and

TPC Benchmark™C

Full Disclosure Report

Fujitsu DS/90 7000 Series Model 7700H Type II

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 15, 1996.

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

All performance data contained in this report were obtained in a rigorously controlled environment. Results obtained in other operating environments may vary significantly. Fujitsu does not warrant or represent that a user can or will achieve similar performance expressed in transactions per minute (tpmC) or normalized price/performance (¥/tpmC). No warranty of system performance or price/performance is expressed or implied in this report.

Printed in Japan October 15, 1996

UXP/DS V20 is derived from UNIX System V Release 4.2

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TP-Base is a trademark of Fujitsu Limited in Japan.

TPC Benchmark, TPC-C and tpmC are trademarks of the Transaction Processing Performance Council.

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 II. 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:

1,681.06 tpmC
¥111,765 per tpmC
Available as of March, 1997

Standard and Executive Summary Statements

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

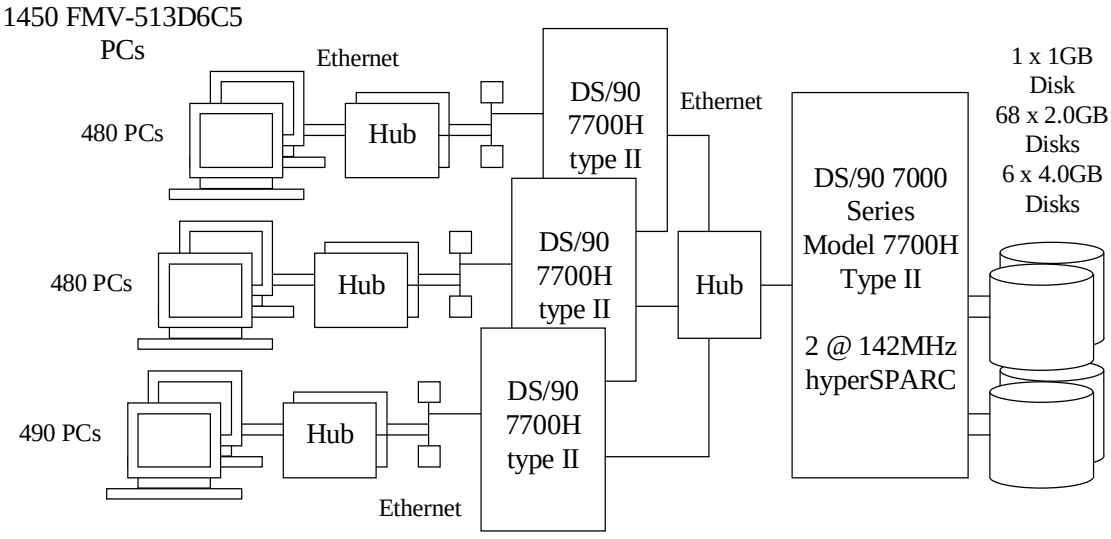
Auditor

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 II C/S with 3 Front-Ends		TPC-C Rev. 3.2
			Report Date: Oct. 1996
Total System Cost	TPC-C Throughput	Price/Performance	Availability Date
187,883,800 Yen	1681.06 tpmC	111,765 Yen/tpmC	March 1997

Processors	Database Manager	Operating System	Other Software	Number of Users
2 @ 142MHz hyperSPARC	Oracle7 RDBMS Version 7.3 Japanese Version	UXP/DS Basic Software V20	TP-Base V20	1450



System Components	Qty	Server Description	Qty	Clients Description
Processor	1	2 hyperSPARC @ 142MHz	3	2 hyperSPARC @ 142MHz (each client)
Cache Memory		1MB (each processor)		1MB (each processor)
Memory		512MB		512MB
Disk Controller	1	SCSI-2 (1 Channel)	3	SCSI-2 (1 Channel)
	9	Wide-SCSI (1 Channel)		
Disks	1	1GB Disk	3	1GB Disk
	68	2.0GB Disk		
	6	4.0GB Disk		
Total GB of Storage		161.0GB		3GB
Terminals	1	Console	3	Console

FUJITSU
ORACLE

Detailed Pricing information
DS/90 7700H Type II C/S
with 3 Front-Ends

TPC-C Rev 3.2

Report Date:

October 15, 1996

Order Number	Description	Quantity	Unit Price	Extended Price	Maintenance rate/unit*	5 Years Maintenance
Server Hardware						
F7970C5	DS/90 7000 model 7700H type II	1	4,700,000	4,700,000	19,600	1,058,400
F7978SB1	Internal Sbus extention unit	1	300,000	300,000	1,500	81,000
F7978SB2	Sbus extention unit	1	900,000	900,000	4,500	243,000
F7952M31	Additional memory (64MB)	8	864,000	6,912,000	0	0
F7949RA3	External Cabinet	4	630,000	2,520,000	3,200	691,200
F7949FU2A	External File unit	18	700,000	12,600,000	3,500	3,402,000
F7958HS1	Wide SCSI-2 adapter	9	250,000	2,250,000	0	0
F7945A4E	Additional Fast-SCSI disk (2.0GB)	1	320,000	320,000	1,600	86,400
F7945A5E	Additional Wide-SCSI disk (2.0GB)	67	380,000	25,460,000	1,900	6,874,200
F7973D41A	Additional Wide-SCSI disk (4.0GB)	6	680,000	4,080,000	3,400	1,101,600
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			61,278,000		13,845,600
Server Software						
B7831SK3G	UXP/DS Basic Software V20	1	800,000	800,000	220,000	1,100,000
	ORACLE7 RDBMS & SQL*Net	1	15,600,000	15,600,000	3,120,000	15,600,000
	Server Software Subtotals			16,400,000		16,700,000
Client Hardware						
F7970C5	DS/90 7000 model 7700H type II (w/ NIC)	3	4,700,000	14,100,000	19,600	3,175,200
F7952M31	Additional memory (64MB)	24	864,000	20,736,000	0	0
F7930LA2C	10Mbps LAN adapter	3	100,000	300,000	0	0
F7960A11	Display unit	3	380,000	1,140,000	1,500	243,000
DCBL-RCB05	RS-232 cable	3	16,000	48,000	0	0
	Client Hardware Subtotals			36,324,000		3,418,200
Client Software						
B7831SK0G	UXP/DS Basic Software V20 Additional user license	3	640,000	1,920,000	220,000	3,300,000
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	2	400,000	800,000	88,000	880,000
	Client Software Subtotals			3,520,000		6,886,000
User Connectivity						
LH8X	Hub units (8ports) **	3	34,800	104,400	1,100	178,200
LH16XA2	Hub units (16ports) **	101	230,000	23,230,000	1,100	5,999,400
	User Connectivity Subtotals			23,334,400		6,177,600
	Totals			140,856,400		47,027,400
	5 Year cost					187,883,800
	tpmC					1681.06
	Yen / tpmC					111,765
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 II Oracle V7.3

MQTH, Computed Maximum Qualified Throughput	1,681.06 tpmC		
Response Times (in seconds)	**Average**	**90%**	**Max.**
New-Order	2.04	4.27	17.36
Payment	1.49	3.57	17.50
Order-Status	1.56	3.66	13.95
Delivery (interactive portion)	0.12	0.26	1.90
Delivery (deferred portion)	1.75	3.85	14.48
Stock-Level	3.21	5.71	18.71
Menu	0.18	0.27	7.59
Transaction Mix, in percent of total transaction			
New-Order			44.69
Payment			43.24
Order-Status			4.02
Delivery			4.00
Stock-Level			4.03
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	18.11	0.01	18.22	12.06	18.37	117.09
Payment	3.02	0.01	3.06	12.17	3.24	117.77
Order-Status	2.01	0.01	2.05	10.18	2.14	86.53
Delivery (interactive)	2.03	0.01	2.06	5.10	2.22	46.59
Stock-Level	2.03	0.01	2.06	5.19	2.16	44.82

