IBM eServer p5 570
Model 9117-570
Using
AIX 5L Version 5.3
and
Oracle Database 10g Enterprise Edition

TPC Benchmark™ C
Full Disclosure Report

Second Edition

April 10, 2006

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IBM eServer xSeries

AIX

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First Edition: July 12, 2004

Second Edition: April 10, 2006

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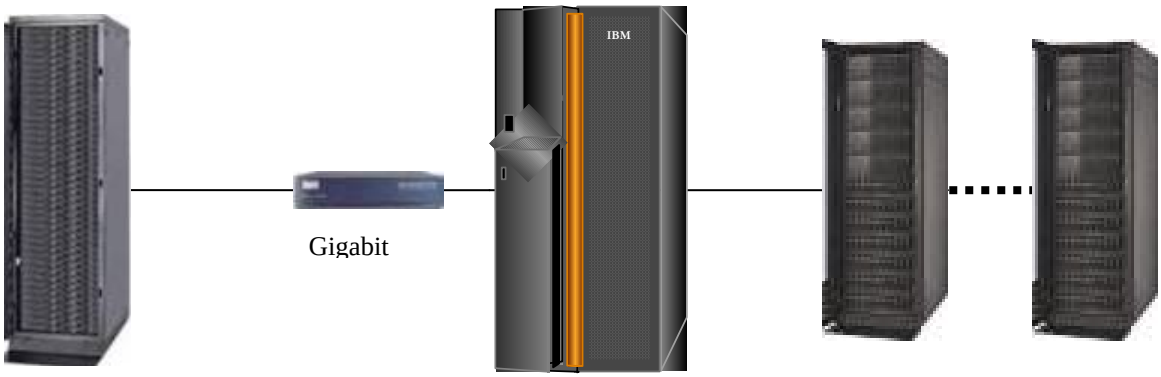
IBM / ORACLE	IBM eServer p5 570 Model 9117-570	TPC-C Rev. 5.3 Report Date: July 12, 2004

Total System Cost	TPC-C Throughput	Price/Performance	Availability Date
$1,951,215 USD	371,044.22	$5.26 USD	September 30, 2004

Processor Chips/Cores/Threads	Database Manager	Operating System	Other Software	No. Users
4/8/16	Oracle Database 10g Enterprise Edition	AIX 5L V5.3	Microsoft COM+	297,600

SUT

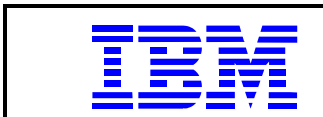


12 Clients
IBM eServer™ x335
2x3.2GHz Intel® Xeon™
1MB L3 Cache
2GB Memory
1 80GB Internal Drive
2 Integrated 10/100/1000

IBM® eServer™ p5 570
4 processor chips with
8x 1.9GHz POWER5™ Cores
36MB L3 Cache per processor chip
256GB Memory
4 Internal Ultra4 SCSI
2 36GB Internal SCSI Drives
2 72GB Internal SCSI Drives
12 IBM FAStT 2Gb FC Adapters
4 Integrated Dual port 10/100/1000 Ethernet

Storage
6 IBM FAStT 900 Storage Servers
57 IBM FAStT 700 Enclosures
720 36.4GB 15K RPM Drives
30 73.4GB 15K RPM Drives

System Components	Each of the 12 Clients		Server	
	Quantity	Description	Quantity	Description
Processor Chips/Cores/Threads	2/2/2	3.2GHz Xeon with 1MB L3 Cache	4/8/16	1.9GHz POWER5™ 36MB L3 Cache per Chip
Memory	4	512 MB	8	32GB
Disk Controllers	1	EIDE	4 12 6	Integrated Ultra4SCSI FAStT 2Gb FC IBM FAStT900 Controllers
Disk Drives	1	80 GB	720 30 2 2	36.4GB 15K RPM FC 73.4GB 15K RPM FC 36.4GB 10K RPM SCSI 72GB 10K RPM SCSI
Total Storage		960 GB		25,537.50GB



ORACLE

IBM eServer p5 570
Model 9117-570

TPC-C Rev. 5.3

Report Date: July 12, 2004

Description	Part No.	Source	Unit Price	Qty	Ext Price	Maint Price
Server Hardware						
IBM eServer p5 570 Anhor Card VPD	9117-570	1	1,000	1	1,000	49,578
Headless Enclosure	7879	1	350	2	700	
I/O Backplane	7866	1	4,100	2	8,200	
System Midplane	7867	1	500	2	1,000	
SCSI disk backplane	7868	1	1,200	2	2,400	
Power Distribution Backplane	7870	1	200	2	400	
Serial Port Riser Card	7878	1	100	2	200	
Power Supply	7888	1	800	4	3,200	
L4 1.9 Processor 0/2Way	7832	1	10,900	4	43,600	
1-way Activation for 7832	7898	1	21,800	4	87,200	
1-way Activation for 7832 - $0 Priced Value Pack	8454	1		4		
Media Backplane	7869	1	140	1	140	
CEC Backplane	7865	1	1,200	2	2,400	
L4 CPU Regulator	7875	1	1,100	6	6,600	
L4 FSP Card	7881	1	650	1	650	
IDE DVDROM, Slim Line	2640	1	378	1	378	
32GB (4x8000MB)	4492	1	103,000	8	824,000	
DASD 73.4 10K rpm	3274	1	1,400	2	2,800	
DASD 36.4 10K rpm	3273	1	750	2	1,500	
Line Cords	6458	1	14	4	56	
Op Panel	1846	1	150	1	150	
SMP Flex Cables - 2 encl	1847	1	2,000	1	2,000	
FSP Flex Cables - 2 encl	1857	1	1,000	1	1,000	
Hardware Management Console	7315-C03	1	2,535	1	2,535	144
HMC Cable	8121	1	62	1	62	
Quiet Touch Keyboard	8800	1	83	1	83	
Mouse	8841	1	62	1	62	
Model D20 I/O Drawer	7311-D11	1	4,461	2	8,922	5,568
Remote I/O Cable, 1.2M	3146	1	417	2	834	
SPCN 2m Cable: Drawer to Drawer	6001	1	25	3	75	
AC Power Supply, 250W	6278	1	375	4	1,500	
RIO-2 Ports to I/O Planar Riser Card	6431	1	900	1	900	
Rack Mount enclosure	7311	1	417	1	417	
2 Gigabit Fibre Channel PCI-X Adapter	5716	1	2,267	12	27,204	
Rack Model T00 - 6098, 6107	7014-T00	1	3,370	1	3,370	768
				Subtotal	**1,035,538**	**56,058**
Storage						
FAStT EXP 700	1740-1RU	1	6,000	57	342,000	
Short Wave SFP	2210	1	499	240	119,760	
2Gb FC, 36.4GB/15K Drive	5212	1	1,115	720	802,800	
2Gb FC, 73.4GB/15K Disk Module	5213	1	2,099	28	58,772	
FAStT900 Storage Server	1742-90U	1	66,500	6	399,000	
Fiber Cable 25m	5625	1	189	12	2,268	
Fiber Cable 1m	5601	1	79	104	8,216	
Fiber Cable 5m	5605	1	129	10	1,290	
2Gb Mini HUB	3507	1	899	12	10,788	
FAStT Storage Manager V8.4 upgrade	1742-7109	1	2,999	1	2,999	
3 Year Warranty Service Upgrade 1740-1RU 24x7x4	694225B1813	1	760	57		43,320
3 Year Warranty Service Upgrade 1742-90U 24x7x4	694225B1915	1	1,087	6		6,522
				Subtotal	**1,747,893**	**49,842**

IBM eServer p5 570
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Server Software						
AIX 5.3 (media only)	5962-A5L	1	50	1	50	
AIX Software	5765-AIX	1	1,225	8	9,800	
AIX Software Maintenance (3Y)	5773-SM3	1	1,958	8		15,664
AIX Software Maintenance 24x7 Upgrade (3Y)	0468	1	496	8		3,968
HMC Software SUB	5639-SB1	1	275	3		825
HMC Software Support	5639-ST1	1	525	3		1,575
C for AIX user Lic+SW maint 12 MO	D5A1DLL	1	515	1	515	
C for AIX user annual SW maint renewal	E1A1FLL	1	103	2		206
Oracle Database 10g Enterprise Edition, Per Processor for 3 years		2	20,000	8	160,000	
Oracle Database Server Support Package for 3 years		2	6,000	1		6,000
Oracle E-Business Discount (license & support)		2		1	-24,900	
				Subtotal	**145,465**	**28,238**
Client Hardware and Software						
x335 w 3.2GHz/1024KB Xeon DP, one 80GB drive	864762X	1	2,679	12	32,148	5,400
3.2GHz 533 MHz 1MB L3 Cache Xeon Processor	13N0661	1	1,549	12	18,588	
512MB PC2100 CL2.5 ECC DDR SDRAM RDIMM	33L5038	1	219	24	5,256	
Microsoft Windows 2000 Server (Preloaded)	09N9982	1	799	12	9,588	
IBM ServicePac for xSeries	29R5396	1	1,375	12		16,500
NetBay42 Standard Rack	9306-421	1	1,439	6	8,634	1,008
xSeries Cable Chain Technology Cable Kit	06P4792	1	54	1	54	
IBM Sleek 2-Button Mouse - (PS/2)	28L3673	1	15	1	15	
Preferred Pro Full Size PS/2 Keyboard	31P7415	1	29	1	29	
E54 15" monitor/Keyboard/Mouse	W9SP47N	1	119	1	119	
				Subtotal	**74,431**	**22,908**
Third Party Hardware/Software						
Visual Studio .NET Professional	528577	3	1,016	1	1,016	
NETGEAR 16PT 10/100/1000MBPS-GIG SW	638864	3	320	3	959	
				Subtotal	**1,975**	
			IBM Total System Discounts*		**-1,163,010**	**-48,123**
				Total	**1,842,292**	**108,923**

	Three-Year Cost of Ownership	**1,951,215**
	tpmC	**371,044**
	$/tpmC	**5.26**

*Discounts are based on US list prices for similar quantities & configurations including pre-payment for maintenance

Audited by: Francois Raab, Info Sizing (www.infosizing.com)

Pricing Sources:

1 IBM HW: Bill Casey, eServer pSeries Offering Manager, wrcasey@us.ibm.com, 512-838-1422

2 Oracle Corporation; mary.beth.pierantoni@oracle.com, 916-315-5081

3 CDW.com

Numerical Quantities Summary for the IBM eServer p5 570 Model 9117-570

MQTH, computed Maximum Qualified Throughput: 371,044.22 tpmC

Response Times (in seconds)	90th %	Average	Maximum
New Order	0.90	0.44	4.16
Payment	0.89	0.44	4.13
Order-Status	0.89	0.44	4.08
Delivery (interactive)	0.38	0.19	2.02
Delivery (deferred)	0.05	0.03	2.41
Stock-Level	0.98	0.51	4.03
Menu	0.39	0.18	2.02

Response time delay added for emulated components 0.1 seconds

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

Keying/Think Times (in seconds)	Min.	Average	Max.
New Order	18.00/0.01	18.01/12.02	18.06/120.21
Payment	3.00/0.01	3.01/12.02	3.06/120.25
Order-Status	2.00/0.01	2.01/10.01	2.05/100.10
Delivery	2.00/0.01	2.01/5.02	2.05/50.21
Stock-Level	2.00/0.01	2.01/5.02	2.05/50.21

Test Duration

Ramp-up Time	1 hour 28 minutes
Measurement interval	2 hours 00 minutes
Transactions during measurement interval (all types)	166,800,105
Ramp-down time	20 minutes

Checkpoints

Number of checkpoints	4
Checkpoint interval	29 minutes 9 sec

Table of Content

Abstract

This report documents the full disclosure information required by the TPC Benchmark™ C Standard Specification Revision 5.3 dated April 2004, for measurements on the IBM eServer p5 570 Model 9117-570. The software used on the IBM eServer p5 570 Model 9117-570 includes AIX 5L Version 5.3 operating system, Oracle 10g database manager. Microsoft COM+ is used as transaction manager.

IBM eServer p5 570 Model 9117-570

Company Name	System Name	Data Base Software	Operating System Software
IBM Corporation	IBM eServer p5 570 Model 9117-570	Oracle Database 10g Enterprise Edition	AIX 5L Version 5.3

Total System Cost	TPC-C Throughput	Price/Performance
• Hardware • Software • 3 Years Maintenance	Sustained maximum throughput of system running TPC-C expressed in transactions per minute	Total system cost/tpmC
$1,951,215 USD	371,044.22	$5.26 USD

Preface

TPC Benchmark™ C Standard Specification was developed by the Transaction Processing Performance Council (TPC). It was released on August 13, 1992 and updated with revision 5.3 in April 2004.

This is the full disclosure report for benchmark testing of the IBM eServer p5 570 Model 9117-570 and Oracle 10g according to the TPC Benchmark™ C Standard Specification.

TPC Benchmark™ C exercises the system components necessary to perform tasks associated with that class of on-line transaction processing (OLTP) environments emphasizing a mixture of read-only and update intensive transactions. This is a complex OLTP application environment exercising a breadth of system components associated by such environments characterized by:

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

This benchmark defines four on-line transactions and one deferred transaction, intended to emulate functions that are common to many OLTP applications. However, this benchmark does not reflect the entire range of OLTP requirements. The extent to which a customer can achieve the results reported by a vendor is highly dependent on how closely TPC-C approximates the customer application. The relative performance of systems derived from this benchmark does not necessarily hold for other workloads or environments. Extrapolations to any other environment are not recommended.

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

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

0 General Items

0.1. Application Code Disclosure

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

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

0.2. Benchmark Sponsor

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

This benchmark was sponsored by **International Business Machines Corporation.**

0.3. Parameter Settings

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

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

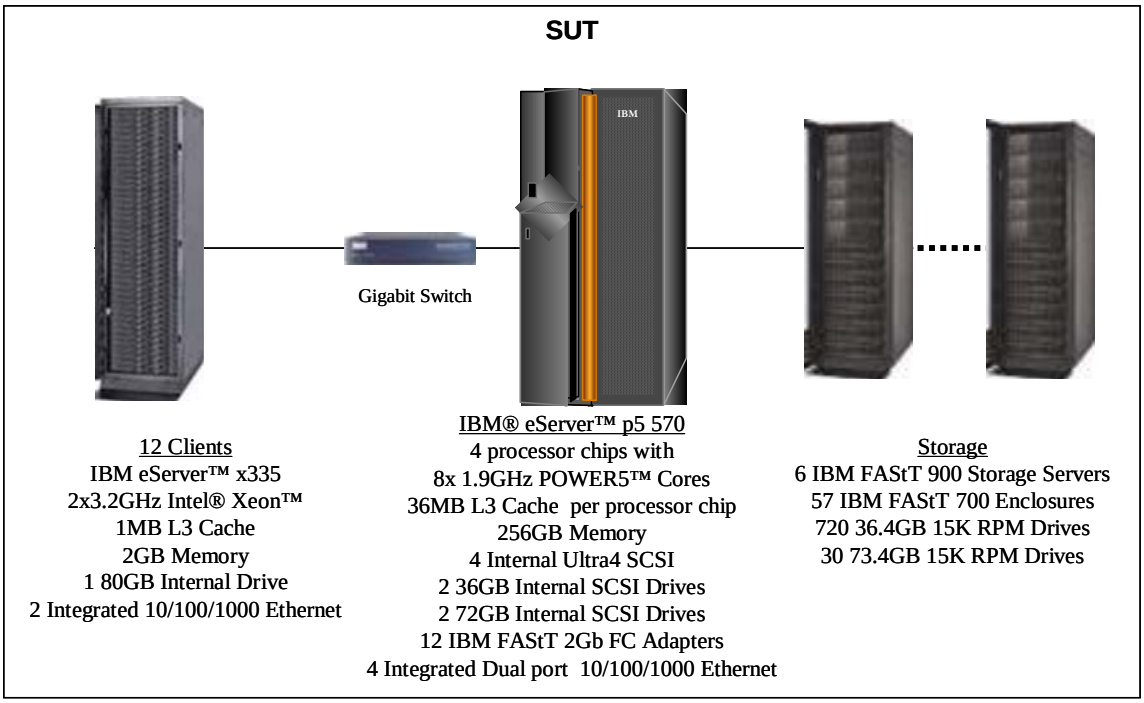
Appendix B contains the system, data base, and application parameters changed from their default values used in these TPC Benchmark™ C tests.

0.4. Configuration Diagrams

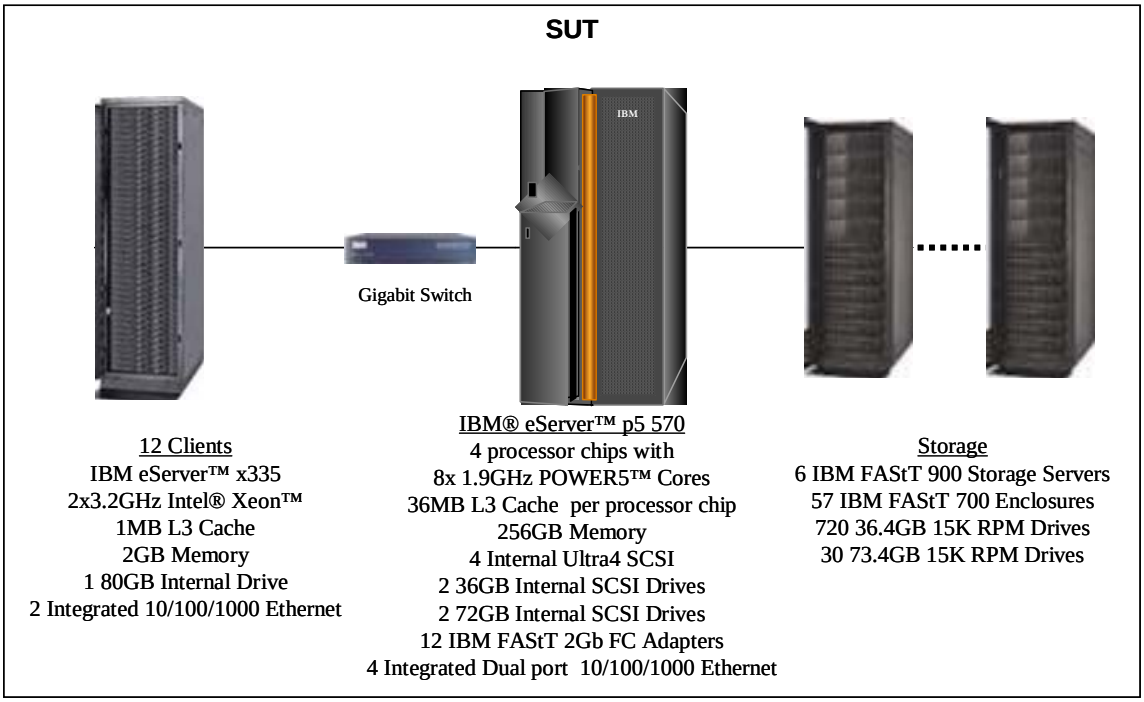
Diagrams of both measured and priced configurations must be provided, accompanied by a description of the differences. This includes, but is not limited to:

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

IBM eServer p5 570 Model 9117-570 Benchmark Configuration



IBM eServer p5 570 Model 9117-570 Priced Configuration



1 Clause 1: Logical Data Base Design Related Items

1.1. Table Definitions

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

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

1.2. Database Organization

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

Physical space was allocated to Oracle Database on the server disks according to the details provided in Appendix C.

1.3. Insert and/or Delete Operations

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

There were no restrictions on insert and/or delete operations to any of the tables. The space required for an additional five percent of the initial table cardinality was allocated to Oracle 10g Server and priced as static space.

1.4. Horizontal or Vertical Partitioning

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

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

2 Clause 2: Transaction & Terminal Profiles Related Items

2.1. Verification for the Random Number Generator

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

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

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

```
const double RANDOM_4_Z = 0.89837799236185
const double RANDOM_4_K = 0.97249842407114
double neg_exp_4(double average {
        return – average * (1/RANDOM_4_Z * log (1 – RANDOM_4_K * drand48()))};
}
```

The seeds for each user were captured and verified by the auditor to be unique. 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 affected any kind of a discernible pattern; none were found.

2.2. Input/Output Screens

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

The screen layouts are now presented in HTML 1.0 web pages. Clauses 2.4.3, 2.5.3, 2.6.3, 2.7.3, and 2.8.3 of the TPC-C specifications were used as guidelines for html character placement.

2.3. Priced Terminal Features

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

The emulated workstations, IBM eServer x335, are commercially available and support all of the requirements in Clause 2.2.2.4.

2.4. Presentation Managers

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

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

2.5. Home and Remote Order-lines

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

Table 2-1 shows the percentage of home and remote transactions that occurred during the measurement period for the New-Order transactions.

2.6. New-Order Rollback Transactions

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

Table 2-1 shows the percentage of New-Order transactions that were rolled back due to an illegal item being entered.

2.7. Number of Items per Order

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

Table 2-1 show the average number of items ordered per New-Order transaction.

2.8. Home and Remote Payment Transactions

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

Table 2-1 shows the percentage of home and remote transactions that occurred during the measurement period for the Payment transactions.

2.9. Non-Primary Key Transactions

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

Table 2-1 shows the percentage of non-primary key accesses to the data base by the Payment and Order-Status transactions.

2.10. Skipped Delivery Transactions

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

Table 2-1 shows the percentage of Delivery transactions missed due to a shortage of supply of rows in the NEW-ORDER table.

2.11. Mix of Transaction Types

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

Table 2-1 shows the mix percentage for each of the transaction types executed by the SUT.

New Order	IBM eServer p5 570 Model 9117-570
Percentage of Home order lines	99.00%
Percentage of Remote order lines	1.00%
Percentage of Rolled Back Transactions	1.00%
Average Number of Items per order	9.99
Payment	
Percentage of Home transactions	85.00%
Percentage of Remote transactions	15.00%
Non-Primary Key Access	
Percentage of Payment using C_LAST	60.00%
Percentage of Order-Status using C_LAST	59.99%
Delivery	
Delivery transactions skipped	0
Transaction Mix	
New-Order	44.91%
Payment	43.02%
Order-Status	4.02%
Delivery	4.02%
Stock-Level	4.01%

Table 2-1: Numerical Quantities for Transaction and Terminal Profiles

2.12. Queuing Mechanism of Delivery

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

The Delivery transaction was submitted to an ISAPI queue that is separate from the COM+ queue that the other transactions used. This queue is serviced by a variable amount of threads that are separate from the worker threads inside the web server. Web server threads are able to complete the on-line part of the Delivery transaction and immediately return successful queuing responses to the drivers. The threads servicing the queue are responsible for completing the deferred part of the transaction asynchronously.

3 Clause 3: Transaction and System Properties

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

All ACID tests were conducted according to specification.

3.1. Atomicity Requirements

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

3.1.1. Atomicity of Completed Transaction

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

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

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

3.1.2. Atomicity of Aborted Transactions

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

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

1. The Payment application code was implemented with scripts that allowed the transaction to be rolled back rather than committed.
2. The balance, BALANCE_3, was retrieved from the Customer table for the same Customer, District, and Warehouse combination used in the completed Payment transaction Atomicity test.
3. The Payment transaction was executed for the Customer, District and Warehouse used in step 2. Rather than commit the transaction, the transaction was rolled back.
4. The balance, BALANCE_4 was retrieved again for the Customer, District, and Warehouse combination used in step 2. It was verified that BALANCE_4 was equal to BALANCE_3, demonstrating that there were no remaining effects of the rolled back Payment transaction.

3.2. Consistency Requirements

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

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

The specification defines 12 consistency conditions of which the following four are required to be explicitly demonstrated:

1. The sum of balances (d_ytd) for all Districts within a specific Warehouse is equal to the balance (w_ytd) of that Warehouse.
2. For each District within a Warehouse, the next available Order ID (d_next_o_id) minus one is equal to the most recent Order ID [max(o_id)] for the Order table associated with the preceeding District and Warehouse.

Additionally, that same relationship exists for the most recent Order ID [max(o_id)] for the New Order table associated with the same District and Warehouse. Those relationships can be illustrated as follows:

d_next_o_id – 1 = max(o_id) = max(no_o_id)

where (d_w_id = o_w_id = no_w_id) and (d_id = o_d_id = no_d_id)

3. For each District within a Warehouse, the value of the most recent Order ID [max(no_o_id)] minus the first Order ID [min(no_o_id)] plus one, for the New Order table associated with the District and Warehouse equals the number of rows in that New Order table. That relationship can be illustrated as follows:

   max(no_o_id) – min(no_o_id) + 1 = number of rows in New Order for the Warehouse/District

4. For each District within a Warehouse, the sum of Order Line counts [sum(o_ol_cnt)] for the Order table associated with the District equals the number of rows in the Order Line table associated with the same District. That relationship can be illustrated as follows:

   sum(o_ol_cnt) = number of rows in the Order Line table for the Warehouse/District

An RTE driven run was executed against a freshly loaded database. After the run the 4 consistency conditions defined above were tested using a script to issue queries to the database. All queries showed that the database was still in a consistent state.

3.3. Isolation Requirements

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

The benchmark specification defines nine tests to demonstrate the property of transaction isolation. The tests, described in Clauses 3.4.2.1 – 3.4.2.9 were all successfully executed using a series of scripts. Case A was observed during the execution of Isolation Tests 7-9.

3.4. Durability Requirements

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

3.4.1. Permanent Unrecoverable Failure of any Single Durable Medium

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

Failure of Log Disk and Log Cache:

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

1. The current count of the total number of orders was determined by the sum of D_NEXT_O_ID of all rows in the DISTRICT table giving SUM_1.
2. A full load test was started and allowed to run for over 10 minutes.
3. One of the disks containing the transaction log was removed. Since the disk was RAID-10 (mirrored), Oracle 10g Server continued to process the transactions successfully.
4. The test continued for at least another 5 minutes.
5. Since write cache mirroring was enabled for the log device, one of the Fibre Channel controllers, which holds one copy of the mirrored cache, was removed. There was a brief pause in I/O while the failover to the remaining log controller occurred. The controller detected a mirror-out-of-sync condition and deactivated write-back cache.
6. The run continued without write-back cache.
7. The system was subsequently shut down.

8. The disk from step 3 was replaced.
9. The system was powered back on and Oracle 10g Server was allowed to recover.
10. Step 1 was performed returning the value for SUM_2. It was verified that SUM_2 was greater than SUM_1 plus the completed New_Order transactions recorded by the RTE. The additional transactions found in the database were attributed to in-flight activity at the time of the failure.

Failure of Durable Medium Containing TPC-C Database Tables:

The following steps were successfully performed to demonstrate Durability against the failure of a disk unit with database tables:

1. The contents of the database were backed up in full.
2. The current count of the total number of orders was determined by the sum of D_NEXT_O_ID of all rows in the DISTRICT table giving SUM_1.
3. A scaled-down test was started with about 20% of the full load.
4. A disk containing the TPCC table was removed causing Oracle 10g Server to report numerous errors when attempting to access that device
5. The disk was powered back on and the full database was restored from the backup copy in step 1.
6. Oracle 10g Server was restarted and the transactions in the log were applied to the database.
7. Step 2 was performed returning SUM_2. It was verified that SUM_2 was greater than SUM_1 plus the completed New_Order transactions recorded by the RTE. The additional transactions found in the database were attributed to in-flight activity at the time of the failure.
8. Consistency condition 3 was verified.

Instantaneous Interruption and Memory Failure:

The following steps were conducted on a fully scaled database:

1. The current count of the total number of orders was determined by the sum of D_NEXT_O_ID of all rows in the DISTRICT table giving SUM_1.
2. A full load test was started and allowed to run for over 10 minutes.
3. The system was powered off, which removed power from all system components, including memory.
4. The system was powered back on and Oracle 10g Server recovered.
5. Step 1 was performed returning SUM_2. It was verified that SUM_2 was greater than SUM_1 plus the completed New_Order transactions recorded by the RTE. The additional transactions found in the database were attributed to in-flight activity at the time of the failure
6. Consistency condition 3 was verified.

4 Clause 4: Scaling and Data Base Population Related Items

4.1. Cardinality of Tables

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

Table 4-1 portrays the TPC Benchmark™ C defined tables and the number of rows for each table as they were built initially.

All tables are based on 31,000 warehouses, the number of active warehouses during the benchmark was 29,760.

Table Name	Number of Rows
Warehouse	29,760
District	310,000
Customer	930,000,000
History	930,000,000
Order	930,000,000
New Order	279,000,000
Order Line	9,300,237,264
Stock	310,000,000
Item	100,000

Table 4-1: Initial Cardinality of Tables

4.2. Distribution of Tables and Logs

The system is configured with 40 RAID0 for the tables and 2 RAID10 for the log.

For the tables, each RAID0 (hdisk) is configured with 18x 36.4GB disks with a capacity of 601.125GB per RAID. There are 233 Logical Volumes (LV) with 10 pairs of storage adapters and 10 volume groups. Each adapter has 4 hdisks and each LV is spread across 4 hdisks.

For the log, one RAID10 is configured with 16 x 73.4GB disk with a capacity of 475GB and the second RAID10 is configured with 14 x73.4GB with a capacity of 407.12GB. There are two Logical Volume (LV) with 2 storage adapters. Each adapter has 1 logical disk and the log LV is striped across the 2 hdisks.

4.3. Data Base Model Implemented

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

The relational database manager used for this test was Oracle Database 10g Enterprise Edition.

4.4. Partitions/Replications Mapping

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

IBM did not implement horizontal or vertical partitioning for this TPC-C test.

Data Distribution			
Adapter	**Hdisk**	**Size (GB)**	**Logical Volumes**
fcs0	hdisk8,10	601.125	cust50,cust49,cust52,cust51,stok62,stok61,stok64,stok63,stok66,stok65, temp20,stok67,temp22,temp0,ordr18,iitem0,cust54,cust53,ordr17,icust27 ,ordr16
fcs0	hdisk12,14	601.125	idist0,icust28,ordr21,ordr19,ordr20,cust59,cust0,cust57,cust58, cust55,cust56,stok69,stok70,stok68,temp21,temp23,stok73,stok0,stok71, stok72
fcs1	hdisk16,18	601.125	cust17,cust16,cust15,cust14,stok17,ordr5,ordr4,cust18,cust13, tool3,tool2,temp8,temp6,stok21,stok22,stok23,stok24,istok4, icust21,stok18,stok19,stok20,hist3,iordr23,log2
fcs1	hdisk20,22	601.125	icust22,istok0,hist4,iordr20,cust23,cust24,cust21,cust22,cust19, cust20,stok31,stok32,temp7,temp9,stok27,stok28,stok29,stok30, stok26,stok25,ordr6,ordr7,temp10
fcs2	hdisk24	601.125	iordr21,hist1,cust4,cust5,cust6,nord1,nord2,stok8,stok5,stok4, stok7,stok6,stok1,ordr1,stok3,stok2,log1,icust11,cust1,icust29, ordr0, cust2,istok2,cust3,temp3,temp2
fcs2	hdisk26	601.125	aux1,iordr21,hist1,iware0,cust4,cust5,cust6,nord1,nord2,stok8, stok5,stok4,stok7,stok6,stok1,ordr1,stok3,stok2,log1,icust11, cust1,icust29,ordr0,cust2,istok2,cust3,temp3,temp2
fcs2	hdisk28,30	601.125	temp5,temp4,stok16,stok15,stok14,stok13,stok12,stok11,stok10, temp1,icust10,istok3,icust210,hist2,iordr22,stok9,ordr3,ordr2, cust12,cust11,cust10,cust9,cust8,cust7
fcs3	hdisk32,34	601.125	cust27,cust26,cust29,cust28,ordr8,cust30,stok33,ordr9,cust25, temp13,temp12,temp11,stok35,stok36,stok34,icust23,roll1,stok39,hist5, stok37,stok38
fcs3	hdisk36,38	601.125	cust31,cust34,cust35,cust32,cust33,hist6,icust24,roll2,stok42, stok41,stok44,stok43,stok46,ordr11,stok45,stok40,temp15,cust36, temp14,ordr10
fcs4	hdisk40,42	601.125	hist7,tool1,icust20,icust25,cust41,cust40,cust39,cust38,stok53, stok47,temp19,ordr13,ordr12,cust42,stok49,stok50,stok51,stok52,cust37, stok48
fcs4	hdisk44,46	601.125	istok1,hist0,icust26,temp24,stok60,temp16,temp17,temp18, stok56,stok57,stok58,stok59,stok55,stok54,cust47,cust48,ordr14,ordr15, cust43,cust44,cust45,cust46
fcs6	hdisk23	601.125	aux3,iordr21,hist1,cust4,cust5,cust6,nord1,nord2,stok8,stok5, stok4,stok7,stok6,stok1,ordr1,stok3,stok2,log1,icust11,cust1, icust29,ordr0,cust2,istok2,cust3,temp3,temp2
fcs6	hdisk25	601.125	iordr21,hist1,cust4,cust5,cust6,nord1,nord2,stok8,stok5,stok4, stok7,stok6,stok1,ordr1,stok3,stok2,log1,icust11,cust1,icust29, ordr0,cust2,istok2,cust3,temp3,temp2
fcs6	hdisk27,29	601.125	temp5,temp4,stok16,stok15,stok14,stok13,stok12,stok11, stok10,temp1,icust10,sys1,istok3,icust210,hist2,aux2,iordr22, stok9,ordr3,ordr2,cust12,cust11,cust10,cust9,cust8,cust7

fcs7	hdisk31,33	601.125	cust27,cust26,cust29,cust28,ordr8,cust30,stok33,ordr9,cust25, temp13,temp12,temp11,stok35,stok36,stok34,icust23,roll1,log3, stok39,hist5,stok37,stok38
fcs7	hdisk35,37	601.125	cust31,cust34,cust35,cust32,cust33,hist6,icust24,roll2,stok42, stok41,stok44,stok43,stok46,ordr11,stok45,stok40,temp15,cust36, temp14,ordr10
fcs8	hdisk39	601.125	hist7,tool1,icust20,log4,icust25,cust41,cust40,cust39,cust38, stok53,stok47,temp19,ordr13,ordr12,cust42,stok49,stok50,stok51,stok52, cust37,stok48
fcs8	hdisk41	601.125	hist7,tool1,icust20,icust25,cust41,cust40,cust39,cust38,stok53, stok47,temp19,ordr13,ordr12,cust42,stok49,stok50,stok51,stok52,cust37, stok48
fcs8	hdisk43,45	601.125	istok1,hist0,icust26,temp24,stok60,temp16,temp17,temp18, stok56,stok57,stok58,stok59,stok55,stok54,cust47,cust48,ordr14,ordr15, cust43,cust44,cust45,cust46
fcs10	hdisk7,9	601.125	cust50,cust49,cust52,cust51,stok62,stok61,stok64,stok63,stok66,stok65, temp20,stok67,temp22,temp0,ordr18,iitem0,cust54,cust53,ordr17,icust27 ,ordr16
fcs10	hdisk11	601.125	item0,icust28,ordr21,ordr19,ordr20,cust59,cust0,cust57,cust58, cust55,cust56,stok69,stok70,stok68,temp21,temp23,stok73,stok0,stok71, stok72
fcs10	hdisk13	601.125	icust28,ordr21,ordr19,ordr20,cust59,cust0,cust57,cust58,cust55, cust56,stok69,stok70,stok68,temp21,temp23,stok73,stok0,stok71,stok72
fcs11	hdisk15,17	601.125	cust17,cust16,cust15,cust14,stok17,ordr5,ordr4,cust18,cust13, tool3,tool2,temp8,temp6,stok21,stok22,stok23,stok24,istok4, icust21,stok18,stok19,stok20,hist3,iordr23,log2
fcs11	hdisk19,21	601.125	icust22,istok0,hist4,iordr20,cust23,cust24,cust21,cust22,cust19, cust20,stok31,stok32,temp7,temp9,stok27,stok28,stok29,stok30, stok26,stok25,ordr6,ordr7,temp10
fcs5	hdisk47	407.124	runlog1,runlog2
fcs9	hdisk48	475.000	runlog1,runlog2

Table 4-2 IBM eServer p5 570 Model 9117-570 Data Distribution Benchmark Configuration

4.5. 60 Day Space Calculation

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

60 Day Space Calculations						
TPM	**371,044**			new_order	**74,656,651**	
Warehouses	**31,000**			Redo blocks written	**726,402,043**	
SEGMENT	**TYPE**	**BLOCKS**	**SIZE**	**FIVE PCT**	**DAILY GROW**	**TOTAL (MB)**
CUSTCLUSTER	CLUSTER	217629648	4096	10881482	0	892621.60
DB_STAT	SYS	524288	4096	0	0	2048.00
DISTCLUSTER	CLUSTER	36805	2048	1840	0	75.48
HIST	TABLE	14379594	4096	0	2753787	66927.27
ICUST1	INDEX	5402148	4096	270107	0	22157.25
ICUST2	INDEX	11740460	4096	587023	0	48154.23
IDIST	INDEX	1620	4096	81	0	6.64
IITEM	INDEX	440	4096	22	0	1.80
IORDR2	INDEX	8495630	4096	424782	0	34845.36
ISTOCK	INDEX	16046170	4096	802309	0	65814.37
ITEMCLUSTER	CLUSTER	14336	2048	717	0	29.40
IWARE	INDEX	748	4096	37	0	3.07
NORDCLUSTER_QUEUE	CLUSTER	2054880	4096	102744	0	8428.22
ORDRCLUSTER_QUEUE	CLUSTER	49238168	16384	0	9429433	916681.27
STOKCLUSTER	CLUSTER	282127744	4096	14106387	0	1157164.58
SYSAUX	SYS	96252	4096	0	0	375.98
SYSTEM	SYS	51200	4096	0	0	200.00
SYS_IQ0000011024$$	SYS	278432	16384	13922	0	4568.03
SYS_IQ0000011070$$	SYS	256860	4096	12843	0	1053.53
WARECLUSTER	CLUSTER	32768	2048	1638	0	67.20
Total		**608,408,191**		**27,205,934**	**12,183,220**	**3,221,223.27**

Dynamic space	825,517	Initial MB for (History+Orders)
Static space	2,237,615	Initial blocks +5% -Dynamic
Daily growth	158,092	
Daily spread	0	Oracle may be configured such that daily spread is 0
60-day space (MB)	11,723,127	
60-day (GB)	**11,448.37**	
Log block size	512	
Log blocks/tpmC	9.73	Number of log blocks used in one tpmC
8-hour log (GB)	**826.31**	

	Formatted	**SUT**			
Disk Type	**Capacity**	**# Arrays**	**Capacity GB**	Data	24045.00
Data RAID0(18-36GB)	615552	40	24045.00	Log	1289.25
Log RAID1(16-72GB)	486400	1	882.12	OS	203.25
Log RAID1(14-72GB)	416895	1	407.12	**Total (GB)**	**25537.50**

Table 4-3: Space Calculation

5 Clause 5: Performance Metrics and Response Time Related Items

5.1. Response Times

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

Table 5-1 lists the response times and the ninetieth percentiles for each of the transaction types for the measured system.

5.2. Keying and Think Times

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

Table 5-1 lists the TPC-C keying and think times for the measured system.

Response Times	New Order	Payment	Order Status	Delivery (int./def.)	Stock Level	Menus
90 %	0.90	0.89	0.89	0.38/0.05	0.98	0.39
Average	0.44	0.44	0.44	0.19/0.03	0.51	0.18
Maximum	4.16	4.13	4.08	2.02/2.41	4.03	2.02
Think Times						
Minimum	0.01	0.01	0.01	0.01	0.01	N/A
Average	12.02	12.02	10.01	5.02	5.02	N/A
Maximum	120.21	120.25	100.10	50.21	50.21	N/A
Keying Times						
Minimum	18.00	3.00	2.00	2.00	2.00	N/A
Average	18.01	3.01	2.01	2.01	2.01	N/A
Maximum	18.06	3.06	2.05	2.05	2.05	N/A

Table 5-1: Think and Keying Times

5.3. Response Time Frequency Distribution

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

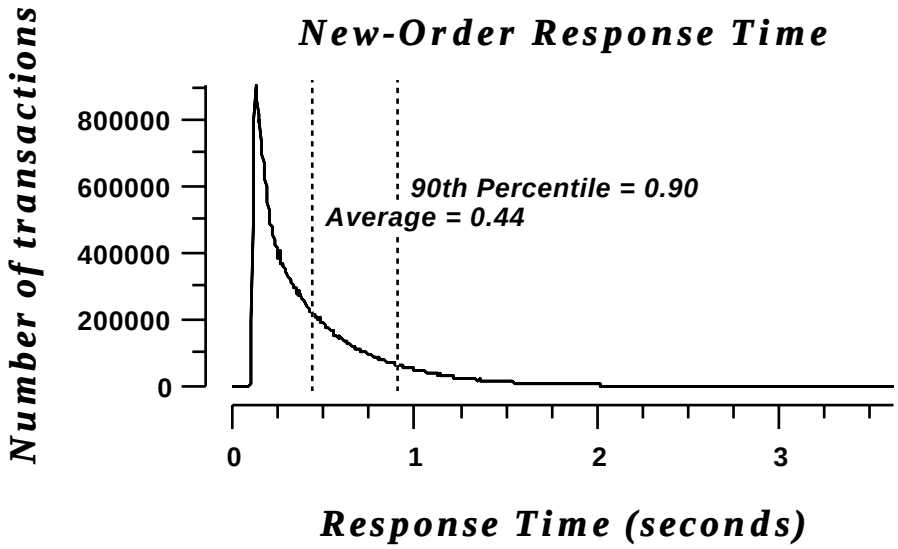


Figure 5-1: New-Order Response Time Distribution

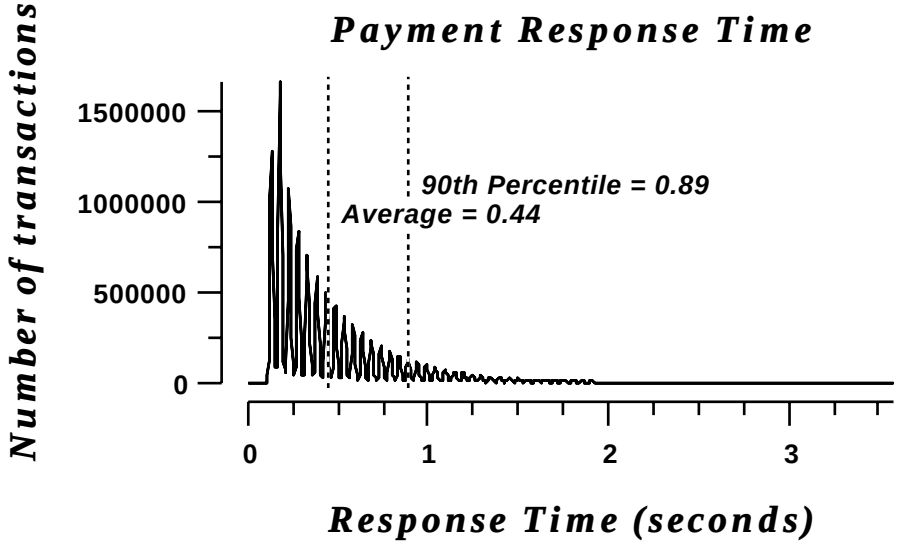


Figure 5-2: Payment Response Time Distribution

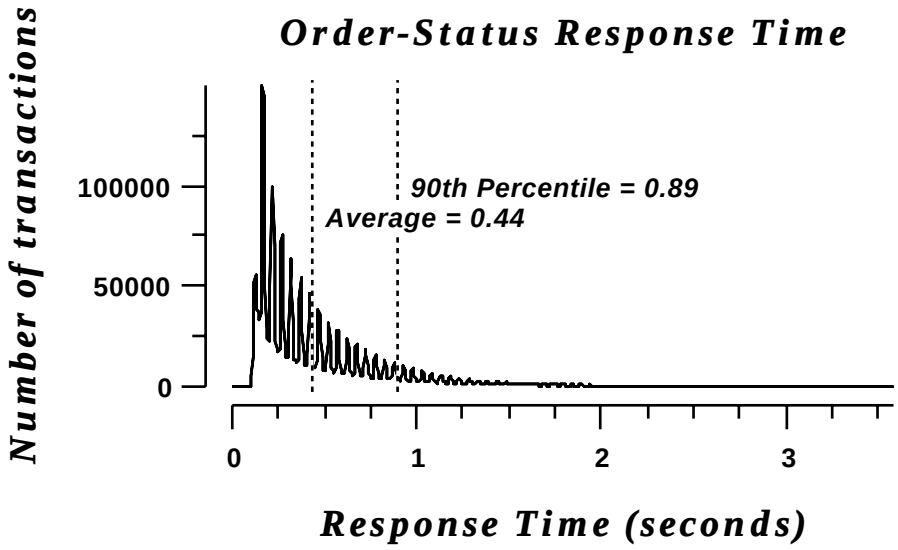


Figure 5-3: Order-Status Response Time Distribution

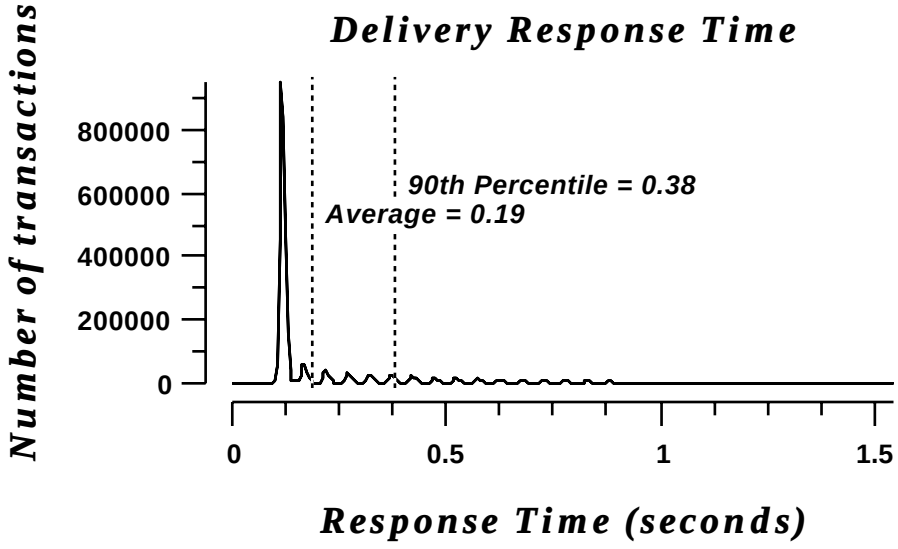


Figure 5-4: Delivery (Interactive) Response Time Distribution

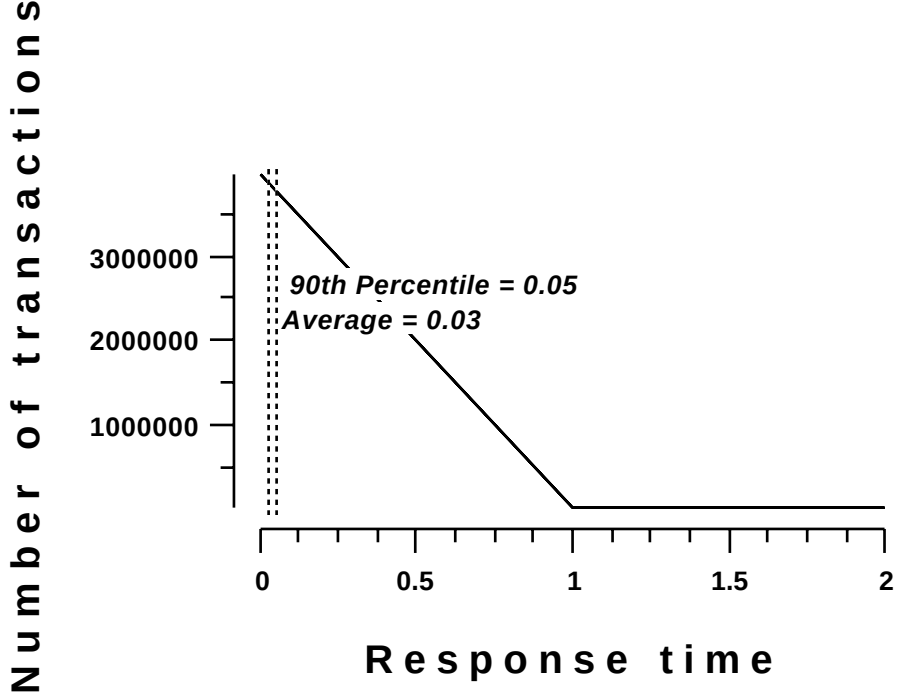


Figure 5-5: Delivery (Deferred) Response Time Distributio

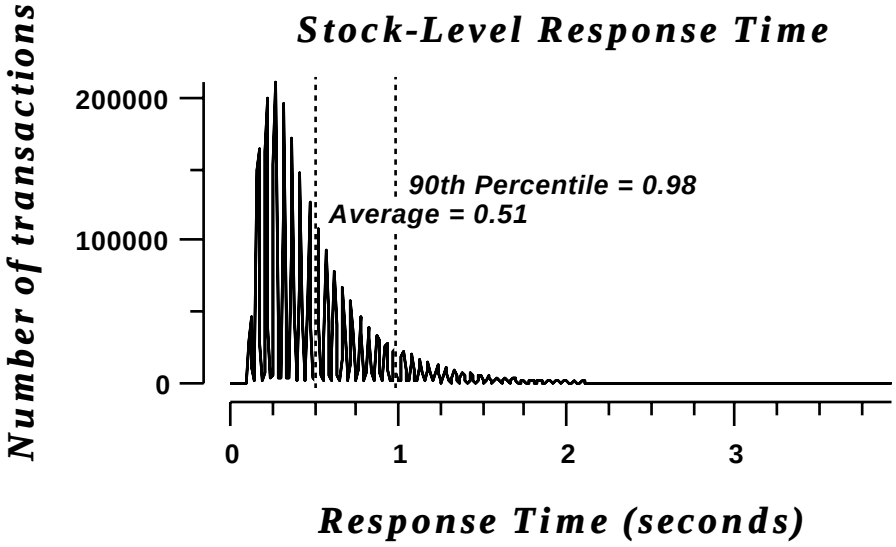


Figure 5-6: Stock Level Response Time Distribution

5.4. Performance Curve for Response Time versus Throughput

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

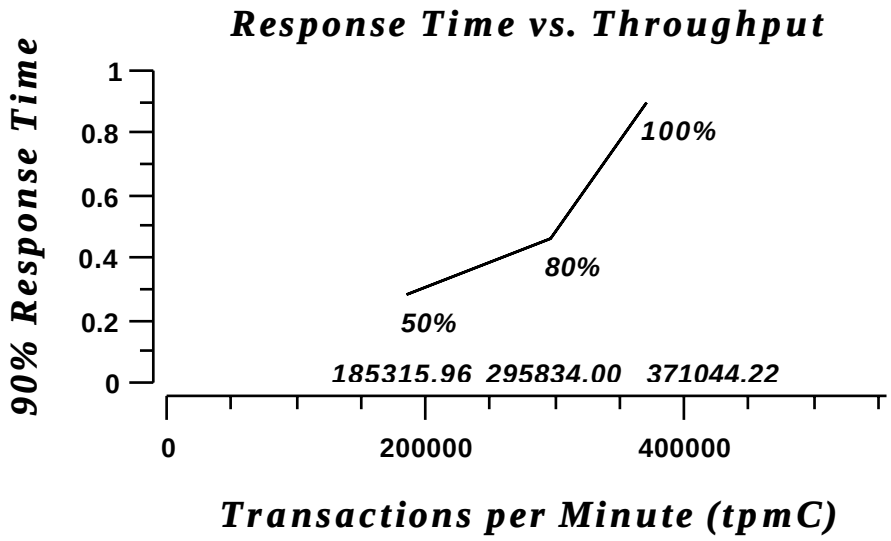


Figure 5-7: New-Order Response Time vs. Throughput

5.5. Think Time Frequency Distribution

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

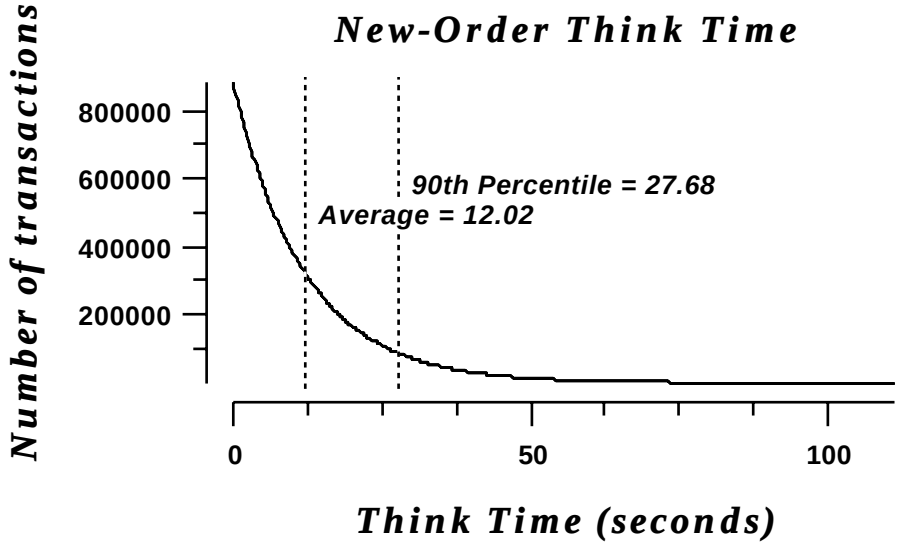


Figure 5-8: New-Order Think Time Distribution

5.6. Throughput versus Elapsed Time

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

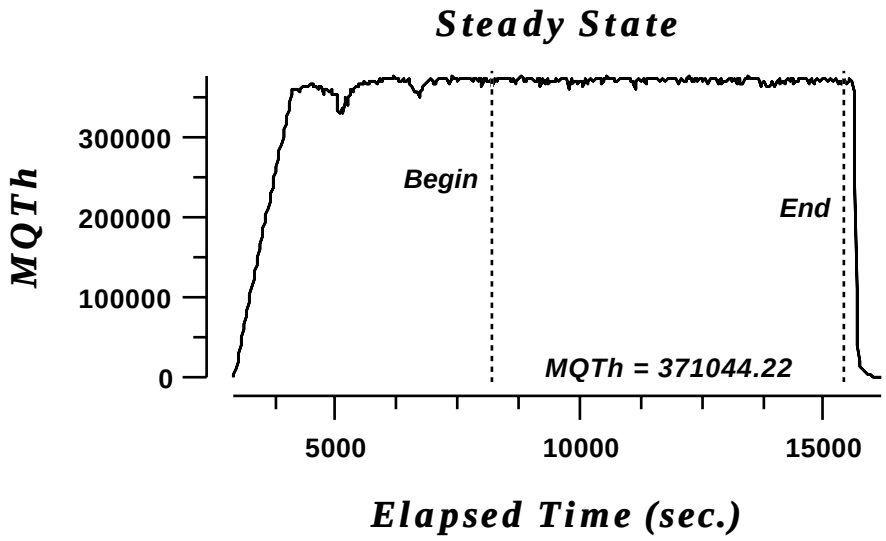


Figure 5-9: New-Order Throughput vs. Elapsed Time

5.7. Steady State Determination

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

All the emulated users were allowed to logon and do transactions. The user ramp-up phase is clearly visible on the graph above. Refer to the Numerical Quantities Summary pages for the rampup time. Figure 5-9 New-Order throughput versus Elapsed Time graph shows that the system maintained a steady state during the measurement interval

5.8. Work Performed During Steady State

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

A 2-hour measurement interval was used to guaranty that all work normally performed during an 8-hour sustained test are included in the reported throughput.

