUE
} bool;
#define BOOL
#endif

#ifdef      DEBUG
# define    debugmsg( s )           fprintf s
#else
# define    debugmsg( s )
#endif

/*

#define     xtol( s )       strtol( s, NULL, 16 )
#define     swap( a, b )    { \
                                                a
= a^b; b = a^b; a = a^b; \
                                        }
#define     nel( arr )      ( sizeof(arr) / sizeof(arr[0]) )



char *fgetline( FILE *, char *, char * );
char *strntok( char **, char * ,int );
char firstcap( char * );
void *xmalloc( size_t );

extern long   malloced;

*/

#endif      /* _CWALIB_H_ */
```

dummy.c

```
/*
        dummy.c : functions for test.

        Version     Beta        1995/02/24
        Version     Beta2       1995/06/23
        Version Beta3           1996/07/05


        Dec. 17, 1994

        Feb. 24, 1995

        Jun. 23, 1995

        Jul. 05, 1996


        (C)Fujitsu Limited. 1994, 1995
*/

#ifdef      SCRTEST

#include            <stdio.h>
#include            <stdlib.h>
#include            <string.h>
#include            <sys/types.h>
#include            <time.h>
#include            "cwalib.h"
#include            "tpcc_info.h"
#include            "tpcc.h"


void        dummy_delivery( struct delstruct * );
void        dummy_stocklvl( struct stostruct * );
void        dummy_orderstat( struct ordstruct * );
void        dummy_payment( struct paystruct * );
void        dummy_neworder( struct newstruct * );
char        *get_datetimestr( char * );
char        *get_datestr( char * );


char *get_datetimestr( char *buf )
{
        struct tm   *tm;
        time_t                  tim;

        time( &tim );
        tm  = localtime( &tim );

        sprintf( buf, "%2d-%2d-
%4d.%2d:%2d:%2d", tm->tm_mday, tm->tm_mon+1,
                    tm->tm_year+1900, tm-
>tm_hour, tm->tm_min, tm->tm_sec );

        return buf;
}


char *get_datestr( char *buf )
{
        struct tm   *tm;
        time_t                  tim;

        time( &tim );
        tm  = localtime( &tim );

        sprintf( buf, "%2d-%2d-%4d",
                    tm->tm_mday, tm-
>tm_mon+1, tm->tm_year+1900 );
        return buf;
}


void dummy_delivery( struct delstruct *bp )
{
        bp->delout.terror = NOERR;
        return;
}


void dummy_stocklvl( struct stostruct *bp )
{
        int         i;

        bp->stoout.terror = NOERR;
        do
        {
                i = rand()%1000;
        } while ( i > bp->stoin.threshold );

        bp->stoout.low_stock = i;

        return;
}


void dummy_payment( struct paystruct *bp )
{
        bp->payout.terror = NOERR;

        get_datetimestr( bp->payout.h_date );
        strcpy( bp->payout.w_street_1, "Baker
street" );
        strcpy( bp->payout.w_street_2, "221B" );
        strcpy( bp->payout.w_city, "London" );
        strcpy( bp->payout.w_state, "GB" );
        strcpy( bp->payout.w_zip, "88033000" );

        strcpy( bp->payout.d_street_1, "Minato-
ku" );
        strcpy( bp->payout.d_street_2, "Azabu
10" );
        strcpy( bp->payout.d_city, "Tokyo" );
        strcpy( bp->payout.d_state, "JP" );
        strcpy( bp->payout.d_zip, "102" );

        bp->payout.c_id = 777;
        strcpy( bp->payout.c_first, "John" );
        strcpy( bp->payout.c_middle, "H" );
        strcpy( bp->payout.c_last, "Watson" );
        strcpy( bp->payout.c_street_1, "Baker
street" );
        strcpy( bp->payout.c_street_2, "221B" );
        strcpy( bp->payout.c_credit, "GC" );
        bp->payout.c_discount = 0.20;
        strcpy( bp->payout.c_city, "London" );
        strcpy( bp->payout.c_state, "GB" );
        strcpy( bp->payout.c_zip, "888" );
        strcpy( bp->payout.c_phone, "" );
        bp->payout.c_balance = 67876;
        bp->payout.c_credit_lim = 77777;
        get_datestr( bp->payout.c_since );

        strcpy( bp->payout.c_data,
"Migyamigyamigyamigyamigya"

        "migyamigyamigyamigyamigya" );

        return;
}


void dummy_orderstat( struct ordstruct *bp )
{
        int         i, j;

        bp->ordout.terror = NOERR;

        bp->ordout.c_id = rand()%10000;
        strcpy( bp->ordout.c_first, "Robert" );
        strcpy( bp->ordout.c_middle, "L" );
        strcpy( bp->ordout.c_last, "Fish" );
```

```
		bp->ordout.c_balance = ( ( rand()*rand()%19999999 )-9999999 ) / 100.0;
		/*
		fprintf( stderr, "ordout.c_balance = %12.4f\n", bp->ordout.c_balance );
		bp->c_balance = -1;
		*/

		bp->ordout.o_id = rand()%10000;
		get_datetimestr( bp->ordout.o_entry_d );
		bp->ordout.o_carrier_id = rand()%100;

		bp->ordout.o_ol_cnt = ( rand()%11 )+5;
		j = bp->ordout.o_ol_cnt;
		for ( i = 0; i < j; i++ )
		{
			bp->ordout.ol_supply_w_id[i] = ( rand()%10 )+1;
			bp->ordout.ol_i_id[i] = ( rand()%100000 )+1;
			bp->ordout.ol_quantity[i] = ( rand()%99 )+1;
			bp->ordout.ol_amount[i] = rand();

			debugmsg( ( stderr, "rand : %f\n", bp->ordout.ol_amount[i] ) );

			get_datetimestr( bp->ordout.ol_delivery_d[i] );
		}

		return;
}


void dummy_neworder( struct newstruct *bp )
{
		static int	o_id = 3001;
		int i;

		bp->newout.terror = NOERR;
		*( bp->newout.status ) = '\0';

		strcpy( bp->newout.c_last, "Holmes" );
		strcpy( bp->newout.c_credit, "GC" );
		bp->newout.o_id = o_id++;
/*
		bp->newout.o_id = ( rand()%100000 )+1;
*/

		get_datetimestr( bp->newout.o_entry_d );
		bp->newout.c_discount = ( rand()%101 )/10000.0;
		bp->newout.w_tax = ( rand()%2001 )/10000.0;
		bp->newout.d_tax = ( rand()%2001 )/10000.0;

		bp->newout.total_amount = 0;

		for ( i = 0; i < 15; i++ )
		{
			if ( bp->newin.ol_supply_w_id[i] == 0 ) {
				break;
			}
			if ( bp->newin.ol_i_id[i] == -1 ) {
				strcpy( bp->newout.status, "Item number is not valid" );
			}

			bp->newout.i_name[i][0] = '\0';
			bp->newout.s_quantity[i] = ( rand()%10 )+1;
			bp->newout.brand_generic[i] = ( rand()%26 )+'A';
			bp->newout.i_price[i] = (( rand()%10000 )+1 )/100.0;
			bp->newout.ol_amount[i] = bp->newout.i_price[i]*bp->newin.ol_quantity[i];
			bp->newout.total_amount += bp->newout.ol_amount[i];
		}
		bp->newout.o_ol_cnt = i;

		return;
}

#endif


tc.c

/*
		Tc.c : Main module for TPC-C client program

		Version Beta 1995/02/21
		Version Beta2		1995/03/06
		Version Beta2a		1995/03/14
		Version	Beta3		1995/03/23
		Version	Beta4		1995/03/29

		Version	Beta5		1996/07/05
		for ORACLE TPC-C kit.
		Version	Beta6		1996/07/19
		public
		Version	Beta7		1996/08/23
		Optimized
*/


#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <sys/types.h>
#include <time.h>
#include <sys/times.h>
#include <sys/time.h>
#include <sys/param.h>
#include <sys/ipc.h>
#include <sys/msg.h>
#include <math.h>
#include <stdarg.h>
#include <unistd.h>
#include <signal.h>

#ifdef		__linux__
# include <ncurses/curses.h>
#else
# include <curses.h>
#endif

#include "cwalib.h"
#include "ui.h"
#include "frame.h"
#include "tpcc_info.h"
#include "tpcc.h"

#ifndef		SCRTEST
# include "atmi.h"
#endif



/***************************************/

#define SERVER_ID	1000
#define ECHECK( x, y )	if ( x < 0 ) \
					{ \

		fprintf( stderr, "%s\n", y ); \

		exit( -1 ); \
					}

#define validdata( fld ) \
		( ( fld.type & F_PTR ? fld.x.dptr[0] : fld.x.data[0] ) != 0 )

#define		orderstatl( n )		((n*5) + 10)
#define neworderl( n )		((n*8) + 11)

#define		roundup( a )	( (a)>0 ? (int)((a)+0.9) : ((int)(-(a)+0.9))*(-1) )

#define INTNULL		0
#define CHECKOK -1

#define TX_NEWORDER 1
#define TX_PAYMENT 2
#define TX_ORDERSTAT 3
#define TX_DELIVERY 4
#define TX_STOCKLVL 5



/***************************************/

void Tstatus( char * );
void changestatus1( char * );
void errorstatus( char * );
void convert_datetime( char *, char * );
void convert_date( char *, char * );
int checkfields( DataField *, int, int, int, ... );
int check_neworder_lines( void );
void delivery_screen( void );
void stocklvl_screen( void );
void payment_screen( void );
void orderstat_screen( void );
void neworder_screen( void );

void init_tux();
void clean_tux();
void fatalerror( char * );
void interrupt( int );



/***************************************/

WINDOW	*win, *statwin;

int		trans_size = 1024;
void		*trans_buf;

int		w_id, d_id, res;
int		myqid, sqid;
long		msgsz;
long		olen;

extern TextField delivery_text[];
extern DataField delivery_data[];
extern TextField stocklvl_text[];
extern DataField stocklvl_data[];
extern TextField payment_text[];
extern DataField payment_data[];
extern TextField orderstat_text[];
extern DataField orderstat_data[];
extern TextField neworder_text[];
extern DataField neworder_data[];

static char	NewOrdername[20];
```

```
static char     Paymentname[20];
static char     OrderStatusname[20];
static char     Deliveryname[20];
static char     StockLevelname[20];
static int      svrnum;


/***************************************/

void TPCframe( int num )
{
        bool        exitflag = FALSE;
        int         c;

#if 0
        svrnum = (num-441)/30+12;
        svrnum = (num-501)/50+1;
#endif

#ifdef  CPU2
        svrnum = num - 1;
        if (svrnum < 50) {
                svrnum = 1;
        } else if(svrnum < 100) {
                svrnum = 2;
        } else if(svrnum < 150) {
                svrnum = 3;
        } else if(svrnum < 200) {
                svrnum = 4;
        } else if(svrnum < 240) {
                svrnum = 5;
        } else if(svrnum < 280) {
                svrnum = 6;
        } else if(svrnum < 320) {
                svrnum = 7;
        } else if(svrnum < 360) {
                svrnum = 8;
        } else if(svrnum < 400) {
                svrnum = 9;
        } else if(svrnum < 440) {
                svrnum = 10;
        } else {
                svrnum = 11;
        }
#else   /* 4CPU */
        svrnum = num - 941;
        if (svrnum < 50) {
                svrnum = 1;
        } else if(svrnum < 100) {
                svrnum = 2;
        } else if(svrnum < 150) {
                svrnum = 3;
        } else if(svrnum < 190) {
                svrnum = 4;
        } else if(svrnum < 230) {
                svrnum = 5;
        } else if(svrnum < 270) {
                svrnum = 6;
        } else if(svrnum < 310) {
                svrnum = 7;
        } else if(svrnum < 350) {
                svrnum = 8;
        } else if(svrnum < 390) {
                svrnum = 9;
        } else if(svrnum < 430) {
                svrnum = 10;
        } else {
                svrnum = 11;
        }
#endif

        /***********************************/

#if 0
        sprintf( NewOrdername,
"NEWORDER", svrnum );
        sprintf( Paymentname,   "PAYMENT",
svrnum );
        sprintf( OrderStatusname,
"ORDERSTATUS", svrnum );
        sprintf( Deliveryname,  "DELIVERY",
svrnum );
        sprintf( StockLevelname,
"STOCKLEVEL", svrnum );
#endif
        sprintf( NewOrdername,  "TPCC%02d",
svrnum );
        sprintf( Paymentname,   "TPCC%02d",
svrnum );
        sprintf( OrderStatusname, "TPCC%02d",
svrnum );
        sprintf( Deliveryname,  "TPCC%02d",
svrnum );
        sprintf( StockLevelname,  "TPCC%02d",
svrnum );

        /***********************************/

        initScreen( "", UI_NOBORDER );
        win = createWindow( 0, 0, 23, 80, "",
WIN_NOBORDER, ATTR_BASE, 0 );
        statwin = createWindow( LINES-1, 0, 1,
80, "", WIN_NOBORDER,
                        ATTR_BASE, 0 );

        while ( !exitflag )
        {
                Tstatus( "D:Delivery
S:Stock Level P:Payment O:Order Status"
                                " N:New Order
Q:Quit" );
                wmove( statwin, 0, COLS );
                touchwin( win );
                nrefresh( 2, win, statwin );

                c = getch();

                switch( c )
                {
                case 'n' :
                case 'N' :
                        wclear( win );

        changestatus1( "New Order" );

        neworder_screen();
                        break;
                case 'p' :
                case 'P' :
                        wclear( win );

        changestatus1( "Payment" );

        payment_screen();
                        break;
                case 's' :
                case 'S' :
                        wclear( win );

        changestatus1( "Stock Level" );

        stocklvl_screen();
                        break;
                case 'o' :
                case 'O' :
                        wclear( win );

        changestatus1( "Order Status" );

        orderstat_screen();
                        break;
                case 'd' :
                case 'D' :
                        wclear( win );

        changestatus1( "Delivery" );

        delivery_screen();
                        break;
                case 'q' :
                case 'Q' :
                        exitflag =
TRUE;
                        break;
                }
        }

        closeScreen();
#ifndef SCRTEST
        tpterm();
#endif

}



void Tstatus( char *status )
{
        int         len = strlen( status );
#if defined( DEBUG ) && DEBUG > 40
        WINDOW      *save_statwin = NULL,
*save_win = NULL;

        if ( save_statwin == NULL ) {
                save_statwin = statwin;
                save_win = win;
        } else {
                if ( save_statwin != statwin
|| save_win != win ) {
                        printf( "Oops!
Not equal!\n" );
                }
                exit;
        }
#endif

        wmove( statwin, 0, (COLS/2)-(len/2) );
        wdeleteln( statwin );
        waddstr( statwin, status );
}



void changestatus1( char *s )
{
        char        buf[80];

        sprintf( buf, "%s screen...Use arrow keys
to move "
                        "... Enter data
in fields", s );
        Tstatus( buf );
        wrefresh( statwin );

        debugmsg( ( stderr, "Change: %s\n", s )
);
}



void errorstatus( char *s )
{
        char buf[80];

        sprintf( buf, "%s screen...Insufficient data
... "
                        "Enter data in
fields", s );
```

```
		Tstatus( buf );
		wrefresh( statwin );

		debugmsg( ( stderr, "Error: %s\n", s ) );
}



void convert_datetime( char *out, char *in )
{
		int		year, month, day, hour, min,
sec;

		sscanf( in, "%d-%d-%d.%d:%d:%d",
			&day, &month, &year,
&hour, &min, &sec );
		sprintf( out,
"%02d%02d%04d%02d%02d%02d",
				day, month,
year, hour, min, sec );
}



void convert_date( char *out, char *in )
{
		int		year, month, day;

		sscanf( in, "%d-%d-%d", &day, &month,
&year );
		sprintf( out, "%02d%02d%04d", day,
month, year );
}



int checkfields( DataField *fld, int opt1, int opt2, int n,
... )
{
		va_list	l;
		int		i, f;

		va_start( l, n );

		if ( ( opt1 >= 0 ) && ( opt2 >= 0 ) )
		{
			if ( !validdata( fld[opt1] ) &&
!validdata( fld[opt2] ) )
			{
				if ( !validdata(
fld[opt1] ) )
				{

		return opt1;
				}
				else
				{

		return opt2;
				}
			}
		}

		for ( i = 0; i < n; i++ )
		{
			f = va_arg( l, int );

			if ( !validdata( fld[f] ) )
			{
				return f;
			}
		}

		va_end( l );

		return CHECKOK;
}



int check_neworder_lines()
{
		int		i, errf;
		bool		allok = TRUE, allclear =
TRUE;


#define	checkcell( i, j ) \
		if ( validdata( neworder_data[neworderl( i
)+j] ) ) \
		{ \
			allclear = FALSE; \
		} \
		else \
		{ \
			allok = FALSE; \
		}


		if ( !validdata( neworder_data[neworderl(
0 )] ) )
		{
			return neworderl( 0 );
		}
		else if ( !validdata(
neworder_data[neworderl( 0 )+1] ) )
		{
			return neworderl( 0 )+1;
		}
		else if ( !validdata(
neworder_data[neworderl( 0 )+3] ) )
		{
			return neworderl( 0 )+3;
		}
		else
		{
			for( i = 1; ( i < 15 ) && (
allok || allclear ); i++ )
			{
				allok = TRUE;
				allclear =
TRUE;

				checkcell( i, 0
);
				checkcell( i, 1
);
				checkcell( i, 3
);
			}

			if ( i == 15 )
			{
				return
CHECKOK;
			}
			else
			{
				i--;

				if ( !validdata(
neworder_data[neworderl( i )] ) )
				{

		return neworderl( i );
				}

				if ( !validdata(
neworder_data[neworderl( i )+1] ) )
				{

		return neworderl( i )+1;
				}

				if ( !validdata(
neworder_data[neworderl( i )+3] ) )
				{

		return neworderl( i )+3;
				}
			}
		}
}



/*
		Delivery screen
*/

void delivery_screen()
{
		struct delstruct		*bp;
		int
			i;
		int
			rtn;
		struct timeval
		timeque;


		bp = ( struct delstruct * )trans_buf;
		bp->tran_kind = TRANDEL;

		/* Preset screen data */

		for ( i=0; !eos( delivery_data[i] ); i++ ) {
			switch( i )
			{
			case 0 :
				sprintf(
delivery_data[i].x.data, "%d", w_id );
				break;
			case 2 :

		delivery_data[2].x.dptr = "";
				break;
			default :

		delivery_data[i].x.data[0] = 0;
				break;
			}
		}

		queryframe( win, FR_FULLSCREEN,
delivery_text, delivery_data );

		while ( ( i = checkfields( delivery_data, -
1, -1, 1, 1 ) ) != CHECKOK )
		{
			delivery_data[1].type &=
~F_START;
			delivery_data[i].type |=
F_START;

			errorstatus( "Delivery" );
			queryframe( win,
FR_RETRY, delivery_text, delivery_data );

			delivery_data[i].type &=
~F_START;
			delivery_data[1].type |=
F_START;
		}


		/* Get screen data and send to database
*/
```

```
		bp->delin.w_id = w_id;
		bp->delin.o_carrier_id = atoi(
delivery_data[1].x.data );
		bp->delin.in_timing_int = 1;
		/* bp->delin.in_timing_int = (
is_measurement() ) ? 1 : 0 */

#if defined( DEBUG ) && ( DEBUG > 10 )
		fprintf( stderr, "Delivery -- w_id : %d,
o_carrier_id : %d\n",
			bp->delin.w_id, bp-
>delin.o_carrier_id );
#endif

resend_delivery:
		debugmsg( ( stderr, "Try tpcall!\n" ) );
#ifndef	SCRTEST
		gettimeofday(&timeque);
#ifdef	TOOLKIT_ORIGINAL_STRUCTURE
		/* 1996.08.07 */
		bp->delin.qtime = ( double
)timeque.tv_sec
								+
( double )timeque.tv_usec / 1000000.0;
#else
		bp->delin.qtime  = timeque.tv_sec;
		bp->delin.uqtime = timeque.tv_usec;
#endif

		rtn = tpacall( Deliveryname, ( char *
)trans_buf,
			sizeof( struct delstruct ),
TPSIGRSTRT | TPNOREPLY );
#else
		dummy_delivery( bp );
		rtn = 0;
#endif
		debugmsg( ( stderr, "Delibery %s\n",
delivery_data[1].x.data ) );

		/* Display messege */

		if ( rtn == -1 ) {
			debugmsg( ( stderr, "tpacall
: Retry\n" ) );
			goto resend_delivery;
		} else {
			delivery_data[2].x.dptr =
"Delivery has been queued";
			display_fields( win,
FR_FULLSCREEN, delivery_text,
					delivery_data
);
		}

}



/*
		Stock Level screen
*/

void stocklvl_screen()
{
		struct stostruct		*bp;
		int					i;


		bp = ( struct stostruct * )trans_buf;
		bp->tran_kind = TRANSTO;

		/* Preset screen data */

		for ( i = 0; !eos( stocklvl_data[i] ); i++ )
		{
			switch( i )
			{
			case 0:
					sprintf(
stocklvl_data[i].x.data, "%d", w_id );
					break;
			case 1:
					sprintf(
stocklvl_data[i].x.data, "%d", d_id );
					break;
			default:

		stocklvl_data[i].x.data[0] = 0;
					break;
			}
		}

		queryframe( win, FR_FULLSCREEN,
stocklvl_text, stocklvl_data );

		while ( ( i = checkfields( stocklvl_data, -1,
-1, 1, 2 ) ) != CHECKOK )
		{
			stocklvl_data[2].type &=
~F_START;
			stocklvl_data[i].type |=
F_START;

			errorstatus( "Stock Level" );
			queryframe( win,
FR_RETRY, stocklvl_text, stocklvl_data );

			stocklvl_data[i].type &=
~F_START;
			stocklvl_data[2].type |=
F_START;
		}

		/* Get screen data and send to database
*/

		bp->stoin.w_id = atoi(
stocklvl_data[0].x.data );
		bp->stoin.d_id = atoi(
stocklvl_data[1].x.data );
		bp->stoin.threshold = atoi(
stocklvl_data[2].x.data );

		/*sleep(4);*/

#if defined( DEBUG ) && ( DEBUG > 10 )
		fprintf( stderr, "Stocklevel -- w_id : %d,
d_id : %d,"
			" threshold : %d\n", bp-
>stoin.w_id, bp->stoin.d_id,
			bp->stoin.threshold );
#endif

resend_stock:
		debugmsg( ( stderr, "Try tpcall!\n" ) );
#ifndef	SCRTEST
		if ( tpcall( StockLevelname,
			( char * )trans_buf, sizeof(
struct stostruct ),
			( char ** )&trans_buf, &olen,
0 ) == -1 )
		{
			debugmsg( ( stderr, "Error :
%d\n", tperrno ) );
			fatalerror( "tpcall failed in
StockLevel\n" );
		}
		bp = ( struct stostruct * )trans_buf;
#else
		dummy_stocklvl( bp );
#endif

		if ( bp->stoout.terror != NOERR )
		{
			if ( bp->stoout.terror ==
IRRECERR ) {
				fatalerror(
"Irrecoverable error in stocklevel\n" );
			}
			debugmsg( ( stderr, "terror :
%d\n", bp->stoout.terror ) );
			goto resend_stock;
		}

#if defined( DEBUG ) && ( DEBUG > 10 )
		fprintf( stderr, "Stocklevel -- low_stock =
%d\n",
			bp->stoout.low_stock );
#endif

		sprintf( stocklvl_data[3].x.data, "%d" , bp-
>stoout.low_stock );

		display_fields( win, FR_FULLSCREEN,
stocklvl_text, stocklvl_data );

}



/*
		Payment screen
*/

void payment_screen()
{
		struct paystruct		*bp;
		int					i;


		bp = ( struct paystruct * )trans_buf;
		bp->tran_kind = TRANPAY;

		/* payment screen data */

		for ( i = 0; !eos( payment_data[i] ); i++ )
		{
			switch( i )
			{
			case 1:
					sprintf(
payment_data[i].x.data, "%d", w_id );
					break;
			case 18 :

		payment_data[18].x.dptr = bp-
>payin.c_last;

		payment_data[18].x.dptr[0] = 0;
					break;
			default:
					if (
payment_data[i].type & F_PTR)
					{

		payment_data[i].x.dptr = "";
					}
					else
					{

		payment_data[i].x.data[0] = 0;
					}
					break;
			}
		}
```

```
		queryframe( win, FR_FULLSCREEN,
payment_text, payment_data );

		while ( ( i = checkfields( payment_data,
13, 18, 4, 2, 14, 15, 28 ) )
				!= CHECKOK )
		{
				payment_data[2].type &=
~F_START;
				payment_data[i].type |=
F_START;

				errorstatus( "Payment" );
				queryframe( win,
FR_RETRY, payment_text, payment_data );

				payment_data[i].type &=
~F_START;
				payment_data[2].type |=
F_START;
		}


		/* Get screen data and to database*/

		bp->payin.w_id = atoi(
payment_data[1].x.data );
		bp->payin.d_id = atoi(
payment_data[2].x.data );
		bp->payin.c_id = atoi(
payment_data[13].x.data );
		bp->payin.c_w_id = atoi(
payment_data[14].x.data );
		bp->payin.c_d_id = atoi(
payment_data[15].x.data );
		bp->payin.h_amount = (float)( atoi(
payment_data[28].x.data )/100.0 );
		if ( *bp->payin.c_last == '\0' ) {
				bp->payin.bylastname = 0;
		} else {
				bp->payin.bylastname = 1;
		}

#if defined( DEBUG ) && ( DEBUG > 10 )
		fprintf( stderr, "Payment -- w_id : %d,
d_id : %d, c_id : %d\n",
				bp->payin.w_id, bp-
>payin.d_id, bp->payin.c_id );
		fprintf( stderr, "	-- c_w_id : %d,
c_d_id : %d, h_amount : %d\n",
				bp->payin.c_w_id, bp-
>payin.c_d_id, bp->payin.h_amount );
#endif

resend_payment:
#if defined( DEBUG ) && ( DEBUG > 40 )
#ifndef	SCRTEST
		fprintf( stderr, "Name : %s\n",
payment_name );
#endif	/* SCRTEST */
		fprintf( stderr, "Pointer : %08X\n", bp );
		fprintf( stderr, "Length : %08d\n", sizeof(
struct paystruct ) );
		fprintf( stderr, "PointerAddr : %08X\n",
&bp );
#endif


		debugmsg( ( stderr, "Try tpcall!\n" ) );
#ifndef	SCRTEST
		if ( tpcall( Paymentname,
				( char * )trans_buf, sizeof(
struct paystruct ),
				( char ** )&trans_buf,
&olen,0 ) == -1 )
		{
				debugmsg( ( stderr, "Error :
%d\n", tperrno ) );
				fatalerror( "tpcall failed in
Payment\n" );
		}
		bp = ( struct paystruct * )trans_buf;
#else
		dummy_payment( bp );
#endif

#if defined( DEBUG ) && ( DEBUG > 40 )
		fprintf( stderr ,"RetLength : %08d\n", olen
);
		fprintf( stderr, "RetPointer : %08X\n", bp
);
#endif

		if ( bp->payout.terror != NOERR )
		{
#if defined( DEBUG ) && ( DEBUG > 10 )
				fprintf( stderr, "Payment --
w_id : %d, d_id : %d, c_id : %d\n",
						bp-
>payin.w_id, bp->payin.d_id, bp->payin.c_id );
				fprintf( stderr, "	--
c_w_id : %d, c_d_id : %d,"
						" h_amount :
%d\n",
						bp-
>payin.c_w_id, bp->payin.c_d_id,
						bp-
>payin.h_amount );
#endif
				if ( bp->payout.terror ==
IRRECERR ) {
#ifndef	SCRTEST
						debugmsg( (
stderr, "Error : %d\n", tperrno ) );
#endif
						fatalerror(
"Irrecoverable error in Payment\n" );
				}

				debugmsg( ( stderr, "terror :
%d\n", bp->payout.terror ) );
				goto resend_payment;
		}

		convert_datetime(
payment_data[0].x.data, bp->payout.h_date );
		payment_data[3].x.dptr = bp-
>payout.w_street_1;
		payment_data[4].x.dptr = bp-
>payout.d_street_1;
		payment_data[5].x.dptr = bp-
>payout.w_street_2;
		payment_data[6].x.dptr = bp-
>payout.d_street_2;
		payment_data[7].x.dptr = bp-
>payout.w_city;
		payment_data[8].x.dptr = bp-
>payout.w_state;
		payment_data[9].x.dptr = bp-
>payout.w_zip;
		payment_data[10].x.dptr = bp-
>payout.d_city;
		payment_data[11].x.dptr = bp-
>payout.d_state;
		payment_data[12].x.dptr = bp-
>payout.d_zip;
		sprintf( payment_data[13].x.data, "%d",
bp->payout.c_id );
		payment_data[16].x.dptr = bp-
>payout.c_first;
		payment_data[17].x.dptr = bp-
>payout.c_middle;
		payment_data[18].x.dptr = bp-
>payout.c_last;
		convert_date( payment_data[19].x.data,
bp->payout.c_since );
		payment_data[20].x.dptr = bp-
>payout.c_street_1;
		payment_data[21].x.dptr = bp-
>payout.c_credit;
		payment_data[22].x.dptr = bp-
>payout.c_street_2;
		sprintf( payment_data[23].x.data, "%d",
				roundup( bp-
>payout.c_discount * 10000.0 ) );
		payment_data[24].x.dptr = bp-
>payout.c_city;
		payment_data[25].x.dptr = bp-
>payout.c_state;
		payment_data[26].x.dptr = bp-
>payout.c_zip;
		payment_data[27].x.dptr = bp-
>payout.c_phone;
		/* "%.0f" --> number is rounded to the
appropriate number of digits */
		sprintf( payment_data[29].x.data, "%.0f",
bp->payout.c_balance*100.0 );
		sprintf( payment_data[30].x.data, "%.0f",
bp->payout.c_credit_lim*100.0 );

		if ( strlen( strncpy(
payment_data[31].x.data, bp->payout.c_data, 50 ) )
				== 50 )
		{
				if ( strlen( strncpy(
payment_data[32].x.data,
						&bp-
>payout.c_data[50], 50 ) ) == 50 )
				{
						if ( strlen(
strncpy( payment_data[33].x.data,

		&bp->payout.c_data[100], 50 ) ) == 50 )
						{

		strncpy( payment_data[34].x.data,

		&bp->payout.c_data[150], 50 );
						}
				}
		}

		display_fields( win, FR_FULLSCREEN,
payment_text, payment_data );

}



/*
		Order status screen
*/

void orderstat_screen()
{
		struct ordstruct		*bp;
		int					i;


		bp = ( struct ordstruct * )trans_buf;
		bp->tran_kind = TRANORD;

		/* Preset screen data */

		for( i = 0; !eos( orderstat_data[i] ); i++ )
		{
				switch( i )
				{
```

```
                        case 0 :
                                sprintf(
orderstat_data[i].x.data, "%d", w_id );
                                break;
                        case 5 :

                orderstat_data[5].x.dptr = bp-
>ordin.c_last;

                orderstat_data[5].x.dptr[0] =0;
                                break;
                        default :
                                if (
orderstat_data[i].type & F_PTR )
                                {

                orderstat_data[i].x.dptr = "";
                                }
                                else
                                {

                orderstat_data[i].x.data[0] = 0;
                                }
                                break;
                        }
                }

                queryframe( win, FR_FULLSCREEN,
orderstat_text, orderstat_data );

                while ( ( i = checkfields( orderstat_data,
2, 5, 1, 1 ) ) != CHECKOK )
                {
                        orderstat_data[1].type &=
~F_START;
                        orderstat_data[i].type |=
F_START;

                        errorstatus( "Order Status"
);
                        queryframe( win,
FR_RETRY, orderstat_text, orderstat_data );

                        orderstat_data[i].type &=
~F_START;
                        orderstat_data[1].type |=
F_START;
                }


                /* Get Screen data and send to database
*/

                bp->ordin.w_id = atoi(
orderstat_data[0].x.data );
                bp->ordin.d_id = atoi(
orderstat_data[1].x.data );
                bp->ordin.c_id = atoi(
orderstat_data[2].x.data );
                if ( *bp->ordin.c_last == '\0' ) {
                        bp->ordin.bylastname = 0;
                } else {
                        bp->ordin.bylastname = 1;
                }

#if defined( DEBUG ) && ( DEBUG > 10 )
                fprintf( stderr, "Orderstatus -- w_id : %d,
d_id : %d, c_id : %d\n",
                        bp->ordin.w_id, bp-
>ordin.d_id, bp->ordin.c_id );
#endif

resend_orderstatus:
                debugmsg( ( stderr, "Try tpcall!\n" ) );
#ifndef SCRTEST
                if ( tpcall( OrderStatusname, ( char *
)trans_buf,
                        sizeof( struct ordstruct ), (
char ** )&trans_buf, &olen, 0 )
                        == -1 )
                {
                        debugmsg( ( stderr, "Error :
%d\n", tperrno ) );
                        fatalerror( "tpcall failed in
OrderStatus\n" );
                }
                bp = ( struct ordstruct * )trans_buf;

#if defined( DEBUG ) && ( DEBUG > 10 )
                fprintf( stderr, "balance : %.0f\n", bp-
>ordout.c_balance );
                fprintf( stderr, "first : %s\n", bp-
>ordout.c_first );
                fprintf( stderr, "middle : %s\n", bp-
>ordout.c_middle );
                fprintf( stderr, "entry : %f\n", bp-
>ordout.o_entry_d );
                fprintf( stderr, "o_ol_cnt : %d\n", bp-
>ordout.o_ol_cnt );
#endif

#else
                dummy_orderstat( bp );
#endif

                if ( bp->ordout.terror != NOERR )
                {
#if defined( DEBUG ) && ( DEBUG > 10 )
                        fprintf( stderr, "Orderstatus -
- w_id : %d, d_id : %d,"
                                "c_id : %d\n",
                                bp-
>ordin.w_id, bp->ordin.d_id, bp->ordout.c_id );
#endif
                        if ( bp->ordout.terror ==
IRRECERR ) {
                                fatalerror(
"Irrecoverable error in orderstatus.\n" );
                        }

                        debugmsg( ( stderr, "C_R :
%d\n", bp->ordout.terror ) );
                        goto resend_orderstatus;
                }

                sprintf( orderstat_data[2].x.data, "%d",
bp->ordout.c_id );
                orderstat_data[3].x.dptr = bp-
>ordout.c_first;
                orderstat_data[4].x.dptr = bp-
>ordout.c_middle;
                orderstat_data[5].x.dptr = bp-
>ordout.c_last;
                /* "%.0f" --> number is rounded to the
appropriate number of digits */
                sprintf( orderstat_data[6].x.data, "%.0f",
bp->ordout.c_balance*100.0 );
                sprintf( orderstat_data[7].x.data, "%d",
bp->ordout.o_id );
                convert_datetime(
orderstat_data[8].x.data, bp->ordout.o_entry_d );

                if ( bp->ordout.o_carrier_id != INTNULL )
{
                        sprintf(
orderstat_data[9].x.data, "%d",
                                bp-
>ordout.o_carrier_id );
                }
                for( i = 0; i < bp->ordout.o_ol_cnt; i++ )
                {
                        sprintf(
orderstat_data[orderstatl( i )].x.data, "%d",
                                bp-
>ordout.ol_supply_w_id[i] );
                        sprintf(
orderstat_data[orderstatl( i )+1].x.data, "%d",
                                bp-
>ordout.ol_i_id[i] );
                        sprintf(
orderstat_data[orderstatl( i )+2].x.data, "%d",
                                bp-
>ordout.ol_quantity[i] );
                        sprintf(
orderstat_data[orderstatl( i )+3].x.data, "%d",
                                roundup( bp-
>ordout.ol_amount[i]*100.0 ) );
                        if( strncmp( bp-
>ordout.ol_delivery_d[i], "NOT DELIVR", 10 )
                                != 0 )
                        {
                                convert_date(
orderstat_data[orderstatl( i )+4].x.data,

                bp->ordout.ol_delivery_d[i] );

                        }
                }

                display_fields( win, FR_FULLSCREEN,
orderstat_text, orderstat_data );

}



/*
                New Order screen
*/

void neworder_screen( )
{
                struct newstruct        *bp;
                int                             i,
j;


                bp = ( struct newstruct * )trans_buf;
                bp->tran_kind = TRANNEW;

                /* Preset screen data */

                for ( i = 0; !eos( neworder_data[i] ); i++ )
                {
                        switch( i )
                        {
                        case 0 :
                                sprintf(
neworder_data[i].x.data, "%d", w_id );
                                break;
                        case 4 :

                neworder_data[4].x.dptr = bp-
>newout.c_last;

                neworder_data[4].x.dptr[0] = 0;
                                break;
                        case 131:

                neworder_data[131].x.dptr = "";
                                break;
                        default:
                                if (
neworder_data[i].type & F_PTR)
                                {
```

```
                neworder_data[i].x.dptr = "";
                                }
                                else
                                {

                neworder_data[i].x.data[0] = 0;
                                }
                                break;
                        }
                }

                queryframe( win, FR_FULLSCREEN,
neworder_text, neworder_data );

                while ( ( ( i = checkfields( neworder_data,
-1, -1, 2, 1, 3 ) )
                                != CHECKOK
)
                        || ( ( i =
check_neworder_lines() ) != CHECKOK ) )
                {
                        if ( i == CHECKOK )
                        {
                                i = j;
                        }

                        neworder_data[1].type &=
~F_START;
                        neworder_data[i].type |=
F_START;

                        errorstatus( "New Order" );
                        queryframe( win,
FR_RETRY, neworder_text, neworder_data );

                        neworder_data[i].type &=
~F_START;
                        neworder_data[1].type |=
F_START;
                }



                /* Get Screen data and to database  */

                bp->newin.w_id = atoi(
neworder_data[0].x.data );
                bp->newin.d_id = atoi(
neworder_data[1].x.data );
                bp->newin.c_id = atoi(
neworder_data[3].x.data );

                for ( i = 0; ( neworder_data[neworderl( i
)].x.data[0] != 0 )
                        && ( i < 15 ); i++ )
                {
                        bp-
>newin.ol_supply_w_id[i]
                                = atoi(
neworder_data[neworderl( i )].x.data );
                        bp->newin.ol_quantity[i]
                                = atoi(
neworder_data[neworderl( i )+3].x.data );
                        bp->newin.ol_i_id[i]
                                = atoi(
neworder_data[neworderl( i )+1].x.data );
                        if ( bp->newin.ol_i_id[i] == 0
) {
                                bp-
>newin.ol_i_id[i] = -1;       /* Invalid Item-ID */

                                /* for Oracle
T.K. */
                        }
                }
                if ( i < 15 ) {
                                bp-
>newin.ol_supply_w_id[i] = 0;
                                bp->newin.ol_quantity[i] =
0;
                                bp->newin.ol_i_id[i] = 0;
                        }

#if defined( DEBUG ) && ( DEBUG > 10 )
                fprintf( stderr, "NewOrder -- w_id : %d,
d_id : %d, c_id : %d,"
                                " lines : %d\n", bp-
>newin.w_id, bp->newin.d_id, bp->newin.c_id, i );
#endif

resend_neworder:
                debugmsg( ( stderr, "Try tpcall!\n" ) );
#ifndef         SCRTEST
                if ( tpcall( NewOrdername, ( char *
)trans_buf,
                                sizeof( struct newstruct ), (
char ** )&trans_buf, &olen, 0 )
                                == -1 )
                {
                                debugmsg( ( stderr, "Error :
%d\n", tperrno ) );
                                fatalerror( "tpcall failed in
NewOrder\n" );
                }
                bp = ( struct newstruct * )trans_buf;
#else
                dummy_neworder( bp );
#endif

                neworder_data[4].x.dptr = bp-
>newout.c_last;
                neworder_data[5].x.dptr = bp-
>newout.c_credit;
                sprintf( neworder_data[7].x.data, "%d",
bp->newout.o_id );

#if 0
if ( bp->newout.o_id < 3000 ) {
                FILE            *out;
                char            path[256];

                sprintf( path, "/var/tmp/tcerror.%d", (w_id-
1)*10+d_id );
                if ( ( out = fopen( path, "a+" ) ) != NULL ) {
                                fprintf( out, "Detect less
than 3000 O_ID: %d\n",
                                                bp-
>newout.o_id );
                                fclose( out );
                }
}
#endif

                if ( bp->newout.terror == NOERR )
                {
                                int             cnt = bp-
>newout.o_ol_cnt;

                                convert_datetime(
neworder_data[2].x.data,
                                                bp-
>newout.o_entry_d );
                                sprintf(
neworder_data[6].x.data, "%d",
                                                roundup( bp-
>newout.c_discount * 10000.0 ) );
                                sprintf(
neworder_data[8].x.data, "%d", cnt );
                                sprintf(
neworder_data[9].x.data, "%d",
                                                roundup( bp-
>newout.w_tax * 10000.0 ) );
                                sprintf(
neworder_data[10].x.data, "%d",
                                                roundup( bp-
>newout.d_tax * 10000.0 ) );

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

#if defined( DEBUG ) && ( DEBUG > 20 )
                                fprintf( stderr,

                "neworder(%d) :"
                                                "
i_name = %s, s_quantity = %d,"
                                                "
brand_generic = %c, i_price = %d,"
                                                "
ol_amount = %d\n",
                                                i,

                bp->newout.i_name[i], bp-
>newout.s_quantity[i],

                bp->newout.brand_generic[i],

                roundup( bp->newout.i_price[i] * 100.0 ),

                roundup( bp->newout.ol_amount[i] *
100.0 ) );
#endif



                bp->newout.i_name[i];
                                sprintf(
neworder_data[neworderl( i )+2].x.dptr =
neworder_data[neworderl( i )+4].x.data, "%d",

                bp->newout.s_quantity[i] );
                                sprintf(
neworder_data[neworderl( i )+5].x.data, "%c",

                bp->newout.brand_generic[i] );
                                sprintf(
neworder_data[neworderl( i )+6].x.data, "%d",

                roundup( bp->newout.i_price[i] * 100.0 ) );
                                sprintf(
neworder_data[neworderl( i )+7].x.data, "%d",

                roundup( bp->newout.ol_amount[i] *
100.0 ) );
                                }
                                sprintf(
neworder_data[132].x.data, "%d",
                                                roundup( bp-
>newout.total_amount * 100.0 ) );

                                /* "Item number is not valid"
or "" ('\0') */
                                neworder_data[131].x.dptr =
bp->newout.status;
                }
                else
                {
                                if ( bp->newout.terror ==
IRRECERR )
                                {
#ifndef         SCRTEST
                                                debugmsg( (
stderr, "Error : %d\n", tperrno ) );
#endif
                                                fatalerror(
"Irrecoverable error in NewOrder\n" );
                                }
                                else
```

```
                {
                        debugmsg( (
stderr, "terror : %d\n", \
        bp->newout.terror ) );
                        goto
resend_neworder;        /* error */
                }
        }

        display_fields( win, FR_FULLSCREEN,
neworder_text, neworder_data );

}



/*
        connect/close to tuxedo server
*/

void init_tux()
{

#ifndef SCRTEST
        if ( tpinit( NULL ) == -1 )
        {
                debugmsg( ( stderr, "Error :
%d\n", tperrno ) );
                fprintf( stderr, "Failed to join
the application.\n" );
                exit( 1 );
        }

        if ( ( trans_buf =
                (void *)tpalloc( "CARRAY",
NULL, trans_size ) )
                == NULL )
        {
                fprintf( stderr, "Tpalloc
failed.\n" );
                exit( 1 );
        }
#else
        if ( ( trans_buf = (void *)malloc(
trans_size ) ) == NULL )
        {
                fprintf( stderr, "Malloc
failed.\n" );
                exit( 1 );
        }
#endif
        memset( trans_buf, 0, ( size_t )trans_size
);

}



void clean_tux()
{
#ifndef SCRTEST
        tpterm();
#endif
}



/* Close screen and print the fatal error message to
stderr */

void fatalerror( char *msg )
{
        FILE    *err;
        char    path[256];

        clean_tux();
        closeScreen();

        sprintf( path, "/tmp/tcerror.%d", (w_id-
1)*10+d_id );
        if ( ( err = fopen( path, "w" ) ) != NULL ){
                fprintf( err, msg );
                fclose( err );
        }
        exit( -1 );
}



void interrupt( int sig )
{
        if ( sig == SIGHUP ) {
        /* in.telnetd send SIGHUP */
                exit( -10 );
        } else {
                fatalerror( "Signal is
received\n" );
        }
}



/*
        main function
*/

main(argc,argv)
        int             argc;
        char            *argv[];
{
        int             clone;


        if ( argc < 2 )
        {
                fprintf( stderr, "Argument
error!\n" );
                exit( 1 );
        }

#if defined( DEBUG ) && ( DEBUG > 10 )
        {
                char            buf[32];

                sprintf( buf,
"/tmp/tcheck.%05d", getpid() );
                freopen( buf, "w", stderr);
                setvbuf( stderr, NULL,
_IOLBF, 0 );
        }
#endif

        clone = atoi( argv[1] );

        w_id = (clone-1)/10 + 1;
        d_id = (clone-1)%10 + 1;

        srand48( getpid() );

        signal( SIGHUP, interrupt );
        signal( SIGINT, interrupt );
        signal( SIGTERM, interrupt );


        init_tux();
#ifndef DEBUG
        fclose( stderr );
#endif
        TPCframe(clone);
        clean_tux();

        exit( 0 );
}
```

# *Appendix B: Server Source Code*

```
/*=====================================
============================+
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GROUP               |
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|

+=====================================
============================+
| FILENAME
|   pldel.c
| DESCRIPTION
|   OCI version (using PL/SQL stored procedure)
of
|   DELIVERY transaction in TPC-C benchmark.