Test Duration	
Ramp-up time (seconds)	2580
Measurement interval	1800
Transactions during measurement interval	50,432
Ramp down time	
Checkpointing	
Number of checkpoints	1
Checkpoint interval	1800 sec.
Reproducibility Run	
Reported measurement	1681.06
Reproducibility measurement	1661.46
Difference	19.60

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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

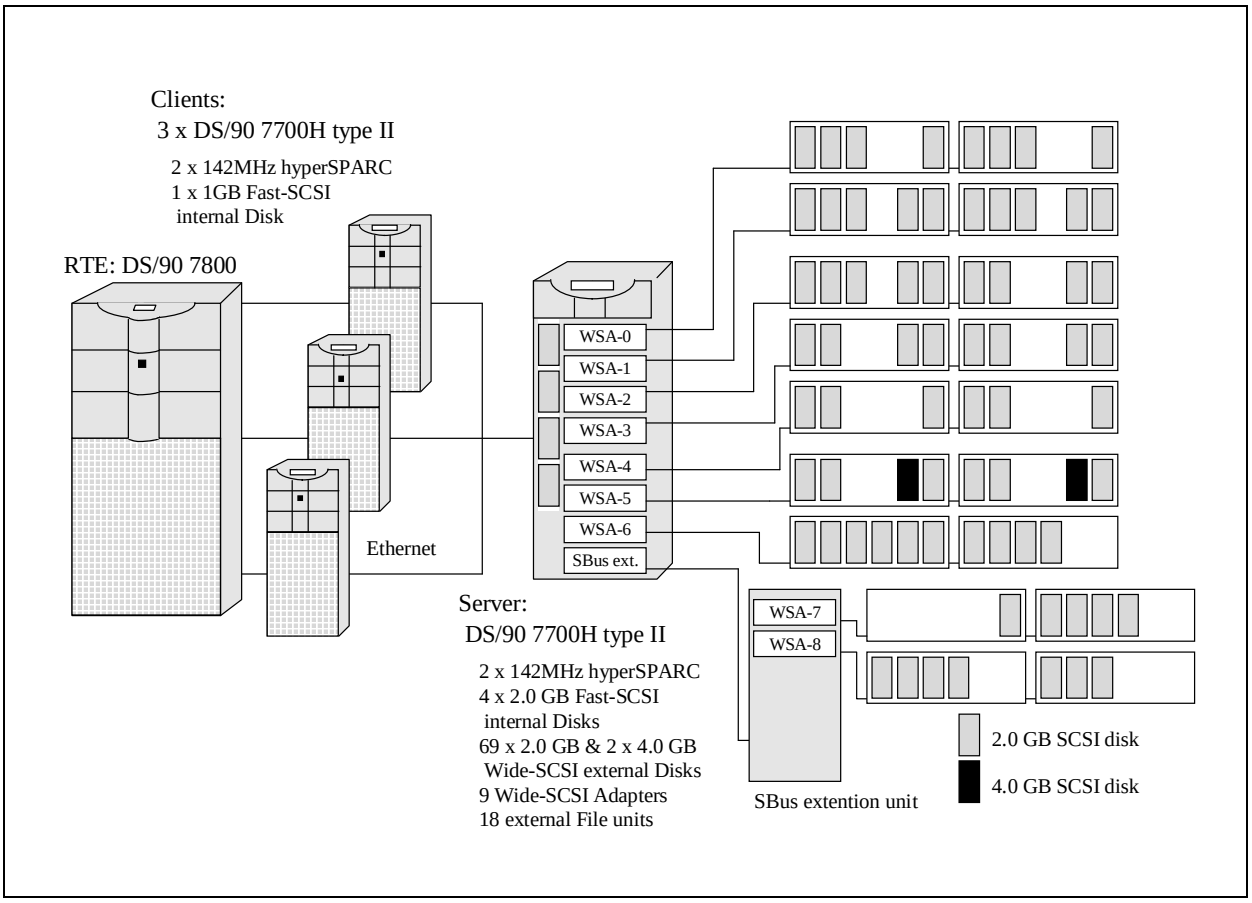
Diagrams of both measured and priced configurations must be provided, accompanied by a description of the differences.

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

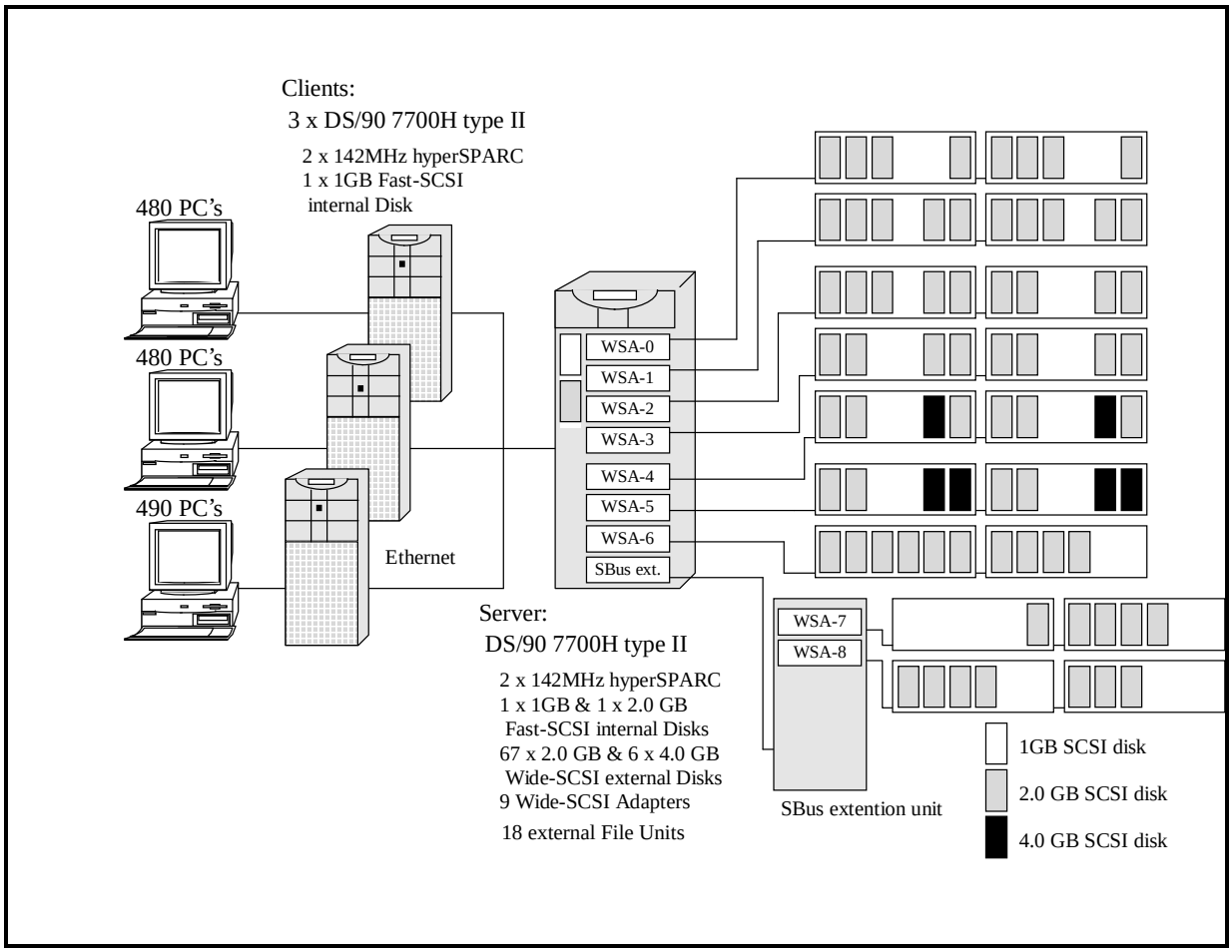
The configuration diagrams for both the tested and priced systems are included on the following pages.