5.8.1. Transaction Flow

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

Microsoft COM+ for Windows 2000 Server was used as a Transaction Monitor(TM). The transaction framework was divided into three programs. The front end program, Microsoft Internet Information Server (IIS), handled all HTML requests through an ISAPI module, a back end database client program (COM+), which connected to the database, and a database server program which handled all database operations at the SUT (Oracle10g). Both the front and back end programs ran on the client systems. The front end program communicates with database client programs through COM+ RPC calls. IIS ISAPI code communicates with the clients through HTML over Ethernet. The database client program communicates with the Server system over Ethernet using SQL*Net calls. Besides calling initialization code during startup, all other functions are transparent to the application code. IIS and COM+ routes the transactions and balances the load according to the options defined in the configuration file (Windows Registry) in appendix B.2, IIS ISAPI code is capable based on this configuration file to direct transactions to COM+ pools. Delivery Transactions are Asynchronous and are handled in the IIS ISAPI code by implementing muliple configurably threads to processes requests from a common queue. The transaction flow is described below.

- COM+ is configured with 26 pools each with a connection to the database.
- ISAPI is configured with 2 threads to handle delivery threads.
- A total of 26000 browser entries are set up in ISAPI.
- Number of warehouses per client is configured as 2480
- IIS is configured to have 400 threads to handle communcation with the users.
- When the users login to the webserver the entire framework is established including the connections tothe database and the common Browser Array in ISAPI.
- When browsers are started, each emulated browser connects to the IIS webserver, that has been configured tohave all .html pages handled by ISAPI code disclosed in Appendix A.
- The TPC-C user chooses the transaction type and proceeds to fill the screen fields required for the transaction.
- The ISAPI code accepts all values entered by the user and transmits those values to one of the TPC-C back end programs. The transaction is performed through a COM+ RPC. There is an interface for each TPC-C transaction type and each TPC-C back end program exports these interfaces. COM+ transparently routes the RPC to one of the servers exporting the corresponding handle.
- The delivery transactions are excuted by placing the request on a queue in ISAPI.
- A TPC-C back end server program receives a RPC and proceeds to execute all database operations related to the request. All information entered on the users emulated browser is contained in the RPC.
- Once the transaction is done (committed or rolled back), the server program fills in the output parameters. The RPC is then sent back to the ISAPI code.
- When the RPC returns to the ISAPI code, the routine writes the transaction out on the users browser

5.8.2. Database Transaction

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

Using SQL*Net calls, the TPC-C back-end program interacts with Oracle 10g Server to perform SQL data manipulations such as update, select, delete and insert, as required by the transaction. After all database operations are performed for a transaction, the transaction is committed.

Oracle 10g Server proceeds to update the database as follows:

When Oracle 10g Server changes a database table with an update, insert, or delete operation, the change is initially made in memory, not on disk. When there is not enough space in the memory buffer to read in or write additional data pages, Oracle 10g Server will make space by flushing some modified pages to disk. Modified pages are also written to disk when a checkpoint occurs. Before a change is made to the database, it is first recorded in the transaction log. This ensures that the database can be recovered completely in the event of a failure. Using the transaction log, transactions that started but did not complete prior to a failure can be undone, and transactions recorded as complete in the transaction log but not yet written to disk can be redone.

5.8.3. Checkpoints

A checkpoint is the process of writing all modified data pages to disk. The TPC-C benchmark was setup to automatically checkpoint every 30 minutes. Two checkpoints occurs during the rampup period, and four other occurring during the measurement interval. The incremental checkpoint duration during the measurement is 29 minutes and 9 second.

5.9. Measurement Interval

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

A 2-hour measurement interval was used.

6 Clause 6: SUT, Driver, & Communication Definition Related Items

6.1. RTE Availability

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

IBM used an internally developed RTE for these tests. Appendix D contains the scripts used in the testing.

6.2. Measurement Interval

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

A 2-hour measurement interval was used. No connections were lost during the run.

6.3. Functionality and Performance of Emulated Components

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

No components were emulated.

6.4. Network Bandwidth

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

The network between the clients and the database server was configured as 1000 MegaBits per second Full Duplex.

6.5. Operator Intervention

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

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

7 Clause 7: Pricing Related Items

7.1. Hardware and Programs Used

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

The detailed list of all hardware and programs for the priced configuration is listed in the pricing sheets for each system reported. The prices for all products and features that are provided by IBM are available the same day as product or feature availability.

7.2. Three Year Cost of System Configuration

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

The price sheet for this disclosure is contained in the executive summary.

7.3. Availability Dates

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

All products are generally available today except the following:

Product	Availability Date
IBM eServer p5 570 Model 9117-570	September 30, 2004
AIX 5L Version 5.3	August 31, 2004
Oracle Database 10g Enterprise Edition	August 31, 2004

7.4. Statement of tpmC and Price/Performance

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

.System	tpmC	3-year System Cost	$/tpmC	Availability Date
IBM eServer p5 570 Model 9117-570	371,044.22	$1,951,215 USD	$5.26 USD	September 30, 2004

Please refer to the price list on the Executive Summary page for details.

8 Clause 9: Audit Related Items

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

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

Sponsor: John J. Makis
IBM eServer Performance
11501 Burnet Road
Austin, TX 78758

June 29, 2004

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

Platform: IBM eServer p5 570 Model 9117-570 c/s
Operating system: AIX 5L V5.3
Database Manager: Oracle 10g Enterprise Edition
Transaction Manager: Microsoft COM+

The results were:

CPU's Speed	Memory	Disks	NewOrder Response Time - 90%	tpmC
Server: IBM eServer p5 570 Model 9117-570				
8 x POWER5 (1.9 GHz)	256 GB main (36 MB L3 cache/DCM)	2 x 36.4GB SCSI int. 2x 73.4 SCSI int 720 x 36.4GB FAStT 30 x 73.4GB FAStT	0.90 Sec.	371,044.22
Twelve (12) Clients: IBM eServer xSeries 335 Model 8676-G2X (Specification for each)				
2 x Intel Xeon (3.2 GHz)	2 GB main (1 MB L3 cache/cpu)	1 x 80GB	n/a	n/a

In my opinion, these performance results were produced in compliance with the TPC requirements for Revision 5.3 of the benchmark.

The following verification items were given special attention:

- The transactions were correctly implemented.
- The database records were the proper size.
- The database was properly scaled and populated.

- The ACID properties were met.
- Input data was generated according to the specified percentages.
- The transaction cycle times included the required browser delay, keying and think times.
- The reported response times were correctly measured.
- At least 90% of all delivery transactions met the 80 Second completion time limit.
- All 90% response times were under the specified maximums.
- The measurement interval was representative of steady state conditions.
- The reported measurement interval was 2.0 hours.
- Four checkpoints were taken during the measurement interval.
- The 60 day storage requirement was correctly computed.
- The system pricing was verified for major components and maintenance.

Additional Audit Notes:

None.

Respectfully Yours,

François Raab, President

Appendix - A: Client Server Code

A.1 Client/Terminal Handler Code

tpccIsapi.def

```
; tpccIsapi.def : declares the module parameters for the DLL.

LIBRARY      "tpccIsapi"

EXPORTS
  HttpExtensionProc
  GetExtensionVersion
  TerminateExtension
```

tpcc.h

```
// Common defines and structures use internally by client code
// Not to be confused with structures actually passed in transaxtions
//

// standard includes

#ifndef _COMMON_TPCC
#define _COMMON_TPCC
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <sys/timeb.h>
#include <time.h>

#ifdef DB2
#include <db2tpcc.h>
#endif
#ifdef ORACLE
#include <ora_tpcc.h>
#endif
#include <iostream>
#include <fstream>
#include <process.h>
#include <ios>

////////////////////////////////////////////////////////////
// Defines
////////////////////////////////////////////////////////////

#define    OK              0
#define    INVALID_STATUS       -1
#define    ERR             -1
#define    INVALID_COM_STATUS    -2


#define TXN_MAX_COMMANDS       55
#define MAX_TRANSACTIONS       14
#define MAX_CMD_LENGTH         100
#define INPUT_ITEMS            3
#define MAX_INT_BUFFER         15
#define NORD_ITEMS             15
#define ITEM_START             11
#define ITEM_END               55
#define MAX_ITEMS              15

#define MAX_STRING_LEN         256
#define MAX_HTML_PAGE_LEN      4096
#define MAX_HTML_HEADER_LEN        512

#define DELIVERY_THREADS_NUM    100

#define DISTRICTS_PER_WAREHOUSE    10
////////////////////////////////////////////////////////////
// Transaction Codes
////////////////////////////////////////////////////////////

#define    TXN_LOGIN           0
#define    TXN_NEW_ORDER           1
#define    TXN_PAYMENT             2
#define    TXN_ORDER_STATUS      3
#define    TXN_DELIVERY          4
#define    TXN_STOCK           5
#define    TXN_EXIT            6
#define    TXN_LOGIN_RESULTS       7
#define    TXN_NEW_ORDER_RESULTS   8
#define    TXN_PAYMENT_RESULTS     9
#define    TXN_ORDER_STATUS_RESULTS 10
#define    TXN_DELIVERY_RESULTS     11
#define    TXN_STOCK_RESULTS       12

#define    CMD_NORD            "nord"
#define    CMD_PYMT            "pymt"
#define    CMD_ORDS            "ords"
#define    CMD_DLVY            "dlvy"
#define    CMD_STOK            "stok"
#define    CMD_EXIT           "exit"
#define    CMD_MENU            "menu"

#define    APP_NAME            "tpcc.html"
#define    HEADER             "Content-Type:text/html\r\nContent-
Length: %d\r\nConnection: Keep-Alive\r\n\r\n"

////////////////////////////////////////////////////////////
// URL Commands
////////////////////////////////////////////////////////////

#define    CMD_TXN_ID          "00"
#define    CMD_TERM_ID           "01"
#define    CMD_W_ID        "02"
#define    CMD_D_ID        "03"
#define    CMD_C_ID        "04"
#define    CMD_C_NAME          "05"
#define    CMD_C_W_ID          "06"
#define    CMD_C_D_ID          "07"
#define    CMD_AMT_PAID        "08"
#define    CMD_STK_THRESHOLD    "09"
#define    CMD_CARRIER_NUM        "10"

#define    ITEM01_SUPP_W        "11"
#define    ITEM01_ITEM_NUM        "12"
#define    ITEM01_OTY         "13"


#define CHAR_FILL            ' '
#define NUMERIC_FILL         ' '
#define NEGITIVE_SYMBOL           '-'
#define MONEY_SYMBOL           '$'
#define DECIMAL_SYMBOL            '.'
#define ZERO_SYMBOL            '0'
#define ZIP_DELIMITER          '-'
#define PHONE_DELIMITER           '-'
#define DATE_DELIMITER          '-'
#define TIME_DELIMITER          ':'

#define DEFAULT_MONEY64_LEN       15
#define DEFAULT_MONEY32_LEN       9
#define DEFAULT_MONEY16_LEN       9

#define DEFAULT_NUMERIC64_LEN    15
#define DEFAULT_NUMERIC32_LEN    9
#define DEFAULT_NUMERIC16_LEN    9

#define DEFAULT_DECIMAL64_LEN    5
#define DEFAULT_DECIMAL32_LEN    5
#define DEFAULT_DECIMAL16_LEN    5
```

```
#define DEFAULT_DATETIME_LEN      19
#define DEFAULT_DATE_LEN          11
#define DEFAULT_TIME_LEN          8

#define DEFAULT_STRING_LEN        25
#define DEFAULT_ZIP_LEN           17
#define DEFAULT_PHONE_LEN         18

////////////////////////////////////////////////////////////////
// String Field Lengths
////////////////////////////////////////////////////////////////

#define NAME_LEN      24
#define LAST_NAME_LEN     16
#define FIRST_NAME_LEN    16
#define INITIALS_LEN      2

#define CREDIT_LEN        2

#define STREET_LEN        20
#define CITY_LEN          20
#define STATE_LEN         2
#define ZIP_LEN           9

#define PHONE_LEN         16
#define DATA_LEN          200

#define ITEM_LIST         15
#define ORDER_LIST        10

////////////////////////////////////////////////////////////////
// Type definitions
////////////////////////////////////////////////////////////////

typedef __int8          INT8b;
typedef __int16         INT16b;
typedef __int32         INT32b;
typedef __int64         INT64b;

typedef unsigned __int8    UINT8b;
typedef unsigned __int16   UINT16b;
typedef unsigned __int32   UINT32b;
typedef unsigned __int64   UINT64b;

typedef INT16b          sqlint16;
typedef INT32b          sqlint32;
typedef INT64b          sqlint64;

typedef INT16b          int16_t;
typedef INT32b          int32_t;
typedef INT64b          int64_t;

typedef char            BYTE8b;
typedef double          DOUBLE;
typedef unsigned long   NATURAL;

////////////////////////////////////////////////////////////////
// Date and time values
////////////////////////////////////////////////////////////////

#define SECONDS_IN_DAY      86400
#define SECONDS_IN_HOUR     3600
#define SECONDS_IN_MINUTE   60
#define GMT_OFFSET          5

#define DAYS_IN_YEAR      365
#define YEARS_IN_LEAP     4
#define START_YEAR        1970
#define MONTHS_IN_YEAR    12

////////////////////////////////////////////////////////////////
```

```
// Error codes
////////////////////////////////////////////////////////////////
#define ERR_INVALID_TXN_TYPE        -1

#define ERR_MISSING_W_ID            -2
#define ERR_NON_NUMERIC_W_ID        -3
#define ERR_MISSING_D_ID            -4
#define ERR_NON_NUMERIC_D_ID        -5
#define ERR_MISSING_C_ID            -6
#define ERR_NON_NUMERIC_C_ID        -7

#define ERR_MISSING_SUPP_W          -8
#define ERR_NON_NUMERIC_SUPP_W      -9
#define ERR_MISSING_ITEM_NUM        -10
#define ERR_NON_NUMERIC_ITEM_NUM    -11
#define ERR_MISSING_ITEM_OTY        -12
#define ERR_NON_NUMERIC_ITEM_QTY    -13

#define ERR_MISSING_CLAST_NAME      -14
#define ERR_NON_NUMERIC_CUST_W_ID   -15
#define ERR_NON_NUMERIC_CUST_D_ID   -16
#define ERR_MISSING_AMOUNT_PAID     -17
#define ERR_NON_NUMERIC_AMOUNT_PAID -18

#define ERR_INVALID_D_ID        "ERROR : Invalid District ID. Try
Again."
#define ERR_INVALID_W_ID        "ERROR : Invalid Warehouse ID.
Try Again."
#define ERR_INVALID_C_ID        "ERROR : Invalid Customer ID.
Try Again."
#define ERR_INVALID_SUPPLY_W_ID     "ERROR : Invalid Item
Supply Warehouse. Try Again."
#define ERR_INVALID_ITEM_NUM    "ERROR : Invalid Item
Number. Try Again."
#define ERR_INVALID_ITEM_OTY    "ERROR : Invalid Item Qty.
Try Again."
#define ERR_MISSING_C_ID_OR_CLAST  "ERROR : Must Enter
Customer Id or Customer Last Name. Try Again."
#define ERR_INVALID_PAYMENT_AMOUNT "ERROR : Invalid
Payment Amount. Try Again."
#define ERR_INVALID_CARRIER     "ERROR : Invalid Carrier
Number. Try Again."
#define ERR_INVALID_THRESHOLD   "ERROR : Invalid
Threshold. Try Again."
#define ERR_INVALID_C_D_ID      "ERROR : Invalid Customer
District Id. Try Again."
#define ERR_INVALID_C_W_ID      "ERROR : Invalid Customer
Warehouse Id. Try Again."
#define ERR_TERMINAL_FULL       "ERROR : Terminal can not
support user.  Terminal full."
#define ERR_C_ID_OR_CLAST_ONLY  "ERROR : Either
customer id or customer last name can be specified."

#define ERR_UNABLE_TO_OPEN_REG      -50
#define ERR_DLVY_THREAD_FAILED      -51
#define ERR_DLVY_SEMAPHORE_INIT_FAILED -52
#define ERR_DLVY_EVENT_INIT_FAILED  -53
#define ERR_DLVY_QUEUE_EATING_TAIL  -54
#define ERR_DLVY_QUEUE_CALLOC_FAIL  -55
#define ERR_NUMSERVERS_NOT_IN_REG   -56
#define ERR_NUMWAREHOUSES_NOT_IN_REG  -57

#define ERR_INVALID_USERNAME        -70
#define ERR_INVALID_PASSWORD        -71
#define ERR_INVALID_DB_NAME         -72
#define ERR_INVALID_REGISTERY_KEY   -73
#define ERR_DB2_DLL_NOT_LOADED      -74
#define ERR_ORACLE_DLL_NOT_LOADED   -75
#define ERR_CONNECT_ADDRESS_NOT_FOUND-76
#define ERR_NORD_ADDRESS_NOT_FOUND  -77
#define ERR_PYMT_ADDRESS_NOT_FOUND  -78
#define ERR_ORDS_ADDRESS_NOT_FOUND  -79
```

```
#define ERR_DLVY_ADDRESS_NOT_FOUND     -80
#define ERR_STOK_ADDRESS_NOT_FOUND     -81
#define ERR_NULL_DLL_NOT_LOADED        -82
#define ERR_UNKNOWN_DB             -83
#define ERR_DISCONNECT_ADDRESS_NOT_FOUND -84
#define ERR_ORA_DLL_NOT_LOADED         -85

#define ERR_SAVING_CONTEXT             -90
#define ERR_DETACHING_CONTEXT          -91
#define ERR_ATTACHING_CONTEXT          -92
#define ERR_HANDLE_IN_USE              -93

#define ERR_CONNECT_TO_TM_FAILED     -99
#define ERR_DLVY_LOG_OPEN_FAILED     -100
#define ERR_DLVY_QUEUE_FULL          -101

////////////////////////////////////////////////////////////////
// Registery Definitions
////////////////////////////////////////////////////////////////
#define    REGISTERY_SUB_KEY   "SOFTWARE\\TPCC"

#define    DELIVERY_THREADS     "dlvyThreads"
#define    DELIVERY_QUEUE_LEN    "dlvyQueueLen"
#define    DELIVERY_LOG_PATH      "dlvyLogPath"
#define    ERROR_LOG_FILE      "errorLogFile"
#define    HTML_TRACE_LOG_FILE     "htmlTraceLogFile"
#define    DB_NAME              "dbName"
#define    NULL_DB              "nullDB"
#define    COM_NULL_DB           "comnullDB"
#define    CLIENT_NULL_DB       "clientNullDB"

#define    NUM_USERS         "numUsers"
#define    DB_TYPE              "dbType"

#define    TXN_MONITOR           "txn_server"
#define    COMM_POOL           "comm_pool"
#define    HTML_TRACE          "htmlTrace"
#define    ISAPI_TRACE          "isapi_trace"

#define    DEFAULT_DLVY_THREADS     1
#define    DEFAULT_DLVY_QUEUE_LEN    10
#define    DEFAULT_DLVY_LOG_PATH
  "c:\\inetpub\\wwwroot\\tpcc\\dlvy"
#define    DEFAULT_ERROR_LOG_FILE
  "c:\\inetpub\\wwwroot\\tpcc\\errorLog.txt"
#define    DEFAULT_HTML_TRACE_LOG_FILE
  "c:\\inetpub\\wwwroot\\tpcc\\htmlTrace.txt"
#define    DEFAULT_NUM_USERS       10000

#define    DEFAULT_DB_NAME         "tpcc"

////////////////////////////////////////////////////////////////
// Structure defines
////////////////////////////////////////////////////////////////

struct nord_wrapper {
  struct in_neword_struct in_nord;
  struct out_neword_struct out_nord;
};

struct paym_wrapper {
  struct in_payment_struct in_paym;
  struct out_payment_struct out_paym;
};

struct ords_wrapper {
  struct in_ordstat_struct in_ords;
  struct out_ordstat_struct out_ords;
};

struct dlvy_wrapper {
  struct in_delivery_struct in_dlvy;
  struct out_delivery_struct out_dlvy;
};

struct stok_wrapper {
  struct in_stocklev_struct in_stok;
  struct out_stocklev_struct out_stok;
};

typedef struct
{
  int  year;
  int  month;
  int  day;

  int  hour;
  int  minute;
  int  second;
} datetime;

struct NEWORDERDATA
{
  struct  in_items_struct {
    int  s_OL_I_ID;
    int  s_OL_SUPPLY_W_ID;
    short  s_OL_QUANTITY;
  } in_item[15];

  long long  in_s_O_ENTRY_D_time;  /* init by SUT */
  int     in_s_C_ID;
  int     in_s_W_ID;
  short  in_s_D_ID;
  short  in_s_O_OL_CNT;    /* init by SUT */
  short  in_s_all_local;
  short  in_duplicate_items;

  struct  out_items_struct {
    double  s_I_PRICE;
    double  s_OL_AMOUNT;
    short  s_S_QUANTITY;
    char    s_I_NAME[25];
    char    s_brand_generic;
  } out_item[15];

  long long  out_s_O_ENTRY_D_time;
  double  out_s_W_TAX;
  double  out_s_D_TAX;
  double  out_s_C_DISCOUNT;
  double  out_s_total_amount;
  int     out_s_O_ID;
  short  out_s_O_OL_CNT;
  short  out_s_transtatus;
  short  out_deadlocks;
  char    out_s_C_LAST[17];
  char    out_s_C_CREDIT[3];

};

struct PAYMENTDATA
{
  long long  in_s_H_DATE_time;
  double  in_s_H_AMOUNT;
  int     in_s_W_ID;
  int     in_s_C_W_ID;
  int     in_s_C_ID;
  short  in_s_C_D_ID;
  short  in_s_D_ID;
  char   in_s_C_LAST[17];

  long long  out_s_H_DATE_time;
  long long  out_s_C_SINCE_time;
  double  out_s_C_CREDIT_LIM;
  double  out_s_C_BALANCE;
```

```
   double  out_s_C_DISCOUNT;
   int     out_s_C_ID;
   short  out_s_transtatus;
   short  out_deadlocks;
   char  out_s_W_STREET_1[21];
   char  out_s_W_STREET_2[21];
   char  out_s_W_CITY[21];
   char  out_s_W_STATE[3];
   char  out_s_W_ZIP[10];
   char  out_s_D_STREET_1[21];
   char  out_s_D_STREET_2[21];
   char  out_s_D_CITY[21];
   char  out_s_D_STATE[3];
   char  out_s_D_ZIP[10];
   char  out_s_C_FIRST[17];
   char  out_s_C_MIDDLE[3];
   char  out_s_C_LAST[17];
   char  out_s_C_STREET_1[21];
   char  out_s_C_STREET_2[21];
   char  out_s_C_CITY[21];
   char  out_s_C_STATE[3];
   char  out_s_C_ZIP[10];
   char  out_s_C_PHONE[17];
   char  out_s_C_CREDIT[3];
   char  out_s_C_DATA[201];
};

struct ORDERSTATUSDATA
{
   int   in_s_C_ID;
   int   in_s_W_ID;
   short in_s_D_ID;
   char  in_s_C_LAST[17];

   double out_s_C_BALANCE;
   long long  out_s_O_ENTRY_D_time;
   int    out_s_C_ID;
   int    out_s_O_ID;
   short  out_s_O_CARRIER_ID;
   short  out_s_ol_cnt;
   struct out_oitems_struct {
      long long  s_OL_DELIVERY_D_time;
      double   s_OL_AMOUNT;
      int   s_OL_I_ID;
      int   s_OL_SUPPLY_W_ID;
      short s_OL_QUANTITY;
   } out_item[15];
   short  out_s_transtatus;
   short  out_deadlocks;
   char   out_s_C_FIRST[17];
   char   out_s_C_MIDDLE[3];
   char   out_s_C_LAST[17];

};

struct DELIVERYDATA
{
   long long  in_s_O_DELIVERY_D_time;
   int   in_s_W_ID;
   short in_s_O_CARRIER_ID;
   int   out_s_O_ID[10];
   short out_s_transtatus;
   short outdeadlocks;
};

struct STOCKLEVELDATA
{
   int   in_s_threshold;
   int   in_s_W_ID;
   short in_s_D_ID;

   int   out_s_low_stock;
   short out_s_transtatus;
   short out_deadlocks;
};

struct DLVYQUEUEDATA
{
   int     warehouse;
   short  in_s_0_CARRIER_ID;

   struct _timeb enqueueTime;
};


//              MISCELLANEOUS HELPER FUNCTIONS
inline void appendText(char **string,char *text);
inline void appendText(char **string,char *text,int length,int justify);
inline void appendChar(char **string,char byte);
inline void DEBUGMSG(FILE * debugFile, char * message);
inline void appendSpaces(char **string,int spaces);

inline void calcOutDateTime(const INT64b value,datetime
*timestamp);
inline int copyOutPhone(char *buffer,char *value,int len);
inline bool copyInMoney64(const char * value,INT64b *number);
inline bool copyInMoney32(const char * value,int *number);
inline int copyInMoney(const char *value);
inline void copyOutMoney64(char *buffer,INT64b value,unsigned int
len);
inline int copyOutDateTime(char*buffer,INT64b value);
inline int copyOutDate(char *buffer,INT64b value);
inline int copyOutTime(char *buffer,INT64b value);
inline int copyOutDecimal64(char *buffer,INT64b value,unsigned int
len);

inline UINT16b changeOrder16(UINT16b value);
inline UINT32b changeOrder32(UINT32b value);
inline UINT64b changeOrder64(UINT64b value);

inline INT16b changeOrder16(INT16b value);
inline INT32b changeOrder32(INT32b value);
inline INT64b changeOrder64(INT64b value);

//
// Name        : appendText
// Description  :
//              Append text to string
// Parameters   :
//              char ** - string point to append to
//              char * - text to append
// Returns      :
//              None
// Comments     :
//

inline void appendText(char **string,char *text)
{
   while(*text)
   {
      *(*string)++ = *text++;
   }

   **string='\0';
   return;
}

//
// Name        : appendText
// Description  :
//              Append text to string
// Parameters   :
//              char ** - string point to append to
//              char * - text to append
```

```
//            int - total field length including blank spaces
//            int - justify flag
// Returns     :
//               None
// Comments    :
//            right justify
//            left justify


inline void appendText(char **string,char *text,int length,int justify)
{
   int byteCount = 0;

   if(justify)
   {
      while(*text)
      {
         *(*string)++ = *text++;
         byteCount++;
      }

      //append blank spaces if text is less than length at end
      for(byteCount;byteCount < length;byteCount++)
         *(*string)++ = ' ';
   }
   else
   {
      long long textLen = strlen(text);
      for(textLen;textLen < length;textLen++)
         *(*string)++ = ' ';

      while(*text)
         *(*string)++ = *text++;

   }
   **string='\0';
}


// Name               : appendChar
// Description  :
//                              Append text to string
// Parameters   :
//                              char ** - string point to append to
//                              char * - text to append
// Returns            :
//                              None
// Comments           :
//

inline void appendChar(char **string,char byte)
{
   *(*string)++ = byte;
   **string='\0';

   return;
}


//
// Name       : appendSpaces
// Description  :
//            appends buffer spaces to result page
// Parameters :
//               **htmlPage
//
// Returns    :
//               amount of characters the function appened
//               to the html page
// Comments     :
//

inline void appendSpaces(char **string,int spaces)
{
   for(int index=0;index<spaces;index++)
   {
      *(*string)++ = ' ';
   }

   **string='\0';
}

//
// Name       : appendCustData
// Description  :
//            appends cust data buffer to result page
// Parameters :
//               **htmlPage
//
// Returns    :
//
//               Adds a newline character every 50 characters displayed.
// Comments     :
//

inline void appendCustData(char **string,char *text)
{
   short byteCount = 0;
   while(*text)
   {
      *(*string)++ = *text++;
      byteCount++;
      if((byteCount % 50) == 0)
      {
         *(*string)++ = '\n';
         *(*string)++ = ' ';*(*string)++ = ' ';*(*string)++ = ' ';*(*string)++ =
' ';
         *(*string)++ = ' ';*(*string)++ = ' ';*(*string)++ = ' ';*(*string)++ =
' ';
         *(*string)++ = ' ';*(*string)++ = ' ';*(*string)++ = ' ';
      }
   }
   **string='\0';
}



//
// calcOutDateTime
//
// Title      : Calculate date & time data out of class array
// Parameters : INT64b - date & time expressed in seconds
//            datetime * - timestamp
// Return Value  : None
// Comments     :
//

inline void calcOutDateTime(const INT64b value,datetime
*timestamp)
{
   // fixed days in each month (FEB 29 is special case)
   static int daysInMonth[12] =
{31,28,31,30,31,30,31,31,30,31,30,31};

   // mask out EPOC seconds
   int dateValue  = ((int) (value & 0xffffffff)) +
            (SECONDS_IN_DAY - (GMT_OFFSET *
SECONDS_IN_HOUR));

   int offset   = (int) (value >> 32);

   // break out the seconds
   int hms     = dateValue % SECONDS_IN_DAY;
   int days = dateValue / SECONDS_IN_DAY;
```

```
  int years   = (days - 1) / DAYS_IN_YEAR;
  int leaps   = years / YEARS_IN_LEAP;

  int daysUsed  = (years * DAYS_IN_YEAR) + leaps;

  // adjust the number of days to account for calculated years
  days = days - daysUsed;

  // set the starting year, month, and day
  timestamp->day    = 1;
  timestamp->month  = 1;
  timestamp->year     = START_YEAR + years;

  // is the current year a leap year
  int leap = !(timestamp->year % YEARS_IN_LEAP);

    // apply remaining days based on days in months
    int daysInCurrentMonth;

    while(days)
    {
      // get days in current month
      daysInCurrentMonth = daysInMonth[timestamp->month - 1];
      if(timestamp->month == 2 && leap)
        daysInCurrentMonth = daysInCurrentMonth + 1;

      // days > days in current month
      if(days > daysInCurrentMonth)
      {
        // increment month
        timestamp->month += 1;
        days = days - daysInCurrentMonth;

        // month exceeds months in year
        if(timestamp->month > MONTHS_IN_YEAR)
        {
          // increment year and reset month
          timestamp->year += 1; timestamp->month = 1;

          // are we now on a leap year
          leap = !(timestamp->year % YEARS_IN_LEAP);
        }
      }
      else
      {
        // set day of month to remaioning days
        timestamp->day = days; days = 0;
      }
    }

    // set time values to remaining seconds
    timestamp->hour = hms / SECONDS_IN_HOUR;
    hms = hms % SECONDS_IN_HOUR;

    timestamp->minute = hms / SECONDS_IN_MINUTE;
    timestamp->second = hms % SECONDS_IN_MINUTE;
    return;
  }

//
// copyOutZip
//
// Title      : Copy zip data out of class array
// Parameters : char * - buffer to copy zip string into
//
// Return Value  : int - Length of copy
// Comments     :
//

inline int copyOutZip(char *buffer,char *value,int len =
DEFAULT_ZIP_LEN)
{
  int index     = 0;
  int bufferPos  = 0;

  // add each digit of zip number to buffer inserting delimiter at 5
  while(value[index] && bufferPos < len)
  {
    if(index == 5)
      buffer[bufferPos++] = ZIP_DELIMITER;

    buffer[bufferPos++] = value[index++];
  }

  // space fill to the required length
  while(bufferPos < len)
    buffer[bufferPos++] = CHAR_FILL;

  buffer[bufferPos] = NULL;
  return len;
}

//
// copyOutPhone
//
// Title      : Copy phone data out of class array
// Parameters : char * - buffer to copy phone string into
//
// Return Value  : int - Length of copy
// Comments     :
//

inline int copyOutPhone(char *buffer,char *value,int len =
DEFAULT_PHONE_LEN)
{
  int index     = 0;
  int bufferPos  = 0;

  // add each digit of phone number to buffer inserting delimiter
before 6, 9, and 12
  while(value[index] && index < len)
  {
    switch(index)
    {
    case  6:
    case  9:
    case 12:
      // insert delimiter
      buffer[bufferPos++] = PHONE_DELIMITER;
    default:
      // add phone digit to buffer
      buffer[bufferPos++] = value[index++];
    }
  }

  // space fill to the required length
  while(bufferPos < len)
    buffer[bufferPos++] = CHAR_FILL;

  buffer[bufferPos] = '\0';

  return len;
}

//
// copyInMoney64
//
// Title      : Copy money data into class array
// Parameters : const char * - value string
// Return Value  : INT64b integer value
// Comments     :
//
```

```
inline bool copyInMoney64(const char * value,INT64b *number)
{
  //INT64b  number       = 0;
  int     index        = 0;
  int     decimal      = 0;
  int     decimals     = 0;
  int     digitsAfterDec= 0;

  bool   negitiveFlag= false;

  // convert each digit to a numeric portion
  while(value[index])
  {
    // handle $ . - All the rest assumed numeric
    switch(value[index])
    {
    case MONEY_SYMBOL:
      // ignore $ sign
      break;
    case NEGITIVE_SYMBOL:
      // set negitive flag
      negitiveFlag = true;
      break;

    case DECIMAL_SYMBOL:
      // set decimal
      decimal=1;
      decimals++;
      if(decimals >1)
        //more than 1 decimal point found
        return false;
      break;

    default:
      // adjust decimal places
      decimal = decimal * 10;

      // add digit to running total
      if(value[index] >= '0' && value[index] <= '9')
      {
        if(decimal)
          if(++digitsAfterDec > 2)
            return false;

        *number = (*number * 10) + (value[index] - '0');
      }
      else
      {
        //non-numeric field inserted
        return false;
      }
    }
    index++;
  }


  // apply decimal where decimal not found
  if(decimal < 100)
  {
    if(decimal)
    {
      *number *= (100 / decimal);
    }
    else
    {
      *number *= 100;
    }
  }

  // make negitive
  if(negitiveFlag)
    *number = *number * (-1);

  return true;
}

inline bool copyInMoney32(const char * value,int *number)
{
  int     index        = 0;
  int     decimal      = 0;
  int     decimals     = 0;
  int     digitsAfterDec= 0;

  bool   negitiveFlag= false;

  // convert each digit to a numeric portion
  while(value[index])
  {
    // handle $ . - All the rest assumed numeric
    switch(value[index])
    {
    case MONEY_SYMBOL:
      // ignore $ sign
      break;
    case NEGITIVE_SYMBOL:
      // set negitive flag
      negitiveFlag = true;
      break;

    case DECIMAL_SYMBOL:
      // set decimal
      decimal=1;
      decimals++;
      if(decimals >1)
        //more than 1 decimal point found
        return false;
      break;

    default:
      // adjust decimal places
      decimal = decimal * 10;

      // add digit to running total
      if(value[index] >= '0' && value[index] <= '9')
      {
        if(decimal)
          if(++digitsAfterDec > 2)
            return false;

        *number = (*number * 10) + (value[index] - '0');
      }
      else
      {
        //non-numeric field inserted
        return false;
      }
    }
    index++;
  }


  // apply decimal where decimal not found
  if(decimal < 100)
  {
    if(decimal)
    {
      *number *= (100 / decimal);
    }
    else
    {
      *number *= 100;
    }
  }
```

```
   // make negitive
   if(negitiveFlag)
      *number = *number * (-1);

   return true;
}

//
// copyInMoney
//
// Title      : Convert char string money field to double
// Parameters : const char * - value string
// Return Value  : double integer value
// Comments     :
//

inline int copyInMoney(const char *value)
{
   char buf[20];
   int i,j,decimalFound,digitsAfterDecimal=0;

   int decimal=0;

   //walk past $ if present in char string
   if(*value == '$')
      *value++;

   int len=(int)strlen(value);
   for (i=0;i<len;i++)
   {
      if(value[i] == '.')
      {
         decimalFound++;
         if(decimalFound > 1)
            return -1;
      }
      if(value[i] == '-')


      if (value[i] != '.')
      {
         if(decimal)
         {
            if(digitsAfterDecimal<2)
               digitsAfterDecimal++;
            else
               return -1;
         }
         buf[j++] = value[i];
      }
   }
   int amount = atoi(buf);

   return amount;
}


//
// copyOutMoney64
//
// Title      : Copy money data out of class array
// Parameters : char * - buffer to copy string 64 bit money into
//              INT64b - value
//              unsigned len - max number of bytes to copy
// Return Value  : int - Length of copy
// Comments     :
//

inline void copyOutMoney64(char *buffer,INT64b value,unsigned int
len = DEFAULT_MONEY64_LEN)
{
   unsigned intindex       = len;
   int           places        = 0;

   bool        negitiveFlag= false;
   bool        moneyFlag     = true;

   // NULL terminate string
   buffer[index] = NULL;

   // check length > 0
// if(!index) return len;

   // handle negitive value
   if(value < 0)
   {
      negitiveFlag = true;
      value = value * (-1);
   }

   // break off each digit from value, fill if needed
   do
   {
      if(value)
      {
         // get next digit and add to buffer
         buffer[--index] = (char) (value % 10 + '0');
         value /= 10; places++;

         if(places == 2 && index)
         {
            places++;
            buffer[--index] = DECIMAL_SYMBOL;
         }
      }
      else
      {
         // add zeros to first place before decimal point on (i.e. 0.00)
         if(places < 2 || places == 3)
         {
            buffer[--index] = ZERO_SYMBOL;
         }
         else
         {
            // add the decimal point
            if(places == 2)
            {
               buffer[--index] = DECIMAL_SYMBOL;
            }
            else
            {
               // add the negitive indicator
               if(negitiveFlag)
               {
                  negitiveFlag = false;
                  buffer[--index] = NEGITIVE_SYMBOL;
               }
               else
               {
                  // add the money indicator
                  if(moneyFlag)
                  {
                     moneyFlag = false;
                     buffer[--index] = MONEY_SYMBOL;
                  }
                  else buffer[--index] = NUMERIC_FILL;
               }
            }
         }

         // need to trace place for decimal point and zero fill
         places++;
      }
```

```
   } while(index);

   //return len;
}

//
// copyOutDateTime
//
// Title      : Copy date & time data out of class array
// Parameters : char * - buffer to copy date & time string into
//              INT64b - value
// Return Value  : int - Length of copy
// Comments      : Fixed length
//

inline int copyOutDateTime(char *buffer,INT64b value)
{
   datetime timestamp;

   // break value into time/date components
   calcOutDateTime(value,&timestamp);

   // put month into buffer
   *buffer++ = (char) ((timestamp.month / 10) + '0');
   *buffer++ = (char) ((timestamp.month % 10) + '0');
   *buffer++ = DATE_DELIMITER;

   // put day into buffer
   *buffer++ = (char) ((timestamp.day / 10) + '0');
   *buffer++ = (char) ((timestamp.day % 10) + '0');
   *buffer++ = DATE_DELIMITER;

   // put yearinto buffer
   int   year = timestamp.year;
   *buffer++ = (char) ((year / 1000) + '0'); year = year % 1000;
   *buffer++ = (char) ((year / 100) + '0');   year = year % 100;
   *buffer++ = (char) ((year / 10) + '0');
   *buffer++ = (char) ((year %  10) + '0');
   *buffer++ = CHAR_FILL;

   // put hour   into buffer
   *buffer++ = (char) ((timestamp.hour / 10) +   '0');
   *buffer++ = (char) ((timestamp.hour % 10) + '0');
   *buffer++ = TIME_DELIMITER;

   // put minute into buffer
   *buffer++ = (char) ((timestamp.minute /  10) + '0');
   *buffer++ = (char) ((timestamp.minute %   10) + '0');
   *buffer++ = TIME_DELIMITER;

   // put second into buffer
   *buffer++ = (char) ((timestamp.second / 10) + '0');
   *buffer++ = (char) ((timestamp.second %  10) + '0');

   *buffer  = NULL;   return DEFAULT_DATETIME_LEN;
}
//
// copyOutTime
//
// Title      : Copy date data out of class array
// Parameters : char * - buffer to copy date string into
//              INT64b - value
// Return Value  : int - Length of copy
// Comments      : Fixed length
//

inline int copyOutDate(char *buffer,INT64b value)
{
   datetime timestamp;

   // break value into time/date components
   calcOutDateTime(value,&timestamp);

   // put month into buffer
   *buffer++ = (char) ((timestamp.month / 10) + '0');
   *buffer++ = (char) ((timestamp.month % 10) + '0');
   *buffer++ = DATE_DELIMITER;

   // put day into buffer
   *buffer++ = (char) ((timestamp.day / 10) + '0');
   *buffer++ = (char) ((timestamp.day % 10) + '0');
   *buffer++ = DATE_DELIMITER;

   // put year into buffer
   int year = timestamp.year;
   *buffer++ = (char) ((year / 1000) + '0'); year = year % 1000;
   *buffer++ = (char) ((year / 100) + '0');   year = year % 100;
   *buffer++ = (char) ((year / 10) + '0');
   *buffer++ = (char) ((year % 10) + '0');
   *buffer++ = CHAR_FILL;

   *buffer = NULL;

   return DEFAULT_DATE_LEN;
}

//
// copyOutTime
//
// Title      : Copy time data out of class array
// Parameters : char * - buffer to copy time string into
//              INT64b - value
// Return Value  : int - Length of copy
// Comments      : Fixed length TBD
//

inline int copyOutTime(char *buffer,INT64b value)
{
   datetime timestamp;

   // break value into time/date components
   calcOutDateTime(value,&timestamp);

   // put hour into buffer
   *buffer++ = (char) ((timestamp.hour / 10) + '0');
   *buffer++ = (char) ((timestamp.hour % 10) + '0');
   *buffer++ = TIME_DELIMITER;

   // put minute into buffer
   *buffer++ = (char) ((timestamp.minute / 10) + '0');
   *buffer++ = (char) ((timestamp.minute % 10) + '0');
   *buffer++ = TIME_DELIMITER;

   // put second into buffer
   *buffer++ = (char) ((timestamp.second / 10) + '0');
   *buffer++ = (char) ((timestamp.second % 10) + '0');

   *buffer = NULL; return DEFAULT_TIME_LEN;
}

//
// copyOutDecimal64
//
// Title      : Copy decimal data out of class array
// Parameters : char * - buffer to copy string 64 bit money into
//              INT64b - value
//              unsigned len - max number of bytes to copy
// Return Value  : int - Length of copy
// Comments      :
//

inline int copyOutDecimal64(char *buffer,INT64b value,unsigned int
len = DEFAULT_DECIMAL64_LEN)
{
```

```
  unsigned intindex       = len;

  int           places        = 0;

  bool          negitiveFlag= false;

  // NULL terminate string
  buffer[index] = NULL;

  // check length > 0
  if(!index) return len;

  // handle negitive value
  if(value < 0)
  {
    negitiveFlag = true;
    value = value * (-1);
  }

  // break off each digit from value, fill if needed
  do
  {
    if(value)
    {
      // get next digit and add to buffer
      buffer[--index] = (char) (value % 10 + '0');
      value /= 10; places++;

      if(places == 2 && index)
      {
        places++;
        buffer[--index] = DECIMAL_SYMBOL;
      }
    }
    else
    {
      // add zeros to first place before decimal point on (i.e. 0.00)
      if(places < 2 || places == 3)
      {
        buffer[--index] = ZERO_SYMBOL;
      }
      else
      {
        // add the decimal point
        if(places == 2)
        {
          buffer[--index] = DECIMAL_SYMBOL;
        }
        else
        {
          // add the negitive indicator
          if(negitiveFlag)
          {
            negitiveFlag = false;
            buffer[--index] = NEGITIVE_SYMBOL;
          }
          else buffer[--index] = NUMERIC_FILL;
        }
      }

      // need to trace place for decimal point and zero fill
      places++;
    }
  } while(index);

  return len;
}

//////////////////////////////////////////////////////////////////////
//  Macros
//////////////////////////////////////////////////////////////////////
using namespace std;
```

```
#ifdef _DEBUG
  extern int debugFlag;
#else
  extern int debugFlag;
#endif

inline BYTE8b *debugFileName(BYTE8b *filePath)
{
  BYTE8b *fileName = filePath + strlen(filePath);

   while(fileName != filePath)
   {
     if(*fileName == '/' || *fileName == '\\' && *(fileName + 1))
       return (fileName + 1);

     fileName--;
   }

   return filePath;
}

#define DEBUGADDRESS(POINTER)hex << (void *) POINTER <<
dec

#ifndef TMPBUF
#define TMPBUF
extern char tmpbuf[128];
#endif

#define ERRORMSG(TEXT)                                  \
                                                        \
        EnterCriticalSection(&errorMutex);              \
        _strtime( tmpbuf );                             \
        errorStream << debugFileName(__FILE__)          \
        << "|" << tmpbuf << "|" << __LINE__ << "|"      \
        << _getpid() << "|" << GetCurrentThreadId() << "|" \
        << TEXT;                                        \
        errorStream.flush();                            \
        LeaveCriticalSection(&errorMutex);

#ifdef _DEBUG

  #define DEBUGMSG(TEXT)                                \
        EnterCriticalSection(&debugMutex);              \
                                                        \
        debugStream << debugFileName(__FILE__)          \
        << "|" << __TIMESTAMP__ << "|" << __LINE__ << "|"  \
        << _getpid() << "|" << GetCurrentThreadId() << "|" \
        << TEXT ;                                       \
        debugStream.flush();                            \
        LeaveCriticalSection(&debugMutex);


  #define DEBUGSTRING(TEXT,LENGTH)                      \
      debugVarString(TEXT,LENGTH)


#else
      #define DEBUGMSG(TEXT) ;
      #define DEBUGSTRING(TEXT,LENGTH) ;

#endif
#endif /* _COMMON_TPCC */
```

htmlPhraser.h

```
//////////////////////////////////////////////////////////////////////
// htmlPharaser.h
//////////////////////////////////////////////////////////////////////
// Class to decode a html query string
//////////////////////////////////////////////////////////////////////
```

```
#pragma once

#include <memory.h>

//////////////////////////////////////////////////////////////////
// Definitions
//////////////////////////////////////////////////////////////////

#define NULL               0

#define COMMAND_ID         0
#define TERM_ID            1
#define W_ID               2
#define D_ID               3
#define C_ID               4
#define C_NAME             5

#define C_W_ID             6
#define C_D_ID             7
#define AMT_PAID           8

#define STK_THRESHOLD      9
#define CARRIER_NUM        10

#define ITEM_LIST_START    11
#define ITEM_LIST_FINISH   55

#define MAX_QUERY_ID       55
#define MAX_FIELD_LEN      256
#define MAX_FIELD_NUM      56

//////////////////////////////////////////////////////////////////
// Command Codes
//////////////////////////////////////////////////////////////////

#define NEW_ORDER_CODE          'n'
#define PAYMENT_CODE            'p'
#define ORDER_STATUS_CODE       'o'
#define DELIVERY_CODE           'd'
#define STOCK_CODE              's'
#define EXIT_CODE               'e'
#define MENU_CODE               'm'

#define COMMAND_LOGIN           0
#define COMMAND_NEW_ORDER       1
#define COMMAND_PAYMENT         2
#define COMMAND_ORDER_STATUS    3
#define COMMAND_DELIVERY        4
#define COMMAND_STOCK           5
#define COMMAND_EXIT            6

#define COMMAND_LOGIN_RESULTS          7
#define COMMAND_NEW_ORDER_RESULTS      8
#define COMMAND_PAYMENT_RESULTS        9
#define COMMAND_ORDER_STATUS_RESULTS   10
#define COMMAND_DELIVERY_RESULTS       11
#define COMMAND_STOCK_RESULTS          12

//////////////////////////////////////////////////////////////////
// Class htmlPhraser
//////////////////////////////////////////////////////////////////

class htmlPhraser
{
   // Constructors / Destructor
   public:
     htmlPhraser(char *queryString);
     ~htmlPhraser()          {return;}

    // geters
    public:
      int  getCommandId();
      int validate(int txnType);

      char *get_TERM_ID()      {return iQueryValues[TERM_ID];}
      char *get_W_ID()         {return iQueryValues[W_ID];}
      char *get_D_ID()         {return iQueryValues[D_ID];}
      char *get_C_ID()         {return iQueryValues[C_ID];}
      char *get_C_NAME()       {return iQueryValues[C_NAME];}
      char *get_C_W_ID()       {return iQueryValues[C_W_ID];}
      char *get_C_D_ID()      {return iQueryValues[C_D_ID];}
      char *get_AMT_PAID()      {return iQueryValues[AMT_PAID];}
      char *get_STK_THRESHOLD()    {return
iQueryValues[STK_THRESHOLD];}
      char *get_CARRIER_NUM()     {return
iQueryValues[CARRIER_NUM];}

      char *get_ITEM_SUPP_W(int item)  {return
iQueryValues[(ITEM_LIST_START + 0) + (item * 3)];}
      char *get_ITEM_ITEM_NUM(int item) {return
iQueryValues[(ITEM_LIST_START + 1) + (item * 3)];}
      char *get_ITEM_QTY(int item)     {return
iQueryValues[(ITEM_LIST_START + 2) + (item * 3)];}

    // Class Functions
    private:
      char convertQueryToken(char **queryString);

    // Class Attributes
    private:
      int  iCustomerIdFlag;
      int  iCarrierNumFlag;
      int  iStockThresholdFlag;

      char  iQueryValues[MAX_FIELD_NUM][MAX_FIELD_LEN];
};

//////////////////////////////////////////////////////////////////
```

resource.h

```
//{{NO_DEPENDENCIES}}
// Microsoft Visual C++ generated include file.
// Used by tpccIsapi.rc
//
#define IDS_PROJNAME 100



// Next default values for new objects
//
#ifdef APSTUDIO_INVOKED
#ifndef APSTUDIO_READONLY_SYMBOLS
#define _APS_NEXT_RESOURCE_VALUE       201
#define _APS_NEXT_COMMAND_VALUE        32768
#define _APS_NEXT_CONTROL_VALUE        201
#define _APS_NEXT_SYMED_VALUE          101
#endif
#endif
```

StdAfx.h

```
// stdafx.h : include file for standard system include files,
// or project specific include files that are used frequently, but
// are changed infrequently
//

#pragma once

#define WIN32_LEAN_AND_MEAN    // Exclude rarely-used stuff
from Windows headers
```

```
#define _ATL_CSTRING_EXPLICIT_CONSTRUCTORS // some
CString constructors will be explicit

// turns off ATL's hiding of some common and often safely ignored
warning messages
#define _ATL_ALL_WARNINGS

// critical error descriptions will only be shown to the user
// in debug builds. they will always be logged to the event log
#ifndef _DEBUG
#define ATL_CRITICAL_ISAPI_ERROR_LOGONLY
#endif


#ifndef _WIN32_WINNT
#define _WIN32_WINNT 0x0403
#endif

// TODO: this disables support for registering COM objects
// exported by this project since the project contains no
// COM objects or typelib. If you wish to export COM objects
// from this project, add a typelib and remove this line
#define _ATL_NO_COM_SUPPORT

#include "resource.h"
#include <atlsrvres.h>
#include <atlisapi.h>
#include <atlstencil.h>

// TODO: reference additional headers your program requires here
```

htmlPhraser.cpp

```
//////////////////////////////////////////////////////////////////////
// htmlPhraser.cpp
//////////////////////////////////////////////////////////////////////
// Class implmentation of htmlPhraser.
// This class will take a query string and break it into a series
// of consituant parts
//////////////////////////////////////////////////////////////////////

#include "htmlPhraser.h"

//////////////////////////////////////////////////////////////////////
// htmlPhraser::htmlPhraser
//////////////////////////////////////////////////////////////////////
// Title   : Constructor
// Parameters : char * query string
// Return Value  : None
// Comments  :
//////////////////////////////////////////////////////////////////////

htmlPhraser::htmlPhraser(char *queryString)
{
   // initilize query values
   iCustomerIdFlag = iCarrierNumFlag = iStockThresholdFlag =
false;

   // this initilizes the query list to NULL's. This means that
   // characters being added are overwriting null characters and
   // therfore the string will be null terminated implicitly.

   memset(iQueryValues,NULL,(MAX_FIELD_NUM *
MAX_FIELD_LEN));

   // controls
   char      queryChar      = NULL;

   int      queryIndex     = -1;
   int      valueIndex     = -1;

   // process each characeter of query string
   while(*queryString)
   {
      // check for special case characters
      if(queryChar)
      {
         // a percentage sign would indicate a token
         if(*queryString != '%')
         {
            // a plus sign repersents a space
            if(*queryString == '+')
            {
               queryChar = ' ';
               *queryString++;
            }
            else queryChar = *queryString++;
         }
         else queryChar = convertQueryToken(&queryString);
      }
      else queryChar = '&';

      // handle query reference (&)
      if(queryChar == '&')
      {
         // reset value index
         valueIndex = -1;

         // do we have a numeric query reference
         if(*queryString >= '0' && *queryString <= '9')
         {
            // numeric query id
            queryIndex =
               ((*queryString - '0') * 10) + (*(queryString + 1) - '0');

            // walk past the two command characters
            queryString += 2;

            // validate query value
            if(queryIndex > MAX_QUERY_ID)
               queryIndex = -1;
         }
         else queryIndex = -1;

         // finished processing for query reference
         continue;
      }

      // we have a query reference but need to wait until we see '='
      // before accepting value

      if(valueIndex == -1)
      {
         // we are waiting for '='
         if(queryChar == '=')
         {
            valueIndex = 0;

            // set query string flags
            switch(queryIndex)
            {
            case C_ID:
               iCustomerIdFlag = true; break;
            case CARRIER_NUM:
               iCarrierNumFlag = true; break;
            case STK_THRESHOLD:
               iStockThresholdFlag = true; break;
            default: break;
            }
         }

         // finishes looging for '='
         continue;
      }
```

```
      // add each character to the query value
      if(queryIndex > -1 && valueIndex > -1)
      {
         // we are processing a query value
         if(valueIndex < MAX_FIELD_LEN)
         {
            // we have not exceeded max line len
            iQueryValues[queryIndex][valueIndex++] = queryChar;
         }
         continue;
      }
   }

   return;
}

//////////////////////////////////////////////////////////////////////
// htmlPhraser::getCommandId
//////////////////////////////////////////////////////////////////////
// Title   : Returns the page command
// Parameters : None
// Return Value  : int - page command
// Comments  :
//////////////////////////////////////////////////////////////////////

int htmlPhraser::getCommandId()
{
   // return command numeric code
   switch(*iQueryValues[COMMAND_ID])
   {
   case NEW_ORDER_CODE:
      if(iCustomerIdFlag)
         return COMMAND_NEW_ORDER_RESULTS;
      else return COMMAND_NEW_ORDER;
   case PAYMENT_CODE:
      if(iCustomerIdFlag)
         return COMMAND_PAYMENT_RESULTS;
      else return COMMAND_PAYMENT;
   case ORDER_STATUS_CODE:
      if(iCustomerIdFlag)
         return COMMAND_ORDER_STATUS_RESULTS;
      else return COMMAND_ORDER_STATUS;
   case DELIVERY_CODE:
      if(iCarrierNumFlag)
         return COMMAND_DELIVERY_RESULTS;
      else return COMMAND_DELIVERY;
   case STOCK_CODE:
      if(iStockThresholdFlag)
         return COMMAND_STOCK_RESULTS;
      else return COMMAND_STOCK;
   case MENU_CODE:
      return COMMAND_LOGIN_RESULTS;
   case EXIT_CODE:
      return COMMAND_EXIT;
   default:
      return COMMAND_LOGIN;
   };


   // should not get here
   return COMMAND_LOGIN;
}

//////////////////////////////////////////////////////////////////////
// htmlPhraser::validate
//////////////////////////////////////////////////////////////////////
// Title   : validate url parameter list for all txn types
// Parameters : int - txn type
// Return Value  : int - error code
// Comments  :
//////////////////////////////////////////////////////////////////////

int validate(int txnType)
{
   return 0;
}

//////////////////////////////////////////////////////////////////////
// htmlPhraser::convertQueryToken
//////////////////////////////////////////////////////////////////////
// Title   : Returns the page command
// Parameters : None
// Return Value  : int - page command
// Comments  :
//////////////////////////////////////////////////////////////////////

char htmlPhraser::convertQueryToken(char **queryString)
{
   char queryChar = NULL;

   // skip over %
   (*queryString)++;

   // look at first character
   switch(**queryString)
   {
   case '2':
      {
         // what follows?
         (*queryString)++;

         switch(**queryString)
         {
         case '1':
            queryChar = '!';
            break;
         case '3':
            queryChar = '#';
            break;
         case '4':
            queryChar = '$';
            break;
         case '5':
            queryChar = '%';
            break;
         case '6':
            queryChar = '&';
            break;
         case '8':
            queryChar = '(';
            break;
         case '9':
            queryChar = ')';
            break;
         case 'B':
            queryChar = '+';
            break;
         case 'C':
            queryChar = ',';
            break;
         case 'F':
            queryChar = '/';
            break;
         case ' ':
            queryChar = ' ';
            break;
         }
      }

      break;
   case '3':
      {
```

```
      // what follows?
      (*queryString)++;

      switch(**queryString)
      {
      case 'A':
        queryChar = ':';
        break;
      case 'B':
        queryChar = ';';
        break;
      case 'D':
        queryChar = '=';
        break;
      case 'F':
        queryChar = '?';
        break;
      case ' ':
        queryChar = ' ';
        break;
      }
    }

    break;
  case '4':
    {
      // what follows?
      (*queryString)++;

      switch(**queryString)
      {
      case '0':
        queryChar = '@';
        break;
      case ' ':
        queryChar = ' ';
        break;
      }
    }

    break;
  case '5':
    {
      // what follows?
      (*queryString)++;

      switch(**queryString)
      {
      case 'B':
        queryChar = '[';
        break;
      case 'D':
        queryChar = ']';
        break;
      case 'E':
        queryChar = '^';
        break;
      case ' ':
        queryChar = ' ';
        break;
      }
    }

    break;
  case '7':
    {
      // what follows?
      (*queryString)++;

      switch(**queryString)
      {
      case 'B':
        queryChar = '{';
        break;
      case 'C':
        queryChar = '|';
        break;
      case 'D':
        queryChar = '}';
        break;
      case 'E':
        queryChar = '~';
        break;
      case ' ':
        queryChar = ' ';
        break;
      }
    }

    break;
  case '+':
    queryChar = '+';
    break;
  }

  // advance pointer and return
  (*queryString)++; return queryChar;
}

//////////////////////////////////////////////////////////////////////
```