+=====================================
============================*/

#include "tpcc.h"
#include "tpccpl.h"


#ifdef ISO5
#define SQLTXT "BEGIN adelivery.adeliver (:w_id,
:cr_id, :o_id, :retry); END;"
#else
#define SQLTXT "BEGIN delivery.deliver (:w_id,
:cr_id, :o_id, :retry); END;"
#endif

#define NDISTS 10


struct delctx {
  sb2 del_o_id_ind[NDISTS];
  ub2 del_o_id_len[NDISTS];
  ub2 del_o_id_rcode[NDISTS];
  ub4 del_o_id_csize;
};

typedef struct delctx delctx;

delctx *dctx;



pldelinit ()

{

  int i;
  text stmbuf[1024];

  dctx = (delctx *) malloc (sizeof(delctx));

  OOPEN(&tpclda,&curd);

  sprintf ((char *) stmbuf, SQLTXT);

  OPARSE(&tpclda,&curd,stmbuf,NA,FALSE,VER7)
;

  for (i = 0; i < NDISTS; i++) {
    dctx->del_o_id_ind[i] = TRUE;
    dctx->del_o_id_len[i] = sizeof(int);
  }
  dctx->del_o_id_csize = NDISTS;

  /* bind variables */


OBNDRV(&tpclda,&curd,":w_id",ADR(w_id),SIZ(in
t),SQLT_INT);

OBNDRV(&tpclda,&curd,":cr_id",ADR(o_carrier_id
),SIZ(int),SQLT_INT);

OBNDRV(&tpclda,&curd,":o_id",ADR(o_id),SIZ(int
),SQLT_INT);

OBNDRAA(&tpclda,&curd,":o_id",del_o_id,SIZ(int)
,SQLT_INT,
        dctx->del_o_id_ind,dctx-
>del_o_id_len,dctx->del_o_id_rcode,NDISTS,
        ADR(dctx->del_o_id_csize));

OBNDRV(&tpclda,&curd,":retry",ADR(retries),SIZ(i
nt),SQLT_INT);

  return (0);

}



pldel ()

{

  int i;

  for (i = 0; i < NDISTS; i++) {
    dctx->del_o_id_ind[i] = TRUE;
    dctx->del_o_id_len[i] = sizeof(int);
  }
  dctx->del_o_id_csize = NDISTS;

  OEXEC(&tpclda,&curd);

  return (0);

}



void pldeldone ()

{

  if (dctx)
    free (dctx);

  if (oclose (&curd))
    errrpt (&tpclda, &curd);

}

/*=====================================
============================+
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|

+=====================================
============================+
| FILENAME
|   plnew.c
| DESCRIPTION
|   OCI version (using PL/SQL stored procedure)
of
|   NEW ORDER transaction in TPC-C
benchmark.

+=====================================
============================*/

#include "tpcc.h"
#include "tpccpl.h"
#ifdef TUX
#include <userlog.h>
#endif


#define SQLTXT1 "BEGIN neworder.enterorder
(:w_id, :d_id, :c_id, :o_ol_cnt, \
  :o_all_local, :c_discount, :c_last, :c_credit,
:d_tax, :w_tax, :o_id, \
  :o_entry_d, :retry); END;"

#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 s_i_id = :ol_i_id AND s_w_id =
:ol_supply_w_id"

#define SQLTXT3 "\
SELECT
i_id,s_w_id,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
i_id,s_w_id,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
i_id,s_w_id,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
i_id,s_w_id,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
i_id,s_w_id,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
i_id,s_w_id,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
i_id,s_w_id,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
i_id,s_w_id,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
i_id,s_w_id,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
i_id,s_w_id,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
i_id,s_w_id,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
i_id,s_w_id,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
i_id,s_w_id,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
i_id,s_w_id,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
i_id,s_w_id,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
VALUES (:ol_o_id, :ol_d_id, \
  :ol_w_id, :ol_number, :ol_i_id, :ol_supply_w_id,
NULL, :ol_quantity, \
  :ol_amount, :ol_dist_info)"

#define NITEMS 15


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 i_id_ind[NITEMS];
  sb2 w_id_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];

  ub2 nol_i_id_len[NITEMS];
  ub2 nol_supply_w_id_len[NITEMS];
  ub2 nol_quantity_len[NITEMS];
  ub2 nol_amount_len[NITEMS];
  ub2 i_name_len[NITEMS];
  ub2 s_quantity_len[NITEMS];
  ub2 i_price_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 i_id_len[NITEMS];
  ub2 w_id_len[NITEMS];
  ub2 s_remote_len[NITEMS];
  ub2 s_quant_len[NITEMS];
  ub2 i_data_len[NITEMS];
  ub2 s_data_len[NITEMS];
  ub2 s_dist_info_len[NITEMS];
  ub2 ol_dist_info_len[NITEMS];

  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 i_id_rcode[NITEMS];
  ub2 w_id_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];

  int ol_w_id[NITEMS];
  int ol_d_id[NITEMS];
  int ol_o_id[NITEMS];
  int ol_number[NITEMS];
  int i_id[NITEMS];
  int w_id[NITEMS];
  int s_remote[NITEMS];
  char i_data[NITEMS][51];
  char s_data[NITEMS][51];
  char s_dist_info[NITEMS][25];
};

typedef struct newctx newctx;

newctx *nctx;



plnewinit ()

{

  int i, j;
  text stmbuf[3000];
  char id[4];
  char sd[4];

  nctx = (newctx *) malloc (sizeof(newctx));

  /* open first cursor */

  OOPEN(&tpclda,&curn1);

  sprintf ((char *) stmbuf, SQLTXT1);

OPARSE(&tpclda,&curn1,stmbuf,NA,FALSE,VER
7);

  /* bind variables */


OBNDRV(&tpclda,&curn1,":w_id",ADR(w_id),SIZ(
w_id),SQLT_INT);

OBNDRV(&tpclda,&curn1,":d_id",ADR(d_id),SIZ(d
_id),SQLT_INT);

OBNDRV(&tpclda,&curn1,":c_id",ADR(c_id),SIZ(c
_id),SQLT_INT);

OBNDRV(&tpclda,&curn1,":o_all_local",ADR(o_all
_local),SIZ(o_all_local),
              SQLT_INT);

OBNDRV(&tpclda,&curn1,":o_ol_cnt",ADR(o_ol_c
nt),SIZ(o_ol_cnt),SQLT_INT);


OBNDRV(&tpclda,&curn1,":w_tax",ADR(w_tax),SI
Z(w_tax),SQLT_FLT);

OBNDRV(&tpclda,&curn1,":d_tax",ADR(d_tax),SI
Z(d_tax),SQLT_FLT);

OBNDRV(&tpclda,&curn1,":o_id",ADR(o_id),SIZ(o
_id),SQLT_INT);

OBNDRV(&tpclda,&curn1,":c_discount",ADR(c_di
scount),SIZ(c_discount),
              SQLT_FLT);

OBNDRV(&tpclda,&curn1,":c_credit",c_credit,SIZ(
c_credit),SQLT_STR);

OBNDRV(&tpclda,&curn1,":c_last",c_last,SIZ(c_la
st),SQLT_STR);

OBNDRV(&tpclda,&curn1,":o_entry_d",o_entry_d,
SIZ(o_entry_d),SQLT_STR);

OBNDRV(&tpclda,&curn1,":retry",ADR(retries),SIZ
(retries),SQLT_INT);

  /* open second cursor */

  OOPEN(&tpclda,&curn2);

  sprintf ((char *) stmbuf, SQLTXT2);

OPARSE(&tpclda,&curn2,stmbuf,NA,FALSE,VER
7);

  /* bind variables */


OBNDRA(&tpclda,&curn2,":ol_i_id",nol_i_id,SIZ(int
),SQLT_INT,
              nctx->nol_i_id_ind,nctx-
>nol_i_id_len,nctx->nol_i_id_rcode);
```

```
OBNDRA(&tpclda,&curn2,":ol_supply_w_id",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);

OBNDRA(&tpclda,&curn2,":ol_quantity",nol_quantity,SIZ(int),SQLT_INT,
                nctx->nol_quantity_ind,nctx->nol_quantity_len,
        nctx->nol_quantity_rcode);

OBNDRA(&tpclda,&curn2,":s_quantity",s_quantity,SIZ(int),SQLT_INT,
                nctx->s_quant_ind,nctx->s_quant_len, nctx->s_quant_rcode);
  OBNDRA(&tpclda,&curn2,":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++) {
    OOPEN(&tpclda,&curn3[i]);
    j = i + 1;
    sprintf ((char *) stmbuf, SQLTXT3, j, j, j, j, j, j, j, j, j, j,
            j, j, j);

OPARSE(&tpclda,&curn3[i],stmbuf,NA,FALSE,VER7);
    for (j = 0; j < NITEMS; j++) {
      sprintf (id, ":%d", j + 10);
      sprintf (sd, ":%d", j + 30);

OBNDRA(&tpclda,&curn3[i],id,ADR(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]);

OBNDRA(&tpclda,&curn3[i],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] = NULL;
      nctx->nol_supply_w_id_len[j] = NULL;
    }

    ODEFIN(&tpclda,&curn3[i],1,nctx->i_id,SIZ(nctx->i_id[0]),SQLT_INT,NA,
          nctx->i_id_ind,NULL,NA,NA,nctx->i_id_len, nctx->i_id_rcode);
    ODEFIN(&tpclda,&curn3[i],2,nctx->w_id,SIZ(nctx->w_id[0]),SQLT_INT,NA,
          nctx->w_id_ind,NULL,NA,NA,nctx->w_id_len, nctx->w_id_rcode);

ODEFIN(&tpclda,&curn3[i],3,i_price,SIZ(float),SQLT_FLT,NA,
          nctx->i_price_ind,NULL,NA,NA,nctx->i_price_len,
          nctx->i_price_rcode);

ODEFIN(&tpclda,&curn3[i],4,i_name,SIZ(i_name[0]),SQLT_STR,NA,
          nctx->i_name_ind,NULL,NA,NA,nctx->i_name_len,nctx->i_name_rcode);
    ODEFIN(&tpclda,&curn3[i],5,nctx->i_data,SIZ(nctx->i_data[0]),SQLT_STR,NA,
          nctx->i_data_ind,NULL,NA,NA,nctx->i_data_len, nctx->i_data_rcode);
    ODEFIN(&tpclda,&curn3[i],6,nctx->s_dist_info,SIZ(nctx->s_dist_info[0]),
          SQLT_STR,NA,nctx->s_dist_info_ind,NULL,NA,NA,
          nctx->s_dist_info_len, nctx->s_dist_info_rcode);
    ODEFIN(&tpclda,&curn3[i],7,nctx->s_data,SIZ(nctx->s_data[0]),SQLT_STR,NA,
          nctx->s_data_ind,NULL,NA,NA,nctx->s_data_len, nctx->s_data_rcode);

ODEFIN(&tpclda,&curn3[i],8,s_quantity,SIZ(int),SQLT_INT,NA,
          nctx->s_quantity_ind,NULL,NA,NA,nctx->s_quantity_len,
          nctx->s_quantity_rcode);
  }

  /* open fourth cursor */

  OOPEN(&tpclda,&curn4);

  sprintf ((char *) stmbuf, SQLTXT4);

OPARSE(&tpclda,&curn4,stmbuf,NA,FALSE,VER7);

  /* bind variables */

  OBNDRA(&tpclda,&curn4,":ol_o_id",nctx->ol_o_id,SIZ(int),SQLT_INT,
                nctx->ol_o_id_ind,nctx->ol_o_id_len,nctx->ol_o_id_rcode);
  OBNDRA(&tpclda,&curn4,":ol_d_id",nctx->ol_d_id,SIZ(int),SQLT_INT,
                nctx->ol_d_id_ind,nctx->ol_d_id_len,nctx->ol_d_id_rcode);
  OBNDRA(&tpclda,&curn4,":ol_w_id",nctx->ol_w_id,SIZ(int),SQLT_INT,
                nctx->ol_w_id_ind,nctx->ol_w_id_len,nctx->ol_w_id_rcode);
  OBNDRA(&tpclda,&curn4,":ol_number",nctx->ol_number,SIZ(int),SQLT_INT,
                nctx->ol_number_ind,nctx->ol_number_len,nctx->ol_number_rcode);

OBNDRA(&tpclda,&curn4,":ol_i_id",nol_i_id,SIZ(int),SQLT_INT,
                nctx->nol_i_id_ind,nctx->nol_i_id_len,nctx->nol_i_id_rcode);

OBNDRA(&tpclda,&curn4,":ol_supply_w_id",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);

OBNDRA(&tpclda,&curn4,":ol_quantity",nol_quantity,SIZ(int),SQLT_INT,
                nctx->nol_quantity_ind,nctx->nol_quantity_len,
        nctx->nol_quantity_rcode);

OBNDRA(&tpclda,&curn4,":ol_amount",nol_amount,SIZ(float),SQLT_FLT,
                nctx->nol_amount_ind,nctx->nol_amount_len,nctx->nol_amount_rcode);
  OBNDRA(&tpclda,&curn4,":ol_dist_info",nctx->s_dist_info,
        SIZ(nctx->s_dist_info[0]),SQLT_STR,nctx->ol_dist_info_ind,
        nctx->ol_dist_info_len, nctx->ol_dist_info_rcode);

  return (0);

}



plnew ()

{

  int i, j, k;
  int rpc, rpc3, rowoff, iters;
  int onepass;

#if defined(ISO1) || defined(ISO7)
  int reread;
  char sdate[30];

  sysdate (sdate);
  printf ("New Order started at: %s\n", sdate);
#endif

retry:

#ifdef ISO7
  reread = 1;
#endif

  status = 0;                   /* number of invalid items */
  onepass = 1;

  /* get number of order lines, and check if all are local */

  o_ol_cnt = NITEMS;
  o_all_local = 1;
  for (i = 0; i < NITEMS; i++) {
    if (nol_i_id[i] == 0) {
      o_ol_cnt = i;
      break;
    }
    if (nol_supply_w_id[i] != w_id) {
      nctx->s_remote[i] = 1;
      o_all_local = 0;
    }
    else
      nctx->s_remote[i] = 0;
  }

  /* execute stored procedure */

  if (oexec (&curn1)) {
    if (curn1.rc == NOT_SERIALIZABLE) {
            fprintf(stderr,"curn1.rc=%d\n",curn1.rc);
      orol (&tpclda);
      retries++;
      goto retry;
    }
```

```
    else if (errrpt (&tpclda, &curn1) ==
RECOVERR) {
            fprintf(stderr,"curn2.rc=%d\n",curn1.rc
);
      orol (&tpclda);
      retries++;
      goto retry;
    }
    else {
            fprintf(stderr,"curn3.rc=%d\n",curn1.rc
);
      orol (&tpclda);
      return (-1);
    }
  }

#ifdef ISO7
iso7:
#endif

  /* 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->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->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(float);
    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] = sizeof(nctx-
>s_dist_info[0]);
    nctx->s_remote_len[i] = sizeof(int);
    nctx->s_quant_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->s_remote_ind[i] = NA;
    nctx->s_quant_ind[i] = NA;

    nctx->nol_i_id_len[i] = NULL;
    nctx->nol_supply_w_id_len[i] = NULL;
    nctx->nol_quantity_len[i] = NULL;
    nctx->nol_amount_len[i] = NULL;
    nctx->ol_w_id_len[i] = NULL;
    nctx->ol_d_id_len[i] = NULL;
    nctx->ol_o_id_len[i] = NULL;
    nctx->ol_number_len[i] = NULL;
    nctx->ol_dist_info_len[i] = NULL;
    nctx->s_remote_len[i] = NULL;
    nctx->s_quant_len[i] = NULL;
  }

  /* array select from item and stock tables */

  if (oexfet (&curn3[d_id-1], o_ol_cnt, 0, 0)) {
    if (curn3[d_id-1].rc == NOT_SERIALIZABLE) {
            fprintf(stderr,"curn4.rc=%d\n",curn3[d
_id-1].rc);
      orol (&tpclda);
      retries++;
      goto retry;
    }
    else if (curn3[d_id-1].rc !=
NO_DATA_FOUND) {
      if (errrpt (&tpclda, &curn3[d_id-1]) ==
RECOVERR) {
            fprintf(stderr,"curn5.rc=%d\n",curn3[d
_id-1].rc);
        orol (&tpclda);
        retries++;
        goto retry;
      }
      else {
            fprintf(stderr,"curn6.rc=%d\n",curn3[d
_id-1].rc);
        orol (&tpclda);
        return (-1);
      }
    }
  }

  /* mark invalid items */

  rpc3 = curn3[d_id-1].rpc;
  if (curn3[d_id-1].rpc != o_ol_cnt)
    for (i = curn3[d_id-1].rpc; i < o_ol_cnt; i++)
     {  /* fprintf(stderr,"Mark invalid items\n"); */
      nctx->i_id_ind[i] = NA;
            }

  /* check for invalid items and reorder results if
necessary */

  for (i = 0; i < o_ol_cnt; i++) {
    if (nctx->i_id_ind[i] != NA) {
      if ((nctx->i_id[i] != nol_i_id[i]) ||
        (nctx->w_id[i] != nol_supply_w_id[i])) {

        /* this item is invalid or results are out of
order */

#ifdef TUX
        userlog ("TPC-C server %d: reordering
items and stocks\n",
          proc_no);
#else
        fprintf (stderr, "TPC-C server %d:
reordering items and stocks\n",
          proc_no);
#endif

        for (j = i + 1; j < o_ol_cnt; j++) {

          /* this item is valid, but results are out of
order */

          if ((nctx->i_id_ind[j] != NA) &&
            (nctx->i_id[j] == nol_i_id[i]) &&
            (nctx->w_id[j] == nol_supply_w_id[i]))
{
            swapitemstock (i, j);
            break;
          }
        }

        /* this item (not the last one) is invalid */

        if (j >= o_ol_cnt) {
          status++;
          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->s_remote_ind[i] = NA;
          nctx->s_quant_ind[i] = NA;

          nctx->nol_i_id_len[i] = NULL;
          nctx->nol_supply_w_id_len[i] = NULL;
          nctx->nol_quantity_len[i] = NULL;
          nctx->nol_amount_len[i] = NULL;
          nctx->ol_w_id_len[i] = NULL;
          nctx->ol_d_id_len[i] = NULL;
          nctx->ol_o_id_len[i] = NULL;
          nctx->ol_number_len[i] = NULL;
          nctx->ol_dist_info_len[i] = NULL;
          nctx->s_remote_len[i] = NULL;
          nctx->s_quant_len[i] = NULL;

          onepass = 0;
          for (j = i + 1; j < o_ol_cnt; j++) {
            if (nctx->i_id_ind[j] == NA) {
              swapitemstock (i, j);
              break;
            }
          }
        }
      }
    }
    else {                    /* this item is invalid */
      status++;
      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->s_remote_ind[i] = NA;
      nctx->s_quant_ind[i] = NA;

      nctx->nol_i_id_len[i] = NULL;
      nctx->nol_supply_w_id_len[i] = NULL;
      nctx->nol_quantity_len[i] = NULL;
      nctx->nol_amount_len[i] = NULL;
      nctx->ol_w_id_len[i] = NULL;
      nctx->ol_d_id_len[i] = NULL;
      nctx->ol_o_id_len[i] = NULL;
      nctx->ol_number_len[i] = NULL;
      nctx->ol_dist_info_len[i] = NULL;
      nctx->s_remote_len[i] = NULL;
      nctx->s_quant_len[i] = NULL;
    }
  }
```

```
  /* more than 1 invalid item!!!  shouldn't happen
in TPC-C */

  if (status > 1) {
#ifdef TUX
     userlog ("TPC-C server %d: more than 1
invalid item?\n", proc_no);
#else
     fprintf (stderr, "TPC-C server %d: more than 1
invalid item?\n", proc_no);
#endif
  }

#ifdef ISO7
  sysdate (sdate);
  printf ("Item table read at: %s\n", sdate);
  for (i = 0; i < o_ol_cnt; i++) {
    if (nctx->nol_i_id_ind[i] != NA)
      printf ("   i_id = %d, i_price = %.2f\n",
nol_i_id[i], i_price[i]);
  }
  if (reread) {
    sleep (30);
    reread = 0;
    goto iso7;
  }
#endif

  /* compute order line amounts, total amount and
stock quantities */

  total_amount = 0.0;
  for (i = 0; i < o_ol_cnt; i++) {
    nctx->ol_o_id[i] = o_id;
    if (nctx->nol_i_id_ind[i] != NA) {
      s_quantity[i] -= nol_quantity[i];
      if (s_quantity[i] < 10)
        s_quantity[i] += 91;
      nol_amount[i] = (float) (nol_quantity[i] *
i_price[i]);
      total_amount += nol_amount[i];
      if (strstr (nctx->i_data[i], "ORIGINAL") &&
          strstr (nctx->s_data[i], "ORIGINAL"))
        brand_gen[i] = 'B';
      else
        brand_gen[i] = 'G';
    }
  }
  total_amount *= (1.0 - c_discount) * (1.0 + d_tax
+ w_tax);

  /* array update of stock table */

  if (oexn (&curn2, o_ol_cnt, 0)) {
    if (curn2.rc == NOT_SERIALIZABLE) {
      orol (&tpclda);
      retries++;
      goto retry;
    }
    else if (errrpt (&tpclda, &curn2) ==
RECOVERR) {
            fprintf(stderr,"curn8.rc=%d\n",curn2.rc
);
      orol (&tpclda);
      retries++;
      goto retry;
    }
    else {
            fprintf(stderr,"curn9.rc=%d\n",curn2.rc
);
      orol (&tpclda);
      return (-1);
    }
  }

  /* continue to do array update of stock until
whole array is processed */

  if (curn2.rpc >= (o_ol_cnt - 1)) {
    rpc = curn2.rpc;
  }
  else {
#ifdef TUX
    userlog ("TPC-C server %d: more than 1 pass
of OEXN!\n", proc_no);
#else
    fprintf (stderr, "TPC-C server %d: more than 1
pass of OEXN!\n", proc_no);
#endif
    rpc = curn2.rpc;
    rowoff = rpc + 1;
    while (rowoff < o_ol_cnt) {
      if (oexn (&curn2, o_ol_cnt, rowoff)) {
        if (curn2.rc == NOT_SERIALIZABLE) {
            fprintf(stderr,"curA.rc=%d\n",curn2.rc);
          orol (&tpclda);
          retries++;
          goto retry;
        }
        else if (errrpt (&tpclda, &curn2) ==
RECOVERR) {
            fprintf(stderr,"curB.rc=%d\n",curn2.rc);
          orol (&tpclda);
          retries++;
          goto retry;
        }
        else {
            fprintf(stderr,"curC.rc=%d\n",curn2.rc)
;
          orol (&tpclda);
          return (-1);
        }
      }
      rpc += curn2.rpc;
      rowoff += curn2.rpc + 1;
    }
  }

   /* number of items selected != number of stock
updated */

  if (rpc3 != rpc) {
#ifdef TUX
    userlog ("Error in TPC-C server %d: %d rows
of item read, ",
            proc_no, rpc3);
    userlog ("                  but %d rows of
stock updated\n", rpc);
#else
    fprintf (stderr, "Error in TPC-C server %d: %d
rows of item read, ",
            proc_no, rpc3);
    fprintf (stderr, "                  but %d rows of
stock update\n", rpc);
#endif
    orol (&tpclda);
    return (-1);
  }

  /* array insert into order line table */

  if (onepass && ((o_ol_cnt - status) > 0)) {
    if (oexn (&curn4, o_ol_cnt - status, 0)) {
      if (curn4.rc == NOT_SERIALIZABLE) {
            fprintf(stderr,"curD.rc=%d\n",curn4.rc)
;
        orol (&tpclda);
        retries++;
        goto retry;
      }
      else if (errrpt (&tpclda, &curn4) ==
RECOVERR) {
            fprintf(stderr,"curE.rc=%d\n",curn4.rc);
        orol (&tpclda);
        retries++;
        goto retry;
      }
      else {
            fprintf(stderr,"curF.rc=%d\n",curn4.rc);
        orol (&tpclda);
        return (-1);
      }
    }
    if (curn4.rpc != (o_ol_cnt - status)) {
#ifdef TUX
      userlog ("Error in TPC-C server %d: array
insert failed\n",
            proc_no);
#else
      fprintf (stderr, "Error in TPC-C server %d:
array insert failed\n",
            proc_no);
#endif
      orol (&tpclda);
      return (-1);
    }
  }

  /* continue array insert into order line until whole
array is processed */

  else if ((o_ol_cnt - status) > 0) {
#ifdef TUX
    userlog ("TPC-C server %d: more than 1 pass
of OEXN!\n", proc_no);
#else
    fprintf (stderr, "TPC-C server %d: more than 1
pass of OEXN!\n", proc_no);
#endif
    rpc = 0;
    for (rowoff = 0; rowoff < o_ol_cnt; rowoff++)
      if (nctx->nol_i_id_ind[rowoff] != NA)
        break;
    for (iters = rowoff + 1; iters < o_ol_cnt; iters++)
      if (nctx->nol_i_id_ind[iters] == NA)
        break;
    while ((rpc < (o_ol_cnt - status)) && (iters <=
o_ol_cnt)) {
      if (oexn (&curn4, iters, rowoff)) {
        if (curn4.rc == NOT_SERIALIZABLE) {
            fprintf(stderr,"curG.rc=%d\n",curn4.rc)
;
          orol (&tpclda);
          retries++;
          goto retry;
        }
        else if (errrpt (&tpclda, &curn4) ==
RECOVERR) {
            fprintf(stderr,"curH.rc=%d\n",curn4.rc)
;
          orol (&tpclda);
          retries++;
          goto retry;
        }
        else {
```

```
            fprintf(stderr,"curl.rc=%d\n",curn4.rc);
          orol (&tpclda);
          return (-1);
        }
      }
      if (curn4.rpc != (iters - rowoff)) {
#ifdef TUX
        userlog ("Error in TPC-C server %d: array
insert failed\n",
            proc_no);
#else
        fprintf (stderr, "Error in TPC-C server %d:
array insert failed\n",
            proc_no);
#endif
        orol (&tpclda);
        return (-1);
      }
      rpc += curn4.rpc;
      for (rowoff = iters + 1; rowoff < o_ol_cnt;
rowoff++)
        if (nctx->nol_i_id_ind[rowoff] != NA)
          break;
      for (iters = rowoff + 1; iters < o_ol_cnt;
iters++)
        if (nctx->nol_i_id_ind[iters] == NA)
          break;
    }
  }

#ifdef ISO1
  sysdate (sdate);
  printf ("Sleep before commit/rollback at: %s\n",
sdate);
  sleep (30);
  sysdate (sdate);
  printf ("Wake up after sleep at: %s\n", sdate);
#endif

  /* commit if no invalid item */

  if (status) {
    orol (&tpclda);
  }
  else {
    OCOM(&tpclda,&tpclda);
  }

#if defined(ISO1) || defined(ISO7)
  sysdate (sdate);
  printf ("New Order completed at: %s\n", sdate);
#endif

  return (0);

}



void plnewdone ()

{

  int i;

  if (nctx)
    free (nctx);

  if (oclose (&curn1))
    errrpt (&tpclda, &curn1);
  if (oclose (&curn2))
    errrpt (&tpclda, &curn2);
  for (i = 0; i < 10; i++)
    if (oclose (&curn3[i]))
      errrpt (&tpclda, &curn3[i]);
  if (oclose (&curn4))
    errrpt (&tpclda, &curn4);

}



swapitemstock (i, j)

int i, j;

{

  int tempi;
  float tempf;
  char tempstr[52];
  ub2 tempub2;
  sb2 tempsb2;

  tempsb2 = nctx->i_id_ind[i];
  nctx->i_id_ind[i] = nctx->i_id_ind[j];
  nctx->i_id_ind[j] = tempsb2;
  tempub2 = nctx->i_id_len[i];
  nctx->i_id_len[i] = nctx->i_id_len[j];
  nctx->i_id_len[j] = tempub2;
  tempub2 = nctx->i_id_rcode[i];
  nctx->i_id_rcode[i] = nctx->i_id_rcode[j];
  nctx->i_id_rcode[j] = tempub2;
  tempi = nctx->i_id[i];
  nctx->i_id[i] = nctx->i_id[j];
  nctx->i_id[j] = tempi;

  tempsb2 = nctx->w_id_ind[i];
  nctx->w_id_ind[i] = nctx->w_id_ind[j];
  nctx->w_id_ind[j] = tempsb2;
  tempub2 = nctx->w_id_len[i];
  nctx->w_id_len[i] = nctx->w_id_len[j];
  nctx->w_id_len[j] = tempub2;
  tempub2 = nctx->w_id_rcode[i];
  nctx->w_id_rcode[i] = nctx->w_id_rcode[j];
  nctx->w_id_rcode[j] = tempub2;
  tempi = nctx->w_id[i];
  nctx->w_id[i] = nctx->w_id[j];
  nctx->w_id[j] = tempi;

  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);

}

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|

+=================================
==========================+
```

```
| FILENAME
|   plord.c
| DESCRIPTION
|   OCI version (using PL/SQL stored procedure)
of
|   ORDER STATUS transaction in TPC-C
benchmark.

+=================================
============================*/

#include "tpcc.h"
#include "tpccpl.h"


#ifdef ISO8
#define SQLTXT "BEGIN aorderstatus.agetstatus
(: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 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;"
#endif

#define NITEMS 15


struct ordctx {
  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];

  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_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];

  ub4 ol_supply_w_id_csize;
  ub4 ol_i_id_csize;
  ub4 ol_quantity_csize;
  ub4 ol_amount_csize;
  ub4 ol_delivery_d_csize;
};

typedef struct ordctx ordctx;

ordctx *octx;



plordinit ()

{

  int i;
  text stmbuf[1024];


  octx = (ordctx *) malloc (sizeof(ordctx));

  OOPEN(&tpclda,&curo);

  sprintf ((char *) stmbuf, SQLTXT);

OPARSE(&tpclda,&curo,stmbuf,NA,FALSE,VER7)
;

  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(float);
    octx->ol_delivery_d_len[i] =
sizeof(ol_delivery_d[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;

  /* bind variables */


OBNDRV(&tpclda,&curo,":w_id",ADR(w_id),SIZ(w
_id),SQLT_INT);

OBNDRV(&tpclda,&curo,":d_id",ADR(d_id),SIZ(d_i
d),SQLT_INT);

OBNDRV(&tpclda,&curo,":c_id",ADR(c_id),SIZ(c_i
d),SQLT_INT);

OBNDRV(&tpclda,&curo,":byln",ADR(bylastname),
SIZ(bylastname),SQLT_INT);

OBNDRV(&tpclda,&curo,":c_last",c_last,SIZ(c_las
t),SQLT_STR);

OBNDRV(&tpclda,&curo,":c_first",c_first,SIZ(c_firs
t),SQLT_STR);

OBNDRV(&tpclda,&curo,":c_middle",c_middle,SIZ
(c_middle),SQLT_STR);

OBNDRV(&tpclda,&curo,":c_balance",ADR(c_bala
nce),SIZ(c_balance),SQLT_FLT);

OBNDRV(&tpclda,&curo,":o_id",ADR(o_id),SIZ(o_i
d),SQLT_INT);

OBNDRV(&tpclda,&curo,":o_entry_d",o_entry_d,S
IZ(o_entry_d),SQLT_STR);

OBNDRV(&tpclda,&curo,":o_cr_id",ADR(o_carrier
_id),SIZ(o_carrier_id),
        SQLT_INT);

OBNDRV(&tpclda,&curo,":o_ol_cnt",ADR(o_ol_cnt
),SIZ(o_ol_cnt),SQLT_INT);

OBNDRAA(&tpclda,&curo,":ol_s_w_id",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,ADR(octx-
>ol_supply_w_id_csize));

OBNDRAA(&tpclda,&curo,":ol_i_id",ol_i_id,SIZ(int)
,SQLT_INT,
                octx->ol_i_id_ind,octx-
>ol_i_id_len,octx->ol_i_id_rcode,NITEMS,
        ADR(octx->ol_i_id_csize));

OBNDRAA(&tpclda,&curo,":ol_quantity",ol_quantit
y,SIZ(int),SQLT_INT,
                octx->ol_quantity_ind,octx-
>ol_quantity_len,octx->ol_quantity_rcode,
        NITEMS,ADR(octx->ol_quantity_csize));

OBNDRAA(&tpclda,&curo,":ol_amount",ol_amount
,SIZ(float),SQLT_FLT,
                octx->ol_amount_ind,octx-
>ol_amount_len,octx->ol_amount_rcode,
        NITEMS,ADR(octx->ol_amount_csize));

OBNDRAA(&tpclda,&curo,":ol_d_d",ol_delivery_d,
SIZ(ol_delivery_d[0]),SQLT_STR,
                octx->ol_delivery_d_ind,octx-
>ol_delivery_d_len,
        octx-
>ol_delivery_d_rcode,NITEMS,ADR(octx-
>ol_delivery_d_csize));

  return (0);

}



plord ()

{

  int i;

  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(float);
    octx->ol_delivery_d_len[i] =
sizeof(ol_delivery_d[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;

  OEXEC(&tpclda,&curo);

  return (0);

}



void plorddone ()
```

```
{

  if (octx)
    free (octx);

  if (oclose (&curo))
    errrpt (&tpclda, &curo);

}

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+=================================
============================+
 | FILENAME
 |   plpay.c
 | DESCRIPTION
 |   OCI version (using PL/SQL stored procedure)
of
 |   PAYMENT transaction in TPC-C benchmark.