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 II

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	

SCSI adapter	Device	TABLE NAME	FILE NAME	SIZE (Mbytes)	DISK CAPACITY
		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	
	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	
	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	
	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	

SCSI adapter	Device	TABLE NAME	FILE NAME	SIZE (Mbytes)	DISK CAPACITY
		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	
	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	
	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	
	hd64	ORDER LINE INDEX	/dev/rdsk/hd6401	721	2.0GB
		NEW ORDER INDEX	/dev/rdsk/hd6402	33	
		ORDER INDEX 1	/dev/rdsk/hd6403	73	

SCSI adapter	Device	TABLE NAME	FILE NAME	SIZE (Mbytes)	DISK CAPACITY
		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	
	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	
	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	
	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

SCSI adapter	Device	TABLE NAME	FILE NAME	SIZE (Mbytes)	DISK CAPACITY
		STOCK	/dev/rdsk/hda4102	251	
		CUSTOMER	/dev/rdsk/hda4104	183	
		ORDERS	/dev/rdsk/hda4105	16	
		NEW ORDER	/dev/rdsk/hda4106	6	
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	
	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	
	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
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
	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
	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	98.98%
	Remote warehouse order lines	1.02%
	Rolled back transactions	0.94%
	Average items per order	10.00
Payment	Home warehouse	85.12%
	Remote warehouse	14.88%
	Accessed by last name	59.99%
Order Status	Accessed by last name	60.55%
Delivery	Skipped transactions	none
Transaction Mix	New Order	44.69%
	Payment	43.24%
	Order status	4.02%
	Delivery	4.00%
	Stock level	4.03%

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 145 warehouses under a full load of 1450 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 1450 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	145
District	1450
Customer	4,350,000
History	4,350,000
Order	4,350,000
New Order	1,305,000
Order Line	43,502,390
Stock	14,500,000
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	1,681.06 tpmC
Price per tpmC	¥111,765

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	2.04	17.36	4.27
Payment	1.49	17.50	3.57
Order-Status	1.56	13.95	3.66
Interactive Delivery	0.12	1.90	0.26
Deferred Delivery	1.75	14.48	3.85
Stock-Level	3.21	18.71	5.71
Menu	0.18	7.59	0.27

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	18.11	18.22	18.37
Payment	3.02	3.06	3.24
Order-Status	2.01	2.05	2.14
Interactive Delivery	2.03	2.06	2.22
Stock-Level	2.03	2.06	2.16

Table 5.3 Think Times

Type	Minimum	Average	Maximum
New-Order	0.01	12.06	117.09
Payment	0.01	12.17	117.77
Order-Status	0.01	10.18	86.53
Interactive Delivery	0.01	5.10	46.59
Stock-Level	0.01	5.19	44.82