StdAfx.cpp

```
// stdafx.cpp : source file that includes just the standard includes
// tpccIsapi.pch will be the pre-compiled header
// stdafx.obj will contain the pre-compiled type information

#include "stdafx.h"

// TODO: reference any additional headers you need in STDAFX.H
// and not in this file
```

tpccIsapi.cpp

```
/*
********************************************************************
** Project    : AIX
** Component: Performance/TPC-C Benchmark
** Name         : tpccIsapi.cpp
** Title      : TPCC html processing
********************************************************************
** Copyright (c) 2003 IBM Corporation
** All rights reserved
********************************************************************
** History       :
**               Developed at IBM Austin by the AIX RS/6000
**               performance group.
**
** Comments      :
**
********************************************************************
*/

#include "stdafx.h"

#include "../tpccCom0/tpccCom0.h"
#include "../tpccCom0/tpccCom0_i.c"
#ifdef PARTITION
#include "../tpccCom1/tpccCom1.h"
#include "../tpccCom1/tpccCom1_i.c"
#include "../tpccCom2/tpccCom2.h"
#include "../tpccCom2/tpccCom2_i.c"
#include "../tpccCom3/tpccCom3.h"
```

```
#include "../tpccCom3/tpccCom3_i.c"
#include "../tpccCom4/tpccCom4.h"
#include "../tpccCom4/tpccCom4_i.c"
#include "../tpccCom5/tpccCom5.h"
#include "../tpccCom5/tpccCom5_i.c"
#include "../tpccCom6/tpccCom6.h"
#include "../tpccCom6/tpccCom6_i.c"
#include "../tpccCom7/tpccCom7.h"
#include "../tpccCom7/tpccCom7_i.c"
#include "../tpccCom8/tpccCom8.h"
#include "../tpccCom8/tpccCom8_i.c"
#include "../tpccCom9/tpccCom9.h"
#include "../tpccCom9/tpccCom9_i.c"
#include "../tpccCom10/tpccCom10.h"
#include "../tpccCom10/tpccCom10_i.c"
#include "../tpccCom11/tpccCom11.h"
#include "../tpccCom11/tpccCom11_i.c"
#include "../tpccCom12/tpccCom12.h"
#include "../tpccCom12/tpccCom12_i.c"
#include "../tpccCom13/tpccCom13.h"
#include "../tpccCom13/tpccCom13_i.c"
#include "../tpccCom14/tpccCom14.h"
#include "../tpccCom14/tpccCom14_i.c"
#include "../tpccCom15/tpccCom15.h"
#include "../tpccCom15/tpccCom15_i.c"
#include "../tpccCom16/tpccCom16.h"
#include "../tpccCom16/tpccCom16_i.c"
#include "../tpccCom17/tpccCom17.h"
#include "../tpccCom17/tpccCom17_i.c"
#include "../tpccCom18/tpccCom18.h"
#include "../tpccCom18/tpccCom18_i.c"
#include "../tpccCom19/tpccCom19.h"
#include "../tpccCom19/tpccCom19_i.c"
#include "../tpccCom20/tpccCom20.h"
#include "../tpccCom20/tpccCom20_i.c"
#include "../tpccCom21/tpccCom21.h"
#include "../tpccCom21/tpccCom21_i.c"
#include "../tpccCom22/tpccCom22.h"
#include "../tpccCom22/tpccCom22_i.c"
#include "../tpccCom23/tpccCom23.h"
#include "../tpccCom23/tpccCom23_i.c"
#include "../tpccCom24/tpccCom24.h"
#include "../tpccCom24/tpccCom24_i.c"
#include "../tpccCom25/tpccCom25.h"
#include "../tpccCom25/tpccCom25_i.c"
#include "../tpccCom26/tpccCom26.h"
#include "../tpccCom26/tpccCom26_i.c"
#include "../tpccCom27/tpccCom27.h"
#include "../tpccCom27/tpccCom27_i.c"
#include "../tpccCom28/tpccCom28.h"
#include "../tpccCom28/tpccCom28_i.c"
#include "../tpccCom29/tpccCom29.h"
#include "../tpccCom29/tpccCom29_i.c"
#include "../tpccCom30/tpccCom30.h"
#include "../tpccCom30/tpccCom30_i.c"
#include "../tpccCom31/tpccCom31.h"
#include "../tpccCom31/tpccCom31_i.c"
#include "../tpccCom32/tpccCom32.h"
#include "../tpccCom32/tpccCom32_i.c"
#include "../tpccCom33/tpccCom33.h"
#include "../tpccCom33/tpccCom33_i.c"
#include "../tpccCom34/tpccCom34.h"
#include "../tpccCom34/tpccCom34_i.c"
#include "../tpccCom35/tpccCom35.h"
#include "../tpccCom35/tpccCom35_i.c"
#include "../tpccCom36/tpccCom36.h"
#include "../tpccCom36/tpccCom36_i.c"
#include "../tpccCom37/tpccCom37.h"
#include "../tpccCom37/tpccCom37_i.c"
#include "../tpccCom38/tpccCom38.h"
#include "../tpccCom38/tpccCom38_i.c"
#include "../tpccCom39/tpccCom39.h"
#include "../tpccCom39/tpccCom39_i.c"
#include "../tpccCom40/tpccCom40.h"
#include "../tpccCom40/tpccCom40_i.c"
#include "../tpccCom41/tpccCom41.h"
#include "../tpccCom41/tpccCom41_i.c"
#include "../tpccCom42/tpccCom42.h"
#include "../tpccCom42/tpccCom42_i.c"
#include "../tpccCom43/tpccCom43.h"
#include "../tpccCom43/tpccCom43_i.c"
#include "../tpccCom44/tpccCom44.h"
#include "../tpccCom44/tpccCom44_i.c"
#include "../tpccCom45/tpccCom45.h"
#include "../tpccCom45/tpccCom45_i.c"
#include "../tpccCom46/tpccCom46.h"
#include "../tpccCom46/tpccCom46_i.c"
#include "../tpccCom47/tpccCom47.h"
#include "../tpccCom47/tpccCom47_i.c"
#include "../tpccCom48/tpccCom48.h"
#include "../tpccCom48/tpccCom48_i.c"
#include "../tpccCom49/tpccCom49.h"
#include "../tpccCom49/tpccCom49_i.c"
#include "../tpccCom50/tpccCom50.h"
#include "../tpccCom50/tpccCom50_i.c"
#endif
#include "tpccIsapi.hpp"

#include <math.h>

// For custom assert and trace handling with WebDbg.exe
[ module(name="tpccIsapi", type="dll") ];
[ emitidl(restricted) ];

#define _WIN32_DCOM

#ifdef _DEBUG
   int debugFlag = 1;
#else
   int debugFlag = 0;
#endif

char tmpbuf[128];

////////////////////////////////////////////////////////////
// Globals
////////////////////////////////////////////////////////////

int     maxDataSize;        //max struct size of all txn(s)
int     numUsers;           //number of users that client will service.
int     dlvyQueueLen;          //static length of dlvy queue
int     dlvyThreads;        //number of dlvy threads to create
int     dlvyBufferFreeSlots;      //length of dlvy txn queue
int     dlvyBufferSlotIndex;   //index into next avaliable slot in dlvy
txn queue
int     dlvyBufferThreadIndex;    //thread index into dlvy txn queue
int     nullDB;             //null db on client(bypass com call).
int     trace;
int     numServers;
int     numWarehouse;
int     ratio;

static DWORD        threadLSIndex;      //isapi thread local storage
index
CRITICAL_SECTION    isapiLock;        //isapi lock
CRITICAL_SECTION    errorLock;           //error log file lock.
CRITICAL_SECTION    termLock;         //terminal array lock.
CRITICAL_SECTION    dlvyQueueLock;      //dlvy queue critical
section lock
HANDLE              dlvyThreadDone = INVALID_HANDLE_VALUE;
   //dlvy thread exit event
HANDLE              dlvyThreadSemaphore =
INVALID_HANDLE_VALUE;   //dlvy thread wrk to do semaphore
int                 dlvyThreadID = 0;
```

```
struct DLVYQUEUEDATA *dlvyQueue;          //dlvy queue
HANDLE              *dlvyThreadHandles;    //ptr to array of thread
handles

TERM_ENTRY *termArray;                    //array of terminal entries to
store each users info.
int        termNextFree;                  //next available slot in terminal
array

FILE  *htmlDebug    = NULL;           //html debug file
FILE  *errorLog     = NULL;           //error file
FILE  *htmlTrace    = NULL;

ofstream debugStream;
ofstream errorStream;
CRITICAL_SECTION debugMutex;
CRITICAL_SECTION errorMutex;

char  dlvyLogPath[128]    = {NULL};
char  errorLogFile[128]   = {NULL};
char  htmlTraceLogFile[128]  = {NULL};
char  dbName[64]          = {NULL};
char  dbType[16]          = {NULL};

typedef INT (*CONNECT_PTR)(char *dbName,void
**connectHandle);
typedef INT (*DISCONNECT_PTR)(void *connectHandle);
typedef INT (*DLVY_FUNC_PTR)(dlvy_wrapper *dlvy,void
*connectHandle);
typedef INT (*NORD_FUNC_PTR)(nord_wrapper *nord,void
*connectHandle);
typedef INT (*PYMT_FUNC_PTR)(paym_wrapper *pymt,void
*connnectHandle);
typedef INT (*ORDS_FUNC_PTR)(ords_wrapper *ords,void
*connectHandle);
typedef INT (*STOK_FUNC_PTR)(stok_wrapper *stok,void
*connectHandle);

HINSTANCE     dbInstance;
CONNECT_PTR     db_connect;
DISCONNECT_PTR  db_disconnect;
DLVY_FUNC_PTR  dlvyCall;

////////////////////////////////////////////////////////////
// Page functions arrays
////////////////////////////////////////////////////////////

typedef int   (*pageFuncPtr) (htmlPhraser
*commandBlock,TXN_HANDLE *txnHandle);

pageFuncPtr htmlPageFunctions[MAX_TRANSACTIONS] =
        {
          {doLoginForm},
          {doNewOrderForm},
          {doPaymentForm},
          {doOrderStatusForm},
          {doDeliveryForm},
          {doStockForm},
          {doExit},
          {doLoginResults},
          {doNewOrderResults},
          {doPaymentResults},
          {doOrderStatusResults},
          {doDeliveryResults},
          {doStockResults}
        };

extern "C" DWORD WINAPI
HttpExtensionProc(LPEXTENSION_CONTROL_BLOCK lpECB)
{
  struct TXN_HANDLE  *txnHandle = NULL;

  txnHandle = (TXN_HANDLE *) TlsGetValue(threadLSIndex);

  if(txnHandle == NULL)
  {
    int rc = initTxnHandle(&txnHandle);
    if (rc != OK)
    {
      char response[256]; char htmlHeader[256];
      sprintf(response,"ERROR : Init txnHandle function failed.\n");

      size_t htmlPageLen = strlen(response);

      //add content length and keep alive header
      sprintf(htmlHeader,HEADER,htmlPageLen);
      lpECB->ServerSupportFunction(lpECB-
>ConnID,HSE_REQ_SEND_RESPONSE_HEADER,"200
OK",NULL,(DWORD*)htmlHeader);
      lpECB->WriteClient(lpECB-
>ConnID,response,(LPDWORD)&htmlPageLen,0);

      return HSE_STATUS_SUCCESS_AND_KEEP_CONN;
    }

    txnHandle = (TXN_HANDLE *) TlsGetValue(threadLSIndex);
    if (txnHandle == NULL)
    {
      char response[256]; char htmlHeader[256];
      sprintf(response,"ERROR : Unable to retrieve txnHandle from
TLS.\n");

      size_t htmlPageLen = strlen(response);

      //add content length and keep alive header
      sprintf(htmlHeader,HEADER,htmlPageLen);
      lpECB->ServerSupportFunction(lpECB-
>ConnID,HSE_REQ_SEND_RESPONSE_HEADER,"200
OK",NULL,(DWORD*)htmlHeader);
      lpECB->WriteClient(lpECB-
>ConnID,response,(LPDWORD)&htmlPageLen,0);

      return HSE_STATUS_SUCCESS_AND_KEEP_CONN;
    }
  }

  try
  {
    txnHandle->urlString  = (char*)lpECB->lpszQueryString;

    DEBUGMSG("calling doHtml() w/ query string:" << txnHandle-
>urlString << endl);
    doHtml(txnHandle);

    size_t htmlPageLen;
    htmlPageLen = strlen(txnHandle->htmlPage);
    if(htmlPageLen >= 4096)
    {
      ERRORMSG("WARNING:  HTML PAGE IS >= 4096!, page
size:"<<htmlPageLen<<endl);
    }
    //add content length and keep alive header
    sprintf(txnHandle->htmlHeader,HEADER,htmlPageLen);
    size_t headerLen = strlen(txnHandle->htmlHeader);
    if(headerLen >= 256)
    {
      ERRORMSG("WARNING:  HTML HEADER IS >= 256!,
header size:"<<headerLen<<endl);
    }

    //write response to user
```

```
    lpECB->ServerSupportFunction(lpECB-
>ConnID,HSE_REQ_SEND_RESPONSE_HEADER,"200
OK",NULL,(DWORD*)txnHandle->htmlHeader);
    lpECB->WriteClient(lpECB->ConnID,txnHandle-
>htmlPage,(LPDWORD)&htmlPageLen,0);

    DEBUGMSG("HTML PAGE-->"<<endl<<txnHandle-
>htmlHeader<<txnHandle->htmlPage<<endl);

  }
  catch (...)
  {
    char response[256];
    ZeroMemory(response,256);
    char *ptr = response;

    appendText(&ptr,"<HTML><BODY> Error : Unhandled
Exception </BODY></HTML>");
    DWORD   cbResponse = sizeof(response)-1 ;

    //write response to user
    lpECB->ServerSupportFunction(lpECB-
>ConnID,HSE_REQ_SEND_RESPONSE_HEADER,"200
OK",NULL,(DWORD*)response);
    lpECB->WriteClient(lpECB->ConnID,response,&cbResponse,0);

  }

   return HSE_STATUS_SUCCESS_AND_KEEP_CONN;
}

extern "C" BOOL WINAPI
GetExtensionVersion(HSE_VERSION_INFO* pVer)
{
  // Create the extension version string, and copy string to
HSE_VERSION_INFO structure.
  pVer->dwExtensionVersion =
MAKELONG(HSE_VERSION_MINOR, HSE_VERSION_MAJOR);

  // Copy description string into HSE_VERSION_INFO structure.
  strcpy(pVer->lpszExtensionDesc, "TPCC ISAPI Extension");

  // Initialze isapi critcal section
  InitializeCriticalSection(&isapiLock);

  // Initailize error log critcal section
  InitializeCriticalSection(&errorLock);

  // Initialze terminal critcal section
  InitializeCriticalSection(&termLock);

  // Initialize debug/error critcal sections
  if(debugFlag)
    InitializeCriticalSection(&debugMutex);
  InitializeCriticalSection(&errorMutex);


  // Read registery values
  if(readRegisteryValues() != OK)
    return(FALSE);

  // Initialize terminal array
  termArray = (TERM_ENTRY*)
calloc(numUsers,sizeof(TERM_ENTRY));
  termNextFree = 1;


  DEBUGMSG("Loading library for dlvy txn."<<endl);
  int rc = getDBInstance();
  if (rc != OK)
  {
    ERRORMSG("Error, unable to load database dll, rc:"<<rc);
    DEBUGMSG("Error, unable to load database dll, rc:"<<rc);

    return FALSE;
  }
  DEBUGMSG("Library loaded for dlvy txn."<<endl);

  DEBUGMSG("Calling initDlvy." <<endl);
  ERRORMSG("Calling initDlvy." <<endl);

  if(initDlvy() != OK)
    return (FALSE);

  DEBUGMSG("Initializing TLS." << endl);

  // Initialize thread local storage index
  threadLSIndex = TlsAlloc();
  if (threadLSIndex == TLS_NULL)
  {
    ERRORMSG("Isapi error: unable to initialize thread local
storage(TLS), rc:" << GetLastError()<<endl);
    return(FALSE);
  }
  ERRORMSG("Initialized TLS." << endl);

  DEBUGMSG("sizeof out_neword_struct:   "<<sizeof(struct
out_neword_struct)<<endl);
  DEBUGMSG("sizeof  in_neword_struct:   "<<sizeof(struct
in_neword_struct)<<endl);
  DEBUGMSG("sizeof out_payment_struct:  "<<sizeof(struct
out_payment_struct)<<endl);
  DEBUGMSG("sizeof  in_payment_struct:  "<<sizeof(struct
in_payment_struct)<<endl);
  DEBUGMSG("sizeof out_ordstat_struct:  "<<sizeof(struct
out_ordstat_struct)<<endl);
  DEBUGMSG("sizeof  in_ordstat_struct:  "<<sizeof(struct
in_ordstat_struct)<<endl);
  DEBUGMSG("sizeof out_delivery_struct: "<<sizeof(struct
out_delivery_struct)<<endl);
  DEBUGMSG("sizeof  in_delivery_struct: "<<sizeof(struct
in_delivery_struct)<<endl);
  DEBUGMSG("sizeof out_stocklev_struct: "<<sizeof(struct
out_stocklev_struct)<<endl);
  DEBUGMSG("sizeof  in_stocklev_struct: "<<sizeof(struct
in_stocklev_struct)<<endl);

  //compute the max struct size for com data construct
  maxDataSize = max(maxDataSize,sizeof(nord_wrapper));
  maxDataSize = max(maxDataSize,sizeof(paym_wrapper));
  maxDataSize = max(maxDataSize,sizeof(ords_wrapper));
  maxDataSize = max(maxDataSize,sizeof(dlvy_wrapper));
  maxDataSize = max(maxDataSize,sizeof(stok_wrapper));
  maxDataSize += 10;

  DEBUGMSG("max data struct size:"<<maxDataSize <<endl);
  ERRORMSG("max data struct size:"<<maxDataSize <<endl);

  return true;
}

extern "C" BOOL WINAPI TerminateExtension(DWORD dwFlags)
{
// ERRORMSG("TerminateExtension"<<endl);
  return true;
}


/*
***********************************************************************
** Name        :  initTxnHandle
** Description :
**            Isapi thread initializes its own com interface
**            structure.
```

```
** Parameters:
**            TXN_HANDLE*    isapi txn handle
** Returns      :
**            int - return code
** Comments     :
**
*****************************************************************
*/
int initTxnHandle(TXN_HANDLE **txnHandle)
{
   DEBUGMSG("Inside init txn handle, getting isapiLock." << endl);
// ERRORMSG("Inside init txn handle, getting isapiLock." << endl);

   EnterCriticalSection(&isapiLock);

   HRESULT hresults = NULL;
   HRESULT hres[50];

   try
   {
      DEBUGMSG("Got isapiLock, initializing txnHandle:
"<<DEBUGADDRESS(*txnHandle)<< endl);
      ERRORMSG("Got isapiLock, initializing txnHandle:
"<<DEBUGADDRESS(*txnHandle)<< "numServers
"<<numServers<<endl);
      *txnHandle = (TXN_HANDLE *) calloc(1,sizeof(TXN_HANDLE));
      if (*txnHandle == NULL)
      {
         ERRORMSG("Unable to allocated TXN_HANDLE,
rc:"<<GetLastError()<<endl);
         return ERR;
      };

(*txnHandle)->comInterface.comHandle0 = NULL;
#ifdef PARTITION
(*txnHandle)->comInterface.comHandle1 = NULL;
(*txnHandle)->comInterface.comHandle3 = NULL;
(*txnHandle)->comInterface.comHandle4 = NULL;
(*txnHandle)->comInterface.comHandle5 = NULL;
(*txnHandle)->comInterface.comHandle6 = NULL;
(*txnHandle)->comInterface.comHandle7 = NULL;
(*txnHandle)->comInterface.comHandle8 = NULL;
(*txnHandle)->comInterface.comHandle9 = NULL;
(*txnHandle)->comInterface.comHandle10 = NULL;
(*txnHandle)->comInterface.comHandle11 = NULL;
(*txnHandle)->comInterface.comHandle12 = NULL;
(*txnHandle)->comInterface.comHandle13 = NULL;
(*txnHandle)->comInterface.comHandle14 = NULL;
(*txnHandle)->comInterface.comHandle15 = NULL;
(*txnHandle)->comInterface.comHandle16 = NULL;
(*txnHandle)->comInterface.comHandle17 = NULL;
(*txnHandle)->comInterface.comHandle18 = NULL;
(*txnHandle)->comInterface.comHandle19 = NULL;
(*txnHandle)->comInterface.comHandle20 = NULL;
(*txnHandle)->comInterface.comHandle21 = NULL;
(*txnHandle)->comInterface.comHandle22 = NULL;
(*txnHandle)->comInterface.comHandle23 = NULL;
(*txnHandle)->comInterface.comHandle24 = NULL;
(*txnHandle)->comInterface.comHandle25 = NULL;
(*txnHandle)->comInterface.comHandle26 = NULL;
(*txnHandle)->comInterface.comHandle27 = NULL;
(*txnHandle)->comInterface.comHandle28 = NULL;
(*txnHandle)->comInterface.comHandle29 = NULL;
(*txnHandle)->comInterface.comHandle30 = NULL;
(*txnHandle)->comInterface.comHandle31 = NULL;
(*txnHandle)->comInterface.comHandle32 = NULL;
(*txnHandle)->comInterface.comHandle33 = NULL;
(*txnHandle)->comInterface.comHandle34 = NULL;
(*txnHandle)->comInterface.comHandle35 = NULL;
(*txnHandle)->comInterface.comHandle36 = NULL;
(*txnHandle)->comInterface.comHandle37 = NULL;
(*txnHandle)->comInterface.comHandle38 = NULL;
(*txnHandle)->comInterface.comHandle39 = NULL;
(*txnHandle)->comInterface.comHandle40 = NULL;
(*txnHandle)->comInterface.comHandle41 = NULL;
(*txnHandle)->comInterface.comHandle42 = NULL;
(*txnHandle)->comInterface.comHandle43 = NULL;
(*txnHandle)->comInterface.comHandle44 = NULL;
(*txnHandle)->comInterface.comHandle45 = NULL;
(*txnHandle)->comInterface.comHandle46 = NULL;
(*txnHandle)->comInterface.comHandle47 = NULL;
(*txnHandle)->comInterface.comHandle48 = NULL;
(*txnHandle)->comInterface.comHandle49 = NULL;
(*txnHandle)->comInterface.comHandle50 = NULL;
#endif
ERRORMSG("Initializing txnHandle com data buffer to
"<<maxDataSize<<"bytes"<<" numServers "<<numServers<<endl);
      ERRORMSG("Initializing txnHandle com data buffer to
"<<maxDataSize<<"bytes"<<endl);
      (*txnHandle)->comInterface.txnBuffer = (char *)
CoTaskMemAlloc(maxDataSize);
      if (!((*txnHandle)->comInterface.txnBuffer))
      {
         ERRORMSG("CoTaskMemAlloc() failed of size
"<<maxDataSize<<", rc: "<<hresults<<endl);
         return(ERR);
      };
      DEBUGMSG("txnHandle com data buffer initialized to " <<
maxDataSize << "bytes" <<endl);
      ERRORMSG("txnHandle com data buffer initialized to " <<
maxDataSize << "bytes " <<"numServers "<<numServers<<endl);

      //(*txnHandle)->comInterface.comHandle = NULL;
      DEBUGMSG("Calling CoInitialize with txnHandle:
"<<DEBUGADDRESS(*txnHandle)<<endl);
//    ERRORMSG("Calling CoInitialize with txnHandle:
"<<DEBUGADDRESS(*txnHandle)<<endl);
      hresults = CoInitializeEx(NULL,COINIT_MULTITHREADED);
      if (FAILED(hresults))
      {
         ERRORMSG("CoInitializeEx() failed, rc : "<<hresults<<endl);
         return(ERR);
      };

      struct  _timeb          startTime;
      struct  _timeb          endTime;

      DEBUGMSG("Calling CoCreateInstance with
txnHandle:"<<DEBUGADDRESS(*txnHandle)<< endl);
      ERRORMSG("Calling CoCreateInstance with
txnHandle:"<<DEBUGADDRESS(*txnHandle)<< " numServers
"<<numServers<<endl);
      _ftime(&startTime);
      int i;
#ifdef PARTITION
      for (i=0;i<=50;i++) hres[i] = 0;

if (numServers >= 51) { hres[50] =
CoCreateInstance(CLSID_tpcc_com50,NULL,CLSCTX_SERVER,II
D_Itpcc_com50,(void **)&(*txnHandle)-
>comInterface.comHandle50); }
if (numServers >= 50) { hres[49] =
CoCreateInstance(CLSID_tpcc_com49,NULL,CLSCTX_SERVER,II
D_Itpcc_com49,(void **)&(*txnHandle)-
>comInterface.comHandle49); }
if (numServers >= 49) { hres[48] =
CoCreateInstance(CLSID_tpcc_com48,NULL,CLSCTX_SERVER,II
D_Itpcc_com48,(void **)&(*txnHandle)-
>comInterface.comHandle48); }
if (numServers >= 48) { hres[47] =
CoCreateInstance(CLSID_tpcc_com47,NULL,CLSCTX_SERVER,II
D_Itpcc_com47,(void **)&(*txnHandle)-
>comInterface.comHandle47); }
```

```
if (numServers >= 47) { hres[46] =
CoCreateInstance(CLSID_tpcc_com46,NULL,CLSCTX_SERVER,II
D_Itpcc_com46,(void **)&(*txnHandle)-
>comInterface.comHandle46); }
if (numServers >= 46) { hres[45] =
CoCreateInstance(CLSID_tpcc_com45,NULL,CLSCTX_SERVER,II
D_Itpcc_com45,(void **)&(*txnHandle)-
>comInterface.comHandle45); }
if (numServers >= 45) { hres[44] =
CoCreateInstance(CLSID_tpcc_com44,NULL,CLSCTX_SERVER,II
D_Itpcc_com44,(void **)&(*txnHandle)-
>comInterface.comHandle44); }
if (numServers >= 44) { hres[43] =
CoCreateInstance(CLSID_tpcc_com43,NULL,CLSCTX_SERVER,II
D_Itpcc_com43,(void **)&(*txnHandle)-
>comInterface.comHandle43); }
if (numServers >= 43) { hres[42] =
CoCreateInstance(CLSID_tpcc_com42,NULL,CLSCTX_SERVER,II
D_Itpcc_com42,(void **)&(*txnHandle)-
>comInterface.comHandle42); }
if (numServers >= 42) { hres[41] =
CoCreateInstance(CLSID_tpcc_com41,NULL,CLSCTX_SERVER,II
D_Itpcc_com41,(void **)&(*txnHandle)-
>comInterface.comHandle41); }
if (numServers >= 41) { hres[40] =
CoCreateInstance(CLSID_tpcc_com40,NULL,CLSCTX_SERVER,II
D_Itpcc_com40,(void **)&(*txnHandle)-
>comInterface.comHandle40); }
if (numServers >= 40) { hres[39] =
CoCreateInstance(CLSID_tpcc_com39,NULL,CLSCTX_SERVER,II
D_Itpcc_com39,(void **)&(*txnHandle)-
>comInterface.comHandle39); }
if (numServers >= 39) { hres[38] =
CoCreateInstance(CLSID_tpcc_com38,NULL,CLSCTX_SERVER,II
D_Itpcc_com38,(void **)&(*txnHandle)-
>comInterface.comHandle38); }
if (numServers >= 38) { hres[37] =
CoCreateInstance(CLSID_tpcc_com37,NULL,CLSCTX_SERVER,II
D_Itpcc_com37,(void **)&(*txnHandle)-
>comInterface.comHandle37); }
if (numServers >= 37) { hres[36] =
CoCreateInstance(CLSID_tpcc_com36,NULL,CLSCTX_SERVER,II
D_Itpcc_com36,(void **)&(*txnHandle)-
>comInterface.comHandle36); }
if (numServers >= 36) { hres[35] =
CoCreateInstance(CLSID_tpcc_com35,NULL,CLSCTX_SERVER,II
D_Itpcc_com35,(void **)&(*txnHandle)-
>comInterface.comHandle35); }
if (numServers >= 35) { hres[34] =
CoCreateInstance(CLSID_tpcc_com34,NULL,CLSCTX_SERVER,II
D_Itpcc_com34,(void **)&(*txnHandle)-
>comInterface.comHandle34); }
if (numServers >= 34) { hres[33] =
CoCreateInstance(CLSID_tpcc_com33,NULL,CLSCTX_SERVER,II
D_Itpcc_com33,(void **)&(*txnHandle)-
>comInterface.comHandle33); }
if (numServers >= 33) { hres[32] =
CoCreateInstance(CLSID_tpcc_com32,NULL,CLSCTX_SERVER,II
D_Itpcc_com32,(void **)&(*txnHandle)-
>comInterface.comHandle32); }
if (numServers >= 32) { hres[31] =
CoCreateInstance(CLSID_tpcc_com31,NULL,CLSCTX_SERVER,II
D_Itpcc_com31,(void **)&(*txnHandle)-
>comInterface.comHandle31); }
if (numServers >= 31) { hres[30] =
CoCreateInstance(CLSID_tpcc_com30,NULL,CLSCTX_SERVER,II
D_Itpcc_com30,(void **)&(*txnHandle)-
>comInterface.comHandle30); }
if (numServers >= 30) { hres[29] =
CoCreateInstance(CLSID_tpcc_com29,NULL,CLSCTX_SERVER,II
D_Itpcc_com29,(void **)&(*txnHandle)-
>comInterface.comHandle29); }
if (numServers >= 29) { hres[28] =
CoCreateInstance(CLSID_tpcc_com28,NULL,CLSCTX_SERVER,II
D_Itpcc_com28,(void **)&(*txnHandle)-
>comInterface.comHandle28); }
if (numServers >= 28) { hres[27] =
CoCreateInstance(CLSID_tpcc_com27,NULL,CLSCTX_SERVER,II
D_Itpcc_com27,(void **)&(*txnHandle)-
>comInterface.comHandle27); }
if (numServers >= 27) { hres[26] =
CoCreateInstance(CLSID_tpcc_com26,NULL,CLSCTX_SERVER,II
D_Itpcc_com26,(void **)&(*txnHandle)-
>comInterface.comHandle26); }
if (numServers >= 26) { hres[25] =
CoCreateInstance(CLSID_tpcc_com25,NULL,CLSCTX_SERVER,II
D_Itpcc_com25,(void **)&(*txnHandle)-
>comInterface.comHandle25); }
if (numServers >= 25) { hres[24] =
CoCreateInstance(CLSID_tpcc_com24,NULL,CLSCTX_SERVER,II
D_Itpcc_com24,(void **)&(*txnHandle)-
>comInterface.comHandle24); }
if (numServers >= 24) { hres[23] =
CoCreateInstance(CLSID_tpcc_com23,NULL,CLSCTX_SERVER,II
D_Itpcc_com23,(void **)&(*txnHandle)-
>comInterface.comHandle23); }
if (numServers >= 23) { hres[22] =
CoCreateInstance(CLSID_tpcc_com22,NULL,CLSCTX_SERVER,II
D_Itpcc_com22,(void **)&(*txnHandle)-
>comInterface.comHandle22); }
if (numServers >= 22) { hres[21] =
CoCreateInstance(CLSID_tpcc_com21,NULL,CLSCTX_SERVER,II
D_Itpcc_com21,(void **)&(*txnHandle)-
>comInterface.comHandle21); }
if (numServers >= 21) { hres[20] =
CoCreateInstance(CLSID_tpcc_com20,NULL,CLSCTX_SERVER,II
D_Itpcc_com20,(void **)&(*txnHandle)-
>comInterface.comHandle20); }
if (numServers >= 20) { hres[19] =
CoCreateInstance(CLSID_tpcc_com19,NULL,CLSCTX_SERVER,II
D_Itpcc_com19,(void **)&(*txnHandle)-
>comInterface.comHandle19); }
if (numServers >= 19) { hres[18] =
CoCreateInstance(CLSID_tpcc_com18,NULL,CLSCTX_SERVER,II
D_Itpcc_com18,(void **)&(*txnHandle)-
>comInterface.comHandle18); }
if (numServers >= 18) { hres[17] =
CoCreateInstance(CLSID_tpcc_com17,NULL,CLSCTX_SERVER,II
D_Itpcc_com17,(void **)&(*txnHandle)-
>comInterface.comHandle17); }
if (numServers >= 17) { hres[16] =
CoCreateInstance(CLSID_tpcc_com16,NULL,CLSCTX_SERVER,II
D_Itpcc_com16,(void **)&(*txnHandle)-
>comInterface.comHandle16); }
if (numServers >= 16) { hres[15] =
CoCreateInstance(CLSID_tpcc_com15,NULL,CLSCTX_SERVER,II
D_Itpcc_com15,(void **)&(*txnHandle)-
>comInterface.comHandle15); }
if (numServers >= 15) { hres[14] =
CoCreateInstance(CLSID_tpcc_com14,NULL,CLSCTX_SERVER,II
D_Itpcc_com14,(void **)&(*txnHandle)-
>comInterface.comHandle14); }
if (numServers >= 14) { hres[13] =
CoCreateInstance(CLSID_tpcc_com13,NULL,CLSCTX_SERVER,II
D_Itpcc_com13,(void **)&(*txnHandle)-
>comInterface.comHandle13); }
if (numServers >= 13) { hres[12] =
CoCreateInstance(CLSID_tpcc_com12,NULL,CLSCTX_SERVER,II
D_Itpcc_com12,(void **)&(*txnHandle)-
>comInterface.comHandle12); }
if (numServers >= 12) { hres[11] =
CoCreateInstance(CLSID_tpcc_com11,NULL,CLSCTX_SERVER,II
D_Itpcc_com11,(void **)&(*txnHandle)-
>comInterface.comHandle11); }
```

```
if (numServers >= 11) { hres[10] =
CoCreateInstance(CLSID_tpcc_com10,NULL,CLSCTX_SERVER,II
D_Itpcc_com10,(void **)&(*txnHandle)-
>comInterface.comHandle10); }
if (numServers >= 10) { hres[9] =
CoCreateInstance(CLSID_tpcc_com9,NULL,CLSCTX_SERVER,IID
_Itpcc_com9,(void **)&(*txnHandle)->comInterface.comHandle9); }
if (numServers >= 9) { hres[8] =
CoCreateInstance(CLSID_tpcc_com8,NULL,CLSCTX_SERVER,IID
_Itpcc_com8,(void **)&(*txnHandle)->comInterface.comHandle8); }
if (numServers >= 8) { hres[7] =
CoCreateInstance(CLSID_tpcc_com7,NULL,CLSCTX_SERVER,IID
_Itpcc_com7,(void **)&(*txnHandle)->comInterface.comHandle7); }
if (numServers >= 7) { hres[6] =
CoCreateInstance(CLSID_tpcc_com6,NULL,CLSCTX_SERVER,IID
_Itpcc_com6,(void **)&(*txnHandle)->comInterface.comHandle6); }
if (numServers >= 6) { hres[5] =
CoCreateInstance(CLSID_tpcc_com5,NULL,CLSCTX_SERVER,IID
_Itpcc_com5,(void **)&(*txnHandle)->comInterface.comHandle5); }
if (numServers >= 5) { hres[4] =
CoCreateInstance(CLSID_tpcc_com4,NULL,CLSCTX_SERVER,IID
_Itpcc_com4,(void **)&(*txnHandle)->comInterface.comHandle4); }
if (numServers >= 4) { hres[3] =
CoCreateInstance(CLSID_tpcc_com3,NULL,CLSCTX_SERVER,IID
_Itpcc_com3,(void **)&(*txnHandle)->comInterface.comHandle3); }
if (numServers >= 3) { hres[2] =
CoCreateInstance(CLSID_tpcc_com2,NULL,CLSCTX_SERVER,IID
_Itpcc_com2,(void **)&(*txnHandle)->comInterface.comHandle2); }
if (numServers >= 2) { hres[1] =
CoCreateInstance(CLSID_tpcc_com1,NULL,CLSCTX_SERVER,IID
_Itpcc_com1,(void **)&(*txnHandle)->comInterface.comHandle1); }
#endif
hres[0] =
CoCreateInstance(CLSID_tpcc_com0,NULL,CLSCTX_SERVER,IID
_Itpcc_com0,(void **)&(*txnHandle)->comInterface.comHandle0);
#ifdef PARTITION
  for (i=0;i<=50;i++)
#else
  for (i=0;i<=0;i++)
  {
    if (FAILED(hres[i]))
    {
      _ftime(&endTime);
      //store error code in txnHandle
      ERRORMSG("CoCreateInstance() failed, COM+ Object
"<<i<<", numServers "<<numServers<<", code: "
        <<HRESULT_CODE(hres[i])<<"
facility:"<<HRESULT_FACILITY(hres[i])<<
        " hres:"<<hex<<hres[i]<<
        " time waiting:"<<
        ((((endTime.time - startTime.time)*1000)+
          (endTime.millitm - startTime.millitm))/1000.0)<<endl);

      return(ERR);
    };
  }
#endif
    _ftime(&endTime);
    DEBUGMSG("CoCreateInstance successful.txnHande com
initialized, time waiting for object to be activated:" <<
        ((((endTime.time - startTime.time)*1000)+
          (endTime.millitm - startTime.millitm))/1000.0)<<endl);
    ERRORMSG("CoCreateInstance successful.txnHande com
initialized, time waiting for object to be activated:" <<
        ((((endTime.time - startTime.time)*1000)+
          (endTime.millitm - startTime.millitm))/1000.0)<<endl);
    //call set complete to return object to pool.
    ERRORMSG("numServers "<<numServers);
#ifdef PARTITION
if (numServers >= 51) { (*txnHandle)->comInterface.comHandle50-
>doSetComplete(); }
if (numServers >= 50) { (*txnHandle)->comInterface.comHandle49-
>doSetComplete(); }
if (numServers >= 49) { (*txnHandle)->comInterface.comHandle48-
>doSetComplete(); }
if (numServers >= 48) { (*txnHandle)->comInterface.comHandle47-
>doSetComplete(); }
if (numServers >= 47) { (*txnHandle)->comInterface.comHandle46-
>doSetComplete(); }
if (numServers >= 46) { (*txnHandle)->comInterface.comHandle45-
>doSetComplete(); }
if (numServers >= 45) { (*txnHandle)->comInterface.comHandle44-
>doSetComplete(); }
if (numServers >= 44) { (*txnHandle)->comInterface.comHandle43-
>doSetComplete(); }
if (numServers >= 43) { (*txnHandle)->comInterface.comHandle42-
>doSetComplete(); }
if (numServers >= 42) { (*txnHandle)->comInterface.comHandle41-
>doSetComplete(); }
if (numServers >= 41) { (*txnHandle)->comInterface.comHandle40-
>doSetComplete(); }
if (numServers >= 40) { (*txnHandle)->comInterface.comHandle39-
>doSetComplete(); }
if (numServers >= 39) { (*txnHandle)->comInterface.comHandle38-
>doSetComplete(); }
if (numServers >= 38) { (*txnHandle)->comInterface.comHandle37-
>doSetComplete(); }
if (numServers >= 37) { (*txnHandle)->comInterface.comHandle36-
>doSetComplete(); }
if (numServers >= 36) { (*txnHandle)->comInterface.comHandle35-
>doSetComplete(); }
if (numServers >= 35) { (*txnHandle)->comInterface.comHandle34-
>doSetComplete(); }
if (numServers >= 34) { (*txnHandle)->comInterface.comHandle33-
>doSetComplete(); }
if (numServers >= 33) { (*txnHandle)->comInterface.comHandle32-
>doSetComplete(); }
if (numServers >= 32) { (*txnHandle)->comInterface.comHandle31-
>doSetComplete(); }
if (numServers >= 31) { (*txnHandle)->comInterface.comHandle30-
>doSetComplete(); }
if (numServers >= 30) { (*txnHandle)->comInterface.comHandle29-
>doSetComplete(); }
if (numServers >= 29) { (*txnHandle)->comInterface.comHandle28-
>doSetComplete(); }
if (numServers >= 28) { (*txnHandle)->comInterface.comHandle27-
>doSetComplete(); }
if (numServers >= 27) { (*txnHandle)->comInterface.comHandle26-
>doSetComplete(); }
if (numServers >= 26) { (*txnHandle)->comInterface.comHandle25-
>doSetComplete(); }
if (numServers >= 25) { (*txnHandle)->comInterface.comHandle24-
>doSetComplete(); }
if (numServers >= 24) { (*txnHandle)->comInterface.comHandle23-
>doSetComplete(); }
if (numServers >= 23) { (*txnHandle)->comInterface.comHandle22-
>doSetComplete(); }
if (numServers >= 22) { (*txnHandle)->comInterface.comHandle21-
>doSetComplete(); }
if (numServers >= 21) { (*txnHandle)->comInterface.comHandle20-
>doSetComplete(); }
if (numServers >= 20) { (*txnHandle)->comInterface.comHandle19-
>doSetComplete(); }
if (numServers >= 19) { (*txnHandle)->comInterface.comHandle18-
>doSetComplete(); }
if (numServers >= 18) { (*txnHandle)->comInterface.comHandle17-
>doSetComplete(); }
if (numServers >= 17) { (*txnHandle)->comInterface.comHandle16-
>doSetComplete(); }
if (numServers >= 16) { (*txnHandle)->comInterface.comHandle15-
>doSetComplete(); }
if (numServers >= 15) { (*txnHandle)->comInterface.comHandle14-
>doSetComplete(); }
```

```
if (numServers >= 14) { (*txnHandle)->comInterface.comHandle13-
>doSetComplete(); }
if (numServers >= 13) { (*txnHandle)->comInterface.comHandle12-
>doSetComplete(); }
if (numServers >= 12) { (*txnHandle)->comInterface.comHandle11-
>doSetComplete(); }
if (numServers >= 11) { (*txnHandle)->comInterface.comHandle10-
>doSetComplete(); }
if (numServers >= 10) { (*txnHandle)->comInterface.comHandle9-
>doSetComplete(); }
if (numServers >= 9) { (*txnHandle)->comInterface.comHandle8-
>doSetComplete(); }
if (numServers >= 8) { (*txnHandle)->comInterface.comHandle7-
>doSetComplete(); }
if (numServers >= 7) { (*txnHandle)->comInterface.comHandle6-
>doSetComplete(); }
if (numServers >= 6) { (*txnHandle)->comInterface.comHandle5-
>doSetComplete(); }
if (numServers >= 5) { (*txnHandle)->comInterface.comHandle4-
>doSetComplete(); }
if (numServers >= 4) { (*txnHandle)->comInterface.comHandle3-
>doSetComplete(); }
if (numServers >= 3) { (*txnHandle)->comInterface.comHandle2-
>doSetComplete(); }
if (numServers >= 2) { (*txnHandle)->comInterface.comHandle1-
>doSetComplete(); }
#endif
(*txnHandle)->comInterface.comHandle0->doSetComplete();

      ERRORMSG("doSetComplete Complete."<<endl);
      //set the com buffers size
      DEBUGMSG("Setting txnHandle: " <<
DEBUGADDRESS(*txnHandle) << "com buffer size to " <<
maxDataSize<< endl)
      ERRORMSG("Setting txnHandle: " <<
DEBUGADDRESS(*txnHandle) << "com buffer size to " <<
maxDataSize<< endl)
      (*txnHandle)->comInterface.size = maxDataSize;

      DEBUGMSG("txnHandle: "<<DEBUGADDRESS(*txnHandle)
<<"set to " << maxDataSize << endl);
      ERRORMSG("txnHandle: "<<DEBUGADDRESS(*txnHandle)
<<"set to " << maxDataSize << endl);

      TlsSetValue(threadLSIndex,*txnHandle);

      DEBUGMSG("txnHandle: "<<DEBUGADDRESS(*txnHandle) <<
"stored in TLS" << endl);
      ERRORMSG("txnHandle: "<<DEBUGADDRESS(*txnHandle) <<
"stored in TLS" << endl);

      ZeroMemory((*txnHandle)-
>htmlPage,MAX_HTML_PAGE_LEN);
      ZeroMemory((*txnHandle)-
>htmlHeader,MAX_HTML_HEADER_LEN);

      LeaveCriticalSection(&isapiLock);
      return(OK);
   }
   catch(...)
   {
      DEBUGMSG("Unhandled exeception in initTxnHandle,
unlocking isapi lock" <<endl);
//    ERRORMSG("Unhandled exeception in initTxnHandle,
unlocking isapi lock" <<endl);
      LeaveCriticalSection(&isapiLock);
   };

   return ERR;
}

/*
*****************************************************************
** Name        :  getDBInstance
** Description :
**           load db specific lib based on dbType registery
**           value.
** Parameters:
**
** Returns     :
**           int - return code
** Comments    :
**           This function only exists for the dlvy threads
**           Dlvy threads hold direct connections to the database
**           and therefore need to know what db interface to talk to.
*****************************************************************
*/
int getDBInstance()
{
   if(nullDB)
   {
      dbInstance =
LoadLibrary("c:\\inetpub\\wwwroot\\tpcc\\nullDB.dll");
      if(dbInstance == NULL)
      {
         return ERR_NULL_DLL_NOT_LOADED;
      }
   }
   else if( (strcmp(dbType,"DB2") == 0) )
   {
      dbInstance =
LoadLibrary("c:\\inetpub\\wwwroot\\tpcc\\tpccDB2glue.dll");
      if(dbInstance == NULL)
      {
         return ERR_DB2_DLL_NOT_LOADED;
      }
   }
   else if( (strcmp(dbType,"ORACLE") == 0) )
   {
      ERRORMSG("Loading Oracle dll"<<endl);
      dbInstance =
LoadLibrary("c:\\inetpub\\wwwroot\\tpcc\\tpccOracleGlue.dll");
      if(dbInstance == NULL)
      {
         ERRORMSG("Could not Load Oracle dll"<<endl);
         return ERR_ORA_DLL_NOT_LOADED;
      }
      ERRORMSG("Loaded Oracle dll"<<endl);
   }
   else
   {
      return ERR_UNKNOWN_DB;
   }

   ERRORMSG("Get address"<<endl);
   db_connect =
(CONNECT_PTR)GetProcAddress(dbInstance,"connect_db");
   if(db_connect == NULL)
   {
      ERRORMSG("Could not find connect_db function in dll"<<endl);
      return ERR_CONNECT_ADDRESS_NOT_FOUND;
   }
   ERRORMSG("Get address"<<endl);
   dlvyCall =
(DLVY_FUNC_PTR)GetProcAddress(dbInstance,"do_dlvy");
   if(dlvyCall == NULL)
   {
      ERRORMSG("Could not find do_dlvy in dll"<<endl);
      return ERR_DLVY_ADDRESS_NOT_FOUND;
   }
   ERRORMSG("Found all addresses in dll"<<endl);
   return OK;
}
```

```
/*
*********************************************************************
** Name         :  initDlvy
** Description :
**             initialize dlvy threads/dlvy queueu
** Parameters:
**
** Returns      :
**             int - return code
** Comments     :
**
*********************************************************************
*/

int initDlvy()
{
   ERRORMSG(">>initDlvy"<<endl);
   // Initialze critcal section
   InitializeCriticalSection(&dlvyQueueLock);

   //create dlvy queue
   dlvyQueue = (DLVYQUEUEDATA *)
calloc(dlvyQueueLen,sizeof(DLVYQUEUEDATA));

   if (dlvyQueue == NULL)
   {
      ERRORMSG("calloc failed to allocate dlvyQueue"<<endl);
      return  ERR_DLVY_QUEUE_CALLOC_FAIL;
   }
   ERRORMSG(">>calloc"<<endl);
   //init dlvy buffer critcal section
   //InitializeCriticalSection(&dlvyQueueLock);

   dlvyThreadDone = CreateEvent(NULL,
                        TRUE,    //manual reset
                        FALSE,  //initially not signalled.
                        NULL);
   if(dlvyThreadDone == NULL)
   {
      DEBUGMSG("Error: dlvyThreadDone handled init failed,
GetLastError:"<<GetLastError()<<endl);

      ERRORMSG("Error : dlvyThreadDone handled init failed,
GetLastError:"<<GetLastError()<<endl);

      return  ERR_DLVY_EVENT_INIT_FAILED;
   }
   //create dlvy semaphore
   dlvyThreadSemaphore =
CreateSemaphore(NULL,0,dlvyQueueLen,NULL);
   if(dlvyThreadSemaphore == NULL)
   {
      DEBUGMSG("Error: dlvyThreadSemaphore semaphore init
failed, GetLastError:"<<GetLastError()<<endl);
      ERRORMSG("Error: dlvyThreadSemaphore semaphore init
failed, GetLastError:"<<GetLastError()<<endl);
      return  ERR_DLVY_SEMAPHORE_INIT_FAILED;

   }

   //set number of free slots available in queue
   dlvyBufferFreeSlots = dlvyQueueLen;

   //index into next avaliable slot in dlvy txn queue
   dlvyBufferSlotIndex = 0;

   //thread index into dlvy txn queue
   dlvyBufferThreadIndex = 0;

   dlvyThreadHandles = new HANDLE[dlvyThreads];

   //create threads
   for(int threadCount = 0;threadCount <
dlvyThreads;threadCount++)
   {
      ERRORMSG(">>Calling dlvyThreadEntry"<<endl);
      dlvyThreadHandles[threadCount] =
(HANDLE)_beginthread(dlvyThreadEntry,0,NULL);
      if(dlvyThreadHandles[threadCount] ==
INVALID_HANDLE_VALUE) {
         ERRORMSG(">>Calling dlvyThreadEntry failed"<<endl);
         return ERR_DLVY_THREAD_FAILED;
      }
   }


   return OK;
}


/*
*********************************************************************
** Name         :  readRegisteryValues
** Description :
**             initialize isapi global variables from registery
** Parameters:
**
** Returns      :
**             int - return code
** Comments     :
**
*********************************************************************
*/
int readRegisteryValues()
{
   HKEY   registeryKey;
   char   value[MAX_STRING_LEN];
   DWORD  regType;
   DWORD  regValue;
   DWORD  regValueSize = MAX_STRING_LEN;

// ERRORMSG(">>readRegisteryValues"<<endl);
   //open up registery key
   if(RegOpenKeyEx(HKEY_LOCAL_MACHINE,REGISTERY_SUB_
KEY,0,KEY_READ,&registeryKey) != ERROR_SUCCESS)
      return ERR_UNABLE_TO_OPEN_REG;

   //get global error log file path/name
   regValueSize = sizeof(value);
   if
(RegQueryValueEx(registeryKey,ERROR_LOG_FILE,0,&regType,(
BYTE *) &value,&regValueSize)== ERROR_SUCCESS )
      strcpy(errorLogFile,value);
   else
      strcpy(errorLogFile,DEFAULT_ERROR_LOG_FILE);

   //open up error/debug streams
   errorStream.rdbuf( )->open(errorLogFile,ios::out);
   if(debugFlag)
      debugStream.rdbuf( )->open(htmlTraceLogFile,ios::out);

   ERRORMSG("Error log file open."<<endl);

   //get null db flag
   regValueSize = sizeof(regValue);
   if(RegQueryValueEx(registeryKey,NULL_DB,0,&regType,(BYTE
*)&regValue,&regValueSize) == ERROR_SUCCESS)
         nullDB = regValue;
   else
         nullDB = 0;

   regValueSize = sizeof(regValue);
   if(RegQueryValueEx(registeryKey,"numServers",0,&regType,(BYT
E *)&regValue,&regValueSize) == ERROR_SUCCESS)
```

```
        numServers = regValue;
    else
        return ERR_NUMSERVERS_NOT_IN_REG;

    ERRORMSG("numServers="<<numServers<<endl);
    regValueSize = sizeof(regValue);
    if(RegQueryValueEx(registeryKey,"numWarehouse",0,&regType,(
BYTE *)&regValue,&regValueSize) == ERROR_SUCCESS)
        numWarehouse = regValue;
    else
        return ERR_NUMWAREHOUSES_NOT_IN_REG;

    ERRORMSG("numWarehouse="<<numWarehouse<<endl);
    //get num dlvy threads
    regValueSize = sizeof(regValue);
    if(RegQueryValueEx(registeryKey,DELIVERY_THREADS,0,&regT
ype,(BYTE *)&regValue,&regValueSize) == ERROR_SUCCESS)
        dlvyThreads = regValue;
    else
        dlvyThreads = DEFAULT_DLVY_THREADS;

    //get dlvy queue len
    regValueSize = sizeof(regValue);
    if(RegQueryValueEx(registeryKey,DELIVERY_QUEUE_LEN,0,&r
egType,(BYTE *)&regValue,&regValueSize) ==
ERROR_SUCCESS)
        dlvyQueueLen = regValue;
    else
        dlvyQueueLen = DEFAULT_DLVY_QUEUE_LEN;

    //get the htmlTrace flag
    regValueSize = sizeof(regValue);
    if(RegQueryValueEx(registeryKey,HTML_TRACE,0,&regType,(BY
TE *)&regValue,&regValueSize) == ERROR_SUCCESS)
        trace = regValue;
    else
        trace = 0;

    //get the client null db flag
    regValueSize = sizeof(regValue);
    if(RegQueryValueEx(registeryKey,NULL_DB,0,&regType,(BYTE
*)&regValue,&regValueSize) == ERROR_SUCCESS)
        nullDB = regValue;
    else
        nullDB = 0;

    //get the num of users
    regValueSize = sizeof(regValue);
    if(RegQueryValueEx(registeryKey,NUM_USERS,0,&regType,(BY
TE *)&regValue,&regValueSize) == ERROR_SUCCESS)
        numUsers = regValue;
    else
        numUsers = DEFAULT_NUM_USERS;

    //get dlvy log file path
    regValueSize = sizeof(value);
    if
(RegQueryValueEx(registeryKey,DELIVERY_LOG_PATH,0,&regTy
pe,(BYTE *) &value,&regValueSize)== ERROR_SUCCESS )
      strcpy(dlvyLogPath,value);
    else
      strcpy(dlvyLogPath,DEFAULT_DLVY_LOG_PATH);

    //get global error log file path/name
    regValueSize = sizeof(value);
    if
(RegQueryValueEx(registeryKey,HTML_TRACE_LOG_FILE,0,&reg
Type,(BYTE *) &value,&regValueSize)== ERROR_SUCCESS )
      strcpy(htmlTraceLogFile,value);
    else

    strcpy(htmlTraceLogFile,DEFAULT_HTML_TRACE_LOG_FILE);

    //get db name
    regValueSize = sizeof(value);
    if (RegQueryValueEx(registeryKey,DB_NAME,0,&regType,(BYTE
*) &value,&regValueSize)== ERROR_SUCCESS )
      strcpy(dbName,value);
    else
      strcpy(dbName,DEFAULT_DB_NAME);

    //get db type
    regValueSize = sizeof(value);
    if (RegQueryValueEx(registeryKey,DB_TYPE,0,&regType,(BYTE
*) &value,&regValueSize)== ERROR_SUCCESS )
      strcpy(dbType,value);

    RegCloseKey(registeryKey);
    double ware=numWarehouse,serv=numServers;
    ratio = (int)ceil((double)(ware/serv));
    ERRORMSG("ratio="<<ratio<<endl);
    return OK;
}

/*
**********************************************************************
** Name         : doLoginForm
** Description :
**           HTML Login page entry point
** Parameters:
**           htmlPhraser command block
**           char *     html result page
** Returns      :
**           int - return code
** Comments     :
**
**********************************************************************
*/

int doLoginForm(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle)
{
    char buffer[20];
    DEBUGMSG("Entering doLoginForm()."<<endl);
// ERRORMSG("Entering doLoginForm()."<<endl);
    char *html=txnHandle->htmlPage;

    DEBUGMSG("Creating html login page"<<endl);
    //begin html page
    appendText(&html,"<HTML><HEAD><TITLE>TPC-C Client Home
Page</TITLE></HEAD>"
               "<FORM ACTION=\""
               APP_NAME
               "\" METHOD=\"GET\">"
               "<H2>Please Login.</H2>"
               "<INPUT TYPE=\"hidden\" NAME=\""
               CMD_TXN_ID
               "\" VALUE=\""
               CMD_MENU
               "\">"
               "<H3>Warehouse <INPUT NAME=\""
               CMD_W_ID
               "\" SIZE=6>"
               " District <INPUT NAME=\""
               CMD_D_ID
               "\" SIZE=2></H3>"
               "<INPUT TYPE=\"submit\" VALUE=\"Submit\">"
               "</FORM></BODY></HTML>");

    appendText(&html," dlvyBufferFreeSlots ");
    appendText(&html,itoa(dlvyBufferFreeSlots,buffer,10));
    appendText(&html," dlvyBufferSlotIndex ");
    appendText(&html,itoa(dlvyBufferSlotIndex,buffer,10));
    appendText(&html," dlvyBufferThreadIndex ");
```

```
   appendText(&html,itoa(dlvyBufferThreadIndex,buffer,10));
   DEBUGMSG("Html login page done"<<endl);
   return OK;
}

/*
**********************************************************************
** Name         : doLoginResults
** Description :
**           HTML Login results page entry point
** Parameters:
**           htmlPhraser command block
**           char *     html result page
** Returns      :
**           int - return code
** Comments     :
**
**********************************************************************
*/

int doLoginResults(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle)
{
   char *html=txnHandle->htmlPage;

   //validate parameters
   if( (txnHandle->w_id = atoi(commandBlock->get_W_ID())) == 0 )
   {
      doLoginErrorPage(html,ERR_INVALID_W_ID);
      return OK;
   }
   if( (txnHandle->d_id = atoi(commandBlock->get_D_ID())) == 0 )
   {
      doLoginErrorPage(html,ERR_INVALID_D_ID);
      return OK;
   }

   //store user into terminal array,
   //function will ERR if the terminal array is full
   if( assignTerminal(txnHandle) != OK)
   {
      doLoginErrorPage(html,ERR_TERMINAL_FULL);
      return OK;
   };
   appendText(&html,"<HTML><HEAD><TITLE>TPC-C Main
Menu</TITLE></HEAD>\r\n"
               "<BODY><FORM ACTION=\""
               APP_NAME
               "\" METHOD=\"GET\">\r\n"
               "<H3>Please Select Transaction.</H3>\r\n");
   html+=appendButtons(html);

   html+=appendHiddenFields(html,txnHandle);

   appendText(&html,"</FORM></BODY></HTML>");

   return OK;
}

/*
**********************************************************************
** Name         : doLoginErrorPage
** Description :
**           HTML Login page entry point
** Parameters:
**           char *     html page buffer
**           char *     error message
** Returns      :
**           int - return code
** Comments     :
**
**********************************************************************
*/

int doLoginErrorPage(char *htmlPage,char *errorMessage)
{
   char *html=htmlPage;

   //begin html page
   appendText(&html,"<HTML><HEAD><TITLE>TPC-C Client Home
Page</TITLE></HEAD>"
               "<FORM ACTION=\""
               APP_NAME
               "\" METHOD=\"GET\">");

   appendText(&html,"<H2>Please Login.</H2>"
               "<INPUT TYPE=\"hidden\" NAME=\""
               CMD_TXN_ID
               "\" VALUE=\""
               CMD_MENU
               "\">"
               "<H3>Warehouse <INPUT NAME=\""
               CMD_W_ID
               "\" SIZE=6>"
               " District <INPUT NAME=\""
               CMD_D_ID
               "\" SIZE=2></H3>"
               "<INPUT TYPE=\"submit\" VALUE=\"Submit\">"
               "</FORM>");
   appendText(&html,errorMessage);
   appendText(&html,"<BODY></HTML>");

   return OK;
}


/*
**********************************************************************
** Name         : doNewOrderForm
** Description :
**           HTML neworder page entry point
** Parameters:
**           htmlPhraser command block
**           char *     html result page
** Returns      :
**           int - return code
** Comments     :
**
**********************************************************************
*/


int doNewOrderForm(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle)
{
   char *html=txnHandle->htmlPage;

   appendText(&html,"<HTML><HEAD><TITLE>TPC-C New
Order</TITLE></HEAD>\r\n"
               "<BODY><FORM ACTION=\""
               APP_NAME
               "\" METHOD=\"GET\">\r\n"
               "<CENTER><H3>Please Fill In New Order
Form.</H3></CENTER>\r\n" //check if not needed
               "Submit Transaction <INPUT TYPE=\"submit\" NAME=\""
               CMD_TXN_ID
               "\" VALUE=\""
               CMD_NORD
               "\">");

   //append the hidden
   html+=appendHiddenFields(html,txnHandle);

   //int buffer for warehouse
```

```
   char buffer[15];
   appendText(&html," <PRE>"
//              "       1       2       3       4       5       6       7       8
9\r\n"
//
"12345678901234567890123456789012345678901234567890123
4567890123456789012345678901234567890\r\n"
              "Warehouse: ");
   appendText(&html,itoa(txnHandle->w_id,buffer,10),7,1);
   appendText(&html,"District: <INPUT NAME=\""
              CMD_D_ID
              "\" SIZE=1>                    Date:<BR>"
                 "Customer <INPUT NAME=\""
              CMD_C_ID
              "\" SIZE=6>  Name:                Credit:      %Disc.:<BR>"
              "Order Number:          Number of Lines:          W_tax:
D_tax:<BR> <BR>"
//              "       1       2       3       4       5       6       7       8
9\r\n"
//
"12345678901234567890123456789012345678901234567890123
4567890123456789012345678901234567890\r\n"
              " Supp_W  Item_Num  Item_Name               Qty Stock
B/G  Price    Amount <BR> ");

   //append the 15 items commands
   html+=appendItems(html,NORD_ITEMS,ITEM_START);

   //seal up html page
   appendText(&html,"</PRE></BODY></HTML>");

   return OK;
}

/*
********************************************************************
** Name         : doNewOrderResults
** Description :
**          HTML neworder page entry point
** Parameters:
**          htmlPhraser command block
**          char *     html result page
** Returns      :
**          int - return code
** Comments     :
**
********************************************************************
*/


int doNewOrderResults(htmlPhraser
*commandBlock,TXN_HANDLE *txnHandle)
{
   DEBUGMSG("Entered doNewOrderResults" << endl);

   char *html=txnHandle->htmlPage;
   struct nord_wrapper *nord = NULL;

   DEBUGMSG("Casting COM txnBuffer to nord struct" <<endl);
   nord = (nord_wrapper*)txnHandle->comInterface.txnBuffer;
   ZeroMemory(nord,maxDataSize);
   DEBUGMSG("COM txnBuffer initialized, validating input
parameters" << endl);

   //set warehouse,district and customer id from command block
   nord->in_nord.s_W_ID = txnHandle->w_id;
   DEBUGMSG("nord w_id:" <<  nord->in_nord.s_W_ID << endl);

   if( (nord->in_nord.s_D_ID = atoi(commandBlock->get_D_ID()) ) ==
0)
   {
      doNewOrderErrorPage(html,ERR_INVALID_D_ID,commandBlock
,txnHandle);
      return OK;
   }
   DEBUGMSG("nord d_id:" <<  nord->in_nord.s_D_ID << endl);

   if((nord->in_nord.s_C_ID = atoi(commandBlock->get_C_ID()) ) ==
0)
   {

   doNewOrderErrorPage(html,ERR_INVALID_C_ID,commandBlock
,txnHandle);
      return OK;
   }
   DEBUGMSG("nord c_id:" <<  nord->in_nord.s_C_ID << endl);

   int itemCmd      = ITEM_START;
   short itemComplete = 0;
   char field[256] ={NULL};

   for (int itemIndex=0;itemIndex<NORD_ITEMS;itemIndex++)
   {
      //supply warehouse
      if( *(commandBlock->get_ITEM_SUPP_W(itemIndex)) )
#ifdef DB2
         if ( (nord->in_nord.in_item[nord-
>in_nord.s_O_OL_CNT].s_OL_SUPPLY_W_ID =
atoi(commandBlock->get_ITEM_SUPP_W(itemIndex))) == 0)
#elif ORACLE
         if ( (nord->in_nord.s_OL_SUPPLY_W_ID[nord-
>in_nord.s_O_OL_CNT] = atoi(commandBlock-
>get_ITEM_SUPP_W(itemIndex))) == 0)
#endif
         {

   doNewOrderErrorPage(html,ERR_INVALID_SUPPLY_W_ID,com
mandBlock,txnHandle);
            return OK;
         }
         else
            itemComplete++;

      //item number
      if( *(commandBlock->get_ITEM_ITEM_NUM(itemIndex)) )
      {
         if(itemComplete==1)
         {
#ifdef DB2
            if ( (nord->in_nord.in_item[nord-
>in_nord.s_O_OL_CNT].s_OL_I_ID = atoi(commandBlock-
>get_ITEM_ITEM_NUM(itemIndex))) == 0)
#elif ORACLE
            if ( (nord->in_nord.s_OL_I_ID[nord->in_nord.s_O_OL_CNT]
= atoi(commandBlock->get_ITEM_ITEM_NUM(itemIndex))) == 0)
#endif
            {

   doNewOrderErrorPage(html,ERR_INVALID_ITEM_NUM,comman
dBlock,txnHandle);
               return OK;
            }
            else
               itemComplete++;
         }
         //missing previous value of item supp warehouse, flag error
         else
         {

   doNewOrderErrorPage(html,ERR_INVALID_SUPPLY_W_ID,com
mandBlock,txnHandle);
            return OK;
```

```
        }
      }
      else if( (itemComplete==1) ) //nothing in the command block,
check to see if the previous item value is present
      {

   doNewOrderErrorPage(html,ERR_INVALID_ITEM_NUM,comman
dBlock,txnHandle);
        return OK;
      }

      //item qty
      if(*(commandBlock->get_ITEM_QTY(itemIndex)))
      {
        if(itemComplete==2)
        {
#ifdef DB2
          if( (nord->in_nord.in_item[nord-
>in_nord.s_O_OL_CNT].s_OL_QUANTITY = atoi(commandBlock-
>get_ITEM_QTY(itemIndex))) == 0)
#elif ORACLE
          if( (nord->in_nord.s_OL_QUANTITY[nord-
>in_nord.s_O_OL_CNT] = atoi(commandBlock-
>get_ITEM_QTY(itemIndex))) == 0)
#endif
          {

   doNewOrderErrorPage(html,ERR_INVALID_ITEM_OTY,comman
dBlock,txnHandle);
            return OK;
          }
          else
            itemComplete++;
        }
        //missing previous value of item number
        else if (itemComplete ==1)
        {

   doNewOrderErrorPage(html,ERR_INVALID_ITEM_NUM,comman
dBlock,txnHandle);
          return OK;
        }
        //missing 1st value of supp warehouse
        else
        {

   doNewOrderErrorPage(html,ERR_INVALID_SUPPLY_W_ID,com
mandBlock,txnHandle);
          return OK;
        }
      }
      else if(itemComplete==2)     //nothing in the command block,
check to see if the previous item values are present
      {

   doNewOrderErrorPage(html,ERR_INVALID_ITEM_NUM,comman
dBlock,txnHandle);
        return OK;
      }

      DEBUGMSG("nord item:" << nord->in_nord.s_O_OL_CNT <<
"SUPPLY_W_ID:" << nord->in_nord.s_OL_SUPPLY_W_ID[nord-
>in_nord.s_O_OL_CNT] <<
        " OL_I_ID:" << nord->in_nord.s_OL_I_ID[nord-
>in_nord.s_O_OL_CNT] << " OL_QUANTITY:" << nord-
>in_nord.s_OL_QUANTITY[nord->in_nord.s_O_OL_CNT] <<endl);

      if(itemComplete == 3)
        nord->in_nord.s_O_OL_CNT++;

      itemComplete=0;
    }

    DEBUGMSG("complete nord items:"<<nord-
>in_nord.s_O_OL_CNT<<" initializing remaing unused items " <<
NORD_ITEMS - nord->in_nord.s_O_OL_CNT  << " to 0" <<endl);
    for(int itemIndex=nord-
>in_nord.s_O_OL_CNT;itemIndex<NORD_ITEMS;itemIndex++)
    {
#ifdef DB2
      nord->in_nord.in_item[itemIndex].s_OL_SUPPLY_W_ID=0;
      nord->in_nord.in_item[itemIndex].s_OL_I_ID = 0;
      nord->in_nord.in_item[itemIndex].s_OL_QUANTITY =0;
#elif ORACLE
      nord->in_nord.s_OL_SUPPLY_W_ID[itemIndex]=0;
      nord->in_nord.s_OL_I_ID[itemIndex] = 0;
      nord->in_nord.s_OL_QUANTITY[itemIndex] =0;
#endif
    }

    DEBUGMSG("nord creating new order results html title page"
<<endl);

    appendText(&html,"<HTML><HEAD><TITLE>TPC-C New Order
Results</TITLE></HEAD>\r\n"
               "<BODY><FORM ACTION=\""
               APP_NAME
               "\" METHOD=\"GET\">\r\n");
    //append menu buttons
    html+=appendButtons(html);
    html+=appendHiddenFields(html,txnHandle);

    appendText(&html,"</FORM><CENTER><H3>New Order</H3>
<BR></CENTER>"
               "<PRE>"
//             "       1       2       3       4       5       6       7       8
9\r\n"
//
"12345678901234567890123456789012345678901234567890123
456789012345678901234567890123456789012345678901234567890\r\n
               "");
    //assume failure
    nord->out_nord.s_transtatus = -1;

    DEBUGMSG("nord executing COM interface function" << endl);
    HRESULT   hres;
    try
    {
#ifdef PARTITION
      switch (txnHandle->part_server)
      {
case 0:hres = txnHandle->comInterface.comHandle0-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 1:hres = txnHandle->comInterface.comHandle1-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 2:hres = txnHandle->comInterface.comHandle2-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 3:hres = txnHandle->comInterface.comHandle3-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 4:hres = txnHandle->comInterface.comHandle4-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 5:hres = txnHandle->comInterface.comHandle5-
>doNewOrder(&txnHandle-
```

```
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 6:hres = txnHandle->comInterface.comHandle6-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 7:hres = txnHandle->comInterface.comHandle7-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 8:hres = txnHandle->comInterface.comHandle8-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 9:hres = txnHandle->comInterface.comHandle9-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 10:hres = txnHandle->comInterface.comHandle10-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 11:hres = txnHandle->comInterface.comHandle11-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 12:hres = txnHandle->comInterface.comHandle12-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 13:hres = txnHandle->comInterface.comHandle13-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 14:hres = txnHandle->comInterface.comHandle14-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 15:hres = txnHandle->comInterface.comHandle15-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 16:hres = txnHandle->comInterface.comHandle16-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 17:hres = txnHandle->comInterface.comHandle17-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 18:hres = txnHandle->comInterface.comHandle18-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 19:hres = txnHandle->comInterface.comHandle19-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 20:hres = txnHandle->comInterface.comHandle20-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 21:hres = txnHandle->comInterface.comHandle21-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 22:hres = txnHandle->comInterface.comHandle22-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 23:hres = txnHandle->comInterface.comHandle23-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 24:hres = txnHandle->comInterface.comHandle24-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 25:hres = txnHandle->comInterface.comHandle25-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 26:hres = txnHandle->comInterface.comHandle26-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 27:hres = txnHandle->comInterface.comHandle27-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 28:hres = txnHandle->comInterface.comHandle28-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 29:hres = txnHandle->comInterface.comHandle29-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 30:hres = txnHandle->comInterface.comHandle30-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 31:hres = txnHandle->comInterface.comHandle31-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 32:hres = txnHandle->comInterface.comHandle32-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 33:hres = txnHandle->comInterface.comHandle33-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 34:hres = txnHandle->comInterface.comHandle34-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 35:hres = txnHandle->comInterface.comHandle35-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 36:hres = txnHandle->comInterface.comHandle36-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 37:hres = txnHandle->comInterface.comHandle37-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 38:hres = txnHandle->comInterface.comHandle38-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 39:hres = txnHandle->comInterface.comHandle39-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 40:hres = txnHandle->comInterface.comHandle40-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 41:hres = txnHandle->comInterface.comHandle41-
>doNewOrder(&txnHandle-
```

```
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 42:hres = txnHandle->comInterface.comHandle42-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 43:hres = txnHandle->comInterface.comHandle43-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 44:hres = txnHandle->comInterface.comHandle44-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 45:hres = txnHandle->comInterface.comHandle45-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 46:hres = txnHandle->comInterface.comHandle46-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 47:hres = txnHandle->comInterface.comHandle47-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 48:hres = txnHandle->comInterface.comHandle48-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 49:hres = txnHandle->comInterface.comHandle49-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 50:hres = txnHandle->comInterface.comHandle50-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
    }
#else
hres = txnHandle->comInterface.comHandle0-
>doNewOrder(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);
#endif
  }
  catch(...)
  {
#ifdef PARTITION
    html+=sprintf(html,"ERROR : nord com call caused exeception,
warehouse: %d, COM server %d, ratio
%d</PRE></BODY></HTML>",nord->in_nord.s_W_ID,txnHandle-
>part_server,ratio);
#else
    html+=sprintf(html,"ERROR : nord com call caused exeception,
warehouse: %d</PRE></BODY></HTML>",nord->in_nord.s_W_ID);
#endif
    return OK;
  }

  if(FAILED(hres))
  {
    ERRORMSG("ERROR : nord com call failed, rc: " <<
DEBUGADDRESS(hex)  << hres);
    DEBUGMSG("ERROR : nord com call failed, rc: " << hex  <<
hres);
  }
  else
  {
    //com call successful, return object back to pool.
#ifdef PARTITION
    switch (txnHandle->part_server) {
```

```
case 0: hres = txnHandle->comInterface.comHandle0-
>doSetComplete();break;
case 1: hres = txnHandle->comInterface.comHandle1-
>doSetComplete();break;
case 2: hres = txnHandle->comInterface.comHandle2-
>doSetComplete();break;
case 3: hres = txnHandle->comInterface.comHandle3-
>doSetComplete();break;
case 4: hres = txnHandle->comInterface.comHandle4-
>doSetComplete();break;
case 5: hres = txnHandle->comInterface.comHandle5-
>doSetComplete();break;
case 6: hres = txnHandle->comInterface.comHandle6-
>doSetComplete();break;
case 7: hres = txnHandle->comInterface.comHandle7-
>doSetComplete();break;
case 8: hres = txnHandle->comInterface.comHandle8-
>doSetComplete();break;
case 9: hres = txnHandle->comInterface.comHandle9-
>doSetComplete();break;
case 10: hres = txnHandle->comInterface.comHandle10-
>doSetComplete();break;
case 11: hres = txnHandle->comInterface.comHandle11-
>doSetComplete();break;
case 12: hres = txnHandle->comInterface.comHandle12-
>doSetComplete();break;
case 13: hres = txnHandle->comInterface.comHandle13-
>doSetComplete();break;
case 14: hres = txnHandle->comInterface.comHandle14-
>doSetComplete();break;
case 15: hres = txnHandle->comInterface.comHandle15-
>doSetComplete();break;
case 16: hres = txnHandle->comInterface.comHandle16-
>doSetComplete();break;
case 17: hres = txnHandle->comInterface.comHandle17-
>doSetComplete();break;
case 18: hres = txnHandle->comInterface.comHandle18-
>doSetComplete();break;
case 19: hres = txnHandle->comInterface.comHandle19-
>doSetComplete();break;
case 20: hres = txnHandle->comInterface.comHandle20-
>doSetComplete();break;
case 21: hres = txnHandle->comInterface.comHandle21-
>doSetComplete();break;
case 22: hres = txnHandle->comInterface.comHandle22-
>doSetComplete();break;
case 23: hres = txnHandle->comInterface.comHandle23-
>doSetComplete();break;
case 24: hres = txnHandle->comInterface.comHandle24-
>doSetComplete();break;
case 25: hres = txnHandle->comInterface.comHandle25-
>doSetComplete();break;
case 26: hres = txnHandle->comInterface.comHandle26-
>doSetComplete();break;
case 27: hres = txnHandle->comInterface.comHandle27-
>doSetComplete();break;
case 28: hres = txnHandle->comInterface.comHandle28-
>doSetComplete();break;
case 29: hres = txnHandle->comInterface.comHandle29-
>doSetComplete();break;
case 30: hres = txnHandle->comInterface.comHandle30-
>doSetComplete();break;
case 31: hres = txnHandle->comInterface.comHandle31-
>doSetComplete();break;
case 32: hres = txnHandle->comInterface.comHandle32-
>doSetComplete();break;
case 33: hres = txnHandle->comInterface.comHandle33-
>doSetComplete();break;
case 34: hres = txnHandle->comInterface.comHandle34-
>doSetComplete();break;
case 35: hres = txnHandle->comInterface.comHandle35-
>doSetComplete();break;
```

```
case 36: hres = txnHandle->comInterface.comHandle36-
>doSetComplete();break;
case 37: hres = txnHandle->comInterface.comHandle37-
>doSetComplete();break;
case 38: hres = txnHandle->comInterface.comHandle38-
>doSetComplete();break;
case 39: hres = txnHandle->comInterface.comHandle39-
>doSetComplete();break;
case 40: hres = txnHandle->comInterface.comHandle40-
>doSetComplete();break;
case 41: hres = txnHandle->comInterface.comHandle41-
>doSetComplete();break;
case 42: hres = txnHandle->comInterface.comHandle42-
>doSetComplete();break;
case 43: hres = txnHandle->comInterface.comHandle43-
>doSetComplete();break;
case 44: hres = txnHandle->comInterface.comHandle44-
>doSetComplete();break;
case 45: hres = txnHandle->comInterface.comHandle45-
>doSetComplete();break;
case 46: hres = txnHandle->comInterface.comHandle46-
>doSetComplete();break;
case 47: hres = txnHandle->comInterface.comHandle47-
>doSetComplete();break;
case 48: hres = txnHandle->comInterface.comHandle48-
>doSetComplete();break;
case 49: hres = txnHandle->comInterface.comHandle49-
>doSetComplete();break;
case 50: hres = txnHandle->comInterface.comHandle50-
>doSetComplete();break;
    }
#else
hres = txnHandle->comInterface.comHandle0->doSetComplete();
#endif
    if(FAILED(hres))
    {
      ERRORMSG("ERROR : nord setcomplete call failed, rc:" <<
hex  << hres);
      DEBUGMSG("ERROR : nord setcomplete call failed, rc:" <<
hex  << hres);
      return OK;
    }
  }

  nord = (nord_wrapper *)txnHandle->comInterface.txnBuffer;
  DEBUGMSG("nord COM interface function successful,
s_transtatus:" << nord->out_nord.s_transtatus << endl);

  int rc = nord->out_nord.s_transtatus;

  char buffer[10];
  appendText(&html,"Warehouse:  ");
  appendText(&html,itoa(nord->in_nord.s_W_ID,buffer,10),6,1);

  appendText(&html,"District: ");
  appendText(&html,itoa(nord->in_nord.s_D_ID,buffer,10),26,1);

  appendText(&html,"Date: ");
  if(rc == OK)
  {
#ifdef ORACLE
    appendText(&html,nord->out_nord.s_O_ENTRY_D_time);
#elif DB2
    char dateTimeBuffer[50];
    copyOutDateTime(dateTimeBuffer,nord-
>out_nord.s_O_ENTRY_D_time);
    appendText(&html,dateTimeBuffer);
#endif
  }
  appendText(&html," <BR>"
             "Customer: ");
  appendText(&html,itoa(nord->in_nord.s_C_ID,buffer,10),8,1);
  appendText(&html,"Name: ");
  appendText(&html,nord-
>out_nord.s_C_LAST,LAST_NAME_LEN+3,1);

  appendText(&html,"Credit: ");
  appendText(&html,nord->out_nord.s_C_CREDIT,5,1);

  appendText(&html,"%Disc.: ");
  if(rc == OK)
  {
#ifdef ORACLE
    html+=sprintf(html,"%2.2lf",nord->out_nord.s_C_DISCOUNT);
#elif DB2
    html+=sprintf(html,"%2.2lf",nord-
>out_nord.s_C_DISCOUNT/100.0);
#endif
  }
  appendText(&html," <BR>"
           "Order Number: ");
  if(rc != INVALID_STATUS)
    appendText(&html,itoa(nord->out_nord.s_O_ID,buffer,10),10,1);

  appendText(&html,"Number of Lines: ");

  if(rc != INVALID_STATUS)
    appendText(&html,itoa(nord-
>out_nord.s_O_OL_CNT,buffer,10),10,1);

  appendText(&html,"W_Tax: ");
  if(rc == OK)
  {
#ifdef ORACLE
    html+=sprintf(html,"%5.2lf",nord->out_nord.s_W_TAX);
#elif DB2
    html+=sprintf(html,"%5.2lf",nord->out_nord.s_W_TAX/100.0);
#endif
  }

  appendText(&html,"   D_Tax: ");
  if(rc == OK)
  {
#ifdef ORACLE
    html+=sprintf(html,"%5.2lf",nord->out_nord.s_D_TAX);
#elif DB2
    html+=sprintf(html,"%5.2lf",nord->out_nord.s_D_TAX/100.0);
#endif
  }
  appendText(&html," <BR> <BR>"
//         "       1       2       3       4       5       6       7       8
9\r\n"
//
"12345678901234567890123456789012345678901234567890123
456789012345678901234567890123456789012345678901234567890\r\n"
          " Supp_W  Item_Id   Item_Name               Qty Stock  B/G
Price    Amount <BR> ");

  //display items
  if (rc == OK)
  {
    //display valid items
    for(int itemCount=0;itemCount < nord-
>out_nord.s_O_OL_CNT;itemCount++)
    {
#ifdef DB2
      appendText(&html,itoa(nord-
>in_nord.in_item[itemCount].s_OL_SUPPLY_W_ID,buffer,10),8,1);
      appendText(&html,itoa(nord-
>in_nord.in_item[itemCount].s_OL_I_ID,buffer,10),10,1);
      appendText(&html,nord-
>out_nord.item[itemCount].s_I_NAME,DEFAULT_STRING_LEN+1,
1);
```

```
        appendText(&html,itoa(nord-
>in_nord.in_item[itemCount].s_OL_QUANTITY,buffer,10),5,1);
        appendText(&html,itoa(nord-
>out_nord.item[itemCount].s_S_QUANTITY,buffer,10),7,1);
        html+=sprintf(html,"%c   $%-7.2lf $%-7.2lf <BR> ",nord-
>out_nord.item[itemCount].s_brand_generic,
                                nord-
>out_nord.item[itemCount].s_I_PRICE/100.0,
                                nord-
>out_nord.item[itemCount].s_OL_AMOUNT/100.0);
#elif ORACLE
        appendText(&html,itoa(nord-
>in_nord.s_OL_SUPPLY_W_ID[itemCount],buffer,10),8,1);
        appendText(&html,itoa(nord-
>in_nord.s_OL_I_ID[itemCount],buffer,10),10,1);
        appendText(&html,nord-
>out_nord.s_I_NAME[itemCount],DEFAULT_STRING_LEN+1,1);
        appendText(&html,itoa(nord-
>in_nord.s_OL_QUANTITY[itemCount],buffer,10),5,1);
        appendText(&html,itoa(nord-
>out_nord.s_S_QUANTITY[itemCount],buffer,10),7,1);
        html+=sprintf(html,"%c   $%-7.2lf $%-7.2lf <BR> ",nord-
>out_nord.s_brand_generic[itemCount],
                                nord-
>out_nord.s_I_PRICE[itemCount]/100.0,
                                nord-
>out_nord.s_OL_AMOUNT[itemCount]/100.0);
#endif
      }
      //display blank line for remaining empty items in the order
      for(int lineBreaks=0;lineBreaks < (NORD_ITEMS-nord-
>out_nord.s_O_OL_CNT);lineBreaks++)
        appendText(&html," <BR>");
    }
    else
      appendText(&html," <BR> <BR> <BR> <BR> <BR> <BR>
<BR> <BR> <BR> <BR> <BR> <BR> <BR> <BR> <BR>");

    appendText(&html,"\r\n <BR> ");

    html+=displayStatus(html,rc);
    if(rc == OK)
#ifdef ORACLE
      html+=sprintf(html,"      Total: $%.2lf",nord-
>out_nord.s_total_amount/100.0);
#elif DB2
      html+=sprintf(html,"      Total: $%.2lf",nord-
>out_nord.s_total_amount);
#endif
    else
      appendText(&html,"      Total: <BR>");

    appendText(&html,"</PRE></BODY> </HTML>");

    DEBUGMSG("nord html page complete.  returning to calling
function" << endl);

    return OK;
}

/*
********************************************************************
** Name         : doNewOrderErrorPage
** Description :
**           HTML neworder page entry point
** Parameters:
**           char *     html result page
**           char *     error message
** Returns      :
**           int - return code
** Comments     :
**
********************************************************************
*/


int doNewOrderErrorPage(char *htmlPage,char
*message,htmlPhraser *commandBlock,TXN_HANDLE *txnHandle)
{
  char *html=htmlPage;

  appendText(&html,"<HTML><HEAD><TITLE>TPC-C New
Order</TITLE></HEAD>\r\n"
            "<BODY><FORM ACTION=\""
            APP_NAME
            "\" METHOD=\"GET\">\r\n"
            "<CENTER><H3>Please Fill In New Order
Form.</H3></CENTER>\r\n"
            "Submit Transaction <INPUT TYPE=\"submit\" NAME=\""
            CMD_TXN_ID
            "\" VALUE=\""
            CMD_NORD
            "\">");

  //append the hidden warehouse and district fields
  html+=appendHiddenFields(html,txnHandle);

  //int buffer for warehouse
  char buffer[15];
  /*appendText(&html,"<PRE>        1        2        3        4        5
6        7        8        9\r\n"

"12345678901234567890123456789012345678901234567890123
4567890123456789012345678901234567890\r\n"
            "Warehouse: ");*/
  appendText(&html,"<PRE>Warehouse: ");
  appendText(&html,itoa(txnHandle->w_id,buffer,10),7,1);
  appendText(&html,"District: <INPUT NAME=\""
            CMD_D_ID
            "\" SIZE=1>                    Date:<BR>"
              "Customer <INPUT NAME=\""
            CMD_C_ID
            "\" SIZE=6>  Name:              Credit:      %Disc.:<BR>"
            "Order Number:          Number of Lines:          W_tax:
D_tax:<BR> <BR>"
            //"        1        2        3        4        5        6        7        8
9\r\n"

//"12345678901234567890123456789012345678901234567890123
4567890123456789012345678901234567890\r\n"
            " Supp_W  Item_Num  Item_Name                Qty Stock
B/G  Price    Amount <BR> ");

  //append the 15 items commands
  html+=appendItems(html,NORD_ITEMS,ITEM_START);
  appendText(&html,message);

  //seal up html page
  appendText(&html,"</PRE></BODY></HTML>");

  return OK;
}


/*
********************************************************************
** Name         : doPaymentForm
** Description :
**           HTML payment page entry point
** Parameters:
**           htmlPhraser command block
**           char *     html result page
** Returns      :
**           int - return code
```

```
** Comments    :
**
*****************************************************************
*/

int doPaymentForm(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle)
{
  char *html=txnHandle->htmlPage;
  appendText(&html,"<HTML><HEAD><TITLE>TPC-C
Payment</TITLE></HEAD>\r\n"
            "<BODY><FORM ACTION=\""
            APP_NAME
            "\" METHOD=\"GET\">\r\n"
            "<CENTER><H3>Please Fill In Payment
Form.</H3></CENTER> <BR>\r\n"
            "Submit Transaction <INPUT TYPE=\"submit\" NAME=\""
            CMD_TXN_ID
            "\" VALUE=\""
            CMD_PYMT
            "\">");
  html+=appendHiddenFields(html,txnHandle);
  appendText(&html,"<BR><PRE>\r\n"
            "Date:<BR>"
            "Warehouse: ");
  char buffer[15];
  appendText(&html,itoa(txnHandle->w_id,buffer,10));

  appendSpaces(&html,10);
  appendText(&html,"District: <INPUT NAME=\""
            CMD_D_ID
            "\" SIZE=1>\r\n<BR>"
            "<BR> <BR> <BR>"
            "Customer: "
            "<INPUT NAME=\""
            CMD_C_ID
            "\" SIZE=5>"
            "   "
            "Cust-Warehouse: "
            "<INPUT NAME=\""
            CMD_C_W_ID
            "\" SIZE=5>"
            "   "
            "Cust-District: "
            "<INPUT NAME=\""
            CMD_C_D_ID
            "\" SIZE=1><BR>"
            "Name:  <INPUT NAME=\""
            CMD_C_NAME
            "\" SIZE=20>");
  appendText(&html,"                          Since: <BR>"
            "                    "
            "                    Credit: <BR>"
            "                      "
            "                    %Disc: <BR>"
            "Amount Paid:          "
            "<INPUT NAME=\""
            CMD_AMT_PAID
            "\" SIZE=10>"
            "          "
            "New Cust-Balance:<BR>"
            "Credit Limit:<BR> <BR>Cust-Data:<BR> <BR> <BR>
<BR> </PRE>");

  return OK;
}

/*
*****************************************************************
** Name        : doPaymentResults
** Description :
**          HTML neworder page entry point
** Parameters:
**          htmlPhraser command block
**          char *    html result page
** Returns     :
**           int - return code
** Comments    :
**
*****************************************************************
*/

int doPaymentResults(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle)
{
  char *html=txnHandle->htmlPage;
  char buffer[50];
  struct paym_wrapper  *pymt = NULL;
  pymt = (paym_wrapper*)txnHandle->comInterface.txnBuffer;
  ZeroMemory(pymt,maxDataSize);

  //set login warehouse id from command block
  pymt->in_paym.s_W_ID = txnHandle->w_id;

  //set district from command block
  if( (pymt->in_paym.s_D_ID = atoi(commandBlock->get_D_ID()))
== 0)
  {

  doPaymentErrorPage(html,ERR_INVALID_D_ID,commandBlock,t
xnHandle);
    return OK;
  }

  //set customer id from command block
  if( (pymt->in_paym.s_C_ID = atoi(commandBlock->get_C_ID()))
== 0)
  {
    if(*(commandBlock->get_C_NAME()) == NULL)
    {
      //no customer id nor customer last name specified.

  doPaymentErrorPage(html,ERR_MISSING_C_ID_OR_CLAST,co
mmandBlock,txnHandle);
      return OK;
    }
    else
      strcpy(pymt->in_paym.s_C_LAST,commandBlock-
>get_C_NAME());
  }
  else
  {
    //make sure that the user only inserted just c_id
    if(*(commandBlock->get_C_NAME()) != NULL)
    {

  doPaymentErrorPage(html,ERR_C_ID_OR_CLAST_ONLY,comm
andBlock,txnHandle);
      return OK;
    }
  }

  //get customer warehose id field
  if( (pymt->in_paym.s_C_W_ID = atoi(commandBlock-
>get_C_W_ID())) == 0)
  {

  doPaymentErrorPage(html,ERR_INVALID_C_W_ID,commandBlo
ck,txnHandle);
    return OK;
  }

  //get customer district id field
```

```
  if ( (pymt->in_paym.s_C_D_ID = atoi(commandBlock-
>get_C_D_ID())) == 0)
  {

  doPaymentErrorPage(html,ERR_INVALID_C_D_ID,commandBloc
k,txnHandle);
    return OK;
  }

  if(!copyInMoney32(commandBlock->get_AMT_PAID(),&pymt-
>in_paym.s_H_AMOUNT))
  {

  doPaymentErrorPage(html,ERR_INVALID_PAYMENT_AMOUNT,
commandBlock,txnHandle);
    return OK;
  }

  appendText(&html,"<HTML><HEAD><TITLE>TPC-C Payment
Results</TITLE></HEAD>\r\n"
            "<BODY><FORM ACTION=\""
            APP_NAME
            "\" METHOD=\"GET\">\r\n");
  html+=appendButtons(html);

  html+=appendHiddenFields(html,txnHandle);

  appendText(&html,"</FORM><CENTER><H3>Payment</H3></C
ENTER>");

  DEBUGMSG("Calling com entry api payment, w_id:"<<pymt-
>in_paym.s_W_ID<<" d_id:"<<pymt->in_paym.s_D_ID<<endl);
  //assume failure
  pymt->out_paym.s_transtatus = -1;

  HRESULT  hres;
  try
  {
#ifdef PARTITION
    switch (txnHandle->part_server)
    {