+=================================
============================*/

#include "tpcc.h"
#include "tpccpl.h"


#ifdef ATOMA
#define SQLTXT "BEGIN apayment.adopayment
(:w_id, :d_id, :c_w_id, :c_d_id, \
  :c_id, :byln, \
  :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, \
  :h_date, :retry); END;"
#else
#define SQLTXT "BEGIN payment.dopayment
(:w_id, :d_id, :c_w_id, :c_d_id, \
  :c_id, :byln, \
  :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, \
  :h_date, :retry); END;"
#endif



plpayinit ()

{

  text stmbuf[1024];

  OOPEN(&tpclda,&curp);

  sprintf ((char *) stmbuf, SQLTXT);

OPARSE(&tpclda,&curp,stmbuf,NA,FALSE,VER7)
;

  /* bind variables */


OBNDRV(&tpclda,&curp,":w_id",ADR(w_id),SIZ(w
_id),SQLT_INT);

OBNDRV(&tpclda,&curp,":d_id",ADR(d_id),SIZ(d_i
d),SQLT_INT);

OBNDRV(&tpclda,&curp,":c_w_id",ADR(c_w_id),S
IZ(c_w_id),SQLT_INT);

OBNDRV(&tpclda,&curp,":c_d_id",ADR(c_d_id),SI
Z(c_d_id),SQLT_INT);

OBNDRV(&tpclda,&curp,":c_id",ADR(c_id),SIZ(c_i
d),SQLT_INT);

OBNDRV(&tpclda,&curp,":byln",ADR(bylastname),
SIZ(bylastname),SQLT_INT);

OBNDRV(&tpclda,&curp,":h_amount",ADR(h_amo
unt),SIZ(h_amount),SQLT_FLT);

OBNDRV(&tpclda,&curp,":c_last",c_last,SIZ(c_las
t),SQLT_STR);

OBNDRV(&tpclda,&curp,":w_street_1",w_street_1
,SIZ(w_street_1),SQLT_STR);

OBNDRV(&tpclda,&curp,":w_street_2",w_street_2
,SIZ(w_street_2),SQLT_STR);

OBNDRV(&tpclda,&curp,":w_city",w_city,SIZ(w_ci
ty),SQLT_STR);

OBNDRV(&tpclda,&curp,":w_state",w_state,SIZ(w
_state),SQLT_STR);

OBNDRV(&tpclda,&curp,":w_zip",w_zip,SIZ(w_zip
),SQLT_STR);

OBNDRV(&tpclda,&curp,":d_street_1",d_street_1,
SIZ(d_street_1),SQLT_STR);

OBNDRV(&tpclda,&curp,":d_street_2",d_street_2,
SIZ(d_street_2),SQLT_STR);

OBNDRV(&tpclda,&curp,":d_city",d_city,SIZ(d_cit
y),SQLT_STR);

OBNDRV(&tpclda,&curp,":d_state",d_state,SIZ(d_
state),SQLT_STR);

OBNDRV(&tpclda,&curp,":d_zip",d_zip,SIZ(d_zip),
SQLT_STR);

OBNDRV(&tpclda,&curp,":c_first",c_first,SIZ(c_firs
t),SQLT_STR);

OBNDRV(&tpclda,&curp,":c_middle",c_middle,SIZ
(c_middle),SQLT_STR);

OBNDRV(&tpclda,&curp,":c_street_1",c_street_1,
SIZ(c_street_1),SQLT_STR);

OBNDRV(&tpclda,&curp,":c_street_2",c_street_2,
SIZ(c_street_2),SQLT_STR);

OBNDRV(&tpclda,&curp,":c_city",c_city,SIZ(c_city
),SQLT_STR);

OBNDRV(&tpclda,&curp,":c_state",c_state,SIZ(c_
state),SQLT_STR);

OBNDRV(&tpclda,&curp,":c_zip",c_zip,SIZ(c_zip),
SQLT_STR);

OBNDRV(&tpclda,&curp,":c_phone",c_phone,SIZ(
c_phone),SQLT_STR);

OBNDRV(&tpclda,&curp,":c_since",c_since,SIZ(c_
since),SQLT_STR);

OBNDRV(&tpclda,&curp,":c_credit",c_credit,SIZ(c
_credit)-1,SQLT_CHR);

OBNDRV(&tpclda,&curp,":c_credit_lim",ADR(c_cr
edit_lim),SIZ(c_credit_lim),
        SQLT_FLT);

OBNDRV(&tpclda,&curp,":c_discount",ADR(c_dis
count),SIZ(c_discount),
        SQLT_FLT);

OBNDRV(&tpclda,&curp,":c_balance",ADR(c_bala
nce),SIZ(c_balance),SQLT_FLT);

OBNDRV(&tpclda,&curp,":c_data",c_data,SIZ(c_d
ata),SQLT_STR);

OBNDRV(&tpclda,&curp,":h_date",h_date,SIZ(h_d
ate),SQLT_STR);

OBNDRV(&tpclda,&curp,":retry",ADR(retries),SIZ(
retries),SQLT_INT);

  return (0);

}



plpay ()

{

  OEXEC(&tpclda,&curp);

  return (0);

}



void plpaydone ()

{

  if (oclose (&curp))
    errrpt (&tpclda, &curp);

}

/*=================================
============================+
```

```
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+=================================
============================+
| FILENAME
|    plsto.c
| DESCRIPTION
|    OCI version (using PL/SQL stored procedure)
of
|    STOCK LEVEL transaction in TPC-C
benchmark.

+=================================
============================*/

#include "tpcc.h"
#include "tpccpl.h"

#define SQLTXT "BEGIN stocklevel.getstocklevel
(:w_id, :d_id, :threshold, \
   :low_stock); END;"

plstoinit ()

{

   text stmbuf[1024];

   OOPEN(&tpclda,&curs);
   sprintf ((char *) stmbuf, SQLTXT);

OPARSE(&tpclda,&curs,stmbuf,NA,FALSE,VER7)
;

   /* bind variables */


OBNDRV(&tpclda,&curs,":w_id",ADR(w_id),SIZ(w
_id),SQLT_INT);

OBNDRV(&tpclda,&curs,":d_id",ADR(d_id),SIZ(d_i
d),SQLT_INT);

OBNDRV(&tpclda,&curs,":threshold",ADR(threshol
d),SIZ(threshold),SQLT_INT);

OBNDRV(&tpclda,&curs,":low_stock",ADR(low_st
ock),SIZ(low_stock),SQLT_INT);

   return (0);

}



plsto ()

{
   text stmbuf[1024];

   sprintf ((char *) stmbuf, SQLTXT "alter session
set isolation_level = read commited");
   OEXEC(&tpclda,&curs);
   sprintf ((char *) stmbuf, SQLTXT "alter session
set isolation_level = serializable");
   return (0);
}



void plstodone ()

{

  if (oclose (&curs))
     errrpt (&tpclda, &curs);

}

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|

+=================================
============================+
| FILENAME
|    tpcc.h
| DESCRIPTION
|    Include file for TPC-C benchmark programs.

+=================================
============================*/

#ifndef TPCC_H
#define TPCC_H

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

#include <oratypes.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

#endif

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|

+=================================
============================+
| FILENAME
|    tpcc_info.h
| DESCRIPTION
|    Include file for TPC-C benchmark programs.

+=================================
============================*/

#ifndef TPCC_INFO_H
#define TPCC_INFO_H

#define TRANNEW 1
#define TRANPAY 2
#define TRANORD 3
#define TRANDEL 4
#define TRANSTO 5

/* 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 {
   int tran_kind;
   struct newinstruct newin;
   struct newoutstruct newout;
};
```

```
/* Payment */

struct payinstruct {
   int w_id;
   int d_id;
   int c_w_id;
   int c_d_id;
   int c_id;
   int bylastname;
   float h_amount;
   char c_last[17];
};

struct payoutstruct {
   int terror;
   char w_street_1[21];
   char w_street_2[21];
   char w_city[21];
   char w_state[3];
   char w_zip[10];
   char d_street_1[21];
   char d_street_2[21];
   char d_city[21];
   char d_state[3];
   char d_zip[10];
   int  c_id;
   char c_first[17];
   char c_middle[3];
   char c_last[17];
   char c_street_1[21];
   char c_street_2[21];
   char c_city[21];
   char c_state[3];
   char c_zip[10];
   char c_phone[17];
   char c_since[11];
   char c_credit[3];
   double c_credit_lim;
   float c_discount;
   double c_balance;
   char c_data[201];
   char h_date[20];
   int retry;
};

struct paystruct {
   int tran_kind;
   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 {
   int tran_kind;
   struct ordinstruct ordin;
   struct ordoutstruct ordout;
};


/* Delivery */

struct delinstruct {
   int w_id;
   int o_carrier_id;
   long qtime;
   long uqtime;
   int in_timing_int;
};

struct deloutstruct {
   int terror;
   int retry;
};

struct delstruct {
   int tran_kind;
   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 {
   int tran_kind;
   struct stoinstruct stoin;
   struct stooutstruct stoout;
};

#endif

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+=================================
============================+
 | FILENAME                          tpccpl.c
 | DESCRIPTION                       TPC-C
transactions in PL/SQL.

+=================================
============================*/
#include <stdio.h>
#include <sys/time.h>
#include <sys/types.h>
#include "tpcc.h"
#include "tpcc_info.h"
#include "tpccpl.h"
#ifdef TUX
#include <userlog.h>
#endif
#define SQLTXT "alter session set isolation_level
= serializable"
FILE *lfp;
FILE *fopen ();
int proc_no = 0;
int logon = 0;
int new_init = 0;
int pay_init = 0;
int ord_init = 0;
int del_init = 0;
int sto_init = 0;
ldadef tpclda;
csrdef curi;
csrdef curs;
csrdef curd;
csrdef curo;
csrdef curp;
csrdef curn, curn1, curn2, curn3[10], curn4;
unsigned long tpchda[256];

/* for stock-level transaction */
int w_id;
int d_id;
int c_id;
int threshold;
int low_stock;

/* for delivery transaction */
int del_o_id[10];
int retries;

/* for order-status transaction */
int bylastname;
char c_last[17];
char c_first[17];
char c_middle[3];
double c_balance;
int o_id;
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];

/* for payment transaction */
int c_w_id;
int c_d_id;
float 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];
char c_since[11];
char c_credit[3];
double c_credit_lim;
float c_discount;
char c_data[201];
char h_date[20];

/* for new order transaction */
int nol_i_id[15];
int nol_supply_w_id[15];
int nol_quantity[15];
float nol_amount[15];
int o_all_local;
float w_tax;
float d_tax;
float total_amount;
char i_name[15][25];
int s_quantity[15];
char brand_gen[15];
float i_price[15];
int status;

errrpt (lda, cur)
ldadef *lda;
csrdef *cur; {
  text msg[2048];
  if (cur->rc) {
    oerhms (lda, cur->rc, msg, 2048);
#ifdef TUX
    userlog ("Error in TPC-C server %d: %s\n",
proc_no, msg);
#else
    fprintf (stderr, "Error in TPC-C server %d:
%s\n", proc_no, msg);
#endif
  }
  if (cur->rc == DEADLOCK)
    return (RECOVERR);
  else
    return (IRRECERR);
}

TPCexit () {
  if (new_init) {
    plnewdone();
    new_init = 0;
  }
  if (pay_init) {
    plpaydone();
    pay_init = 0;
  }
  if (ord_init) {
    plorddone();
    ord_init = 0;
  }
  if (del_init) {
    pldeldone();
    del_init = 0;
  }
  if (sto_init) {
    plstodone();
    sto_init = 0;
  }
/* log off */
  if (logon) {
    if (ologof (&tpclda))
#ifdef TUX
      userlog ("Error in TPC-C server %d: Failed
to log off\n", proc_no);
#else
      fprintf (stderr, "Error in TPC-C server %d:
Failed to log off\n", proc_no);
#endif
    logon = 0;
  }
  if (lfp) {
    fclose (lfp);
    lfp = NULL;
  }
}

TPCinit (id, uid)
int id;
char *uid; {
  int i;
  char filename[40];
  text stmbuf[100];
  proc_no = id;
  sprintf (filename, "./LOG/tpcc_%d.del", proc_no);
  if ((lfp = fopen (filename, "w")) == NULL) {
#ifdef TUX
    userlog ("Error in TPC-C server %d: Failed to
open %s\n", proc_no, filename);
#else
    fprintf (stderr, "Error in TPC-C server %d:
Failed to open %s\n", proc_no, filename);
#endif
    return (-1);
  }

/* log on to Oracle */
  if (orlon (&tpclda, (ub1 *) tpchda, (text *) uid, -1,
(text *) 0, -1, 0)) {
#ifdef TUX
    userlog ("Error in TPC-C server %d: Failed to
log on\n", proc_no);
#else
    fprintf (stderr, "Error in TPC-C server %d:
Failed to log on\n", proc_no);
#endif
    errrpt (&tpclda, &tpclda);
    return (-1);
  }

/* turn off auto-commit */
  if (ocof (&tpclda)) {
    errrpt (&tpclda, &tpclda);
    ologof (&tpclda);
    return (-1);
  }

/* run all transaction in serializable mode */
  if (oopen (&curi, &tpclda, (text *) 0, NA, NA, (text
*) 0, NA)) {
    errrpt (&tpclda, &curi);
    ologof (&tpclda);
    return (-1);
  }
  sprintf ((char *) stmbuf, SQLTXT);
  if (oparse (&curi, stmbuf, (sb4) NA, FALSE,
(ub4) VER7)) {
    errrpt (&tpclda, &curi);
    oclose (&curi);
    ologof (&tpclda);
    return (-1);
  }
  if (oexec (&curi)) {
    errrpt (&tpclda, &curi);
    orol (&tpclda);
    oclose (&curi);
    ologof (&tpclda);
    return (-1);
  }
  if (oclose (&curi))
    errrpt (&tpclda, &curi);

  logon = 1;

  if (plnewinit ()) {
    TPCexit ();
    return (-1);
  } else
    new_init = 1;

  if (plpayinit ()) {
    TPCexit ();
    return (-1);
  } else
    pay_init = 1;

  if (plordinit ()) {
    TPCexit ();
    return (-1);
  } else
    ord_init = 1;

  if (pldelinit ()) {
    TPCexit ();
    return (-1);
  } else
    del_init = 1;

  if (plstoinit ()) {
    TPCexit ();
    return (-1);
  } else
    sto_init = 1;
  return (0);
}

TPCnew (str)
struct newstruct *str; {
  int i;
  w_id = str->newin.w_id;
  d_id = str->newin.d_id;
  c_id = str->newin.c_id;
  for (i = 0; i < 15; i++) {
    nol_i_id[i] = str->newin.ol_i_id[i];
    nol_supply_w_id[i] = str-
>newin.ol_supply_w_id[i];
    nol_quantity[i] = str->newin.ol_quantity[i];
  }
  retries = 0;
  if (str->newout.terror = plnew ()) {
    if (str->newout.terror != RECOVERR)
      str->newout.terror = IRRECERR;
    return (-1);
  }
  str->newout.terror = NOERR;
  str->newout.o_id = o_id;
  str->newout.o_ol_cnt = o_ol_cnt;
  strncpy (str->newout.c_last, c_last, 17);
  strncpy (str->newout.c_credit, c_credit, 3);
  str->newout.c_discount = c_discount;
  str->newout.w_tax = w_tax;
  str->newout.d_tax = d_tax;
  strncpy (str->newout.o_entry_d, o_entry_d, 20);
  str->newout.total_amount = total_amount;
  for (i = 0; i < o_ol_cnt; i++) {
```

```
      strncpy (str->newout.i_name[i], i_name[i], 25);
      str->newout.s_quantity[i] = s_quantity[i];
      str->newout.brand_generic[i] = brand_gen[i];
      str->newout.i_price[i] = i_price[i];
      str->newout.ol_amount[i] = nol_amount[i];
    }
    if (status)
      strcpy (str->newout.status, "Item number is
not valid");
    else
      str->newout.status[0] = '\0';
      str->newout.retry = retries;
    return (0);
}

TPCpay (str)
struct paystruct *str; {
    w_id = str->payin.w_id;
    d_id = str->payin.d_id;
    c_w_id = str->payin.c_w_id;
    c_d_id = str->payin.c_d_id;
    h_amount = str->payin.h_amount;
    bylastname = str->payin.bylastname;
    if (bylastname) {
      c_id = 0;
      strncpy (c_last, str->payin.c_last, 17);
    } else {
      c_id = str->payin.c_id;
      strcpy (c_last, " ");
    }
    retries = 0;
    if (str->payout.terror = plpay ()) {
      if (str->payout.terror != RECOVERR)
        str->payout.terror = IRRECERR;
      return (-1);
    }
    str->payout.terror = NOERR;
    strncpy (str->payout.w_street_1, w_street_1,
21);
    strncpy (str->payout.w_street_2, w_street_2,
21);
    strncpy (str->payout.w_city, w_city, 21);
    strncpy (str->payout.w_state, w_state, 3);
    strncpy (str->payout.w_zip, w_zip, 10);
    strncpy (str->payout.d_street_1, d_street_1, 21);
    strncpy (str->payout.d_street_2, d_street_2, 21);
    strncpy (str->payout.d_city, d_city, 21);
    strncpy (str->payout.d_state, d_state, 3);
    strncpy (str->payout.d_zip, d_zip, 10);
    str->payout.c_id = c_id;
    strncpy (str->payout.c_first, c_first, 17);
    strncpy (str->payout.c_middle, c_middle, 3);
    strncpy (str->payout.c_last, c_last, 17);
    strncpy (str->payout.c_street_1, c_street_1, 21);
    strncpy (str->payout.c_street_2, c_street_2, 21);
    strncpy (str->payout.c_city, c_city, 21);
    strncpy (str->payout.c_state, c_state, 3);
    strncpy (str->payout.c_zip, c_zip, 10);
    strncpy (str->payout.c_phone, c_phone, 17);
    strncpy (str->payout.c_since, c_since, 11);
    strncpy (str->payout.c_credit, c_credit, 3);
    str->payout.c_credit_lim = c_credit_lim;
    str->payout.c_discount = c_discount;
    str->payout.c_balance = c_balance;
    strncpy (str->payout.c_data, c_data, 201);
    strncpy (str->payout.h_date, h_date, 20);
    str->payout.retry = retries;
    return (0);
}

TPCord (str)
struct ordstruct *str; {
    int i;
    w_id = str->ordin.w_id;
    d_id = str->ordin.d_id;
    bylastname = str->ordin.bylastname;
    if (bylastname) {
      c_id = 0;
      strncpy (c_last, str->ordin.c_last, 17);
    } else {
      c_id = str->ordin.c_id;
      strcpy (c_last, " ");
    }
    retries = 0;
    if (str->ordout.terror = plord ()) {
      if (str->ordout.terror != RECOVERR)
        str->ordout.terror = IRRECERR;
      return (-1);
    }
    str->ordout.terror = NOERR;
    str->ordout.c_id = c_id;
    strncpy (str->ordout.c_last, c_last, 17);
    strncpy (str->ordout.c_first, c_first, 17);
    strncpy (str->ordout.c_middle, c_middle, 3);
    str->ordout.c_balance = c_balance;
    str->ordout.o_id = o_id;
    strncpy (str->ordout.o_entry_d, o_entry_d, 20);
    str->ordout.o_carrier_id = o_carrier_id;
    str->ordout.o_ol_cnt = o_ol_cnt;
    for (i = 0; i < o_ol_cnt; i++) {
      ol_delivery_d[i][10] = '\0';
      str->ordout.ol_supply_w_id[i] =
ol_supply_w_id[i];
      str->ordout.ol_i_id[i] = ol_i_id[i];
      str->ordout.ol_quantity[i] = ol_quantity[i];
      str->ordout.ol_amount[i] = ol_amount[i];
      strncpy (str->ordout.ol_delivery_d[i],
ol_delivery_d[i], 11);
    }
    str->ordout.retry = retries;
    return (0);
}

TPCdel (str)
struct delstruct *str; {
    long tr_end;
    int i;
    struct timeval tp ,tp_e;

    w_id = str->delin.w_id;
    o_carrier_id = str->delin.o_carrier_id;
    retries = 0;
    if (str->delout.terror = pldel ()) {
      if (str->delout.terror != RECOVERR)
        str->delout.terror = IRRECERR;
      return (-1);
    }

    gettimeofday(&tp_e);
    fprintf (lfp, "%09d%03d %09d%03d %d %d",str-
>delin.qtime,str->delin.uqtime/1000,
tp_e.tv_sec,tp_e.tv_usec/1000, w_id,
o_carrier_id);

    for (i = 0; i < 10; i++) {

      fprintf (lfp, " %d %d", i + 1, del_o_id[i]);
      if (del_o_id[i] <= 0) {
#ifdef TUX
        userlog ("DELIVERY: no new order for w_id:
%d, d_id %d\n", w_id, i + 1);
#else
        fprintf (stderr, "DELIVERY: no new order for
w_id: %d, d_id %d\n", w_id, i + 1);
#endif
      }
    }

    fprintf (lfp, " \n");
    str->delout.terror = NOERR;
    str->delout.retry = retries;
    return (0);
}

TPCsto (str)
struct stostruct *str; {
    w_id = str->stoin.w_id;
    d_id = str->stoin.d_id;
    threshold = str->stoin.threshold;
    retries = 0;
    if (str->stoout.terror = plsto ()) {
      if (str->stoout.terror != RECOVERR)
        str->stoout.terror = IRRECERR;
      return (-1);
    }
    str->stoout.terror = NOERR;
    str->stoout.low_stock = low_stock;
    str->stoout.retry = retries;
    return (0);
}

/*=================================
============================+
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+=================================
============================+
 | FILENAME                              tpccpl.c
 | DESCRIPTION                           TPC-C
transactions in PL/SQL.

+=================================
============================*/
#include <stdio.h>
#include <sys/time.h>
#include <sys/types.h>
#include "tpcc.h"
#include "tpcc_info.h"
#include "tpccpl.h"
#ifdef TUX
#include <userlog.h>
#endif
#define SQLTXT "alter session set isolation_level
= serializable"
FILE *lfp;
FILE *fopen ();
int proc_no = 0;
int logon = 0;
int new_init = 0;
int pay_init = 0;
int ord_init = 0;
int del_init = 0;
int sto_init = 0;
ldadef tpclda;
csrdef curi;
csrdef curs;
csrdef curd;
csrdef curo;
csrdef curp;
csrdef curn, curn1, curn2, curn3[10], curn4;
unsigned long tpchda[256];

/* for stock-level transaction */
```

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

/* for delivery transaction */
int del_o_id[10];
int retries;

/* for order-status transaction */
int bylastname;
char c_last[17];
char c_first[17];
char c_middle[3];
double c_balance;
int o_id;
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];

/* for payment transaction */
int c_w_id;
int c_d_id;
float 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];
char c_since[11];
char c_credit[3];
double c_credit_lim;
float c_discount;
char c_data[201];
char h_date[20];

/* for new order transaction */
int nol_i_id[15];
int nol_supply_w_id[15];
int nol_quantity[15];
float nol_amount[15];
int o_all_local;
float w_tax;
float d_tax;
float total_amount;
char i_name[15][25];
int s_quantity[15];
char brand_gen[15];
float i_price[15];
int status;

errrpt (lda, cur)
ldadef *lda;
csrdef *cur; {
  text msg[2048];
  if (cur->rc) {
    oerhms (lda, cur->rc, msg, 2048);
#ifdef TUX
    userlog ("Error in TPC-C server %d: %s\n",
proc_no, msg);
#else
    fprintf (stderr, "Error in TPC-C server %d:
%s\n", proc_no, msg);
#endif
  }
  if (cur->rc == DEADLOCK)
    return (RECOVERR);
  else
    return (IRRECERR);
}

TPCexit () {
  if (new_init) {
    plnewdone();
    new_init = 0;
  }
  if (pay_init) {
    plpaydone();
    pay_init = 0;
  }
  if (ord_init) {
    plorddone();
    ord_init = 0;
  }
  if (del_init) {
    pldeldone();
    del_init = 0;
  }
  if (sto_init) {
    plstodone();
    sto_init = 0;
  }
/* log off */
  if (logon) {
    if (ologof (&tpclda))
#ifdef TUX
      userlog ("Error in TPC-C server %d: Failed
to log off\n", proc_no);
#else
      fprintf (stderr, "Error in TPC-C server %d:
Failed to log off\n", proc_no);
#endif
    logon = 0;
  }
  if (lfp) {
    fclose (lfp);
    lfp = NULL;
  }
}

TPCinit (id, uid)
int id;
char *uid; {
  int i;
  char filename[40];
  text stmbuf[100];
  proc_no = id;
  sprintf (filename, "./LOG/tpcc_%d.del", proc_no);
  if ((lfp = fopen (filename, "w")) == NULL) {
#ifdef TUX
    userlog ("Error in TPC-C server %d: Failed to
open %s\n", proc_no, filename);
#else
    fprintf (stderr, "Error in TPC-C server %d:
Failed to open %s\n", proc_no, filename);
#endif
    return (-1);
  }

/* log on to Oracle */
  if (orlon (&tpclda, (ub1 *) tpchda, (text *) uid, -1,
(text *) 0, -1, 0)) {
#ifdef TUX
    userlog ("Error in TPC-C server %d: Failed to
log on\n", proc_no);
#else
    fprintf (stderr, "Error in TPC-C server %d:
Failed to log on\n", proc_no);
#endif
    errrpt (&tpclda, &tpclda);
    return (-1);
  }

/* turn off auto-commit */
  if (ocof (&tpclda)) {
    errrpt (&tpclda, &tpclda);
    ologof (&tpclda);
    return (-1);
  }

/* run all transaction in serializable mode */
  if (oopen (&curi, &tpclda, (text *) 0, NA, NA, (text
*) 0, NA)) {
    errrpt (&tpclda, &curi);
    ologof (&tpclda);
    return (-1);
  }
  sprintf ((char *) stmbuf, SQLTXT);
  if (oparse (&curi, stmbuf, (sb4) NA, FALSE,
(ub4) VER7)) {
    errrpt (&tpclda, &curi);
    oclose (&curi);
    ologof (&tpclda);
    return (-1);
  }
  if (oexec (&curi)) {
    errrpt (&tpclda, &curi);
    orol (&tpclda);
    oclose (&curi);
    ologof (&tpclda);
    return (-1);
  }
  if (oclose (&curi))
    errrpt (&tpclda, &curi);

  logon = 1;

  if (plnewinit ()) {
    TPCexit ();
    return (-1);
  } else
    new_init = 1;

  if (plpayinit ()) {
    TPCexit ();
    return (-1);
  } else
    pay_init = 1;

  if (plordinit ()) {
    TPCexit ();
    return (-1);
  } else
    ord_init = 1;

  if (pldelinit ()) {
    TPCexit ();
    return (-1);
  } else
```

```
    del_init = 1;

  if (plstoinit ()) {
    TPCexit ();
    return (-1);
  } else
    sto_init = 1;
  return (0);
}

TPCnew (str)
struct newstruct *str; {
  int i;
  w_id = str->newin.w_id;
  d_id = str->newin.d_id;
  c_id = str->newin.c_id;
  for (i = 0; i < 15; i++) {
    nol_i_id[i] = str->newin.ol_i_id[i];
    nol_supply_w_id[i] = str-
>newin.ol_supply_w_id[i];
    nol_quantity[i] = str->newin.ol_quantity[i];
  }
  retries = 0;
  if (str->newout.terror = plnew ()) {
    if (str->newout.terror != RECOVERR)
      str->newout.terror = IRRECERR;
    return (-1);
  }
  str->newout.terror = NOERR;
  str->newout.o_id = o_id;
  str->newout.o_ol_cnt = o_ol_cnt;
  strncpy (str->newout.c_last, c_last, 17);
  strncpy (str->newout.c_credit, c_credit, 3);
  str->newout.c_discount = c_discount;
  str->newout.w_tax = w_tax;
  str->newout.d_tax = d_tax;
  strncpy (str->newout.o_entry_d, o_entry_d, 20);
  str->newout.total_amount = total_amount;
  for (i = 0; i < o_ol_cnt; i++) {
    strncpy (str->newout.i_name[i], i_name[i], 25);
    str->newout.s_quantity[i] = s_quantity[i];
    str->newout.brand_generic[i] = brand_gen[i];
    str->newout.i_price[i] = i_price[i];
    str->newout.ol_amount[i] = nol_amount[i];
  }
  if (status)
    strcpy (str->newout.status, "Item number is
not valid");
  else
    str->newout.status[0] = '\0';
    str->newout.retry = retries;
  return (0);
}

TPCpay (str)
struct paystruct *str; {
  w_id = str->payin.w_id;
  d_id = str->payin.d_id;
  c_w_id = str->payin.c_w_id;
  c_d_id = str->payin.c_d_id;
  h_amount = str->payin.h_amount;
  bylastname = str->payin.bylastname;
  if (bylastname) {
    c_id = 0;
    strncpy (c_last, str->payin.c_last, 17);
  } else {
    c_id = str->payin.c_id;
    strcpy (c_last, " ");
  }
  retries = 0;
  if (str->payout.terror = plpay ()) {
    if (str->payout.terror != RECOVERR)
      str->payout.terror = IRRECERR;
    return (-1);
  }
  str->payout.terror = NOERR;
  strncpy (str->payout.w_street_1, w_street_1,
21);
  strncpy (str->payout.w_street_2, w_street_2,
21);
  strncpy (str->payout.w_city, w_city, 21);
  strncpy (str->payout.w_state, w_state, 3);
  strncpy (str->payout.w_zip, w_zip, 10);
  strncpy (str->payout.d_street_1, d_street_1, 21);
  strncpy (str->payout.d_street_2, d_street_2, 21);
  strncpy (str->payout.d_city, d_city, 21);
  strncpy (str->payout.d_state, d_state, 3);
  strncpy (str->payout.d_zip, d_zip, 10);
  str->payout.c_id = c_id;
  strncpy (str->payout.c_first, c_first, 17);
  strncpy (str->payout.c_middle, c_middle, 3);
  strncpy (str->payout.c_last, c_last, 17);
  strncpy (str->payout.c_street_1, c_street_1, 21);
  strncpy (str->payout.c_street_2, c_street_2, 21);
  strncpy (str->payout.c_city, c_city, 21);
  strncpy (str->payout.c_state, c_state, 3);
  strncpy (str->payout.c_zip, c_zip, 10);
  strncpy (str->payout.c_phone, c_phone, 17);
  strncpy (str->payout.c_since, c_since, 11);
  strncpy (str->payout.c_credit, c_credit, 3);
  str->payout.c_credit_lim = c_credit_lim;
  str->payout.c_discount = c_discount;
  str->payout.c_balance = c_balance;
  strncpy (str->payout.c_data, c_data, 201);
  strncpy (str->payout.h_date, h_date, 20);
  str->payout.retry = retries;
  return (0);
}

TPCord (str)
struct ordstruct *str; {
  int i;
  w_id = str->ordin.w_id;
  d_id = str->ordin.d_id;
  bylastname = str->ordin.bylastname;
  if (bylastname) {
    c_id = 0;
    strncpy (c_last, str->ordin.c_last, 17);
  } else {
    c_id = str->ordin.c_id;
    strcpy (c_last, " ");
  }
  retries = 0;
  if (str->ordout.terror = plord ()) {
    if (str->ordout.terror != RECOVERR)
      str->ordout.terror = IRRECERR;
    return (-1);
  }
  str->ordout.terror = NOERR;
  str->ordout.c_id = c_id;
  strncpy (str->ordout.c_last, c_last, 17);
  strncpy (str->ordout.c_first, c_first, 17);
  strncpy (str->ordout.c_middle, c_middle, 3);
  str->ordout.c_balance = c_balance;
  str->ordout.o_id = o_id;
  strncpy (str->ordout.o_entry_d, o_entry_d, 20);
  str->ordout.o_carrier_id = o_carrier_id;
  str->ordout.o_ol_cnt = o_ol_cnt;
  for (i = 0; i < o_ol_cnt; i++) {
    ol_delivery_d[i][10] = '\0';
    str->ordout.ol_supply_w_id[i] =
ol_supply_w_id[i];
    str->ordout.ol_i_id[i] = ol_i_id[i];
    str->ordout.ol_quantity[i] = ol_quantity[i];
    str->ordout.ol_amount[i] = ol_amount[i];
    strncpy (str->ordout.ol_delivery_d[i],
ol_delivery_d[i], 11);
  }
  str->ordout.retry = retries;
  return (0);
}

TPCdel (str)
struct delstruct *str; {
  long tr_end;
  int i;
  struct timeval tp ,tp_e;

  w_id = str->delin.w_id;
  o_carrier_id = str->delin.o_carrier_id;
  retries = 0;
  if (str->delout.terror = pldel ()) {
    if (str->delout.terror != RECOVERR)
      str->delout.terror = IRRECERR;
    return (-1);
  }

  gettimeofday(&tp_e);
  fprintf (lfp, "%09d%03d %09d%03d %d %d",str-
>delin.qtime,str->delin.uqtime/1000,
tp_e.tv_sec,tp_e.tv_usec/1000, w_id,
o_carrier_id);

  for (i = 0; i < 10; i++) {

    fprintf (lfp, " %d %d", i + 1, del_o_id[i]);
    if (del_o_id[i] <= 0) {
#ifdef TUX
      userlog ("DELIVERY: no new order for w_id:
%d, d_id %d\n", w_id, i + 1);
#else
      fprintf (stderr, "DELIVERY: no new order for
w_id: %d, d_id %d\n", w_id, i + 1);
#endif
    }
  }

  fprintf (lfp, " \n");
  str->delout.terror = NOERR;
  str->delout.retry = retries;
  return (0);
}

TPCsto (str)
struct stostruct *str; {
  w_id = str->stoin.w_id;
  d_id = str->stoin.d_id;
  threshold = str->stoin.threshold;
  retries = 0;
  if (str->stoout.terror = plsto ()) {
    if (str->stoout.terror != RECOVERR)
      str->stoout.terror = IRRECERR;
    return (-1);
  }
  str->stoout.terror = NOERR;
  str->stoout.low_stock = low_stock;
  str->stoout.retry = retries;
  return (0);
}

/*=================================
==============================+
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```

```
+=====================================
============================+
 | FILENAME                          tpccpl.c
 | DESCRIPTION                       TPC-C
transactions in PL/SQL.

+=====================================
============================*/
#include <stdio.h>
#include <sys/time.h>
#include <sys/types.h>
#include "tpcc.h"
#include "tpcc_info.h"
#include "tpccpl.h"
#ifdef TUX
#include <userlog.h>
#endif
#define SQLTXT "alter session set isolation_level
= serializable"
FILE *lfp;
FILE *fopen ();
int proc_no = 0;
int logon = 0;
int new_init = 0;
int pay_init = 0;
int ord_init = 0;
int del_init = 0;
int sto_init = 0;
ldadef tpclda;
csrdef curi;
csrdef curs;
csrdef curd;
csrdef curo;
csrdef curp;
csrdef curn, curn1, curn2, curn3[10], curn4;
unsigned long tpchda[256];

/* for stock-level transaction */
int w_id;
int d_id;
int c_id;
int threshold;
int low_stock;

/* for delivery transaction */
int del_o_id[10];
int retries;

/* for order-status transaction */
int bylastname;
char c_last[17];
char c_first[17];
char c_middle[3];
double c_balance;
int o_id;
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];

/* for payment transaction */
int c_w_id;
int c_d_id;
float 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];
char c_since[11];
char c_credit[3];
double c_credit_lim;
float c_discount;
char c_data[201];
char h_date[20];

/* for new order transaction */
int nol_i_id[15];
int nol_supply_w_id[15];
int nol_quantity[15];
float nol_amount[15];
int o_all_local;
float w_tax;
float d_tax;
float total_amount;
char i_name[15][25];
int s_quantity[15];
char brand_gen[15];
float i_price[15];
int status;

errrpt (lda, cur)
ldadef *lda;
csrdef *cur; {
  text msg[2048];
  if (cur->rc) {
    oerhms (lda, cur->rc, msg, 2048);
#ifdef TUX
    userlog ("Error in TPC-C server %d: %s\n",
proc_no, msg);
#else
    fprintf (stderr, "Error in TPC-C server %d:
%s\n", proc_no, msg);
#endif
  }
  if (cur->rc == DEADLOCK)
    return (RECOVERR);
  else
    return (IRRECERR);
}

TPCexit () {
  if (new_init) {
    plnewdone();
    new_init = 0;
  }
  if (pay_init) {
    plpaydone();
    pay_init = 0;
  }
  if (ord_init) {
    plorddone();
    ord_init = 0;
  }
  if (del_init) {
    pldeldone();
    del_init = 0;
  }
  if (sto_init) {
    plstodone();
    sto_init = 0;
  }
/* log off */
  if (logon) {
    if (ologof (&tpclda))
#ifdef TUX
      userlog ("Error in TPC-C server %d: Failed
to log off\n", proc_no);
#else
      fprintf (stderr, "Error in TPC-C server %d:
Failed to log off\n", proc_no);
#endif
    logon = 0;
  }
  if (lfp) {
    fclose (lfp);
    lfp = NULL;
  }
}

TPCinit (id, uid)
int id;
char *uid; {
  int i;
  char filename[40];
  text stmbuf[100];
  proc_no = id;
  sprintf (filename, "./LOG/tpcc_%d.del", proc_no);
  if ((lfp = fopen (filename, "w")) == NULL) {
#ifdef TUX
    userlog ("Error in TPC-C server %d: Failed to
open %s\n", proc_no, filename);
#else
    fprintf (stderr, "Error in TPC-C server %d:
Failed to open %s\n", proc_no, filename);
#endif
    return (-1);
  }

/* log on to Oracle */
  if (orlon (&tpclda, (ub1 *) tpchda, (text *) uid, -1,
(text *) 0, -1, 0)) {
#ifdef TUX
    userlog ("Error in TPC-C server %d: Failed to
log on\n", proc_no);
#else
    fprintf (stderr, "Error in TPC-C server %d:
Failed to log on\n", proc_no);
#endif
    errrpt (&tpclda, &tpclda);
    return (-1);
  }

/* turn off auto-commit */
  if (ocof (&tpclda)) {
    errrpt (&tpclda, &tpclda);
    ologof (&tpclda);
    return (-1);
  }

/* run all transaction in serializable mode */
  if (oopen (&curi, &tpclda, (text *) 0, NA, NA, (text
*) 0, NA)) {
    errrpt (&tpclda, &curi);
    ologof (&tpclda);
    return (-1);
  }
  sprintf ((char *) stmbuf, SQLTXT);
  if (oparse (&curi, stmbuf, (sb4) NA, FALSE,
(ub4) VER7)) {
```

```
    errrpt (&tpclda, &curi);
    oclose (&curi);
    ologof (&tpclda);
    return (-1);
  }
  if (oexec (&curi)) {
    errrpt (&tpclda, &curi);
    orol (&tpclda);
    oclose (&curi);
    ologof (&tpclda);
    return (-1);
  }
  if (oclose (&curi))
    errrpt (&tpclda, &curi);

  logon = 1;

  if (plnewinit ()) {
    TPCexit ();
    return (-1);
  } else
    new_init = 1;

  if (plpayinit ()) {
    TPCexit ();
    return (-1);
  } else
    pay_init = 1;

  if (plordinit ()) {
    TPCexit ();
    return (-1);
  } else
    ord_init = 1;

  if (pldelinit ()) {
    TPCexit ();
    return (-1);
  } else
    del_init = 1;

  if (plstoinit ()) {
    TPCexit ();
    return (-1);
  } else
    sto_init = 1;
  return (0);
}

TPCnew (str)
struct newstruct *str; {
  int i;
  w_id = str->newin.w_id;
  d_id = str->newin.d_id;
  c_id = str->newin.c_id;
  for (i = 0; i < 15; i++) {
    nol_i_id[i] = str->newin.ol_i_id[i];
    nol_supply_w_id[i] = str-
>newin.ol_supply_w_id[i];
    nol_quantity[i] = str->newin.ol_quantity[i];
  }
  retries = 0;
  if (str->newout.terror = plnew ()) {
    if (str->newout.terror != RECOVERR)
      str->newout.terror = IRRECERR;
    return (-1);
  }
  str->newout.terror = NOERR;
  str->newout.o_id = o_id;
  str->newout.o_ol_cnt = o_ol_cnt;
  strncpy (str->newout.c_last, c_last, 17);
  strncpy (str->newout.c_credit, c_credit, 3);
  str->newout.c_discount = c_discount;
  str->newout.w_tax = w_tax;
  str->newout.d_tax = d_tax;
  strncpy (str->newout.o_entry_d, o_entry_d, 20);
  str->newout.total_amount = total_amount;
  for (i = 0; i < o_ol_cnt; i++) {
    strncpy (str->newout.i_name[i], i_name[i], 25);
    str->newout.s_quantity[i] = s_quantity[i];
    str->newout.brand_generic[i] = brand_gen[i];
    str->newout.i_price[i] = i_price[i];
    str->newout.ol_amount[i] = nol_amount[i];
  }
  if (status)
    strcpy (str->newout.status, "Item number is
not valid");
  else
    str->newout.status[0] = '\0';
    str->newout.retry = retries;
  return (0);
}

TPCpay (str)
struct paystruct *str; {
  w_id = str->payin.w_id;
  d_id = str->payin.d_id;
  c_w_id = str->payin.c_w_id;
  c_d_id = str->payin.c_d_id;
  h_amount = str->payin.h_amount;
  bylastname = str->payin.bylastname;
  if (bylastname) {
    c_id = 0;
    strncpy (c_last, str->payin.c_last, 17);
  } else {
    c_id = str->payin.c_id;
    strcpy (c_last, " ");
  }
  retries = 0;
  if (str->payout.terror = plpay ()) {
    if (str->payout.terror != RECOVERR)
      str->payout.terror = IRRECERR;
    return (-1);
  }
  str->payout.terror = NOERR;
  strncpy (str->payout.w_street_1, w_street_1,
21);
  strncpy (str->payout.w_street_2, w_street_2,
21);
  strncpy (str->payout.w_city, w_city, 21);
  strncpy (str->payout.w_state, w_state, 3);
  strncpy (str->payout.w_zip, w_zip, 10);
  strncpy (str->payout.d_street_1, d_street_1, 21);
  strncpy (str->payout.d_street_2, d_street_2, 21);
  strncpy (str->payout.d_city, d_city, 21);
  strncpy (str->payout.d_state, d_state, 3);
  strncpy (str->payout.d_zip, d_zip, 10);
  str->payout.c_id = c_id;
  strncpy (str->payout.c_first, c_first, 17);
  strncpy (str->payout.c_middle, c_middle, 3);
  strncpy (str->payout.c_last, c_last, 17);
  strncpy (str->payout.c_street_1, c_street_1, 21);
  strncpy (str->payout.c_street_2, c_street_2, 21);
  strncpy (str->payout.c_city, c_city, 21);
  strncpy (str->payout.c_state, c_state, 3);
  strncpy (str->payout.c_zip, c_zip, 10);
  strncpy (str->payout.c_phone, c_phone, 17);
  strncpy (str->payout.c_since, c_since, 11);
  strncpy (str->payout.c_credit, c_credit, 3);
  str->payout.c_credit_lim = c_credit_lim;
  str->payout.c_discount = c_discount;
  str->payout.c_balance = c_balance;
  strncpy (str->payout.c_data, c_data, 201);
  strncpy (str->payout.h_date, h_date, 20);
  str->payout.retry = retries;
  return (0);
}

TPCord (str)
struct ordstruct *str; {
  int i;
  w_id = str->ordin.w_id;
  d_id = str->ordin.d_id;
  bylastname = str->ordin.bylastname;
  if (bylastname) {
    c_id = 0;
    strncpy (c_last, str->ordin.c_last, 17);
  } else {
    c_id = str->ordin.c_id;
    strcpy (c_last, " ");
  }
  retries = 0;
  if (str->ordout.terror = plord ()) {
    if (str->ordout.terror != RECOVERR)
      str->ordout.terror = IRRECERR;
    return (-1);
  }
  str->ordout.terror = NOERR;
  str->ordout.c_id = c_id;
  strncpy (str->ordout.c_last, c_last, 17);
  strncpy (str->ordout.c_first, c_first, 17);
  strncpy (str->ordout.c_middle, c_middle, 3);
  str->ordout.c_balance = c_balance;
  str->ordout.o_id = o_id;
  strncpy (str->ordout.o_entry_d, o_entry_d, 20);
  str->ordout.o_carrier_id = o_carrier_id;
  str->ordout.o_ol_cnt = o_ol_cnt;
  for (i = 0; i < o_ol_cnt; i++) {
    ol_delivery_d[i][10] = '\0';
    str->ordout.ol_supply_w_id[i] =
ol_supply_w_id[i];
    str->ordout.ol_i_id[i] = ol_i_id[i];
    str->ordout.ol_quantity[i] = ol_quantity[i];
    str->ordout.ol_amount[i] = ol_amount[i];
    strncpy (str->ordout.ol_delivery_d[i],
ol_delivery_d[i], 11);
  }
  str->ordout.retry = retries;
  return (0);
}

TPCdel (str)
struct delstruct *str; {
  long tr_end;
  int i;
  struct timeval tp ,tp_e;

  w_id = str->delin.w_id;
  o_carrier_id = str->delin.o_carrier_id;
  retries = 0;
  if (str->delout.terror = pldel ()) {
    if (str->delout.terror != RECOVERR)
      str->delout.terror = IRRECERR;
    return (-1);
  }

  gettimeofday(&tp_e);
  fprintf (lfp, "%09d%03d %09d%03d %d %d",str-
>delin.qtime,str->delin.uqtime/1000,
tp_e.tv_sec,tp_e.tv_usec/1000, w_id,
o_carrier_id);

  for (i = 0; i < 10; i++) {

    fprintf (lfp, " %d %d", i + 1, del_o_id[i]);
    if (del_o_id[i] <= 0) {
```

```
#ifdef TUX
        userlog ("DELIVERY: no new order for w_id:
%d, d_id %d\n", w_id, i + 1);
#else
        fprintf (stderr, "DELIVERY: no new order for
w_id: %d, d_id %d\n", w_id, i + 1);
#endif
      }
    }

    fprintf (lfp, " \n");
    str->delout.terror = NOERR;
    str->delout.retry = retries;
    return (0);
}

TPCsto (str)
struct stostruct *str; {
    w_id = str->stoin.w_id;
    d_id = str->stoin.d_id;
    threshold = str->stoin.threshold;
    retries = 0;
    if (str->stoout.terror = plsto ()) {
      if (str->stoout.terror != RECOVERR)
        str->stoout.terror = IRRECERR;
      return (-1);
    }
    str->stoout.terror = NOERR;
    str->stoout.low_stock = low_stock;
    str->stoout.retry = retries;
    return (0);
}

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+=================================
==========================+
| FILENAME                                tpccpl.c
| DESCRIPTION                             TPC-C
transactions in PL/SQL.