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

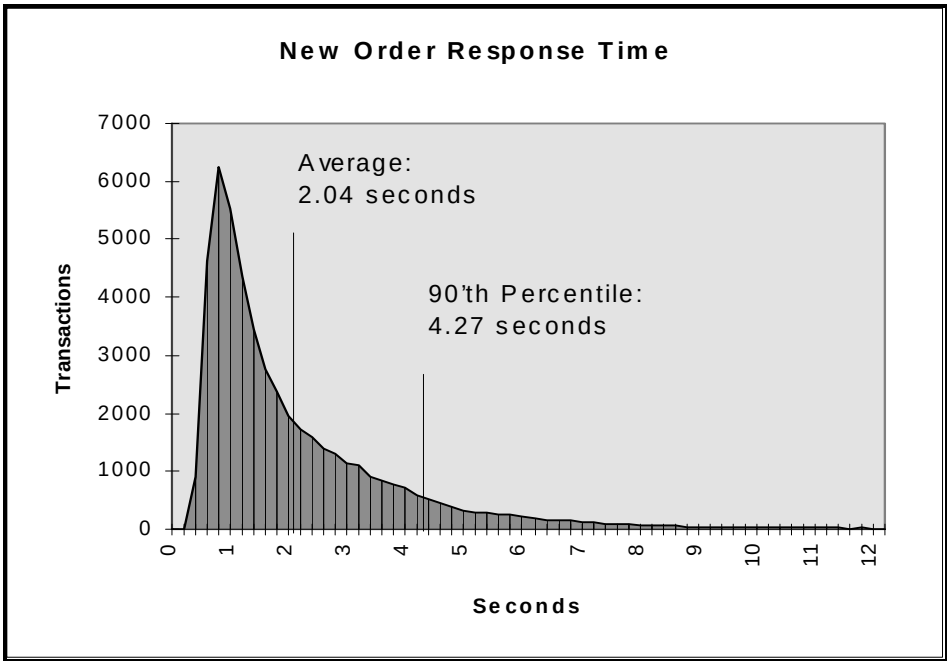


Figure 5.2: Payment Response Time Distribution

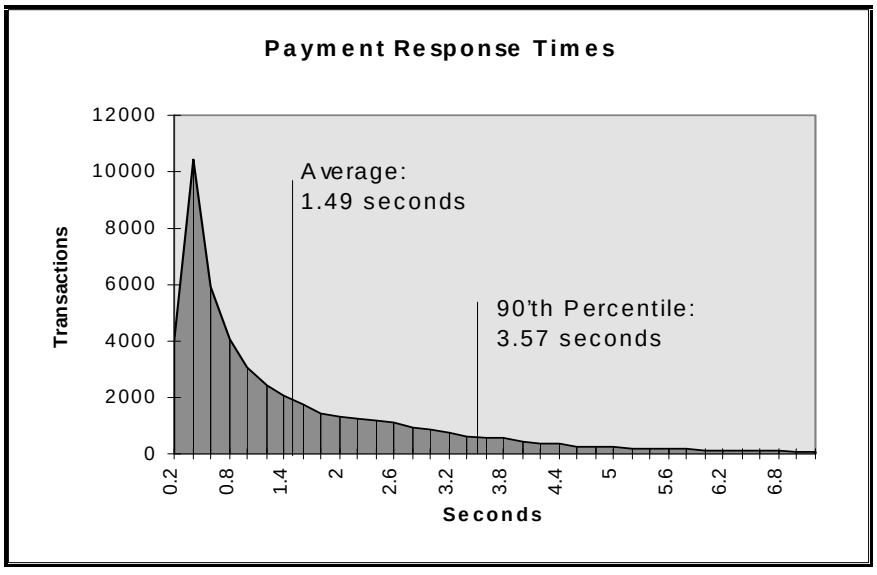


Figure 5.3: Order Status Response Time Distribution

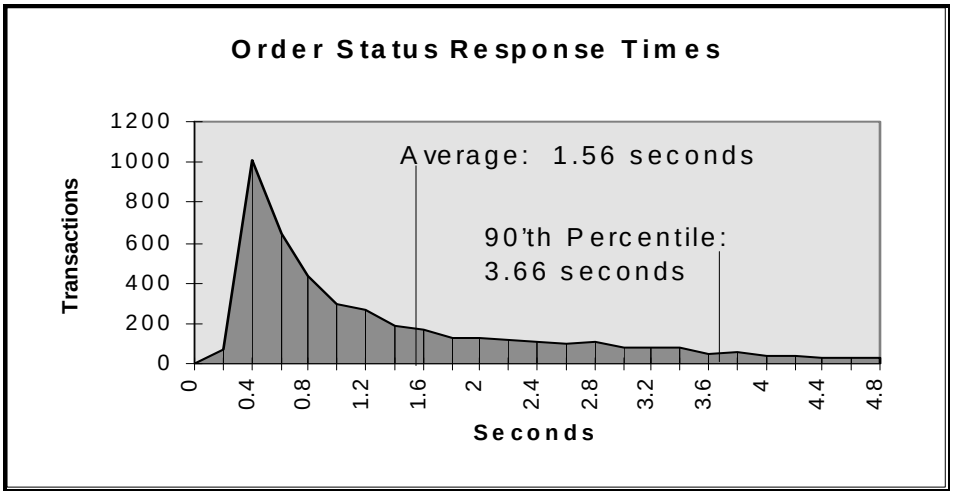


Figure 5.4: Delivery Response Time Distribution

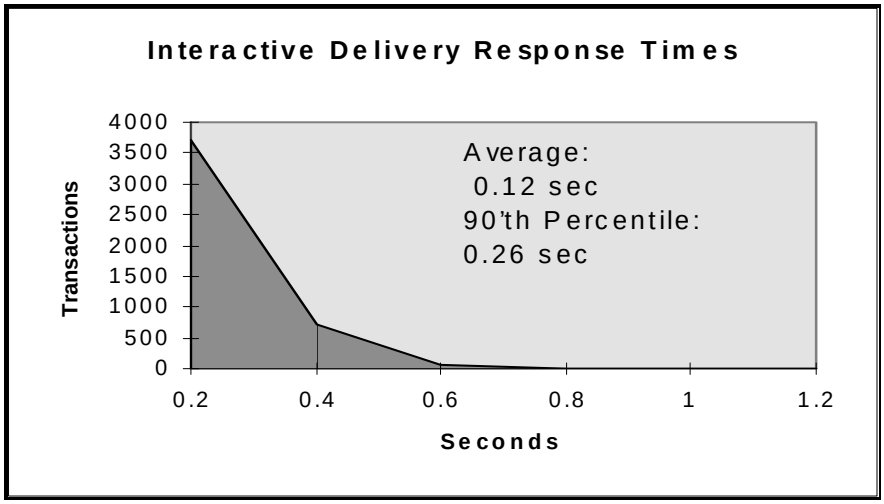


Figure 5.5: Stock Level Response Time Distribution

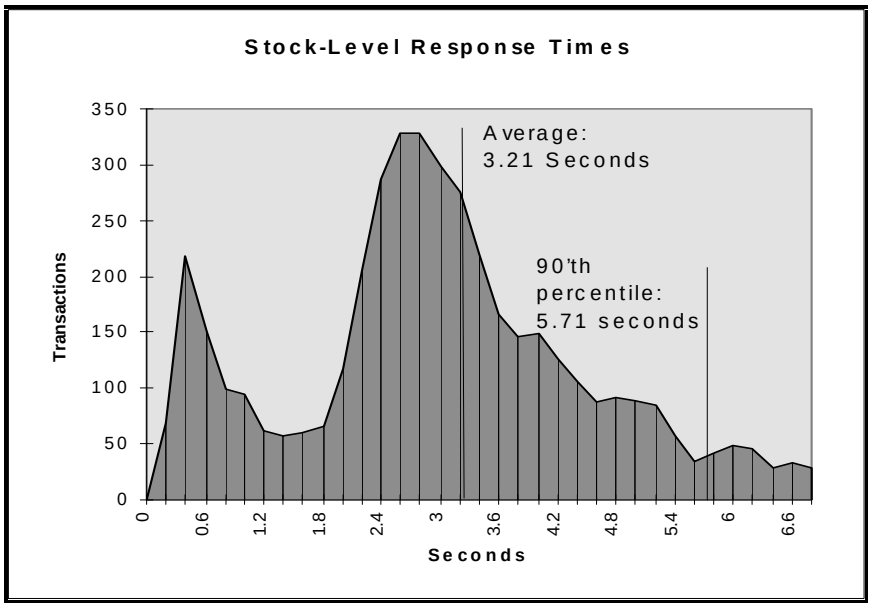


Figure 5.6: New Order Think Time Frequency Distribution

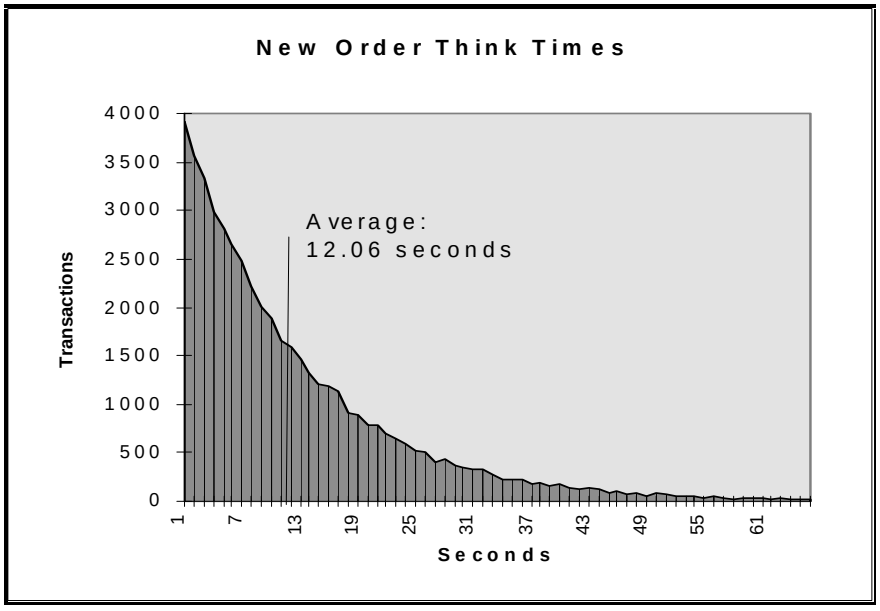


Figure 5.7: Response time versus Throughput

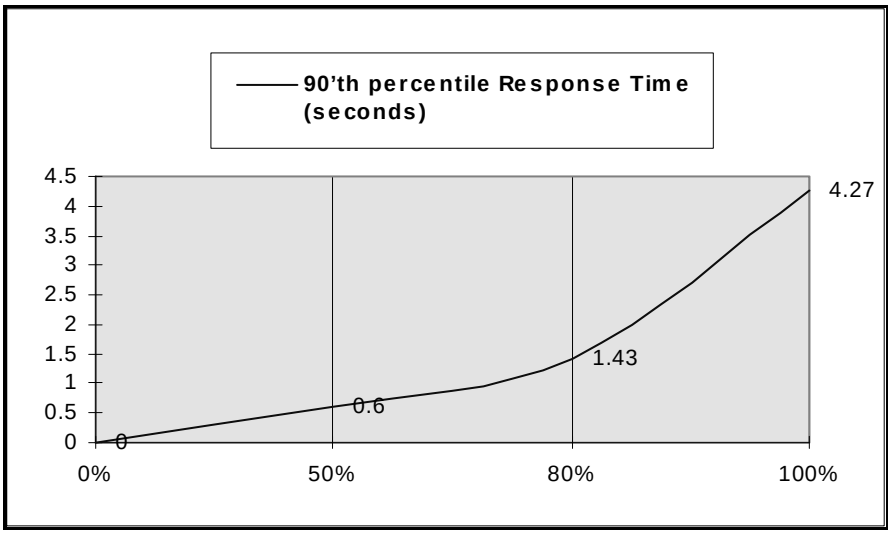
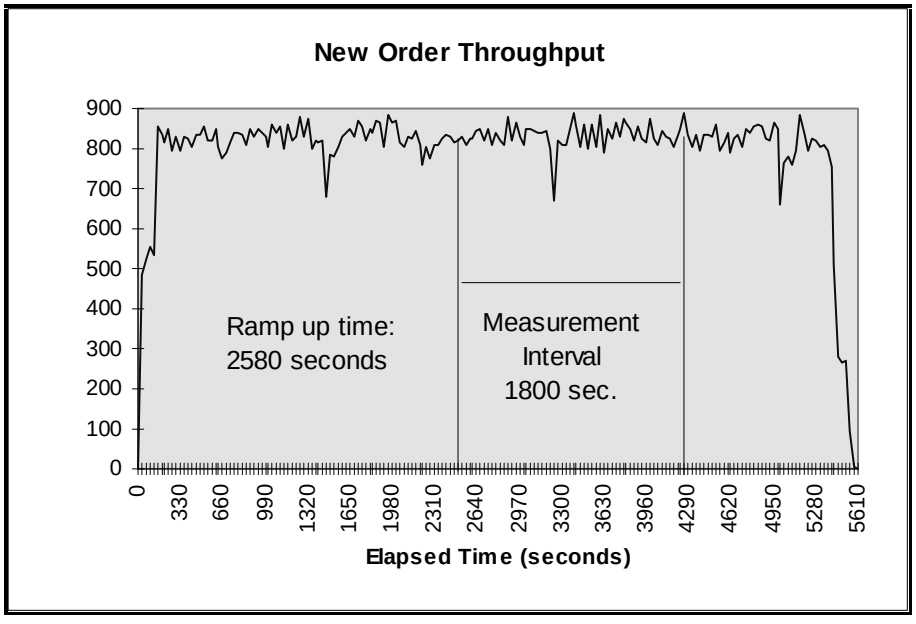