case 0:hres = txnHandle->comInterface.comHandle0-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 1:hres = txnHandle->comInterface.comHandle1-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 2:hres = txnHandle->comInterface.comHandle2-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 3:hres = txnHandle->comInterface.comHandle3-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 4:hres = txnHandle->comInterface.comHandle4-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 5:hres = txnHandle->comInterface.comHandle5-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 6:hres = txnHandle->comInterface.comHandle6-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 7:hres = txnHandle->comInterface.comHandle7-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 8:hres = txnHandle->comInterface.comHandle8-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 9:hres = txnHandle->comInterface.comHandle9-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 10:hres = txnHandle->comInterface.comHandle10-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 11:hres = txnHandle->comInterface.comHandle11-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 12:hres = txnHandle->comInterface.comHandle12-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 13:hres = txnHandle->comInterface.comHandle13-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 14:hres = txnHandle->comInterface.comHandle14-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 15:hres = txnHandle->comInterface.comHandle15-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 16:hres = txnHandle->comInterface.comHandle16-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 17:hres = txnHandle->comInterface.comHandle17-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 18:hres = txnHandle->comInterface.comHandle18-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 19:hres = txnHandle->comInterface.comHandle19-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 20:hres = txnHandle->comInterface.comHandle20-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 21:hres = txnHandle->comInterface.comHandle21-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 22:hres = txnHandle->comInterface.comHandle22-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 23:hres = txnHandle->comInterface.comHandle23-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 24:hres = txnHandle->comInterface.comHandle24-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 25:hres = txnHandle->comInterface.comHandle25-
>doPayment(&txnHandle-
```

```
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 26:hres = txnHandle->comInterface.comHandle26-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 27:hres = txnHandle->comInterface.comHandle27-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 28:hres = txnHandle->comInterface.comHandle28-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 29:hres = txnHandle->comInterface.comHandle29-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 30:hres = txnHandle->comInterface.comHandle30-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 31:hres = txnHandle->comInterface.comHandle31-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 32:hres = txnHandle->comInterface.comHandle32-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 33:hres = txnHandle->comInterface.comHandle33-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 34:hres = txnHandle->comInterface.comHandle34-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 35:hres = txnHandle->comInterface.comHandle35-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 36:hres = txnHandle->comInterface.comHandle36-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 37:hres = txnHandle->comInterface.comHandle37-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 38:hres = txnHandle->comInterface.comHandle38-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 39:hres = txnHandle->comInterface.comHandle39-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 40:hres = txnHandle->comInterface.comHandle40-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 41:hres = txnHandle->comInterface.comHandle41-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 42:hres = txnHandle->comInterface.comHandle42-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 43:hres = txnHandle->comInterface.comHandle43-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 44:hres = txnHandle->comInterface.comHandle44-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 45:hres = txnHandle->comInterface.comHandle45-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 46:hres = txnHandle->comInterface.comHandle46-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 47:hres = txnHandle->comInterface.comHandle47-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 48:hres = txnHandle->comInterface.comHandle48-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 49:hres = txnHandle->comInterface.comHandle49-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 50:hres = txnHandle->comInterface.comHandle50-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;    }
#else
hres = txnHandle->comInterface.comHandle0-
>doPayment(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);
#endif
  }
  catch(...)
  {
#ifdef PARTITION
     html+=sprintf(html,"ERROR : Com pymt call caused exeception,
warehouse: %d, COM server %d, ratio
%d</PRE></BODY></HTML>",pymt->in_paym.s_W_ID,txnHandle-
>part_server,ratio);
#else
     html+=sprintf(html,"ERROR : Com pymt call caused exeception,
warehouse: %d</PRE></BODY></HTML>",pymt-
>in_paym.s_W_ID);
#endif
     return OK;
  }

  if(FAILED(hres))
  {
     html+=sprintf(html,"ERROR : pymt com call failed, warehouse:
%d, rc: %x</PRE></BODY></HTML>",pymt-
>in_paym.s_W_ID,hres);
     ERRORMSG("ERROR : pymt com call failed, rc:
"<<DEBUGADDRESS(hres)<<endl);
     return OK;
  }

#ifdef PARTITION
     switch (txnHandle->part_server) {
case 0: hres = txnHandle->comInterface.comHandle0-
>doSetComplete();break;
case 1: hres = txnHandle->comInterface.comHandle1-
>doSetComplete();break;
case 2: hres = txnHandle->comInterface.comHandle2-
>doSetComplete();break;
case 3: hres = txnHandle->comInterface.comHandle3-
>doSetComplete();break;
```

```
case 4: hres = txnHandle->comInterface.comHandle4-
>doSetComplete();break;
case 5: hres = txnHandle->comInterface.comHandle5-
>doSetComplete();break;
case 6: hres = txnHandle->comInterface.comHandle6-
>doSetComplete();break;
case 7: hres = txnHandle->comInterface.comHandle7-
>doSetComplete();break;
case 8: hres = txnHandle->comInterface.comHandle8-
>doSetComplete();break;
case 9: hres = txnHandle->comInterface.comHandle9-
>doSetComplete();break;
case 10: hres = txnHandle->comInterface.comHandle10-
>doSetComplete();break;
case 11: hres = txnHandle->comInterface.comHandle11-
>doSetComplete();break;
case 12: hres = txnHandle->comInterface.comHandle12-
>doSetComplete();break;
case 13: hres = txnHandle->comInterface.comHandle13-
>doSetComplete();break;
case 14: hres = txnHandle->comInterface.comHandle14-
>doSetComplete();break;
case 15: hres = txnHandle->comInterface.comHandle15-
>doSetComplete();break;
case 16: hres = txnHandle->comInterface.comHandle16-
>doSetComplete();break;
case 17: hres = txnHandle->comInterface.comHandle17-
>doSetComplete();break;
case 18: hres = txnHandle->comInterface.comHandle18-
>doSetComplete();break;
case 19: hres = txnHandle->comInterface.comHandle19-
>doSetComplete();break;
case 20: hres = txnHandle->comInterface.comHandle20-
>doSetComplete();break;
case 21: hres = txnHandle->comInterface.comHandle21-
>doSetComplete();break;
case 22: hres = txnHandle->comInterface.comHandle22-
>doSetComplete();break;
case 23: hres = txnHandle->comInterface.comHandle23-
>doSetComplete();break;
case 24: hres = txnHandle->comInterface.comHandle24-
>doSetComplete();break;
case 25: hres = txnHandle->comInterface.comHandle25-
>doSetComplete();break;
case 26: hres = txnHandle->comInterface.comHandle26-
>doSetComplete();break;
case 27: hres = txnHandle->comInterface.comHandle27-
>doSetComplete();break;
case 28: hres = txnHandle->comInterface.comHandle28-
>doSetComplete();break;
case 29: hres = txnHandle->comInterface.comHandle29-
>doSetComplete();break;
case 30: hres = txnHandle->comInterface.comHandle30-
>doSetComplete();break;
case 31: hres = txnHandle->comInterface.comHandle31-
>doSetComplete();break;
case 32: hres = txnHandle->comInterface.comHandle32-
>doSetComplete();break;
case 33: hres = txnHandle->comInterface.comHandle33-
>doSetComplete();break;
case 34: hres = txnHandle->comInterface.comHandle34-
>doSetComplete();break;
case 35: hres = txnHandle->comInterface.comHandle35-
>doSetComplete();break;
case 36: hres = txnHandle->comInterface.comHandle36-
>doSetComplete();break;
case 37: hres = txnHandle->comInterface.comHandle37-
>doSetComplete();break;
case 38: hres = txnHandle->comInterface.comHandle38-
>doSetComplete();break;
case 39: hres = txnHandle->comInterface.comHandle39-
>doSetComplete();break;
case 40: hres = txnHandle->comInterface.comHandle40-
>doSetComplete();break;
case 41: hres = txnHandle->comInterface.comHandle41-
>doSetComplete();break;
case 42: hres = txnHandle->comInterface.comHandle42-
>doSetComplete();break;
case 43: hres = txnHandle->comInterface.comHandle43-
>doSetComplete();break;
case 44: hres = txnHandle->comInterface.comHandle44-
>doSetComplete();break;
case 45: hres = txnHandle->comInterface.comHandle45-
>doSetComplete();break;
case 46: hres = txnHandle->comInterface.comHandle46-
>doSetComplete();break;
case 47: hres = txnHandle->comInterface.comHandle47-
>doSetComplete();break;
case 48: hres = txnHandle->comInterface.comHandle48-
>doSetComplete();break;
case 49: hres = txnHandle->comInterface.comHandle49-
>doSetComplete();break;
case 50: hres = txnHandle->comInterface.comHandle50-
>doSetComplete();break;
    }
#else
hres = txnHandle->comInterface.comHandle0->doSetComplete();
#endif
  pymt = (paym_wrapper *)txnHandle->comInterface.txnBuffer;

  //get return code
  int rc = pymt->out_paym.s_transtatus;
  if( rc != OK)
  {
    html+=displayStatus(html,rc);
    appendText(&html,itoa(rc,buffer,10));
    appendText(&html,"</PRE></BODY></HTML>");
    return OK;
  }
// appendText(&html, "<BR><PRE>\r\n");
// appendText(&html,"        1        2        3        4        5        6
7        8<BR>");
//
  appendText(&html,"12345678901234567890123456789012345678
89012345678901234567890123456789012345678901234567890<BR>");

  //start creating result body
  appendText(&html, "<BR><PRE>\r\n"
            "Date: ");

#ifdef ORACLE
  appendText(&html,pymt->out_paym.s_H_DATE_time);
#endif
#ifdef DB2
  copyOutDateTime(buffer,pymt->out_paym.s_H_DATE_time);
  appendText(&html,buffer);
#endif
  appendText(&html, "<BR>"
                "Warehouse: ");
  appendText(&html,itoa(pymt-
>in_paym.s_W_ID,buffer,10),6+24,1);
  appendText(&html,"District: ");
  appendText(&html,itoa(pymt->in_paym.s_D_ID,buffer,10),2,1);
  appendText(&html,"<BR>");

  //print out warehouse and district information
  appendText(&html,pymt-
>out_paym.s_W_STREET_1,STREET_LEN+21,1);
  appendText(&html,pymt-
>out_paym.s_D_STREET_1,STREET_LEN,1);
  appendText(&html,"<BR>");

  appendText(&html,pymt-
>out_paym.s_W_STREET_2,STREET_LEN+21,1);
```

```
  appendText(&html,pymt-
>out_paym.s_D_STREET_2,STREET_LEN,1);
  appendText(&html,"<BR>");

  appendText(&html,pymt->out_paym.s_W_CITY,CITY_LEN+1,1);
  appendText(&html,pymt-
>out_paym.s_W_STATE,STATE_LEN+1,1);
  copyOutZip(buffer,pymt->out_paym.s_W_ZIP);
  appendText(&html,buffer);

  appendText(&html,pymt->out_paym.s_D_CITY,CITY_LEN+1,1);
  appendText(&html,pymt-
>out_paym.s_D_STATE,STATE_LEN+1,1);
  copyOutZip(buffer,pymt->out_paym.s_D_ZIP);
  appendText(&html,buffer);

  //print out customer information
  appendText(&html,"<BR> <BR>Customer: ");
  appendText(&html,itoa(pymt->out_paym.s_C_ID,buffer,10),5+1,1);

  appendText(&html,"Cust-Warehouse: ");
  appendText(&html,itoa(pymt-
>in_paym.s_C_W_ID,buffer,10),6+1,1);

  appendText(&html,"Cust-District: ");
  appendText(&html,itoa(pymt->in_paym.s_C_D_ID,buffer,10));

  //add customer information
  appendText(&html,"<BR>Name:   ");
  appendText(&html,pymt-
>out_paym.s_C_FIRST,FIRST_NAME_LEN+1,1);
  appendText(&html,pymt-
>out_paym.s_C_MIDDLE,INITIALS_LEN+1,1);
  DEBUGMSG("Last name:"<<pymt->out_paym.s_C_LAST<<endl);
  appendText(&html,pymt-
>out_paym.s_C_LAST,LAST_NAME_LEN+5,1);

  appendText(&html,"Since: ");
#ifdef ORACLE
  appendText(&html,pymt->out_paym.c_since_d);
#endif
#ifdef DB2
  copyOutDateTime(buffer,pymt->out_paym.s_C_SINCE_time);
  appendText(&html,buffer);
#endif
  appendText(&html,"<BR>");
  appendSpaces(&html,8);

  appendText(&html,pymt-
>out_paym.s_C_STREET_1,STREET_LEN+20,1);
  appendText(&html," Credit: ");
  appendText(&html,pymt->out_paym.s_C_CREDIT);

  appendText(&html,"<BR>");
  appendSpaces(&html,8);

  appendText(&html,pymt-
>out_paym.s_C_STREET_2,STREET_LEN+21,1);
  appendText(&html,"%Disc: ");
#ifdef ORACLE
  html+=sprintf(html,"%2.2lf",pymt->out_paym.s_C_DISCOUNT);
#elif DB2
  html+=sprintf(html,"%2.2lf",pymt-
>out_paym.s_C_DISCOUNT/100.0);
#endif
  appendText(&html,"<BR>");
  appendSpaces(&html,8);

  appendText(&html,pymt->out_paym.s_C_CITY,CITY_LEN+1,1);

  appendText(&html,pymt-
>out_paym.s_C_STATE,STATE_LEN+1,1);

  copyOutZip(buffer,pymt->out_paym.s_C_ZIP);
  appendText(&html,buffer,15,1);

  appendText(&html,"Phone: ");
  copyOutPhone(buffer,pymt->out_paym.s_C_PHONE);
  appendText(&html,buffer);

  appendText(&html," <BR> <BR>Amount Paid: $");
  html+=sprintf(html,"%-9.2lf",pymt-
>in_paym.s_H_AMOUNT/100.0);

  appendText(&html," New Cust-Balance: $");
#ifdef ORACLE
  html+=sprintf(html,"%-9.2lf",pymt->out_paym.s_C_BALANCE);
#elif DB2
  html+=sprintf(html,"%-9.2lf",pymt-
>out_paym.s_C_BALANCE/100.0);
#endif
  appendText(&html,"<BR>Credit Limit: $");
#ifdef ORACLE
  html+=sprintf(html,"%-9.2lf",pymt->out_paym.s_C_CREDIT_LIM);
#elif DB2
  html+=sprintf(html,"%-9.2lf",pymt-
>out_paym.s_C_CREDIT_LIM/100.0);
#endif
  appendText(&html," <BR> <BR>Cust-Data: ");
  if(pymt->out_paym.s_C_CREDIT[0] == 'B' && pymt-
>out_paym.s_C_CREDIT[1] == 'C')
  {
    appendCustData(&html,pymt->out_paym.s_C_DATA);
    appendText(&html," <BR>");
  }
  else
    appendText(&html," <BR> <BR> <BR>");

  html+=displayStatus(html,rc);
  appendText(&html,"</PRE></BODY></HTML>");

  return OK;
}
/*
*********************************************************************
** Name         : doPaymentErrorPage
** Description :
**          append payment error body
** Parameters:
**          char *    html page result
**          char *    error message
**          htmlPhraser * command block
** Returns     :
**          int - return code
** Comments    :
**
*********************************************************************
*/

int doPaymentErrorPage(char *htmlPage,char
*message,htmlPhraser *commandBlock,TXN_HANDLE *txnHandle)
{
  char *html=htmlPage;
  appendText(&html,"<HTML><HEAD><TITLE>TPC-C
Payment</TITLE></HEAD>\r\n"
             "<BODY><FORM ACTION=\""
             APP_NAME
             "\" METHOD=\"GET\">\r\n"
             "<CENTER><H3>Please Fill In Payment
Form.</H3></CENTER> <BR>\r\n"
             "Submit Transaction <INPUT TYPE=\"submit\" NAME=\""
             CMD_TXN_ID
             "\" VALUE=\""
             CMD_PYMT
```

```
            "\">");
  html+=appendHiddenFields(html,txnHandle);
  appendText(&html,"<BR><PRE>\r\n"
            "Date:<BR>"
            "Warehouse: ");
  char buffer[15];
  appendText(&html,itoa(txnHandle->w_id,buffer,10));

  appendSpaces(&html,10);
  appendText(&html,"District: <INPUT NAME=\""
            CMD_D_ID
            "\" SIZE=1>\r\n<BR>"
            "<BR> <BR> <BR> <BR>"
            "Customer: "
            "<INPUT NAME=\""
            CMD_C_ID
            "\" SIZE=5>"
            "   "
            "Cust-Warehouse: "
            "<INPUT NAME=\""
            CMD_C_W_ID
            "\" SIZE=6>"
            "   "
            "Cust-District: "
            "<INPUT NAME=\""
            CMD_C_D_ID
            "\" SIZE=1><BR>"
            "Name:  <INPUT NAME=\""
            CMD_C_NAME
            "\" SIZE=20>");
  appendText(&html,"                          Since: <BR>"
            "                                "
            "                          Credit: <BR>"
            "                                "
            "                          %Disc: <BR>"
            "Amount Paid:             "
            "<INPUT NAME=\""
            CMD_AMT_PAID
            "\" SIZE=10>"
            "           "
            "New Cust-Balance:<BR>"
            "Credit Limit:<BR> <BR> <BR> Cust-Data:<BR> <BR>
<BR> <BR> ");
  appendText(&html,message);
  appendText(&html,"</PRE>");

  return OK;
}

/*
*********************************************************************
** Name        : doOrderStatusForm
** Description :
**          HTML orderStatus page entry point
** Parameters:
**          htmlPhraser command block
**          char *     html result page
** Returns     :
**          int - return code
** Comments    :
**
*********************************************************************
*/

int doOrderStatusForm(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle)
{
  char *html=txnHandle->htmlPage;

  appendText(&html,"<HTML><HEAD><TITLE>TPC-C Order
Status</TITLE></HEAD>\r\n"
            "<BODY><FORM ACTION=\""
            APP_NAME
            "\" METHOD=\"GET\">\r\n"
            "<CENTER><H3>Please Fill In Order Status
Form.</H3></CENTER> <BR>\r\n"
            "Submit Transaction <INPUT TYPE=\"submit\" NAME=\""
            CMD_TXN_ID
            "\" VALUE=\""
            CMD_ORDS
            "\">"
            "<BR> ");
  html+=appendHiddenFields(html,txnHandle);

  appendText(&html,"<PRE>\r\n"
            "Warehouse: ");
  char buffer[15];
  appendText(&html,itoa(txnHandle->w_id,buffer,10));

  appendText(&html,"               District: <INPUT NAME=\""
            CMD_D_ID
            "\" SIZE=1>\r\n<BR>"
            "Customer: "
            "<INPUT NAME=\""
            CMD_C_ID
            "\" SIZE=5>"
            "   "
            "Name: "
            "<INPUT NAME=\""
            CMD_C_NAME
            "\" SIZE=20><BR>"
            "Cust-Balance: <BR>"
            "Order-Number:       Entry-Date:                  Carrier-
Number<BR>"
            "Supply-W     Item-Num     Oty         Amount
Delivery<BR></PRE>");

  appendText(&html,"</BODY></HTML>");

  return OK;
}

/*
*********************************************************************
** Name        : doOrderStatusResults
** Description :
**          HTML orderStatus page entry point
** Parameters:
**          htmlPhraser*   command block
**          char *     html result page
** Returns     :
**          int - return code
** Comments    :
**
*********************************************************************
*/

int doOrderStatusResults(htmlPhraser
*commandBlock,TXN_HANDLE *txnHandle)
{
  char *html=txnHandle->htmlPage;
  struct ords_wrapper *ords = NULL;
  ords = (ords_wrapper *) txnHandle->comInterface.txnBuffer;
  ZeroMemory(ords,maxDataSize);

  //set warehouse login id from command blk
  ords->in_ords.s_W_ID = txnHandle->w_id;

  //set district login id from command blk
  if( (ords->in_ords.s_D_ID = atoi(commandBlock->get_D_ID())) ==
0)
  {
```

```
   doOrderStatusErrorPage(html,ERR_INVALID_D_ID,commandBlo
ck,txnHandle);
      return OK;
   }

   if( (ords->in_ords.s_C_ID = atoi(commandBlock->get_C_ID())) ==
0)
   {
      if(*(commandBlock->get_C_NAME()) == NULL)
      {
         //no customer id nor customer last name specified.

   doOrderStatusErrorPage(html,ERR_MISSING_C_ID_OR_CLAST,
commandBlock,txnHandle);
         return OK;
      }
      else
         strcpy(ords->in_ords.s_C_LAST,commandBlock-
>get_C_NAME());
   }
   else
   {
      //make sure that the user only inserted just c_id
      if(*(commandBlock->get_C_NAME()) != NULL)
      {

   doOrderStatusErrorPage(html,ERR_C_ID_OR_CLAST_ONLY,co
mmandBlock,txnHandle);
         return OK;
      }
   }

   appendText(&html,"<HTML><HEAD><TITLE>TPC-C Order
Status Results</TITLE></HEAD>\r\n"
               "<BODY><FORM ACTION=\""
               APP_NAME
               "\" METHOD=\"GET\">\r\n");
   html+=appendButtons(html);

   html+=appendHiddenFields(html,txnHandle);

   appendText(&html,"</FORM>");

   ords->out_ords.s_transtatus = -1;

   HRESULT   hres;
   try
   {
#ifdef PARTITION
      switch (txnHandle->part_server)
      {
case 0:hres = txnHandle->comInterface.comHandle0-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 1:hres = txnHandle->comInterface.comHandle1-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 2:hres = txnHandle->comInterface.comHandle2-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 3:hres = txnHandle->comInterface.comHandle3-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 4:hres = txnHandle->comInterface.comHandle4-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 5:hres = txnHandle->comInterface.comHandle5-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 6:hres = txnHandle->comInterface.comHandle6-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 7:hres = txnHandle->comInterface.comHandle7-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 8:hres = txnHandle->comInterface.comHandle8-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 9:hres = txnHandle->comInterface.comHandle9-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 10:hres = txnHandle->comInterface.comHandle10-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 11:hres = txnHandle->comInterface.comHandle11-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 12:hres = txnHandle->comInterface.comHandle12-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 13:hres = txnHandle->comInterface.comHandle13-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 14:hres = txnHandle->comInterface.comHandle14-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 15:hres = txnHandle->comInterface.comHandle15-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 16:hres = txnHandle->comInterface.comHandle16-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 17:hres = txnHandle->comInterface.comHandle17-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 18:hres = txnHandle->comInterface.comHandle18-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 19:hres = txnHandle->comInterface.comHandle19-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 20:hres = txnHandle->comInterface.comHandle20-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 21:hres = txnHandle->comInterface.comHandle21-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 22:hres = txnHandle->comInterface.comHandle22-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
```

```
case 23:hres = txnHandle->comInterface.comHandle23-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 24:hres = txnHandle->comInterface.comHandle24-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 25:hres = txnHandle->comInterface.comHandle25-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 26:hres = txnHandle->comInterface.comHandle26-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 27:hres = txnHandle->comInterface.comHandle27-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 28:hres = txnHandle->comInterface.comHandle28-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 29:hres = txnHandle->comInterface.comHandle29-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 30:hres = txnHandle->comInterface.comHandle30-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 31:hres = txnHandle->comInterface.comHandle31-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 32:hres = txnHandle->comInterface.comHandle32-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 33:hres = txnHandle->comInterface.comHandle33-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 34:hres = txnHandle->comInterface.comHandle34-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 35:hres = txnHandle->comInterface.comHandle35-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 36:hres = txnHandle->comInterface.comHandle36-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 37:hres = txnHandle->comInterface.comHandle37-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 38:hres = txnHandle->comInterface.comHandle38-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 39:hres = txnHandle->comInterface.comHandle39-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 40:hres = txnHandle->comInterface.comHandle40-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 41:hres = txnHandle->comInterface.comHandle41-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 42:hres = txnHandle->comInterface.comHandle42-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 43:hres = txnHandle->comInterface.comHandle43-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 44:hres = txnHandle->comInterface.comHandle44-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 45:hres = txnHandle->comInterface.comHandle45-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 46:hres = txnHandle->comInterface.comHandle46-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 47:hres = txnHandle->comInterface.comHandle47-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 48:hres = txnHandle->comInterface.comHandle48-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 49:hres = txnHandle->comInterface.comHandle49-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 50:hres = txnHandle->comInterface.comHandle50-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
    }
#else
hres = txnHandle->comInterface.comHandle0-
>doOrderStatus(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);
#endif
  }
  catch(...)
  {
#ifdef PARTITION
    html+=sprintf(html,"ERROR : ords com call caused exeception,
warehouse: %d, COM server %d, ratio
%d.</PRE></BODY></HTML>",ords->in_ords.s_W_ID,txnHandle-
>part_server,ratio);
#else
    html+=sprintf(html,"ERROR : ords com call caused exeception,
warehouse: %d</PRE></BODY></HTML>",ords->in_ords.s_W_ID);
#endif
    return OK;
  }

  if(FAILED(hres))
  {
    html+=sprintf(html,"ERROR : ords com call failed,
rc:%x</PRE></BODY></HTML>",hres);
    ERRORMSG("ERROR : ords com call failed,
rc:"<<DEBUGADDRESS(hres));
    return OK;
  }

#ifdef PARTITION
```

```
   switch (txnHandle->part_server) {
case 0: hres = txnHandle->comInterface.comHandle0-
>doSetComplete();break;
case 1: hres = txnHandle->comInterface.comHandle1-
>doSetComplete();break;
case 2: hres = txnHandle->comInterface.comHandle2-
>doSetComplete();break;
case 3: hres = txnHandle->comInterface.comHandle3-
>doSetComplete();break;
case 4: hres = txnHandle->comInterface.comHandle4-
>doSetComplete();break;
case 5: hres = txnHandle->comInterface.comHandle5-
>doSetComplete();break;
case 6: hres = txnHandle->comInterface.comHandle6-
>doSetComplete();break;
case 7: hres = txnHandle->comInterface.comHandle7-
>doSetComplete();break;
case 8: hres = txnHandle->comInterface.comHandle8-
>doSetComplete();break;
case 9: hres = txnHandle->comInterface.comHandle9-
>doSetComplete();break;
case 10: hres = txnHandle->comInterface.comHandle10-
>doSetComplete();break;
case 11: hres = txnHandle->comInterface.comHandle11-
>doSetComplete();break;
case 12: hres = txnHandle->comInterface.comHandle12-
>doSetComplete();break;
case 13: hres = txnHandle->comInterface.comHandle13-
>doSetComplete();break;
case 14: hres = txnHandle->comInterface.comHandle14-
>doSetComplete();break;
case 15: hres = txnHandle->comInterface.comHandle15-
>doSetComplete();break;
case 16: hres = txnHandle->comInterface.comHandle16-
>doSetComplete();break;
case 17: hres = txnHandle->comInterface.comHandle17-
>doSetComplete();break;
case 18: hres = txnHandle->comInterface.comHandle18-
>doSetComplete();break;
case 19: hres = txnHandle->comInterface.comHandle19-
>doSetComplete();break;
case 20: hres = txnHandle->comInterface.comHandle20-
>doSetComplete();break;
case 21: hres = txnHandle->comInterface.comHandle21-
>doSetComplete();break;
case 22: hres = txnHandle->comInterface.comHandle22-
>doSetComplete();break;
case 23: hres = txnHandle->comInterface.comHandle23-
>doSetComplete();break;
case 24: hres = txnHandle->comInterface.comHandle24-
>doSetComplete();break;
case 25: hres = txnHandle->comInterface.comHandle25-
>doSetComplete();break;
case 26: hres = txnHandle->comInterface.comHandle26-
>doSetComplete();break;
case 27: hres = txnHandle->comInterface.comHandle27-
>doSetComplete();break;
case 28: hres = txnHandle->comInterface.comHandle28-
>doSetComplete();break;
case 29: hres = txnHandle->comInterface.comHandle29-
>doSetComplete();break;
case 30: hres = txnHandle->comInterface.comHandle30-
>doSetComplete();break;
case 31: hres = txnHandle->comInterface.comHandle31-
>doSetComplete();break;
case 32: hres = txnHandle->comInterface.comHandle32-
>doSetComplete();break;
case 33: hres = txnHandle->comInterface.comHandle33-
>doSetComplete();break;
case 34: hres = txnHandle->comInterface.comHandle34-
>doSetComplete();break;
case 35: hres = txnHandle->comInterface.comHandle35-
>doSetComplete();break;
case 36: hres = txnHandle->comInterface.comHandle36-
>doSetComplete();break;
case 37: hres = txnHandle->comInterface.comHandle37-
>doSetComplete();break;
case 38: hres = txnHandle->comInterface.comHandle38-
>doSetComplete();break;
case 39: hres = txnHandle->comInterface.comHandle39-
>doSetComplete();break;
case 40: hres = txnHandle->comInterface.comHandle40-
>doSetComplete();break;
case 41: hres = txnHandle->comInterface.comHandle41-
>doSetComplete();break;
case 42: hres = txnHandle->comInterface.comHandle42-
>doSetComplete();break;
case 43: hres = txnHandle->comInterface.comHandle43-
>doSetComplete();break;
case 44: hres = txnHandle->comInterface.comHandle44-
>doSetComplete();break;
case 45: hres = txnHandle->comInterface.comHandle45-
>doSetComplete();break;
case 46: hres = txnHandle->comInterface.comHandle46-
>doSetComplete();break;
case 47: hres = txnHandle->comInterface.comHandle47-
>doSetComplete();break;
case 48: hres = txnHandle->comInterface.comHandle48-
>doSetComplete();break;
case 49: hres = txnHandle->comInterface.comHandle49-
>doSetComplete();break;
case 50: hres = txnHandle->comInterface.comHandle50-
>doSetComplete();break;
    }
#else
hres = txnHandle->comInterface.comHandle0->doSetComplete();
#endif
   ords = (ords_wrapper *)txnHandle->comInterface.txnBuffer;
   int rc = ords->out_ords.s_transtatus;

   if( rc != OK)
   {
      html+=displayStatus(html,rc);
      appendText(&html,"</PRE></BODY></HTML>");
      return OK;
   }

   //start creating result body
   appendText(&html,"</FORM><CENTER><H3>Order-
Status</H3></CENTER>");
   appendText(&html, "<BR><PRE>\r\n");
// appendText(&html,"       1       2       3       4       5       6
7       8<BR>");
//
   appendText(&html,"12345678901234567890123456789012345678
90123456789012345678901234567890123456789012345678901234567890<BR>");
   appendText(&html, "Warehouse: ");
   char buffer[50];

   appendText(&html,itoa(ords->in_ords.s_W_ID,buffer,10),6+1,1);
   appendText(&html,"District: ");
   appendText(&html,itoa(ords->in_ords.s_D_ID,buffer,10));
   appendText(&html,"<BR>"
            "Customer: ");
   //get customer id
   appendText(&html,itoa(ords->in_ords.s_C_ID,buffer,10),6+1,1);
   appendText(&html,"Name: ");
   //get first, middle, and last from wrapper
   appendText(&html,ords-
>out_ords.s_C_FIRST,FIRST_NAME_LEN+1,1);
   appendText(&html,ords-
>out_ords.s_C_MIDDLE,INITIALS_LEN+1,1);
```

```
   appendText(&html,ords-
>out_ords.s_C_LAST,LAST_NAME_LEN+5,1);

   //get customer balance from wrapper
   appendText(&html,"\r\nCust-Balance: $");
   html+=sprintf(html,"%.2lf",ords->out_ords.s_C_BALANCE/100.0);

   //display order number, entry date, and carrier number
   appendText(&html,"<BR> <BR>"
              "Order-Number ");
   appendText(&html,itoa(ords->out_ords.s_O_ID,buffer,10),12,1);
   appendText(&html,"Entry-Date: ");
#ifdef ORACLE
   appendText(&html,ords->out_ords.s_O_ENTRY_D_time);
#endif
#ifdef DB2
   copyOutDateTime(buffer,ords->out_ords.s_O_ENTRY_D_time);
   appendText(&html,buffer,22,1);
#endif
   appendText(&html,"Carrier-Number: ");
   appendText(&html,itoa(ords-
>out_ords.s_O_CARRIER_ID,buffer,10));

   //add item title columns
   appendText(&html,"<BR>"
              "Supply-W     "
              "Item-Id    "
              "Qty    "
              "Amount      "
              "Delivery-Date<BR>");

   //display items
   for (int itemCount=0;itemCount<ords-
>out_ords.s_ol_cnt;itemCount++)
   {
      appendSpaces(&html,2);

#ifdef DB2
      //get supp w
      appendText(&html,itoa(ords-
>out_ords.item[itemCount].s_OL_SUPPLY_W_ID,buffer,10),11,1);

      //get item num
      appendText(&html,itoa(ords-
>out_ords.item[itemCount].s_OL_I_ID,buffer,10),11,1);

      //get item oty
      appendText(&html,itoa(ords-
>out_ords.item[itemCount].s_OL_QUANTITY,buffer,10),6,1);

      //get item dollor amount
      html+=sprintf(html,"$%-14.2lf",ords-
>out_ords.item[itemCount].s_OL_AMOUNT/100.0);
#elif ORACLE
      //get supp w
      appendText(&html,itoa(ords-
>out_ords.s_OL_SUPPLY_W_ID[itemCount],buffer,10),11,1);

      //get item num
      appendText(&html,itoa(ords-
>out_ords.s_OL_I_ID[itemCount],buffer,10),11,1);

      //get item oty
      appendText(&html,itoa(ords-
>out_ords.s_OL_QUANTITY[itemCount],buffer,10),6,1);

      //get item dollor amount
      html+=sprintf(html,"$%-14.2lf",ords-
>out_ords.s_OL_AMOUNT[itemCount]/100.0);
#endif

      //get delivery date
#ifdef ORACLE
      appendText(&html,ords-
>out_ords.s_OL_DELIVERY_D_time[itemCount]);
#endif
#ifdef DB2
      copyOutDate(buffer,ords-
>out_ords.item[itemCount].s_OL_DELIVERY_D_time);
      appendText(&html,buffer);
#endif
      appendText(&html," <BR>");

   }

   //append line breaks if item count is less than 15
   for (int itemCount=0;itemCount < (15-ords-
>out_ords.s_ol_cnt);itemCount++)
      appendText(&html,"<BR> ");

   html+=displayStatus(html,rc);

   appendText(&html,"</PRE></BODY></HTML>");

   return OK;
}

/*
*********************************************************************
** Name         : doOrderStatusErrorPage
** Description :
**           HTML orderStatus error page
** Parameters:
**           char *     html page result
**           char *     error message
**           htmlPhraser*   command block
**           TXN_HANDLE*  txn handle
** Returns      :
**           int - return code
** Comments     :
**
*********************************************************************
*/

int doOrderStatusErrorPage(char *htmlPage,char
*message,htmlPhraser *commandBlock,TXN_HANDLE *txnHandle)
{
   char *html=htmlPage;

   appendText(&html,"<HTML><HEAD><TITLE>TPC-C Order
Status</TITLE></HEAD>\r\n"
              "<BODY><FORM ACTION=\""
              APP_NAME
              "\" METHOD=\"GET\">\r\n"
              "<CENTER><H3>Please Fill In Order Status
Form.</H3></CENTER> <BR>\r\n"
              "Submit Transaction <INPUT TYPE=\"submit\" NAME=\""
              CMD_TXN_ID
              "\" VALUE=\""
              CMD_ORDS
              "\">"
              "<BR> ");
   html+=appendHiddenFields(html,txnHandle);

   appendText(&html,"<PRE>\r\n"
              "Warehouse: ");
   char buffer[15];
   appendText(&html,itoa(txnHandle->w_id,buffer,10));

   appendText(&html,"              District: <INPUT NAME=\""
              CMD_D_ID
              "\" SIZE=1>\r\n<BR>"
              "Customer: "
              "<INPUT NAME=\""
```

```
            CMD_C_ID
            "\" SIZE=5>"
            "   "
            "Name: "
            "<INPUT NAME=\""
            CMD_C_NAME
            "\" SIZE=20><BR>"
            "Cust-Balance: <BR>"
            "Order-Number:        Entry-Date:                  Carrier-
Number<BR>"
            "Supply-W     Item-Num     Oty          Amount
Delivery <BR>");

  appendText(&html,message);
  appendText(&html,"</PRE></BODY></HTML>");

  return OK;
}

/*
*****************************************************************
** Name         : doDeliveryForm
** Description :
**          HTML payment page entry point
** Parameters:
**          htmlPhraser command block
**          char *     html result page
** Returns      :
**          int - return code
** Comments     :
**
*****************************************************************
*/
int doDeliveryForm(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle)
{
  char *html=txnHandle->htmlPage;

  appendText(&html,"<HTML><HEAD><TITLE>TPC-C
Delivery</TITLE></HEAD>\r\n"
            "<BODY><FORM ACTION=\""
            APP_NAME
            "\" METHOD=\"GET\">\r\n"
            "<CENTER><H3>Delivery.</H3></CENTER>\r\n"
            "Submit Transaction <INPUT TYPE=\"submit\" NAME=\""
            CMD_TXN_ID
            "\" VALUE=\""
            CMD_DLVY
            "\">");
  html+=appendHiddenFields(html,txnHandle);

  appendText(&html,"<BR> <PRE>"
            "Warehouse: ");
  char buffer[10];
  appendText(&html,itoa(txnHandle->w_id,buffer,10));

  appendText(&html," <BR> <BR>"
            "Carrier Number: "
            "<INPUT NAME=\""
            CMD_CARRIER_NUM
            "\" SIZE=1>"
            "</FORM></PRE>");

  appendText(&html,"</BODY></HTML>");

  return OK;
}

/*
*****************************************************************
** Name         : doDeliveryResults
** Description :
**          HTML payment page entry point
** Parameters:
**          htmlPhraser*   command block
**          TXN_HANDLE*  txn handle
** Returns      :
**          int - return code
** Comments     :
**
*****************************************************************
*/

int doDeliveryResults(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle)
{
  char *html = txnHandle->htmlPage;

  //declare delivery structure
  struct dlvy_wrapper    dlvy;

  //set warehouse login id from command blk
  dlvy.in_dlvy.s_W_ID = txnHandle->w_id;

  //set the carrier id from command blk
  if( (dlvy.in_dlvy.s_O_CARRIER_ID = atoi(commandBlock-
>get_CARRIER_NUM())) == 0)
  {

  doDeliveryErrorPage(html,ERR_INVALID_CARRIER,commandBl
ock,txnHandle);
    return OK;
  }

  //print title, add hidden fields , txn buttons
  appendText(&html,"<HTML><HEAD><TITLE>TPC-C Delivery
Results</TITLE></HEAD>\r\n<BODY><FORM ACTION=\""
            APP_NAME
            "\" METHOD=\"GET\">\r\n");

  html+=appendButtons(html);

  html+=appendHiddenFields(html,txnHandle);

  appendText(&html,
"<FORM><CENTER><H3>Delivery</H3></CENTER>");

  //call null db or comm w/ delivery wrapper
  int rc =
queueDlvyTxn(dlvy.in_dlvy.s_W_ID,dlvy.in_dlvy.s_O_CARRIER_ID)
;
  //if we are using the null db, rc will always be ok.  The only time
rc != OK is
  //1) unable to queue txn because dlvy queue is full.
  if( rc != OK)
  {
    html+=displayStatus(html,rc);
    appendText(&html,"</PRE></BODY></HTML>\r\n");

    ERRORMSG("ERROR : Unable to queue dlvy txn,
rc:"<<rc<<endl);
    return OK;
  }

  //start creating result body
  appendText(&html,"Warehouse: ");

  //get w_id from wrapper
  char buffer[10];
  appendText(&html,itoa(dlvy.in_dlvy.s_W_ID,buffer,10));
  appendText(&html,"<BR> <BR>Carrier Number: ");

  //get carrier_id from wrapper
  appendText(&html,itoa(dlvy.in_dlvy.s_O_CARRIER_ID,buffer,10));
```

```
   appendText(&html,"<BR> <BR>Execution Status: Delivery has
been queued </PRE></BODY></HTML>");

   return OK;
}

/*
*********************************************************************
** Name         : doDeliveryErrorPage
** Description :
**           HTML payment error page entry point
** Parameters:
**           char *     html result page
**           char *     error message
**           htmlPhraser command block
**           TXN_HANDLE*  txn handle
**
** Returns      :
**           int - return code
** Comments     :
**
*********************************************************************
*/
int doDeliveryErrorPage(char *htmlPage,char
*message,htmlPhraser *commandBlock,TXN_HANDLE *txnHandle)
{
   char *html=htmlPage;

   appendText(&html,"<HTML><HEAD><TITLE>TPC-C
Delivery</TITLE></HEAD>\r\n"
               "<BODY><FORM ACTION=\""
               APP_NAME
               "\" METHOD=\"GET\">\r\n"
               "<CENTER><H3>Delivery.</H3></CENTER>\r\n"
               "Submit Transaction <INPUT TYPE=\"submit\" NAME=\""
               CMD_TXN_ID
               "\" VALUE=\""
               CMD_DLVY
               "\">");
   html+=appendHiddenFields(html,txnHandle);

   appendText(&html,"<BR> <PRE>"
               "Warehouse: ");
   char buffer[15];
   appendText(&html,itoa(txnHandle->w_id,buffer,10));

   appendText(&html," <BR> <BR>"
               "Carrier Number: "
               "<INPUT NAME=\""
               CMD_CARRIER_NUM
               "\" SIZE=1> <BR>");

   appendText(&html,message);
   appendText(&html,"</PRE></BODY></HTML>");

   return OK;
}



/*
*********************************************************************
** Name         : doStockForm
** Description :
**           HTML stock page entry point
** Parameters:
**           htmlPhraser command block
**           TXN_HANDLE*  txn handle
** Returns      :
**           int - return code
** Comments     :
**
*********************************************************************
*/

int doStockForm(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle)
{
   char *html=txnHandle->htmlPage;
   appendText(&html,"<HTML><HEAD><TITLE>TPC-C Stock
Level</TITLE></HEAD>\r\n"
               "<BODY><FORM ACTION=\""
               APP_NAME
               "\" METHOD=\"GET\">\r\n"
               "<CENTER><H3>Please Fill In Stock
Form.</H3></CENTER> <BR>\r\n"
               "Submit Transaction <INPUT TYPE=\"submit\" NAME=\""
               CMD_TXN_ID
               "\" VALUE=\""
               CMD_STOK
               "\">");
   html+=appendHiddenFields(html,txnHandle);

   appendText(&html,"<PRE>"
               "Warehouse: ");
   char buffer[15];
   appendText(&html,itoa(txnHandle->w_id,buffer,10),6+1,1);
   appendText(&html,"District: ");

   appendText(&html,itoa(txnHandle->d_id,buffer,10));
   appendText(&html," <BR> <BR>"
               "Stock Level Threshold: "
               "<INPUT NAME=\""
               CMD_STK_THRESHOLD
               "\" SIZE=1> <BR> <BR>"
               "Low Stock: <BR>"
               "</PRE>");

   appendText(&html,"</FORM></BODY></HTML>");

   return OK;
}

/*
*********************************************************************
** Name         : doStockResults
** Description :
**            HTML stock page entry point
** Parameters:
**           htmlPhraser command block
**           TXN_HANDLE * handle for this transaction
** Returns      :
**           int - return code
** Comments     :
**
*********************************************************************
*/

int doStockResults(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle)
{
   char *html = txnHandle->htmlPage;
   struct stok_wrapper *stok;
   stok = (stok_wrapper*)txnHandle->comInterface.txnBuffer;
   ZeroMemory(stok,maxDataSize);

   //set warehouse login id from command blk
   stok->in_stok.s_W_ID = txnHandle->w_id;

   //set district login id from command blk
   stok->in_stok.s_D_ID = txnHandle->d_id;

   //set stock level threshold id from command blk
```

```
   if( (stok->in_stok.s_threshold = atoi(commandBlock-
>get_STK_THRESHOLD())) == 0)
   {

   doStockErrorPage(html,ERR_INVALID_THRESHOLD,commandB
lock,txnHandle);
      return OK;
   }
   //assume failure, set s_transtatus to err
   stok->out_stok.s_transtatus = INVALID_STATUS;

   //print title, add hidden fields , txn buttons
   appendText(&html,"<HTML><HEAD><TITLE>TPC-C Stock Level
Results</TITLE></HEAD>\r\n"
               "<BODY><FORM ACTION=\""
               APP_NAME
               "\" METHOD=\"GET\">\r\n");

   html+=appendButtons(html);

   html+=appendHiddenFields(html,txnHandle);

   appendText(&html,"</FORM>");

   stok->out_stok.s_transtatus = -1;

   DEBUGMSG("Calling com entry api for stock call, w_id:"<<stok-
>in_stok.s_W_ID<<" d_id:"<<stok->in_stok.s_D_ID<<
      " threshold:"<<stok->in_stok.s_threshold<<endl);

   HRESULT   hres;
   try
   {
#ifdef PARTITION
      switch (txnHandle->part_server)
      {
case 0:hres = txnHandle->comInterface.comHandle0-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 1:hres = txnHandle->comInterface.comHandle1-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 2:hres = txnHandle->comInterface.comHandle2-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 3:hres = txnHandle->comInterface.comHandle3-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 4:hres = txnHandle->comInterface.comHandle4-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 5:hres = txnHandle->comInterface.comHandle5-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 6:hres = txnHandle->comInterface.comHandle6-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 7:hres = txnHandle->comInterface.comHandle7-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 8:hres = txnHandle->comInterface.comHandle8-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 9:hres = txnHandle->comInterface.comHandle9-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 10:hres = txnHandle->comInterface.comHandle10-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 11:hres = txnHandle->comInterface.comHandle11-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 12:hres = txnHandle->comInterface.comHandle12-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 13:hres = txnHandle->comInterface.comHandle13-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 14:hres = txnHandle->comInterface.comHandle14-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 15:hres = txnHandle->comInterface.comHandle15-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 16:hres = txnHandle->comInterface.comHandle16-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 17:hres = txnHandle->comInterface.comHandle17-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 18:hres = txnHandle->comInterface.comHandle18-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 19:hres = txnHandle->comInterface.comHandle19-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 20:hres = txnHandle->comInterface.comHandle20-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 21:hres = txnHandle->comInterface.comHandle21-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 22:hres = txnHandle->comInterface.comHandle22-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 23:hres = txnHandle->comInterface.comHandle23-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 24:hres = txnHandle->comInterface.comHandle24-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 25:hres = txnHandle->comInterface.comHandle25-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 26:hres = txnHandle->comInterface.comHandle26-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
```

```
case 27:hres = txnHandle->comInterface.comHandle27-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 28:hres = txnHandle->comInterface.comHandle28-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 29:hres = txnHandle->comInterface.comHandle29-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 30:hres = txnHandle->comInterface.comHandle30-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 31:hres = txnHandle->comInterface.comHandle31-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 32:hres = txnHandle->comInterface.comHandle32-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 33:hres = txnHandle->comInterface.comHandle33-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 34:hres = txnHandle->comInterface.comHandle34-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 35:hres = txnHandle->comInterface.comHandle35-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 36:hres = txnHandle->comInterface.comHandle36-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 37:hres = txnHandle->comInterface.comHandle37-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 38:hres = txnHandle->comInterface.comHandle38-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 39:hres = txnHandle->comInterface.comHandle39-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 40:hres = txnHandle->comInterface.comHandle40-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 41:hres = txnHandle->comInterface.comHandle41-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 42:hres = txnHandle->comInterface.comHandle42-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 43:hres = txnHandle->comInterface.comHandle43-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 44:hres = txnHandle->comInterface.comHandle44-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 45:hres = txnHandle->comInterface.comHandle45-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 46:hres = txnHandle->comInterface.comHandle46-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 47:hres = txnHandle->comInterface.comHandle47-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 48:hres = txnHandle->comInterface.comHandle48-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 49:hres = txnHandle->comInterface.comHandle49-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;
case 50:hres = txnHandle->comInterface.comHandle50-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);break;    }
#else
hres = txnHandle->comInterface.comHandle0-
>doStockLevel(&txnHandle-
>comInterface.size,(UCHAR**)&txnHandle-
>comInterface.txnBuffer);
#endif
  }
  catch(...)
  {
#ifdef PARTITION
    html+=sprintf(html,"ERROR : Com Stock call caused
exeception, warehouse: %d, COM server %d, ratio
%d.</PRE></BODY></HTML>",stok->in_stok.s_W_ID,txnHandle-
>part_server,ratio);
#else
    html+=sprintf(html,"ERROR : Com Stock call caused
exeception, warehouse: %d</PRE></BODY></HTML>",stok-
>in_stok.s_W_ID);
#endif
    return OK;
  }

  //cast result back to stock structure
  if(FAILED(hres))
  {
    html+=sprintf(html,"ERROR : stok com call failed, rc:
%ld</PRE></BODY></HTML>",hres);
    ERRORMSG("ERROR : stok com call failed, rc:
"<<DEBUGADDRESS(hres)<<endl);
    return OK;
  }

  try
  {
#ifdef PARTITION
    switch (txnHandle->part_server) {
case 0: hres = txnHandle->comInterface.comHandle0-
>doSetComplete();break;
case 1: hres = txnHandle->comInterface.comHandle1-
>doSetComplete();break;
case 2: hres = txnHandle->comInterface.comHandle2-
>doSetComplete();break;
case 3: hres = txnHandle->comInterface.comHandle3-
>doSetComplete();break;
case 4: hres = txnHandle->comInterface.comHandle4-
>doSetComplete();break;
case 5: hres = txnHandle->comInterface.comHandle5-
>doSetComplete();break;
```

```
case 6: hres = txnHandle->comInterface.comHandle6-
>doSetComplete();break;
case 7: hres = txnHandle->comInterface.comHandle7-
>doSetComplete();break;
case 8: hres = txnHandle->comInterface.comHandle8-
>doSetComplete();break;
case 9: hres = txnHandle->comInterface.comHandle9-
>doSetComplete();break;
case 10: hres = txnHandle->comInterface.comHandle10-
>doSetComplete();break;
case 11: hres = txnHandle->comInterface.comHandle11-
>doSetComplete();break;
case 12: hres = txnHandle->comInterface.comHandle12-
>doSetComplete();break;
case 13: hres = txnHandle->comInterface.comHandle13-
>doSetComplete();break;
case 14: hres = txnHandle->comInterface.comHandle14-
>doSetComplete();break;
case 15: hres = txnHandle->comInterface.comHandle15-
>doSetComplete();break;
case 16: hres = txnHandle->comInterface.comHandle16-
>doSetComplete();break;
case 17: hres = txnHandle->comInterface.comHandle17-
>doSetComplete();break;
case 18: hres = txnHandle->comInterface.comHandle18-
>doSetComplete();break;
case 19: hres = txnHandle->comInterface.comHandle19-
>doSetComplete();break;
case 20: hres = txnHandle->comInterface.comHandle20-
>doSetComplete();break;
case 21: hres = txnHandle->comInterface.comHandle21-
>doSetComplete();break;
case 22: hres = txnHandle->comInterface.comHandle22-
>doSetComplete();break;
case 23: hres = txnHandle->comInterface.comHandle23-
>doSetComplete();break;
case 24: hres = txnHandle->comInterface.comHandle24-
>doSetComplete();break;
case 25: hres = txnHandle->comInterface.comHandle25-
>doSetComplete();break;
case 26: hres = txnHandle->comInterface.comHandle26-
>doSetComplete();break;
case 27: hres = txnHandle->comInterface.comHandle27-
>doSetComplete();break;
case 28: hres = txnHandle->comInterface.comHandle28-
>doSetComplete();break;
case 29: hres = txnHandle->comInterface.comHandle29-
>doSetComplete();break;
case 30: hres = txnHandle->comInterface.comHandle30-
>doSetComplete();break;
case 31: hres = txnHandle->comInterface.comHandle31-
>doSetComplete();break;
case 32: hres = txnHandle->comInterface.comHandle32-
>doSetComplete();break;
case 33: hres = txnHandle->comInterface.comHandle33-
>doSetComplete();break;
case 34: hres = txnHandle->comInterface.comHandle34-
>doSetComplete();break;
case 35: hres = txnHandle->comInterface.comHandle35-
>doSetComplete();break;
case 36: hres = txnHandle->comInterface.comHandle36-
>doSetComplete();break;
case 37: hres = txnHandle->comInterface.comHandle37-
>doSetComplete();break;
case 38: hres = txnHandle->comInterface.comHandle38-
>doSetComplete();break;
case 39: hres = txnHandle->comInterface.comHandle39-
>doSetComplete();break;
case 40: hres = txnHandle->comInterface.comHandle40-
>doSetComplete();break;
case 41: hres = txnHandle->comInterface.comHandle41-
>doSetComplete();break;
case 42: hres = txnHandle->comInterface.comHandle42-
>doSetComplete();break;
case 43: hres = txnHandle->comInterface.comHandle43-
>doSetComplete();break;
case 44: hres = txnHandle->comInterface.comHandle44-
>doSetComplete();break;
case 45: hres = txnHandle->comInterface.comHandle45-
>doSetComplete();break;
case 46: hres = txnHandle->comInterface.comHandle46-
>doSetComplete();break;
case 47: hres = txnHandle->comInterface.comHandle47-
>doSetComplete();break;
case 48: hres = txnHandle->comInterface.comHandle48-
>doSetComplete();break;
case 49: hres = txnHandle->comInterface.comHandle49-
>doSetComplete();break;
case 50: hres = txnHandle->comInterface.comHandle50-
>doSetComplete();break;
    }
#else
hres = txnHandle->comInterface.comHandle0->doSetComplete();
#endif
  }
  catch(...)
  {
    ERRORMSG("txnHandle address:"<<hex<<txnHandle<<
      "txnHandle->comInterface.txnBuffer:"<<hex<<(void
*)txnHandle->comInterface.txnBuffer<<endl);


    ERRORMSG("Com Stock setComplete call caused exeception
to occur."<<endl);
    html+=sprintf(html,"ERROR : Com Stock setComplete call
caused exeception to occur.</PRE></BODY></HTML>");
    return OK;
  }

  stok = (stok_wrapper *)txnHandle->comInterface.txnBuffer;
  int rc = stok->out_stok.s_transtatus;
  if(rc != OK)
  {
    html+=displayStatus(html,rc);
    appendText(&html,"</PRE></BODY></HTML>");
    return OK;
  }

  //start creating result body
  appendText(&html,"<FORM><CENTER><H3>Stock-
Level</H3></CENTER>");
  appendText(&html, "<BR><PRE>\r\n"
    "Warehouse: ");

  //get w_id from wrapper
  char buffer[10];
  appendText(&html,itoa(stok->in_stok.s_W_ID,buffer,10),6+1,1);

  appendText(&html,"District: ");
  appendText(&html,itoa(stok->in_stok.s_D_ID,buffer,10));

  appendText(&html," <BR> <BR>"
          "Stock Level Threshold: ");
  appendText(&html,itoa(stok->in_stok.s_threshold,buffer,10));

  appendText(&html," <BR> <BR>"
          "Low Stock: ");
  appendText(&html,itoa(stok->out_stok.s_low_stock,buffer,10));
  appendText(&html," <BR> <BR>");

  html+=displayStatus(html,rc);
  appendText(&html,"</PRE></BODY></HTML>");

  return OK;
```

```
}

/*
*********************************************************************
** Name         : doStockErrorPage
** Description :
**              HTML stock page entry point
** Parameters:
**           htmlPhraser command block
**           char *     html result page
**              char *     query string
**              tpccHandle *handle for this transaction
** Returns      :
**              int - return code
** Comments     :
**
*********************************************************************
*/

int doStockErrorPage(char *htmlPage,char *message,htmlPhraser
*commandBlock,TXN_HANDLE *txnHandle)
{
   char *html=htmlPage;

   appendText(&html,"<HTML><HEAD><TITLE>TPC-C Stock
Level</TITLE></HEAD>\r\n"
              "<BODY><FORM ACTION=\""
              APP_NAME
              "\" METHOD=\"GET\">\r\n"
              "<CENTER><H3>Please Fill In Stock
Form.</H3></CENTER> <BR>\r\n"
              "Submit Transaction <INPUT TYPE=\"submit\" NAME=\""
              CMD_TXN_ID
              "\" VALUE=\""
              CMD_STOK
              "\">");
   html+=appendHiddenFields(html,txnHandle);

   appendText(&html,"<PRE>"
              "Warehouse:  ");
   char buffer[15];
   appendText(&html,itoa(txnHandle->w_id,buffer,10));
   appendSpaces(&html,2);
   appendText(&html,"District: ");
   appendText(&html,commandBlock->get_D_ID());
   appendText(&html," <BR> <BR>"
              "Stock Level Threshold: "
              "<INPUT NAME=\""
              CMD_STK_THRESHOLD
              "\" SIZE=1> <BR> <BR>"
              "Low Stock: <BR>");

   appendText(&html,message);


   appendText(&html,"</PRE></FORM></BODY></HTML>");

   return OK;
}



/*
*********************************************************************
** Name         : doExit
** Description :
**           HTML exit page entry point
** Parameters:
**           htmlPhraser command block
**           char *     html result page
** Returns      :
**           int - return code
** Comments     :
**
*********************************************************************
*/
int doExit(htmlPhraser *commandBlock,TXN_HANDLE *txnHandle)
{
   return (doLoginForm(commandBlock,txnHandle));
}

/*
*********************************************************************
** Name         : displayStatus
** Description :
**           appends status string to the html page
** Parameters:
**           char*      html page
**           int    rc
** Returns      :
**           amount of characters the function appened
**           to the html page
** Comments     :
**
*********************************************************************
*/
int displayStatus(char *htmlPage,int rc)
{
   char *html = htmlPage;

   appendText(&html,"");

   switch (rc)
   {
   case OK:
      appendText(&html,"Execution Status: Transaction
Committed",50,1);
      break;
   case INVALID_ITEM:
      appendText(&html,"Execution Status: Item number is not
valid",50,1);
      break;
   case INVALID_STATUS:
      appendText(&html,"Execution Status: ERROR Rollback
INVALID_STATUS",50,1);
      break;
   case INVALID_COM_STATUS:
      appendText(&html,"Execution Status: ERROR: Rollback COM
FAILURE",50,1);
      break;
   case ERR_DLVY_QUEUE_FULL:
      appendText(&html,"Execution Status: ERROR: Rollback DLVY
QUEUE FULL",50,1);
      break;
   default:
      appendText(&html,"Execution Status: ERROR: Rollback",50,1);

   };

   appendText(&html,"     ");

   return (int)(html - htmlPage);
}
/*
*********************************************************************
** Name         : appendButtons
** Description :
**           append hidden field to recognize user after login
**
** Parameters:
**           *htmlPage       html result page
**           *TXN_HANDLE     txn handle
** Returns      :
**           int          amount of characters the function appened
```

```
**                      to the html page
** Comments    :
**
*****************************************************************
*/
int appendHiddenFields(char *htmlPage,TXN_HANDLE *txnHandle)
{
  char *html = htmlPage;
  char buffer[15];

  appendText(&html,"<INPUT TYPE=\"hidden\" NAME=\""
             CMD_TERM_ID
             "\" VALUE=\"");
  appendText(&html,itoa(txnHandle->term_id,buffer,10));
  appendText(&html,"\">\r\n");

  return (int)(html-htmlPage);

}
/*
*****************************************************************
** Name        : appendButtons
** Description :
**          appends buttons transaction buttons to result page
** Parameters:
**          *htmlPage
**
** Returns     :
**          amount of characters the function appened
**          to the html page
** Comments    :
**
*****************************************************************
*/
int appendButtons(char *htmlPage)
{
  char *html = htmlPage;

  appendText(&html,"<INPUT TYPE=\"submit\" NAME=\""
             CMD_TXN_ID
             "\" VALUE=\""
             CMD_NORD
             "\">\r\n"
             "<INPUT TYPE=\"submit\" NAME=\""
             CMD_TXN_ID
             "\" VALUE=\""
             CMD_PYMT
             "\">\r\n"
             "<INPUT TYPE=\"submit\" NAME=\""
             CMD_TXN_ID
             "\" VALUE=\""
             CMD_ORDS
             "\">\r\n"
             "<INPUT TYPE=\"submit\" NAME=\""
             CMD_TXN_ID
             "\" VALUE=\""
             CMD_DLVY
             "\">\r\n"
             "<INPUT TYPE=\"submit\" NAME=\""
             CMD_TXN_ID
             "\" VALUE=\""
             CMD_STOK
             "\">\r\n"
             "<INPUT TYPE=\"submit\" NAME=\""
             CMD_TXN_ID
             "\" VALUE=\""
             CMD_EXIT
            "\">\r\n <BR>");

  return (int)(html - htmlPage);
}
```

```
/*
*****************************************************************
** Name        : appendItems
** Description :
**          appends items to new order and order status page
** Parameters:
**          *htmlPage         html result page
**          short             items to append
**          short             item CMD id start
**
** Returns     :
**          amount of characters the function appened
**          to the html page
** Comments    :
**
*****************************************************************
*/
int appendItems(char *htmlPage,short itemCount,short cmdIDStart)
{
  char *html = htmlPage;
  char numBuffer[MAX_INT_BUFFER];

  for(int item=0;item < itemCount;item++)
  {
    appendText(&html,"<BR> <INPUT NAME=\"");
    appendText(&html,itoa(cmdIDStart++,numBuffer,10));
    appendText(&html,"\" SIZE=6> <INPUT NAME=\"");
    appendText(&html,itoa(cmdIDStart++,numBuffer,10));
    appendText(&html,"\" SIZE=6>                    <INPUT
NAME=\"");
    appendText(&html,itoa(cmdIDStart++,numBuffer,10));
    appendText(&html,"\" SIZE=2>\r\n");
  }

  return (int)(html - htmlPage);
}

/*
*****************************************************************
** Name        : dlvyThreadEntry
** Description :
**          dlvy thread worker entry point
** Parameters:
**
** Returns     :
**
** Comments    :
**          All dlvy threads created by initDly enter at
**          this point.  They must first make a connection
**          to the database, then go to sleep.
**
**          Main isapi threads control dlvy worker semaphore
**          and signal when a dlvy txn is queued.
**
*****************************************************************
*/

void dlvyThreadEntry(void *)
{
  int     rc = 0;
  FILE    *server_logtrans;

  DEBUGMSG("dlvyThread " << GetCurrentThreadId() << " entered
dlvyThreadEntry, calling db_connect to db:" << dbName << endl);

  void *connectHandle;
  //connect to database.
  DEBUGMSG("ptr created. calling db_connect to db:" << dbName
<< endl);
  ERRORMSG("ptr created. calling db_connect to db:" << dbName
<< endl);
  rc = db_connect(dbName,&connectHandle);
```

```
  if(rc != OK)
  {
    ERRORMSG("dlvyThread " << GetCurrentThreadId() <<"
unable to connect to database, rc:" << rc << endl);
    DEBUGMSG("dlvyThread " << GetCurrentThreadId() <<" unable
to connect to database, rc:" << rc << endl);
    return;
  }

  DEBUGMSG("dlvyThread " << GetCurrentThreadId() << " connect
to db:" << dbName << " successful" << endl);

  FILE *dlvyLog = NULL;
  char logFileName[MAX_STRING_LEN] = {NULL};

  EnterCriticalSection(&isapiLock);
  //open dlvy log file for this thread
  sprintf(logFileName,"%s\\del_%d.txt",dlvyLogPath,dlvyThreadID);
  dlvyLog = fopen(logFileName,"w");
  if(!dlvyLog)
  {
    ERRORMSG("dlvyThread " << GetCurrentThreadId() << "
unable to open dlvy log "
          << dlvyLogPath << "\\del_" << dlvyThreadID << endl);
    DEBUGMSG("dlvyThread " << GetCurrentThreadId() << "
unable toopen dlvy log "
          << dlvyLogPath << "\\del_" << dlvyThreadID << endl);
    return;
  }

  //increment the global dlvy thread id
  dlvyThreadID++;

  LeaveCriticalSection(&isapiLock);

  DEBUGMSG("dlvyThread " << GetCurrentThreadId() <<" dlvy log
file name: " << logFileName << " open." << endl);

  HANDLE  workerHandles[2];                 //handle array to store
event to wait on

  struct  DLVYQUEUEDATA     dlvyQueueData;      //dlvy queue
struct to store queued txn
  struct dlvy_wrapper    dlvyTxn;           //dlvy wrapper of db2
structs

  struct  _timeb          endQueueTime;     //time stamp to queue
removal time
  struct  _timeb          endProcessTime;      //time stamp for end
process time

  char   orderIDs[MAX_STRING_LEN] = {NULL};        //string to
store oids for each district
  int     bytesWritten =   0;
  int     dlvyCount =0;

  DEBUGMSG("dlvyThread entering work loop" << endl);

  //successful, while true
  while(true)
  {
    try
    {
      DEBUGMSG("dlvyThread initializing wait handles" << endl);

      //wait for both program exit AND if there is work to do
      workerHandles[0] = dlvyThreadDone;
      workerHandles[1] = dlvyThreadSemaphore;

      DEBUGMSG("dlvyThread going to sleep waiting for wrk" <<
endl);

      rc =
WaitForMultipleObjects(2,&workerHandles[0],FALSE,INFINITE);

      DEBUGMSG("dlvyThread awake, checking wake condition"
<< endl);

      if(rc == WAIT_OBJECT_0)
        break;
      else if(rc == (WAIT_OBJECT_0+1) )
      {
        DEBUGMSG("dlvyThread awake, wake condition of
dlvyThreadSemaphore" << endl);
      }

      DEBUGMSG("dlvyThread trying to enter critical section" <<
endl);

      EnterCriticalSection(&dlvyQueueLock);

      DEBUGMSG("dlvyThread entered critical section" << endl);

      //remove queued dlvy txn
      dlvyQueueData.enqueueTime.time      =
  dlvyQueue[dlvyBufferThreadIndex].enqueueTime.time;
      dlvyQueueData.enqueueTime.millitm  =
  dlvyQueue[dlvyBufferThreadIndex].enqueueTime.millitm;
      dlvyQueueData.in_s_0_CARRIER_ID    =
  dlvyQueue[dlvyBufferThreadIndex].in_s_0_CARRIER_ID;
      dlvyQueueData.warehouse           =
  dlvyQueue[dlvyBufferThreadIndex].warehouse;

      DEBUGMSG("dlvyThread removed dlvy:" << dlvyCount <<
",w_id:" << dlvyQueueData.warehouse
                << " carrier_id:" <<
dlvyQueueData.in_s_0_CARRIER_ID << endl);

      DEBUGMSG("dlvyThread removed dlvy in queue index: "
<<dlvyBufferThreadIndex<< " w_id: " << dlvyQueueData.warehouse
                  << " carrier_id: " <<
dlvyQueueData.in_s_0_CARRIER_ID << endl);

      //increment the number of free slots
      dlvyBufferFreeSlots++;

      //increment the thread index to next slot in dlvy queue
      dlvyBufferThreadIndex++;

      DEBUGMSG("dlvyThread incremented amount of free slots:"
<< dlvyBufferFreeSlots << " and thread index:" <<
                  dlvyBufferThreadIndex << endl);

      //check if we reached the end of dlvy queue, if so, reset back
index back to 0
      if(dlvyBufferThreadIndex == dlvyQueueLen)
      {
        DEBUGMSG("dlvyThread  reset dlvyBufferThreadIndex to
0, current dlvyBufferThreadIndex:" << dlvyBufferThreadIndex
            << " free slots:"<<dlvyBufferFreeSlots<<endl);
        ERRORMSG("dlvyThread  reset dlvyBufferThreadIndex to
0, current dlvyBufferThreadIndex:" << dlvyBufferThreadIndex
            << " free slots:"<<dlvyBufferFreeSlots<<endl);

        dlvyBufferThreadIndex=0;
      }

      DEBUGMSG("dlvyThread releasing critical section" << endl);

      LeaveCriticalSection(&dlvyQueueLock);

      //take enqueue time
      _ftime(&endQueueTime);
```

```
        DEBUGMSG("dlvyThread executing txn w_id:" <<
dlvyQueueData.warehouse
             << " carrier_id:" << dlvyQueueData.in_s_0_CARRIER_ID
<< endl);

        //prepare to call database
        dlvyTxn.in_dlvy.s_O_CARRIER_ID  =
  dlvyQueueData.in_s_0_CARRIER_ID;
        dlvyTxn.in_dlvy.s_W_ID       = dlvyQueueData.warehouse;
        dlvyTxn.out_dlvy.s_transtatus =  -1;

        //increment dlvy count
        dlvyCount++;

        DEBUGMSG("dlvyThread %d calling dlvy txn" << rc << endl);

        //call dvly txn
        rc = dlvyCall(&dlvyTxn,connectHandle);

        _ftime(&endProcessTime);

        rc = dlvyTxn.out_dlvy.s_transtatus;

#ifdef ORACLE
        DEBUGMSG("dlvy txn response time:"<<
              ((((endProcessTime.time - endQueueTime.time)*1000)+
              (endProcessTime.millitm -
endQueueTime.millitm))/1000.0)<<
              " w_id:"<<dlvyTxn.in_dlvy.s_W_ID<<" carrier:"
<<dlvyTxn.in_dlvy.s_O_CARRIER_ID<<
              " rc: "<< rc <<endl);
#endif
#ifdef DB2
        DEBUGMSG("dlvy txn response time:"<<
              ((((endProcessTime.time - endQueueTime.time)*1000)+
              (endProcessTime.millitm -
endQueueTime.millitm))/1000.0)<<
              " w_id:"<<dlvyTxn.in_dlvy.s_W_ID<<" carrier:"
<<dlvyTxn.in_dlvy.s_O_CARRIER_ID<<
              " deadLocks:"<<dlvyTxn.out_dlvy.deadlocks<<" rc: "<< rc
<<endl);
#endif
        DEBUGMSG("dlvyThread dlvy s_transtatus:" << rc << endl);

        if(rc == OK)
        {
           bytesWritten=0;
           char *buffer = orderIDs;

           for(int districtIndex=0;districtIndex <
DISTRICTS_PER_WAREHOUSE;districtIndex++)
           {
              if(dlvyTxn.out_dlvy.s_O_ID[districtIndex] == 0)
                 bytesWritten = sprintf(buffer,"\nD_ID %d had no new
orders",districtIndex);
              else
                 bytesWritten = sprintf(buffer,"%d
",dlvyTxn.out_dlvy.s_O_ID[districtIndex]);


              buffer+=bytesWritten;
           }
        }
        else
           sprintf(orderIDs,"/nDelivery transaction failed");


        fprintf(dlvyLog,DELIVERY_LOG_SUCCESS_STR,
                    dlvyCount,
                    dlvyQueueData.enqueueTime.time,
                    dlvyQueueData.enqueueTime.millitm,
                    endQueueTime.time,
                    endQueueTime.millitm,
                    dlvyQueueData.warehouse,
                    dlvyQueueData.in_s_0_CARRIER_ID,
                    orderIDs,
                    endProcessTime.time,
                    endProcessTime.millitm);

        fflush(dlvyLog);
      }
      catch(...)
      {
        ERRORMSG("ERROR : Unhandled exeception in dlvy thread.
Thread exiting"<<endl);
        fprintf(dlvyLog,"ERROR : Unhandled exeception in dlvy thread
%ld. Thread exiting.\n",GetCurrentThreadId());
        fflush(dlvyLog);

        LeaveCriticalSection(&dlvyQueueLock);
      }
    }//end while true
}

/*
*****************************************************************
** Name         : queueDlvyTxn
** Description :
**           function queues dlvy txn in dlvy queue
** Parameters:
**           int    warehouse
**           short      carrier
** Returns      :
**           int    error code
** Comments     :
**            Function will queue dlvy txn if 2 points are true
**            1) We have room in our dlvy buffer
**            2) We writing over the end of the queue
**
*****************************************************************
*/

int queueDlvyTxn(int warehouse, short carrier_id)
{
   DEBUGMSG("Taking lock to queue dlvy txn.");

   EnterCriticalSection(&dlvyQueueLock);

   DEBUGMSG("Lock aquired to queue dlvy txn");

   if(dlvyBufferFreeSlots)
   {
      DEBUGMSG("Checking if we are inserting at tail of dlvy
queue."<<endl);
      if( dlvyBufferSlotIndex == (dlvyBufferThreadIndex-1))
      {
        ERRORMSG("Error dlvy queue inserting over unserviced
queued dlvy txn."<<endl);
        DEBUGMSG("Error dlvy queue inserting over unserviced
queued dlvy txn."<<endl);
        LeaveCriticalSection(&dlvyQueueLock);
        return ERR_DLVY_QUEUE_EATING_TAIL;
      }

      DEBUGMSG("free slots dlvy queue:"<<dlvyBufferFreeSlots<<"
inserting txn in slot: " <<dlvyBufferSlotIndex<<
        "w_id: "<<warehouse<<" carrier: "<<carrier_id<<endl);

      dlvyQueue[dlvyBufferSlotIndex].warehouse = warehouse;
      dlvyQueue[dlvyBufferSlotIndex].in_s_0_CARRIER_ID =
carrier_id;

      _ftime(&dlvyQueue[dlvyBufferSlotIndex].enqueueTime);
```

```
//take lock here

      //decrement the number of free slots in the buffer
      dlvyBufferFreeSlots--;

      //increment the index to the next dlvy queue slot.
      dlvyBufferSlotIndex++;

      DEBUGMSG("dlvy txn queued, slots available in
queue:"<<dlvyBufferFreeSlots<<" queue slot
index:"<<dlvyBufferSlotIndex
            <<"w_id:"<<warehouse<<" carrier:"<<carrier_id<<endl);

      DEBUGMSG("dlvy txn queued, slots available in queue:
"<<dlvyBufferFreeSlots<<" queue slot index: "<<dlvyBufferSlotIndex
            <<" w_id: "<<warehouse<<" carrier: "<<carrier_id<<endl);

      if(dlvyBufferSlotIndex == dlvyQueueLen)
      {
         DEBUGMSG("queue slot index hit end of queue, reset to 0,
current index:"<<dlvyBufferSlotIndex<<" free
slots:"<<dlvyBufferFreeSlots<<endl);
         ERRORMSG("queue slot index hit end of queue, reset to 0,
current index:"<<dlvyBufferSlotIndex<<" free
slots:"<<dlvyBufferFreeSlots<<
            "Thread Worker Queue
Index:"<<dlvyBufferThreadIndex<<endl);
         dlvyBufferSlotIndex=0;
      }
//leave critical section
   }
   else
   {
      //no slots available in dlvy buffer, release critcal section and
return an nord->in_nord.in_item
      LeaveCriticalSection(&dlvyQueueLock);
      ERRORMSG("dlvy queue buffer full, increase the dlvy queue
length."<<endl);
      return ERR_DLVY_QUEUE_FULL;
   }

   LeaveCriticalSection(&dlvyQueueLock);

   //release semaphore to wake thread that there is work
   ReleaseSemaphore(dlvyThreadSemaphore,1,NULL);

   return OK;
}


/*
*********************************************************************
** Name         : doHtml
** Description :
**           HTML processing page entry point
** Parameters:
**           txn handle
** Returns      :
**           int - return code
** Comments     :
**
*********************************************************************
*/

void doHtml(TXN_HANDLE *txnHandle)
{
   DEBUGMSG("Entered doHtml(), parsing query string:"<<
txnHandle->urlString << " into command block"<< endl);
// ERRORMSG("Entered doHtml(), parsing query string:"<<
txnHandle->urlString << " into command block"<< endl);
   htmlPhrasercommandBlock(txnHandle->urlString);
   DEBUGMSG("Query string parsed.  command:"<<
commandBlock.getCommandId() << " user's terminal id:" <<
commandBlock.get_TERM_ID() << endl);

   int terminalID = atoi(commandBlock.get_TERM_ID());
   int commandID = commandBlock.getCommandId();

   DEBUGMSG("User sent in a terimal id:"<<terminalID<<", checking
to see if user has logged in before"<<endl);
   if(terminalID > 0)
   {
      DEBUGMSG("Terminal id > 0, user has logged in already,
terminalID:"<<terminalID<<" retrieving warehouse district
pair"<<endl);
      if(getTerminal(terminalID,txnHandle) != OK)
         return;
      DEBUGMSG("User had valid terminal id, user's login
warehouse:"<<txnHandle->w_id<<" district:"<<txnHandle-
>d_id<<endl);
   }
   else
   {
      DEBUGMSG("User did not submit a terminal id or valid terminal
id, ensure that the user is trying to log in."<<endl);
      if( (commandID != TXN_LOGIN) && (commandID !=
TXN_LOGIN_RESULTS) )
      {
         DEBUGMSG("ERROR : User has not logged in."<<endl);
         ERRORMSG("ERROR : User has not logged in."<<endl);
         sprintf(txnHandle->htmlPage,"ERROR : User has not logged
in or did not submit a valid terminal.");
         return;
      }
      DEBUGMSG("User is in process of logging in,
commandID:"<<commandID<<endl);
   }

   DEBUGMSG("Calling html page
function:"<<commandBlock.getCommandId()<<endl);
   int rc =
htmlPageFunctions[commandBlock.getCommandId()](&commandBl
ock,txnHandle);
   DEBUGMSG("Return from html page
function:"<<commandBlock.getCommandId()<<endl);

   return;
}

/*
*********************************************************************
** Name         : getTerminal
** Description :
**           retrieves terminal information based on terminal id
** Parameters:
**           int       terminal id
**           TERM_HANDLE*  txn handle
** Returns      :
**           int - return code
** Comments     :
**
*********************************************************************
*/
int getTerminal(int terminal,TXN_HANDLE *txnHandle)
{
// ERRORMSG(">>getTerminal"<<endl);
   //check to see if terminal id is out of range
   if(terminal >= numUsers)
   {
      //terminal id not valid.
      sprintf(txnHandle->htmlPage,"ERROR : Client does not support
more than %d users, terminal id:%d",numUsers,terminal);
```

```
    ERRORMSG("ERROR : Client does not support more than
"<<numUsers<<" users, terminal id:"<<terminal<<endl);
    return ERR;
  }

  //check if terminal id is points to a not in use terminal
  if(!(termArray+terminal)->terminalInUse)
  {
    sprintf(txnHandle->htmlPage,"ERROR : Terminal id given points
to a not in use terminal.");
    ERRORMSG("ERROR :  Terminal id given points to a not in use
terminal."<<endl);
    return ERR;
  }

  DEBUGMSG("Storing terminal warehouse, district , and initial
term id for user:"<<terminal<<endl);

  //assign terminal values to txn_handle
  txnHandle->d_id = termArray[terminal].d_id;
  txnHandle->w_id = termArray[terminal].w_id;
  txnHandle->term_id = termArray[terminal].terminalID;
#ifdef PARTITION
  txnHandle->part_server = termArray[terminal].part_serv;
#endif
  DEBUGMSG("Users terminal:"<<terminal<<", stored
warehouse:"<<txnHandle->w_id<<
        " district:"<<txnHandle->d_id<<" termialID
stored:"<<txnHandle->term_id<<endl);

  return OK;
}

/*
**********************************************************************
** Name         : assignTerminal
** Description :
**           assigns terminal index to user
** Parameters:
**           TERM_HANDLE*  txn handle
** Returns      :
**           int - return code
** Comments     :
**
**********************************************************************
*/
int assignTerminal(TXN_HANDLE *txnHandle)
{
// ERRORMSG(">>assignTerminal"<<endl);
  EnterCriticalSection(&termLock);

  //check if terminal array is full.
  if(termNextFree == numUsers)
  {
    LeaveCriticalSection(&termLock);
    return ERR;
  }

  DEBUGMSG("Storing user warehouse:"<<txnHandle->w_id<<"
district:"<< txnHandle->d_id<<
        " in terminal slot:"<<termNextFree<<endl);

  //store users w_id and d_id
  termArray[termNextFree].d_id = txnHandle->d_id;
  termArray[termNextFree].w_id = txnHandle->w_id;
#ifdef PARTITION
  termArray[termNextFree].part_serv = (txnHandle-
>w_id%(numWarehouse+1))/ratio;
#endif

  //set terminal slot to be in use
  termArray[termNextFree].terminalInUse = true;
  termArray[termNextFree].terminalID = termNextFree;
  //in txn handle, set the terminal id
  txnHandle->term_id = termNextFree;

  //increment to next free terminal.
  termNextFree++;

  DEBUGMSG("User warehouse:"<<txnHandle->w_id<<"
district:"<< txnHandle->d_id <<
    " stored in terminal slot:"<<txnHandle->term_id<<" next terminal
free:"<<termNextFree<<endl);
  LeaveCriticalSection(&termLock);

  return OK;
}
```