+=================================
==========================*/
#include <stdio.h>
#include <sys/time.h>
#include <sys/types.h>
#include "tpcc.h"
#include "tpcc_info.h"
#include "tpccpl.h"
#ifdef TUX
#include <userlog.h>
#endif
#define SQLTXT "alter session set isolation_level
= serializable"
FILE *lfp;
FILE *fopen ();
int proc_no = 0;
int logon = 0;
int new_init = 0;
int pay_init = 0;
int ord_init = 0;
int del_init = 0;
int sto_init = 0;
ldadef tpclda;
csrdef curi;
csrdef curs;
csrdef curd;
csrdef curo;
csrdef curp;
csrdef curn, curn1, curn2, curn3[10], curn4;
unsigned long tpchda[256];

/* for stock-level transaction */
int w_id;
int d_id;
int c_id;
int threshold;
int low_stock;

/* for delivery transaction */
int del_o_id[10];
int retries;

/* for order-status transaction */
int bylastname;
char c_last[17];
char c_first[17];
char c_middle[3];
double c_balance;
int o_id;
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];

/* for payment transaction */
int c_w_id;
int c_d_id;
float 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];
char c_since[11];
char c_credit[3];
double c_credit_lim;
float c_discount;
char c_data[201];
char h_date[20];

/* for new order transaction */
int nol_i_id[15];
int nol_supply_w_id[15];
int nol_quantity[15];
float nol_amount[15];
int o_all_local;
float w_tax;
float d_tax;
float total_amount;
char i_name[15][25];
int s_quantity[15];
char brand_gen[15];
float i_price[15];
int status;

errrpt (lda, cur)
ldadef *lda;
csrdef *cur; {
  text msg[2048];
  if (cur->rc) {
    oerhms (lda, cur->rc, msg, 2048);
#ifdef TUX
    userlog ("Error in TPC-C server %d: %s\n",
proc_no, msg);
#else
    fprintf (stderr, "Error in TPC-C server %d:
%s\n", proc_no, msg);
#endif
  }
  if (cur->rc == DEADLOCK)
    return (RECOVERR);
  else
    return (IRRECERR);
}

TPCexit () {
  if (new_init) {
    plnewdone();
    new_init = 0;
  }
  if (pay_init) {
    plpaydone();
    pay_init = 0;
  }
  if (ord_init) {
    plorddone();
    ord_init = 0;
  }
  if (del_init) {
    pldeldone();
    del_init = 0;
  }
  if (sto_init) {
    plstodone();
    sto_init = 0;
  }
/* log off */
  if (logon) {
    if (ologof (&tpclda))
#ifdef TUX
      userlog ("Error in TPC-C server %d: Failed
to log off\n", proc_no);
#else
      fprintf (stderr, "Error in TPC-C server %d:
Failed to log off\n", proc_no);
#endif
    logon = 0;
  }
  if (lfp) {
    fclose (lfp);
    lfp = NULL;
  }
}

TPCinit (id, uid)
int id;
char *uid; {
  int i;
  char filename[40];
  text stmbuf[100];
  proc_no = id;
  sprintf (filename, "./LOG/tpcc_%d.del", proc_no);
  if ((lfp = fopen (filename, "w")) == NULL) {
#ifdef TUX
```

```
    userlog ("Error in TPC-C server %d: Failed to
open %s\n", proc_no, filename);
#else
    fprintf (stderr, "Error in TPC-C server %d:
Failed to open %s\n", proc_no, filename);
#endif
    return (-1);
  }

/* log on to Oracle */
  if (orlon (&tpclda, (ub1 *) tpchda, (text *) uid, -1,
(text *) 0, -1, 0)) {
#ifdef TUX
    userlog ("Error in TPC-C server %d: Failed to
log on\n", proc_no);
#else
    fprintf (stderr, "Error in TPC-C server %d:
Failed to log on\n", proc_no);
#endif
    errrpt (&tpclda, &tpclda);
    return (-1);
  }

/* turn off auto-commit */
  if (ocof (&tpclda)) {
    errrpt (&tpclda, &tpclda);
    ologof (&tpclda);
    return (-1);
  }

/* run all transaction in serializable mode */
  if (oopen (&curi, &tpclda, (text *) 0, NA, NA, (text
*) 0, NA)) {
    errrpt (&tpclda, &curi);
    ologof (&tpclda);
    return (-1);
  }
  sprintf ((char *) stmbuf, SQLTXT);
  if (oparse (&curi, stmbuf, (sb4) NA, FALSE,
(ub4) VER7)) {
    errrpt (&tpclda, &curi);
    oclose (&curi);
    ologof (&tpclda);
    return (-1);
  }
  if (oexec (&curi)) {
    errrpt (&tpclda, &curi);
    orol (&tpclda);
    oclose (&curi);
    ologof (&tpclda);
    return (-1);
  }
  if (oclose (&curi))
    errrpt (&tpclda, &curi);

  logon = 1;

  if (plnewinit ()) {
    TPCexit ();
    return (-1);
  } else
    new_init = 1;

  if (plpayinit ()) {
    TPCexit ();
    return (-1);
  } else
    pay_init = 1;

  if (plordinit ()) {
    TPCexit ();
    return (-1);
  } else
    ord_init = 1;

  if (pldelinit ()) {
    TPCexit ();
    return (-1);
  } else
    del_init = 1;

  if (plstoinit ()) {
    TPCexit ();
    return (-1);
  } else
    sto_init = 1;
  return (0);
}

TPCnew (str)
struct newstruct *str; {
  int i;
  w_id = str->newin.w_id;
  d_id = str->newin.d_id;
  c_id = str->newin.c_id;
  for (i = 0; i < 15; i++) {
    nol_i_id[i] = str->newin.ol_i_id[i];
    nol_supply_w_id[i] = str-
>newin.ol_supply_w_id[i];
    nol_quantity[i] = str->newin.ol_quantity[i];
  }
  retries = 0;
  if (str->newout.terror = plnew ()) {
    if (str->newout.terror != RECOVERR)
      str->newout.terror = IRRECERR;
    return (-1);
  }
  str->newout.terror = NOERR;
  str->newout.o_id = o_id;
  str->newout.o_ol_cnt = o_ol_cnt;
  strncpy (str->newout.c_last, c_last, 17);
  strncpy (str->newout.c_credit, c_credit, 3);
  str->newout.c_discount = c_discount;
  str->newout.w_tax = w_tax;
  str->newout.d_tax = d_tax;
  strncpy (str->newout.o_entry_d, o_entry_d, 20);
  str->newout.total_amount = total_amount;
  for (i = 0; i < o_ol_cnt; i++) {
    strncpy (str->newout.i_name[i], i_name[i], 25);
    str->newout.s_quantity[i] = s_quantity[i];
    str->newout.brand_generic[i] = brand_gen[i];
    str->newout.i_price[i] = i_price[i];
    str->newout.ol_amount[i] = nol_amount[i];
  }
  if (status)
    strcpy (str->newout.status, "Item number is
not valid");
  else
    str->newout.status[0] = '\0';
    str->newout.retry = retries;
  return (0);
}

TPCpay (str)
struct paystruct *str; {
  w_id = str->payin.w_id;
  d_id = str->payin.d_id;
  c_w_id = str->payin.c_w_id;
  c_d_id = str->payin.c_d_id;
  h_amount = str->payin.h_amount;
  bylastname = str->payin.bylastname;
  if (bylastname) {
    c_id = 0;
    strncpy (c_last, str->payin.c_last, 17);
  } else {
    c_id = str->payin.c_id;
    strcpy (c_last, " ");
  }
  retries = 0;
  if (str->payout.terror = plpay ()) {
    if (str->payout.terror != RECOVERR)
      str->payout.terror = IRRECERR;
    return (-1);
  }
  str->payout.terror = NOERR;
  strncpy (str->payout.w_street_1, w_street_1,
21);
  strncpy (str->payout.w_street_2, w_street_2,
21);
  strncpy (str->payout.w_city, w_city, 21);
  strncpy (str->payout.w_state, w_state, 3);
  strncpy (str->payout.w_zip, w_zip, 10);
  strncpy (str->payout.d_street_1, d_street_1, 21);
  strncpy (str->payout.d_street_2, d_street_2, 21);
  strncpy (str->payout.d_city, d_city, 21);
  strncpy (str->payout.d_state, d_state, 3);
  strncpy (str->payout.d_zip, d_zip, 10);
  str->payout.c_id = c_id;
  strncpy (str->payout.c_first, c_first, 17);
  strncpy (str->payout.c_middle, c_middle, 3);
  strncpy (str->payout.c_last, c_last, 17);
  strncpy (str->payout.c_street_1, c_street_1, 21);
  strncpy (str->payout.c_street_2, c_street_2, 21);
  strncpy (str->payout.c_city, c_city, 21);
  strncpy (str->payout.c_state, c_state, 3);
  strncpy (str->payout.c_zip, c_zip, 10);
  strncpy (str->payout.c_phone, c_phone, 17);
  strncpy (str->payout.c_since, c_since, 11);
  strncpy (str->payout.c_credit, c_credit, 3);
  str->payout.c_credit_lim = c_credit_lim;
  str->payout.c_discount = c_discount;
  str->payout.c_balance = c_balance;
  strncpy (str->payout.c_data, c_data, 201);
  strncpy (str->payout.h_date, h_date, 20);
  str->payout.retry = retries;
  return (0);
}

TPCord (str)
struct ordstruct *str; {
  int i;
  w_id = str->ordin.w_id;
  d_id = str->ordin.d_id;
  bylastname = str->ordin.bylastname;
  if (bylastname) {
    c_id = 0;
    strncpy (c_last, str->ordin.c_last, 17);
  } else {
    c_id = str->ordin.c_id;
    strcpy (c_last, " ");
  }
  retries = 0;
  if (str->ordout.terror = plord ()) {
    if (str->ordout.terror != RECOVERR)
      str->ordout.terror = IRRECERR;
    return (-1);
  }
  str->ordout.terror = NOERR;
  str->ordout.c_id = c_id;
  strncpy (str->ordout.c_last, c_last, 17);
  strncpy (str->ordout.c_first, c_first, 17);
  strncpy (str->ordout.c_middle, c_middle, 3);
  str->ordout.c_balance = c_balance;
  str->ordout.o_id = o_id;
  strncpy (str->ordout.o_entry_d, o_entry_d, 20);
  str->ordout.o_carrier_id = o_carrier_id;
```

```
   str->ordout.o_ol_cnt = o_ol_cnt;
   for (i = 0; i < o_ol_cnt; i++) {
      ol_delivery_d[i][10] = '\0';
      str->ordout.ol_supply_w_id[i] =
ol_supply_w_id[i];
      str->ordout.ol_i_id[i] = ol_i_id[i];
      str->ordout.ol_quantity[i] = ol_quantity[i];
      str->ordout.ol_amount[i] = ol_amount[i];
      strncpy (str->ordout.ol_delivery_d[i],
ol_delivery_d[i], 11);
   }
   str->ordout.retry = retries;
   return (0);
}

TPCdel (str)
struct delstruct *str; {
   long tr_end;
   int i;
   struct timeval tp ,tp_e;

   w_id = str->delin.w_id;
   o_carrier_id = str->delin.o_carrier_id;
   retries = 0;
   if (str->delout.terror = pldel ()) {
      if (str->delout.terror != RECOVERR)
         str->delout.terror = IRRECERR;
      return (-1);
   }

   gettimeofday(&tp_e);
   fprintf (lfp, "%09d%03d %09d%03d %d %d",str-
>delin.qtime,str->delin.uqtime/1000,
tp_e.tv_sec,tp_e.tv_usec/1000, w_id,
o_carrier_id);

   for (i = 0; i < 10; i++) {

         fprintf (lfp, " %d %d", i + 1, del_o_id[i]);
      if (del_o_id[i] <= 0) {
#ifdef TUX
         userlog ("DELIVERY: no new order for w_id:
%d, d_id %d\n", w_id, i + 1);
#else
         fprintf (stderr, "DELIVERY: no new order for
w_id: %d, d_id %d\n", w_id, i + 1);
#endif
      }
   }

   fprintf (lfp, " \n");
   str->delout.terror = NOERR;
   str->delout.retry = retries;
   return (0);
}

TPCsto (str)
struct stostruct *str; {
   w_id = str->stoin.w_id;
   d_id = str->stoin.d_id;
   threshold = str->stoin.threshold;
   retries = 0;
   if (str->stoout.terror = plsto ()) {
      if (str->stoout.terror != RECOVERR)
         str->stoout.terror = IRRECERR;
      return (-1);
   }
   str->stoout.terror = NOERR;
   str->stoout.low_stock = low_stock;
   str->stoout.retry = retries;
   return (0);
}
```

```
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|

+=================================
============================+
| FILENAME
|    tpccpl.h
| DESCRIPTION
|    Header file for TPC-C transactions in PL/SQL.

+=================================
============================*/

#ifndef TPCCPL_H
#define TPCCPL_H

#include <stdio.h>

#define DELRT 80.0

extern int plnewinit ();
extern int plpayinit ();
extern int plordinit ();
extern int pldelinit ();
extern int plstoinit ();

extern int plnew ();
extern int plpay ();
extern int plord ();
extern int pldel ();
extern int plsto ();

extern void plnewdone ();
extern void plpaydone ();
extern void plorddone ();
extern void pldeldone ();
extern void plstodone ();

extern errrpt ();

extern FILE *lfp;
extern FILE *fopen ();
extern int proc_no;
extern int doid[];

extern ldadef tpclda;
extern csrdef curs;
extern csrdef curd;
extern csrdef curo;
extern csrdef curp;
extern csrdef curn, curn1, curn2, curn3[10], curn4;
extern unsigned long tpchda[];


/* 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 char 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 float ol_amount[15];
extern char ol_delivery_d[15][11];

/* for payment transaction */

extern int c_w_id;
extern int c_d_id;
extern float 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 char c_since[11];
extern char c_credit[3];
extern double c_credit_lim;
extern float c_discount;
extern char c_data[201];
extern char 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 float 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 float i_price[15];
extern int status;
```

```
#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 */

#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
OBNDRV(lda,cursor,sqlvar,progv,progvl,ftype)\
   if
(obndrv((cursor),(text*)(sqlvar),NA,(ub1*)(progv),(p
rogvl),(ftype),NA,\
      (sb2 *)0, (text *)0, NA, NA))\
      {errrpt(lda,cursor);return(-1);}\
   else\
      DISCARD 0

#define
OBNDRA(lda,cursor,sqlvar,progv,progvl,ftype,indp
,alen,arcode)\
   if
(obndra((cursor),(text*)(sqlvar),NA,(ub1*)(progv),(p
rogvl),(ftype),NA,\

(indp),(alen),(arcode),(ub4)0,(ub4*)0,(text*)0,NA,N
A))\
      {errrpt(lda,cursor);return(-1);}\
   else\
      DISCARD 0

#define
OBNDRAA(lda,cursor,sqlvar,progv,progvl,ftype,ind
p,alen,arcode,ms,cs)\
   if
(obndra((cursor),(text*)(sqlvar),NA,(ub1*)(progv),(p
rogvl),(ftype),NA,\

(indp),(alen),(arcode),(ub4)(ms),(ub4*)(cs),(text*)0,
NA,NA))\
      {errrpt(lda,cursor);return(-1);}\
   else\
      DISCARD 0

#define
ODEFIN(lda,cursor,pos,buf,bufl,ftype,scale,indp,f
mt,fmtl,fmtt,rlen,rcode)\
   if
(odefin((cursor),(pos),(ub1*)(buf),(bufl),(ftype),(sca
le),(indp),\
      (text*)(fmt),(fmtl),(fmtt),(rlen),(rcode)))\
      {errrpt(lda,cursor);return(-1);}\
   else\
      DISCARD 0

#define OEXFET(lda,cursor,nrows,cancel,exact)\
   if (oexfet((cursor),(nrows),(cancel),(exact)))\
      {if ((cursor)->rc == 1403) DISCARD 0; \
       else if (errrpt(lda,cursor)==RECOVERR) \
         {orol(lda);return(RECOVERR);} \
       else{orol(lda);return(-1);}}\
   else\
      DISCARD 0

#define OOPEN(lda,cursor)\
   if
(oopen((cursor),(lda),(text*)0,NA,NA,(text*)0,NA))\
      {errrpt(lda,cursor);return(-1);}\
   else\
      DISCARD 0

#define
OPARSE(lda,cursor,sqlstm,sqll,defflg,lngflg)\
   if
(oparse((cursor),(sqlstm),(sb4)(sqll),(defflg),(ub4)(l
ngflg)))\
      {errrpt(lda,cursor);return(-1);}\
   else\
      DISCARD 0

#define OFEN(lda,cursor,nrows)\
   if (ofen((cursor),(nrows)))\
      {if (errrpt(lda,cursor)==RECOVERR) \
         {orol(lda);return(RECOVERR);} \
       else{orol(lda);return(-1);}}\
   else\
      DISCARD 0

#define OEXEC(lda,cursor)\
   if (oexec((cursor)))\
      {if (errrpt(lda,cursor)==RECOVERR) \
         {orol(lda);return(RECOVERR);} \
       else{orol(lda);return(-1);}}\
   else\
      DISCARD 0


#define OCOM(lda,cursor)\
   if (ocom((lda))) \
      {errrpt(lda,cursor);orol(lda);return(-1);}\
   else\
      DISCARD 0


#define OEXN(lda,cursor,iters,rowoff)\
   if (oexn((cursor),(iters),(rowoff))) \
      {if (errrpt(lda,cursor)==RECOVERR) \
         {orol(lda);return(RECOVERR);} \
       else{orol(lda);return(-1);}}\
   else\
      DISCARD 0

#endif

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 |

+=================================
============================+
 | FILENAME
 |   tpccsvr.c
 | DESCRIPTION
 |   Tuxedo server for TPC-C.

+=================================
============================*/

#include <stdio.h>
#include "tpcc.h"
#include "tpcc_info.h"
#include <atmi.h>
#include <userlog.h>

#define FJ
#ifdef FJ
union infostruct
{
   int tran_kind;
   struct newstruct newinfo;
   struct paystruct payinfo;
   struct ordstruct ordinfo;
   struct delstruct delinfo;
   struct stostruct stoinfo;
} *info;
#endif
/* [END OF ADD] */

struct newstruct *newinfo;
struct paystruct *payinfo;
struct ordstruct *ordinfo;
struct delstruct *delinfo;
struct stostruct *stoinfo;



tpsvrinit (argc, argv)

int argc;
char *argv[];

{

  int id;
  char *uid;

  if (argc >= 2) {
    id = atoi (argv[argc - 2]);
    uid = argv[argc - 1];
    return (TPCinit (id, uid));
  }
  else {
    userlog ("Error: not enough arguments to
tpsvrinit\n");
    return (-1);
  }

}



void tpsvrdone ()

{
```

```
   TPCexit ();

}


#ifdef FJ
/*    10 entries */
TPCC01(msg)
TPSVCINFO *msg;
{
   info = (union infostruct *)msg->data;
   switch(info->tran_kind)
   {
   case TRANNEW:
                newinfo = (struct newstruct *)info;
                if (TPCnew (newinfo))
                   tpreturn (TPFAIL, 0, newinfo, sizeof
(struct newstruct), 0);
                else
                   tpreturn (TPSUCCESS, 0, newinfo,
sizeof (struct newstruct), 0);
                break;

   case TRANPAY:
                payinfo = (struct paystruct *)info;
                if (TPCpay (payinfo))
                   tpreturn (TPFAIL, 0, payinfo, sizeof
(struct paystruct), 0);
                else
                   tpreturn (TPSUCCESS, 0, payinfo,
sizeof (struct paystruct), 0);
                break;

   case TRANORD:
                ordinfo = (struct ordstruct  *)info;
                if (TPCord (ordinfo))
                   tpreturn (TPFAIL, 0, ordinfo, sizeof
(struct ordstruct), 0);
                else
                   tpreturn (TPSUCCESS, 0, ordinfo,
sizeof (struct ordstruct), 0);
                break;

   case TRANDEL:
                delinfo = (struct delstruct *)info;
                if (TPCdel (delinfo))
                   tpreturn (TPFAIL, 0, NULL, 0, 0);
                else
                   tpreturn (TPSUCCESS, 0, NULL,
0, 0);
                break;

   case TRANSTO:
                stoinfo = (struct stostruct *) msg-
>data;
                if (TPCsto (stoinfo))
                   tpreturn (TPFAIL, 0, stoinfo, sizeof
(struct stostruct), 0);
                else
                   tpreturn (TPSUCCESS, 0, stoinfo,
sizeof (struct stostruct), 0);
                break;
   }
}

TPCC02(msg)
TPSVCINFO *msg;
{
   info = (union infostruct *)msg->data;
   switch(info->tran_kind)
   {
   case TRANNEW:
                newinfo = (struct newstruct *)info;
                if (TPCnew (newinfo))
                   tpreturn (TPFAIL, 0, newinfo, sizeof
(struct newstruct), 0);
                else
                   tpreturn (TPSUCCESS, 0, newinfo,
sizeof (struct newstruct), 0);
                break;

   case TRANPAY:
                payinfo = (struct paystruct *)info;
                if (TPCpay (payinfo))
                   tpreturn (TPFAIL, 0, payinfo, sizeof
(struct paystruct), 0);
                else
                   tpreturn (TPSUCCESS, 0, payinfo,
sizeof (struct paystruct), 0);
                break;

   case TRANORD:
                ordinfo = (struct ordstruct *)info;
                if (TPCord (ordinfo))
                   tpreturn (TPFAIL, 0, ordinfo, sizeof
(struct ordstruct), 0);
                else
                   tpreturn (TPSUCCESS, 0, ordinfo,
sizeof (struct ordstruct), 0);
                break;

   case TRANDEL:
                delinfo = (struct delstruct *)info;
                if (TPCdel (delinfo))
                   tpreturn (TPFAIL, 0, NULL, 0, 0);
                else
                   tpreturn (TPSUCCESS,  0, NULL,
0, 0);
                break;

   case TRANSTO:
                stoinfo = (struct stostruct *) msg-
>data;
                if (TPCsto (stoinfo))
                   tpreturn (TPFAIL, 0, stoinfo, sizeof
(struct stostruct), 0);
                else
                   tpreturn (TPSUCCESS, 0, stoinfo,
sizeof (struct stostruct), 0);
                break;
   }
}

TPCC03(msg)
TPSVCINFO *msg;
{
   info = (union infostruct *)msg->data;
   switch(info->tran_kind)
   {
   case TRANNEW:
                newinfo = (struct newstruct *)info;
                if (TPCnew (newinfo))
                   tpreturn (TPFAIL, 0, newinfo, sizeof
(struct newstruct), 0);
                else
                   tpreturn (TPSUCCESS, 0, newinfo,
sizeof (struct newstruct), 0);
                break;

   case TRANPAY:
                payinfo = (struct paystruct *)info;
                if (TPCpay (payinfo))
                   tpreturn (TPFAIL, 0, payinfo, sizeof
(struct paystruct), 0);
                else
                   tpreturn (TPSUCCESS, 0, payinfo,
sizeof (struct paystruct), 0);
                break;

   case TRANORD:
                ordinfo = (struct ordstruct *)info;
                if (TPCord (ordinfo))
                   tpreturn (TPFAIL, 0, ordinfo, sizeof
(struct ordstruct), 0);
                else
                   tpreturn (TPSUCCESS, 0, ordinfo,
sizeof (struct ordstruct), 0);
                break;

   case TRANDEL:
                delinfo = (struct delstruct *)info;
                if (TPCdel (delinfo))
                   tpreturn (TPFAIL, 0, NULL, 0, 0);
                else
                   tpreturn (TPSUCCESS, 0, NULL,
0, 0);
                break;

   case TRANSTO:
                stoinfo = (struct stostruct *) msg-
>data;
                if (TPCsto (stoinfo))
                   tpreturn (TPFAIL, 0, stoinfo, sizeof
(struct stostruct), 0);
                else
                   tpreturn (TPSUCCESS, 0, stoinfo,
sizeof (struct stostruct), 0);
                break;
   }
}

TPCC04(msg)
TPSVCINFO *msg;
{
   info = (union infostruct *)msg->data;
   switch(info->tran_kind)
   {
   case TRANNEW:
                newinfo = (struct newstruct *)info;
                if (TPCnew (newinfo))
                   tpreturn (TPFAIL, 0, newinfo, sizeof
(struct newstruct), 0);
                else
                   tpreturn (TPSUCCESS, 0, newinfo,
sizeof (struct newstruct), 0);
                break;

   case TRANPAY:
                payinfo = (struct paystruct *)info;
                if (TPCpay (payinfo))
                   tpreturn (TPFAIL, 0, payinfo, sizeof
(struct paystruct), 0);
                else
                   tpreturn (TPSUCCESS, 0, payinfo,
sizeof (struct paystruct), 0);
                break;

   case TRANORD:
                ordinfo = (struct ordstruct *)info;
                if (TPCord (ordinfo))
                   tpreturn (TPFAIL, 0, ordinfo, sizeof
(struct ordstruct), 0);
                else
                   tpreturn (TPSUCCESS, 0, ordinfo,
sizeof (struct ordstruct), 0);
                break;
```

```
   case TRANDEL:
            delinfo = (struct delstruct *)info;
            if (TPCdel (delinfo))
               tpreturn (TPFAIL, 0, NULL, 0, 0);
            else
               tpreturn (TPSUCCESS, 0, NULL,
0, 0);
            break;

   case TRANSTO:
            stoinfo = (struct stostruct *) msg-
>data;
            if (TPCsto (stoinfo))
               tpreturn (TPFAIL, 0, stoinfo, size of
(struct stostruct), 0);
            else
               tpreturn (TPSUCCESS, 0, stoinfo,
sizeof (struct stostruct), 0);
            break;
   }
}

TPCC05(msg)
TPSVCINFO *msg;
{
   info = (union infostruct *)msg->data;
   switch(info->tran_kind)
   {
   case TRANNEW:
            newinfo = (struct newstruct *)info;
            if (TPCnew (newinfo))
               tpreturn (TPFAIL, 0, newinfo, sizeof
(struct newstruct), 0);
            else
               tpreturn (TPSUCCESS, 0, newinfo,
sizeof (struct newstruct), 0);
            break;

   case TRANPAY:
            payinfo = (struct paystruct *)info;
            if (TPCpay (payinfo))
               tpreturn (TPFAIL, 0, payinfo, sizeof
(struct paystruct), 0);
            else
               tpreturn (TPSUCCESS, 0, payinfo,
sizeof (struct paystruct), 0);
            break;

   case TRANORD:
            ordinfo = (struct ordstruct *)info;
            if (TPCord (ordinfo))
               tpreturn (TPFAIL, 0, ordinfo, sizeof
(struct ordstruct), 0);
            else
               tpreturn (TPSUCCESS, 0, ordinfo,
sizeof (struct ordstruct), 0);
            break;

   case TRANDEL:
            delinfo = (struct delstruct *)info;
            if (TPCdel (delinfo))
               tpreturn (TPFAIL, 0, NULL, 0, 0) ;
            else
               tpreturn (TPSUCCESS, 0, NULL,
0, 0);
            break;

   case TRANSTO:
            stoinfo = (struct stostruct *) msg-
>data;
            if (TPCsto (stoinfo))
               tpreturn (TPFAIL, 0, stoinfo, sizeof
(struct stostruct), 0);
            else
               tpreturn (TPSUCCESS, 0, stoinfo,
sizeof (struct stostruct), 0);
            break;
   }
}

TPCC06(msg)
TPSVCINFO *msg;
{
   info = (union infostruct *)msg->data;
   switch(info->tran_kind)
   {
   case TRANNEW:
            newinfo = (struct newstruct *)info;
            if (TPCnew (newinfo))
               tpreturn (TPFAIL, 0, n ewinfo, sizeof
(struct newstruct), 0);
            else
               tpreturn (TPSUCCESS, 0, newinfo,
sizeof (struct newstruct), 0);
            break;

   case TRANPAY:
            payinfo = (struct paystruct *)info;
            if (TPCpay (payinfo))
               tpreturn (TPFAIL, 0, payinfo, sizeof
(struct paystruct), 0);
            else
               tpreturn (TPSUCCESS, 0, payinfo,
sizeof (struct paystruct), 0);
            break;

   case TRANORD:
            ordinfo = (struct ordstruct *)info;
            if (TPCord (ordinfo))
               tpreturn (TPFAIL, 0, ordinfo, sizeof
(struct ordstruct), 0);
            else
               tpreturn (TPSUCCESS, 0, ordinfo,
sizeof (struct ordstruct), 0);
            break;

   case TRANDEL:
            delinfo = (struct delstruct *)info;
            if (TPCdel (delinfo))
               tpreturn (TPFAIL, 0, NULL, 0, 0);
            else
               tpreturn (TPSUCCESS, 0, NULL,
0, 0);
            break;

   case TRANSTO:
            stoinfo = (struct stostruct *) msg-
>data;
            if (TPCsto (stoinfo))
               tpreturn (TPFAIL, 0, stoinfo, sizeof
(struct stostruct), 0);
            else
               tpreturn (TPSUCCESS, 0, stoinfo,
sizeof (struct stostruct), 0);
            break;
   }
}

TPCC07(msg)
TPSVCINFO *msg;
{
   info = (union infostruct *)msg->data;
   switch(info->tran_kind)
   {
   case TRANNEW:
            newinfo = (struct newstruct *)info;
            if (TPCnew (newinfo))
               tpreturn (TPFAIL, 0, newinfo, sizeof
(struct newstruct), 0);
            else
               tpreturn (TPSUCCESS, 0, newinfo,
sizeof (struct newstruct), 0);
            break;

   case TRANPAY:
            payinfo = (struct paystruct *)info;
            if (TPCpay (payinfo))
```

```
                tpreturn (TPFAIL, 0, payinfo, sizeof
(struct paystruct), 0);
             else
                tpreturn (TPSUCCESS, 0, payinfo,
sizeof (struct paystruct), 0);
             break;

   case TRANORD:
             ordinfo = (struct ordstruct *)info;
             if (TPCord (ordinfo))
                tpreturn (TPFAIL, 0, ordinfo, sizeof
(struct ordstruct), 0);
             else
                tpreturn (TPSUCCESS, 0, ordinfo,
sizeof (struct ordstruct), 0);
             break;

   case TRANDEL:
             delinfo = (struct delstruct *)info;
             if (TPCdel (delinfo))
                tpreturn (TPFAIL, 0, NULL, 0, 0);
             else
                tpreturn (TPSUCCESS, 0, NULL,
0, 0);
             break;

   case TRANSTO:
             stoinfo = (struct stostruct *) msg-
>data;
             if (TPCsto (stoinfo))
                tpreturn (TPFAIL, 0, stoinfo, sizeof
(struct stostruct), 0);
             else
                tpreturn (TPSUCCESS, 0, stoinfo,
sizeof (struct stostruct), 0);
             break;
   }
}

TPCC09(msg)
TPSVCINFO *msg;
{
   info = (union infostruct *)msg->data;
   switch(info->tran_kind)
   {
   case TRANNEW:
             newinfo = (struct newstruct *)info;
             if (TPCnew (newinfo))
                tpreturn (TPFAIL, 0, newinfo, sizeof
(struct newstruct), 0);
             else
                tpreturn (TPSUCCESS, 0, newinfo,
sizeof (struct newstruct), 0);
             break;

   case TRANPAY:
             payinfo = (struct paystruct *)info;
             if (TPCpay (payinfo))
                tpreturn (TPFAIL, 0, payinfo, sizeof
(struct paystruct), 0);
             else
                tpreturn (TPSUCCESS, 0, payinfo,
sizeof (struct paystruct), 0);
             break;

   case TRANORD:
             ordinfo = (struct ordstruct *)info;
             if (TPCord (ordinfo))
                tpreturn (TPFAIL, 0, ordinfo, sizeof
(struct ordstruct), 0);
             else
                tpreturn (TPSUCCESS, 0, ordinfo,
sizeof (struct ordstruct), 0);
             break;

   case TRANDEL:
             delinfo = (struct delstruct *)info;
             if (TPCdel (delinfo))
                tpreturn (TPFAIL, 0, NULL, 0, 0);
             else
                tpreturn (TPSUCCESS, 0, NULL,
0, 0);
             break;

   case TRANSTO:
             stoinfo = (struct stostruct *) msg-
>data;
             if (TPCsto (stoinfo))
                tpreturn (TPFAIL, 0, stoinfo, sizeof
(struct stostruct), 0);
             else
                tpreturn (TPSUCCESS, 0, stoinfo,
sizeof (struct stostruct), 0);
             break;
   }
}

TPCC10(msg)
TPSVCINFO *msg;
{
   info = (union infostruct *)msg->data;
   switch(info->tran_kind)
   {
   case TRANNEW:
             newinfo = (struct newstruct *)info;
             if (TPCnew (newinfo))
                tpreturn (TPFAIL, 0, newinfo, sizeof
(struct newstruct), 0);
             else
                tpreturn (TPSUCCESS, 0, newinfo,
sizeof (struct newstruct), 0);
             break;

   case TRANPAY:
             payinfo = (struct paystruct *)info;
             if (TPCpay (payinfo))
                tpreturn (TPFAIL, 0, payinfo, sizeof
(struct paystruct), 0);
             else
                tpreturn (TPSUCCESS, 0, payinfo,
sizeof (struct paystruct), 0);
             break;

   case TRANORD:
             ordinfo = (struct ordstruct *)info;
             if (TPCord (ordinfo))
                tpreturn (TPFAIL, 0, ordinfo, sizeof
(struct ordstruct), 0);
             else
                tpreturn (TPSUCCESS, 0, ordinfo,
sizeof (struct ordstruct), 0);
             break;

   case TRANDEL:
             delinfo = (struct delstruct *)info;
             if (TPCdel (delinfo))
                tpreturn (TPFAIL, 0, NULL, 0, 0);
             else
                tpreturn (TPSUCCESS, 0, NULL,
0, 0);
             break;

   case TRANSTO:
             stoinfo = (struct stostruct *) msg-
>data;
             if (TPCsto (stoinfo))
                tpreturn (TPFAIL, 0, stoinfo, sizeof
(struct stostruct), 0);
             else
                tpreturn (TPSUCCESS, 0, stoinfo,
sizeof (struct stostruct), 0);
             break;
   }
}

TPCC11(msg)
TPSVCINFO *msg;
{
   info = (union infostruct *)msg->data;
   switch(info->tran_kind)
   {
   case TRANNEW:
             newinfo = (struct newstruct *)info;
             if (TPCnew (newinfo))
                tpreturn (TPFAIL, 0, newinfo, sizeof
(struct newstruct), 0);
             else
                tpreturn (TPSUCCESS, 0, newinfo,
sizeof (struct newstruct), 0);
             break;

   case TRANPAY:
             payinfo = (struct paystruct *)info;
             if (TPCpay (payinfo))
                tpreturn (TPFAIL, 0, payinfo, sizeof
(struct paystruct), 0);
             else
                tpreturn (TPSUCCESS, 0, payinfo,
sizeof (struct paystruct), 0);
             break;

   case TRANORD:
             ordinfo = (struct ordstruct *)info;
             if (TPCord (ordinfo))
                tpreturn (TPFAIL, 0, ordinfo, sizeof
(struct ordstruct), 0);
             else
                tpreturn (TPSUCCESS, 0, ordinfo,
sizeof (struct ordstruct), 0);
             break;

   case TRANDEL:
             delinfo = (struct delstruct  *)info;
             if (TPCdel (delinfo))
                tpreturn (TPFAIL, 0, NULL, 0, 0);
             else
                tpreturn (TPSUCCESS, 0, NULL,
0, 0);
             break;

   case TRANSTO:
             stoinfo = (struct stostruct *) msg-
>data;
             if (TPCsto (stoinfo))
                tpreturn (TPFAIL, 0, stoinfo, sizeof
(struct stostruct), 0);
             else
                tpreturn (TPSUCCESS, 0, stoinfo,
sizeof (struct stostruct), 0);
             break;
   }
}

TPCC12(msg)
TPSVCINFO *msg;
```

```
{
   info = (union infostruct *)msg->data;
   switch(info->tran_kind)
   {
   case TRANNEW:
            newinfo = (struct  newstruct *)info;
            if (TPCnew (newinfo))
               tpreturn (TPFAIL, 0, newinfo, sizeof
(struct newstruct), 0);
            else
               tpreturn (TPSUCCESS, 0, newinfo,
sizeof (struct newstruct), 0);
            break;

   case TRANPAY:
            payinfo = (struct paystruct *)info;
            if (TPCpay (payinfo))
               tpreturn (TPFAIL, 0, payinfo, sizeof
(struct paystruct), 0);
            else
               tpreturn (TPSUCCESS, 0, payinfo,
sizeof (struct paystruct), 0);
            break;

   case TRANORD:
            ordinfo = (struct ordstruct *)info;
            if (TPCord (ordinfo))
               tpreturn ( TPFAIL, 0, ordinfo, sizeof
(struct ordstruct), 0);
            else
               tpreturn (TPSUCCESS, 0, ordinfo,
sizeof (struct ordstruct), 0);
            break;

   case TRANDEL:
            delinfo = (struct delstruct *)info;
            if (TPCdel (delinfo))
               tpreturn (TPFAIL, 0, NULL, 0, 0);
            else
               tpreturn (TPSUCCESS, 0, NULL,
0, 0);
            break;

   case TRANSTO:
            stoinfo = (struct stostruct *) msg-
>data;
            if (TPCsto (stoinfo))
               tpreturn (TPFAIL, 0, stoinfo, sizeof
(struct stostruct), 0);
            else
               tpreturn (TPSUCCESS, 0, stoinfo,
sizeof (struct stostruct), 0);
            break;
   }
}