Figure 5.8: New Order Sustained Throughput



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	43.24%
	ORDER STATUS	4.02%
	DELIVERY	4.00%
	STOCK LEVEL	4.03%

New Order	Home warehouse order lines	98.98%
	Remote warehouse order lines	1.02%
	Rolled back transactions	0.94%
	Average items per order	10.00
Payment	Home warehouse	85.12%
	Remote warehouse	14.88%
	Accessed by last name	59.99%
Order Status	Accessed by last name	60.55%
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:**	•**1,681.06 tpmC**
•**Price per tpmC**	•**¥111,765**
•**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

```
/*
        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_ */

/*
        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_ */

/*
        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

/*
        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

/*
                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,

        "XXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXX", 0, 0 },
        { 18, 11, "", F_RO|F_NE,

        "XXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXX", 0, 0 },
        { 19, 11, "", F_RO|F_NE,

        "XXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXX", 0, 0 },
        { 20, 11, "", F_RO|F_NE,

        "XXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXX", 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,
"XXXXXXXXXXXXXXXXXXXXXXXXX",
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,
"XXXXXXXXXXXXXXXXXXXXXXXXX",
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,
"XXXXXXXXXXXXXXXXXXXXXXXXX",
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 }
};

/*
        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_STRUCT
URE             /* 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[1 50], 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


        neworder_data[neworderl( i
)+2].x.dptr =

        bp->newout.i_name[i];
                        sprintf(
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 );
}
```

```
/*
        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 :
                /* ¥«¡¼¥½¥ë¤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¤ï½ü¡£ */
                        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¡¢

                                °ï½ü¤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-¹æ¤Î°ÌÃÖ (^^;; */


        if ( flags & F_RJ )
        {
                /*
É½¼¨¤ò±¦µÍ¤á¤Ç¹Ô¤Ê¤¹¾ì¹ç¡¢¥Ç¡¼¥¿¤Î¸å¤í
¤«¤é½èÍý¤·¤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¡¢½ºÎ»¥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¤¿»þÅÀ¤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¤Ç¤Ï¤Ê¤¯¡¤Éé¹æ¤È¤·¤Æ¤Î
'-' */


        if ( minusp == -1 )

        {

                /* '-'
¤ò¸¡½Ð¤·¤¿¤Î¤Çµ-Ï¿¡¥

                  ¼ÂºÝ¤Î½ñ¤-¹þ¤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¤-¹þ¤ó¤ÀÊ¸»ú¿ô =
¸½ºß¤Î¥«¡¼¥½¥ë°ÌÃÖ¤ò

¥»¥Ã¥È¡±¦µÍ¤á¤Î»þ¤Ï¡¢out ¤ÎºÇ¸å¤Î°ÌÃÖ¤ò

¥»¥Ã¥È¡£ */


        if ( ( curp == len ) && !( flags &
F_RJ ) )

        {

        curp = i;

        }


        /*
¥Ç¡¼¿¤ÎÆþ¤Ã¤Æ¤¤¤Ê¤¤¤È¤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¸¡¥¾¾¤Ë¶õÇò¤ò½ÐÎÏ¡¥ */


                out[i] = ' ';

                minusp = i;

                break;
                                case -2 :

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

¥Õ¥é¥°¤ò½é´ü¾¤¤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 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 TAB:
				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

}

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

ORACLE_HOME	= /oracle
SOURCE_DIR	=
$(ORACLE_HOME)/bench/tpc/tpcc/TUX_so
urce
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='$(CCFLAGSDEFAU
LT) $(MAPOPTION) -DSCRTEST' \
                        BLDCLI=$(CC) \
                        BLDFIN= \
                        BLDFOUT= \
                        BLDLIB='$(LIBS)' \
                        Tc

2cpu        :
            make
            CCFLAGS='$(CCFLAGSDEFAU
LT) $(MAPOPTION) -DCPU2' \

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

normal      :
            make
            CCFLAGS='$(CCFLAGSDEFAU
LT) $(MAPOPTION)' \

            BLDCLI='${ROOTDIR}/bin/buil
dclient -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
```

Appendix B: Server Source Code

```
/*=====================================
============================+
|      Copyright (c) 1995  Oracle Corp, Redwood
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|                OPEN SYSTEMS PERFORMANCE
GROUP               |
|                   All Rights Reserved
|

+=====================================
============================+
| 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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GROUP               |
|                   All Rights Reserved
|

+=====================================
============================+
| FILENAME
|   plnew.c
| DESCRIPTION
|   OCI version (using PL/SQL stored procedure)
of
|   NEW ORDER transaction in TPC-C
benchmark.

+=====================================
============================*/

#include "tpcc.h"
#include "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

/*   Kind of transactions */
#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 {
/*   Kind of transactions */
   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 {
/*   Kind of transactions */
   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 {
/*   Kind of transactions */
   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 {
/*   Kind of transactions */
   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 {
/*   Kind of transactions */
   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.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,NA))\
      {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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GROUP               |
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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

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, n ewinfo,
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, sizeof
(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, 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;
   }
}

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;
   }
}

TPCC08(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, p ayinfo,
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, 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;
   }
}

TPCC15(msg)
TPSVCINFO *msg;
{
   info = (union infostruct *)msg->data;
   switch(info->tran_kind)
   {
   case TRANNEW:
                newinfo = (struct newstru ct *)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

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) $(INCLU DE) -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 : 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 : 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 : 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 : 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 : 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 = 400


*#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) = {
		NBUF,
		NCALL,
		NPROC,
		NLWP,
		0,
		MAXCLSYSPRI,
		0,
		MAXUP,
		NHBUF,
		NHBUF-1,
		NPBUF,
		0,
		MAXPMEM,
		NAUTOUP,
		BUFHWM,
* XENIX Support
		0,
		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 = 400
SHMRSVMIN = 208
SHMZEROTHRTIM = 10
#
#=================================
==========================+
#       Copyright (c) 1995  Oracle Corp, Redwood
Shores, CA      |
#               OPEN SYSTEMS PERFORMANCE
GROUP                 |
#                  All Rights Reserved
|
#=================================
==========================+
# FILENAME
#     p_run.ora
# DESCRIPTION
#     Oracle parameter file for running TPC-C.
#=================================
============================
#

serializable              = FALSE
optimizer_mode                    = CHOOSE


db_writers                = 1
async_read          = true
async_write         = true
cpu_count           = 2
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        = 176440
_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

```
#================================
================================
===+
#       Copyright (c) 1994  Oracle Corp,
Redwood Shores, CA      |
#                OPEN SYSTEMS
PERFORMANCE GROUP              |
#                    All Rights Reserved
|
#================================
================================
===+
# FILENAME
#     addfile.sh
# DESCRIPTION
#     Add datafile to a tablespace.
# USAGE
#     addfile.sh <tablespace> <data file>
<size>
#================================
================================
===*/

sqldba <<!
  connect internal
  alter tablespace $1 add datafile '$2' size $3
reuse;
  exit;
!