tpccIsapi.rc

```
// Microsoft Visual C++ generated resource script.
//
#include "resource.h"

#define APSTUDIO_READONLY_SYMBOLS
//////////////////////////////////////////////////////////////////////
//
// Generated from the TEXTINCLUDE 2 resource.
//
#include "winres.h"
#include "atlsrvres.h"

//////////////////////////////////////////////////////////////////////
#undef APSTUDIO_READONLY_SYMBOLS

#ifdef APSTUDIO_INVOKED
//////////////////////////////////////////////////////////////////////
//
// TEXTINCLUDE
//

1 TEXTINCLUDE
BEGIN
   "resource.h\0"
END

2 TEXTINCLUDE
BEGIN
   "#include ""winres.h""\r\n"
   "#include ""atlsrvres.h""\r\n"
   "\0"
END

3 TEXTINCLUDE
BEGIN

    "LANGUAGE LANG_ENGLISH, SUBLANG_ENGLISH_US\r\n"
  "#pragma code_page(1252)\r\n"
  "#include ""atlsrv.rc""\r\n"
    "\0"
END

#endif    // APSTUDIO_INVOKED



//////////////////////////////////////////////////////////////////////
//
// Version
//

VS_VERSION_INFO VERSIONINFO
 FILEVERSION 1,0,0,1
 PRODUCTVERSION 1,0,0,1
```

```
 FILEFLAGSMASK 0x3fL
#ifdef _DEBUG
 FILEFLAGS 0x1L
#else
 FILEFLAGS 0x0L
#endif
 FILEOS 0x4L
 FILETYPE 0x2L
 FILESUBTYPE 0x0L
BEGIN
    BLOCK "StringFileInfo"
    BEGIN
        BLOCK "040904e4"
        BEGIN
          VALUE "CompanyName", "TODO: <Company name>"
            VALUE "FileDescription", "TODO: <File description>"
            VALUE "FileVersion", "1.0.0.1"
            VALUE "InternalName", "isapi.dll"
            VALUE "LegalCopyright", "TODO: (c) <Company name>.  All
rights reserved."
            VALUE "OriginalFilename", "isapi.dll"
            VALUE "ProductName", "TODO: <Product name>"
            VALUE "ProductVersion", "1.0.0.1"
            VALUE "OLESelfRegister", ""
        END
    END
    BLOCK "VarFileInfo"
    BEGIN
      VALUE "Translation", 0x0409, 1252
    END
END



LANGUAGE 9, 1
#pragma code_page(1252)
//////////////////////////////////////////////////////////////////////////////
//
// String Table
//

STRINGTABLE
BEGIN
   IDS_PROJNAME            "tpccIsapi"
END

//////////////////////////////////////////////////////////////////////////////


#ifndef APSTUDIO_INVOKED
//////////////////////////////////////////////////////////////////////////////
//
// Generated from the TEXTINCLUDE 3 resource.
//
LANGUAGE LANG_ENGLISH, SUBLANG_ENGLISH_US
#pragma code_page(1252)
#include "atlsrv.rc"

//////////////////////////////////////////////////////////////////////////////
#endif    // not APSTUDIO_INVOKED
```