TPCC13(msg)
TPSVCINFO *msg;
{
   info = (union infostruct *)msg->data;
   switch(info->tran_kind)
   {
   case TRANNEW:
            newinfo = (struct newstruct *)info;
            if (TPCnew (newinfo))
               tpreturn (TPFAIL, 0, newinfo, sizeof
(struct newstruct), 0);
            else
               tpreturn (TPSUCCESS, 0, newinfo,
sizeof (struct newstruct), 0);
            break;

   case TRANPAY:
            payinfo = (struct paystruct *)info;
            if (TPCpay (payinfo))
               tpreturn (TPFAIL, 0, payinfo, sizeof
(struct paystruct), 0);
            else
               tpreturn (TPSUCCESS, 0, payinfo,
sizeof (struct paystruct), 0);
            break;

   case TRANORD:
            ordinfo = (struct ordstruct *)info;
            if (TPCord (ordinfo))
               tpreturn (TPFAIL, 0, ordinfo, sizeof
(struct ordstruct), 0);
            else
               tpreturn (TPSUCCESS, 0, ordinfo,
sizeof (struct ordstruct), 0);
            break;

   case TRANDEL:
            delinfo = (struct delstruct *)info;
            if (TPCdel (delinfo))
               tpreturn (TPFAIL, 0, NULL, 0, 0);
            else
               tpreturn (TPSUCCESS, 0, NULL,
0, 0);
            break;

   case TRANSTO:
            stoinfo = (struct stostruct *) msg-
>data;
            if (TPCsto (stoinfo))
               tpreturn (TPFAIL, 0, stoinfo, sizeof
(struct stostruct), 0);
            else
               tpreturn (TPSUCCESS, 0, stoinfo,
sizeof (struct stostruct), 0);
            break;
   }
}

TPCC14(msg)
TPSVCINFO *msg;
{
   info = (union infostruct *)msg->data;
   switch(info->tran_kind)
   {
   case TRANNEW:
            newinfo = (struct newstruct *)info;
            if (TPCnew (newinfo))
               tpreturn (TPFAIL, 0, newinfo, sizeof
(struct newstruct), 0);
            else
               tpreturn (TPSUCCESS, 0, newinf o,
sizeof (struct newstruct), 0);
            break;

   case TRANPAY:
            payinfo = (struct paystruct *)info;
            if (TPCpay (payinfo))
               tpreturn (TPFAIL, 0, payinfo, sizeof
(struct paystruct), 0);
            else
               tpreturn (TPSUCCESS, 0, payinfo,
sizeof (struct paystruct), 0);
            break;

   case TRANORD:
            ordinfo = (struct ordstruct *)info;
            if (TPCord (ordinfo))
               tpreturn (TPFAIL, 0, ordinfo, sizeof
(struct ordstruct), 0);
            else
               tpreturn (TPSUCCESS, 0, ordinfo,
sizeof (struct ordstruct), 0);
            break;

   case TRANDEL:
            delinfo = (struct delstruct *)info;
            if (TPCdel (delinfo))
               tpreturn (TPFAIL, 0, NULL, 0, 0);
            else
               tpreturn (TPSUCCESS, 0, NULL,
0, 0);
            break;

   case TRANSTO:
            stoinfo = (struct stostruct *) msg-
>data;
            if (TPCsto (stoinfo))
               tpreturn (TPFAIL, 0, stoinfo, sizeof
(struct stostruct), 0);
            else
               tpreturn (TPSUCCESS, 0, stoinfo,
sizeof (struct stostruct), 0);
            break;
   }
}

TPCC15(msg)
TPSVCINFO *msg;
{
   info = (union infostruct *)msg->data;
   switch(info->tran_kind)
   {
   case TRANNEW:
            newinfo = (struct newstruct *)info;
            if (TPCnew (newinfo))
               tpreturn (TPFAIL, 0, newinfo, sizeof
(struct newstruct), 0);
            else
               tpreturn (TPSUCCESS, 0, newinfo,
sizeof (struct newstruct), 0);
            break;

   case TRANPAY:
            payinfo = (struct paystruct *)info;
            if (TPCpay (payinfo))
               tpreturn (TPFAIL, 0, payinfo, sizeof
(struct paystruct), 0);
            else
               tpreturn (TPSUCCESS, 0, payinfo,
sizeof (struct paystruct), 0);
            break;

   case TRANORD:
            ordinfo = (struct ordstruct *)info;
            if (TPCord (ordinfo))
               tpreturn (TPFAIL, 0, ordinfo, sizeof
(struct ordstruct), 0);
            else
               tpreturn (TPSUCCESS, 0, ordinfo,
sizeof (struct ordstruct), 0);
            break;

   case TRANDEL:
            delinfo = (struct delstruct *)info;
            if (TPCdel (delinfo))
               tpreturn (TPFAIL, 0, NULL, 0, 0);
            else
               tpreturn (TPSUCCESS, 0, NULL,
0, 0);
```

```
                break;

    case TRANSTO:
                stoinfo = (struct stostruct *) msg-
>data;
                if (TPCsto (stoinfo))
                  tpreturn (TPFAIL, 0, (char *)stoinfo,
sizeof (struct stostruct), 0);
                else
                  tpreturn (TPSUCCESS, 0, (char
*)stoinfo, sizeof (struct stostruct), 0);
                break;
    }
}
#else
/* [END OF ADD] */

NEWORDER (msg)

TPSVCINFO *msg;

{

  newinfo = (struct newstruct *) msg->data;
  if (TPCnew (newinfo))
    tpreturn (TPFAIL, 0, newinfo, sizeof (struct
newstruct), 0);
  else
    tpreturn (TPSUCCESS, 0, newinfo, sizeof
(struct newstruct), 0);

}



PAYMENT (msg)

TPSVCINFO *msg;

{

  payinfo = (struct paystruct *) msg->data;
  if (TPCpay (payinfo))
    tpreturn (TPFAIL, 0, payinfo, sizeof (struct
paystruct), 0);
  else
    tpreturn (TPSUCCESS, 0, payinfo, sizeof
(struct paystruct), 0);

}



ORDERSTATUS (msg)

TPSVCINFO *msg;

{

  ordinfo = (struct ordstruct *) msg->data;
  if (TPCord (ordinfo))
    tpreturn (TPFAIL, 0, ordinfo, sizeof (struct
ordstruct), 0);
  else
    tpreturn (TPSUCCESS, 0, ordinfo, sizeof
(struct ordstruct), 0);

}



DELIVERY (msg)

TPSVCINFO *msg;

{

  delinfo = (struct delstruct *) msg->data;
  if (TPCdel (delinfo))
    tpreturn (TPFAIL, 0, NULL, 0, 0);
  else
    tpreturn (TPSUCCESS, 0, NULL, 0, 0);

}



STOCKLEVEL (msg)

TPSVCINFO *msg;

{

  stoinfo = (struct stostruct *) msg->data;
  if (TPCsto (stoinfo))
    tpreturn (TPFAIL, 0, stoinfo, sizeof (struct
stostruct), 0);
  else
    tpreturn (TPSUCCESS, 0, stoinfo, sizeof
(struct stostruct), 0);

}
#endif
#
#====================================
============================+
#       Copyright (c) 1995  Oracle Corp, Redwood
Shores, CA      |
#                 OPEN SYSTEMS PERFORMANCE
GROUP                 |
#                   All Rights Reserved
|
#====================================
============================+
# FILENAME
#      tpcc_src.mk
# DESCRIPTION
#      Makefile suffix for bench/tpc/tpcc/source
directory
#====================================
============================
#
# Suffixes:
#   .ott : two-task program
#   .ost : single-task program
.SUFFIXES: .ott .ost
#
#  Programs:
#
#      tpcc.ott, tpcc.ost:         OCI TPC-C generator
#      tpccload.ott, tpccload.ost: Database loader
for TPC-C
#      getrand:                    Program to generate
random number
#      90per:                      Program to find 90th
percentile
#

I_SYM=-I
INCLUDE=$(I_SYM).
$(I_SYM)$(ORACLE_HOME)/rdbms/demo
ROOTDIR=/opt/uxptuxt
ITUX=$(I_SYM)$(ROOTDIR)/include
ARLOCAL=
AR=ar
ARCREATE=$(AR) cr$(ARLOCAL)
DOAR=$(ARCREATE) $@ $?
#CC=oraxlc -F$(ORACLE_HOME)/bench/xlc.cfg
#CC=cc -F$(ORACLE_HOME)/bench/xlc.cfg
CC=cc
#CFLAGS=-O
CFLAGS=-O
#LD=ld
LD=cc
#LDFLAGS=-H512 -T512 -bhalt:4
#LDOBJS=/lib/crt0.o -lc
#  $(ORACLE_HOME)/rdbms/lib/epcni.o \
#  $(ORACLE_HOME)/rdbms/lib/epcni.o \

SGL_TASK_FLAGS= -
bI:$(ORACLE_HOME)/lib/mili.exp \
  -bI:$(ORACLE_HOME)/lib/pw-syscall.exp -
bI:${ORACLE_HOME}/lib/ksms.imp
SGL_TASK_LIB=
$(ORACLE_HOME)/lib/osntabst.o
${ORACLE_HOME}/lib/config.o \
  $(ORACLE_HOME)/rdbms/lib/osnsgl.o -lbench
$(ORACLE_HOME)/lib/libepc.a \
  -lclient -lserver -lcommon -lgeneric -lknlopt \
  -lapps -lcog -lcox -lidl -lknlde -lpkg -lpls -lsem -
lsyn \
  -lclient -lserver -lcommon -lgeneric -lknlopt \
  -lapps -lcog -lcox -lidl -lknlde -lpkg -lpls -lsem -
lsyn \
  -lclient -lserver -lcommon -lgeneric \
  -lapps -lcog -lcox -lidl -lknlde -lpkg -lpls -lsem -
lsyn \
  -lsqlnet -lclient -lserver -lcommon -lgeneric \
  -lsqlnet -lclient -lserver -lcommon -lgeneric \
  -lnlsrtl3 -lc3v6 -lcore3 -lnlsrtl3 -lcore3 \
  `cat $(ORACLE_HOME)/rdbms/lib/psoliblist` \
  -lm -lld -lm -lc
#TWO_TASK_FLAGS= -bI
$(ORACLE_HOME)/lib/mili.exp
TWO_TASK_FLAGS=
TWO_TASK_LIB=-lbench \
  -lsqlnet $(ORACLE_HOME)/lib/libncr.a \
  -lclient -lserver -lcommon -lgeneric \
  -lsqlnet $(ORACLE_HOME)/lib/libncr.a \
  -lsqlnet \
  -lclient -lserver -lcommon -lgeneric \
  $(ORACLE_HOME)/lib/libepc.a \
  -lnlsrtl3 -lc3v6 -lcore3 -lnlsrtl3 -lcore3 \
  -lm -lsocket -lm -lc -lnsl

OBJS=tpccload.o c_trans.o c_drv.o c_dump.o
tpccpl.o getrand.o 90per.o
CTRAN_OBJS=plnew.o plpay.o plord.o pldel.o
plsto.o
CTRANTUX_OBJS=plnew_tux.o plpay.o plord.o
pldel.o plsto.o
OTHER_OBJS=c_drv_val.o test_drv.o
test_sample.o test_tran.o
TUX_OBJS=c_drv_tux.o tpccpl_tux.o tpccsvr.o

TPCBIN=$(ORACLE_HOME)/bench/tpc/bin

all: compile load setup

compile: $(OBJS)

load: tpccload.ott tpcc.ott getrand 90per
tpccsvr.ott

cleanup:
```

```
	rm -f $(OBJS) $(CTRAN_OBJS)
$(CTRANTUX_OBJS) $(OTHER_OBJS) \
	$(TUX_OBJS)

tpccload.o: tpccload.c tpcc.h
	$(CC) $(CFLAGS) $(INCLUDE) -c
tpccload.c

c_drv.o: c_drv.c tpcc.h tpcc_info.h
	$(CC) $(CFLAGS) $(INCLUDE) -c
c_drv.c

c_drv_val.o: c_drv.c tpcc.h tpcc_info.h
	cp c_drv.c c_drv_val.c
	$(CC) $(CFLAGS) -DVALIDATE
$(INCLUDE) -c c_drv_val.c
	rm -f c_drv_val.c

c_drv_tux.o: c_drv.c tpcc.h tpcc_info.h
	cp c_drv.c c_drv_tux.c
	$(CC) $(CFLAGS) -DTUX
$(INCLUDE) $(ITUX) -c c_drv_tux.c
	rm -f c_drv_tux.c

c_dump.o: c_dump.c tpcc.h tpcc_info.h
	$(CC) $(CFLAGS) $(INCLUDE) -c
c_dump.c

test_drv.o: test_drv.c tpcc.h tpcc_info.h
	$(CC) $(CFLAGS) $(INCLUDE) -c
test_drv.c

test_sample.o: test_drv.c tpcc.h tpcc_info.h
	cp test_drv.c test_sample.c
	$(CC) $(CFLAGS) -DSAMPLE
$(INCLUDE) -c test_sample.c
	rm -f test_sample.c

test_tran.o: test_tran.c tpcc.h tpcc_info.h
	$(CC) $(CFLAGS) $(INCLUDE) -c
test_tran.c

c_trans.o: $(CTRAN_OBJS)
	ld -r -o c_trans.o $(CTRAN_OBJS)

c_trans_tux.o: $(CTRANTUX_OBJS)
	ld -r -o c_trans_tux.o
$(CTRANTUX_OBJS)

tpccpl.o: tpccpl.c tpcc.h tpcc_info.h tpccpl.h
	$(CC) $(CFLAGS) $(INCLUDE) -c
tpccpl.c

tpccpl_tux.o: tpccpl.c tpcc.h tpcc_info.h tpccpl.h
	cp tpccpl.c tpccpl_tux.c
	$(CC) $(CFLAGS) -DTUX
$(INCLUDE) $(ITUX) -c tpccpl_tux.c
	rm -f tpccpl_tux.c

plnew_tux.o: plnew.c tpcc.h tpccpl.h
	cp plnew.c plnew_tux.c
	$(CC) $(CFLAGS) -DTUX
$(INCLUDE) $(ITUX) -c plnew_tux.c
	rm -f plnew_tux.c

plnew.o: plnew.c tpcc.h tpccpl.h
	$(CC) $(CFLAGS) $(INCLUDE) -c
plnew.c

plpay.o: plpay.c tpcc.h tpccpl.h
	$(CC) $(CFLAGS) $(INCLUDE) -c
plpay.c

plord.o: plord.c tpcc.h tpccpl.h
	$(CC) $(CFLAGS) $(INCLUDE) -c
plord.c

pldel.o: pldel.c tpcc.h tpccpl.h
	$(CC) $(CFLAGS) $(INCLUDE) -c
pldel.c

plsto.o: plsto.c tpcc.h tpccpl.h
	$(CC) $(CFLAGS) $(INCLUDE) -c
plsto.c

tpccsvr.o: tpccsvr.c tpcc.h tpcc_info.h
	$(CC) $(CFLAGS) $(INCLUDE)
$(ITUX) -c tpccsvr.c

getrand.o: getrand.c
	$(CC) $(CFLAGS) $(INCLUDE) -c
getrand.c

90per.o: 90per.c
	$(CC) $(CFLAGS) $(INCLUDE) -c
90per.c

getrand: getrand.o
	$(CC) $(CFLAGS)
$(TWO_TASK_FLAGS) -o $@ getrand.o

90per: 90per.o
	$(CC) $(CFLAGS)
$(TWO_TASK_FLAGS) -o $@ 90per.o


tpccload.ott: tpccload.o
	$(LD) $(LDFLAGS) -o $@ \
	$(TWO_TASK_FLAGS) -
L$(ORACLE_HOME)/lib -
L$(ORACLE_HOME)/rdbms/lib \
	tpccload.o \
	$(TWO_TASK_LIB) $(LDOBJS)


tpcc.ott: c_drv.o c_trans.o tpccpl.o c_dump.o
	$(LD) $(LDFLAGS) -o $@ \
	$(TWO_TASK_FLAGS) -
L$(ORACLE_HOME)/lib -
L$(ORACLE_HOME)/rdbms/lib \
	c_drv.o c_trans.o tpccpl.o c_dump.o \
	$(TWO_TASK_LIB) $(LDOBJS)

test_drv: c_drv_val.o test_drv.o c_dump.o
	$(LD) $(LDFLAGS) -o $@ \
	$(TWO_TASK_FLAGS) \
	-L$(ORACLE_HOME)/lib -
L$(ORACLE_HOME)/rdbms/lib \
	c_drv_val.o test_drv.o c_dump.o \
	-lbench -lm $(LDOBJS)

test_sample: c_drv.o test_sample.o c_dump.o
	$(LD) $(LDFLAGS) -o $@ \
	$(TWO_TASK_FLAGS) \
	-L$(ORACLE_HOME)/lib -
L$(ORACLE_HOME)/rdbms/lib \
	c_drv.o test_sample.o c_dump.o \
	-lbench -lm $(LDOBJS)


test_tran.ott: test_tran.o c_trans.o tpccpl.o
c_dump.o
	$(LD) $(LDFLAGS) -o $@ \
	$(TWO_TASK_FLAGS) -
L$(ORACLE_HOME)/lib -
L$(ORACLE_HOME)/rdbms/lib \
	test_tran.o c_trans.o tpccpl.o
c_dump.o \
	$(TWO_TASK_LIB) $(LDOBJS)

tpcccli: c_drv_tux.o c_dump.o
	(CFLAGS="$(CFLAGS)"; export
CFLAGS; CC=$(CC); export CC; \
	 buildclient -v -o $@ -f '-
L$(ORACLE_HOME)/lib c_drv_tux.o c_dump.o' \
	 -f '-lbench' -l '-lm')

#tpccsvr.ott: tpccsvr.o c_trans_tux.o tpccpl_tux.o
#	(CFLAGS="$(CFLAGS)"; export
CFLAGS; CC=$(CC); export CC; \
#	 buildserver -v -o $@ \
#	 -s
NEWORDER,PAYMENT,ORDERSTATUS,DELIV
ERY,STOCKLEVEL \
#	 -f '$(TWO_TASK_FLAGS)' \
#	 -f '-L$(ORACLE_HOME)/lib -
L$(ORACLE_HOME)/rdbms/lib' \
#	 -f 'tpccsvr.o c_trans_tux.o
tpccpl_tux.o' \
#	 -l '$(TWO_TASK_LIB)')

tpccsvr.ott: tpccsvr.o c_trans_tux.o tpccpl_tux.o
	(CFLAGS="$(CFLAGS)"; export
CFLAGS; CC=$(CC); export CC; \
	 buildserver -v -o $@ \
	 -s
TPCC01,TPCC02,TPCC03,TPCC04,TPCC05,TP
CC06,TPCC07,TPCC08,TPCC09,TPCC10,TPCC
11,TPCC12,TPCC13,TPCC14,TPCC15 \
	 -f '$(TWO_TASK_FLAGS)' \
	 -f '-L$(ORACLE_HOME)/lib -
L$(ORACLE_HOME)/rdbms/lib' \
	 -f 'tpccsvr.o c_trans_tux.o
tpccpl_tux.o' \
	 -l '$(TWO_TASK_LIB)')

setup:  tpcc.ott getrand 90per
	rm -f $(TPCBIN)/tpccload
	(cd $(TPCBIN); ln -s
../tpcc/source/tpccload.ott tpccload)
	rm -f $(TPCBIN)/tpcc.ott
	(cd $(TPCBIN); ln -s
../tpcc/source/tpcc.ott .)
	rm -f $(TPCBIN)/getrand
	(cd $(TPCBIN); ln -s
../tpcc/source/getrand .)
	rm -f $(TPCBIN)/90per
	(cd $(TPCBIN); ln -s
../tpcc/source/90per .)
```

# *Appendix C: RTE Scripts*

Tpcc.conf.1

```
#
#  tpcC.conf : configration file for TPC-C
#
#

STARTGROUP = sync , 1
        STARTRTE
                RTEHOST = eve162
                STARTSUT
                        SUTHOST
= eve184a,470
                        SUTLOGIN
= oracle

        SUTPASSWD = oracle
                        SUTCMD
= Tc
                ENDSUT
        ENDRTE
#       STRCMD    = tpcCstartCmdSH
#       TSCOM     = tpcCtscomSH
#       TECOM     = tpcCtecomSH
        LOGOUT    = NONE
        LOGMODE   = ALL
        LOGCOMMENT= COMOFF
        LOGFILE   = tpcC.log
        SIMFILE   = ../data/tpcc.pps
        PROTCOL   = telnet,9237
#WAREHOUSE SCALE
        VAL       = U1I = 235
#RAMP-UP TIME
        VAL       = U2I = 1800
#MEASUERMENT TIME
        VAL       = U3I = 1800
#RAMP-DOWN TIME
        VAL       = U4I = 1800
#NEW THINKTIME (msec)
        VAL       = U5I = 12200
#PAY THINKTIME (msec)
        VAL       = U6I = 12200
#
        VAL       = U7I = 0
        VAL       = U8I = 0
        VAL       = U9I = 0
#
#ORD THINKTIME (msec)
        VAL       = U10I= 10300
#DEL THINKTIME (msec)
        VAL       = U11I= 5250
#STK THINKTIME (msec)
        VAL       = U12I= 5250
#NURAND CONSTANT c_id
        VAL       = U13I= 0
#NURAND CONSTANT c_last
        VAL       = U14I= 0
#NURAND CONSTANT ol_i_id
        VAL       = U15I= 0
#MSG  OFF:0, Each Term:1, Field:2
#       VAL       = U16I= 2
        VAL       = U16I= 1
#NEW KEYING-TIME (msec)
        VAL       = U17I = 18400
#PAY KEYING-TIME (msec)
        VAL       = U18I = 3080
#ORD KEYING-TIME (msec)
        VAL       = U19I= 2060
#DEL KEYING-TIME (msec)
        VAL       = U20I= 2080
#STK KEYING-TIME (msec)
        VAL       = U21I= 2080
ENDGROUP
```

tpcc.conf.2

```
#
#  tpcC.conf : configration file for TPC-C
#
#

STARTGROUP = sync , 1
        STARTRTE
                RTEHOST = eve162
                STARTSUT
                        SUTHOST
= eve185a,470
                        SUTLOGIN
= oracle

        SUTPASSWD = oracle
                        SUTCMD
= Tc
                ENDSUT
        ENDRTE
#       STRCMD    = tpcCstartCmdSH
#       TSCOM     = tpcCtscomSH
#       TECOM     = tpcCtecomSH
        LOGOUT    = NONE
        LOGMODE   = ALL
        LOGCOMMENT= COMOFF
        LOGFILE   = tpcC.log
        SIMFILE   = ../data/tpcc.pps
        PROTCOL   = telnet,9237
#WAREHOUSE SCALE
        VAL       = U1I = 235
#RAMP-UP TIME
        VAL       = U2I = 1800
#MEASUERMENT TIME
        VAL       = U3I = 1800
#RAMP-DOWN TIME
        VAL       = U4I = 1800
#NEW THINKTIME (msec)
        VAL       = U5I = 12200
#PAY THINKTIME (msec)
        VAL       = U6I = 12200
#
        VAL       = U7I = 0
        VAL       = U8I = 0
        VAL       = U9I = 0
#
#ORD THINKTIME (msec)
        VAL       = U10I= 10300
#DEL THINKTIME (msec)
        VAL       = U11I= 5250
#STK THINKTIME (msec)
        VAL       = U12I= 5250
#NURAND CONSTANT c_id
        VAL       = U13I= 0
#NURAND CONSTANT c_last
        VAL       = U14I= 0
#NURAND CONSTANT ol_i_id
        VAL       = U15I= 0
#MSG  OFF:0, Each Term:1, Field:2
#       VAL       = U16I= 2
        VAL       = U16I= 1
#NEW KEYING-TIME (msec)
        VAL       = U17I = 18400
#PAY KEYING-TIME (msec)
        VAL       = U18I = 3080
#ORD KEYING-TIME (msec)
        VAL       = U19I= 2060
#DEL KEYING-TIME (msec)
        VAL       = U20I= 2080
#STK KEYING-TIME (msec)
        VAL       = U21I= 2080
ENDGROUP
```

tpcc.conf.3

```
#
#  tpcC.conf : configration file for TPC-C
#
#

STARTGROUP = sync , 1
        STARTRTE
                RTEHOST = eve162
                STARTSUT
                        SUTHOST
= eve186a,470
                        SUTLOGIN
= oracle

        SUTPASSWD = oracle
                        SUTCMD
= Tc
                ENDSUT
        ENDRTE
#       STRCMD    = tpcCstartCmdSH
#       TSCOM     = tpcCtscomSH
#       TECOM     = tpcCtecomSH
        LOGOUT    = NONE
        LOGMODE   = ALL
        LOGCOMMENT= COMOFF
        LOGFILE   = tpcC.log
        SIMFILE   = ../data/tpcc.pps
        PROTCOL   = telnet,9237
#WAREHOUSE SCALE
        VAL       = U1I = 235
#RAMP-UP TIME
        VAL       = U2I = 1800
#MEASUERMENT TIME
        VAL       = U3I = 1800
#RAMP-DOWN TIME
        VAL       = U4I = 1800
#NEW THINKTIME (msec)
        VAL       = U5I = 12200
#PAY THINKTIME (msec)
        VAL       = U6I = 12200
#
        VAL       = U7I = 0
        VAL       = U8I = 0
        VAL       = U9I = 0
#
#ORD THINKTIME (msec)
        VAL       = U10I= 10300
#DEL THINKTIME (msec)
        VAL       = U11I= 5250
#STK THINKTIME (msec)
        VAL       = U12I= 5250
#NURAND CONSTANT c_id
        VAL       = U13I= 0
#NURAND CONSTANT c_last
        VAL       = U14I= 0
```

```
#NURAND CONSTANT ol_i_id
        VAL         = U15I= 0
#MSG  OFF:0, Each Term:1, Field:2
#       VAL         = U16I= 2
        VAL         = U16I= 1
#NEW KEYING-TIME (msec)
        VAL         = U17I = 18400
#PAY KEYING-TIME (msec)
        VAL         = U18I = 3080
#ORD KEYING-TIME (msec)
        VAL         = U19I= 2060
#DEL KEYING-TIME (msec)
        VAL         = U20I= 2080
#STK KEYING-TIME (msec)
        VAL         = U21I= 2080
ENDGROUP
```

tpcc.conf.4

```
#
#  tpcC.conf : configration file for TPC-C
#
#

STARTGROUP = sync , 1
        STARTRTE
                RTEHOST = eve162
                STARTSUT
                        SUTHOST
= eve187a,470
                        SUTLOGIN
= oracle

        SUTPASSWD = oracle
                        SUTCMD
= Tc
                ENDSUT
        ENDRTE
#       STRCMD    = tpcCstartCmdSH
#       TSCOM     = tpcCtscomSH
#       TECOM     = tpcCtecomSH
        LOGOUT    = NONE
        LOGMODE   = ALL
        LOGCOMMENT= COMOFF
        LOGFILE   = tpcC.log
        SIMFILE   = ../data/tpcc.pps
        PROTCOL   = telnet,9237
#WAREHOUSE SCALE
        VAL         = U1I = 235
#RAMP-UP TIME
        VAL         = U2I = 1800
#MEASUERMENT TIME
        VAL         = U3I = 1800
#RAMP-DOWN TIME
        VAL         = U4I = 1800
#NEW THINKTIME (msec)
        VAL         = U5I = 12200
#PAY THINKTIME (msec)
        VAL         = U6I = 12200
#
        VAL         = U7I = 0
        VAL         = U8I = 0
        VAL         = U9I = 0
#
#ORD THINKTIME (msec)
        VAL         = U10I= 10300
#DEL THINKTIME (msec)
        VAL         = U11I= 5250
#STK THINKTIME (msec)
        VAL         = U12I= 5250
#NURAND CONSTANT c_id
        VAL         = U13I= 0
#NURAND CONSTANT c_last
        VAL         = U14I= 0
#NURAND CONSTANT ol_i_id
        VAL         = U15I= 0
#MSG  OFF:0, Each Term:1, Field:2
#       VAL         = U16I= 2
        VAL         = U16I= 1
#NEW KEYING-TIME (msec)
        VAL         = U17I = 18400
#PAY KEYING-TIME (msec)
        VAL         = U18I = 3080
#ORD KEYING-TIME (msec)
        VAL         = U19I= 2060
#DEL KEYING-TIME (msec)
        VAL         = U20I= 2080
#STK KEYING-TIME (msec)
        VAL         = U21I= 2080
ENDGROUP
```

tpcc.conf.5

```
#
#  tpcC.conf : configration file for TPC-C
#
#

STARTGROUP = sync , 1
        STARTRTE
                RTEHOST = eve162
                STARTSUT
                        SUTHOST
= eve188a,470
                        SUTLOGIN
= oracle

        SUTPASSWD = oracle
                        SUTCMD
= Tc
                ENDSUT
        ENDRTE
#       STRCMD    = tpcCstartCmdSH
#       TSCOM     = tpcCtscomSH
#       TECOM     = tpcCtecomSH
        LOGOUT    = NONE
        LOGMODE   = ALL
        LOGCOMMENT= COMOFF
        LOGFILE   = tpcC.log
        SIMFILE   = ../data/tpcc.pps
        PROTCOL   = telnet,9237
#WAREHOUSE SCALE
        VAL         = U1I = 235
#RAMP-UP TIME
        VAL         = U2I = 1800
#MEASUERMENT TIME
        VAL         = U3I = 1800
#RAMP-DOWN TIME
        VAL         = U4I = 1800
#NEW THINKTIME (msec)
        VAL         = U5I = 12200
#PAY THINKTIME (msec)
        VAL         = U6I = 12200
#
        VAL         = U7I = 0
        VAL         = U8I = 0
        VAL         = U9I = 0
#
#ORD THINKTIME (msec)
        VAL         = U10I= 10300
#DEL THINKTIME (msec)
        VAL         = U11I= 5250
#STK THINKTIME (msec)
        VAL         = U12I= 5250
#NURAND CONSTANT c_id
        VAL         = U13I= 0
#NURAND CONSTANT c_last
        VAL         = U14I= 0
#NURAND CONSTANT ol_i_id
        VAL         = U15I= 0
#MSG  OFF:0, Each Term:1, Field:2
#       VAL         = U16I= 2
        VAL         = U16I= 1
#NEW KEYING-TIME (msec)
        VAL         = U17I = 18400
#PAY KEYING-TIME (msec)
        VAL         = U18I = 3080
#ORD KEYING-TIME (msec)
        VAL         = U19I= 2060
#DEL KEYING-TIME (msec)
        VAL         = U20I= 2080
#STK KEYING-TIME (msec)
        VAL         = U21I= 2080
ENDGROUP
```

*

# *Appendix D: System Tunables*

```
*#ident	"%W% %H% %T%"
*
* ASYNC
*
*FLAG	#VEC	PREFIX	SOFT	#DEV	IPL
DEPENDENCIES/VARIABLES
csn		-		aio_		66		-
		-

		numaio(%i) = {NUMAIO}
$$
* NUMBER OF AIO CONTROL BLOCKS
NUMAIO = 1200
*#ident	"@(#)kernel.cf		4.11 20 Sep
1994 19:31:36 - FUJITSU/SCCS"
*
* KERNEL
*
*FLAG	#VEC	PREFIX	SOFT
		#DEV	IPL
		DEPENDENCIES/VARIABLES
none		-		-		-
-		-

		v(%i%i%i%i%i%i%i%i%i%i%i%i%i%i%i%i%i%i%i%i%i%i%i%i%i%i%i%i%i%i%i) = {

				NBUF,

				NCALL,

				NPROC,

				NLWP,

				0,

				MAXCLSYSPRI,

				0,

				MAXUP,

				NHBUF,

				NHBUF-1,

				NPBUF,

				0,

				MAXPMEM,

				NAUTOUP,

				BUFHWM,
* XENIX Support

				0,

				0,

				0,

				0,
* End XENIX Support

				MAXULWP,
* XXX - make into real tunables:
* v_nonexclusive

				1,
* v_max_proc_exbind: a guess only

				100,
* v_static_sq

				128

		}

		nullptr_default(%i) = { NULLPTR }

		nullptr_log(%i) = { NULLPTRLOG }


		npgoutbuf (%i) = { NPGOUTBUF }

		rstchown (%i) = { RSTCHOWN }

		rootfstype (%15c) = { ROOTFSTYPE }

		ncsize (%i) = { DNLCSIZE }
$$

************************************************************
**********
* kernel tunable parameters
*
* NCALL   - number of callout (timeout) entries
* NPROC   - max number of processes system
wide
* NLWP    - max number of LWPs system wide
* MAXUP   - max number of processes per user
* ARG_MAX - maximum length of argument
strings for exec
* FLCKREC - max number of active file/record
locks system-wide
************************************************************
**********
NCALL = 512
NPROC = 2000
NLWP = 3000
MAXUP = 512
ARG_MAX = 1048576
FLCKREC = 300

************************************************************
**********
* Default per process resource limits (set to
0x7FFFFFFF for infinite limit)
* S prefix is for soft limits, H prefix is for hard
limits
*
* CPULIM - maximum combined user and system
time in seconds
* FSZLIM - maximum file size in bytes
* DATLIM - maximum writeable mapped memory
(swap space) in bytes
* STKLIM - maximum size of current stack in
bytes
* CORLIM - maximum size of core file in bytes
* FNOLIM - maximum number of file descriptors
* VMMLIM - maximum amount of simultaneously
mapped virtual memory in bytes
************************************************************
**********
SCPULIM = 0x7FFFFFFF
HCPULIM = 0x7FFFFFFF
SFSZLIM = 0x7FFFFFFF
HFSZLIM = 0x7FFFFFFF
SDATLIM = 0x40000000
HDATLIM = 0x40000000
SSTKLIM = 0x1000000
HSTKLIM = 0x1000000
SCORLIM = 0x7FFFFFFF
HCORLIM = 0x7FFFFFFF
SFNOLIM = 0x2000
HFNOLIM = 0x2000
SVMMLIM = 0xe0000000
HVMMLIM = 0xe0000000

************************************************************
**********
* buffer cache parameters
*
* NBUF   - number of I/O buffers
* NHBUF  - number of hash buffers to allocate
* NPBUF  - number of physical I/O buffers
* BUFHWM - high-water-mark of buffer cache
memory usage, in units of K Bytes
************************************************************
**********
NBUF = 100
NHBUF = 64
NPBUF = 20
BUFHWM = 0
NPGOUTBUF = 16

************************************************************
**********
* paging parameters
*
* FSFLUSHR     - time interval in seconds at
which fsflush is run
* NAUTOUP      -
* SPTMAP       - ?
* GPGSLO       - if freemem < GPGSLO, start to
steal pages from processes
* MINARMEM     - ?
* MINASMEM     - ?
* PAGES_UNLOCK - not used
************************************************************
**********
FSFLUSHR = 10
NAUTOUP = 60
SPTMAP = 100
GPGSLO = 25
MINARMEM = 20
MINASMEM = 25
PAGES_UNLOCK = 20


************************************************************
**********
* file access feature
*
* RSTCHOWN    - multiple groups and chown(2)
restrictions
* NGROUPS_MAX - maximum number of groups
per process (default, min, max)
************************************************************
**********
```

```
RSTCHOWN = 1
NGROUPS_MAX = 16
ROOTFSTYPE = "ufs"
DNLCSIZE = 0

********************************************************
**********
* streams parameters
*
* NSTRPUSH - max number of modules that can
be pushed on a stream
* STRTHRESH  - maximum bytes stream to
allocate
* STRMSGSZ - max size of the data portion of a
streams message
* STRCTLSZ - max size of the data portion of a
streams message
* STRNSCHED - Max number of service
procedures to run in any given runqueues
*                       invocation
********************************************************
**********
NSTRPUSH = 9
STRMSGSZ = 0
STRCTLSZ = 1024
STRNSCHED = 16

********************************************************
**********
* UXP/DS family-specific parameters
*
* OFFTIME  -
* SYSSEGSZ -
* FILEMAP  -
********************************************************
**********
OFFTIME = 10
SYSSEGSZ = 0
FILEMAP = 0

********************************************************
**********
* Others parameters
*
* MAXCLSYSPRI - max global priority used by
system class
* MAXPMEM     - maximum physical memory to
use.
* MAXULWP     - per-uid number of lwps limit
* NULLPTR     - Null-pointer workaround default (0
= disable, 1,2 = enable)
* NULLPTRLOG  - Null-pointer workaround default
(0 = disable, 1 = enable)
* INITCLASS   - Scheduling class of init process
* REBOOTFLAG  - Reboot after memory dump (0
= disable, 1 = enable)
* DUMPFLAG    - Memory dump control (0 =
disable, 1 = enable)
* STRCTLSZ    - max size of the data portion of a
streams message
* STRMSGSZ    - max size of the data portion of a
streams message
* PUTBUFSZ    -
********************************************************
**********
MAXCLSYSPRI = 99
MAXPMEM = 0
MAXULWP = 192
NULLPTR = 0
NULLPTRLOG = 0
INITCLASS = "TS"
REBOOTFLAG = 1
DUMPFLAG = 1
CPUTIMEMODE = 0
KDBFLAG = 0
ADJRATE = 5

*#ident        "@(#)mem.cf                4.3 20 Sep
1994 19:31:07 - FUJITSU/SCCS"
*
* MEM
*
*FLAG        #VEC        PREFIX      SOFT
            #DEV        IPL
            DEPENDENCIES/VARIABLES
orx         -           kvm_        -           -
            -
*
* Kernel segment driver aging control parameters.
*

            segmap_age_time(%l) =
{SEGMAP_AGE_TIME * HZ}

            segkvn_age_time(%l) =
{SEGKVN_AGE_TIME * HZ}

            segmap_agings(%l) =
{SEGMAP_AGINGS}

            tune(%i%i%i%i%i%i%i%i) = {

                        GPGSLO,

                        FSFLUSHR,

                        MINAMEM,

                        KMEM_RESV,

                        FLCKREC,

                        MAXDMAPAGE,

                        0,

                        0 }

            pages_pp_maximum(%i) =
{PAGES_UNLOCK}

            pages_dkma_maximum(%i) =
{PAGES_NODISKMA}

            scale_maxpgio(%i) =
{SCALE_MAXPGIO}

            deficit_age(%i) = {DEFICIT_AGE}

            io_weight(%i) = {IO_WEIGHT}

            cpu_weight(%i) = {CPU_WEIGHT}

            swap_weight(%i) = {SWAP_WEIGHT}

            sleep_weight(%i) =
{SLEEP_WEIGHT}

            maxslp(%i) = {MAXSLP}

            swap_maxdev(%i) =
{SWAP_MAXDEV}
*
* Miscellaneous Aging Parameters
*

* Elapsed time aging: interval under memory
stress
            et_age_interval_fast(%l) =
{ET_AGE_INTERVAL * HZ}

* Maximum permitted value for short term deficit
due to swapins
            max_deficit(%i) = {MAX_DEFICIT}

* Minimum number of nonlocked pages a process
must have, for getting aged
            nonlocked_minpg(%i) =
{NONLOCKED_MINPG}
            maxrss(%i) = {MAXRSS}

* The aging quanta defined below are in units of
clock ticks *
            init_agequantum(%l) =
{INIT_AGEQUANTUM}
            min_agequantum(%l) =
{MIN_AGEQUANTUM}
            max_agequantum(%l) =
{MAX_AGEQUANTUM}

*
* Threshold RSS growth rates (in units of pages
over RSS sampling period)
* for performing growth rate based short term
aging quantum adjustment.
*
            lo_grow_rate(%i) =
{LO_GROW_RATE}
            hi_grow_rate(%i) =
{HI_GROW_RATE}
*
* The following are kernel configuration
parameters to request
* the size of the kernel virtual space managed by
each of the
* kernel segment managers.
*
* See carve_kvspace() for a discussion of how
these are used.
*

            segkmem_bytes(%l) =
{SEGKMEM_BYTES}

            segkmem_percent(%l) =
{SEGKMEM_PERCENT}

            segmap_bytes(%l) =
{SEGMAP_BYTES}

            segmap_percent(%l) =
{SEGMAP_PERCENT}

            segkvn_bytes(%l) =
{SEGKVN_BYTES}

            segkvn_percent(%l) =
{SEGKVN_PERCENT}
*
            syssegsz(%i) = {SYSSEGSZ}
            filemap(%i) = {FILEMAP}
$$
* Kernel Virtual Address Space ----------
SEGKMEM_BYTES = 0x1000000
SEGKMEM_PERCENT = 50
SEGKVN_BYTES = 0x1000000
```