#================================
================================
===+
#       Copyright (c) 1995  Oracle Corp,
Redwood Shores, CA      |
#                OPEN SYSTEMS
PERFORMANCE GROUP              |
#                    All Rights Reserved
|
#================================
================================
===+
# 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  14M);
  alter table order_line  storage (next 103M);
  alter table new_order   storage (next   4M);
  alter index iorders     storage (next  17M);
  alter index iorders2    storage (next  29M);
  alter index inew_order  storage (next   5M);
  alter index iorder_line storage (next  46M);
  alter index istock      storage (next  45M);
  alter index icustomer   storage (next  43M);
  alter index icustomer2  storage (next  37M);
  quit;
!

#================================
================================
===+
#       Copyright (c) 1995  Oracle Corp,
Redwood Shores, CA      |
#                OPEN SYSTEMS
PERFORMANCE GROUP              |
#                    All Rights Reserved
|
#================================
================================
===+
# FILENAME
#      benchdb.sh
# DESCRIPTION
#      Usage: benchdb.sh [options]
#           -n          do not create new tpcc
database
#           -c          do not run catalog scripts
#================================
================================
===
#


BENCH_HOME=$ORACLE_HOME/bench/
tpc
TPCC_SOURCE=$BENCH_HOME/tpcc/sou
rce
TPCC_SQL=$BENCH_HOME/tpcc/sql
TPCC_DBA=$BENCH_HOME/tpcc/dba
TPCC_OUTPUT=$BENCH_HOME/tpcc/out
put
TPCC_ADMIN=$BENCH_HOME/tpcc/admi
n

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
146M 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  169M &
create.sh ordl   /dev/rdsk/hdb1001 675M &
create.sh iordl  /dev/rdsk/hd3401  557M &
create.sh inord  /dev/rdsk/hd4402   25M &
create.sh iord1  /dev/rdsk/hd5403   55M &
create.sh ware   /dev/rdsk/hd1502   14M &
create.sh items  /dev/rdsk/hd1503   19M &
create.sh temp   /dev/rdsk/hd3502  422M &
create.sh istk   /dev/rdsk/hd2501  492M &
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  55M &
create.sh icust2 /dev/rdsk/hd4405   61M &
create.sh roll   /dev/rdsk/hd3501   42M &
create.sh icust1 /dev/rdsk/hd1504  288M &
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   422M &
addfile.sh temp   /dev/rdsk/hd5502   422M &
addfile.sh temp   /dev/rdsk/hd6502   422M &
addfile.sh temp   /dev/rdsk/hda1502  422M &
addfile.sh temp   /dev/rdsk/hda2502  422M &
addfile.sh temp   /dev/rdsk/hda3502  422M &
addfile.sh temp   /dev/rdsk/hda4502  422M &
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 &
wait
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 &
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 &
wait

#   [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 &
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 &
wait
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 &
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 &
wait
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 &
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 &
wait

#   [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 &
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 &
wait
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 &
wait

#   [ORDER LINE]
addfile.sh ordl   /dev/rdsk/hdb1101  675M &
addfile.sh ordl   /dev/rdsk/hdb1201  675M &
addfile.sh ordl   /dev/rdsk/hdb1301  675M &
addfile.sh ordl   /dev/rdsk/hdb1401  675M &
addfile.sh ordl   /dev/rdsk/hdb1501  675M &
addfile.sh ordl   /dev/rdsk/hdb2001  675M &
addfile.sh ordl   /dev/rdsk/hdb2101  675M &
addfile.sh ordl   /dev/rdsk/hdb2201  675M &
addfile.sh ordl   /dev/rdsk/hdb2301  675M &
wait

#   [STOCKS]
```

```
addfile.sh stocks /dev/rdsk/hd1002   169M &
addfile.sh stocks /dev/rdsk/hd3002   169M &
addfile.sh stocks /dev/rdsk/hd4002   169M &
addfile.sh stocks /dev/rdsk/hd5002   169M &
addfile.sh stocks /dev/rdsk/hd6002   169M &
addfile.sh stocks /dev/rdsk/hda1002  169M &
addfile.sh stocks /dev/rdsk/hda2002  169M &
addfile.sh stocks /dev/rdsk/hda3002  169M &
addfile.sh stocks /dev/rdsk/hda4002  169M &
addfile.sh stocks /dev/rdsk/hda5002  169M &
addfile.sh stocks /dev/rdsk/hda6002  169M &
addfile.sh stocks /dev/rdsk/hd1102   169M &
addfile.sh stocks /dev/rdsk/hd2102   169M &
addfile.sh stocks /dev/rdsk/hd3102   169M &
wait
addfile.sh stocks /dev/rdsk/hd4102   169M &
addfile.sh stocks /dev/rdsk/hd5102   169M &
addfile.sh stocks /dev/rdsk/hd6102   169M &
addfile.sh stocks /dev/rdsk/hda1102  169M &
addfile.sh stocks /dev/rdsk/hda2102  169M &
addfile.sh stocks /dev/rdsk/hda3102  169M &
addfile.sh stocks /dev/rdsk/hda4102  169M &
addfile.sh stocks /dev/rdsk/hda5102  169M &
addfile.sh stocks /dev/rdsk/hda6102  169M &
addfile.sh stocks /dev/rdsk/hd1202   169M &
addfile.sh stocks /dev/rdsk/hd2202   169M &
addfile.sh stocks /dev/rdsk/hd3202   169M &
addfile.sh stocks /dev/rdsk/hd4202   169M &
addfile.sh stocks /dev/rdsk/hd5202   169M &
wait
addfile.sh stocks /dev/rdsk/hdc1001  169M &
addfile.sh stocks /dev/rdsk/hdc2001  169M &
addfile.sh stocks /dev/rdsk/hdc1101  169M &
addfile.sh stocks /dev/rdsk/hdc2101  169M &
addfile.sh stocks /dev/rdsk/hdc1201  169M &
addfile.sh stocks /dev/rdsk/hdc2201  169M &
addfile.sh stocks /dev/rdsk/hdc1301  169M &
addfile.sh stocks /dev/rdsk/hdc2301  169M &
wait

#   [CUSTOMER INDEX 2]
addfile.sh icust2 /dev/rdsk/hd3405    61M &
addfile.sh icust2 /dev/rdsk/hd5405    61M &
addfile.sh icust2 /dev/rdsk/hd6405    61M &
addfile.sh icust2 /dev/rdsk/hda1405   61M &
addfile.sh icust2 /dev/rdsk/hda2405   61M &

#   [ORDER INDEX 2]
addfile.sh iord2  /dev/rdsk/hdc3001   55M &
addfile.sh iord2  /dev/rdsk/hdc3101   55M &
addfile.sh iord2  /dev/rdsk/hdc3201   55M &
wait

#   [ORDER INDEX 1]
addfile.sh iord1  /dev/rdsk/hd3403    55M &
addfile.sh iord1  /dev/rdsk/hd4403    55M &
addfile.sh iord1  /dev/rdsk/hd6403    55M &
addfile.sh iord1  /dev/rdsk/hda1403   55M &
addfile.sh iord1  /dev/rdsk/hda2403   55M &
wait