tpccIsapi.hpp

```
/*
********************************************************************
** Project    : AIX
** Component: Performance/TPC-W Benchmark
** Name         : tpccIsapi.hpp
** Title      : ISAPI interface for tpcc
********************************************************************
** Copyright (c) 2001,2002 IBM Corporation
** All rights reserved
********************************************************************
** History       :
**               Developed at IBM Austin by the AIX RS/6000
**               performance group.
**
** Comments      :
**
********************************************************************
*/

#ifndef __tpccISAPI_hpp__
#define __tpccISAPI_hpp__

#include <windows.h>
#include <httpext.h>

#include "tpcc.h"
#include "htmlPhraser.h"

#include <iomanip>
#ifdef DB2
#include <db2tpcc.h>
#endif
#ifdef ORACLE
#include <oratpcc.h>
#endif

#include <comsvcs.h>

//////////////////////////////////////////////////////////////////////////////
// Terminal struct
//////////////////////////////////////////////////////////////////////////////
struct TERM_ENTRY
{
   int      terminalID;
   bool   terminalInUse;
#ifdef PARTITION
   int     part_serv;
#endif
   int      w_id;
   short  d_id;
};

//////////////////////////////////////////////////////////////////////////////
// COM interface
//////////////////////////////////////////////////////////////////////////////
struct COM_HANDLE
{
Itpcc_com0   *comHandle0;
#ifdef PARTITION
Itpcc_com1   *comHandle1;
Itpcc_com2   *comHandle2;
Itpcc_com3   *comHandle3;
Itpcc_com4   *comHandle4;
Itpcc_com5   *comHandle5;
Itpcc_com6   *comHandle6;
Itpcc_com7   *comHandle7;
Itpcc_com8   *comHandle8;
Itpcc_com9   *comHandle9;
Itpcc_com10   *comHandle10;
Itpcc_com11   *comHandle11;
Itpcc_com12   *comHandle12;
Itpcc_com13   *comHandle13;
Itpcc_com14   *comHandle14;
Itpcc_com15   *comHandle15;
Itpcc_com16   *comHandle16;
Itpcc_com17   *comHandle17;
Itpcc_com18   *comHandle18;
Itpcc_com19   *comHandle19;
Itpcc_com20   *comHandle20;
Itpcc_com21   *comHandle21;
```

```
ltpcc_com22   *comHandle22;
ltpcc_com23   *comHandle23;
ltpcc_com24   *comHandle24;
ltpcc_com25   *comHandle25;
ltpcc_com26   *comHandle26;
ltpcc_com27   *comHandle27;
ltpcc_com28   *comHandle28;
ltpcc_com29   *comHandle29;
ltpcc_com30   *comHandle30;
ltpcc_com31   *comHandle31;
ltpcc_com32   *comHandle32;
ltpcc_com33   *comHandle33;
ltpcc_com34   *comHandle34;
ltpcc_com35   *comHandle35;
ltpcc_com36   *comHandle36;
ltpcc_com37   *comHandle37;
ltpcc_com38   *comHandle38;
ltpcc_com39   *comHandle39;
ltpcc_com40   *comHandle40;
ltpcc_com41   *comHandle41;
ltpcc_com42   *comHandle42;
ltpcc_com43   *comHandle43;
ltpcc_com44   *comHandle44;
ltpcc_com45   *comHandle45;
ltpcc_com46   *comHandle46;
ltpcc_com47   *comHandle47;
ltpcc_com48   *comHandle48;
ltpcc_com49   *comHandle49;
ltpcc_com50   *comHandle50;
#endif
char     *txnBuffer;
   int         size;
};

//////////////////////////////////////////////////////////////////
// TXN handle
//////////////////////////////////////////////////////////////////
struct TXN_HANDLE
{
#ifdef PARTITION
   int      part_server;
#endif
   char   htmlPage[MAX_HTML_PAGE_LEN];
   char   htmlHeader[MAX_HTML_HEADER_LEN];
   char   *urlString;

   //user data
   int      w_id;
   int      d_id;
   int      sync_id;
   int      term_id;
   int      conn_id;

   COM_HANDLE comInterface;
};

//////////////////////////////////////////////////////////////////
// Definitions
//////////////////////////////////////////////////////////////////
#define    INVALID_ITEM    100
#define    HEADER          "Content-Type:text/html\r\nContent-
Length: %d\r\nConnection: Keep-Alive\r\n\r\n"
#define    TLS_NULL        0xFFFFFFFF
#define    ACCESS_TIMEOUT      3600000                    //One
hour in milli seconds

#define    DELIVERY_LOG_SUCCESS_STR  "--Tran %d Queue
%d.%03d Start %d.%03d\nW_ID: %d CARRIER_ID: %d %s\nend-
time: %d.%03d\n"

//////////////////////////////////////////////////////////////////
// Function Prototypes
//////////////////////////////////////////////////////////////////

int initDlvy();
int initTxnHandle(TXN_HANDLE **txnHandle);
int closeTxnHandle(TXN_HANDLE *txnHandle);
int readRegisteryValues();
int getTerminal(int terminal,TXN_HANDLE *txnHandle);
int assignTerminal(TXN_HANDLE *txnHandle);
int getDBInstance();

void doHtml(TXN_HANDLE *txnHandle);
int doLoginForm(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle);
int doLoginResults(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle);
int doNewOrderForm(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle);
int doNewOrderResults(htmlPhraser
*commandBlock,TXN_HANDLE *txnHandle);
int doPaymentForm(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle);
int doPaymentResults(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle);
int doOrderStatusForm(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle);
int doOrderStatusResults(htmlPhraser
*commandBlock,TXN_HANDLE *txnHandle);
int doDeliveryForm(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle);
int doDeliveryResults(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle);
int doStockForm(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle);
int doStockResults(htmlPhraser *commandBlock,TXN_HANDLE
*txnHandle);
int doExit(htmlPhraser *commandBlock,TXN_HANDLE *txnHandle);

int doLoginErrorPage(char *htmlPage,char *message);
int doNewOrderErrorPage(char *htmlPage,char
*message,htmlPhraser *commandBlock,TXN_HANDLE *txnHandle);
int doPaymentErrorPage(char *htmlPage,char
*message,htmlPhraser *commandBlock,TXN_HANDLE *txnHandle);
int doOrderStatusErrorPage(char *htmlPage,char
*message,htmlPhraser *commandBlock,TXN_HANDLE *txnHandle);
int doDeliveryErrorPage(char *htmlPage,char
*message,htmlPhraser *commandBlock,TXN_HANDLE *txnHandle);
int doStockErrorPage(char *htmlPage,char *message,htmlPhraser
*commandBlock,TXN_HANDLE *txnHandle);

void dlvyThreadEntry(void *);
int  queueDlvyTxn(int warehouse, short carrier_id);

int appendButtons(char *htmlPage);
int appendItems(char *htmlPage,short itemCount,short cmdIDStart);
int appendHiddenFields(char *htmlPage,TXN_HANDLE *txnHandle);

int displayStatus(char *htmlPage,int rc);

#endif
```

A.2 Transaction Code

pldel.cpp

```
#include "../../tpccisapi/tpcc.h"
#include "plora.h"
#include "ora_tpcc.h"

extern int sqlfile(FILE* server_logtrans,char *fnam, text *linebuf);
extern void oralogprintf(FILE* server_logtrans,char *format, ...);
```

```
extern char OracleHome[256];

#define DMLRETDEL

#define SQLTXT "BEGIN inittpcc.init_del ; END;"

#define SQLTXT1 "DELETE FROM nord WHERE no_d_id = :d_id \
              AND no_w_id = :w_id and rownum <= 1 \
             RETURNING no_o_id into :o_id "

#define SQLTXT3 "UPDATE ordr SET o_carrier_id = :carrier_id \
              WHERE o_id = :o_id and o_d_id = :d_id and o_w_id
= :w_id \
              returning o_c_id into :o_c_id"

#define SQLTXT4 "UPDATE ordl \
   SET ol_delivery_d = :cr_date \
   WHERE ol_w_id = :w_id AND ol_d_id = :d_id AND ol_o_id = :o_id
\
   RETURNING sum(ol_amount) into :ol_amount "

#define SQLTXT6 "UPDATE cust SET c_balance = c_balance
+ :amt, \
   c_delivery_cnt = c_delivery_cnt + 1 WHERE c_w_id = :w_id AND \
   c_d_id = :d_id AND c_id = :c_id"

#define NDISTS 10
#define ROWIDLEN 20


struct delctx {
   sb2 del_o_id_ind[NDISTS];
   sb2 d_id_ind[NDISTS];
   sb2 c_id_ind[NDISTS];
   sb2 del_date_ind[NDISTS];
   sb2 carrier_id_ind[NDISTS];
   sb2 amt_ind[NDISTS];

   ub4 del_o_id_len[NDISTS];
   ub4 c_id_len[NDISTS];
   int oid_ctx;
   int cid_ctx;
   OCIBind *olamt_bp;

   ub2 w_id_len[NDISTS];
   ub2 d_id_len[NDISTS];
   ub2 del_date_len[NDISTS];
   ub2 carrier_id_len[NDISTS];
   ub2 amt_len[NDISTS];

   ub2 del_o_id_rcode[NDISTS];
   ub2 cons_rcode[NDISTS];
   ub2 w_id_rcode[NDISTS];
   ub2 d_id_rcode[NDISTS];
   ub2 c_id_rcode[NDISTS];
   ub2 del_date_rcode[NDISTS];
   ub2 carrier_id_rcode[NDISTS];
   ub2 amt_rcode[NDISTS];

   int del_o_id[NDISTS];
   int del_d_id[NDISTS];
   int cons[NDISTS];
   int w_id[NDISTS];
   int d_id[NDISTS];
   int c_id[NDISTS];
   int carrier_id[NDISTS];
   int amt[NDISTS];
   ub4 del_o_id_rcnt;
   int retry;
   OCIRowid *no_rowid_ptr[NDISTS];
   OCIRowid *o_rowid_ptr[NDISTS];
   OCIDate del_date[NDISTS];
   OCIStmt *curd0;
   OCIStmt *curd1;
   OCIStmt *curd2;
   OCIStmt *curd3;
   OCIStmt *curd4;
   OCIStmt *curd5;
   OCIStmt *curd6;
   OCIStmt *curdtest;

   OCIBind *w_id_bp;
   OCIBind *w_id_bp3;
   OCIBind *w_id_bp4;
   OCIBind *w_id_bp5;
   OCIBind *w_id_bp6;
   OCIBind *d_id_bp;
   OCIBind *d_id_bp3;
   OCIBind *d_id_bp4;
   OCIBind *d_id_bp6;
   OCIBind *o_id_bp;
   OCIBind *cr_date_bp;
   OCIBind *c_id_bp;
   OCIBind *c_id_bp3;
   OCIBind *no_rowid_bp;
   OCIBind *carrier_id_bp;
   OCIBind *o_rowid_bp;
   OCIBind *del_o_id_bp;
   OCIBind *del_o_id_bp3;
   OCIBind *amt_bp;
   OCIBind *bstr1_bp[10];
   OCIBind *bstr2_bp[10];
   OCIBind *retry_bp;
   OCIDefine *inum_dp;
   OCIDefine *d_id_dp;
   OCIDefine *del_o_id_dp;
   OCIDefine *no_rowid_dp;
   OCIDefine *c_id_dp;
   OCIDefine *o_rowid_dp;
   OCIDefine *cons_dp;
   OCIDefine *amt_dp;

   int norow;
};

typedef struct delctx delctx;
struct pldelctx {

   ub2 del_d_id_len[NDISTS];
   ub2 del_o_id_len[NDISTS];


   ub2 w_id_len;
   ub2 d_id_len[NDISTS];
   ub2 o_c_id_len[NDISTS];
   ub2 sums_len[NDISTS];
   ub2 carrier_id_len;
   ub2 ordcnt_len;
   ub2 del_date_len;

   int del_o_id[NDISTS];
   int del_d_id[NDISTS];
   int o_c_id[NDISTS];
#ifdef USE_IEEE_NUMBER
   float sums[NDISTS];
#else
   int sums[NDISTS];
#endif
   OCIDate del_date;
   int carrier_id;
   int ordcnt;

   ub4 del_o_id_rcnt;
   ub4 del_d_id_rcnt;
```

```
  ub4 o_c_id_rcnt;
  ub4 sums_rcnt;

  int retry;
  OCIStmt *curp1;
  OCIStmt *curp2;
  OCIBind *w_id_bp;
  OCIBind *d_id_bp;
  OCIBind *o_id_bp;
  OCIBind *o_c_id_bp;
  OCIBind *ordcnt_bp;
  OCIBind *sums_bp;
  OCIBind *del_date_bp;
  OCIBind *carrier_id_bp;
  OCIBind *retry_bp;

  int norow;

};
typedef struct pldelctx pldelctx;

#ifdef DMLRETDEL
struct amtctx {
 int ol_amt[NITEMS];
 sb2 ol_amt_ind[NITEMS];
 ub4 ol_amt_len[NITEMS];
 ub2 ol_amt_rcode[NITEMS];
 int ol_cnt;
};
typedef struct amtctx amtctx;

#endif


tkvcdinit (ora_cn_data_t *ora_SlotDataP)
{
  char sqlfilename[256];
  text stmbuf[SQL_BUF_SIZE];
  FILE *server_logtrans = ora_SlotDataP->server_logtrans;

  delctx *dctx;
  pldelctx *pldctx;
  dlvy_wrapper *delP;
  OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
  OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
  dvoid *errhp = ora_SlotDataP->errhp;
  OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
  OCISession *tpcusr = ora_SlotDataP->tpcusr;
  OCIStmt *curi = ora_SlotDataP->curi;

  dctx = (delctx *) malloc (sizeof(delctx));
  memset(dctx,(char)0,sizeof(delctx));
  dctx->norow = 0;

  ora_SlotDataP->dctx = (void *)dctx;
  delP = &ora_SlotDataP->delP;

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


    DISCARD OCIHandleAlloc(tpcenv,(dvoid**) &pldctx->curp2,
OCI_HTYPE_STMT,
                0, (dvoid**)0);
#if defined(ISO5) || defined(ISO6) || defined(ISO8)
 #if defined(ISO5)
    sprintf(sqlfilename,"%s%s",OracleHome,"/tpcc-
kit/benchrun/blocks/tkvcpdel_iso5.sql");
   sqlfile(ora_SlotDataP->server_logtrans,sqlfilename,stmbuf);
 #endif
 #if defined(ISO6)
    sprintf(sqlfilename,"%s%s",OracleHome,"/tpcc-
kit/benchrun/blocks/tkvcpdel_iso6.sql");
    sqlfile(ora_SlotDataP->server_logtrans,sqlfilename,stmbuf);
 #endif
 #if defined(ISO8)
    sprintf(sqlfilename,"%s%s",OracleHome,"/tpcc-
kit/benchrun/blocks/tkvcpdel_iso8.sql");
    sqlfile(ora_SlotDataP->server_logtrans,sqlfilename,stmbuf);
 #endif
#else
    sprintf(sqlfilename,"%s%s",OracleHome,"/tpcc-
kit/benchrun/blocks/tkvcpdel.sql");
    sqlfile(ora_SlotDataP->server_logtrans,sqlfilename,stmbuf);
#endif
    DISCARD OCIStmtPrepare(pldctx->curp2, (OCIError *)errhp,
stmbuf,
                (ub4)strlen((char *)stmbuf), OCI_NTV_SYNTAX,
OCI_DEFAULT);
    OCIBNDPL(pldctx->curp2, pldctx->w_id_bp , (OCIError
*)errhp,":w_id",
      ADR(delP->in_dlvy.s_W_ID), SIZ(int), SQLT_INT,&pldctx-
>w_id_len);
    OCIBNDPL(pldctx->curp2, pldctx->ordcnt_bp , (OCIError
*)errhp,":ordcnt",
           ADR(pldctx->ordcnt), SIZ(int), SQLT_INT,&pldctx-
>ordcnt_len);

    OCIBNDPL(pldctx->curp2, pldctx->del_date_bp,(OCIError
*)errhp,":now",
           ADR(pldctx->del_date), SIZ(OCIDate),SQLT_ODT,&pldctx-
>del_date_len);

    OCIBNDPL(pldctx->curp2, pldctx->carrier_id_bp , (OCIError
*)errhp,
      ":carrier_id", ADR(delP->in_dlvy.s_O_CARRIER_ID), SIZ(int),
           SQLT_INT, &pldctx->carrier_id_len);

    OCIBNDPLA(pldctx->curp2, pldctx->d_id_bp, (OCIError
*)errhp,":d_id",
           pldctx->del_d_id, SIZ(int),SQLT_INT, pldctx-
>del_d_id_len,
           NDISTS, &pldctx->del_d_id_rcnt);
    OCIBNDPLA(pldctx->curp2, pldctx->o_id_bp, (OCIError
*)errhp,":order_id",
           pldctx->del_o_id,SIZ(int),SQLT_INT, pldctx-
>del_o_id_len,NDISTS,
           &pldctx->del_o_id_rcnt);
#ifdef USE_IEEE_NUMBER
    OCIBNDPLA(pldctx->curp2, pldctx->sums_bp, (OCIError
*)errhp,":sums",
           pldctx->sums,SIZ(float),SQLT_BFLOAT, pldctx-
>sums_len,NDISTS,
           &pldctx->sums_rcnt);
#else
    OCIBNDPLA(pldctx->curp2, pldctx->sums_bp, (OCIError
*)errhp,":sums",
           pldctx->sums,SIZ(int),SQLT_INT, pldctx-
>sums_len,NDISTS,
           &pldctx->sums_rcnt);
```

```
#endif
    OCIBNDPLA(pldctx->curp2, pldctx->o_c_id_bp, (OCIError
*)errhp,":o_c_id",
              pldctx->o_c_id,SIZ(int),SQLT_INT, pldctx-
>o_c_id_len,NDISTS,
              &pldctx->o_c_id_rcnt);
    OCIBND(pldctx->curp2, pldctx->retry_bp , (OCIError
*)errhp,":retry",
           ADR(pldctx->retry), SIZ(int),SQLT_INT);

  return (0);

}

tkvcd (ora_cn_data_t *ora_SlotDataP)
{
  ub4 i;
  FILE *server_logtrans = ora_SlotDataP->server_logtrans;

  delctx *dctx = (delctx *)ora_SlotDataP->dctx;
  pldelctx *pldctx = (pldelctx *)ora_SlotDataP->pldctx;
#ifdef DMLRETDEL /* VMM 1/13/98 */
  amtctx *actx = (amtctx *)ora_SlotDataP->actx;
#endif /* DMLRETDEL */
  dlvy_wrapper *delP = &ora_SlotDataP->delP;
  OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
  OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
  dvoid *errhp = ora_SlotDataP->errhp;
  OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
  OCISession *tpcusr = ora_SlotDataP->tpcusr;
  OCIStmt *curi = ora_SlotDataP->curi;

retry:
    pldctx->w_id_len = sizeof (int);
    pldctx->carrier_id_len = sizeof (int);
    for (i = 0; i < NDISTS; i++)
    {
      pldctx->del_o_id_len[i] = sizeof(int);
    }
    pldctx->del_date_len = DEL_DATE_LEN;
   DISCARD memcpy(&pldctx->del_date,&delP-
>in_dlvy.cr_date,sizeof(OCIDate));

    pldctx->retry=0;

   delP->out_dlvy.terror = OCIStmtExecute(tpcsvc,pldctx-
>curp2,(OCIError *)errhp,1,0,NULLP(CONST OCISnapshot),
                  NULLP(OCISnapshot),OCI_DEFAULT);
   if((delP->out_dlvy.terror != OCI_SUCCESS) && (delP-
>out_dlvy.terror != OCI_NO_DATA))
    {
     DISCARD OCITransRollback(tpcsvc,(OCIError
*)errhp,OCI_DEFAULT);
     delP->out_dlvy.terror = OCIERROR((OCIError *)errhp,delP-
>out_dlvy.terror);
     if(delP->out_dlvy.terror == NOT_SERIALIZABLE)
     {
       delP->out_dlvy.retry++;
       goto retry;
     }
     else if (delP->out_dlvy.terror == RECOVERR)
     {
       delP->out_dlvy.retry++;
       goto retry;
     }
     else if (delP->out_dlvy.terror == SNAPSHOT_TOO_OLD)
     {
       delP->out_dlvy.retry++;
       goto retry;
     }
     else
     {
       return -1;
     }
    }
    for (i = 0; i < NDISTS; i++)
    {
      delP->out_dlvy.s_O_ID[i] = 0;
    }
    for (i = 0; i < pldctx->del_o_id_rcnt; i++)
      delP->out_dlvy.s_O_ID[pldctx->del_d_id[i] - 1] = pldctx-
>del_o_id[i];
   return (0);

}


void tkvcddone (ora_cn_data_t *ora_SlotDataP)

{
  pldelctx *pldctx = (pldelctx *)ora_SlotDataP->pldctx;

    if (pldctx)
    {
      DISCARD OCIHandleFree((dvoid *)pldctx-
>curp1,OCI_HTYPE_STMT);
      DISCARD OCIHandleFree((dvoid *)pldctx-
>curp2,OCI_HTYPE_STMT);
      DISCARD free(pldctx);
    }
}
```

plnew.cpp

```
#include "../../tpccisapi/tpcc.h"
#include "plora.h"
#include "ora_tpcc.h"

#define SQLTXT2 "BEGIN inittpcc.init_no(:idx1arr); END;"

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

extern void oralogprintf(FILE *server_logtrans,char *format, ...);

extern char OracleHome[256];
extern int sqlfile(FILE *server_logtrans,char *fnam, text *linebuf);

struct newctx {

  ub2 nol_i_id_len[NITEMS];
  ub2 nol_supply_w_id_len[NITEMS];
  ub2 nol_quantity_len[NITEMS];
  ub2 nol_amount_len[NITEMS];
  ub2 s_quantity_len[NITEMS];
  ub2 i_name_len[NITEMS];
  ub2 i_price_len[NITEMS];
  ub2 s_dist_info_len[NITEMS];
  ub2 ol_o_id_len[NITEMS];
  ub2 ol_number_len[NITEMS];
  ub2 s_remote_len[NITEMS];
  ub2 s_quant_len[NITEMS];
  ub2 ol_dist_info_len[NITEMS];
  ub2 s_bg_len[NITEMS];
#ifdef USE_IEEE_NUMBER
  float ol_quantity[15];
  float ol_amount[15];
  float s_remote[NITEMS];
#else
  int ol_quantity[15];
  int ol_amount[15];
  int s_remote[NITEMS];
```

```
#endif /* USE_IEEE_NUMBER */
  int ol_number[15];
  char s_dist_info[NITEMS][25];
  OCIStmt *curn1;
  OCIBind *ol_i_id_bp;
  OCIBind *ol_supply_w_id_bp;
  OCIBind *i_price_bp;
  OCIBind *i_name_bp;
  OCIBind *s_bg_bp;
  ub4 nol_i_count;
  ub4 nol_s_count;
  ub4 nol_q_count;
  ub4 nol_item_count;
  ub4 nol_name_count;
  ub4 nol_qty_count;
  ub4 nol_bg_count;
  ub4 nol_am_count;
  ub4 s_remote_count;
  OCIStmt *curn2;
  OCIBind *ol_quantity_bp;
  OCIBind *s_remote_bp;
  OCIBind *s_quantity_bp;
  OCIBind *w_id_bp;
  OCIBind *d_id_bp;
  OCIBind *c_id_bp;
  OCIBind *o_all_local_bp;
  OCIBind *o_all_cnt_bp;
  OCIBind *w_tax_bp;
  OCIBind *d_tax_bp;
  OCIBind *o_id_bp;
  OCIBind *c_discount_bp;
  OCIBind *c_credit_bp;
  OCIBind *c_last_bp;
  OCIBind *retries_bp;
  OCIBind *cr_date_bp;
  OCIBind *ol_o_id_bp;
  OCIBind *ol_amount_bp;

  ub2 w_id_len; /* RP - may need to be (ub2), was (sb2) */
  ub2 d_id_len;
  ub2 c_id_len;
  ub2 o_all_local_len;
  ub2 o_ol_cnt_len;
  ub2 w_tax_len;
  ub2 d_tax_len;
  ub2 o_id_len;
  ub2 c_discount_len;
  ub2 c_credit_len;
  ub2 c_last_len;
  ub2 retries_len;
  ub2 cr_date_len;
};

typedef struct newctx newctx;

tkvcninit (ora_cn_data_t *ora_SlotDataP)
{
  char sqlfilename[256];
  text stmbuf[32*1024];
  FILE *server_logtrans = ora_SlotDataP->server_logtrans;

  newctx *nctx;
  OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
  OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
  dvoid *errhp = ora_SlotDataP->errhp;
  OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
  OCISession *tpcusr = ora_SlotDataP->tpcusr;
  OCIStmt *curi = ora_SlotDataP->curi;
  nord_wrapper *newP;

  oralogprintf(ora_SlotDataP->server_logtrans,">>tkvcninit\n");
  nctx = (newctx *) malloc (sizeof(newctx));
  DISCARD memset(nctx,(char)0,sizeof(newctx));
  ora_SlotDataP->nctx = (void *)nctx;

  memset(&ora_SlotDataP->globals,(char)0,sizeof(nord_wrapper));
  newP = &ora_SlotDataP->globals;

  nctx->w_id_len = sizeof(newP->in_nord.s_W_ID);
  nctx->d_id_len = sizeof(newP->in_nord.s_D_ID);
  nctx->c_id_len = sizeof(newP->in_nord.s_C_ID);
  nctx->o_all_local_len = sizeof(newP->in_nord.s_all_local);
  nctx->o_ol_cnt_len = sizeof(newP->out_nord.s_O_OL_CNT);
  nctx->w_tax_len = 0;
  nctx->d_tax_len = 0;
  nctx->o_id_len = sizeof(newP->out_nord.s_O_ID);
  nctx->c_discount_len = 0;
  nctx->c_credit_len = 0;
  nctx->c_last_len = 0;
  nctx->retries_len = sizeof(newP->out_nord.retry);
  nctx->cr_date_len = sizeof(newP->in_nord.cr_date);

  /* open first cursor */
  DISCARD OCIERROR((OCIError
*)errhp,OCIHandleAlloc(tpcenv,(dvoid **)(&nctx->curn1),
        OCI_HTYPE_STMT, 0, (dvoid**)0));
#if defined(ISO)
  sprintf(sqlfilename,"%s/tpcc-
kit/benchrun/blocks/tkvcpnew_iso.sql",OracleHome);
  sqlfile(ora_SlotDataP->server_logtrans,sqlfilename,stmbuf);
#else
#if defined(ISO7)
  sprintf(sqlfilename,"%s/tpcc-
kit/benchrun/blocks/tkvcpnew_iso7.sql",OracleHome);
  sqlfile(ora_SlotDataP->server_logtrans,sqlfilename,stmbuf);
#else
  sprintf(sqlfilename,"%s/tpcc-
kit/benchrun/blocks/tkvcpnew.sql",OracleHome);
  sqlfile(ora_SlotDataP->server_logtrans,sqlfilename,stmbuf);
#endif
#endif

  DISCARD OCIERROR((OCIError *)errhp,OCIStmtPrepare(nctx-
>curn1, (OCIError *)errhp, stmbuf,
        strlen((char *)stmbuf), OCI_NTV_SYNTAX, OCI_DEFAULT));

  /* bind variables */
  oralogprintf(ora_SlotDataP->server_logtrans,"--tkvcninit\n");

  OCIBNDPL(nctx->curn1, nctx->w_id_bp, (OCIError *)errhp,
":w_id",ADR(newP->in_nord.s_W_ID),SIZ(newP->in_nord.s_W_ID),
        SQLT_INT, &nctx->w_id_len);
  OCIBNDPL(nctx->curn1, nctx->d_id_bp, (OCIError *)errhp,
":d_id",ADR(newP->in_nord.s_D_ID),SIZ(newP->in_nord.s_D_ID),
        SQLT_INT, &nctx->d_id_len);
  OCIBNDPL(nctx->curn1, nctx->c_id_bp, (OCIError *)errhp,
":c_id",ADR(newP->in_nord.s_C_ID),SIZ(newP->in_nord.s_C_ID),
        SQLT_INT, &nctx->c_id_len);
  OCIBNDPL(nctx->curn1, nctx->o_all_local_bp, (OCIError *)errhp,
":o_all_local",
     ADR(newP->in_nord.s_all_local), SIZ(newP-
>in_nord.s_all_local),SQLT_INT, &nctx->o_all_local_len);
  OCIBNDPL(nctx->curn1, nctx->o_all_cnt_bp, (OCIError *)errhp,
":o_ol_cnt",ADR(newP->out_nord.s_O_OL_CNT),
     SIZ(newP->out_nord.s_O_OL_CNT),SQLT_INT, &nctx-
>o_ol_cnt_len);
  OCIBNDPL(nctx->curn1, nctx->w_tax_bp, (OCIError *)errhp,
":w_tax",ADR(newP->out_nord.s_W_TAX),SIZ(newP-
>out_nord.s_W_TAX),
        SQLT_FLT, &nctx->w_tax_len);
  OCIBNDPL(nctx->curn1, nctx->d_tax_bp, (OCIError *)errhp,
":d_tax",ADR(newP->out_nord.s_D_TAX),SIZ(newP-
>out_nord.s_D_TAX),
        SQLT_FLT, &nctx->d_tax_len);
```

```
  OCIBNDPL(nctx->curn1, nctx->o_id_bp, (OCIError *)errhp,
":o_id",ADR(newP->out_nord.s_O_ID),SIZ(newP-
>out_nord.s_O_ID),
        SQLT_INT, &nctx->o_id_len);
  OCIBNDPL(nctx->curn1, nctx->c_discount_bp, (OCIError *)errhp,
":c_discount",
    ADR(newP->out_nord.s_C_DISCOUNT), SIZ(newP-
>out_nord.s_C_DISCOUNT),SQLT_FLT, &nctx->c_discount_len);
  OCIBNDPL(nctx->curn1, nctx->c_credit_bp, (OCIError *)errhp,
":c_credit",newP->out_nord.s_C_CREDIT,
    SIZ(newP->out_nord.s_C_CREDIT),SQLT_CHR, &nctx-
>c_credit_len);
  OCIBNDPL(nctx->curn1, nctx->c_last_bp, (OCIError *)errhp,
":c_last",newP->out_nord.s_C_LAST,SIZ(newP-
>out_nord.s_C_LAST),
        SQLT_STR, &nctx->c_last_len);
  OCIBNDPL(nctx->curn1, nctx->retries_bp, (OCIError *)errhp,
":retry",ADR(newP->out_nord.retry),
        SIZ(newP->out_nord.retry),SQLT_INT, &nctx->retries_len);
  OCIBNDPL(nctx->curn1, nctx->cr_date_bp, (OCIError *)errhp,
":cr_date",&newP->in_nord.cr_date,
        SIZ(OCIDate), SQLT_ODT, &nctx->cr_date_len);

  OCIBNDPLA(nctx->curn1, nctx->ol_i_id_bp,(OCIError
*)errhp,":ol_i_id",newP->in_nord.s_OL_I_ID,
        SIZ(newP->in_nord.s_OL_I_ID[0]), SQLT_INT, nctx-
>nol_i_id_len,NITEMS,&nctx->nol_i_count);
  OCIBNDPLA(nctx->curn1, nctx->ol_supply_w_id_bp, (OCIError
*)errhp, ":ol_supply_w_id",
    newP->in_nord.s_OL_SUPPLY_W_ID,SIZ(newP-
>in_nord.s_OL_SUPPLY_W_ID[0]),SQLT_INT, nctx-
>nol_supply_w_id_len,
        NITEMS, &nctx->nol_s_count);
#ifdef USE_IEEE_NUMBER
  OCIBNDPLA(nctx->curn1, nctx->ol_quantity_bp,(OCIError
*)errhp,":ol_quantity",
        newP->in_nord.ol_quantity, SIZ(newP-
>in_nord.ol_quantity[0]),SQLT_FLT,nctx->nol_quantity_len,
        NITEMS,&nctx->nol_q_count);

  OCIBNDPLA(nctx->curn1, nctx->i_price_bp,(OCIError
*)errhp,":i_price",newP->out_nord.s_I_PRICE,SIZ(newP-
>out_nord.s_I_PRICE[0]),
        SQLT_FLT, nctx->i_price_len, NITEMS, &nctx-
>nol_item_count);
#else
  OCIBNDPLA(nctx->curn1, nctx->ol_quantity_bp,(OCIError
*)errhp,":ol_quantity",
    newP->in_nord.s_OL_QUANTITY, SIZ(newP-
>in_nord.s_OL_QUANTITY[0]),SQLT_INT,nctx->nol_quantity_len,
        NITEMS,&nctx->nol_q_count);
  OCIBNDPLA(nctx->curn1, nctx->i_price_bp,(OCIError
*)errhp,":i_price",newP->out_nord.s_I_PRICE,SIZ(newP-
>out_nord.s_I_PRICE[0]),
        SQLT_INT, nctx->i_price_len, NITEMS, &nctx-
>nol_item_count);
#endif
  OCIBNDPLA(nctx->curn1, nctx->i_name_bp,(OCIError
*)errhp,":i_name",newP->out_nord.s_I_NAME,
        SIZ(newP->out_nord.s_I_NAME[0]),SQLT_STR, nctx-
>i_name_len,NITEMS,
        &nctx->nol_name_count);
#ifdef USE_IEEE_NUMBER
  OCIBNDPLA(nctx->curn1, nctx->s_quantity_bp,(OCIError
*)errhp,":s_quantity",newP->out_nord.s_S_QUANTITY,
        SIZ(newP->out_nord.s_S_QUANTITY[0]), SQLT_FLT,nctx-
>s_quant_len,NITEMS,&nctx->nol_qty_count);
#else
  OCIBNDPLA(nctx->curn1, nctx->s_quantity_bp,(OCIError
*)errhp,":s_quantity",newP->out_nord.s_S_QUANTITY,
        SIZ(newP->out_nord.s_S_QUANTITY[0]), SQLT_INT,nctx-
>s_quant_len,NITEMS,&nctx->nol_qty_count);
#endif
  OCIBNDPLA(nctx->curn1, nctx->s_bg_bp,(OCIError
*)errhp,":brand_generic",newP->out_nord.s_brand_generic,
        SIZ(newP->out_nord.s_brand_generic[0]), SQLT_CHR,nctx-
>s_bg_len,NITEMS,&nctx->nol_bg_count);
#ifdef USE_IEEE_NUMBER
  OCIBNDPLA(nctx->curn1, nctx->ol_amount_bp,(OCIError
*)errhp,":ol_amount",newP->out_nord.s_OL_AMOUNT,
        SIZ(newP->out_nord.s_OL_AMOUNT[0]),SQLT_FLT, nctx-
>nol_amount_len,NITEMS,&nctx->nol_am_count);
  OCIBNDPLA(nctx->curn1, nctx->s_remote_bp,(OCIError
*)errhp,":s_remote",nctx->s_remote,
        SIZ(nctx->s_remote[15]),SQLT_FLT, nctx-
>s_remote_len,NITEMS,&nctx->s_remote_count);
#else
  OCIBNDPLA(nctx->curn1, nctx->ol_amount_bp,(OCIError
*)errhp,":ol_amount",newP->out_nord.s_OL_AMOUNT,
        SIZ(newP->out_nord.s_OL_AMOUNT[0]),SQLT_INT, nctx-
>nol_amount_len,NITEMS,&nctx->nol_am_count);
  OCIBNDPLA(nctx->curn1, nctx->s_remote_bp,(OCIError
*)errhp,":s_remote",nctx->s_remote,
        SIZ(nctx->s_remote[0]),SQLT_INT, nctx-
>s_remote_len,NITEMS,&nctx->s_remote_count);
#endif

  /* open second cursor */
  DISCARD OCIERROR((OCIError *)errhp,OCIHandleAlloc(tpcenv,
(dvoid **)(&nctx->curn2),
            OCI_HTYPE_STMT, 0, (dvoid**)0));
  DISCARD sprintf ((char *) stmbuf, SQLTXT2);
  DISCARD OCIERROR((OCIError *)errhp,OCIStmtPrepare(nctx-
>curn2, (OCIError *)errhp, stmbuf,
            strlen((char *)stmbuf), OCI_NTV_SYNTAX,
OCI_DEFAULT));


  /* execute second cursor to init newinit package */
  {
    int idx1arr[NITEMS];
    OCIBind *idx1arr_bp;
    ub2 idx1arr_len[NITEMS];
    sb2 idx1arr_ind[NITEMS];
    ub4 idx1arr_count;
    ub2 idx;

    for (idx = 0; idx < NITEMS; idx++) {
      idx1arr[idx] = idx + 1;
      idx1arr_ind[idx] = TRUE;
      idx1arr_len[idx] = sizeof(int);
    }
    idx1arr_count = NITEMS;
   newP->out_nord.s_O_OL_CNT = NITEMS;


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

   newP->out_nord.terror = OCIStmtExecute(tpcsvc,nctx-
>curn2,(OCIError *)errhp,1,0,
              NULLP(CONST
OCISnapshot),NULLP(OCISnapshot),OCI_DEFAULT);
     if(newP->out_nord.terror != OCI_SUCCESS) {
       OCITransRollback(tpcsvc,(OCIError *)errhp,OCI_DEFAULT);
      newP->out_nord.terror = OCIERROR((OCIError *)errhp,newP-
>out_nord.terror);
       return -1;
     }
   }

  oralogprintf(ora_SlotDataP->server_logtrans,"<<tkvcninit\n");
```

```
  return (0);

}

tkvcn (ora_cn_data_t *ora_SlotDataP)
{

   int i;
   int rcount;
   FILE *server_logtrans = ora_SlotDataP->server_logtrans;

   OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
   OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
   dvoid *errhp = ora_SlotDataP->errhp;
   OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
   OCISession *tpcusr = ora_SlotDataP->tpcusr;
   OCIStmt *curi = ora_SlotDataP->curi;
   nord_wrapper *newP = &ora_SlotDataP->globals;
   newctx *nctx = (newctx *)ora_SlotDataP->nctx;

retry:

   newP->out_nord.status = 0;                    /* number of invalid
items */

   /* get number of order lines, and check if all are local */

   newP->out_nord.s_O_OL_CNT = NITEMS;
   newP->in_nord.s_all_local = 1;
   for (i = 0; i < NITEMS; i++) {
      if (newP->in_nord.s_OL_I_ID[i] == 0) {
         newP->out_nord.s_O_OL_CNT = i;
         break;
      }
      if (newP->in_nord.s_OL_SUPPLY_W_ID[i] != newP-
>in_nord.s_W_ID) {
#ifdef USE_IEEE_NUMBER
         nctx->s_remote[i] = 1.0;
#else
         nctx->s_remote[i] = 1;
#endif
         newP->in_nord.s_all_local = 0;
      }
      else
         nctx->s_remote[i] = 0;
   }

   nctx->w_id_len = sizeof(newP->in_nord.s_W_ID);
   nctx->d_id_len = sizeof(newP->in_nord.s_D_ID);
   nctx->c_id_len = sizeof(newP->in_nord.s_C_ID);
   nctx->o_all_local_len = sizeof(newP->in_nord.s_all_local);
   nctx->o_ol_cnt_len = sizeof(newP->out_nord.s_O_OL_CNT);
   nctx->w_tax_len = 0;
   nctx->d_tax_len = 0;
   nctx->o_id_len = sizeof(newP->out_nord.s_O_ID);
   nctx->c_discount_len = 0;
   nctx->c_credit_len = 0;
   nctx->c_last_len = 0;
   nctx->retries_len = sizeof(newP->out_nord.retry);
   nctx->cr_date_len = sizeof(newP->in_nord.cr_date);
   /* this is the row count */
   rcount = newP->out_nord.s_O_OL_CNT;
   nctx->nol_i_count = newP->out_nord.s_O_OL_CNT;
   nctx->nol_q_count = newP->out_nord.s_O_OL_CNT;
   nctx->nol_s_count = newP->out_nord.s_O_OL_CNT;
   nctx->s_remote_count = newP->out_nord.s_O_OL_CNT;

   nctx->nol_qty_count  = 0;
   nctx->nol_bg_count = 0;
   nctx->nol_item_count = 0;
   nctx->nol_name_count = 0;
   nctx->nol_am_count   = 0;

   /* initialization for array operations */
   for (i = 0; i < newP->out_nord.s_O_OL_CNT; i++) {
      nctx->ol_number[i] = i + 1;
      nctx->nol_i_id_len[i] = sizeof(newP->in_nord.s_OL_I_ID[i]);
      nctx->nol_supply_w_id_len[i] = sizeof(newP-
>in_nord.s_OL_SUPPLY_W_ID[i]);
      nctx->nol_quantity_len[i] = sizeof(newP-
>in_nord.s_OL_QUANTITY[i]);
      nctx->nol_amount_len[i] = sizeof(newP-
>out_nord.s_OL_AMOUNT[i]);
      nctx->ol_o_id_len[i] = sizeof(newP->out_nord.s_O_ID);
      nctx->ol_number_len[i] = sizeof(int);
      nctx->ol_dist_info_len[i] = nctx->s_dist_info_len[i];
      nctx->s_remote_len[i] = sizeof(int);
      nctx->s_quant_len[i] = sizeof(int);
      nctx->i_name_len[i]=0;
      nctx->s_bg_len[i] = 0;
   }
   for (i = newP->out_nord.s_O_OL_CNT; i < NITEMS; i++) {
      nctx->nol_i_id_len[i] = 0;
      nctx->nol_supply_w_id_len[i] = 0;
      nctx->nol_quantity_len[i] = 0;
      nctx->nol_amount_len[i] = 0;
      nctx->ol_o_id_len[i] = 0;
      nctx->ol_number_len[i] = 0;
      nctx->ol_dist_info_len[i] = 0;
      nctx->s_remote_len[i] = 0;
      nctx->s_quant_len[i] = 0;
      nctx->i_name_len[i]=0;
      nctx->s_bg_len[i] = 0;
   }

   newP->out_nord.terror = OCIStmtExecute(tpcsvc,nctx-
>curn1,(OCIError *)errhp,1,0,0,0,
                        OCI_DEFAULT |
OCI_COMMIT_ON_SUCCESS);

   if(newP->out_nord.terror != OCI_SUCCESS) {
      OCITransRollback(tpcsvc,(OCIError *)errhp,OCI_DEFAULT);
      newP->out_nord.terror =
ocierror(server_logtrans,__FILE__,__LINE__,errhp,newP-
>out_nord.terror);
      oralogprintf(ora_SlotDataP->server_logtrans,"newP-
>out_nord.terror %d\n",newP->out_nord.terror);
      if(newP->out_nord.terror == NOT_SERIALIZABLE) {
         newP->out_nord.retry++;
         goto retry;
      } else if (newP->out_nord.terror == RECOVERR) {
         newP->out_nord.retry++;
         goto retry;
      } else if (newP->out_nord.terror == SNAPSHOT_TOO_OLD) {
         newP->out_nord.retry++;
         goto retry;
      } else {
         return -1;
      }
   }

   /* did the txn succeed ? */
   if (rcount != newP->out_nord.s_O_OL_CNT)
   {
       newP->out_nord.status = rcount - newP-
>out_nord.s_O_OL_CNT;
      newP->out_nord.s_O_OL_CNT = rcount;
      newP->out_nord.terror = 100;
   }
   newP->out_nord.s_total_amount = 0;
   for (i = 0; i < newP->out_nord.s_O_OL_CNT; i++)
   {
      newP->out_nord.s_total_amount += newP-
>out_nord.s_OL_AMOUNT[i];
```

```
  }
  newP->out_nord.s_total_amount *= ((float)(1.0 - newP-
>out_nord.s_C_DISCOUNT)) * (float)(1.0 + ((float)(newP-
>out_nord.s_D_TAX)) + ((float)(newP->out_nord.s_W_TAX)));
  newP->out_nord.s_total_amount = newP-
>out_nord.s_total_amount;

  return(newP->out_nord.terror);
}


void tkvcndone (ora_cn_data_t *ora_SlotDataP)

{
  newctx *nctx = (newctx *)ora_SlotDataP->nctx;


  if (nctx)
  {
    DISCARD OCIHandleFree((dvoid *)nctx-
>curn1,OCI_HTYPE_STMT);
    DISCARD OCIHandleFree((dvoid *)nctx-
>curn2,OCI_HTYPE_STMT);
    free (nctx);
  }
}
```