```
SEGKVN_PERCENT = 15
SEGMAP_BYTES = 0x1000000
SEGMAP_PERCENT = 20
* Segment Driver Parameters ----------------
SEGMAP_AGE_TIME    = 60
SEGMAP_AGINGS =    20
SEGKVN_AGE_TIME    = 60
* Paging Parameters -------------------------
MINAMEM  = 16
KMEM_RESV = 16
PAGES_NODISKMA = 16
* Swapping Parameters ----------------------
SCALE_MAXPGIO = 1
DEFICIT_AGE = 10
IO_WEIGHT = 1
CPU_WEIGHT = 10
SWAP_WEIGHT = 1
SLEEP_WEIGHT = 0
MAXSLP = 600
SWAP_MAXDEV =      16
MAX_DEFICIT =      256
* Aging Parameters --------------------------
ET_AGE_INTERVAL    = 5
NONLOCKED_MINPG    = 0
MAXRSS    =        512
INIT_AGEQUANTUM    = 50
MIN_AGEQUANTUM     = 25
MAX_AGEQUANTUM     = 60
LO_GROW_RATE =     2
HI_GROW_RATE =     8
* Parameters for Restricted-DMA Support -----
MAXDMAPAGE = 16384
* All Rights Reserved, Copyright (c) PFU &
FUJITSU LIMITED 1993,1994
*
*#ident "@(#)sem.cf      4.4 14 Jun 1994 DS"
*
* SEM
*
*FLAG      #VEC      PREFIX    SOFT
            #DEV      IPL
            DEPENDENCIES/VARIABLES
ox          -         sem       -           -
            -         ipc


            seminfo(%i%i%i%i%i%i%i%i%i%i)

                        ={SEMMAP,

                                  SEMMNI,

                                  SEMMNS,

                                  SEMMNU,

                                  SEMMSL,

                                  SEMOPM,

                                  SEMUME,


            16+8*SEMUME,

                                  SEMVMX,

                                  SEMAEM}

$$$

SEMMAP = 10
SEMMNI = 40
SEMMNS = 60
SEMMNU = 40
SEMMSL = 25
SEMOPM = 10
SEMUME = 10
SEMVMX = 32767
SEMAEM = 16384
*#ident      "@(#)shm.cf             1.2 29 Apr
1993 %T - FUJITSU/SCCS"
*
* SHM
*
*FLAG      #VEC      PREFIX    SOFT
            #DEV      IPL
            DEPENDENCIES/VARIABLES
ox          -         shm       -           -
            -         ipc

                      shminfo(%i%i%i%i)

                          ={SHMMAX,

                                  SHMMIN,

                                  SHMMNI,

                                  SHMSEG}


            shmrsvmem(%i)={SHMRSVMEM}


            shmrsvmin(%i)={SHMRSVMIN}




            shmzerothrtim(%i)={SHMZEROTHRTI
M}
$$$

SHMMAX = 0x39000000
SHMMIN = 1
SHMMNI = 100
SHMSEG = 100
SHMRSVMEM = 896
SHMRSVMIN = 208
SHMZEROTHRTIM = 10
#
#=====================================
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|
#=====================================
============================+
# FILENAME
#     p_run.ora
# DESCRIPTION
#     Oracle parameter file for running TPC-C.
#=====================================
============================
#

serializable              = FALSE
optimizer_mode                    = CHOOSE
db_writers                = 1
async_read          = true
async_write         = true
cpu_count           = 4
db_block_lru_latches     = 8
spin_count                = 750
parallel_max_servers = 30
checkpoint_process      = TRUE
compatible          = 7.3.2.2.0
db_name             = tpcc
db_files                  = 1000
db_file_multiblock_read_count = 32
db_block_buffers       = 409880
_db_block_write_batch   = 256
db_block_checkpoint_batch = 1024
dml_locks           = 0
log_archive_start      = FALSE
log_archive_buffer_size = 32
log_checkpoint_interval = 10000000000
log_checkpoints_to_alert = TRUE
log_buffer          = 1048576
log_simultaneous_copies = 8
log_small_entry_max_size= 800
gc_rollback_segments    = 220
gc_db_locks                               = 100
gc_releasable_locks       = 100
max_rollback_segments = 220
open_cursors          = 200
processes           = 200
sessions            = 400
transactions          = 400
distributed_transactions = 0
transactions_per_rollback_segment = 1
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,t
30,t31,t32,t33,t34,t35,t36,t37,t38,t39,t40,t41,t41,t4
3,t44,t45,t46,t47,t48,t49,t50,t51,t52,t53,t54,t55)
shared_pool_size          = 7000000
discrete_transactions_enabled = FALSE
cursor_space_for_time   = TRUE

*RESOURCES
IPCKEY                  80952
MASTER                  SITE1
UID                     101
GID                     102
PERM                    0660
MAXACCESSERS            550
MAXSERVERS              15
MAXSERVICES             100
MODEL                   SHM
LDBAL                   N

*MACHINES
eve186      LMID=SITE1
            TUXCONFIG="/home/oracle/client/tux
config"
            ROOTDIR="/opt/uxptuxt"
            APPDIR="/oracle/bench/tpc/tpcc/TUX
_source"
            ULOGPFX="/home/oracle/client/ulog"

*GROUPS
GROUP1                  LMID=SITE1
            GRPNO=1

*SERVERS
DEFAULT:  RESTART=Y MAXGEN=5
REPLYQ=N RQPERM=0660
"tpccsvr.ott" SRVGRP=GROUP1 SRVID=1
CLOPT ="-s TPCC01 1 tpcc/tpcc"
"tpccsvr.ott" SRVGRP=GROUP1 SRVID=2
CLOPT ="-s TPCC02 2 tpcc/tpcc"
```

```
"tpccsvr.ott" SRVGRP=GROUP1 SRVID=3
CLOPT ="-s TPCC03 3 tpcc/tpcc"
"tpccsvr.ott" SRVGRP=GROUP1 SRVID=4
CLOPT ="-s TPCC04 4 tpcc/tpcc"
"tpccsvr.ott" SRVGRP=GROUP1 SRVID=5
CLOPT ="-s TPCC05 5 tpcc/tpcc"
"tpccsvr.ott" SRVGRP=GROUP1 SRVID=6
CLOPT ="-s TPCC06 6 tpcc/tpcc"
"tpccsvr.ott" SRVGRP=GROUP1 SRVID=7
CLOPT ="-s TPCC07 7 tpcc/tpcc"
"tpccsvr.ott" SRVGRP=GROUP1 SRVID=8
CLOPT ="-s TPCC08 8 tpcc/tpcc"
"tpccsvr.ott" SRVGRP=GROUP1 SRVID=9
CLOPT ="-s TPCC09 9 tpcc/tpcc"
"tpccsvr.ott" SRVGRP=GROUP1 SRVID=10
CLOPT ="-s TPCC10 10 tpcc/tpcc"
"tpccsvr.ott" SRVGRP=GROUP1 SRVID=11
CLOPT ="-s TPCC11 11 tpcc/tpcc"

*SERVICES
TPCC01
TPCC02
TPCC03
TPCC04
TPCC05
TPCC06
TPCC07
TPCC08
TPCC09
TPCC10
TPCC11

*ROUTING

# *NETWORK
```

# *Appendix E: Database Creation Code*

```
#
#====================================
============================+
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|
#====================================
============================+
# FILENAME
#     addfile.sh
# DESCRIPTION
#     Add datafile to a tablespace.
# USAGE
#     addfile.sh <tablespace> <data file> <size>
#====================================
============================*/

sqldba <<!
   connect internal
   alter tablespace $1 add datafile '$2' size $3
reuse;
   exit;
!

#
#====================================
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|
#====================================
============================+
# FILENAME
#     alter.sh
# DESCRIPTION
#     Change next extent size for TPC-C tables and
indexes.
# USAGE
#     alter.sh
#====================================
============================*/

sqlplus tpcc/tpcc <<!
   alter table history     storage (next   9M);
   alter cluster ccluster  storage (next  30M);
   alter cluster scluster  storage (next  34M);
   alter table orders      storage (next   7M);
   alter table order_line  storage (next 101M);
   alter table new_order   storage (next   4M);
   alter index iorders     storage (next  11M);
   alter index iorders2    storage (next  14M);
   alter index inew_order  storage (next  14M);
   alter index iorder_line storage (next  42M);
   alter index istock      storage (next  44M);
   alter index icustomer   storage (next  42M);
   alter index icustomer2  storage (next  36M);
   quit;
!

#
#====================================
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|
#====================================
============================+
# FILENAME
#     benchdb.sh
# DESCRIPTION
#     Usage: benchdb.sh [options]
#           -n          do not create new tpcc
database
#           -c          do not run catalog scripts
#====================================
============================
#


BENCH_HOME=$ORACLE_HOME/bench/tpc
TPCC_SOURCE=$BENCH_HOME/tpcc/source
TPCC_SQL=$BENCH_HOME/tpcc/sql
TPCC_DBA=$BENCH_HOME/tpcc/dba
TPCC_OUTPUT=$BENCH_HOME/tpcc/output
TPCC_ADMIN=$BENCH_HOME/tpcc/admin

while [ "$#" != "0" ]
do
  case $1 in
     -n) shift
        NO_CREATE="y"
        ;;
     -c) shift
        NO_CAT="y"
        ;;
      *) echo "Bag arg: $1"
        exit 1;
        ;;
  esac
done

#
# Create database if NO_CREATE unset
#

if [ "$NO_CREATE" = "" ]
then
sqldba <<!
            set echo on
            connect internal
            startup
pfile=$TPCC_ADMIN/p_create.ora  nomount
            create database tpcc controlfile reuse
maxdatafiles 1000
         datafile '/dev/rdsk/hd1501'  size  236M
reuse
                  logfile  '/dev/rdsk/hda5401' size
2039M reuse,
                                '/dev/rdsk/hda6401'
size 2039M reuse;
            exit
!

#
# FOR OPS:
# Need to add MAXINSTANCES and adjust
MAXLOGFILES for the create database
# statement.
#

#
# Create more rollback segments
#

sqldba <<!
#   connect system/manager
   connect internal
   create rollback segment s1  storage (initial 30k
minextents 2 next 30k);
   create rollback segment s2  storage (initial 30k
minextents 2 next 30k);
   create rollback segment s3  storage (initial 30k
minextents 2 next 30k);
   create rollback segment s4  storage (initial 30k
minextents 2 next 30k);
   create rollback segment s5  storage (initial 30k
minextents 2 next 30k);
   create rollback segment s6  storage (initial 30k
minextents 2 next 30k);
   create rollback segment s7  storage (initial 30k
minextents 2 next 30k);
   create rollback segment s8  storage (initial 30k
minextents 2 next 30k);
   create rollback segment s9  storage (initial 30k
minextents 2 next 30k);
   create rollback segment s10 storage (initial 30k
minextents 2 next 30k);
   disconnect;
   connect internal;
   shutdown;
   exit;
!
fi

#
#  Startup database with params file that includes
new rollback segments
#

sqldba <<!
            set echo on
#       connect system/manager
      connect internal
      startup pfile=$TPCC_ADMIN/p_build.ora;
      exit;
!
create.sh hist   /dev/rdsk/hd1001   19M &
create.sh stocks /dev/rdsk/hd2002  172M &
create.sh ordl   /dev/rdsk/hdb1001 912M &
create.sh iordl  /dev/rdsk/hd3401  677M &
create.sh inord  /dev/rdsk/hd4402   30M &
create.sh iord1  /dev/rdsk/hd5403   67M &
create.sh ware   /dev/rdsk/hd1502   14M &
create.sh items  /dev/rdsk/hd1503   19M &
create.sh temp   /dev/rdsk/hd3502  684M &
create.sh istk   /dev/rdsk/hd2501  797M &
wait
create.sh cust   /dev/rdsk/hd1004  182M &
create.sh ord    /dev/rdsk/hd2005   15M &
create.sh nord   /dev/rdsk/hd3006    5M &
create.sh iord2  /dev/rdsk/hdb3501  59M &
create.sh icust2 /dev/rdsk/hd4405   74M &
create.sh roll   /dev/rdsk/hd3501   42M &
create.sh icust1 /dev/rdsk/hd1504  467M &
wait
```

```
#
# FOR OPS:
# Needs to create more rollback segment
tablespace to house extra
# rollback segments for the additional instances.
#

#
#  Add datafiles to tablespaces in parallel
#

#   [ROLL BACK]
addfile.sh roll   /dev/rdsk/hd4501    42M &
addfile.sh roll   /dev/rdsk/hd5501    42M &
addfile.sh roll   /dev/rdsk/hd6501    42M &
addfile.sh roll   /dev/rdsk/hda1501   42M &
addfile.sh roll   /dev/rdsk/hda2501   42M &
addfile.sh roll   /dev/rdsk/hda3501   42M &
addfile.sh roll   /dev/rdsk/hda4501   42M &

#   [TEMP]
addfile.sh temp   /dev/rdsk/hd4502   684M &
addfile.sh temp   /dev/rdsk/hd5502   684M &
addfile.sh temp   /dev/rdsk/hd6502   684M &
addfile.sh temp   /dev/rdsk/hda1502  684M &
addfile.sh temp   /dev/rdsk/hda2502  684M &
addfile.sh temp   /dev/rdsk/hda3502  684M &
addfile.sh temp   /dev/rdsk/hda4502  684M &
wait

#   [HISTORY]
addfile.sh hist   /dev/rdsk/hd2001    19M &
addfile.sh hist   /dev/rdsk/hd3001    19M &
addfile.sh hist   /dev/rdsk/hd4001    19M &
addfile.sh hist   /dev/rdsk/hd5001    19M &
addfile.sh hist   /dev/rdsk/hd6001    19M &
addfile.sh hist   /dev/rdsk/hda1001   19M &
addfile.sh hist   /dev/rdsk/hda2001   19M &
addfile.sh hist   /dev/rdsk/hda3001   19M &
addfile.sh hist   /dev/rdsk/hda4001   19M &
addfile.sh hist   /dev/rdsk/hda5001   19M &
addfile.sh hist   /dev/rdsk/hda6001   19M &
addfile.sh hist   /dev/rdsk/hd1101    19M &
addfile.sh hist   /dev/rdsk/hd2101    19M &
addfile.sh hist   /dev/rdsk/hd3101    19M &
addfile.sh hist   /dev/rdsk/hd4101    19M &
addfile.sh hist   /dev/rdsk/hd5101    19M &
addfile.sh hist   /dev/rdsk/hd6101    19M &
addfile.sh hist   /dev/rdsk/hda1101   19M &
addfile.sh hist   /dev/rdsk/hda2101   19M &
addfile.sh hist   /dev/rdsk/hda3101   19M &
wait
addfile.sh hist   /dev/rdsk/hda4101   19M &
addfile.sh hist   /dev/rdsk/hda5101   19M &
addfile.sh hist   /dev/rdsk/hda6101   19M &
addfile.sh hist   /dev/rdsk/hd1201    19M &
addfile.sh hist   /dev/rdsk/hd2201    19M &
addfile.sh hist   /dev/rdsk/hd3201    19M &
addfile.sh hist   /dev/rdsk/hd4201    19M &
addfile.sh hist   /dev/rdsk/hd5201    19M &
addfile.sh hist   /dev/rdsk/hd6201    19M &
addfile.sh hist   /dev/rdsk/hda1201   19M &
addfile.sh hist   /dev/rdsk/hda2201   19M &
addfile.sh hist   /dev/rdsk/hda3201   19M &
addfile.sh hist   /dev/rdsk/hda4201   19M &
addfile.sh hist   /dev/rdsk/hda5201   19M &
addfile.sh hist   /dev/rdsk/hda6201   19M &
addfile.sh hist   /dev/rdsk/hd1301    19M &
addfile.sh hist   /dev/rdsk/hd2301    19M &
addfile.sh hist   /dev/rdsk/hd3301    19M &
addfile.sh hist   /dev/rdsk/hd4301    19M &
addfile.sh hist   /dev/rdsk/hd5301    19M &
wait
addfile.sh hist   /dev/rdsk/hd6301    19M &
addfile.sh hist   /dev/rdsk/hda1301   19M &
addfile.sh hist   /dev/rdsk/hda2301   19M &
addfile.sh hist   /dev/rdsk/hda3301   19M &
addfile.sh hist   /dev/rdsk/hda4301   19M &
addfile.sh hist   /dev/rdsk/hda5301   19M &

#   [CUSTOMER]
addfile.sh cust   /dev/rdsk/hd2004   182M &
addfile.sh cust   /dev/rdsk/hd3004   182M &
addfile.sh cust   /dev/rdsk/hd4004   182M &
addfile.sh cust   /dev/rdsk/hd5004   182M &
addfile.sh cust   /dev/rdsk/hd6004   182M &
addfile.sh cust   /dev/rdsk/hda1004  182M &
addfile.sh cust   /dev/rdsk/hda2004  182M &
addfile.sh cust   /dev/rdsk/hda3004  182M &
addfile.sh cust   /dev/rdsk/hda4004  182M &
addfile.sh cust   /dev/rdsk/hda5004  182M &
wait
addfile.sh cust   /dev/rdsk/hda6004  182M &
addfile.sh cust   /dev/rdsk/hd1104   182M &
addfile.sh cust   /dev/rdsk/hd2104   182M &
addfile.sh cust   /dev/rdsk/hd3104   182M &
addfile.sh cust   /dev/rdsk/hd4104   182M &
addfile.sh cust   /dev/rdsk/hd5104   182M &
addfile.sh cust   /dev/rdsk/hd6104   182M &
addfile.sh cust   /dev/rdsk/hda1104  182M &
addfile.sh cust   /dev/rdsk/hda2104  182M &
addfile.sh cust   /dev/rdsk/hda3104  182M &
addfile.sh cust   /dev/rdsk/hda4104  182M &
addfile.sh cust   /dev/rdsk/hda5104  182M &
addfile.sh cust   /dev/rdsk/hda6104  182M &
addfile.sh cust   /dev/rdsk/hd1204   182M &
addfile.sh cust   /dev/rdsk/hd2204   182M &
addfile.sh cust   /dev/rdsk/hd3204   182M &
addfile.sh cust   /dev/rdsk/hd4204   182M &
addfile.sh cust   /dev/rdsk/hd5204   182M &
addfile.sh cust   /dev/rdsk/hd6204   182M &
addfile.sh cust   /dev/rdsk/hda1204  182M &
wait
addfile.sh cust   /dev/rdsk/hda2204  182M &
addfile.sh cust   /dev/rdsk/hda3204  182M &
addfile.sh cust   /dev/rdsk/hda4204  182M &
addfile.sh cust   /dev/rdsk/hda5204  182M &
addfile.sh cust   /dev/rdsk/hda6204  182M &
addfile.sh cust   /dev/rdsk/hd1304   182M &
addfile.sh cust   /dev/rdsk/hd2304   182M &
addfile.sh cust   /dev/rdsk/hd3304   182M &
addfile.sh cust   /dev/rdsk/hd4304   182M &
addfile.sh cust   /dev/rdsk/hd5304   182M &
addfile.sh cust   /dev/rdsk/hd6304   182M &
addfile.sh cust   /dev/rdsk/hda1304  182M &
addfile.sh cust   /dev/rdsk/hda2304  182M &
addfile.sh cust   /dev/rdsk/hda3304  182M &
addfile.sh cust   /dev/rdsk/hda4304  182M &
addfile.sh cust   /dev/rdsk/hda5304  182M &
wait

#   [ORDERS]
addfile.sh ord    /dev/rdsk/hd1005    15M &
addfile.sh ord    /dev/rdsk/hd3005    15M &
addfile.sh ord    /dev/rdsk/hd4005    15M &
addfile.sh ord    /dev/rdsk/hd5005    15M &
addfile.sh ord    /dev/rdsk/hd6005    15M &
addfile.sh ord    /dev/rdsk/hda1005   15M &
addfile.sh ord    /dev/rdsk/hda2005   15M &
addfile.sh ord    /dev/rdsk/hda3005   15M &
addfile.sh ord    /dev/rdsk/hda4005   15M &
addfile.sh ord    /dev/rdsk/hda5005   15M &
addfile.sh ord    /dev/rdsk/hda6005   15M &
addfile.sh ord    /dev/rdsk/hd1105    15M &
addfile.sh ord    /dev/rdsk/hd2105    15M &
addfile.sh ord    /dev/rdsk/hd3105    15M &
addfile.sh ord    /dev/rdsk/hd4105    15M &
addfile.sh ord    /dev/rdsk/hd5105    15M &
addfile.sh ord    /dev/rdsk/hd6105    15M &
addfile.sh ord    /dev/rdsk/hda1105   15M &
addfile.sh ord    /dev/rdsk/hda2105   15M &
addfile.sh ord    /dev/rdsk/hda3105   15M &
wait
addfile.sh ord    /dev/rdsk/hda4105   15M &
addfile.sh ord    /dev/rdsk/hda5105   15M &
addfile.sh ord    /dev/rdsk/hda6105   15M &
addfile.sh ord    /dev/rdsk/hd1205    15M &
addfile.sh ord    /dev/rdsk/hd2205    15M &
addfile.sh ord    /dev/rdsk/hd3205    15M &
addfile.sh ord    /dev/rdsk/hd4205    15M &
addfile.sh ord    /dev/rdsk/hd5205    15M &
addfile.sh ord    /dev/rdsk/hd6205    15M &
addfile.sh ord    /dev/rdsk/hda1205   15M &
addfile.sh ord    /dev/rdsk/hda2205   15M &
addfile.sh ord    /dev/rdsk/hda3205   15M &
addfile.sh ord    /dev/rdsk/hda4205   15M &
addfile.sh ord    /dev/rdsk/hda5205   15M &
addfile.sh ord    /dev/rdsk/hda6205   15M &
addfile.sh ord    /dev/rdsk/hd1305    15M &
addfile.sh ord    /dev/rdsk/hd2305    15M &
addfile.sh ord    /dev/rdsk/hd3305    15M &
addfile.sh ord    /dev/rdsk/hd4305    15M &
addfile.sh ord    /dev/rdsk/hd5305    15M &
wait
addfile.sh ord    /dev/rdsk/hd6305    15M &
addfile.sh ord    /dev/rdsk/hda1305   15M &
addfile.sh ord    /dev/rdsk/hda2305   15M &
addfile.sh ord    /dev/rdsk/hda3305   15M &
addfile.sh ord    /dev/rdsk/hda4305   15M &
addfile.sh ord    /dev/rdsk/hda5305   15M &

#   [NEW ORDER]
addfile.sh nord   /dev/rdsk/hd1006     5M &
addfile.sh nord   /dev/rdsk/hd2006     5M &
addfile.sh nord   /dev/rdsk/hd4006     5M &
addfile.sh nord   /dev/rdsk/hd5006     5M &
addfile.sh nord   /dev/rdsk/hd6006     5M &
addfile.sh nord   /dev/rdsk/hda1006    5M &
addfile.sh nord   /dev/rdsk/hda2006    5M &
addfile.sh nord   /dev/rdsk/hda3006    5M &
addfile.sh nord   /dev/rdsk/hda4006    5M &
addfile.sh nord   /dev/rdsk/hda5006    5M &
wait
addfile.sh nord   /dev/rdsk/hda6006    5M &
addfile.sh nord   /dev/rdsk/hd1106     5M &
addfile.sh nord   /dev/rdsk/hd2106     5M &
addfile.sh nord   /dev/rdsk/hd3106     5M &
addfile.sh nord   /dev/rdsk/hd4106     5M &
addfile.sh nord   /dev/rdsk/hd5106     5M &
addfile.sh nord   /dev/rdsk/hd6106     5M &
addfile.sh nord   /dev/rdsk/hda1106    5M &
addfile.sh nord   /dev/rdsk/hda2106    5M &
addfile.sh nord   /dev/rdsk/hda3106    5M &
addfile.sh nord   /dev/rdsk/hda4106    5M &
addfile.sh nord   /dev/rdsk/hda5106    5M &
addfile.sh nord   /dev/rdsk/hda6106    5M &
addfile.sh nord   /dev/rdsk/hd1206     5M &
addfile.sh nord   /dev/rdsk/hd2206     5M &
addfile.sh nord   /dev/rdsk/hd3206     5M &
addfile.sh nord   /dev/rdsk/hd4206     5M &
addfile.sh nord   /dev/rdsk/hd5206     5M &
addfile.sh nord   /dev/rdsk/hd6206     5M &
addfile.sh nord   /dev/rdsk/hda1206    5M &
wait
addfile.sh nord   /dev/rdsk/hda2206    5M &
```

```
addfile.sh nord   /dev/rdsk/hda3206    5M &
addfile.sh nord   /dev/rdsk/hda4206    5M &
addfile.sh nord   /dev/rdsk/hda5206    5M &
addfile.sh nord   /dev/rdsk/hda6206    5M &
addfile.sh nord   /dev/rdsk/hd1306     5M &
addfile.sh nord   /dev/rdsk/hd2306     5M &
addfile.sh nord   /dev/rdsk/hd3306     5M &
addfile.sh nord   /dev/rdsk/hd4306     5M &
addfile.sh nord   /dev/rdsk/hd5306     5M &
addfile.sh nord   /dev/rdsk/hd6306     5M &
addfile.sh nord   /dev/rdsk/hda1306    5M &
addfile.sh nord   /dev/rdsk/hda2306    5M &
addfile.sh nord   /dev/rdsk/hda3306    5M &
addfile.sh nord   /dev/rdsk/hda4306    5M &
addfile.sh nord   /dev/rdsk/hda5306    5M &
wait

#   [ORDER LINE]
addfile.sh ordl   /dev/rdsk/hdb1101  912M &
addfile.sh ordl   /dev/rdsk/hdb1201  912M &
addfile.sh ordl   /dev/rdsk/hdb1301  912M &
addfile.sh ordl   /dev/rdsk/hdb1401  912M &
addfile.sh ordl   /dev/rdsk/hdb1501  912M &
addfile.sh ordl   /dev/rdsk/hdb2001  912M &
addfile.sh ordl   /dev/rdsk/hdb2101  912M &
addfile.sh ordl   /dev/rdsk/hdb2201  912M &
addfile.sh ordl   /dev/rdsk/hdb2301  912M &
addfile.sh ordl   /dev/rdsk/hdb2401  912M &
addfile.sh ordl   /dev/rdsk/hdb2501  912M &

#   [STOCKS]
addfile.sh stocks /dev/rdsk/hd1002   172M &
addfile.sh stocks /dev/rdsk/hd3002   172M &
addfile.sh stocks /dev/rdsk/hd4002   172M &
addfile.sh stocks /dev/rdsk/hd5002   172M &
addfile.sh stocks /dev/rdsk/hd6002   172M &
addfile.sh stocks /dev/rdsk/hda1002  172M &
addfile.sh stocks /dev/rdsk/hda2002  172M &
addfile.sh stocks /dev/rdsk/hda3002  172M &
addfile.sh stocks /dev/rdsk/hda4002  172M &
addfile.sh stocks /dev/rdsk/hda5002  172M &
wait
addfile.sh stocks /dev/rdsk/hda6002  172M &
addfile.sh stocks /dev/rdsk/hd1102   172M &
addfile.sh stocks /dev/rdsk/hd2102   172M &
addfile.sh stocks /dev/rdsk/hd3102   172M &
addfile.sh stocks /dev/rdsk/hd4102   172M &
addfile.sh stocks /dev/rdsk/hd5102   172M &
addfile.sh stocks /dev/rdsk/hd6102   172M &
addfile.sh stocks /dev/rdsk/hda1102  172M &
addfile.sh stocks /dev/rdsk/hda2102  172M &
addfile.sh stocks /dev/rdsk/hda3102  172M &
addfile.sh stocks /dev/rdsk/hda4102  172M &
addfile.sh stocks /dev/rdsk/hda5102  172M &
addfile.sh stocks /dev/rdsk/hda6102  172M &
addfile.sh stocks /dev/rdsk/hd1202   172M &
addfile.sh stocks /dev/rdsk/hd2202   172M &
addfile.sh stocks /dev/rdsk/hd3202   172M &
addfile.sh stocks /dev/rdsk/hd4202   172M &
addfile.sh stocks /dev/rdsk/hd5202   172M &
addfile.sh stocks /dev/rdsk/hd6202   172M &
addfile.sh stocks /dev/rdsk/hda1202  172M &
wait
addfile.sh stocks /dev/rdsk/hda2202  172M &
addfile.sh stocks /dev/rdsk/hda3202  172M &
addfile.sh stocks /dev/rdsk/hda4202  172M &
addfile.sh stocks /dev/rdsk/hda5202  172M &
addfile.sh stocks /dev/rdsk/hda6202  172M &
addfile.sh stocks /dev/rdsk/hd1302   172M &
addfile.sh stocks /dev/rdsk/hd2302   172M &
addfile.sh stocks /dev/rdsk/hd3302   172M &
addfile.sh stocks /dev/rdsk/hd4302   172M &
addfile.sh stocks /dev/rdsk/hd5302   172M &
addfile.sh stocks /dev/rdsk/hd6302   172M &
addfile.sh stocks /dev/rdsk/hda1302  172M &
addfile.sh stocks /dev/rdsk/hda2302  172M &
addfile.sh stocks /dev/rdsk/hda3302  172M &
addfile.sh stocks /dev/rdsk/hda4302  172M &
addfile.sh stocks /dev/rdsk/hda5302  172M &
wait
addfile.sh stocks /dev/rdsk/hdc1001  172M &
addfile.sh stocks /dev/rdsk/hdc2001  172M &
addfile.sh stocks /dev/rdsk/hdc1101  172M &
addfile.sh stocks /dev/rdsk/hdc2101  172M &
addfile.sh stocks /dev/rdsk/hdc1201  172M &
addfile.sh stocks /dev/rdsk/hdc2201  172M &
addfile.sh stocks /dev/rdsk/hdc1301  172M &
addfile.sh stocks /dev/rdsk/hdc2301  172M &
addfile.sh stocks /dev/rdsk/hdc1401  172M &
addfile.sh stocks /dev/rdsk/hdc2401  172M &
addfile.sh stocks /dev/rdsk/hdc1501  172M &
addfile.sh stocks /dev/rdsk/hdc2501  172M &

#   [CUSTOMER INDEX 2]
addfile.sh icust2 /dev/rdsk/hd3405    74M &
addfile.sh icust2 /dev/rdsk/hd5405    74M &
addfile.sh icust2 /dev/rdsk/hd6405    74M &
addfile.sh icust2 /dev/rdsk/hda1405   74M &
addfile.sh icust2 /dev/rdsk/hda2405   74M &
addfile.sh icust2 /dev/rdsk/hda3405   74M &
addfile.sh icust2 /dev/rdsk/hda4405   74M &
wait

#   [ORDER INDEX 1]
addfile.sh iord1  /dev/rdsk/hd3403    67M &
addfile.sh iord1  /dev/rdsk/hd4403    67M &
addfile.sh iord1  /dev/rdsk/hd6403    67M &
addfile.sh iord1  /dev/rdsk/hda1403   67M &
addfile.sh iord1  /dev/rdsk/hda2403   67M &
addfile.sh iord1  /dev/rdsk/hda3403   67M &
addfile.sh iord1  /dev/rdsk/hda4403   67M &
wait

#   [ORDER INDEX 2]
addfile.sh iord2  /dev/rdsk/hdc3001   59M &
addfile.sh iord2  /dev/rdsk/hdc3101   59M &
addfile.sh iord2  /dev/rdsk/hdc3201   59M &
addfile.sh iord2  /dev/rdsk/hdc3301   59M &
addfile.sh iord2  /dev/rdsk/hdc3401   59M &
wait

#   [NEW ORDER INDEX]
addfile.sh inord  /dev/rdsk/hd3402    30M &
addfile.sh inord  /dev/rdsk/hd5402    30M &
addfile.sh inord  /dev/rdsk/hd6402    30M &
addfile.sh inord  /dev/rdsk/hda1402   30M &
addfile.sh inord  /dev/rdsk/hda2402   30M &
addfile.sh inord  /dev/rdsk/hda3402   30M &
addfile.sh inord  /dev/rdsk/hda4402   30M &
wait

#   [ORDER LINE INDEX]
addfile.sh iordl  /dev/rdsk/hd4401   677M &
addfile.sh iordl  /dev/rdsk/hd5401   677M &
addfile.sh iordl  /dev/rdsk/hd6401   677M &
addfile.sh iordl  /dev/rdsk/hda1401  677M &
addfile.sh iordl  /dev/rdsk/hda2401  677M &
addfile.sh iordl  /dev/rdsk/hda3401  677M &
addfile.sh iordl  /dev/rdsk/hda4401  677M &
wait

#
# run catalog if NO_CAT unset
#
if [ "$NO_CAT" = "" ]
then
sqldba <<!
        set echo off;
#       connect sys/change_on_install;
        connect internal
        @?/rdbms/admin/catalog;
        @?/rdbms/admin/catproc;
        @?/rdbms/admin/catparr;
        exit;
!
fi

#
#==================================
============================+
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Shores, CA       |
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GROUP                 |
#                    All Rights Reserved
|
#==================================
============================+
# FILENAME
#      benchsetup.sh
# DESCRIPTION
#      Usage: benchsetup.sh [options]
#           -mu <multiplier>     (# of warehouses)
#           -nd                  do not run benchdb.sh
#           -nt                  do not create tpcc tables
#           -nx                  do not create index for
tpcc tables
#==================================
============================
#

BENCH_HOME=$ORACLE_HOME/bench/tpc
BENCH_GEN=$ORACLE_HOME/bench/gen
GEN_SQL=$BENCH_GEN/sql
TPCC_SOURCE=$BENCH_HOME/tpcc/source
TPCC_SQL=$BENCH_HOME/tpcc/sql
TPCC_OUTPUT=$BENCH_HOME/tpcc/output
TPCC_ADMIN=$BENCH_HOME/tpcc/admin
TPCC_STORE=$BENCH_HOME/tpcc/stored_pro
c
TPCC_LOADER=$BENCH_HOME/tpcc/loader
TPCC_SCRIPTS=$BENCH_HOME/tpcc/scripts

PATH=${PATH}:$TPCC_SOURCE
export PATH

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 "Bag arg: $1"
        exit 1;
        ;;
  esac
done

if [ "$MULT" = "" ]
then
  echo $N "Database multiplier (# of
warehouses)? [235]" $C
  read MULT
  if [ "$MULT" = "" ]
  then
    MULT=235
  fi
fi

#
# Create database.
#

if [ "$NO_DB" = "" ]
then
  benchdb.sh
fi

#
#  Create tables.
#

if [ "$NO_TAB" = "" ]
then
  sqlplus system/manager
@$TPCC_SQL/tpcc_tab
  sqlplus system/manager
@$TPCC_SQL/tpcc_rol
fi

LDIR1=/data1
LDIR2=/data2
LDIR3=/data3
LDIR4=/data4
LDIR5=/data5
LDIR6=/data6
LDIR7=/data7
LDIR8=/data8
LDIR9=/data9
LDIR10=/data10
LDIR11=/data11
LDIR12=/data12
LDIR13=/data13
LDIR14=/data14
LDIR15=/data15
LDIR16=/data16
LDIR17=/data17
LDIR18=/data18
LDIR19=/data19
LDIR20=/data20
LDIR21=/data21
LDIR22=/data22
LDIR23=/data23
LDIR24=/data24
LDIR25=/data25
LDIR26=/data26
LDIR27=/data27
LDIR28=/data28
LDIR29=/data29
LDIR30=/data30
LDIR31=/data31
LDIR32=/data32
LDIR33=/data33
LDIR34=/data34
LDIR35=/data35
LDIR36=/data36
LDIR37=/data37
LDIR38=/data38
LDIR39=/data39
LDIR40=/data40
LDIR41=/data41
LDIR42=/data42
LDIR43=/data43
LDIR44=/data44
LDIR45=/data45
LDIR46=/data46
LDIR47=/data47

#
#  Load history, new-order, order, order-line tables
#

pload.sh -mu $MULT &

#
#  Create customer and stock tables while loading
other tables
#

if [ "$NO_TAB" = "" ]
then
  sqlplus tpcc/tpcc @$TPCC_SQL/tpcc_tab2 &
  sqlplus tpcc/tpcc @$TPCC_SQL/tpcc_tab3 &
fi

wait

#
#  Load warehouse, district, item tables
#

tpccload -M $MULT -w
tpccload -M $MULT -d
tpccload -M $MULT -i

#
#  Load customer table
#

tpccload -M $MULT -c -b   1 -e  12 &
tpccload -M $MULT -c -b  13 -e  24 &
tpccload -M $MULT -c -b  25 -e  36 &
tpccload -M $MULT -c -b  37 -e  48 &
tpccload -M $MULT -c -b  49 -e  60 &
tpccload -M $MULT -c -b  61 -e  72 &
tpccload -M $MULT -c -b  73 -e  84 &
tpccload -M $MULT -c -b  85 -e  96 &
tpccload -M $MULT -c -b  97 -e 108 &
tpccload -M $MULT -c -b 109 -e 120 &
tpccload -M $MULT -c -b 121 -e 132 &
tpccload -M $MULT -c -b 133 -e 144 &
tpccload -M $MULT -c -b 145 -e 156 &
tpccload -M $MULT -c -b 157 -e 168 &
tpccload -M $MULT -c -b 169 -e 180 &
tpccload -M $MULT -c -b 181 -e 192 &
tpccload -M $MULT -c -b 193 -e 204 &
tpccload -M $MULT -c -b 205 -e 216 &
tpccload -M $MULT -c -b 217 -e 228 &
tpccload -M $MULT -c -b 229 -e 235 &
wait

#
#  Load stock table
#

tpccload -M $MULT -S -j      1 -k   2500 &
tpccload -M $MULT -S -j   2501 -k   5000 &
tpccload -M $MULT -S -j   5001 -k   7500 &
tpccload -M $MULT -S -j   7501 -k  10000 &
tpccload -M $MULT -S -j  10001 -k  12500 &
tpccload -M $MULT -S -j  12501 -k  15000 &
tpccload -M $MULT -S -j  15001 -k  17500 &
tpccload -M $MULT -S -j  17501 -k  20000 &
tpccload -M $MULT -S -j  20001 -k  22500 &
tpccload -M $MULT -S -j  22501 -k  25000 &
tpccload -M $MULT -S -j  25001 -k  27500 &
tpccload -M $MULT -S -j  27501 -k  30000 &
tpccload -M $MULT -S -j  30001 -k  32500 &
tpccload -M $MULT -S -j  32501 -k  35000 &
tpccload -M $MULT -S -j  35001 -k  37500 &
tpccload -M $MULT -S -j  37501 -k  40000 &
tpccload -M $MULT -S -j  40001 -k  42500 &
tpccload -M $MULT -S -j  42501 -k  45000 &
tpccload -M $MULT -S -j  45001 -k  47500 &
tpccload -M $MULT -S -j  47501 -k  50000 &
wait
tpccload -M $MULT -S -j  50001 -k  52500 &
tpccload -M $MULT -S -j  52501 -k  55000 &
tpccload -M $MULT -S -j  55001 -k  57500 &
tpccload -M $MULT -S -j  57501 -k  60000 &
tpccload -M $MULT -S -j  60001 -k  62500 &
tpccload -M $MULT -S -j  62501 -k  65000 &
tpccload -M $MULT -S -j  65001 -k  67500 &
tpccload -M $MULT -S -j  67501 -k  70000 &
tpccload -M $MULT -S -j  70001 -k  72500 &
tpccload -M $MULT -S -j  72501 -k  75000 &
tpccload -M $MULT -S -j  75001 -k  77500 &
tpccload -M $MULT -S -j  77501 -k  80000 &
tpccload -M $MULT -S -j  80001 -k  82500 &
tpccload -M $MULT -S -j  82501 -k  85000 &
tpccload -M $MULT -S -j  85001 -k  87500 &
tpccload -M $MULT -S -j  87501 -k  90000 &
tpccload -M $MULT -S -j  90001 -k  92500 &
tpccload -M $MULT -S -j  92501 -k  95000 &
tpccload -M $MULT -S -j  95001 -k  97500 &
tpccload -M $MULT -S -j  97501 -k 100000 &
wait

#
#  Create indexes
#

if [ "$NO_IND" = "" ]
then
  sqldba <<!
    connect internal
    alter tablespace temp
      default storage (initial 99M next 99M
pctincrease 0);
    exit;
!
  sqlplus tpcc/tpcc @$TPCC_SQL/tpcc_ix1
  sqlplus tpcc/tpcc @$TPCC_SQL/tpcc_ix2
  sqldba <<!
    connect internal
    alter tablespace temp
      default storage (initial 20K next 20K
pctincrease 50);
    exit;
!
fi
```

```
alter.sh

#
#  Analyze tables and indexes
#

sqlplus tpcc/tpcc @$TPCC_SQL/tpcc_ana

#
#  Create table for processing benchmark results
#

sqlplus sys/change_on_install
@$GEN_SQL/orst_cre
sqlplus sys/change_on_install
@$TPCC_SQL/c_stat
sqlplus sys/change_on_install @$GEN_SQL/pst_c

#
#  Create stored procedures
#

sqlplus tpcc/tpcc @$TPCC_STORE/new
sqlplus tpcc/tpcc @$TPCC_STORE/pay
sqlplus tpcc/tpcc @$TPCC_STORE/ord
sqlplus tpcc/tpcc @$TPCC_STORE/del
sqlplus tpcc/tpcc @$TPCC_STORE/sto

sqlplus system/manager <<!
  alter user tpcc temporary tablespace system;
  quit;
!

sqlplus sys/change_on_install <<!
  grant execute on dbms_lock to public;
  grant execute on dbms_pipe to public;
  quit;
!