#   [NEW ORDER INDEX]
addfile.sh inord  /dev/rdsk/hd3402    25M &
addfile.sh inord  /dev/rdsk/hd5402    25M &
addfile.sh inord  /dev/rdsk/hd6402    25M &
addfile.sh inord  /dev/rdsk/hda1402   25M &
addfile.sh inord  /dev/rdsk/hda2402   25M &
wait

#   [ORDER LINE INDEX]
addfile.sh iordl  /dev/rdsk/hd4401   557M &
addfile.sh iordl  /dev/rdsk/hd5401   557M &
addfile.sh iordl  /dev/rdsk/hd6401   557M &
addfile.sh iordl  /dev/rdsk/hda1401  557M &
addfile.sh iordl  /dev/rdsk/hda2401  557M &
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

#================================
================================
===+
#       Copyright (c) 1995  Oracle Corp,
Redwood Shores, CA      |
#                 OPEN SYSTEMS
PERFORMANCE 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/ge
n
GEN_SQL=$BENCH_GEN/sql
TPCC_SOURCE=$BENCH_HOME/tpcc/sou
rce
TPCC_SQL=$BENCH_HOME/tpcc/sql
TPCC_OUTPUT=$BENCH_HOME/tpcc/out
put
TPCC_ADMIN=$BENCH_HOME/tpcc/admi
n
TPCC_STORE=$BENCH_HOME/tpcc/store
d_proc
TPCC_LOADER=$BENCH_HOME/tpcc/loa
der
TPCC_SCRIPTS=$BENCH_HOME/tpcc/scri
pts

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)? [145]" $C
  read MULT
  if [ "$MULT" = "" ]
  then
     MULT=145
  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

#
#  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   8 &
tpccload -M $MULT -c -b   9 -e  16 &
tpccload -M $MULT -c -b  17 -e  24 &
tpccload -M $MULT -c -b  25 -e  32 &
tpccload -M $MULT -c -b  33 -e  40 &
tpccload -M $MULT -c -b  41 -e  48 &
tpccload -M $MULT -c -b  49 -e  56 &
tpccload -M $MULT -c -b  57 -e  64 &
tpccload -M $MULT -c -b  65 -e  72 &
tpccload -M $MULT -c -b  73 -e  80 &
tpccload -M $MULT -c -b  81 -e  88 &
tpccload -M $MULT -c -b  89 -e  96 &
tpccload -M $MULT -c -b  97 -e 104 &
tpccload -M $MULT -c -b 105 -e 112 &
tpccload -M $MULT -c -b 113 -e 120 &
tpccload -M $MULT -c -b 121 -e 128 &
tpccload -M $MULT -c -b 129 -e 136 &
tpccload -M $MULT -c -b 137 -e 144 &
tpccload -M $MULT -c -b 145 -e 145 &
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 [ "$NO_IND" = "" ]
then
  sqldba <<!
    connect internal
    alter tablespace temp
      default storage (initial 84M next 84M
pctincrease 0);
    exit;
!
  sqlplus tpcc/tpcc @$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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Redwood Shores, CA      |
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PERFORMANCE GROUP               |
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|
#================================
================================
===+
# 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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PERFORMANCE GROUP               |
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|
#================================
================================
===+
# FILENAME
#     pload.sh
# DESCRIPTION
#     Usage: pload.sh [options]
#           -mu <multiplier>     (# of
warehouses)
#================================
================================
===
#

BENCH_HOME=$ORACLE_HOME/bench/
tpc
BENCH_GEN=$ORACLE_HOME/bench/ge
n
GEN_SQL=$BENCH_GEN/sql
TPCC_SOURCE=$BENCH_HOME/tpcc/sou
rce
TPCC_SQL=$BENCH_HOME/tpcc/sql
TPCC_OUTPUT=$BENCH_HOME/tpcc/out
put
TPCC_ADMIN=$BENCH_HOME/tpcc/admi
n
TPCC_STORE=$BENCH_HOME/tpcc/store
d_proc
TPCC_LOADER=$BENCH_HOME/tpcc/loa
der
TPCC_SCRIPTS=$BENCH_HOME/tpcc/scri
pts

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)? [145]" $C
  read MULT
  if [ "$MULT" = "" ]
  then
     MULT=145
  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

#
#  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 &
wait
tpccload -M $MULT -h -g -b  51 -e  55 >
${LDIR11}/hist11.dat &
tpccload -M $MULT -h -g -b  56 -e  60 >
${LDIR12}/hist12.dat &
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 &
wait
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 &
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 &
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 &
wait
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 &
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=${LDIR20}/hist20.dat
discard=hist20.dsc \
    file=/dev/rdsk/hda2101 &
wait
sqlldr tpcc/tpcc
control=$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=${LDIR24}/hist24.dat
discard=hist24.dsc \
    file=/dev/rdsk/hda6101 &
sqlldr tpcc/tpcc
control=$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 &
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 &

#
#  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/no
rd1
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 &
wait
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 &
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 &
wait
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 &
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 &
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 &
wait
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 &
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 &
wait
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 &
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 &
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 &

cat ${LDIR1}/ordline1.dat \
    ${LDIR2}/ordline2.dat \
    ${LDIR3}/ordline3.dat >
${LDIR1}/ordline1-3.dat &
cat ${LDIR4}/ordline4.dat \
    ${LDIR5}/ordline5.dat \
    ${LDIR6}/ordline6.dat >
${LDIR2}/ordline4-6.dat &
cat ${LDIR7}/ordline7.dat \
    ${LDIR8}/ordline8.dat \
    ${LDIR9}/ordline9.dat >
${LDIR3}/ordline7-9.dat &
cat ${LDIR10}/ordline10.dat \
    ${LDIR11}/ordline11.dat \
    ${LDIR12}/ordline12.dat >
${LDIR4}/ordline10-12.dat &
cat ${LDIR13}/ordline13.dat \
    ${LDIR14}/ordline14.dat \
    ${LDIR15}/ordline15.dat >
${LDIR5}/ordline13-15.dat &
cat ${LDIR16}/ordline16.dat \
    ${LDIR17}/ordline17.dat \
    ${LDIR18}/ordline18.dat >
${LDIR6}/ordline16-18.dat &
cat ${LDIR19}/ordline19.dat \
    ${LDIR20}/ordline20.dat \
    ${LDIR21}/ordline21.dat >
${LDIR7}/ordline19-21.dat &
cat ${LDIR22}/ordline22.dat \
    ${LDIR23}/ordline23.dat \
    ${LDIR24}/ordline24.dat >
${LDIR8}/ordline22-24.dat &
cat ${LDIR25}/ordline25.dat \
    ${LDIR26}/ordline26.dat \
    ${LDIR27}/ordline27.dat >
${LDIR9}/ordline25-27.dat &
cat ${LDIR28}/ordline28.dat \
    ${LDIR29}/ordline29.dat >
${LDIR10}/ordline28-29.dat &
wait

sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline1.log \
      bad=ordline1.bad
data=${LDIR1}/ordline1-3.dat
discard=ordline1.dsc \
      file=/dev/rdsk/hdb1001 &
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline2.log \
      bad=ordline2.bad
data=${LDIR2}/ordline4-6.dat
discard=ordline2.dsc \
      file=/dev/rdsk/hdb1101 &
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline3.log \
      bad=ordline3.bad
data=${LDIR3}/ordline7-9.dat
discard=ordline3.dsc \
      file=/dev/rdsk/hdb1201 &
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline4.log \
      bad=ordline4.bad
data=${LDIR4}/ordline10-12.dat
discard=ordline4.dsc \
      file=/dev/rdsk/hdb1301 &
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline5.log \
      bad=ordline5.bad
data=${LDIR5}/ordline13-15.dat
discard=ordline5.dsc \
      file=/dev/rdsk/hdb1401 &
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline6.log \
      bad=ordline6.bad
data=${LDIR6}/ordline16-18.dat
discard=ordline6.dsc \
      file=/dev/rdsk/hdb1501 &
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline7.log \
      bad=ordline7.bad
data=${LDIR7}/ordline19-21.dat
discard=ordline7.dsc \
      file=/dev/rdsk/hdb2001 &
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline8.log \
      bad=ordline8.bad
data=${LDIR8}/ordline22-24.dat
discard=ordline8.dsc \
      file=/dev/rdsk/hdb2101 &
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline9.log \
      bad=ordline9.bad
data=${LDIR9}/ordline25-27.dat
discard=ordline9.dsc \
      file=/dev/rdsk/hdb2201 &
sqlldr tpcc/tpcc
control=$TPCC_LOADER/ordline.ctl
log=ordline10.log \
      bad=ordline10.bad
data=${LDIR10}/ordline28-29.dat
discard=ordline10.dsc \
      file=/dev/rdsk/hdb2301 &
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 &
rm -f ${LDIR1}/ordline1-3.dat \
      ${LDIR2}/ordline4-6.dat \
      ${LDIR3}/ordline7-9.dat \
      ${LDIR4}/ordline10-12.dat \
```