plord.cpp

```
#include "../../tpccisapi/tpcc.h"
#include "plora.h"
#include "ora_tpcc.h"
#include "tpccflags.h"

extern void oralogprintf(FILE *,char *format, ...);


/*---------------------------------------------------------------------------
                PRIVATE TYPES AND CONSTANTS
  ---------------------------------------------------------------------------*/

/*---------------------------------------------------------------------------
                STATIC FUNCTION DECLARATIONS
  ---------------------------------------------------------------------------*/



#define SQLCUR0 "SELECT rowid FROM cust \
            WHERE c_d_id = :d_id AND c_w_id = :w_id AND c_last
= :c_last \
            ORDER BY c_last, c_d_id, c_w_id, c_first"

#define SQLCUR1 "SELECT /*+ USE_NL(cust) INDEX_DESC(ordr
iordr2) */  \
            c_id, c_balance, c_first, c_middle, c_last, \
            o_id, o_entry_d, o_carrier_id, o_ol_cnt, ordr.rowid \
            FROM cust, ordr \
            WHERE cust.rowid = :cust_rowid \
            AND   o_d_id = c_d_id AND o_w_id = c_w_id AND
o_c_id = c_id \
            ORDER BY o_c_id DESC, o_d_id DESC, o_w_id DESC,
o_id DESC"


#define SQLCUR2 "SELECT /*+ USE_NL(cust)  INDEX_DESC (ordr
iordr2) */   \
            c_balance, c_first, c_middle, c_last, \
            o_id, o_entry_d, o_carrier_id, o_ol_cnt, ordr.rowid \
            FROM cust, ordr \
            WHERE c_id = :c_id AND c_d_id = :d_id AND c_w_id
= :w_id \
            AND o_d_id = c_d_id AND o_w_id = c_w_id AND o_c_id
= c_id \
            ORDER BY o_c_id DESC, o_d_id DESC, o_w_id DESC ,
o_id DESC"


#define SQLCUR3 "SELECT  /*+ ORDERED USE_NL(ordl)
CLUSTER(ordl) */ \
            ol_i_id, ol_supply_w_id, ol_quantity, ol_amount,
ol_delivery_d \
            FROM ordr, ordl \
            WHERE ordr.rowid = :ordr_rowid \
             AND o_id = ol_o_id AND  ol_d_id = o_d_id AND ol_w_id
= o_w_id"

#define SQLCUR4 "SELECT count(c_last) FROM cust \
            WHERE c_d_id = :d_id AND c_w_id = :w_id AND c_last
= :c_last "


struct ordctx {

  ub2 c_rowid_len[100];
  ub2 ol_supply_w_id_len[NITEMS];
  ub2 ol_i_id_len[NITEMS];
  ub2 ol_quantity_len[NITEMS];
  ub2 ol_amount_len[NITEMS];
  ub2 ol_delivery_d_len[NITEMS];
  ub2 ol_w_id_len;
  ub2 ol_d_id_len;
  ub2 ol_o_id_len;


  ub4 ol_supply_w_id_csize;
  ub4 ol_i_id_csize;
  ub4 ol_quantity_csize;
  ub4 ol_amount_csize;
  ub4 ol_delivery_d_csize;
  ub4 ol_w_id_csize;
  ub4 ol_d_id_csize;
  ub4 ol_o_id_csize;

  OCIStmt *curo0;
  OCIStmt *curo1;
  OCIStmt *curo2;
  OCIStmt *curo3;
  OCIStmt *curo4;
  OCIBind *c_id_bp;
  OCIBind *w_id_bp[4];
  OCIBind *d_id_bp[4];
  OCIBind *c_last_bp[2];
  OCIBind *o_id_bp;
  OCIBind *c_rowid_bp;
  OCIBind *o_rowid_bp;
  OCIDefine *c_rowid_dp;
  OCIDefine *c_last_dp[2];
  OCIDefine *c_id_dp;
  OCIDefine *c_first_dp[2];
  OCIDefine *c_middle_dp[2];
  OCIDefine *c_balance_dp[2];
  OCIDefine *o_rowid_dp[2];
  OCIDefine *o_id_dp[2];
  OCIDefine *o_entry_d_dp[2];
  OCIDefine *o_cr_id_dp[2];
  OCIDefine *o_ol_cnt_dp[2];
  OCIDefine *ol_d_d_dp;
  OCIDefine *ol_i_id_dp;
  OCIDefine *ol_supply_w_id_dp;
  OCIDefine *ol_quantity_dp;
  OCIDefine *ol_amount_dp;
  OCIDefine *ol_d_base_dp;
  OCIDefine *c_count_dp;
```

```
   OCIRowid *c_rowid_ptr[100];
   OCIRowid *c_rowid_cust;
   OCIRowid *o_rowid;
   int cs;
   int cust_idx;
   int norow;
   int rcount;
   int somerows;
};

typedef struct ordctx ordctx;

struct defctx
{
 boolean reexec;
 ub4 count;
};

struct defctx_ordctx
{
   defctx *ctxp;
   ordctx *octx;
};
typedef struct defctx_ordctx defctx_ordctx;


tkvcoinit (ora_cn_data_t *ora_SlotDataP)

{
   FILE *server_logtrans = ora_SlotDataP->server_logtrans;

   int i;
   text stmbuf[SQL_BUF_SIZE];

   ordctx *octx;
   defctx *cbctx;
   defctx_ordctx *ctxp_octx;
   ords_wrapper *ordP;
   OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
   OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
   dvoid *errhp = ora_SlotDataP->errhp;
   OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
   OCISession *tpcusr = ora_SlotDataP->tpcusr;
   OCIStmt *curi = ora_SlotDataP->curi;

   octx = (ordctx *) malloc (sizeof(ordctx));
   DISCARD memset(octx,(char)0,sizeof(ordctx));
   octx->cs = 1;
   octx->norow = 0;
   octx->somerows = 10;
   ora_SlotDataP->octx = (void *)octx;

   cbctx = (defctx *) malloc (sizeof(defctx));
   DISCARD memset(cbctx,(char)0,sizeof(defctx));
   ora_SlotDataP->cbctx = (void *)cbctx;

   /* allocate the space */
   ctxp_octx = (defctx_ordctx *)malloc(sizeof(defctx_ordctx));
   ora_SlotDataP->ctxp_octx = (void *)ctxp_octx;

   memset(&ora_SlotDataP->ordP,(char)0,sizeof(ords_wrapper));
   ordP = &ora_SlotDataP->ordP;

   /* get the rowid handles */
   OCIERROR(errhp, OCIDescriptorAlloc((dvoid *)tpcenv,(dvoid
**)&octx->o_rowid,
                  (ub4)OCI_DTYPE_ROWID, (size_t) 0, (dvoid **)0));
   for(i=0;i<100;i++) {
    DISCARD OCIERROR(errhp, OCIDescriptorAlloc(tpcenv,
                (dvoid**)&octx->c_rowid_ptr[i],
OCI_DTYPE_ROWID,0,(dvoid**)0));
  }

  //   DISCARD OCIERROR(errhp,
  //     OCIHandleAlloc(tpcenv,(dvoid**)&octx-
>curo0,OCI_HTYPE_STMT,0,(dvoid**)0));
    DISCARD OCIERROR(errhp,
      OCIHandleAlloc(tpcenv,(dvoid**)&octx-
>curo0,OCI_HTYPE_STMT,0,(dvoid**)0));
    DISCARD OCIERROR(errhp,
      OCIHandleAlloc(tpcenv,(dvoid**)&octx-
>curo1,OCI_HTYPE_STMT,0,(dvoid**)0));
    DISCARD OCIERROR(errhp,
      OCIHandleAlloc(tpcenv,(dvoid**)&octx-
>curo2,OCI_HTYPE_STMT,0,(dvoid**)0));
    DISCARD OCIERROR(errhp,
      OCIHandleAlloc(tpcenv,(dvoid**)&octx-
>curo3,OCI_HTYPE_STMT,0,(dvoid**)0));
    DISCARD OCIERROR(errhp,
      OCIHandleAlloc(tpcenv,(dvoid**)&octx-
>curo4,OCI_HTYPE_STMT,0,(dvoid**)0));

  /*  c_id = 0, use find customer by lastname. Get an array or rowid's
back*/
    DISCARD sprintf((char *) stmbuf, SQLCUR0);
    DISCARD OCIERROR(errhp,
       OCIStmtPrepare(octx->curo0,(OCIError
*)errhp,stmbuf,(ub4)strlen((char *)stmbuf),
                  OCI_NTV_SYNTAX,OCI_DEFAULT));
    DISCARD OCIERROR(errhp,
       OCIAttrSet(octx->curo0,OCI_HTYPE_STMT,&octx->norow,0,
              OCI_ATTR_PREFETCH_ROWS,(OCIError *)errhp));
  /* get order/customer info back based on rowid */
    DISCARD sprintf((char *) stmbuf, SQLCUR1);
    DISCARD OCIERROR(errhp,
       OCIStmtPrepare(octx->curo1,(OCIError
*)errhp,stmbuf,(ub4)strlen((char *)stmbuf),
                  OCI_NTV_SYNTAX,OCI_DEFAULT));
    DISCARD OCIERROR(errhp,
       OCIAttrSet(octx->curo1,OCI_HTYPE_STMT,&octx->norow,0,
              OCI_ATTR_PREFETCH_ROWS,(OCIError *)errhp));

  /*  c_id == 0, use lastname to find customer */
    DISCARD sprintf((char *) stmbuf, SQLCUR2);
    DISCARD OCIERROR(errhp,
       OCIStmtPrepare(octx->curo2,(OCIError
*)errhp,stmbuf,(ub4)strlen((char *)stmbuf),
                  OCI_NTV_SYNTAX,OCI_DEFAULT));
    DISCARD OCIERROR(errhp,
       OCIAttrSet(octx->curo2,OCI_HTYPE_STMT,&octx->norow,0,
              OCI_ATTR_PREFETCH_ROWS,(OCIError *)errhp));

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

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

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

       octx->ol_supply_w_id_len[i] = sizeof(int);
```

```
      octx->ol_i_id_len[i] = sizeof(int);
#ifdef USE_IEEE_NUMBER
     octx->ol_quantity_len[i] = sizeof(float);
      octx->ol_amount_len[i] = sizeof(float);
#else
     octx->ol_quantity_len[i] = sizeof(int);
      octx->ol_amount_len[i] = sizeof(int);
#endif
     octx->ol_delivery_d_len[i] = sizeof(ordP-
>out_ords.s_OL_DELIVERY_D_base[0]);
   }
   octx->ol_supply_w_id_csize = NITEMS;
   octx->ol_i_id_csize = NITEMS;
   octx->ol_quantity_csize = NITEMS;
   octx->ol_amount_csize = NITEMS;
   octx->ol_delivery_d_csize = NITEMS;
   octx->ol_w_id_csize = NITEMS;
   octx->ol_o_id_csize = NITEMS;
   octx->ol_d_id_csize = NITEMS;
   octx->ol_w_id_len = sizeof(int);
   octx->ol_d_id_len = sizeof(int);
   octx->ol_o_id_len = sizeof(int);

   /* bind variables */

   /* c_id (customer id) is not known */
   OCIBND(octx->curo0,octx->w_id_bp[0],(OCIError
*)errhp,":w_id",ADR(ordP->in_ords.s_W_ID),
         SIZ(int),SQLT_INT);
   OCIBND(octx->curo0,octx->d_id_bp[0],(OCIError
*)errhp,":d_id",ADR(ordP->in_ords.s_D_ID),
         SIZ(int),SQLT_INT);
   OCIBND(octx->curo0,octx->c_last_bp[0],(OCIError
*)errhp,":c_last",ordP->in_ords.s_C_LAST,
      SIZ(ordP->in_ords.s_C_LAST), SQLT_STR);
   OCIDFNRA(octx->curo0,octx->c_rowid_dp,(OCIError
*)errhp,1,octx->c_rowid_ptr,
           SIZ(OCIRowid*), SQLT_RDD, NULL, octx->c_rowid_len,
NULL);

   OCIBND(octx->curo1,octx->c_rowid_bp,(OCIError
*)errhp,":cust_rowid", &octx->c_rowid_cust,
         sizeof( octx->c_rowid_ptr[0]),SQLT_RDD);
   OCIDEF(octx->curo1,octx->c_id_dp,(OCIError
*)errhp,1,ADR(ordP->in_ords.s_C_ID),SIZ(int),SQLT_INT);
#ifdef USE_IEEE_NUMBER
   OCIDEF(octx->curo1,octx->c_balance_dp[0],(OCIError
*)errhp,2,ADR(ordP->out_ords.s_C_BALANCE),
         SIZ(double),SQLT_BDOUBLE);
#else
   OCIDEF(octx->curo1,octx->c_balance_dp[0],(OCIError
*)errhp,2,ADR(ordP->out_ords.s_C_BALANCE),
         SIZ(double),SQLT_FLT);
#endif
   OCIDEF(octx->curo1,octx->c_first_dp[0],(OCIError *)errhp,3,ordP-
>out_ords.s_C_FIRST,SIZ(ordP->out_ords.s_C_FIRST)-1,
         SQLT_CHR);
   OCIDEF(octx->curo1,octx->c_middle_dp[0],(OCIError
*)errhp,4,ordP->out_ords.s_C_MIDDLE,
         SIZ(ordP->out_ords.s_C_MIDDLE)-1,SQLT_AFC);
   OCIDEF(octx->curo1,octx->c_last_dp[0],(OCIError *)errhp,5,ordP-
>out_ords.s_C_LAST,SIZ(ordP->out_ords.s_C_LAST)-1,
         SQLT_CHR);
   OCIDEF(octx->curo1,octx->o_id_dp[0],(OCIError
*)errhp,6,ADR(ordP->out_ords.s_O_ID),SIZ(int),SQLT_INT);
   OCIDEF(octx->curo1,octx->o_entry_d_dp[0],(OCIError *)errhp,7,
         &ordP-
>out_ords.s_OL_DELIVERY_D_base,SIZ(OCIDate),SQLT_ODT);
   OCIDEF(octx->curo1,octx->o_cr_id_dp[0],(OCIError
*)errhp,8,ADR(ordP->out_ords.s_O_CARRIER_ID),
         SIZ(int),SQLT_INT);
   OCIDEF(octx->curo1,octx->o_ol_cnt_dp[0],(OCIError
*)errhp,9,ADR(ordP->out_ords.s_ol_cnt),
         SIZ(int),SQLT_INT);
   OCIDEF(octx->curo1,octx->o_rowid_dp[0],(OCIError
*)errhp,10,ADR(octx->o_rowid),
         SIZ(OCIRowid*),SQLT_RDD);


/* Bind for third cursor , no-zero customer id */
   OCIBND(octx->curo2,octx->w_id_bp[1],(OCIError
*)errhp,":w_id",ADR(ordP->in_ords.s_W_ID),
         SIZ(int),SQLT_INT);
   OCIBND(octx->curo2,octx->d_id_bp[1],(OCIError
*)errhp,":d_id",ADR(ordP->in_ords.s_D_ID),
         SIZ(int),SQLT_INT);
   OCIBND(octx->curo2,octx->c_id_bp,(OCIError
*)errhp,":c_id",ADR(ordP->in_ords.s_C_ID),
         SIZ(int),SQLT_INT);
#ifdef USE_IEEE_NUMBER
   OCIDEF(octx->curo2,octx->c_balance_dp[1],(OCIError
*)errhp,1,ADR(ordP->out_ords.s_C_BALANCE),
         SIZ(double),SQLT_BDOUBLE);
#else
   OCIDEF(octx->curo2,octx->c_balance_dp[1],(OCIError
*)errhp,1,ADR(ordP->out_ords.s_C_BALANCE),
         SIZ(double),SQLT_FLT);
#endif
   OCIDEF(octx->curo2,octx->c_first_dp[1],(OCIError *)errhp,2,ordP-
>out_ords.s_C_FIRST,SIZ(ordP->out_ords.s_C_FIRST)-1,
         SQLT_CHR);
   OCIDEF(octx->curo2,octx->c_middle_dp[1],(OCIError
*)errhp,3,ordP->out_ords.s_C_MIDDLE,
         SIZ(ordP->out_ords.s_C_MIDDLE)-1,SQLT_AFC);
   OCIDEF(octx->curo2,octx->c_last_dp[1],(OCIError *)errhp,4,ordP-
>out_ords.s_C_LAST,SIZ(ordP->out_ords.s_C_LAST)-1,
         SQLT_CHR);
   OCIDEF(octx->curo2,octx->o_id_dp[1],(OCIError
*)errhp,5,ADR(ordP->out_ords.s_O_ID),SIZ(int),SQLT_INT);
   OCIDEF(octx->curo2,octx->o_entry_d_dp[1],(OCIError *)errhp,6,
&ordP->out_ords.s_OL_DELIVERY_D_base,
         SIZ(OCIDate),SQLT_ODT);
   OCIDEF(octx->curo2, octx->o_cr_id_dp[1],(OCIError
*)errhp,7,ADR(ordP->out_ords.s_O_CARRIER_ID),
         SIZ(int), SQLT_INT);
   OCIDEF(octx->curo2,octx->o_ol_cnt_dp[1],(OCIError
*)errhp,8,ADR(ordP->out_ords.s_ol_cnt),
         SIZ(int),SQLT_INT);
   OCIDEF(octx->curo2,octx->o_rowid_dp[1],(OCIError
*)errhp,9,ADR(octx->o_rowid),
         SIZ(OCIRowid*),SQLT_RDD);

/* Bind for last cursor */

/*
   OCIBND(octx->curo3,octx->w_id_bp[2],(OCIError
*)errhp,":w_id",ADR(ordP->ordin.w_id), SIZ(int),SQLT_INT);
   OCIBND(octx->curo3,octx->d_id_bp[2],(OCIError
*)errhp,":d_id",ADR(ordP->ordin.d_id), SIZ(int),SQLT_INT);
   OCIBND(octx->curo3,octx->o_id_bp,(OCIError
*)errhp,":o_id",ADR(ordP->ordout.o_id), SIZ(int),SQLT_INT);
   OCIBND(octx->curo3,octx->c_id_bp,(OCIError
*)errhp,":c_id",ADR(ordP->ordin.c_id), SIZ(int),SQLT_INT);
 */
   OCIBND(octx->curo3,octx->o_rowid_bp,(OCIError
*)errhp,":ordr_rowid",
         &octx->o_rowid, SIZ(OCIRowid*),SQLT_RDD);

   OCIDFNRA(octx->curo3, octx->ol_i_id_dp, (OCIError *)errhp, 1,
ordP->out_ords.s_OL_I_ID,SIZ(int),SQLT_INT,
           NULL,octx->ol_i_id_len, NULL);
   OCIDFNRA(octx->curo3,octx->ol_supply_w_id_dp,(OCIError
*)errhp,2, ordP->out_ords.s_OL_SUPPLY_W_ID,
```

```
          SIZ(int),SQLT_INT, NULL,
          octx->ol_supply_w_id_len, NULL);
#ifdef USE_IEEE_NUMBER
   OCIDFNRA(octx->curo3, octx->ol_quantity_dp,(OCIError
*)errhp,3, ordP->out_ords.s_OL_QUANTITY,SIZ(float),
          SQLT_FLT, NULL,octx->ol_quantity_len, NULL);
   OCIDFNRA(octx->curo3,octx->ol_amount_dp,(OCIError
*)errhp,4,ordP->out_ords.s_OL_AMOUNT, SIZ(float),
          SQLT_FLT,NULL, octx->ol_amount_len, NULL);
#else
   OCIDFNRA(octx->curo3, octx->ol_quantity_dp,(OCIError
*)errhp,3, ordP->out_ords.s_OL_QUANTITY,SIZ(int),
          SQLT_INT, NULL,octx->ol_quantity_len, NULL);
   OCIDFNRA(octx->curo3,octx->ol_amount_dp,(OCIError
*)errhp,4,ordP->out_ords.s_OL_AMOUNT, SIZ(int),
          SQLT_INT,NULL, octx->ol_amount_len, NULL);
#endif
   OCIDFNRA(octx->curo3,octx->ol_d_base_dp,(OCIError
*)errhp,5,ordP->out_ords.s_OL_DELIVERY_D_base,SIZ(OCIDate),
          SQLT_ODT, NULL,octx->ol_delivery_d_len,NULL);

   OCIBND(octx->curo4,octx->w_id_bp[3],(OCIError
*)errhp,":w_id",ADR(ordP->in_ords.s_W_ID),
          SIZ(int),SQLT_INT);
   OCIBND(octx->curo4,octx->d_id_bp[3],(OCIError
*)errhp,":d_id",ADR(ordP->in_ords.s_D_ID),
          SIZ(int),SQLT_INT);
   OCIBND(octx->curo4,octx->c_last_bp[1],(OCIError
*)errhp,":c_last",ordP->out_ords.s_C_LAST,
          SIZ(ordP->out_ords.s_C_LAST), SQLT_STR);
   OCIDEF(octx->curo4,octx->c_count_dp,(OCIError
*)errhp,1,ADR(octx->rcount),SIZ(int),
          SQLT_INT);


   return (0);

}

tkvco (ora_cn_data_t *ora_SlotDataP)

{
  FILE *server_logtrans = ora_SlotDataP->server_logtrans;

   int i;
   int rcount;

   ordctx *octx = (ordctx *)ora_SlotDataP->octx;
   defctx *cbctx = (defctx *)ora_SlotDataP->cbctx;
   ords_wrapper *ordP = &ora_SlotDataP->ordP;
   OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
   OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
   dvoid *errhp = ora_SlotDataP->errhp;
   OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
   OCISession *tpcusr = ora_SlotDataP->tpcusr;
   OCIStmt *curi = ora_SlotDataP->curi;


#if defined(ISO9)
   int secondread = 0;
   char sdate[30];
   ub4  datelen;
   sysdate(sdate);
   printf("Order Status started at: %s\n", sdate);
#endif

   for (i = 0; i < NITEMS; i++) {
      octx->ol_supply_w_id_len[i] = sizeof(int);
      octx->ol_i_id_len[i] = sizeof(int);
#ifdef USE_IEEE_NUMBER
     octx->ol_quantity_len[i] = sizeof(float);
      octx->ol_amount_len[i] = sizeof(float);
#else
      octx->ol_quantity_len[i] = sizeof(int);
       octx->ol_amount_len[i] = sizeof(int);
#endif
      octx->ol_delivery_d_len[i] = sizeof(OCIDate);
    }
   octx->ol_supply_w_id_csize = NITEMS;
   octx->ol_i_id_csize = NITEMS;
   octx->ol_quantity_csize = NITEMS;
   octx->ol_amount_csize = NITEMS;
   octx->ol_delivery_d_csize = NITEMS;
retry:
   if(ordP->in_ords.bylastname)
   {
     cbctx->reexec = FALSE;
    ordP->out_ords.terror=OCIStmtExecute(tpcsvc,octx-
>curo0,(OCIError *)errhp,100,0,
              NULLP(CONST
OCISnapshot),NULLP(OCISnapshot),OCI_DEFAULT);
     /* will get OCI_NO_DATA if <100 found */
    if ((ordP->out_ords.terror != OCI_NO_DATA) && (ordP-
>out_ords.terror != OCI_SUCCESS))
     {
       ordP->out_ords.terror=OCIERROR(errhp, ordP-
>out_ords.terror);
       if((ordP->out_ords.terror == NOT_SERIALIZABLE) || (ordP-
>out_ords.terror == RECOVERR))
       {
         DISCARD OCITransCommit(tpcsvc,(OCIError
*)errhp,OCI_DEFAULT);
         ordP->out_ords.retry++;
         goto retry;
       } else {
         return -1;
       }
     }
    if (ordP->out_ords.terror == OCI_NO_DATA) /* there are no more
rows */
     {
      /* get rowcount, find middle one */
       DISCARD OCIAttrGet(octx-
>curo0,OCI_HTYPE_STMT,&rcount,NULL,
                          OCI_ATTR_ROW_COUNT,(OCIError *)errhp);

       if (rcount <1)
       {
         oralogprintf(server_logtrans,"ORDERSTATUS:
rcount=%d\n",rcount);
         oralogprintf(server_logtrans,"ORDERSTATUS: c_d_id %d
c_w_id %d c_last %s\n",ordP->in_ords.s_D_ID,ordP-
>in_ords.s_W_ID,ordP->in_ords.s_C_LAST);
         return (-1);
       }
       octx->cust_idx=(rcount)/2 ;
     }
     else
     {
       /* count the number of rows */
       ordP->out_ords.terror=OCIStmtExecute(tpcsvc,octx-
>curo4,(OCIError *)errhp,1,0,
                 NULLP(CONST
OCISnapshot),NULLP(OCISnapshot),OCI_DEFAULT);
       if ((ordP->out_ords.terror != OCI_NO_DATA) && (ordP-
>out_ords.terror != OCI_SUCCESS))
       {
         ordP->out_ords.terror=OCIERROR(errhp, ordP-
>out_ords.terror);
         if ((ordP->out_ords.terror == NOT_SERIALIZABLE) || (ordP-
>out_ords.terror == RECOVERR))
         {
           DISCARD OCITransCommit(tpcsvc,(OCIError
*)errhp,OCI_DEFAULT);
```

```
          ordP->out_ords.retry++;
          goto retry;
        } else {
          return -1;
        }
      }
      if (octx->rcount+1 < 2*10 )
        octx->cust_idx=(octx->rcount+1)/2 ;
      else          /* */
      {
        cbctx->reexec = TRUE;
        cbctx->count = (octx->rcount+1)/2 ;
       ordP->out_ords.terror=OCIStmtExecute(tpcsvc,octx->curo0,(OCIError *)errhp,cbctx->count,
                              0,NULLP(CONST OCISnapshot),
                              NULLP(OCISnapshot),OCI_DEFAULT);
        /* will get OCI_NO_DATA if <100 found */
        if (cbctx->count > 0)
        {
          oralogprintf(server_logtrans,"ORDERSTATUS: did not get all rows ");
          return (-1);
        }

       if ((ordP->out_ords.terror != OCI_NO_DATA) && (ordP->out_ords.terror != OCI_SUCCESS))
        {
          ordP->out_ords.terror=OCIERROR(errhp, ordP->out_ords.terror);
          if((ordP->out_ords.terror == NOT_SERIALIZABLE) || (ordP->out_ords.terror == RECOVERR))
          {
            DISCARD OCITransCommit(tpcsvc,(OCIError *)errhp,OCI_DEFAULT);
            ordP->out_ords.retry++;
            goto retry;
           } else {
           return -1;
           }
        }
        octx->cust_idx=0 ;
      }
    }

    octx->c_rowid_cust = octx->c_rowid_ptr[octx->cust_idx];
    ordP->out_ords.terror=OCIStmtExecute(tpcsvc,octx->curo1,(OCIError *)errhp,1,0,
                  NULLP(CONST OCISnapshot),NULLP(OCISnapshot),OCI_DEFAULT);
    if (ordP->out_ords.terror != OCI_SUCCESS)
    {
      ordP->out_ords.terror=OCIERROR(errhp,ordP->out_ords.terror);
       DISCARD OCITransCommit(tpcsvc,(OCIError *)errhp,OCI_DEFAULT);
      if((ordP->out_ords.terror == NOT_SERIALIZABLE) || (ordP->out_ords.terror == RECOVERR)
        || (ordP->out_ords.terror == SNAPSHOT_TOO_OLD))
       {
          ordP->out_ords.retry++;
          goto retry;
          } else {
          return -1;
       }
      }
   } /* lastname */
    else
    {
      ordP->out_ords.terror=OCIStmtExecute(tpcsvc,octx->curo2,(OCIError *)errhp,1,0,
                        NULLP(CONST OCISnapshot),NULLP(OCISnapshot),
                        OCI_DEFAULT);
      if (ordP->out_ords.terror != OCI_SUCCESS)
      {
        ordP->out_ords.terror=OCIERROR(errhp,ordP->out_ords.terror);
        DISCARD OCITransCommit(tpcsvc,(OCIError *)errhp,OCI_DEFAULT);
       if((ordP->out_ords.terror == NOT_SERIALIZABLE) || (ordP->out_ords.terror == RECOVERR)
          || (ordP->out_ords.terror == SNAPSHOT_TOO_OLD))
        {
          ordP->out_ords.retry++;
          goto retry;
        }
        else
        {
          return -1;
        }
      }
    }
    octx->ol_w_id_len = sizeof(int);
    octx->ol_d_id_len = sizeof(int);
    octx->ol_o_id_len = sizeof(int);

   ordP->out_ords.terror = OCIStmtExecute(tpcsvc,octx->curo3,(OCIError *)errhp,ordP->out_ords.s_ol_cnt,0,
                        NULLP(CONST OCISnapshot),NULLP(OCISnapshot),
                        OCI_DEFAULT | OCI_COMMIT_ON_SUCCESS);
    if (ordP->out_ords.terror != OCI_SUCCESS )
    {
      ordP->out_ords.terror=OCIERROR(errhp,ordP->out_ords.terror);
      DISCARD OCITransCommit(tpcsvc,(OCIError *)errhp,OCI_DEFAULT);
     if((ordP->out_ords.terror == NOT_SERIALIZABLE) || (ordP->out_ords.terror == RECOVERR)
        || (ordP->out_ords.terror == SNAPSHOT_TOO_OLD))
      {
        ordP->out_ords.retry++;
        goto retry;
      }
      else
      {
        return -1;
      }

    }
   /* clean up and convert the delivery dates */
    for (i = 0; i < ordP->out_ords.s_ol_cnt; i++)
    {
      ordP->out_ords.ol_del_len[i]=sizeof(ordP->out_ords.s_OL_DELIVERY_D_time[i]);
      DISCARD OCIERROR(errhp,OCIDateToText((OCIError *)errhp,&ordP->out_ords.s_OL_DELIVERY_D_base[i],
         (const text*)SHORTDATE,(ub1)strlen(SHORTDATE),(text*)0,0,
          (ub4 *)&ordP->out_ords.ol_del_len[i], (text *)ordP->out_ords.s_OL_DELIVERY_D_time[i]));
    }
   ordP->out_ords.terror = 0;
   return (0);

}


void tkvcodone (ora_cn_data_t *ora_SlotDataP)
{

   if (ora_SlotDataP->octx) {
      free (ora_SlotDataP->octx);
      ora_SlotDataP->octx = NULL;
```

```
  }
}

/* end of file tkvcord.c */
```

plpay.cpp

```
#include "../../tpccisapi/tpcc.h"
#include "plora.h"
#include "ora_tpcc.h"

extern char OracleHome[256];
extern int sqlfile(FILE *server_logtrans,char *fnam, text *linebuf);

extern void oralogprintf(FILE *,char *format, ...);

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

struct payctx {
  OCIStmt *curpi;
  OCIStmt *curp0;
  OCIStmt *curp1;
  OCIBind *w_id_bp[2];
  ub2 w_id_len;

  OCIBind *d_id_bp[2];
  ub2 d_id_len;

  OCIBind *c_w_id_bp[2];
  ub2 c_w_id_len;

  OCIBind *c_d_id_bp[2];
  ub2 c_d_id_len;

  OCIBind *c_id_bp[2];
  ub2 c_id_len;

  OCIBind *h_amount_bp[2];
  ub2 h_amount_len;

  OCIBind *c_last_bp[2];
  ub2 c_last_len;

  OCIBind *w_street_1_bp[2];
  ub2 w_street_1_len;

  OCIBind *w_street_2_bp[2];
  ub2 w_street_2_len;

  OCIBind *w_city_bp[2];
  ub2 w_city_len;

  OCIBind *w_state_bp[2];
  ub2 w_state_len;

  OCIBind *w_zip_bp[2];
  ub2 w_zip_len;

  OCIBind *d_street_1_bp[2];
  ub2 d_street_1_len;

  OCIBind *d_street_2_bp[2];
  ub2 d_street_2_len;

  OCIBind *d_city_bp[2];
  ub2 d_city_len;

  OCIBind *d_state_bp[2];
  ub2 d_state_len;

  OCIBind *d_zip_bp[2];
  ub2 d_zip_len;

  OCIBind *c_first_bp[2];
  ub2 c_first_len;

  OCIBind *c_middle_bp[2];
  ub2 c_middle_len;

  OCIBind *c_street_1_bp[2];
  ub2 c_street_1_len;

  OCIBind *c_street_2_bp[2];
  ub2 c_street_2_len;

  OCIBind *c_city_bp[2];
  ub2 c_city_len;

  OCIBind *c_state_bp[2];
  ub2 c_state_len;

  OCIBind *c_zip_bp[2];
  ub2 c_zip_len;

  OCIBind *c_phone_bp[2];
  ub2 c_phone_len;

  OCIBind *c_since_bp[2];
  ub2 c_since_len;

  OCIBind *c_credit_bp[2];
  ub2 c_credit_len;

  OCIBind *c_credit_lim_bp[2];
  ub2 c_credit_lim_len;

  OCIBind *c_discount_bp[2];
  ub2 c_discount_len;

  OCIBind *c_balance_bp[2];
  ub2 c_balance_len;

  OCIBind *c_data_bp[2];
  ub2 c_data_len;

  OCIBind *h_date_bp[2];
  ub2 h_date_len;

  OCIBind *retries_bp[2];
  ub2 retries_len;

  OCIBind *cr_date_bp[2];
  ub2 cr_date_len;

  OCIBind *byln_bp[2];
  ub2 byln_len;
};

typedef struct payctx payctx;

int tkvcpinit (ora_cn_data_t *ora_SlotDataP)
{
   char sqlfilename[256];
   FILE *server_logtrans = ora_SlotDataP->server_logtrans;
   /*  */
   payctx *pctx;
   paym_wrapper *payP;
   OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
   OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
   dvoid *errhp = ora_SlotDataP->errhp;
   OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
   OCISession *tpcusr = ora_SlotDataP->tpcusr;
```

```
  OCIStmt *curi = ora_SlotDataP->curi;

  oralogprintf(ora_SlotDataP->server_logtrans,">>tkvcpinit\n");
  text stmbuf[SQL_BUF_SIZE];

  pctx = (payctx *)malloc(sizeof(payctx));
  memset(pctx,(char)0,sizeof(payctx));
  ora_SlotDataP->pctx = (void *)pctx;

  payP = &ora_SlotDataP->payP;
  memset(&ora_SlotDataP->payP,(char)0,sizeof(paym_wrapper));

/* cursor for init */
  DISCARD OCIERROR(errhp,OCIHandleAlloc(tpcenv, (dvoid
**)(&(pctx->curpi)),
        OCI_HTYPE_STMT,0,(dvoid**)0));

  DISCARD OCIERROR(errhp,OCIHandleAlloc(tpcenv, (dvoid
**)(&(pctx->curp0)),
        OCI_HTYPE_STMT,0,(dvoid**)0));
  DISCARD OCIERROR(errhp,OCIHandleAlloc(tpcenv, (dvoid
**)(&(pctx->curp1)),
        OCI_HTYPE_STMT,0,(dvoid**)0));

  /*  build the init statement  and execute it */

  sprintf ((char*)stmbuf, SQLTXT_INIT);
  DISCARD OCIERROR(errhp,OCIStmtPrepare(pctx->curpi,
(OCIError *)errhp, stmbuf,
        strlen((char *)stmbuf), OCI_NTV_SYNTAX,
OCI_DEFAULT));
  DISCARD OCIERROR(errhp, OCIStmtExecute(tpcsvc,pctx-
>curpi,(OCIError *)errhp,1,0,
              NULLP(CONST
OCISnapshot),NULLP(OCISnapshot),OCI_DEFAULT));

  /* customer id !=  0, go by cust id */
  sprintf(sqlfilename,"%s/tpcc-
kit/benchrun/blocks/paynz.sql",OracleHome);
  sqlfile(ora_SlotDataP->server_logtrans,sqlfilename,stmbuf);
  DISCARD OCIERROR(errhp,OCIStmtPrepare(pctx->curp0,
(OCIError *)errhp, stmbuf,
        strlen((char *)stmbuf), OCI_NTV_SYNTAX,
OCI_DEFAULT));

  /* customer id ==  0, go by last name */

  sprintf(sqlfilename,"%s/tpcc-
kit/benchrun/blocks/payz.sql",OracleHome);
  sqlfile(ora_SlotDataP->server_logtrans,sqlfilename,stmbuf);
  DISCARD OCIERROR(errhp,OCIStmtPrepare(pctx->curp1,
(OCIError *)errhp, stmbuf,
        strlen((char *)stmbuf), OCI_NTV_SYNTAX,
OCI_DEFAULT));

 pctx->w_id_len = SIZ(payP->in_paym.s_W_ID);
 pctx->d_id_len = SIZ(payP->in_paym.s_D_ID);
 pctx->c_w_id_len = SIZ(payP->in_paym.s_C_W_ID);
 pctx->c_d_id_len = SIZ(payP->in_paym.s_C_D_ID);
 pctx->c_id_len = 0;
 pctx->h_amount_len = SIZ(int);
 pctx->c_last_len = 0;
 pctx->w_street_1_len = 0;
 pctx->w_street_2_len = 0;
 pctx->w_city_len = 0;
 pctx->w_state_len = 0;
 pctx->w_zip_len = 0;
 pctx->d_street_1_len = 0;
 pctx->d_street_2_len = 0;
 pctx->d_city_len = 0;
 pctx->d_state_len = 0;
 pctx->d_zip_len = 0;
 pctx->c_first_len = 0;
 pctx->c_middle_len = 0;
 pctx->c_street_1_len = 0;
 pctx->c_street_2_len = 0;
 pctx->c_city_len = 0;
 pctx->c_state_len = 0;
 pctx->c_zip_len = 0;
 pctx->c_phone_len = 0;
 pctx->c_since_len = 7;
 pctx->c_credit_len = 0;
 pctx->c_credit_lim_len = 0;
 pctx->c_discount_len = 0;
 pctx->c_balance_len = sizeof(double);
 pctx->c_data_len = 0;
 pctx->h_date_len = 0;
 pctx->retries_len =SIZ(payP->out_paym.retry) ;
 pctx->cr_date_len = 7;



  /* bind variables */


  OCIBNDPL(pctx->curp0, pctx->w_id_bp[0], (OCIError
*)errhp,":w_id",ADR(payP->in_paym.s_W_ID),SIZ(int),
        SQLT_INT, NULL);

  OCIBNDPL(pctx->curp0, pctx->d_id_bp[0], (OCIError
*)errhp,":d_id",ADR(payP->in_paym.s_D_ID),SIZ(int),
        SQLT_INT, NULL);
  OCIBND(pctx->curp0, pctx->c_w_id_bp[0], (OCIError
*)errhp,":c_w_id",ADR(payP->in_paym.s_C_W_ID),SIZ(int),
        SQLT_INT);
  OCIBND(pctx->curp0, pctx->c_d_id_bp[0], (OCIError
*)errhp,":c_d_id",ADR(payP->in_paym.s_C_D_ID),SIZ(int),
        SQLT_INT);
  OCIBND(pctx->curp0, pctx->c_id_bp[0], (OCIError
*)errhp,":c_id",ADR(payP->in_paym.s_C_ID),SIZ(int),
        SQLT_INT);

  OCIBNDPL(pctx->curp0, pctx->h_amount_bp[0], (OCIError
*)errhp,":h_amount",ADR(payP->in_paym.s_H_AMOUNT),
        SIZ(payP->in_paym.s_H_AMOUNT),SQLT_INT,  &pctx-
>h_amount_len);

  OCIBNDPL(pctx->curp0, pctx->c_last_bp[0], (OCIError
*)errhp,":c_last",payP->out_paym.s_C_LAST,SIZ(payP-
>out_paym.s_C_LAST),
        SQLT_STR, &pctx->c_last_len);

  OCIBNDPL(pctx->curp0, pctx->w_street_1_bp[0], (OCIError
*)errhp,":w_street_1",payP->out_paym.s_W_STREET_1,
        SIZ(payP->out_paym.s_W_STREET_1),SQLT_STR, &pctx-
>w_street_1_len);
  OCIBNDPL(pctx->curp0, pctx->w_street_2_bp[0], (OCIError
*)errhp,":w_street_2",payP->out_paym.s_W_STREET_2,
        SIZ(payP->out_paym.s_W_STREET_2),SQLT_STR, &pctx-
>w_street_2_len);
  OCIBNDPL(pctx->curp0, pctx->w_city_bp[0], (OCIError
*)errhp,":w_city",payP->out_paym.s_W_CITY,SIZ(payP-
>out_paym.s_W_CITY),
        SQLT_STR, &pctx->w_city_len);
  OCIBNDPL(pctx->curp0, pctx->w_state_bp[0], (OCIError
*)errhp,":w_state",payP->out_paym.s_W_STATE,
        SIZ(payP->out_paym.s_W_STATE), SQLT_STR, &pctx-
>w_state_len);
  OCIBNDPL(pctx->curp0, pctx->w_zip_bp[0], (OCIError
*)errhp,":w_zip",payP->out_paym.s_W_ZIP,SIZ(payP-
>out_paym.s_W_ZIP),
        SQLT_STR, &pctx->w_zip_len);
```

```
  OCIBNDPL(pctx->curp0, pctx->d_street_1_bp[0], (OCIError
*)errhp,":d_street_1",payP->out_paym.s_D_STREET_1,
    SIZ(payP->out_paym.s_D_STREET_1),SQLT_STR, &pctx-
>d_street_1_len);
  OCIBNDPL(pctx->curp0, pctx->d_street_2_bp[0], (OCIError
*)errhp,":d_street_2",payP->out_paym.s_D_STREET_2,
    SIZ(payP->out_paym.s_D_STREET_2),SQLT_STR, &pctx-
>d_street_2_len);
  OCIBNDPL(pctx->curp0, pctx->d_city_bp[0], (OCIError
*)errhp,":d_city",payP->out_paym.s_D_CITY,SIZ(payP-
>out_paym.s_D_CITY),
       SQLT_STR, &pctx->d_city_len);
  OCIBNDPL(pctx->curp0, pctx->d_state_bp[0], (OCIError
*)errhp,":d_state",payP->out_paym.s_D_STATE,
    SIZ(payP->out_paym.s_D_STATE), SQLT_STR, &pctx-
>d_state_len);
  OCIBNDPL(pctx->curp0, pctx->d_zip_bp[0], (OCIError
*)errhp,":d_zip",payP->out_paym.s_D_ZIP,SIZ(payP-
>out_paym.s_D_ZIP),
       SQLT_STR, &pctx->d_zip_len);
  OCIBNDPL(pctx->curp0, pctx->c_first_bp[0], (OCIError
*)errhp,":c_first",payP->out_paym.s_C_FIRST,
    SIZ(payP->out_paym.s_C_FIRST), SQLT_STR, &pctx-
>c_first_len);
  OCIBNDPL(pctx->curp0, pctx->c_middle_bp[0], (OCIError
*)errhp,":c_middle",payP->out_paym.s_C_MIDDLE,2,
       SQLT_AFC, &pctx->c_middle_len);
  OCIBNDPL(pctx->curp0, pctx->c_street_1_bp[0], (OCIError
*)errhp,":c_street_1",payP->out_paym.s_C_STREET_1,
    SIZ(payP->out_paym.s_C_STREET_1),SQLT_STR, &pctx-
>c_street_1_len);
  OCIBNDPL(pctx->curp0, pctx->c_street_2_bp[0], (OCIError
*)errhp,":c_street_2",payP->out_paym.s_C_STREET_2,
    SIZ(payP->out_paym.s_C_STREET_2),SQLT_STR, &pctx-
>c_street_2_len);
  OCIBNDPL(pctx->curp0, pctx->c_city_bp[0], (OCIError
*)errhp,":c_city",payP->out_paym.s_C_CITY,SIZ(payP-
>out_paym.s_C_CITY),
       SQLT_STR, &pctx->c_city_len);
  OCIBNDPL(pctx->curp0, pctx->c_state_bp[0], (OCIError
*)errhp,":c_state",payP->out_paym.s_C_STATE,
    SIZ(payP->out_paym.s_C_STATE), SQLT_STR, &pctx-
>c_state_len);
  OCIBNDPL(pctx->curp0, pctx->c_zip_bp[0], (OCIError
*)errhp,":c_zip",payP->out_paym.s_C_ZIP,SIZ(payP-
>out_paym.s_C_ZIP),
       SQLT_STR,&pctx->c_zip_len);
  OCIBNDPL(pctx->curp0, pctx->c_phone_bp[0], (OCIError
*)errhp,":c_phone",payP->out_paym.s_C_PHONE,
    SIZ(payP->out_paym.s_C_PHONE), SQLT_STR, &pctx-
>c_phone_len);
  OCIBNDPL(pctx->curp0, pctx->c_since_bp[0], (OCIError
*)errhp,":c_since",&payP->out_paym.c_since,
       SIZ(OCIDate), SQLT_ODT, &pctx->c_since_len);
  OCIBNDPL(pctx->curp0, pctx->c_credit_bp[0], (OCIError
*)errhp,":c_credit",payP->out_paym.s_C_CREDIT,
       SIZ(payP->out_paym.s_C_CREDIT),SQLT_CHR, &pctx-
>c_credit_len);

  OCIBNDPL(pctx->curp0, pctx->c_credit_lim_bp[0], (OCIError
*)errhp,":c_credit_lim",
       ADR(payP->out_paym.s_C_CREDIT_LIM),SIZ(double),
SQLT_FLT, &pctx->c_credit_lim_len);

  OCIBNDPL(pctx->curp0, pctx->c_discount_bp[0], (OCIError
*)errhp,":c_discount",
       ADR(payP->out_paym.s_C_DISCOUNT),SIZ(payP-
>out_paym.s_C_DISCOUNT), SQLT_FLT, &pctx->c_discount_len);
  OCIBNDPL(pctx->curp0, pctx->c_balance_bp[0], (OCIError
*)errhp,":c_balance",
       ADR(payP->out_paym.s_C_BALANCE),
SIZ(double),SQLT_FLT, &pctx->c_balance_len);

  OCIBNDPL(pctx->curp0, pctx->c_data_bp[0], (OCIError
*)errhp,":c_data",payP->out_paym.s_C_DATA,SIZ(payP-
>out_paym.s_C_DATA),
       SQLT_STR, &pctx->c_data_len);

  OCIBNDPL(pctx->curp0, pctx->retries_bp[0], (OCIError
*)errhp,":retry",ADR(payP->out_paym.retry),
       SIZ(int), SQLT_INT, &pctx->retries_len);

  OCIBNDPL(pctx->curp0, pctx->cr_date_bp[0], (OCIError
*)errhp,":cr_date",ADR(payP->in_paym.cr_date),
       SIZ(OCIDate),SQLT_ODT, &pctx->cr_date_len);

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


  OCIBNDPL(pctx->curp1, pctx->w_id_bp[1], (OCIError
*)errhp,":w_id",ADR(payP->in_paym.s_W_ID),SIZ(int),
       SQLT_INT, &pctx->w_id_len);
  OCIBNDPL(pctx->curp1, pctx->d_id_bp[1], (OCIError
*)errhp,":d_id",ADR(payP->in_paym.s_D_ID),SIZ(int),
       SQLT_INT, &pctx->d_id_len);
  OCIBND(pctx->curp1, pctx->c_w_id_bp[1], (OCIError
*)errhp,":c_w_id",ADR(payP->in_paym.s_C_W_ID),SIZ(int),
       SQLT_INT);
  OCIBND(pctx->curp1, pctx->c_d_id_bp[1], (OCIError
*)errhp,":c_d_id",ADR(payP->in_paym.s_C_D_ID),SIZ(int),
       SQLT_INT);
  OCIBNDPL(pctx->curp1, pctx->c_id_bp[1], (OCIError
*)errhp,":c_id",ADR(payP->out_paym.s_C_ID),SIZ(int),
       SQLT_INT, &pctx->c_id_len);
#ifdef USE_IEEE_NUMBER
  OCIBNDPL(pctx->curp1, pctx->h_amount_bp[1], (OCIError
*)errhp,":h_amount",ADR(payP->in_paym.s_H_AMOUNT),
       SIZ(float),SQLT_FLT, &pctx->h_amount_len);
#else
  OCIBNDPL(pctx->curp1, pctx->h_amount_bp[1], (OCIError
*)errhp,":h_amount",ADR(payP->in_paym.s_H_AMOUNT),
       SIZ(int),SQLT_INT, &pctx->h_amount_len);
#endif
  OCIBND(pctx->curp1, pctx->c_last_bp[1], (OCIError
*)errhp,":c_last",payP->in_paym.s_C_LAST,SIZ(payP-
>in_paym.s_C_LAST),
       SQLT_STR);
  OCIBNDPL(pctx->curp1, pctx->w_street_1_bp[1], (OCIError
*)errhp,":w_street_1",payP->out_paym.s_W_STREET_1,
    SIZ(payP->out_paym.s_W_STREET_1),SQLT_STR, &pctx-
>w_street_1_len);
  OCIBNDPL(pctx->curp1, pctx->w_street_2_bp[1], (OCIError
*)errhp,":w_street_2",payP->out_paym.s_W_STREET_2,
    SIZ(payP->out_paym.s_W_STREET_2),SQLT_STR, &pctx-
>w_street_2_len);
  OCIBNDPL(pctx->curp1, pctx->w_city_bp[1], (OCIError
*)errhp,":w_city",payP->out_paym.s_W_CITY,SIZ(payP-
>out_paym.s_W_CITY),
       SQLT_STR, &pctx->w_city_len);
  OCIBNDPL(pctx->curp1, pctx->w_state_bp[1], (OCIError
*)errhp,":w_state",payP->out_paym.s_W_STATE,
    SIZ(payP->out_paym.s_W_STATE), SQLT_STR, &pctx-
>w_state_len);
  OCIBNDPL(pctx->curp1, pctx->w_zip_bp[1], (OCIError
*)errhp,":w_zip",payP->out_paym.s_W_ZIP,SIZ(payP-
>out_paym.s_W_ZIP),
       SQLT_STR, &pctx->w_zip_len);
  OCIBNDPL(pctx->curp1, pctx->d_street_1_bp[1], (OCIError
*)errhp,":d_street_1",payP->out_paym.s_D_STREET_1,
    SIZ(payP->out_paym.s_D_STREET_1),SQLT_STR, &pctx-
>d_street_1_len);
  OCIBNDPL(pctx->curp1, pctx->d_street_2_bp[1], (OCIError
*)errhp,":d_street_2",payP->out_paym.s_D_STREET_2,
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    SIZ(payP->out_paym.s_D_STREET_2),SQLT_STR, &pctx-
>d_street_2_len);
  OCIBNDPL(pctx->curp1, pctx->d_city_bp[1], (OCIError
*)errhp,":d_city",payP->out_paym.s_D_CITY,SIZ(payP-
>out_paym.s_D_CITY),
        SQLT_STR, &pctx->d_city_len);
  OCIBNDPL(pctx->curp1, pctx->d_state_bp[1], (OCIError
*)errhp,":d_state",payP->out_paym.s_D_STATE,
        SIZ(payP->out_paym.s_D_STATE), SQLT_STR, &pctx-
>d_state_len);
  OCIBNDPL(pctx->curp1, pctx->d_zip_bp[1], (OCIError
*)errhp,":d_zip",payP->out_paym.s_D_ZIP,SIZ(payP-
>out_paym.s_D_ZIP),
        SQLT_STR, &pctx->d_zip_len);
  OCIBNDPL(pctx->curp1, pctx->c_first_bp[1], (OCIError
*)errhp,":c_first",payP->out_paym.s_C_FIRST,
    SIZ(payP->out_paym.s_C_FIRST), SQLT_STR, &pctx-
>c_first_len);
  OCIBNDPL(pctx->curp1, pctx->c_middle_bp[1], (OCIError
*)errhp,":c_middle",payP->out_paym.s_C_MIDDLE,2,
        SQLT_AFC, &pctx->c_middle_len);

  OCIBNDPL(pctx->curp1, pctx->c_street_1_bp[1], (OCIError
*)errhp,":c_street_1",payP->out_paym.s_C_STREET_1,
    SIZ(payP->out_paym.s_C_STREET_1),SQLT_STR, &pctx-
>c_street_1_len);
  OCIBNDPL(pctx->curp1, pctx->c_street_2_bp[1], (OCIError
*)errhp,":c_street_2",payP->out_paym.s_C_STREET_2,
    SIZ(payP->out_paym.s_C_STREET_2),SQLT_STR, &pctx-
>c_street_2_len);
  OCIBNDPL(pctx->curp1, pctx->c_city_bp[1], (OCIError
*)errhp,":c_city",payP->out_paym.s_C_CITY,
    SIZ(payP->out_paym.s_C_CITY),SQLT_STR, &pctx-
>c_city_len);
  OCIBNDPL(pctx->curp1, pctx->c_state_bp[1], (OCIError
*)errhp,":c_state",payP->out_paym.s_C_STATE,
    SIZ(payP->out_paym.s_C_STATE), SQLT_STR, &pctx-
>c_state_len);
  OCIBNDPL(pctx->curp1, pctx->c_zip_bp[1], (OCIError
*)errhp,":c_zip",payP->out_paym.s_C_ZIP,SIZ(payP-
>out_paym.s_C_ZIP),
        SQLT_STR, &pctx->c_zip_len);
  OCIBNDPL(pctx->curp1, pctx->c_phone_bp[1], (OCIError
*)errhp,":c_phone",payP->out_paym.s_C_PHONE,
    SIZ(payP->out_paym.s_C_PHONE), SQLT_STR, &pctx-
>c_phone_len);
  OCIBNDPL(pctx->curp1, pctx->c_since_bp[1], (OCIError
*)errhp,":c_since",&payP->out_paym.c_since,
        SIZ(OCIDate), SQLT_ODT, &pctx->c_since_len);
  OCIBNDPL(pctx->curp1, pctx->c_credit_bp[1], (OCIError
*)errhp,":c_credit",payP->out_paym.s_C_CREDIT,
        SIZ(payP->out_paym.s_C_CREDIT),SQLT_CHR, &pctx-
>c_credit_len);
  OCIBNDPL(pctx->curp1, pctx->c_credit_lim_bp[1], (OCIError
*)errhp,":c_credit_lim",
        ADR(payP->out_paym.s_C_CREDIT_LIM),SIZ(double),
SQLT_FLT, &pctx->c_credit_lim_len);
  OCIBNDPL(pctx->curp1, pctx->c_discount_bp[1], (OCIError
*)errhp,":c_discount",
        ADR(payP->out_paym.s_C_DISCOUNT),SIZ(float),
SQLT_FLT, &pctx->c_discount_len);

  OCIBNDPL(pctx->curp1, pctx->c_balance_bp[1], (OCIError
*)errhp,":c_balance",
        ADR(payP->out_paym.s_C_BALANCE),
SIZ(double),SQLT_FLT, &pctx->c_balance_len);
  OCIBNDPL(pctx->curp1, pctx->c_data_bp[1], (OCIError
*)errhp,":c_data",payP->out_paym.s_C_DATA,SIZ(payP-
>out_paym.s_C_DATA),
        SQLT_STR, &pctx->c_data_len);
  OCIBNDPL(pctx->curp1, pctx->retries_bp[1], (OCIError
*)errhp,":retry",ADR(payP->out_paym.retry),
        SIZ(int), SQLT_INT, &pctx->retries_len);
  OCIBNDPL(pctx->curp1, pctx->cr_date_bp[1], (OCIError
*)errhp,":cr_date",ADR(payP->in_paym.cr_date),
        SIZ(OCIDate),SQLT_ODT, &pctx->cr_date_len);
  oralogprintf(ora_SlotDataP->server_logtrans,"<<tkvcpinit\n");
  return (0);

}


tkvcp (ora_cn_data_t *ora_SlotDataP)

{
  FILE *server_logtrans = ora_SlotDataP->server_logtrans;

  /*  */
  payctx *pctx = (payctx *)ora_SlotDataP->pctx;
  paym_wrapper *payP = &ora_SlotDataP->payP;
  OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
  OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
  dvoid *errhp = ora_SlotDataP->errhp;
  OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
  OCISession *tpcusr = ora_SlotDataP->tpcusr;
  OCIStmt *curi = ora_SlotDataP->curi;

retry:
  pctx->w_id_len = SIZ(payP->in_paym.s_W_ID);
  pctx->d_id_len = SIZ(payP->in_paym.s_D_ID);
  pctx->c_w_id_len = 0;
  pctx->c_d_id_len = 0;
  pctx->c_id_len = 0;
  pctx->h_amount_len = SIZ(payP->in_paym.s_H_AMOUNT);
  pctx->c_last_len = SIZ(payP->in_paym.s_C_LAST);
  pctx->w_street_1_len = 0;
  pctx->w_street_2_len = 0;
  pctx->w_city_len = 0;
  pctx->w_state_len = 0;
  pctx->w_zip_len = 0;
  pctx->d_street_1_len = 0;
  pctx->d_street_2_len = 0;
  pctx->d_city_len = 0;
  pctx->d_state_len = 0;
  pctx->d_zip_len = 0;
  pctx->c_first_len = 0;
  pctx->c_middle_len = 0;
  pctx->c_street_1_len = 0;
  pctx->c_street_2_len = 0;
  pctx->c_city_len = 0;
  pctx->c_state_len = 0;
  pctx->c_zip_len = 0;
  pctx->c_phone_len = 0;
  pctx->c_since_len = 7;
  pctx->c_credit_len = 0;
  pctx->c_credit_lim_len = 0;
  pctx->c_discount_len = 0;
  pctx->c_balance_len = sizeof(double);
  pctx->c_data_len = 0;
  pctx->h_date_len = 0;
  pctx->retries_len = SIZ(payP->out_paym.retry);
  pctx->cr_date_len = 7;

  if(payP->in_paym.bylastname) {
    payP->out_paym.terror=OCIStmtExecute(tpcsvc,pctx-
>curp1,(OCIError *)errhp,1,0,
          NULLP(CONST OCISnapshot),NULLP(OCISnapshot),
          OCI_DEFAULT|OCI_COMMIT_ON_SUCCESS);
  } else {
    payP->out_paym.terror=OCIStmtExecute(tpcsvc,pctx-
>curp0,(OCIError *)errhp,1,0,
          NULLP(CONST OCISnapshot),NULLP(OCISnapshot),
          OCI_DEFAULT|OCI_COMMIT_ON_SUCCESS);
    payP->out_paym.s_C_ID = payP->in_paym.s_C_ID;
```

```
  }

  if(payP->out_paym.terror != OCI_SUCCESS) {
    oralogprintf(ora_SlotDataP->server_logtrans,"payP-
>out_paym.terror = %d\n",payP->out_paym.terror);
    OCITransRollback(tpcsvc,(OCIError *)errhp,OCI_DEFAULT);
    payP->out_paym.terror = OCIERROR(errhp,payP-
>out_paym.terror);
    oralogprintf(ora_SlotDataP->server_logtrans,"payP-
>out_paym.terror = %d\n",payP->out_paym.terror);
    if(payP->out_paym.terror == NOT_SERIALIZABLE) {
       payP->out_paym.retry++;
       goto retry;
    } else if (payP->out_paym.terror == RECOVERR) {
       payP->out_paym.retry++;
       goto retry;
    } else if (payP->out_paym.terror == SNAPSHOT_TOO_OLD) {
       payP->out_paym.retry++;
       goto retry;
     } else {
       return -1;
     }
   }
   return 0;
}



void tkvcpdone (ora_cn_data_t *ora_SlotDataP)

{
  if(ora_SlotDataP->pctx) {
    free(ora_SlotDataP->pctx);
    ora_SlotDataP->pctx = NULL;
  }
}
```