##
##  Create LOG Mirror
##

mirror1.sh &
mirror2.sh &
wait

#
#  Shutdown database
#

sqldba <<!
  connect internal;
  alter system switch logfile;
  alter system switch logfile;
  shutdown;
  exit;
!

#
#=====================================
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Shores, CA      |
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GROUP                |
#                    All Rights Reserved
|
#=====================================
============================+
# FILENAME
#     create.sh
# DESCRIPTION
#     create a tablespace.
# USAGE
#     create.sh <tablespace> <data file> <size>
#=====================================
============================*/

sqldba <<!
  connect internal
  create tablespace $1 datafile '$2' size $3 reuse;
  exit;
!

#
#=====================================
============================+
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Shores, CA      |
#                 OPEN SYSTEMS PERFORMANCE
GROUP                |
#                    All Rights Reserved
|
#=====================================
============================+
# FILENAME
#      pload.sh
# DESCRIPTION
#      Usage: pload.sh [options]
#            -mu <multiplier>     (# of warehouses)
#=====================================
============================
#

BENCH_HOME=$ORACLE_HOME/bench/tpc
BENCH_GEN=$ORACLE_HOME/bench/gen
GEN_SQL=$BENCH_GEN/sql
TPCC_SOURCE=$BENCH_HOME/tpcc/source
TPCC_SQL=$BENCH_HOME/tpcc/sql
TPCC_OUTPUT=$BENCH_HOME/tpcc/output
TPCC_ADMIN=$BENCH_HOME/tpcc/admin
TPCC_STORE=$BENCH_HOME/tpcc/stored_pro
c
TPCC_LOADER=$BENCH_HOME/tpcc/loader
TPCC_SCRIPTS=$BENCH_HOME/tpcc/scripts

PATH=${PATH}:$TPCC_SOURCE
export PATH

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 "Bag arg: $1"
        exit 1;
        ;;
  esac
done

if [ "$MULT" = "" ]
then
  echo $N "Database multiplier (# of
warehouses)? [235]" $C
  read MULT
  if [ "$MULT" = "" ]
  then
     MULT=235
  fi
fi

LDIR1=/data1
LDIR2=/data2
LDIR3=/data3
LDIR4=/data4
LDIR5=/data5
LDIR6=/data6
LDIR7=/data7
LDIR8=/data8
LDIR9=/data9
LDIR10=/data10
LDIR11=/data11
LDIR12=/data12
LDIR13=/data13
LDIR14=/data14
LDIR15=/data15
LDIR16=/data16
LDIR17=/data17
LDIR18=/data18
LDIR19=/data19
LDIR20=/data20
LDIR21=/data21
LDIR22=/data22
LDIR23=/data23
LDIR24=/data24
LDIR25=/data25
LDIR26=/data26
LDIR27=/data27
LDIR28=/data28
LDIR29=/data29
LDIR30=/data30
LDIR31=/data31
LDIR32=/data32
LDIR33=/data33
LDIR34=/data34
LDIR35=/data35
LDIR36=/data36
LDIR37=/data37
LDIR38=/data38
LDIR39=/data39
LDIR40=/data40
LDIR41=/data41
LDIR42=/data42
LDIR43=/data43
LDIR44=/data44
LDIR45=/data45
LDIR46=/data46
LDIR47=/data47

#
#  Load history table
#
```

```
tpccload -M $MULT -h -g -b   1 -e   5 >
${LDIR1}/hist1.dat &
tpccload -M $MULT -h -g -b   6 -e  10 >
${LDIR2}/hist2.dat &
tpccload -M $MULT -h -g -b  11 -e  15 >
${LDIR3}/hist3.dat &
tpccload -M $MULT -h -g -b  16 -e  20 >
${LDIR4}/hist4.dat &
tpccload -M $MULT -h -g -b  21 -e  25 >
${LDIR5}/hist5.dat &
tpccload -M $MULT -h -g -b  26 -e  30 >
${LDIR6}/hist6.dat &
tpccload -M $MULT -h -g -b  31 -e  35 >
${LDIR7}/hist7.dat &
tpccload -M $MULT -h -g -b  36 -e  40 >
${LDIR8}/hist8.dat &
tpccload -M $MULT -h -g -b  41 -e  45 >
${LDIR9}/hist9.dat &
tpccload -M $MULT -h -g -b  46 -e  50 >
${LDIR10}/hist10.dat &
tpccload -M $MULT -h -g -b  51 -e  55 >
${LDIR11}/hist11.dat &
tpccload -M $MULT -h -g -b  56 -e  60 >
${LDIR12}/hist12.dat &
wait
tpccload -M $MULT -h -g -b  61 -e  65 >
${LDIR13}/hist13.dat &
tpccload -M $MULT -h -g -b  66 -e  70 >
${LDIR14}/hist14.dat &
tpccload -M $MULT -h -g -b  71 -e  75 >
${LDIR15}/hist15.dat &
tpccload -M $MULT -h -g -b  76 -e  80 >
${LDIR16}/hist16.dat &
tpccload -M $MULT -h -g -b  81 -e  85 >
${LDIR17}/hist17.dat &
tpccload -M $MULT -h -g -b  86 -e  90 >
${LDIR18}/hist18.dat &
tpccload -M $MULT -h -g -b  91 -e  95 >
${LDIR19}/hist19.dat &
tpccload -M $MULT -h -g -b  96 -e 100 >
${LDIR20}/hist20.dat &
tpccload -M $MULT -h -g -b 101 -e 105 >
${LDIR21}/hist21.dat &
tpccload -M $MULT -h -g -b 106 -e 110 >
${LDIR22}/hist22.dat &
tpccload -M $MULT -h -g -b 111 -e 115 >
${LDIR23}/hist23.dat &
tpccload -M $MULT -h -g -b 116 -e 120 >
${LDIR24}/hist24.dat &
wait
tpccload -M $MULT -h -g -b 121 -e 125 >
${LDIR25}/hist25.dat &
tpccload -M $MULT -h -g -b 126 -e 130 >
${LDIR26}/hist26.dat &
tpccload -M $MULT -h -g -b 131 -e 135 >
${LDIR27}/hist27.dat &
tpccload -M $MULT -h -g -b 136 -e 140 >
${LDIR28}/hist28.dat &
tpccload -M $MULT -h -g -b 141 -e 145 >
${LDIR29}/hist29.dat &
tpccload -M $MULT -h -g -b 146 -e 150 >
${LDIR30}/hist30.dat &
tpccload -M $MULT -h -g -b 151 -e 155 >
${LDIR31}/hist31.dat &
tpccload -M $MULT -h -g -b 156 -e 160 >
${LDIR32}/hist32.dat &
tpccload -M $MULT -h -g -b 161 -e 165 >
${LDIR33}/hist33.dat &
tpccload -M $MULT -h -g -b 166 -e 170 >
${LDIR34}/hist34.dat &
tpccload -M $MULT -h -g -b 171 -e 175 >
${LDIR35}/hist35.dat &
tpccload -M $MULT -h -g -b 176 -e 180 >
${LDIR36}/hist36.dat &
wait
tpccload -M $MULT -h -g -b 181 -e 185 >
${LDIR37}/hist37.dat &
tpccload -M $MULT -h -g -b 186 -e 190 >
${LDIR38}/hist38.dat &
tpccload -M $MULT -h -g -b 191 -e 195 >
${LDIR39}/hist39.dat &
tpccload -M $MULT -h -g -b 196 -e 200 >
${LDIR40}/hist40.dat &
tpccload -M $MULT -h -g -b 201 -e 205 >
${LDIR41}/hist41.dat &
tpccload -M $MULT -h -g -b 206 -e 210 >
${LDIR42}/hist42.dat &
tpccload -M $MULT -h -g -b 211 -e 215 >
${LDIR43}/hist43.dat &
tpccload -M $MULT -h -g -b 216 -e 220 >
${LDIR44}/hist44.dat &
tpccload -M $MULT -h -g -b 221 -e 225 >
${LDIR45}/hist45.dat &
tpccload -M $MULT -h -g -b 226 -e 230 >
${LDIR46}/hist46.dat &
tpccload -M $MULT -h -g -b 231 -e 235 >
${LDIR47}/hist47.dat &
wait

sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist1.log \
    bad=hist1.bad data=${LDIR1}/hist1.dat
discard=hist1.dsc \
    file=/dev/rdsk/hd1001 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist2.log \
    bad=hist2.bad data=${LDIR2}/hist2.dat
discard=hist2.dsc \
    file=/dev/rdsk/hd2001 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist3.log \
    bad=hist3.bad data=${LDIR3}/hist3.dat
discard=hist3.dsc \
    file=/dev/rdsk/hd3001 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist4.log \
    bad=hist4.bad data=${LDIR4}/hist4.dat
discard=hist4.dsc \
    file=/dev/rdsk/hd4001 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist5.log \
    bad=hist5.bad data=${LDIR5}/hist5.dat
discard=hist5.dsc \
    file=/dev/rdsk/hd5001 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist6.log \
    bad=hist6.bad data=${LDIR6}/hist6.dat
discard=hist6.dsc \
    file=/dev/rdsk/hd6001 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist7.log \
    bad=hist7.bad data=${LDIR7}/hist7.dat
discard=hist7.dsc \
    file=/dev/rdsk/hda1001 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist8.log \
    bad=hist8.bad data=${LDIR8}/hist8.dat
discard=hist8.dsc \
    file=/dev/rdsk/hda2001 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist9.log \
    bad=hist9.bad data=${LDIR9}/hist9.dat
discard=hist9.dsc \
    file=/dev/rdsk/hda3001 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist10.log \
    bad=hist10.bad data=${LDIR10}/hist10.dat
discard=hist10.dsc \
    file=/dev/rdsk/hda4001 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist11.log \
    bad=hist11.bad data=${LDIR11}/hist11.dat
discard=hist11.dsc \
    file=/dev/rdsk/hda5001 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist12.log \
    bad=hist12.bad data=${LDIR12}/hist12.dat
discard=hist12.dsc \
    file=/dev/rdsk/hda6001 &
wait
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist13.log \
    bad=hist13.bad data=${LDIR13}/hist13.dat
discard=hist13.dsc \
    file=/dev/rdsk/hd1101 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist14.log \
    bad=hist14.bad data=${LDIR14}/hist14.dat
discard=hist14.dsc \
    file=/dev/rdsk/hd2101 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist15.log \
    bad=hist15.bad data=${LDIR15}/hist15.dat
discard=hist15.dsc \
    file=/dev/rdsk/hd3101 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist16.log \
    bad=hist16.bad data=${LDIR16}/hist16.dat
discard=hist16.dsc \
    file=/dev/rdsk/hd4101 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist17.log \
    bad=hist17.bad data=${LDIR17}/hist17.dat
discard=hist17.dsc \
    file=/dev/rdsk/hd5101 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist18.log \
    bad=hist18.bad data=${LDIR18}/hist18.dat
discard=hist18.dsc \
    file=/dev/rdsk/hd6101 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist19.log \
    bad=hist19.bad data=${LDIR19}/hist19.dat
discard=hist19.dsc \
    file=/dev/rdsk/hda1101 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist20.log \
    bad=hist20.bad data=${LDIR20}/hist20.dat
discard=hist20.dsc \
    file=/dev/rdsk/hda2101 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist21.log \
    bad=hist21.bad data=${LDIR21}/hist21.dat
discard=hist21.dsc \
    file=/dev/rdsk/hda3101 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist22.log \
    bad=hist22.bad data=${LDIR22}/hist22.dat
discard=hist22.dsc \
    file=/dev/rdsk/hda4101 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist23.log \
    bad=hist23.bad data=${LDIR23}/hist23.dat
discard=hist23.dsc \
    file=/dev/rdsk/hda5101 &
```

```
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist24.log \
    bad=hist24.bad data=${LDIR24}/hist24.dat
discard=hist24.dsc \
    file=/dev/rdsk/hda6101 &
wait
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist25.log \
    bad=hist25.bad data=${LDIR25}/hist25.dat
discard=hist25.dsc \
    file=/dev/rdsk/hd1201 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist26.log \
    bad=hist26.bad data=${LDIR26}/hist26.dat
discard=hist26.dsc \
    file=/dev/rdsk/hd2201 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist27.log \
    bad=hist27.bad data=${LDIR27}/hist27.dat
discard=hist27.dsc \
    file=/dev/rdsk/hd3201 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist28.log \
    bad=hist28.bad data=${LDIR28}/hist28.dat
discard=hist28.dsc \
    file=/dev/rdsk/hd4201 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist29.log \
    bad=hist29.bad data=${LDIR29}/hist29.dat
discard=hist29.dsc \
    file=/dev/rdsk/hd5201 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist30.log \
    bad=hist30.bad data=${LDIR30}/hist30.dat
discard=hist30.dsc \
    file=/dev/rdsk/hd6201 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist31.log \
    bad=hist31.bad data=${LDIR31}/hist31.dat
discard=hist31.dsc \
    file=/dev/rdsk/hda1201 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist32.log \
    bad=hist32.bad data=${LDIR32}/hist32.dat
discard=hist32.dsc \
    file=/dev/rdsk/hda2201 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist33.log \
    bad=hist33.bad data=${LDIR33}/hist33.dat
discard=hist33.dsc \
    file=/dev/rdsk/hda3201 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist34.log \
    bad=hist34.bad data=${LDIR34}/hist34.dat
discard=hist34.dsc \
    file=/dev/rdsk/hda4201 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist35.log \
    bad=hist35.bad data=${LDIR35}/hist35.dat
discard=hist35.dsc \
    file=/dev/rdsk/hda5201 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist36.log \
    bad=hist36.bad data=${LDIR36}/hist36.dat
discard=hist36.dsc \
    file=/dev/rdsk/hda6201 &
wait
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist37.log \
    bad=hist37.bad data=${LDIR37}/hist37.dat
discard=hist37.dsc \
    file=/dev/rdsk/hd1301 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist38.log \
    bad=hist38.bad data=${LDIR38}/hist38.dat
discard=hist38.dsc \
    file=/dev/rdsk/hd2301 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist39.log \
    bad=hist39.bad data=${LDIR39}/hist39.dat
discard=hist39.dsc \
    file=/dev/rdsk/hd3301 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist40.log \
    bad=hist40.bad data=${LDIR40}/hist40.dat
discard=hist40.dsc \
    file=/dev/rdsk/hd4301 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist41.log \
    bad=hist41.bad data=${LDIR41}/hist41.dat
discard=hist41.dsc \
    file=/dev/rdsk/hd5301 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist42.log \
    bad=hist42.bad data=${LDIR42}/hist42.dat
discard=hist42.dsc \
    file=/dev/rdsk/hd6301 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist43.log \
    bad=hist43.bad data=${LDIR43}/hist43.dat
discard=hist43.dsc \
    file=/dev/rdsk/hda1301 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist44.log \
    bad=hist44.bad data=${LDIR44}/hist44.dat
discard=hist44.dsc \
    file=/dev/rdsk/hda2301 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist45.log \
    bad=hist45.bad data=${LDIR45}/hist45.dat
discard=hist45.dsc \
    file=/dev/rdsk/hda3301 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist46.log \
    bad=hist46.bad data=${LDIR46}/hist46.dat
discard=hist46.dsc \
    file=/dev/rdsk/hda4301 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/hist.ctl
log=hist47.log \
    bad=hist47.bad data=${LDIR47}/hist47.dat
discard=hist47.dsc \
    file=/dev/rdsk/hda5301 &
wait

rm -f ${LDIR1}/hist1.dat \
    ${LDIR2}/hist2.dat \
    ${LDIR3}/hist3.dat \
    ${LDIR4}/hist4.dat \
    ${LDIR5}/hist5.dat \
    ${LDIR6}/hist6.dat \
    ${LDIR7}/hist7.dat \
    ${LDIR8}/hist8.dat \
    ${LDIR9}/hist9.dat \
    ${LDIR10}/hist10.dat &
rm -f ${LDIR11}/hist11.dat \
    ${LDIR12}/hist12.dat \
    ${LDIR13}/hist13.dat \
    ${LDIR14}/hist14.dat \
    ${LDIR15}/hist15.dat \
    ${LDIR16}/hist16.dat \
    ${LDIR17}/hist17.dat \
    ${LDIR18}/hist18.dat \
    ${LDIR19}/hist19.dat \
    ${LDIR20}/hist20.dat &
rm -f ${LDIR21}/hist21.dat \
    ${LDIR22}/hist22.dat \
    ${LDIR23}/hist23.dat \
    ${LDIR24}/hist24.dat \
    ${LDIR25}/hist25.dat \
    ${LDIR26}/hist26.dat \
    ${LDIR27}/hist27.dat \
    ${LDIR28}/hist28.dat \
    ${LDIR29}/hist29.dat \
    ${LDIR30}/hist30.dat &
rm -f ${LDIR31}/hist31.dat \
    ${LDIR32}/hist32.dat \
    ${LDIR33}/hist33.dat \
    ${LDIR34}/hist34.dat \
    ${LDIR35}/hist35.dat \
    ${LDIR36}/hist36.dat \
    ${LDIR37}/hist37.dat \
    ${LDIR38}/hist38.dat \
    ${LDIR39}/hist39.dat \
    ${LDIR40}/hist40.dat &
rm -f ${LDIR41}/hist41.dat \
    ${LDIR42}/hist42.dat \
    ${LDIR43}/hist43.dat \
    ${LDIR44}/hist44.dat \
    ${LDIR45}/hist45.dat \
    ${LDIR46}/hist46.dat \
    ${LDIR47}/hist47.dat &
wait

#
#  Load new-order table
#

tpccload -M $MULT -n -g > ${LDIR1}/neword1.dat
sqlldr tpcc/tpcc
control=$TPCC_LOADER/neword.ctl
log=neword1.log \
     bad=neword1.bad
data=${LDIR1}/neword1.dat discard=neword1.dsc
#
file=${ORACLE_HOME}/dbs/tpcc_disks/nord1
rm -f ${LDIR1}/neword1.dat

#
#  Load order and order-line table
#

tpccload -M $MULT -o ${LDIR1}/ordline1.dat   -g -
b   1 -e   5 > ${LDIR1}/order1.dat &
tpccload -M $MULT -o ${LDIR2}/ordline2.dat   -g -
b   6 -e  10 > ${LDIR2}/order2.dat &
tpccload -M $MULT -o ${LDIR3}/ordline3.dat   -g -
b  11 -e  15 > ${LDIR3}/order3.dat &
tpccload -M $MULT -o ${LDIR4}/ordline4.dat   -g -
b  16 -e  20 > ${LDIR4}/order4.dat &
tpccload -M $MULT -o ${LDIR5}/ordline5.dat   -g -
b  21 -e  25 > ${LDIR5}/order5.dat &
tpccload -M $MULT -o ${LDIR6}/ordline6.dat   -g -
b  26 -e  30 > ${LDIR6}/order6.dat &
tpccload -M $MULT -o ${LDIR7}/ordline7.dat   -g -
b  31 -e  35 > ${LDIR7}/order7.dat &
tpccload -M $MULT -o ${LDIR8}/ordline8.dat   -g -
b  36 -e  40 > ${LDIR8}/order8.dat &
tpccload -M $MULT -o ${LDIR9}/ordline9.dat   -g -
b  41 -e  45 > ${LDIR9}/order9.dat &
tpccload -M $MULT -o ${LDIR10}/ordline10.dat -g
-b  46 -e  50 > ${LDIR10}/order10.dat &
tpccload -M $MULT -o ${LDIR11}/ordline11.dat -g
-b  51 -e  55 > ${LDIR11}/order11.dat &
tpccload -M $MULT -o ${LDIR12}/ordline12.dat -g
-b  56 -e  60 > ${LDIR12}/order12.dat &
wait
```

```
tpccload -M $MULT -o ${LDIR13}/ordline13.dat -g
-b  61 -e  65 > ${LDIR13}/order13.dat &
tpccload -M $MULT -o ${LDIR14}/ordline14.dat -g
-b  66 -e  70 > ${LDIR14}/order14.dat &
tpccload -M $MULT -o ${LDIR15}/ordline15.dat -g
-b  71 -e  75 > ${LDIR15}/order15.dat &
tpccload -M $MULT -o ${LDIR16}/ordline16.dat -g
-b  76 -e  80 > ${LDIR16}/order16.dat &
tpccload -M $MULT -o ${LDIR17}/ordline17.dat -g
-b  81 -e  85 > ${LDIR17}/order17.dat &
tpccload -M $MULT -o ${LDIR18}/ordline18.dat -g
-b  86 -e  90 > ${LDIR18}/order18.dat &
tpccload -M $MULT -o ${LDIR19}/ordline19.dat -g
-b  91 -e  95 > ${LDIR19}/order19.dat &
tpccload -M $MULT -o ${LDIR20}/ordline20.dat -g
-b  96 -e 100 > ${LDIR20}/order20.dat &
tpccload -M $MULT -o ${LDIR21}/ordline21.dat -g
-b 101 -e 105 > ${LDIR21}/order21.dat &
tpccload -M $MULT -o ${LDIR22}/ordline22.dat -g
-b 106 -e 110 > ${LDIR22}/order22.dat &
tpccload -M $MULT -o ${LDIR23}/ordline23.dat -g
-b 111 -e 115 > ${LDIR23}/order23.dat &
tpccload -M $MULT -o ${LDIR24}/ordline24.dat -g
-b 116 -e 120 > ${LDIR24}/order24.dat &
wait
tpccload -M $MULT -o ${LDIR25}/ordline25.dat -g
-b 121 -e 125 > ${LDIR25}/order25.dat &
tpccload -M $MULT -o ${LDIR26}/ordline26.dat -g
-b 126 -e 130 > ${LDIR26}/order26.dat &
tpccload -M $MULT -o ${LDIR27}/ordline27.dat -g
-b 131 -e 135 > ${LDIR27}/order27.dat &
tpccload -M $MULT -o ${LDIR28}/ordline28.dat -g
-b 136 -e 140 > ${LDIR28}/order28.dat &
tpccload -M $MULT -o ${LDIR29}/ordline29.dat -g
-b 141 -e 145 > ${LDIR29}/order29.dat &
tpccload -M $MULT -o ${LDIR30}/ordline30.dat -g
-b 146 -e 150 > ${LDIR30}/order30.dat &
tpccload -M $MULT -o ${LDIR31}/ordline31.dat -g
-b 151 -e 155 > ${LDIR31}/order31.dat &
tpccload -M $MULT -o ${LDIR32}/ordline32.dat -g
-b 156 -e 160 > ${LDIR32}/order32.dat &
tpccload -M $MULT -o ${LDIR33}/ordline33.dat -g
-b 161 -e 165 > ${LDIR33}/order33.dat &
tpccload -M $MULT -o ${LDIR34}/ordline34.dat -g
-b 166 -e 170 > ${LDIR34}/order34.dat &
tpccload -M $MULT -o ${LDIR35}/ordline35.dat -g
-b 171 -e 175 > ${LDIR35}/order35.dat &
tpccload -M $MULT -o ${LDIR36}/ordline36.dat -g
-b 176 -e 180 > ${LDIR36}/order36.dat &
wait
tpccload -M $MULT -o ${LDIR37}/ordline37.dat -g
-b 181 -e 185 > ${LDIR37}/order37.dat &
tpccload -M $MULT -o ${LDIR38}/ordline38.dat -g
-b 186 -e 190 > ${LDIR38}/order38.dat &
tpccload -M $MULT -o ${LDIR39}/ordline39.dat -g
-b 191 -e 195 > ${LDIR39}/order39.dat &
tpccload -M $MULT -o ${LDIR40}/ordline40.dat -g
-b 196 -e 200 > ${LDIR40}/order40.dat &
tpccload -M $MULT -o ${LDIR41}/ordline41.dat -g
-b 201 -e 205 > ${LDIR41}/order41.dat &
tpccload -M $MULT -o ${LDIR42}/ordline42.dat -g
-b 206 -e 210 > ${LDIR42}/order42.dat &
tpccload -M $MULT -o ${LDIR43}/ordline43.dat -g
-b 211 -e 215 > ${LDIR43}/order43.dat &
tpccload -M $MULT -o ${LDIR44}/ordline44.dat -g
-b 216 -e 220 > ${LDIR44}/order44.dat &
tpccload -M $MULT -o ${LDIR45}/ordline45.dat -g
-b 221 -e 225 > ${LDIR45}/order45.dat &
tpccload -M $MULT -o ${LDIR46}/ordline46.dat -g
-b 226 -e 230 > ${LDIR46}/order46.dat &
tpccload -M $MULT -o ${LDIR47}/ordline47.dat -g
-b 231 -e 235 > ${LDIR47}/order47.dat &
wait

sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order1.log \
    bad=order1.bad data=${LDIR1}/order1.dat
discard=order1.dsc \
    file=/dev/rdsk/hd1005 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order2.log \
    bad=order2.bad data=${LDIR2}/order2.dat
discard=order2.dsc \
    file=/dev/rdsk/hd2005 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order3.log \
    bad=order3.bad data=${LDIR3}/order3.dat
discard=order3.dsc \
    file=/dev/rdsk/hd3005 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order4.log \
    bad=order4.bad data=${LDIR4}/order4.dat
discard=order4.dsc \
    file=/dev/rdsk/hd4005 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order5.log \
    bad=order5.bad data=${LDIR5}/order5.dat
discard=order5.dsc \
    file=/dev/rdsk/hd5005 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order6.log \
    bad=order6.bad data=${LDIR6}/order6.dat
discard=order6.dsc \
    file=/dev/rdsk/hd6005 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order7.log \
    bad=order7.bad data=${LDIR7}/order7.dat
discard=order7.dsc \
    file=/dev/rdsk/hda1005 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order8.log \
    bad=order8.bad data=${LDIR8}/order8.dat
discard=order8.dsc \
    file=/dev/rdsk/hda2005 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order9.log \
    bad=order9.bad data=${LDIR9}/order9.dat
discard=order9.dsc \
    file=/dev/rdsk/hda3005 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order10.log \
    bad=order10.bad data=${LDIR10}/order10.dat
discard=order10.dsc \
    file=/dev/rdsk/hda4005 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order11.log \
    bad=order11.bad data=${LDIR11}/order11.dat
discard=order11.dsc \
    file=/dev/rdsk/hda5005 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order12.log \
    bad=order12.bad data=${LDIR12}/order12.dat
discard=order12.dsc \
    file=/dev/rdsk/hda6005 &
wait
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order13.log \
    bad=order13.bad data=${LDIR13}/order13.dat
discard=order13.dsc \
    file=/dev/rdsk/hd1105 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order14.log \
    bad=order14.bad data=${LDIR14}/order14.dat
discard=order14.dsc \
    file=/dev/rdsk/hd2105 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order15.log \
    bad=order15.bad data=${LDIR15}/order15.dat
discard=order15.dsc \
    file=/dev/rdsk/hd3105 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order16.log \
    bad=order16.bad data=${LDIR16}/order16.dat
discard=order16.dsc \
    file=/dev/rdsk/hd4105 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order17.log \
    bad=order17.bad data=${LDIR17}/order17.dat
discard=order17.dsc \
    file=/dev/rdsk/hd5105 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order18.log \
    bad=order18.bad data=${LDIR18}/order18.dat
discard=order18.dsc \
    file=/dev/rdsk/hd6105 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order19.log \
    bad=order19.bad data=${LDIR19}/order19.dat
discard=order19.dsc \
    file=/dev/rdsk/hda1105 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order20.log \
    bad=order20.bad data=${LDIR20}/order20.dat
discard=order20.dsc \
    file=/dev/rdsk/hda2105 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order21.log \
    bad=order21.bad data=${LDIR21}/order21.dat
discard=order21.dsc \
    file=/dev/rdsk/hda3105 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order22.log \
    bad=order22.bad data=${LDIR22}/order22.dat
discard=order22.dsc \
    file=/dev/rdsk/hda4105 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order23.log \
    bad=order23.bad data=${LDIR23}/order23.dat
discard=order23.dsc \
    file=/dev/rdsk/hda5105 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order24.log \
    bad=order24.bad data=${LDIR24}/order24.dat
discard=order24.dsc \
    file=/dev/rdsk/hda6105 &
wait
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order25.log \
    bad=order25.bad data=${LDIR25}/order25.dat
discard=order25.dsc \
    file=/dev/rdsk/hd1205 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order26.log \
    bad=order26.bad data=${LDIR26}/order26.dat
discard=order26.dsc \
    file=/dev/rdsk/hd2205 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order27.log \
    bad=order27.bad data=${LDIR27}/order27.dat
discard=order27.dsc \
    file=/dev/rdsk/hd3205 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order28.log \
    bad=order28.bad data=${LDIR28}/order28.dat
discard=order28.dsc \
    file=/dev/rdsk/hd4205 &
```

```
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order29.log \
    bad=order29.bad data=${LDIR29}/order29.dat
discard=order29.dsc \
    file=/dev/rdsk/hd5205 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order30.log \
    bad=order30.bad data=${LDIR30}/order30.dat
discard=order30.dsc \
    file=/dev/rdsk/hd6205 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order31.log \
    bad=order31.bad data=${LDIR31}/order31.dat
discard=order31.dsc \
    file=/dev/rdsk/hda1205 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order32.log \
    bad=order32.bad data=${LDIR32}/order32.dat
discard=order32.dsc \
    file=/dev/rdsk/hda2205 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order33.log \
    bad=order33.bad data=${LDIR33}/order33.dat
discard=order33.dsc \
    file=/dev/rdsk/hda3205 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order34.log \
    bad=order34.bad data=${LDIR34}/order34.dat
discard=order34.dsc \
    file=/dev/rdsk/hda4205 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order35.log \
    bad=order35.bad data=${LDIR35}/order35.dat
discard=order35.dsc \
    file=/dev/rdsk/hda5205 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order36.log \
    bad=order36.bad data=${LDIR36}/order36.dat
discard=order36.dsc \
    file=/dev/rdsk/hda6205 &
wait
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order37.log \
    bad=order37.bad data=${LDIR37}/order37.dat
discard=order37.dsc \
    file=/dev/rdsk/hd1305 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order38.log \
    bad=order38.bad data=${LDIR38}/order38.dat
discard=order38.dsc \
    file=/dev/rdsk/hd2305 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order39.log \
    bad=order39.bad data=${LDIR39}/order39.dat
discard=order39.dsc \
    file=/dev/rdsk/hd3305 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order40.log \
    bad=order40.bad data=${LDIR40}/order40.dat
discard=order40.dsc \
    file=/dev/rdsk/hd4305 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order41.log \
    bad=order41.bad data=${LDIR41}/order41.dat
discard=order41.dsc \
    file=/dev/rdsk/hd5305 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order42.log \
    bad=order42.bad data=${LDIR42}/order42.dat
discard=order42.dsc \
    file=/dev/rdsk/hd6305 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order43.log \
    bad=order43.bad data=${LDIR43}/order43.dat
discard=order43.dsc \
    file=/dev/rdsk/hda1305 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order44.log \
    bad=order44.bad data=${LDIR44}/order44.dat
discard=order44.dsc \
    file=/dev/rdsk/hda2305 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order45.log \
    bad=order45.bad data=${LDIR45}/order45.dat
discard=order45.dsc \
    file=/dev/rdsk/hda3305 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order46.log \
    bad=order46.bad data=${LDIR46}/order46.dat
discard=order46.dsc \
    file=/dev/rdsk/hda4305 &
sqlldr tpcc/tpcc control=$TPCC_LOADER/order.ctl
log=order47.log \
    bad=order47.bad data=${LDIR47}/order47.dat
discard=order47.dsc \
    file=/dev/rdsk/hda5305 &
wait

rm -f ${LDIR1}/order1.dat \
    ${LDIR2}/order2.dat \
    ${LDIR3}/order3.dat \
    ${LDIR4}/order4.dat \
    ${LDIR5}/order5.dat \
    ${LDIR6}/order6.dat \
    ${LDIR7}/order7.dat \
    ${LDIR8}/order8.dat \
    ${LDIR9}/order9.dat \
    ${LDIR10}/order10.dat &
rm -f ${LDIR11}/order11.dat \
    ${LDIR12}/order12.dat \
    ${LDIR13}/order13.dat \
    ${LDIR14}/order14.dat \
    ${LDIR15}/order15.dat \
    ${LDIR16}/order16.dat \
    ${LDIR17}/order17.dat \
    ${LDIR18}/order18.dat \
    ${LDIR19}/order19.dat \
    ${LDIR20}/order20.dat &
rm -f ${LDIR21}/order21.dat \
    ${LDIR22}/order22.dat \
    ${LDIR23}/order23.dat \
    ${LDIR24}/order24.dat \
    ${LDIR25}/order25.dat \
    ${LDIR26}/order26.dat \
    ${LDIR27}/order27.dat \
    ${LDIR28}/order28.dat \
    ${LDIR29}/order29.dat \
    ${LDIR30}/order30.dat &
rm -f ${LDIR31}/order31.dat \
    ${LDIR32}/order32.dat \
    ${LDIR33}/order33.dat \
    ${LDIR34}/order34.dat \
    ${LDIR35}/order35.dat \
    ${LDIR36}/order36.dat \
    ${LDIR37}/order37.dat \
    ${LDIR38}/order38.dat \
    ${LDIR39}/order39.dat \
    ${LDIR40}/order40.dat &
rm -f ${LDIR41}/order41.dat \
    ${LDIR42}/order42.dat \
    ${LDIR43}/order43.dat \
    ${LDIR44}/order44.dat \
    ${LDIR45}/order45.dat \
    ${LDIR46}/order46.dat \
    ${LDIR47}/order47.dat &

cat ${LDIR1}/ordline1.dat \
   ${LDIR2}/ordline2.dat \
   ${LDIR3}/ordline3.dat \
   ${LDIR4}/ordline4.dat > ${LDIR1}/ordline1-
20.dat &
cat ${LDIR5}/ordline5.dat \
   ${LDIR6}/ordline6.dat \
   ${LDIR7}/ordline7.dat \
   ${LDIR8}/ordline8.dat > ${LDIR2}/ordline21-
40.dat &
cat ${LDIR9}/ordline9.dat \
   ${LDIR10}/ordline10.dat \
   ${LDIR11}/ordline11.dat \
   ${LDIR12}/ordline12.dat > ${LDIR3}/ordline41-
60.dat &
cat ${LDIR13}/ordline13.dat \
   ${LDIR14}/ordline14.dat \
   ${LDIR15}/ordline15.dat \
   ${LDIR16}/ordline16.dat > ${LDIR4}/ordline61-
80.dat &
cat ${LDIR17}/ordline17.dat \
   ${LDIR18}/ordline18.dat \
   ${LDIR19}/ordline19.dat \
   ${LDIR20}/ordline20.dat > ${LDIR5}/ordline81-
100.dat &
cat ${LDIR21}/ordline21.dat \
   ${LDIR22}/ordline22.dat \
   ${LDIR23}/ordline23.dat \
   ${LDIR24}/ordline24.dat > ${LDIR6}/ordline101-
120.dat &
cat ${LDIR25}/ordline25.dat \
   ${LDIR26}/ordline26.dat \
   ${LDIR27}/ordline27.dat \
   ${LDIR28}/ordline28.dat > ${LDIR7}/ordline121-
140.dat &
cat ${LDIR29}/ordline29.dat \
   ${LDIR30}/ordline30.dat \
   ${LDIR31}/ordline31.dat \
   ${LDIR32}/ordline32.dat > ${LDIR8}/ordline141-
160.dat &
cat ${LDIR33}/ordline33.dat \
   ${LDIR34}/ordline34.dat \
   ${LDIR35}/ordline35.dat \
   ${LDIR36}/ordline36.dat > ${LDIR9}/ordline161-
180.dat &
cat ${LDIR37}/ordline37.dat \
   ${LDIR38}/ordline38.dat \
   ${LDIR39}/ordline39.dat \
   ${LDIR40}/ordline40.dat >
${LDIR10}/ordline181-200.dat &
cat ${LDIR41}/ordline41.dat \
   ${LDIR42}/ordline42.dat \
   ${LDIR43}/ordline43.dat \
   ${LDIR44}/ordline44.dat >
${LDIR11}/ordline201-220.dat &
cat ${LDIR45}/ordline45.dat \
   ${LDIR46}/ordline46.dat \
   ${LDIR47}/ordline47.dat >
${LDIR12}/ordline221-235.dat &
wait

sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline1.log \
    bad=ordline1.bad data=${LDIR1}/ordline1-
20.dat discard=ordline1.dsc \
    file=/dev/rdsk/hdb1001 &
```

```
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline2.log \
    bad=ordline2.bad data=${LDIR2}/ordline21-
40.dat discard=ordline2.dsc \
    file=/dev/rdsk/hdb1101 &
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline3.log \
    bad=ordline3.bad data=${LDIR3}/ordline41-
60.dat discard=ordline3.dsc \
    file=/dev/rdsk/hdb1201 &
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline4.log \
    bad=ordline4.bad data=${LDIR4}/ordline61-
80.dat discard=ordline4.dsc \
    file=/dev/rdsk/hdb1301 &
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline5.log \
    bad=ordline5.bad data=${LDIR5}/ordline81-
100.dat discard=ordline5.dsc \
    file=/dev/rdsk/hdb1401 &
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline6.log \
    bad=ordline6.bad data=${LDIR6}/ordline101-
120.dat discard=ordline6.dsc \
    file=/dev/rdsk/hdb1501 &
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline7.log \
    bad=ordline7.bad data=${LDIR7}/ordline121-
140.dat discard=ordline7.dsc \
    file=/dev/rdsk/hdb2001 &
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline8.log \
    bad=ordline8.bad data=${LDIR8}/ordline141-
160.dat discard=ordline8.dsc \
    file=/dev/rdsk/hdb2101 &
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline9.log \
    bad=ordline9.bad data=${LDIR9}/ordline161-
180.dat discard=ordline9.dsc \
    file=/dev/rdsk/hdb2201 &
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline10.log \
    bad=ordline10.bad
data=${LDIR10}/ordline181-200.dat
discard=ordline10.dsc \
    file=/dev/rdsk/hdb2301 &
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline11.log \
    bad=ordline11.bad
data=${LDIR11}/ordline201-220.dat
discard=ordline11.dsc \
    file=/dev/rdsk/hdb2401 &
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline12.log \
    bad=ordline12.bad
data=${LDIR12}/ordline221-235.dat
discard=ordline12.dsc \
    file=/dev/rdsk/hdb2501 &
wait

rm -f ${LDIR1}/ordline1.dat \
    ${LDIR2}/ordline2.dat \
    ${LDIR3}/ordline3.dat \
    ${LDIR4}/ordline4.dat \
    ${LDIR5}/ordline5.dat \
    ${LDIR6}/ordline6.dat \
    ${LDIR7}/ordline7.dat \
    ${LDIR8}/ordline8.dat \
    ${LDIR9}/ordline9.dat \
    ${LDIR10}/ordline10.dat &
rm -f ${LDIR11}/ordline11.dat \
    ${LDIR12}/ordline12.dat \
    ${LDIR13}/ordline13.dat \
    ${LDIR14}/ordline14.dat \
    ${LDIR15}/ordline15.dat \
    ${LDIR16}/ordline16.dat \
    ${LDIR17}/ordline17.dat \
    ${LDIR18}/ordline18.dat \
    ${LDIR19}/ordline19.dat \
    ${LDIR20}/ordline20.dat &
rm -f ${LDIR21}/ordline21.dat \
    ${LDIR22}/ordline22.dat \
    ${LDIR23}/ordline23.dat \
    ${LDIR24}/ordline24.dat \
    ${LDIR25}/ordline25.dat \
    ${LDIR26}/ordline26.dat \
    ${LDIR27}/ordline27.dat \
    ${LDIR28}/ordline28.dat \
    ${LDIR29}/ordline29.dat \
    ${LDIR30}/ordline30.dat &
rm -f ${LDIR31}/ordline31.dat \
    ${LDIR32}/ordline32.dat \
    ${LDIR33}/ordline33.dat \
    ${LDIR34}/ordline34.dat \
    ${LDIR35}/ordline35.dat \
    ${LDIR36}/ordline36.dat \
    ${LDIR37}/ordline37.dat \
    ${LDIR38}/ordline38.dat \
    ${LDIR39}/ordline39.dat \
    ${LDIR40}/ordline40.dat &
rm -f ${LDIR41}/ordline41.dat \
    ${LDIR42}/ordline42.dat \
    ${LDIR43}/ordline43.dat \
    ${LDIR44}/ordline44.dat \
    ${LDIR45}/ordline45.dat \
    ${LDIR46}/ordline46.dat \
    ${LDIR47}/ordline47.dat \
    ${LDIR1}/ordline1-20.dat \
    ${LDIR2}/ordline21-40.dat \
    ${LDIR3}/ordline41-60.dat \
    ${LDIR4}/ordline61-80.dat \
    ${LDIR5}/ordline81-100.dat \
    ${LDIR6}/ordline101-120.dat \
    ${LDIR7}/ordline121-140.dat \
    ${LDIR8}/ordline141-160.dat \
    ${LDIR9}/ordline161-180.dat \
    ${LDIR10}/ordline181-200.dat \
    ${LDIR11}/ordline201-220.dat \
    ${LDIR12}/ordline221-235.dat &
wait