```
    ${LDIR5}/ordline13-15.dat \
    ${LDIR6}/ordline16-18.dat \
    ${LDIR7}/ordline19-21.dat \
    ${LDIR8}/ordline22-24.dat \
    ${LDIR9}/ordline25-27.dat \
    ${LDIR10}/ordline28-29.dat &
wait

/*================================
================================
===+
|      Copyright (c) 1994  Oracle Corp,
Redwood Shores, CA      |
|                OPEN SYSTEMS
PERFORMANCE GROUP               |
|                   All Rights Reserved
|

+================================
================================
===+
| FILENAME
|   tpccload.c
| DESCRIPTION
|   Load or generate TPC-C database tables.
|   Usage: tpccload -M <# of warehouses>
[options]
|           options: -A  load all tables
|                    -w  load warehouse table
|                    -d  load district table
|                    -c  load customer table
|                    -i  load item table
|                    -s  load stock table (cluster
around s_w_id)
|                    -S  load stock table (cluster
around s_i_id)
|                    -h  load history table
|                    -n  load new-order table
|                    -o <oline file> load order and
order-line table
|                    -b <ware#>  beginning
warehouse number
|                    -e <ware#>  ending warehouse
number
|                    -j <item#>  beginning item
number (with -S)
|                    -k <item#>  ending item
number (with -S)
|                    -g  generate rows to standard
output

+================================
================================
===*/

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

#define DISTARR 10                  /* district
insert array size          */
#define CUSTARR 100
                    /* customer insert array size
                    */
#define STOCARR 100
                    /* stock insert array size
                    */
#define ITEMARR 100
                    /* item insert array size
                    */
#define HISTARR 100             /* history
insert array size    */
#define ORDEARR 100             /* order
insert array size      */
#define NEWOARR 100             /* new order
insert array size  */

#define DISTFAC 10                  /* max.
disctrict id */
#define CUSTFAC 3000
                    /* max. customer id     */
#define STOCFAC 100000
                    /* max. stock id          */
#define ITEMFAC 100000
                    /* max. item id
                    */
#define HISTFAC 30000           /* history /
warehouse  */
#define ORDEFAC 3000            /* order /
district     */
#define NEWOFAC 900             /* new order
/ district */

#define C       0               /* constant in non-
uniform dist. eqt. */
#define CNUM1   1               /* first constant
in non-uniform dist. eqt. */
#define CNUM2   2               /* second
constant in non-uniform dist. eqt. */
#define CNUM3   3               /* third constant
in non-uniform dist. eqt. */

#define SEED    2               /* seed for random
functions */

#define SQLTXTW "INSERT INTO
warehouse 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 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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================================
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|
#================================
================================
===+
# 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
```

```
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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
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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 7M next 7M 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 10M next 10M
pctincrease 0) pctfree 1;

exit;


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rem
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================================
==+
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 18M next 18M
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 6M next 6M 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 6M next 6M 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 37M next 37M
pctincrease 0
             freelist groups 13 freelists 24);

exit;


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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);
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  exit;

rem
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==+
rem        Copyright (c) 1995  Oracle Corp,
Redwood Shores, CA      |
rem                OPEN SYSTEMS
PERFORMANCE GROUP               |
rem                     All Rights Reserved
|
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   storage (initial 20K next 10M
pctincrease 0
rem           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 224M
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        4350000
        hash is         (c_w_id * 30000 + c_d_id *
3000 + c_id)
        size            850
        initrans        3
        pctfree         0
        tablespace      cust
        storage (initial 90M next 90M
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
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================================
==+
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        14500000
        hash is         (s_i_id * 145 + s_w_id)
        size            350
        initrans        3
        pctfree         0
        tablespace      stocks
        storage (initial 84M next 84M
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
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================================
==+
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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================================
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|
rem
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================================
==+
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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================================
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rem
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================================
==+
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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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
================================
================================
==+
rem          Copyright (c) 1993  Oracle Corp,
Belmont, CA          |
rem                OPEN SYSTEMS
PERFORMANCE GROUP                |
rem                    All Rights Reserved
|
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	**1,681**
Warehouses	**145**

SEGMENT	TYPE	TSPACE	BLOCKS	FIVE_PCT	DAILY_GROW	TOTAL
CUSTOMER	TABLE	CUST	2,175,012	108,751	0	2,283,763
DISTRICT	TABLE	WARE	1,454	73	0	1,527
HISTORY	TABLE	HIST	120,319	0	22,305	142,624
ICUSTOMER	INDEX	ICUST1	51,534	2,577	0	54,111
ICUSTOMER2	INDEX	ICUST2	114,751	5,738	0	120,489
IDISTRICT	INDEX	WARE	1,000	50	0	1,050
IITEM	INDEX	ITEMS	1,000	50	0	1,050
INEW_ORDER	INDEX	INORD	19,824	991	0	20,815
IORDERS	INDEX	IORD1	62,718	3,136	0	65,854
IORDERS2	INDEX	IORD2	82,120	4,106	0	86,226
IORDER_LINE	INDEX	IORDL	621,487	31,074	0	652,561
ISTOCK	INDEX	ISTK	149,029	7,451	0	156,480
ITEM	TABLE	ITEMS	6,667	333	0	7,000
IWAREHOUSE	INDEX	WARE	50	3	0	53
NEW_ORDER	TABLE	NORD	11,181	559	0	11,740
ORDERS	TABLE	ORD	86,161	0	15,972	102,133
ORDER_LINE	TABLE	ORDL	1,553,393	0	287,967	1,841,360
ROLL_SEG	SYS	ROLL	172,032	0	0	172,032
STOCK	TABLE	STOCKS	2,900,001	145,000	0	3,045,001
SYSTEM	SYS	SYSTEM	74,752	0	0	74,752
WAREHOUSE	TABLE	WARE	145	7	0	152
Total			**8,204,630**	**309,899**	**326,244**	**8,840,773**
Dynamic space		1,759,873				
Static space		6,754,656				
Free space		326,244				
Daily growth		326,244				

Daily spread		0	Oracle may be configured such that daily spread is 0			
180-day space (blk.)		65,478,576				
Block size (bytes)		2,048				
180-day (GB)		124.89				
Log block size		1,024				
Log blocks/tpmC		13.89	Number of log blocks used in one minute			
8-hour log (GB)		10.69				
DISKS PRICED						
SIZE	**Count**	**Capacity(GB)**			**SPACE USAGE (GB)**	
1.0 GB DISK	1	1.0			180-day	124.89
2.0 GB DISK	68	136.0			Log	10.69
4.0 GB DISK	6	24.0			OS,swap,etc	1.00
Total	**75**	**161.0**			**Total**	**136.58**

Appendix G: Auditor's attestation letter