/*=================================
============================+
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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
VALUES (:w_id, :w_name, :w_street_1, \
  :w_street_2, :w_city, :w_state, :w_zip, :w_tax,
300000.0)"

#define SQLTXTD "INSERT INTO district
VALUES (:d_id, :d_w_id, :d_name, \
  :d_street_1, :d_street_2, :d_city, :d_state,
:d_zip, :d_tax, 30000.0, 3001)"

#define SQLTXTC "INSERT INTO customer
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, 50000.0,
:c_discount, -10.0, 10.0, 1, \
  0, :c_data)"

#define SQLTXTH "INSERT INTO history
VALUES (:h_c_id, :h_c_d_id, :h_c_w_id, \
  :h_d_id, :h_w_id, SYSDATE, 10.0, :h_data)"

#define SQLTXTS "INSERT INTO stock 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 VALUES
(:i_id, :i_im_id, :i_name, :i_price, \
  :i_data)"

#define SQLTXTO1 "INSERT INTO orders
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
VALUES (:o_id, :o_d_id, :o_w_id, :o_c_id, \
  SYSDATE, NULL, :o_ol_cnt, 1)"

#define SQLTXTOL1 "INSERT INTO order_line
VALUES (:ol_o_id, :ol_d_id, \
  :ol_w_id, :ol_number, :ol_i_id, :ol_supply_w_id,
SYSDATE, 5, 0.0, \
  :ol_dist_info)"

#define SQLTXTOL2 "INSERT INTO order_line
VALUES (:ol_o_id, :ol_d_id, \
  :ol_w_id, :ol_number, :ol_i_id, :ol_supply_w_id,
NULL, 5, :ol_amount, \
  :ol_dist_info)"

#define SQLTXTNO "INSERT INTO new_order
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];
float 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];
float 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];

/*---------------------------------------------------------------+
 | 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 (float),
              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 (float), 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 (float), SQLT_FLT, -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 (float), SQLT_FLT, -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 (getpid ());
  srand48 (getpid ());
  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) * 0.0001;
      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 %s %s %s %s %s %s %6.4f
300000.0\n", loop,
                w_name, w_street_1, w_street_2,
w_city, str2, num9, w_tax);
        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) * 0.0001;
        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 %s
%6.4f 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]);
        }
        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) * 0.0001;
        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 %s %cC 50000.0 %6.4f -10.0 10.0 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) * 0.01;
        randstr (i_name[i], 14, 24);
        randdatastr (i_data[i], 26, 50);

        if (gen) {
          printf ("%d %d %s %6.2f %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 %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 %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 10.0
%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 {
              printf ("%d %d %d %d %s \"\" %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] = 0.0;
            else
              ol_amount[j] = (lrand48 () % 999999 +
1) * 0.01;
            randstr (str24[j], 24, 24);

            if (gen) {
              if (cid < 2101) {
                fprintf (olfp, "%d %d %d %d %d %d
%s 5 %7.2f %s\n", cid,
                         cdid, cwid, j + 1, ol_i_id[j],
cwid, sdate,
                         ol_amount[j], str24[j]);
              }
              else {
                fprintf (olfp, "%d %d %d %d %d %d
\"\" 5 %7.2f %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;
  int len;

  len = (rand () % (y - x + 1)) + x;
  for (i = 0; i < len; i++)
    str[i] = (char) (rand () % 26 + 'a');
  str[len] = '\0';

}



randdatastr (str, x, y)

char *str;
int x;
int y;

{

  int i;
  int len;
  int pos;

  len = (rand () % (y - x + 1)) + x;
  for (i = 0; i < len; i++)
    str[i] = (char) (rand () % 26 + 'a');
  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);

}
#
#===================================
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#                OPEN SYSTEMS PERFORMANCE
GROUP                 |
#                    All Rights Reserved
|
#===================================
============================+
# FILENAME
#      p_build.ora
# DESCRIPTION
#      Oracle parameter file for building TPC-C
database.
```

```
#===================================
============================
#

db_writers                      = 25
sort_area_size = 2097152
parallel_server_idle_time = 30
parallel_max_servers = 30
checkpoint_process      = TRUE
compatible              = 7.3.2.0.0
db_name                 = tpcc
db_files                        = 1000
db_file_multiblock_read_count = 32
db_block_buffers        = 100000
_db_block_write_batch   = 128
db_block_checkpoint_batch = 64
dml_locks               = 500
log_archive_start       = FALSE
log_archive_buffer_size = 32
log_checkpoint_interval = 1000000000
log_checkpoints_to_alert = TRUE
log_buffer              = 1048576
gc_rollback_segments    = 220
max_rollback_segments = 220
processes               = 200
sessions                = 400
transactions            = 400
distributed_transactions = 0
transactions_per_rollback_segment = 1
rollback_segments       = (s1, s2, s3, s4, s5, s6,
s7, s8, s9, s10)
shared_pool_size        = 7000000
discrete_transactions_enabled = FALSE
cursor_space_for_time   = TRUE
#
#===================================
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|
#===================================
============================+
# FILENAME
#      p_create.ora
# DESCRIPTION
#      Oracle parameter file for creating TPC-C
database.
#===================================
============================
#
compatible              = 7.3.2.0.0
db_name                 = tpcc
db_files                        = 1000
db_block_buffers        = 2000
dml_locks               = 500
log_checkpoint_interval = 999999999
log_buffer              = 32768
sessions                = 70
processes               = 50
transactions            = 50

rem
rem
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|
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;

rem
rem
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|
rem
===================================
============================+
rem  FILENAME
rem       tpcc_ix1.sql
rem  DESCRIPTION
rem       Create indexes for TPC-C database.
rem
===================================
============================
rem

set timing on

drop index iwarehouse;
drop index idistrict;
drop index icustomer;
drop index icustomer2;
drop index istock;
drop index iitem;

create unique index iwarehouse on
warehouse(w_id)
      tablespace ware
      initrans 3
      storage (initial 100K next 20K pctincrease 0)
pctfree 1;

create unique index idistrict on district(d_w_id,
d_id)
      tablespace ware
      initrans 3
      storage (initial 2000K next 60K pctincrease 0)
pctfree 1;

create unique index iitem on item(i_id)
      tablespace items
      storage (initial 2000K next 100K pctincrease
0) pctfree 1;

create unique index icustomer on
customer(c_w_id, c_d_id, c_id)
      tablespace icust1
      initrans 3
      parallel 10
      storage (initial 8M next 8M pctincrease 0)
pctfree 1;

create unique index icustomer2 on
customer(c_w_id, c_d_id, c_last, c_first, c_id)
      tablespace icust2
      initrans 3
      parallel 10
      storage (initial 12M next 12M pctincrease 0)
pctfree 1;

create unique index istock on stock(s_i_id,
s_w_id)
      tablespace istk
      initrans 3
      parallel 10
      storage (initial 15M next 15M pctincrease 0)
pctfree 1;

exit;


rem
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|
rem
===================================
============================+
rem  FILENAME
rem       tpcc_ix2.sql
rem  DESCRIPTION
rem       Create indexes for TPC-C database.
rem
===================================
============================
rem

set timing on

drop index iorders;
drop index iorders2;
```

```
drop index inew_order;
drop index iorder_line;

create unique index iorders on orders(o_w_id,
o_d_id, o_id)
      tablespace iord1
      initrans 3
      parallel 10
      pctfree 1
      storage (initial 11M next 11M pctincrease 0
            freelist groups 13 freelists 24);

create unique index iorders2 on orders(o_w_id,
o_d_id, o_c_id, o_id)
      tablespace iord2
      initrans 3
      parallel 10
      pctfree 25
      storage (initial 14M next 14M pctincrease 0
            freelist groups 13 freelists 24);

create unique index inew_order on
new_order(no_w_id, no_d_id, no_o_id)
      tablespace inord
      initrans 4
      parallel 10
      pctfree 5
      storage (initial 7M next 7M pctincrease 0
            freelist groups 13 freelists 24);

create unique index iorder_line on
order_line(ol_w_id, ol_d_id, ol_o_id, ol_number)
      tablespace iordl
      initrans 4
      parallel 10
      pctfree 1
      storage (initial 48M next 48M pctincrease 0
            freelist groups 13 freelists 24);

exit;


rem
rem
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rem                        All Rights Reserved
|
rem
================================================
==========================+
rem  FILENAME
rem       tpcc_rol.sql
rem  DESCRIPTION
rem       Create rollback segments for TPCC
database.
rem
================================================
==========================
rem


  CREATE ROLLBACK SEGMENT t1
    TABLESPACE roll
    STORAGE (initial 70K next 70K minextents 2);
  CREATE ROLLBACK SEGMENT t2
    TABLESPACE roll
    STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t3
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t4
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t5
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t6
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t7
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t8
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t9
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t10
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t11
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t12
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t13
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t14
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t15
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t16
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t17
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t18
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t19
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t20
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t21
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t22
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t23
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t24
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t25
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t26
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t27
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t28
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t29
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t30
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t31
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t32
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t33
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t34
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t35
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t36
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  STORAGE (initial 70K next 70K minextents 2);
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  STORAGE (initial 70K next 70K minextents 2);
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t40
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t41
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t42
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t43
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t44
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t45
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t46
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t47
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t48
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t49
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t50
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
```

```
CREATE ROLLBACK SEGMENT t51
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t52
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t53
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t54
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t61
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t62
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  STORAGE (initial 70K next 70K minextents 2);
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t64
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CREATE ROLLBACK SEGMENT t67
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CREATE ROLLBACK SEGMENT t69
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CREATE ROLLBACK SEGMENT t70
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CREATE ROLLBACK SEGMENT t74
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t75
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  STORAGE (initial 70K next 70K minextents 2);
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t82
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t83
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t84
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  STORAGE (initial 70K next 70K minextents 2);
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CREATE ROLLBACK SEGMENT t86
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t89
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t90
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t91
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t92
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t93
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t94
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t95
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t96
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t97
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t98
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t99
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t100
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t101
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t102
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t103
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t104
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t105
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t106
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t107
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t108
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t109
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t110
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t111
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t112
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t113
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t114
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t115
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t116
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t117
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t118
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t119
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t120
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t121
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t122
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
```

```
CREATE ROLLBACK SEGMENT t123
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t124
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t125
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t126
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t127
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t128
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t129
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t130
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t131
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t132
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t133
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t134
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t135
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t136
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t137
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t138
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t139
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t140
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t141
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t142
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t143
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t144
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t145
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t146
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t147
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t148
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t149
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t150
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t151
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t152
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t153
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t154
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t155
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t156
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t157
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t158
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t159
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t160
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  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t161
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t162
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t163
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t164
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t165
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t166
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t167
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t168
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t169
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t170
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t171
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t172
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t173
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t174
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t175
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t176
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t177
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t178
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t179
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t180
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t181
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t182
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t183
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t184
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t185
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t186
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t187
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t188
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t189
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t190
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t191
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t192
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t193
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
CREATE ROLLBACK SEGMENT t194
  TABLESPACE roll
  STORAGE (initial 70K next 70K minextents 2);
```

```
  CREATE ROLLBACK SEGMENT t195
    TABLESPACE roll
    STORAGE (initial 70K next 70K minextents 2);
  CREATE ROLLBACK SEGMENT t196
    TABLESPACE roll
    STORAGE (initial 70K next 70K minextents 2);
  CREATE ROLLBACK SEGMENT t197
    TABLESPACE roll
    STORAGE (initial 70K next 70K minextents 2);
  CREATE ROLLBACK SEGMENT t198
    TABLESPACE roll
    STORAGE (initial 70K next 70K minextents 2);
  CREATE ROLLBACK SEGMENT t199
    TABLESPACE roll
    STORAGE (initial 70K next 70K minextents 2);
  CREATE ROLLBACK SEGMENT t200
    TABLESPACE roll
    STORAGE (initial 70K next 70K minextents 2);

  exit;

rem
rem
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|
rem
================================================================+
rem  FILENAME
rem      tpcc_tab.sql
rem  DESCRIPTION
rem      Create tables for TPC-C database.
rem
================================================================
rem

rem
rem FIRST, create TPCC userid and connect to it.
rem
              grant connect,resource,unlimited
tablespace to tpcc identified by tpcc;
      alter user tpcc temporary tablespace temp;
              connect tpcc/tpcc

rem
rem NEXT, DROP all first
rem
      drop cluster icluster including tables;
              drop table warehouse;
              drop table district;
              drop table history;
              drop table orders;
              drop table new_order;
              drop table order_line;
              drop table item;

set timing on

rem
rem LAST, CREATE all tables
rem

rem
rem WAREHOUSE table
rem

              create table warehouse (
                      w_id          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),
                      w_tax         number,
                      w_ytd         number
              )
      tablespace ware
      initrans 4
      pctfree 95 pctused 4
      storage (initial 1000K next 40K pctincrease
0);


rem
rem DISTRICT table
rem

              create table district (
      d_id          number,
      d_w_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),
      d_tax         number,
      d_ytd         number,
      d_next_o_id   number
      )
      tablespace ware
      initrans 4
      pctfree 95 pctused 4
      storage (initial 1000K next 100K pctincrease
0);


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 3
      pctfree 1
      storage (initial 20K next 18944K pctincrease
0
              freelist groups 13 freelists 24);


rem
rem ORDER table
rem

              create table orders (
      o_id          number,
      o_d_id        number,
      o_w_id        number,
      o_c_id        number,
      o_entry_d     date,
      o_carrier_id  number,
      o_ol_cnt      number,
      o_all_local   number
      )
      tablespace ord
      initrans 3
      pctfree 5
      storage (initial 20K next 14848K pctincrease
0
              freelist groups 13 freelists 24);


rem
rem NEW_ORDER table
rem

              create table new_order (
      no_o_id       number,
      no_d_id       number,
      no_w_id       number
      )
      tablespace nord
      initrans 4
      pctfree 5
      storage (initial 20K next  4608K pctincrease 0
              freelist groups 13 freelists 24);


rem
rem ORDER_LINE table
rem

              create table order_line (
      ol_o_id       number,
      ol_d_id       number,
      ol_w_id       number,
      ol_number     number,
      ol_i_id       number,
      ol_supply_w_id  number,
      ol_delivery_d   date,
      ol_quantity   number,
      ol_amount     number,
      ol_dist_info  char(24)
      )
      tablespace ordl
      initrans 4
      pctfree 5
      storage (initial 20K next 303M pctincrease 0
              freelist groups 13 freelists 24);


rem
rem ITEM table
rem length = 4 + 24 + 5 + 50 = 83
rem

      create cluster icluster (
      i_id          number(6,0)
      )
      hashkeys      100000
      hash is       i_id
      size          120
      initrans      3
      pctfree       0
      tablespace    items
```

```
        storage (initial 14M next 720K pctincrease 0);

        create table item (
        i_id            number(6,0),
        i_im_id         number,
        i_name          varchar2(24),
        i_price         number,
        i_data          varchar2(50)
        )
        cluster icluster(i_id);


rem
rem done
rem

        exit;

rem
rem
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rem
================================================
============================+
rem  FILENAME
rem       tpcc_tab2.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(4,0)
        )
        hashkeys        7050000
        hash is         (c_w_id * 30000 + c_d_id *
3000 + c_id)
        size            850
        initrans        3
        pctfree         0
        tablespace      cust
        storage (initial 181M next 181M pctincrease
0 minextents 12);

                create table customer (
        c_id            number(5,0),
        c_d_id          number(2,0),
        c_w_id          number(4,0),
        c_first         varchar2(16),
        c_middle        char(2),
        c_last          varchar2(16),
        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_credit        char(2),
        c_credit_lim    number,
        c_discount      number,
        c_balance       number,
        c_ytd_payment   number,
        c_payment_cnt   number,
        c_delivery_cnt  number,
        c_data          varchar2(500)
        )
        cluster ccluster (c_id, c_d_id, c_w_id);

rem
rem done
rem

        exit;

rem
rem
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rem                         All Rights Reserved
|
rem
================================================
============================+
rem  FILENAME
rem       tpcc_tab3.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(4,0)
        )
        hashkeys        23500000
        hash is         (s_i_id * 235 + s_w_id)
        size            350
        initrans        3
        pctfree         0
        tablespace      stocks
        storage (initial 171M next 171M pctincrease
0 minextents 16);

                create table stock (
        s_i_id          number(6,0),
        s_w_id          number(4,0),
        s_quantity      number,
        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),
        s_ytd           number,
        s_order_cnt     number,
        s_remote_cnt    number,
        s_data          varchar2(50)
        )
        cluster scluster (s_i_id, s_w_id);

rem
rem done
rem

        exit;

rem
rem
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|
rem
================================================
============================+
rem  FILENAME
rem       del.sql
rem  DESCRIPTION
rem       SQL script to create a stored procedure
for delivery
rem       transactions.
rem
================================================
============================
rem

CREATE OR REPLACE PACKAGE delivery
IS
  TYPE intarray IS TABLE OF INTEGER INDEX
BY BINARY_INTEGER;
  PROCEDURE deliver
  (
    ware_id          INTEGER,
    carrier_id       INTEGER,
    order_id   IN OUT intarray,
    retry      IN OUT INTEGER
  );
END;
/


CREATE OR REPLACE PACKAGE BODY
delivery
IS
```

```
  PROCEDURE deliver
  (
    ware_id          INTEGER,
    carrier_id       INTEGER,
    order_id   IN OUT intarray,
    retry      IN OUT INTEGER
  )
  IS
    dist_id       INTEGER;
    cust_id       INTEGER;
    amount_sum    NUMBER;
    no_rowid      ROWID;
    not_serializable EXCEPTION;
    PRAGMA EXCEPTION_INIT(not_serializable,
-8177);
    deadlock        EXCEPTION;
    PRAGMA EXCEPTION_INIT(deadlock, -60);
    CURSOR n_cur IS
      SELECT no_o_id, rowid
      FROM new_order
      WHERE no_w_id = ware_id AND no_d_id =
dist_id AND no_o_id =
        (SELECT min(no_o_id)
         FROM new_order
         WHERE no_w_id = ware_id AND no_d_id
= dist_id);
  BEGIN

    FOR i IN 1 .. 10 LOOP
      dist_id := i;

      LOOP BEGIN
        OPEN n_cur;
        FETCH n_cur INTO order_id(i), no_rowid;

        IF (n_cur%NOTFOUND) THEN            --
no new order
          CLOSE n_cur;
          COMMIT;
          order_id(i) := 0;
          EXIT;
        END IF;

        CLOSE n_cur;

        DELETE FROM new_order
          WHERE rowid = no_rowid;

        UPDATE orders
          SET o_carrier_id = carrier_id
          WHERE o_d_id = dist_id AND o_w_id =
ware_id AND
                o_id = order_id(i);

        SELECT o_c_id
          INTO cust_id
          FROM orders
          WHERE o_d_id = dist_id AND o_w_id =
ware_id AND
                o_id = order_id(i);

        UPDATE order_line
          SET ol_delivery_d = SYSDATE
          WHERE ol_d_id = dist_id AND ol_w_id
= ware_id AND
                ol_o_id = order_id(i);

        SELECT sum(ol_amount)
          INTO amount_sum
          FROM order_line
          WHERE ol_d_id = dist_id AND ol_w_id
= ware_id AND
                ol_o_id = order_id(i);

        UPDATE customer
          SET c_balance = c_balance +
amount_sum,
              c_delivery_cnt = c_delivery_cnt + 1
          WHERE c_id = cust_id AND c_d_id =
dist_id AND c_w_id = ware_id;

        COMMIT;
        EXIT;

        EXCEPTION
          WHEN not_serializable OR deadlock
THEN
            ROLLBACK;
            retry := retry + 1;
        END;

      END LOOP;
    END LOOP;
  END;
END;
/

quit;
rem
rem
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|
rem
================================================
============================+
rem  FILENAME
rem      new.sql
rem  DESCRIPTION
rem      SQL script to create a stored package for
new order
rem      transactions.
rem
================================================
============================
rem

CREATE OR REPLACE PACKAGE neworder
IS
  PROCEDURE enterorder
  (
    ware_id              INTEGER,
    dist_id              INTEGER,
    cust_id              INTEGER,
    ord_ol_cnt           INTEGER,
    ord_all_local        INTEGER,
    cust_discount       OUT NUMBER,
    cust_last           OUT VARCHAR2,
    cust_credit         OUT VARCHAR2,
    dist_tax            OUT NUMBER,
    ware_tax            OUT NUMBER,
    ord_id           IN OUT INTEGER,
    ord_entry_d      IN OUT VARCHAR2,
    retry            IN OUT INTEGER
  );
END;
/

CREATE OR REPLACE PACKAGE BODY
neworder
IS
  PROCEDURE enterorder
  (
    ware_id              INTEGER,
    dist_id              INTEGER,
    cust_id              INTEGER,
    ord_ol_cnt           INTEGER,
    ord_all_local        INTEGER,
    cust_discount       OUT NUMBER,
    cust_last           OUT VARCHAR2,
    cust_credit         OUT VARCHAR2,
    dist_tax            OUT NUMBER,
    ware_tax            OUT NUMBER,
    ord_id           IN OUT INTEGER,
    ord_entry_d      IN OUT VARCHAR2,
    retry            IN OUT INTEGER
  )
  IS
    timestamp            DATE;
    not_serializable     EXCEPTION;
    PRAGMA EXCEPTION_INIT(not_serializable,-
8177);
    deadlock             EXCEPTION;
    PRAGMA EXCEPTION_INIT(deadlock,-60);
  BEGIN
    LOOP BEGIN
      UPDATE district SET d_next_o_id =
d_next_o_id + 1
        WHERE d_id = dist_id AND d_w_id =
ware_id;
      SELECT d_tax, d_next_o_id - 1
        INTO dist_tax, ord_id
        FROM district
        WHERE d_id = dist_id AND d_w_id =
ware_id;
      SELECT c_discount, c_last, c_credit
        INTO cust_discount, cust_last, cust_credit
        FROM customer
        WHERE c_id = cust_id AND c_d_id =
dist_id AND c_w_id = ware_id;
      timestamp := SYSDATE;
      ord_entry_d := TO_CHAR(timestamp,'DD-
MM-YYYY.HH24:MI:SS');
      INSERT INTO new_order VALUES (ord_id,
dist_id, ware_id);
      INSERT INTO orders VALUES (ord_id,
dist_id, ware_id, cust_id,
                  timestamp, NULL,
ord_ol_cnt, ord_all_local);
      SELECT w_tax INTO ware_tax FROM
warehouse
        WHERE w_id = ware_id;
      EXIT;

      EXCEPTION
        WHEN not_serializable OR deadlock
THEN
          ROLLBACK;
          retry := retry + 1;
      END;
    END LOOP;
  END;
END;
/

quit;

rem
```

```
rem
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|
rem
=====================================
==========================+
rem  FILENAME
rem       ord.sql
rem  DESCRIPTION
rem       SQL script to create a stored package for
order status
rem       transactions.
rem
=====================================
==========================
rem

CREATE OR REPLACE PACKAGE orderstatus
IS
  TYPE intarray IS TABLE OF INTEGER INDEX
BY BINARY_INTEGER;
  TYPE numarray IS TABLE OF NUMBER INDEX
BY BINARY_INTEGER;
  TYPE strarray IS TABLE OF VARCHAR2(11)
INDEX BY BINARY_INTEGER;
  TYPE rowidarray IS TABLE OF ROWID INDEX
BY BINARY_INTEGER;
  PROCEDURE getstatus
  (
    ware_id                INTEGER,
    dist_id                INTEGER,
    cust_id           IN OUT INTEGER,
    bylastname             INTEGER,
    cust_last         IN OUT VARCHAR2,
    cust_first           OUT VARCHAR2,
    cust_middle          OUT VARCHAR2,
    cust_balance         OUT NUMBER,
    ord_id            IN OUT INTEGER,
    ord_entry_d          OUT VARCHAR2,
    ord_carrier_id       OUT INTEGER,
    ord_ol_cnt           OUT INTEGER,
    oline_supply_w_id IN OUT intarray,
    oline_i_id        IN OUT intarray,
    oline_quantity    IN OUT intarray,
    oline_amount      IN OUT numarray,
    oline_delivery_d  IN OUT strarray
  );
END;
/

CREATE OR REPLACE PACKAGE BODY
orderstatus
IS
  PROCEDURE getstatus
  (
    ware_id                INTEGER,
    dist_id                INTEGER,
    cust_id           IN OUT INTEGER,
    bylastname             INTEGER,
    cust_last         IN OUT VARCHAR2,
    cust_first           OUT VARCHAR2,
    cust_middle          OUT VARCHAR2,
    cust_balance         OUT NUMBER,
    ord_id            IN OUT INTEGER,
    ord_entry_d          OUT VARCHAR2,
    ord_carrier_id       OUT INTEGER,
    ord_ol_cnt           OUT INTEGER,
    oline_supply_w_id IN OUT intarray,
    oline_i_id        IN OUT intarray,
    oline_quantity    IN OUT intarray,
    oline_amount      IN OUT numarray,
    oline_delivery_d  IN OUT strarray
  )
  IS
    cust_rowid             ROWID;
    ol                     BINARY_INTEGER;
    c_num                  BINARY_INTEGER;
    row_id                 rowidarray;
    CURSOR o_cur IS
      SELECT ol_i_id, ol_supply_w_id,
ol_quantity, ol_amount,
          nvl(to_char(ol_delivery_d,'DD-MM-
YYYY'), 'NOT DELIVR') del_date
      FROM order_line
      WHERE ol_d_id = dist_id AND ol_w_id =
ware_id AND ol_o_id = ord_id;
    CURSOR c_cur IS
      SELECT rowid
      FROM customer
      WHERE c_d_id = dist_id AND c_w_id =
ware_id AND c_last = cust_last
      ORDER BY c_w_id, c_d_id, c_last, c_first;
  BEGIN

    IF bylastname != 0 THEN

      c_num := 0;
      FOR c_id_rec IN c_cur LOOP
        c_num := c_num + 1;
        row_id(c_num) := c_id_rec.rowid;
      END LOOP;
      cust_rowid := row_id ((c_num + 1) / 2);

      SELECT c_id, c_balance, c_first, c_middle,
c_last
        INTO cust_id, cust_balance, cust_first,
cust_middle, cust_last
        FROM customer
        WHERE rowid = cust_rowid;

    ELSE

      SELECT c_balance, c_first, c_middle, c_last
        INTO cust_balance, cust_first,
cust_middle, cust_last
        FROM customer
        WHERE c_id = cust_id AND c_d_id =
dist_id AND c_w_id = ware_id;

    END IF;

    SELECT o_id, to_char(o_entry_d, 'DD-MM-
YYYY.HH24:MI:SS'),
        nvl(o_carrier_id,0), o_ol_cnt
      INTO ord_id, ord_entry_d, ord_carrier_id,
ord_ol_cnt
      FROM orders
      WHERE o_d_id = dist_id AND o_w_id =
ware_id AND o_id =
        (SELECT max(o_id)
         FROM orders
         WHERE o_d_id = dist_id AND o_w_id =
ware_id AND o_c_id = cust_id);

    ol := 0;
    FOR o_cur_rec IN o_cur LOOP
      ol := ol + 1;
      oline_i_id(ol) := o_cur_rec.ol_i_id;
      oline_supply_w_id(ol) :=
o_cur_rec.ol_supply_w_id;
      oline_quantity(ol) := o_cur_rec.ol_quantity;
      oline_amount(ol) := o_cur_rec.ol_amount;
      oline_delivery_d(ol) := o_cur_rec.del_date;
    END LOOP;

    COMMIT;

  END;
END;
/

quit;

rem
rem
=====================================
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Belmont, CA          |
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|
rem
=====================================
==========================+
rem  FILENAME
rem       pay.sql
rem  DESCRIPTION
rem       SQL script to create a stored procedure
for payment
rem       transactions.
rem
=====================================
==========================
rem

CREATE OR REPLACE PACKAGE payment
IS
  PROCEDURE dopayment
  (
    ware_id                INTEGER,
    dist_id                INTEGER,
    cust_w_id              INTEGER,
    cust_d_id              INTEGER,
    cust_id           IN OUT INTEGER,
    bylastname             INTEGER,
    hist_amount            NUMBER,
    cust_last         IN OUT VARCHAR2,
    ware_street_1        OUT VARCHAR2,
    ware_street_2        OUT VARCHAR2,
    ware_city            OUT VARCHAR2,
    ware_state           OUT VARCHAR2,
    ware_zip             OUT VARCHAR2,
    dist_street_1        OUT VARCHAR2,
    dist_street_2        OUT VARCHAR2,
    dist_city            OUT VARCHAR2,
    dist_state           OUT VARCHAR2,
    dist_zip             OUT VARCHAR2,
    cust_first           OUT VARCHAR2,
    cust_middle          OUT VARCHAR2,
    cust_street_1        OUT VARCHAR2,
    cust_street_2        OUT VARCHAR2,
    cust_city            OUT VARCHAR2,
    cust_state           OUT VARCHAR2,
    cust_zip             OUT VARCHAR2,
    cust_phone           OUT VARCHAR2,
    cust_since           OUT VARCHAR2,
    cust_credit       IN OUT VARCHAR2,
    cust_credit_lim      OUT NUMBER,
```

```
    cust_discount       OUT NUMBER,
    cust_balance     IN OUT NUMBER,
    cust_data          OUT VARCHAR2,
    hist_date          OUT VARCHAR2,
    retry           IN OUT INTEGER
  );
END;
/

CREATE OR REPLACE PACKAGE BODY
payment
IS
  PROCEDURE dopayment
  (
    ware_id               INTEGER,
    dist_id               INTEGER,
    cust_w_id             INTEGER,
    cust_d_id             INTEGER,
    cust_id          IN OUT INTEGER,
    bylastname            INTEGER,
    hist_amount           NUMBER,
    cust_last        IN OUT VARCHAR2,
    ware_street_1       OUT VARCHAR2,
    ware_street_2       OUT VARCHAR2,
    ware_city           OUT VARCHAR2,
    ware_state          OUT VARCHAR2,
    ware_zip            OUT VARCHAR2,
    dist_street_1       OUT VARCHAR2,
    dist_street_2       OUT VARCHAR2,
    dist_city           OUT VARCHAR2,
    dist_state          OUT VARCHAR2,
    dist_zip            OUT VARCHAR2,
    cust_first          OUT VARCHAR2,
    cust_middle         OUT VARCHAR2,
    cust_street_1       OUT VARCHAR2,
    cust_street_2       OUT VARCHAR2,
    cust_city           OUT VARCHAR2,
    cust_state          OUT VARCHAR2,
    cust_zip            OUT VARCHAR2,
    cust_phone          OUT VARCHAR2,
    cust_since          OUT VARCHAR2,
    cust_credit      IN OUT VARCHAR2,
    cust_credit_lim     OUT NUMBER,
    cust_discount       OUT NUMBER,
    cust_balance     IN OUT NUMBER,
    cust_data          OUT VARCHAR2,
    hist_date          OUT VARCHAR2,
    retry           IN OUT INTEGER
  )
  IS
    TYPE rowidarray IS TABLE OF ROWID
INDEX BY BINARY_INTEGER;
    cust_rowid            ROWID;
    dist_name             VARCHAR2(11);
    ware_name             VARCHAR2(11);
    history_date          DATE;
    c_num                 BINARY_INTEGER;
    row_id                rowidarray;
    not_serializable      EXCEPTION;
    PRAGMA EXCEPTION_INIT(not_serializable,-
8177);
    deadlock              EXCEPTION;
    PRAGMA EXCEPTION_INIT(deadlock,-60);
    CURSOR c_cur IS
      SELECT rowid
      FROM customer
      WHERE c_d_id = dist_id AND c_w_id =
ware_id AND c_last = cust_last
      ORDER BY c_w_id, c_d_id, c_last, c_first;
  BEGIN
    LOOP BEGIN

      IF bylastname != 0 THEN

        c_num := 0;
        FOR c_id_rec IN c_cur LOOP
          c_num := c_num + 1;
          row_id(c_num) := c_id_rec.rowid;
        END LOOP;
        cust_rowid := row_id ((c_num + 1) / 2);

        SELECT c_id, c_first, c_middle, c_last,
c_street_1, c_street_2,
               c_city, c_state, c_zip, c_phone,
               to_char (c_since, 'DD-MM-YYYY'),
c_credit, c_credit_lim,
               c_discount, c_balance
          INTO cust_id, cust_first, cust_middle,
cust_last, cust_street_1,
               cust_street_2, cust_city, cust_state,
cust_zip, cust_phone,
               cust_since, cust_credit,
cust_credit_lim, cust_discount,
               cust_balance
          FROM customer
          WHERE rowid = cust_rowid;

      ELSE

        SELECT rowid, c_first, c_middle, c_last,
c_street_1, c_street_2,
               c_city, c_state, c_zip, c_phone,
               to_char (c_since, 'DD-MM-YYYY'),
c_credit, c_credit_lim,
               c_discount, c_balance
          INTO cust_rowid, cust_first,
cust_middle, cust_last,
               cust_street_1, cust_street_2,
cust_city, cust_state,
               cust_zip, cust_phone, cust_since,
cust_credit,
               cust_credit_lim, cust_discount,
cust_balance
          FROM customer
          WHERE c_id = cust_id AND c_d_id =
cust_d_id AND
                c_w_id = cust_w_id;

      END IF;

      cust_balance := cust_balance -
hist_amount;

      IF cust_credit = 'BC' THEN

        UPDATE customer
          SET c_balance = c_balance -
hist_amount,
              c_ytd_payment = c_ytd_payment +
hist_amount,
              c_payment_cnt = c_payment_cnt + 1,
              c_data = substr ((to_char (cust_id) || '
' ||
                                to_char (cust_d_id) || ' ' ||
                                to_char (cust_w_id) || ' ' ||
                                to_char (dist_id) || ' ' ||
                                to_char (ware_id) || ' ' ||
                                to_char (hist_amount,
'9999.99') || ' | ')
                               || c_data, 1, 500)
          WHERE rowid = cust_rowid;

        SELECT substr (c_data, 1, 200)
          INTO cust_data
          FROM customer
          WHERE rowid = cust_rowid;

      ELSE

        UPDATE customer
          SET c_balance = c_balance -
hist_amount,
              c_ytd_payment = c_ytd_payment +
hist_amount,
              c_payment_cnt = c_payment_cnt + 1
          WHERE rowid = cust_rowid;

        cust_data := ' ';

      END IF;

      UPDATE district
        SET d_ytd = d_ytd + hist_amount
        WHERE d_id = dist_id AND d_w_id =
ware_id;

      SELECT d_name, d_street_1, d_street_2,
d_city, d_state, d_zip
        INTO dist_name, dist_street_1,
dist_street_2, dist_city,
             dist_state, dist_zip
        FROM district
        WHERE d_id = dist_id AND d_w_id =
ware_id;

      UPDATE warehouse
        SET w_ytd = w_ytd + hist_amount
        WHERE w_id = ware_id;

      SELECT w_name, w_street_1, w_street_2,
w_city, w_state, w_zip
        INTO ware_name, ware_street_1,
ware_street_2, ware_city,
             ware_state, ware_zip
        FROM warehouse
        WHERE w_id = ware_id;

      history_date := sysdate;
      hist_date := to_char (history_date, 'DD-MM-
YYYY.HH24:MI:SS');

      INSERT INTO history VALUES
        (cust_id, cust_d_id, cust_w_id, dist_id,
ware_id, history_date,
         hist_amount, ware_name || '    ' ||
dist_name);

      COMMIT;
      EXIT;

      EXCEPTION
        WHEN not_serializable OR deadlock
THEN
          ROLLBACK;
          retry := retry + 1;
      END;

    END LOOP;
  END;
END;
/

quit;

rem
```

```
rem
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rem
=====================================
============================+
rem  FILENAME
rem       sto.sql
rem  DESCRIPTION
rem       SQL script to create a stored procedure
for stock level
rem       transactions.
rem
=====================================
============================
rem

CREATE OR REPLACE PACKAGE stocklevel
IS
  PROCEDURE getstocklevel
  (
    ware_id       INTEGER,
    dist_id       INTEGER,
    threshold     INTEGER,
    low_stock OUT INTEGER
  );
END;
/

CREATE OR REPLACE PACKAGE BODY
stocklevel
IS
  PROCEDURE getstocklevel
  (
    ware_id       INTEGER,
    dist_id       INTEGER,
    threshold     INTEGER,
    low_stock OUT INTEGER
  )
  IS
  BEGIN
    SELECT count (DISTINCT s_i_id)
      INTO low_stock
      FROM order_line, stock, district
      WHERE d_id = dist_id AND d_w_id =
ware_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);
    COMMIT;
  END;
END;
/

quit;

*
```

# *Appendix F: 180 Day Space Calculations*

| TPM | 2,735 | | | | | |
|---|---|---|---|---|---|---|
| Warehouses | 235 | | | | | |
| | | | | | | |
| | | | | | | |
| SEGMENT | TYPE | TSPACE | BLOCKS | FIVE_PCT | DAILY_GROW | TOTAL |
| CUSTOMER | TABLE | CUST | 3,525,007 | 176,250 | 0 | 3,701,257 |
| DISTRICT | TABLE | WARE | 2,354 | 118 | 0 | 2,472 |
| HISTORY | TABLE | HIST | 196,984 | 0 | 36,212 | 233,196 |
| ICUSTOMER | INDEX | ICUST1 | 81,110 | 4,056 | 0 | 85,166 |
| ICUSTOMER2 | INDEX | ICUST2 | 185,652 | 9,283 | 0 | 194,935 |
| IDISTRICT | INDEX | WARE | 1,000 | 50 | 0 | 1,050 |
| IITEM | INDEX | ITEMS | 1,000 | 50 | 0 | 1,050 |
| INEW_ORDER | INDEX | INORD | 26,320 | 1,316 | 0 | 27,636 |
| IORDERS | INDEX | IORD1 | 80,684 | 4,034 | 0 | 84,718 |
| IORDERS2 | INDEX | IORD2 | 134,637 | 6,732 | 0 | 141,369 |
| IORDER_LINE | INDEX | IORDL | 942,203 | 47,110 | 0 | 989,313 |
| ISTOCK | INDEX | ISTK | 246,188 | 12,309 | 0 | 258,497 |
| ITEM | TABLE | ITEMS | 6,667 | 333 | 0 | 7,000 |
| IWAREHOUSE | INDEX | WARE | 50 | 3 | 0 | 53 |
| NEW_ORDER | TABLE | NORD | 18,408 | 920 | 0 | 19,328 |
| ORDERS | TABLE | ORD | 140,553 | 0 | 25,838 | 166,391 |
| ORDER_LINE | TABLE | ORDL | 2,540,379 | 0 | 466,997 | 3,007,376 |
| ROLL_SEG | SYS | ROLL | 172,032 | 0 | 0 | 172,032 |
| STOCK | TABLE | STOCKS | 4,700,001 | 235,000 | 0 | 4,935,001 |
| SYSTEM | SYS | SYSTEM | 120,832 | 0 | 0 | 120,832 |
| WAREHOUSE | TABLE | WARE | 235 | 12 | 0 | 247 |
| | | | | | | |
| Total | | | 13,122,296 | 497,576 | 529,047 | 14,148,919 |
| | | | | | | |
| Dynamic space | | 2,877,916 | | | | |
| Static space | | 10,741,956 | | | | |
| Free space | | 529,047 | | | | |
| | | | | | | |
| Daily growth | | 529,047 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Daily spread | | 0 | Oracle may be configured such that daily spread is 0 | | | |
| 180-day space (blk.) | | 105,970,416 | | | | |
| Block size (bytes) | | 2,048 | | | | |
| 180-day (GB) | | 202.12 | | | | |
| | | | | | | |
| Log block size | | 1,024 | | | | |
| Log blocks/tpmC | | 13.89 | Number of log blocks used in one minute | | | |
| 8-hour log (GB) | | 17.39 | | | | |
| | | | | | | |
| | | | | | | |
| DISKS PRICED | | | | | SPACE USAGE (GB) | |
| SIZE | Count | Capacity(GB) | | | 180-day | 202.12 |
| 2.0 GB DISK | 96 | 192.0 | | | Log | 17.39 |
| 4.0 GB DISK | 14 | 56.0 | | | OS,swap,etc | 2.00 |
| Total | 110 | 248.0 | | | Total | 221.51 |
| | | | | | | |

# *Appendix G: Auditor's attestation letter*