plsto.cpp

```
#include "../../tpccisapi/tpcc.h"
#include "plora.h"
#include "ora_tpcc.h"

extern void oralogprintf(FILE *,char *format, ...);

#ifdef PLSQLSTO
#define SQLTXT "BEGIN stocklevel.getstocklevel
(:w_id, :d_id, :threshold, \
   :low_stock); END;"
#else
#define SQLTXT "SELECT /*+ nocache (stok) */ count (DISTINCT
s_i_id) \
          FROM ordl, stok, dist \
          WHERE d_id = :d_id AND d_w_id = :w_id AND \
               d_id = ol_d_id AND d_w_id = ol_w_id AND \
               ol_i_id = s_i_id AND ol_w_id = s_w_id AND \
               s_quantity < :threshold AND \
               ol_o_id BETWEEN (d_next_o_id - 20) AND (d_next_o_id
- 1) \
       order by ol_o_id desc"
#endif

struct stoctx {
  OCIStmt *curs;
  OCIBind *w_id_bp;
  OCIBind *d_id_bp;
  OCIBind *threshold_bp;
#ifdef PLSQLSTO
  OCIBind *low_stock_bp;
#else
  OCIDefine *low_stock_bp;
#endif
  int norow;
};

typedef struct stoctx stoctx;

tkvcsinit (ora_cn_data_t *ora_SlotDataP)

{
   FILE *server_logtrans = ora_SlotDataP->server_logtrans;

   /*  */
   stoctx *sctx;
   stok_wrapper *stoP;
   OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
   OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
   dvoid *errhp = ora_SlotDataP->errhp;
   OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
   OCISession *tpcusr = ora_SlotDataP->tpcusr;
   OCIStmt *curi = ora_SlotDataP->curi;

   text stmbuf[SQL_BUF_SIZE];
   sctx = (stoctx *)malloc(sizeof(stoctx));
   memset(sctx,(char)0,sizeof(stoctx));
   ora_SlotDataP->sctx = (void *)sctx;

   memset(&ora_SlotDataP->stoP,(char)0,sizeof(stok_wrapper));
   stoP = &ora_SlotDataP->stoP;

   sctx->norow=0;

   OCIERROR((OCIError *)errhp,
      OCIHandleAlloc(tpcenv,(dvoid**)&sctx-
>curs,OCI_HTYPE_STMT,0,(dvoid**)0));
   sprintf ((char *) stmbuf, SQLTXT);
   OCIERROR((OCIError *)errhp,OCIStmtPrepare(sctx-
>curs,(OCIError *)errhp,stmbuf,strlen((char *)stmbuf),
               OCI_NTV_SYNTAX,OCI_DEFAULT));
#ifndef PLSQLSTO
   OCIERROR((OCIError *)errhp,
      OCIAttrSet(sctx->curs,OCI_HTYPE_STMT,(dvoid*)&sctx-
>norow,0,
            OCI_ATTR_PREFETCH_ROWS,(OCIError *)errhp));
#endif

   /* bind variables */

   OCIBND(sctx->curs,sctx->w_id_bp,(OCIError *)errhp, ":w_id",
ADR(stoP->in_stok.s_W_ID),sizeof(int),
         SQLT_INT);
   OCIBND(sctx->curs,sctx->d_id_bp,(OCIError *)errhp, ":d_id",
ADR(stoP->in_stok.s_D_ID),sizeof(int),
      SQLT_INT);
#ifdef USE_IEEE_NUMBER
   OCIBND(sctx->curs,sctx->threshold_bp,(OCIError *)errhp,
":threshold", ADR(stoP->in_stok.s_threshold),
      sizeof(float),SQLT_FLT);
#else
   OCIBND(sctx->curs,sctx->threshold_bp,(OCIError *)errhp,
":threshold", ADR(stoP->in_stok.s_threshold),
      sizeof(int),SQLT_INT);
#endif
#ifdef PLSQLSTO
   OCIBND(sctx->curs,sctx->low_stock_bp,(OCIError
*)errhp,":low_stock" , ADR(stoP->out_stok.s_low_stock),
      sizeof(int), SQLT_INT);
#else
   OCIDEFINE(sctx->curs,sctx->low_stock_bp,(OCIError *)errhp, 1,
ADR(stoP->out_stok.s_low_stock),
      sizeof(int), SQLT_INT);
#endif
```

```
   return (0);

}

tkvcs (ora_cn_data_t *ora_SlotDataP)
{
   FILE *server_logtrans = ora_SlotDataP->server_logtrans;
   stoctx *sctx = (stoctx *)ora_SlotDataP->sctx;
   stok_wrapper *stoP = &ora_SlotDataP->stoP;
   OCIEnv *tpcenv = ora_SlotDataP->tpcenv;
   OCIServer *tpcsrv = ora_SlotDataP->tpcsrv;
   dvoid *errhp = ora_SlotDataP->errhp;
   OCISvcCtx *tpcsvc = ora_SlotDataP->tpcsvc;
   OCISession *tpcusr = ora_SlotDataP->tpcusr;
   OCIStmt *curi = ora_SlotDataP->curi;

retry:
   stoP->out_stok.terror= OCIStmtExecute(tpcsvc,sctx-
>curs,(OCIError *)errhp,1,0,0,0,
      OCI_COMMIT_ON_SUCCESS | OCI_DEFAULT);
   if (stoP->out_stok.terror != OCI_SUCCESS)
   {
      stoP->out_stok.terror=OCIERROR((OCIError *)errhp,stoP-
>out_stok.terror);
      OCITransRollback(tpcsvc,(OCIError *)errhp,OCI_DEFAULT);
      if((stoP->out_stok.terror == NOT_SERIALIZABLE) || (stoP-
>out_stok.terror == RECOVERR)
         || (stoP->out_stok.terror == SNAPSHOT_TOO_OLD))
      {
         stoP->out_stok.retry++;
         goto retry;
      } else {
         return -1;
      }
   }

   return (0);
}



void tkvcsdone (ora_cn_data_t *ora_SlotDataP)

{
  /*  */
  stoctx *sctx = (stoctx *)ora_SlotDataP->sctx;
  if (sctx) {
    free(sctx);
    ora_SlotDataP->sctx = NULL;
  }

}
```

stdafx.cpp

```
// stdafx.cpp : source file that includes just the standard includes
// tpccOracleGlue.pch will be the pre-compiled header
// stdafx.obj will contain the pre-compiled type information

#include "stdafx.h"

// TODO: reference any additional headers you need in STDAFX.H
// and not in this file
```

tpccOracleGlue.cpp

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

#include "stdafx.h"
#include "../tpccCom0/tpccCom0.h"
#include "../tpccCom0/tpccCom0_i.c"
#ifdef PARTITION
#include "../tpccCom1/tpccCom1.h"
#include "../tpccCom1/tpccCom1_i.c"
#include "../tpccCom2/tpccCom2.h"
#include "../tpccCom2/tpccCom2_i.c"
#include "../tpccCom3/tpccCom3.h"
#include "../tpccCom3/tpccCom3_i.c"
#include "../tpccCom4/tpccCom4.h"
#include "../tpccCom4/tpccCom4_i.c"
#include "../tpccCom5/tpccCom5.h"
#include "../tpccCom5/tpccCom5_i.c"
#include "../tpccCom6/tpccCom6.h"
#include "../tpccCom6/tpccCom6_i.c"
#include "../tpccCom7/tpccCom7.h"
#include "../tpccCom7/tpccCom7_i.c"
#include "../tpccCom8/tpccCom8.h"
#include "../tpccCom8/tpccCom8_i.c"
#include "../tpccCom9/tpccCom9.h"
#include "../tpccCom9/tpccCom9_i.c"
#include "../tpccCom10/tpccCom10.h"
#include "../tpccCom10/tpccCom10_i.c"
#include "../tpccCom11/tpccCom11.h"
#include "../tpccCom11/tpccCom11_i.c"
#include "../tpccCom12/tpccCom12.h"
#include "../tpccCom12/tpccCom12_i.c"
#include "../tpccCom13/tpccCom13.h"
#include "../tpccCom13/tpccCom13_i.c"
#include "../tpccCom14/tpccCom14.h"
#include "../tpccCom14/tpccCom14_i.c"
#include "../tpccCom15/tpccCom15.h"
#include "../tpccCom15/tpccCom15_i.c"
#include "../tpccCom16/tpccCom16.h"
#include "../tpccCom16/tpccCom16_i.c"
#include "../tpccCom17/tpccCom17.h"
#include "../tpccCom17/tpccCom17_i.c"
#include "../tpccCom18/tpccCom18.h"
#include "../tpccCom18/tpccCom18_i.c"
#include "../tpccCom19/tpccCom19.h"
#include "../tpccCom19/tpccCom19_i.c"
#include "../tpccCom20/tpccCom20.h"
#include "../tpccCom20/tpccCom20_i.c"
#include "../tpccCom21/tpccCom21.h"
#include "../tpccCom21/tpccCom21_i.c"
#include "../tpccCom22/tpccCom22.h"
#include "../tpccCom22/tpccCom22_i.c"
#include "../tpccCom23/tpccCom23.h"
#include "../tpccCom23/tpccCom23_i.c"
#include "../tpccCom24/tpccCom24.h"
#include "../tpccCom24/tpccCom24_i.c"
#include "../tpccCom25/tpccCom25.h"
#include "../tpccCom25/tpccCom25_i.c"
#include "../tpccCom26/tpccCom26.h"
#include "../tpccCom26/tpccCom26_i.c"
#include "../tpccCom27/tpccCom27.h"
#include "../tpccCom27/tpccCom27_i.c"
#include "../tpccCom28/tpccCom28.h"
#include "../tpccCom28/tpccCom28_i.c"
#include "../tpccCom29/tpccCom29.h"
#include "../tpccCom29/tpccCom29_i.c"
#include "../tpccCom30/tpccCom30.h"
#include "../tpccCom30/tpccCom30_i.c"
#include "../tpccCom31/tpccCom31.h"
#include "../tpccCom31/tpccCom31_i.c"
#include "../tpccCom32/tpccCom32.h"
#include "../tpccCom32/tpccCom32_i.c"
#include "../tpccCom33/tpccCom33.h"
#include "../tpccCom33/tpccCom33_i.c"
#include "../tpccCom34/tpccCom34.h"
#include "../tpccCom34/tpccCom34_i.c"
#include "../tpccCom35/tpccCom35.h"
#include "../tpccCom35/tpccCom35_i.c"
```

```
#include "../tpccCom36/tpccCom36.h"
#include "../tpccCom36/tpccCom36_i.c"
#include "../tpccCom37/tpccCom37.h"
#include "../tpccCom37/tpccCom37_i.c"
#include "../tpccCom38/tpccCom38.h"
#include "../tpccCom38/tpccCom38_i.c"
#include "../tpccCom39/tpccCom39.h"
#include "../tpccCom39/tpccCom39_i.c"
#include "../tpccCom40/tpccCom40.h"
#include "../tpccCom40/tpccCom40_i.c"
#include "../tpccCom41/tpccCom41.h"
#include "../tpccCom41/tpccCom41_i.c"
#include "../tpccCom42/tpccCom42.h"
#include "../tpccCom42/tpccCom42_i.c"
#include "../tpccCom43/tpccCom43.h"
#include "../tpccCom43/tpccCom43_i.c"
#include "../tpccCom44/tpccCom44.h"

#include "../tpccCom44/tpccCom44_i.c"
#include "../tpccCom45/tpccCom45.h"
#include "../tpccCom45/tpccCom45_i.c"
#include "../tpccCom46/tpccCom46.h"
#include "../tpccCom46/tpccCom46_i.c"
#include "../tpccCom47/tpccCom47.h"
#include "../tpccCom47/tpccCom47_i.c"
#include "../tpccCom48/tpccCom48.h"
#include "../tpccCom48/tpccCom48_i.c"
#include "../tpccCom49/tpccCom49.h"
#include "../tpccCom49/tpccCom49_i.c"
#include "../tpccCom50/tpccCom50.h"
#include "../tpccCom50/tpccCom50_i.c"
#endif
#include "tpccOracleGlue.h"
#include <time.h>
#include <winsock.h>
#include "../tpccisapi/tpccisapi.hpp"

char tmpbuf[128];
CRITICAL_SECTION debugMutex;
CRITICAL_SECTION errorMutex;
char OracleHome[256];

#define INVALID_ITEM 100

#ifdef _DEBUG
   int debugFlag = 1;
#else
   int debugFlag = 0;
#endif

   void print_time_prefix(FILE *file)
{
    time_t cur_timet;
    char time_str[30];

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

    fprintf(file, "%s - ",
            time_str);
}

char *get_time_prefix(char *buffer)
{
    time_t cur_timet;
    char time_str[30];
    int len;

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

    len = sprintf(buffer, "%s - ",
                  time_str);
    if (len >= TIME_PREFIX_LEN) {
       fprintf(stderr, "TIME_PREFIX_LEN (%d) too small: %d\n",
               TIME_PREFIX_LEN, len);
       exit(12);
    }
    return(buffer);
}

void oralogprintf(FILE* server_logtrans,char *format, ...)
{
    char formatBuffer[200];
    char *fmt = formatBuffer;
    int fmtLen;
    va_list ap;
    va_start(ap, format);

    fmtLen = TIME_PREFIX_LEN + (int)strlen(format) + 2;
    if (fmtLen > sizeof(formatBuffer)) {
        fmt = (char *)malloc(fmtLen);
    }
    get_time_prefix(fmt);
    strcat(fmt, format);
   if (server_logtrans) {
        vfprintf(server_logtrans, fmt, ap);
        fflush(server_logtrans);
    } else {
        vfprintf(stderr, fmt, ap);
    }
    if (fmt != formatBuffer) free(fmt);
    va_end(ap);
}

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

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

void get_time_init();

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

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

LARGE_INTEGER pFreq;
double sFreq;

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

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

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

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

BOOL APIENTRY DllMain( HANDLE hModule,
                       DWORD  ul_reason_for_call,
                       LPVOID lpReserved
                     )
{
  switch (ul_reason_for_call)
  {
  case DLL_PROCESS_ATTACH:

  if(RegOpenKeyEx(HKEY_LOCAL_MACHINE,REGISTERY_SUB_
KEY,0,KEY_READ,&registeryKey) == ERROR_SUCCESS)
    {
      regValueSize = 256;
      if
(RegQueryValueEx(registeryKey,"OracleHome",0,&regType,(BYTE
*)&value,&regValueSize) == ERROR_SUCCESS) {
        strcpy(OracleHome,value);
      }
      regValueSize = sizeof(value);
      if
(RegQueryValueEx(registeryKey,"dbUserName",0,&regType,(BYTE
*) &value,&regValueSize)== ERROR_SUCCESS )
        strcpy(userName,value);
      else
        return ERR_INVALID_USERNAME;

      regValueSize = sizeof(value);
      if
(RegQueryValueEx(registeryKey,"dbPassword",0,&regType,(BYTE
*) &value,&regValueSize)== ERROR_SUCCESS )
        strcpy(userPassword,value);
      else
        return ERR_INVALID_PASSWORD;
    }
    else
    {
      return ERR_INVALID_REGISTERY_KEY;
    }
    break;
  case DLL_THREAD_ATTACH:
  case DLL_THREAD_DETACH:
  case DLL_PROCESS_DETACH:
    break;
  }
   return TRUE;
}

extern "C" TPCCORACLEGLUE_API int connect_db(char
*dbName,void **ctx)
{
// FILE    *server_logtrans;

// server_logtrans =
fopen("C:\\inetpub\\wwwroot\\tpcc\\my_debug_gluecode.txt", "w+");
// oralogprintf(server_logtrans,"Opening logfile\n");
// fflush(server_logtrans);
// fclose(server_logtrans);

  *ctx = (void *)get_db_ready((ora_cn_data_t *)*ctx, userName,
userPassword, dbName);
  ora_cn_data_t *curP = (ora_cn_data_t *)ctx;
  if (ctx == NULL)
  {
    oralogprintf(curP->server_logtrans,"Object get_db_ready()
failed\n");

    return ERR_SAVING_CONTEXT;
  }
  return OK;
}

extern "C" TPCCORACLEGLUE_API int disconnect_db(void *ctx)
{
  ora_cn_data_t *curP = (ora_cn_data_t *)ctx;
  clean_connection(curP->server_logtrans, ctx);
  return OK;
}

extern "C" TPCCORACLEGLUE_API int do_nord(nord_wrapper
*nord,void *ctx)
{
  ora_cn_data_t *curP = (ora_cn_data_t *)ctx;
  static int numCalls = 0;

  memcpy(&curP->globals,nord,sizeof(nord_wrapper));
  int rc = TPCnew((void *)curP);
  if (rc != 0 && rc != INVALID_ITEM)
  {
    int i;
    oralogprintf(curP->server_logtrans,"Error TPCnew : terror %d, rc
%d, retry %d, w_id %d, d_id %d, c_id %d, o_ol_cnt %d (out cnt
%d)\n",
      curP->globals.out_nord.terror, rc, curP-
>globals.out_nord.retry,
      curP->globals.in_nord.s_W_ID, curP-
>globals.in_nord.s_D_ID,
      curP->globals.in_nord.s_C_ID, curP-
>globals.in_nord.s_O_OL_CNT, curP-
>globals.out_nord.s_O_OL_CNT);
    for (i=0; i<15; i++)
    {
      oralogprintf(curP->server_logtrans,"ol_i_id %d,
ol_supply_w_id %d, ol_quantity %d\n",
        curP->globals.in_nord.s_OL_I_ID[i], curP-
>globals.in_nord.s_OL_SUPPLY_W_ID[i],
        curP->globals.in_nord.s_OL_QUANTITY[i]);
    }
  }
  memcpy(nord,&curP->globals,sizeof(nord_wrapper));
  nord->out_nord.s_transtatus = rc == 0 ? TPCC_SUCCESS : curP-
>globals.out_nord.terror;
// if (++numCalls % 10000 == 0) {
//      oralogprintf(curP->server_logtrans,"doNewOrder so far %d\n",
numCalls);
//   }

  return OK;
}

extern "C" TPCCORACLEGLUE_API int do_pymt(paym_wrapper
*pymt,void *ctx)
{
  ora_cn_data_t *curP = (ora_cn_data_t *)ctx;
  static int numCalls = 0;

  pymt->in_paym.bylastname = ((pymt->in_paym.s_C_ID == 0) ? 1 :
0);
  memcpy(&curP->payP,pymt,sizeof(paym_wrapper));

  int rc = TPCpay((void *)curP);
  if (rc != 0)
  {
    oralogprintf(curP->server_logtrans,"Error TPCpay: terror %d, rc
%d, retry %d, w_id %d, D_id %d, C_w_id %d, c_id %d, bylastname
%d, amount %d, c_last %s (%s)\n",
```

```
        curP->payP.out_paym.terror, rc, curP->payP.out_paym.retry,
        curP->payP.in_paym.s_W_ID,
        curP->payP.in_paym.s_D_ID,
        curP->payP.in_paym.s_C_W_ID,
        curP->payP.in_paym.s_C_ID,
        curP->payP.in_paym.bylastname,
        curP->payP.in_paym.s_H_AMOUNT,
        curP->payP.in_paym.s_C_LAST ? curP->payP.in_paym.s_C_LAST : "-NULL-",
        (char *)pymt->out_paym.s_C_LAST ? (char *)pymt->out_paym.s_C_LAST : "-NULL-");
   }
   memcpy(pymt,&curP->payP,sizeof(paym_wrapper));
   pymt->out_paym.s_transtatus = rc == 0 ? TPCC_SUCCESS : curP->payP.out_paym.terror;
// if (++numCalls % 10000 == 0) {
//       oralogprintf(curP->server_logtrans,"doPayment so far %d\n", numCalls);
//    }

   return OK;
}
extern "C"  TPCCORACLEGLUE_API int do_ords(ords_wrapper *ords,void *ctx)
{
   ora_cn_data_t *curP = (ora_cn_data_t *)ctx;
   static int numCalls = 0;

   // oralogprintf(curP->server_logtrans,"OrderStatus, I'm tid %d\n",ThreadNum);
   ords->in_ords.bylastname = ((ords->in_ords.s_C_ID == 0) ? 1 : 0);
   memcpy(&curP->ordP,ords,sizeof(ords_wrapper));
   int rc = TPCord((void *)curP);
   if (rc != 0)
   {
      oralogprintf(curP->server_logtrans,"Error TPCord: terror %d, rc %d, retry %d, w_id %d, d_id %d,c_id %d, bylastname %d, c_last %s\n ",
        curP->ordP.out_ords.terror, rc, curP->ordP.out_ords.retry,
        curP->ordP.in_ords.s_W_ID, curP->ordP.in_ords.s_D_ID, curP->ordP.in_ords.s_C_ID,
        curP->ordP.in_ords.bylastname, curP->ordP.in_ords.s_C_LAST);
   }
   memcpy(ords,&curP->ordP,sizeof(ords_wrapper));
   ords->out_ords.s_transtatus = rc == 0 ? TPCC_SUCCESS : curP->ordP.out_ords.terror;
// if (++numCalls % 10000 == 0) {
//       oralogprintf(curP->server_logtrans,"doOrderStatus so far %d\n", numCalls);
//    }

   return OK;
}


extern "C" TPCCORACLEGLUE_API int do_dlvy(dlvy_wrapper *dlvy,void *ctx)
{
   ora_cn_data_t *curP = (ora_cn_data_t *)ctx;
   dlvy_wrapper *delP=&(curP->delP);
   FILE *server_logtrans = curP->server_logtrans;
   dvoid *errhp = curP->errhp;
   int rc;
   static int numCalls = 0;

   memcpy(&curP->delP,dlvy,sizeof(dlvy_wrapper));
   delP->out_dlvy.retry = 0;
   delP->in_dlvy.plsqlflag = 1;

   OCIERROR(errhp,OCIDateSysDate((OCIError *)errhp,&delP->in_dlvy.cr_date));

   if (rc = tkvcd (curP)) {
      if(delP->out_dlvy.terror == DEL_ERROR)
         return DEL_ERROR;
      return (-1);
   }
   memcpy(dlvy,&curP->delP,sizeof(dlvy_wrapper));
   dlvy->out_dlvy.s_transtatus = rc == 0 ? TPCC_SUCCESS : delP->out_dlvy.terror;
// if (++numCalls % 10000 == 0) {
//    oralogprintf(curP->server_logtrans,"doOrderStatus so far %d\n", numCalls);
// }

   return OK;
}

extern "C" TPCCORACLEGLUE_API int do_stok(stok_wrapper *stok,void *ctx)
{
   ora_cn_data_t *curP = (ora_cn_data_t *)ctx;
   static int numCalls = 0;
   FILE *server_logtrans = curP->server_logtrans;
   // oralogprintf(curP->server_logtrans,"StockLevel, I'm tid %d\n",ThreadNum);

   //call stock level txn
   memcpy(&curP->stoP,stok,sizeof(stok_wrapper));
   int rc = TPCsto((void *)curP);
   if ( rc != 0 ) {
      oralogprintf(curP->server_logtrans,"Error TPCsto : terror %d, rc %d, retry %d, w_id %d, d_id %d, threashold %d\n",
        curP->stoP.out_stok.terror, rc, curP->stoP.out_stok.retry,
        curP->stoP.in_stok.s_W_ID, curP->stoP.in_stok.s_D_ID,
        curP->stoP.in_stok.s_threshold);
   }
   memcpy(stok,&curP->stoP,sizeof(stok_wrapper));
   stok->out_stok.s_transtatus = rc == 0 ? TPCC_SUCCESS : curP->stoP.out_stok.terror;
// if (++numCalls % 10000 == 0) {
//       oralogprintf(curP->server_logtrans,"doStockLevel so far %d\n", numCalls);
//    }

   return OK;
}
```

tpccpl.cpp

```
#include "../stdafx.h"
#define ORA_NT
#include <stdio.h>
#include <time.h>
#include "../../tpccisapi/tpcc.h"
#include "plora.h"
#include "ora_tpcc.h"
#include <stdarg.h>

extern int server_null_test;

extern CRITICAL_SECTION debugMutex;

#define INVALID_ITEM 100

#define SQLTXT "alter session set isolation_level = serializable"
#define SQLTXTTRC "alter session set sql_trace = true"
#define SQLTXTTIM "alter session set timed_statistics = true"
#define SQLTXTIMU "alter session set \"_in_memory_undo\" = true"
#define SQLTXTNCP "alter session set plsql_compiler_flags=anonymous_block_native"

#ifdef ORA_NT
```

```
#undef boolean
#include "dpbcore.h"
#define gettime dpbtimef
#else
extern double gettime ();
#endif

static int init_cn_data(struct ora_cn_data_t *dataP);
static void initOCIhandles(struct ora_cn_data_t *cn_dataP, char*
uid, char *pwd);

extern void oralogprintf(FILE *,char *format, ...);

int proc_no;
static char *db_uid;
static char *db_pwd;

#ifndef AVOID_DEADLOCK
void swap(nord_wrapper *newP, int i, int j, int *indx, int in);
void q_sort(nord_wrapper *newP,int left, int right, int *indx, int in);
#endif

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


/* vmm313 void ocierror(fname, lineno, errhp, status)  */
int ocierror(FILE *server_logtrans,char *fname, int lineno, dvoid
*errhp, sword status)
{
  text errbuf[512];
  sb4 errcode;
  sb4 lstat;
  ub4 recno=2;


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


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

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

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

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

//DEBUGP(( "%s: %d sqlfile() fnam: %s,  linebuf: %#x\n", __FILE__,
__LINE__, fnam, linebuf));

/*
    sprintf(realfile,"%s/bench/tpc/tpcc/blocks/%s",oracle_home,fnam);
*/
    sprintf(realfile,"%s",fnam);
   if ((fd = vopen(realfile,"r")) == NULL) {
      oralogprintf(server_logtrans,"%s: %d >sqlfile vopen failed\n",
__FILE__, __LINE__);
      return(-1);
   }
```

```
    while (fgets((char *)linebuf+nulpt, SQL_BUF_SIZE,fd))
    {
        nulpt = (int)strlen((char *)linebuf);
    }
   oralogprintf(server_logtrans,"%s: %d <sqlfile\n", __FILE__,
__LINE__);
    return(nulpt);
}

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

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

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

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

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

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

Date.century = (unsigned char)(century + 100);
if (Date.century < 119 || Date.century > 120) cnvrtOK = 0;
Date.year  = (unsigned char)(loctime->tm_year+100);
if (Date.year < 100 || Date.year > 199) cnvrtOK = 0;
Date.month = (unsigned char)(loctime->tm_mon + 1);
if (Date.month < 1 || Date.month > 12) cnvrtOK = 0;
Date.day   = (unsigned char)loctime->tm_mday;
if (Date.day < 1 || Date.day > 31) cnvrtOK = 0;
Date.hour  = (unsigned char)(loctime->tm_hour + 1);
if (Date.hour < 1 || Date.hour > 24) cnvrtOK = 0;
Date.minute= (unsigned char)(loctime->tm_min + 1);
if (Date.minute < 1 || Date.minute > 60) cnvrtOK = 0;
Date.second= (unsigned char)(loctime->tm_sec + 1);
if (Date.second < 1 || Date.second > 60) cnvrtOK = 0;


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

 return;

}
void cvtdmy (unsigned char *oradt, char *outdate)
{

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


        int day,month,year;

        memcpy(&Date,oradt,7);

        year = (Date.century-100)*100 + Date.year-100;
        month = Date.month;
        day = Date.day;
        sprintf(outdate,"%02d-%02d-%4d\0",day,month,year);

        return;
}

void cvtdmyhms (unsigned char *oradt, char *outdate)
{

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


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

        memcpy(&Date,oradt,7);

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

        sprintf(outdate,"%02d-%02d-%4d %02d:%02d:%02d\0",
                        day,month,year,hour,min,sec);

        return;
}
#endif


void TPCexit (void)
{
// free(Ctpcc_com::get_cur());
}

void clean_connection(FILE* server_logtrans,void *ptr)
{

   /* free trans specific cursor handles first and later the ora handles
*/
   ora_cn_data_t *cn_dataP = (ora_cn_data_t *)ptr;

   if (cn_dataP != NULL) {
        OCIServer *tpcsrv;
        OCISession *tpcusr;
        OCIEnv *tpcenv;
        dvoid *errhp;
        OCISvcCtx *tpcsvc;

        oralogprintf(server_logtrans, "clean_connection, Freeing OCI
handles\n");
```

```
      tkvcpdone(cn_dataP);
       tkvcsdone(cn_dataP);
       tkvcodone(cn_dataP);
       tkvcndone(cn_dataP);
       /* free OCI handles */
       if (tpcusr = cn_dataP->tpcusr) {
            oralogprintf(server_logtrans, "free_handles>
OCIHandleFree tpcusr\n");
            OCIHandleFree((dvoid *)tpcusr, OCI_HTYPE_SESSION);
       }
       if (tpcsvc = cn_dataP->tpcsvc) {
            oralogprintf(server_logtrans, "free_handles>
OCIHandleFree tpcsvc\n");
            OCIHandleFree((dvoid *)tpcsvc, OCI_HTYPE_SVCCTX);
       }
       if (errhp = cn_dataP->errhp) {
            oralogprintf(server_logtrans, "free_handles>
OCIHandleFree errhp\n");
            OCIHandleFree((OCIError *)errhp,
OCI_HTYPE_ERROR);
       }
       if (tpcsrv = cn_dataP->tpcsrv) {
            oralogprintf(server_logtrans, "free_handles>
OCIHandleFree tpcsrv\n");
            OCIHandleFree((OCIError *)tpcsrv,
OCI_HTYPE_SERVER);
       }
       if (tpcenv = cn_dataP->tpcenv) {
            oralogprintf(server_logtrans, "free_handles>
OCIHandleFree tpcenv\n");
            OCIHandleFree((OCIError *)tpcenv, OCI_HTYPE_ENV);
       }

       oralogprintf(server_logtrans, "free_handles> free cn_dataP\n");
   }
}



static void initOCIhandles(struct ora_cn_data_t *cn_dataP, char
*uid, char *pwd,char *dbName)
{

   int tracelevel = 0;  /* new define */
   OCIDate cr_date;
   text stmbuf[100];
   OCIEnv *tpcenv=NULL;
   OCIServer *tpcsrv=NULL;
   OCIError *errhp;
   OCISvcCtx *tpcsvc;
   OCISession *tpcusr;
   OCIStmt *curi;

   oralogprintf(cn_dataP->server_logtrans,">> initOCIhandles uid %s
pwd %s dbName %s\n",uid,pwd,dbName);
   OCIEnvCreate (&tpcenv,OCI_OBJECT|OCI_THREADED, (dvoid
*)0, 0, 0, 0, (size_t)0, (dvoid **)0);
   if (tpcenv==NULL) {
      oralogprintf(cn_dataP->server_logtrans,"Cannot get handle to
environment, OCIEnvCreate failed\n");
   }
   OCIHandleAlloc((dvoid *)tpcenv, (dvoid **)&tpcsrv,
OCI_HTYPE_SERVER, 0 , (dvoid **)0);

   OCIHandleAlloc((dvoid *)tpcenv, (dvoid **)&errhp,
OCI_HTYPE_ERROR, 0 , (dvoid **)0);
   OCIHandleAlloc((dvoid *)tpcenv, (dvoid **)&tpcsvc,
OCI_HTYPE_SVCCTX, 0 , (dvoid **)0);
//EnterCriticalSection(&debugMutex);
   ocierror(cn_dataP->server_logtrans,__FILE__,__LINE__,errhp,
OCIServerAttach(tpcsrv, (OCIError *)errhp, (text
*)dbName,0,OCI_DEFAULT));
   if (tpcsrv==NULL) {
      oralogprintf(cn_dataP->server_logtrans,"Cannot get handle to
server, OCIServerAttach failed\n");
   }
   oralogprintf(cn_dataP->server_logtrans,"OCIServerAttach
returned %x\n",tpcsrv);
//LeaveCriticalSection(&debugMutex);
   OCIAttrSet((dvoid *)tpcsvc, OCI_HTYPE_SVCCTX, (dvoid
*)tpcsrv, (ub4)0,OCI_ATTR_SERVER, (OCIError *)errhp);

   OCIHandleAlloc((dvoid *)tpcenv, (dvoid **)&tpcusr,
OCI_HTYPE_SESSION, 0 , (dvoid **)0);

   OCIAttrSet((dvoid *)tpcusr, OCI_HTYPE_SESSION, (dvoid *)uid,
(ub4)4,OCI_ATTR_USERNAME, (OCIError *)errhp);

   OCIAttrSet((dvoid *)tpcusr, OCI_HTYPE_SESSION, (dvoid *)pwd,
(ub4)4,
            OCI_ATTR_PASSWORD, (OCIError *)errhp);
   ocierror(cn_dataP->server_logtrans,__FILE__,__LINE__,errhp,
OCISessionBegin(tpcsvc, (OCIError *)errhp, tpcusr,
OCI_CRED_RDBMS, OCI_DEFAULT));

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

   /* run all transaction in serializable mode */

   OCIHandleAlloc(tpcenv, (dvoid **)&curi, OCI_HTYPE_STMT, 0,
(dvoid**)0);
   sprintf ((char *) stmbuf, SQLTXT);
   OCIStmtPrepare(curi, (OCIError *)errhp, stmbuf, strlen((char
*)stmbuf), OCI_NTV_SYNTAX, OCI_DEFAULT);
   ocierror(cn_dataP-
>server_logtrans,__FILE__,__LINE__,errhp,OCIStmtExecute(tpcsvc
, curi, (OCIError *)errhp,1,0,0,0,OCI_DEFAULT));
   OCIHandleFree(curi, OCI_HTYPE_STMT);


   if (getenv("USE_IMU")) {
      printf("Use in_memory_undo\n");
      OCIHandleAlloc(tpcenv, (dvoid **)&curi, OCI_HTYPE_STMT, 0,
(dvoid**)0);
      sprintf ((char *) stmbuf, SQLTXTIMU);
      OCIStmtPrepare(curi, (OCIError *)errhp, stmbuf, strlen((char
*)stmbuf), OCI_NTV_SYNTAX, OCI_DEFAULT);
      ocierror(cn_dataP-
>server_logtrans,__FILE__,__LINE__,errhp,OCIStmtExecute(tpcsvc
, curi, (OCIError *)errhp,1,0,0,0,OCI_DEFAULT));
      OCIHandleFree(curi, OCI_HTYPE_STMT);
   }

   if (getenv("USE_NCOMP")) {
      printf("Use NCOMP\n");
      OCIHandleAlloc(tpcenv, (dvoid **)&curi, OCI_HTYPE_STMT, 0,
(dvoid**)0);
      sprintf ((char *) stmbuf, SQLTXTNCP);
      OCIStmtPrepare(curi, (OCIError *)errhp, stmbuf, strlen((char
*)stmbuf), OCI_NTV_SYNTAX, OCI_DEFAULT);
      ocierror(cn_dataP-
>server_logtrans,__FILE__,__LINE__,errhp,OCIStmtExecute(tpcsvc
, curi, (OCIError *)errhp,1,0,0,0,OCI_DEFAULT));
      OCIHandleFree(curi, OCI_HTYPE_STMT);
   }

   if (tracelevel == 3) {
     OCIHandleAlloc(tpcenv, (dvoid **)&curi, OCI_HTYPE_STMT, 0,
(dvoid**)0);
      memset(stmbuf,0,100);
      sprintf ((char *) stmbuf, SQLTXTTIM);
      OCIStmtPrepare(curi, (OCIError *)errhp, stmbuf, strlen((char
*)stmbuf),
```

```
                    OCI_NTV_SYNTAX, OCI_DEFAULT);
    ocierror(cn_dataP->server_logtrans,__FILE__,__LINE__,errhp,
OCIStmtExecute(tpcsvc, curi, (OCIError
*)errhp,1,0,0,0,OCI_DEFAULT));
    OCIHandleFree((dvoid *)curi, OCI_HTYPE_STMT);
  }


  ocierror(cn_dataP-
>server_logtrans,__FILE__,__LINE__,errhp,OCIDateSysDate((OCI
Error *)errhp,&cr_date));

   /*  Store the handles just initialized in the thread slot
   */
  cn_dataP->tpcenv = tpcenv;
  cn_dataP->tpcsrv = tpcsrv;
  cn_dataP->errhp  = errhp;
  cn_dataP->tpcsvc = tpcsvc;
  cn_dataP->tpcusr = tpcusr;
  cn_dataP->curi   = curi;
  oralogprintf(cn_dataP->server_logtrans,"<< initOCIhandles\n");
}

/*
 *  init_cn_data
 *      Initializes all the transactions for a single connection
 */
static int init_cn_data(ora_cn_data_t *cnP,char *uid,char *pwd,char
*dbName)
{
   int status;

   oralogprintf(cnP->server_logtrans,">> init_cn_data\n");
   initOCIhandles(cnP, uid,pwd,dbName);

   if (status = tkvcninit (cnP)) {
      fprintf(stderr, "tkvcninit failed: %d\n", status);
      TPCexit ();
      return (status);
   }

   if (status = tkvcpinit (cnP)) {
     fprintf(stderr, "tkvcpinit failed: %d\n", status);
      TPCexit ();
      return (status);
   }

   if (status = tkvcoinit (cnP)) {
      fprintf(stderr, "tkvcoinit failed: %d\n", status);
      TPCexit ();
      return (status);
   }

  if (status = tkvcdinit (cnP)) {
      fprintf(stderr, "tkvcdinit failed: %d\n", status);
      TPCexit ();
      return (status);
   }

  if (status = tkvcsinit (cnP)) {
      fprintf(stderr, "tkvcsinit failed: %d\n", status);
      TPCexit ();
      return (status);
   }
return 0;
}


void *create_ora_connection(char *uid, char *pwd, char *dbName) {
  HKEY Key;
  char   value[256];
  DWORD  regValueSize = 256;
  DWORD  regType;
  FILE    *server_logtrans;

  ora_cn_data_t *cnP = (ora_cn_data_t
*)malloc(sizeof(ora_cn_data_t));

  if
(RegOpenKeyEx(HKEY_LOCAL_MACHINE,"SOFTWARE\\TPCC",
0, KEY_READ, &Key) == ERROR_SUCCESS)
  {
    regValueSize = 256;
    if
(RegQueryValueEx(Key,"OraComServLog",0,&regType,(BYTE
*)&value,&regValueSize) == ERROR_SUCCESS)
    {
      server_logtrans = fopen(value, "w+");
      oralogprintf(server_logtrans,"Opening logfile %s\n",value);
    }
  }
  cnP->server_logtrans = server_logtrans;
   oralogprintf(server_logtrans,">> create_ora_connection\n");
  if (cnP!=NULL)
    init_cn_data(cnP,uid,pwd,dbName);
  else
    oralogprintf(server_logtrans,"Cannot allocate ora_cn_data_t.\n");
   return (void *)cnP;
}

ora_cn_data_t *get_db_ready(ora_cn_data_t *curP, char *uid, char
*pwd, char *dbName)
{

   curP = (ora_cn_data_t
*)create_ora_connection(uid,pwd,dbName);
   if (curP==NULL) {
      oralogprintf(curP->server_logtrans,"create_ora_connection
failed!\n");
   }

   return(curP);
}

TPCnew (void *cnP)
{
  int i;
  ora_cn_data_t *cn_dataP = (ora_cn_data_t *)cnP;
  FILE *server_logtrans = cn_dataP->server_logtrans;
  nord_wrapper *newP = &cn_dataP->globals;
  int indx[NITEMS], ordl_cnt=newP->out_nord.s_O_OL_CNT;
  dvoid *errhp = cn_dataP->errhp;

  newP->out_nord.retry = 0;

#ifndef AVOID_DEADLOCK

  for (i = NITEMS; i > 0; i--) {
    if (newP->in_nord.s_OL_I_ID[i-1] > 0) {
      ordl_cnt = i;
      break;
    }
  }

  for (i = 0; i < NITEMS; i++) indx[i] = i;

   q_sort(newP, 0, ordl_cnt-1, indx, 1);

#endif


  OCIERROR(errhp,OCIDateSysDate((OCIError *)errhp,&newP-
>in_nord.cr_date));
```

```
  if (tkvcn (cn_dataP)) {
    if (newP->out_nord.terror != RECOVERR)
    {
      if (newP->out_nord.status) {
        return(newP->out_nord.terror);
      }
      else {
        newP->out_nord.terror = INVALID_STATUS;
        return (INVALID_STATUS);
      }
    }
  }


  newP->out_nord.datelen = sizeof(newP-
>out_nord.s_O_ENTRY_D_time);
   OCIERROR(errhp,
      OCIDateToText((OCIError *)errhp,&newP-
>in_nord.cr_date,(text*)FULLDATE,SIZ(FULLDATE),(text*)0,0,
     (ub4 *)&newP->out_nord.datelen,(text *)newP-
>out_nord.s_O_ENTRY_D_time));



#ifndef AVOID_DEADLOCK
   q_sort(newP, 0, ordl_cnt-1, indx, 0);
#endif
  newP->out_nord.terror = 0;
  return (0);
}

TPCpay (void *cnP)
{
  ora_cn_data_t *cn_dataP = (ora_cn_data_t *)cnP;
  FILE *server_logtrans = cn_dataP->server_logtrans;
  paym_wrapper *payP = &cn_dataP->payP;
  dvoid *errhp = cn_dataP->errhp;
  char months[13][4] = {"",
"JAN","FEB","MAR","APR","MAY","JUN","JUL","AUG","SEP","OCT",
"NOV","DEC"};

  OCIERROR(errhp,OCIDateSysDate((OCIError *)errhp,&payP-
>in_paym.cr_date));

  sprintf(payP->out_paym.s_H_DATE_time,"%d-%s-%d
%d:%d:%d",payP->in_paym.cr_date.OCIDateDD,
  months[payP->in_paym.cr_date.OCIDateMM], payP-
>in_paym.cr_date.OCIDateYYYY,
  payP->in_paym.cr_date.OCIDateTime.OCITimeHH,  payP-
>in_paym.cr_date.OCIDateTime.OCITimeMI,
  payP->in_paym.cr_date.OCIDateTime.OCITimeSS);

  if (payP->in_paym.bylastname) {
    payP->in_paym.s_C_ID = 0;
  }
  else {
    payP->in_paym.s_C_LAST[0] = ' ';
  }

  if (tkvcp (cn_dataP)) {
    if (payP->out_paym.terror != RECOVERR)
      payP->out_paym.terror = IRRECERR;
    return (-1);
  }

  sprintf(payP->out_paym.c_since_d,"%d-%s-%d",payP-
>out_paym.c_since.OCIDateDD,months[payP-
>out_paym.c_since.OCIDateMM],
  payP->out_paym.c_since.OCIDateYYYY);

  payP->out_paym.terror = 0;
  return (0);

}


TPCord (void *cnP)
{
  ora_cn_data_t *cn_dataP = (ora_cn_data_t *)cnP;
  ords_wrapper *ordP = &cn_dataP->ordP;

  if (tkvco (cn_dataP)) {
    if (ordP->out_ords.terror != RECOVERR)
      ordP->out_ords.terror = IRRECERR;
    return (-1);
  }

  ordP->out_ords.terror = 0;
  if ( ordP->out_ords.s_O_CARRIER_ID == 11 )
     ordP->out_ords.s_O_CARRIER_ID = 0;

  return (0);

}

int TPCdel (void *cnP)
{
  ora_cn_data_t *cn_dataP = (ora_cn_data_t *)cnP;
  FILE *server_logtrans = cn_dataP->server_logtrans;
  dlvy_wrapper *str = &cn_dataP->delP;
  dvoid *errhp = cn_dataP->errhp;
  OCIDate cr_date;

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

  if (tkvcd (cn_dataP)) {
   if(str->out_dlvy.terror == DEL_ERROR)
     return DEL_ERROR;
    if (str->out_dlvy.terror != RECOVERR)
      str->out_dlvy.terror = IRRECERR;
    return (-1);
  }

  str->out_dlvy.terror = 0;
  return (0);
}


TPCsto (void *cnP)
{
  ora_cn_data_t *cn_dataP = (ora_cn_data_t *)cnP;
  stok_wrapper *stoP = &cn_dataP->stoP;

  stoP->out_stok.retry = 0;

  if (tkvcs (cn_dataP)) {
    if (stoP->out_stok.terror != RECOVERR)
      stoP->out_stok.terror = IRRECERR;
    return (-1);
  }

  stoP->out_stok.terror = 0;

  return (0);

}

#ifndef AVOID_DEADLOCK

void q_sort(nord_wrapper *newP,int left, int right, int *indx, int in)
{
  int i, last;
```

```
  if(left >= right)
    return;
  swap(newP,left,(left+right)/2, indx, in);
  last = left;
  for(i=left+1;i<=right;i++)
     if(newP->in_nord.s_OL_I_ID[i] < newP->in_nord.s_OL_I_ID[left])
      swap(newP,last,i, indx, in);
  swap(newP, left,last, indx, in);
  q_sort(newP,left,last-1, indx, in);
  q_sort(newP,last+1,right, indx, in);
}

void swap(struct nord_wrapper *newP, int i, int j, int *indx, int in)
{
  int tempd;
  int tempi;
  char tmpstr[25];
  char tmpch;

  tempi = indx[i];
  indx[i] = indx[j];
  indx[j] = tempi;

  if (in) {

     tempi = newP->in_nord.s_OL_I_ID[i];
       newP->in_nord.s_OL_I_ID[i] = newP->in_nord.s_OL_I_ID[j];
       newP->in_nord.s_OL_I_ID[j] = tempi;
       tempi = newP->in_nord.s_OL_SUPPLY_W_ID[i];
       newP->in_nord.s_OL_SUPPLY_W_ID[i] = newP-
>in_nord.s_OL_SUPPLY_W_ID[j];
       newP->in_nord.s_OL_SUPPLY_W_ID[j] = tempi;

       tempi = newP->in_nord.s_OL_QUANTITY[i];
       newP->in_nord.s_OL_QUANTITY[i] = newP-
>in_nord.s_OL_QUANTITY[j];
       newP->in_nord.s_OL_QUANTITY[j] = (short)tempi;
   } else {
       strcpy(tmpstr,newP->out_nord.s_I_NAME[i]);
       strcpy(newP->out_nord.s_I_NAME[i],newP-
>out_nord.s_I_NAME[j]);
       strcpy(newP->out_nord.s_I_NAME[j],tmpstr);

      tempi = newP->out_nord.s_S_QUANTITY[i];
       newP->out_nord.s_S_QUANTITY[i] = newP-
>out_nord.s_S_QUANTITY[j];
       newP->out_nord.s_S_QUANTITY[j] = (short)tempi;

      tmpch = newP->out_nord.s_brand_generic[i];
       newP->out_nord.s_brand_generic[i] = newP-
>out_nord.s_brand_generic[j];

       newP->out_nord.s_brand_generic[j] = tmpch;

      tempd = newP->out_nord.s_I_PRICE[i];
       newP->out_nord.s_I_PRICE[i] = newP-
>out_nord.s_I_PRICE[j];
       newP->out_nord.s_I_PRICE[j] = tempd;

      tempd = newP->out_nord.s_OL_AMOUNT[i];
       newP->out_nord.s_OL_AMOUNT[i] = newP-
>out_nord.s_OL_AMOUNT[j];
       newP->out_nord.s_OL_AMOUNT[j] = tempd;
   }
}

#endif
```

ora_tpcc.h

```
/*
 * $Header: tpcc.h 7030100.1 95/07/19 15:10:55 plai Generic<base>
$ Copyr (c) 1993 Oracle
 */
/*=============================================================
===============+
 |        Copyright (c) 1995  Oracle Corp, Redwood Shores, CA      |
 |                OPEN SYSTEMS PERFORMANCE GROUP
|
 |                     All Rights Reserved                       |

 +=============================================================
===============+
 | FILENAME
 |    tpcc.h
 | DESCRIPTION
 |    Include file for TPC-C benchmark programs.

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

#ifndef TPCC_H
#define TPCC_H


#ifndef FALSE
# define FALSE 0
#endif

#ifndef TRUE
# define TRUE 1
#endif

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

#ifndef boolean
#define boolean int
#endif

#include <tpccflags.h>

#include <oratypes.h>
#include <oci.h>
#include <ocidfn.h>
/*
#ifdef __STDC__
#include "ociapr.h"
#else
#include "ocikpr.h"
#endif
*/

typedef struct cda_def csrdef;
typedef struct cda_def ldadef;

typedef __int16 int16_t;
typedef __int32 int32_t;
typedef __int64 int64_t;


/* TPC-C transaction functions */

extern int TPCinit ();
extern int TPCnew ();
extern int TPCpay ();
extern int TPCord ();
extern int TPCdel ();
extern int TPCsto ();
extern void TPCexit ();
extern int TPCdumpinit ();
```

```
extern void TPCdumpnew ();
extern void TPCdumppay ();
extern void TPCdumpord ();
extern void TPCdumpdel ();
extern void TPCdumpsto ();
extern void TPCdumpexit ();
extern void userlog(char* fmtp, ...);


/* Error codes */

#define RECOVERR -10
#define IRRECERR -20
#define NOERR    111
#define DEL_ERROR -666
#define DEL_DATE_LEN 7
#define NDISTS 10
#define NITEMS 15
#define SQL_BUF_SIZE 8192

#define FULLDATE "dd-mon-yy.hh24:mi:ss"
#define SHORTDATE "dd-mm-yyyy"

#define DELRT 80.0


extern int tkvcss (); /* for alter session to get memory size and trace
*/
extern boolean multitranx;
extern int ord_init;


extern void errrpt ();
extern int ocierror(FILE *server_logtrans,char *fname, int
lineno,dvoid *errhp, sword status);
//extern int sqlfile(char *fname, text *linebuf);

extern FILE *lfp;
//extern FILE *fopen ();
extern int proc_no;
extern int doid[];

/* Miscellaneous */

#ifndef DISCARD
# define DISCARD (void)
#endif

#ifndef sword
# define sword int
#endif

#define VER7           2

#define NA             -1      /* ANSI SQL NULL */
#define NLT            1       /* length for string null terminator */
#define DEADLOCK       60      /* ORA-00060: deadlock */
#define NO_DATA_FOUND  1403    /* ORA-01403: no data found
*/
#define NOT_SERIALIZABLE  8177  /* ORA-08177: transaction not
serializable */
#define SNAPSHOT_TOO_OLD  1555  /* ORA-01555: snapshot too
old */

#ifndef NULLP
# define NULLP(x)  (x  *)NULL
#endif /* NULLP */

#define ADR(object) ((ub1 *)&(object))
#define SIZ(object) ((sword)sizeof(object))

typedef char date[24+NLT];

typedef char varchar2;

#define min(x,y)  (((x) < (y)) ? (x) : (y))

#define OCIERROR(errp,function)\
       ocierror(server_logtrans,__FILE__,__LINE__,(dvoid
*)(errp),(function));

#define OCIBND(stmp, bndp, errp, sqlvar, progv, progvl, ftype)\
      ocierror(server_logtrans,__FILE__,__LINE__,(errp), \

OCIHandleAlloc((stmp),(dvoid**)&(bndp),OCI_HTYPE_BIND,0,(dvoi
d**)0)); \
      ocierror(server_logtrans,__FILE__,__LINE__, (errp), \
           OCIBindByName((stmp), &(bndp), (errp), \
          (text *)(sqlvar), strlen((sqlvar)),\
          (progv), (progvl), (ftype),0,0,0,0,0,OCI_DEFAULT));

/* bind arrays for sql */
#define
OCIBNDRA(stmp,bndp,errp,sqlvar,progv,progvl,ftype,indp,alen,arco
de) \
      DISCARD ocierror(server_logtrans,__FILE__,__LINE__,(errp), \

OCIHandleAlloc((stmp),(dvoid**)&(bndp),OCI_HTYPE_BIND,0,(dvoi
d**)0)); \
      DISCARD ocierror(server_logtrans,__FILE__,__LINE__,(errp), \
        OCIBindByName((stmp),&(bndp),(errp),(text
*)(sqlvar),strlen((sqlvar)),\

(progv),(progvl),(ftype),(indp),(alen),(arcode),0,0,OCI_DEFAULT));

/* use with callback data */
#define OCIBNDRAD(stmp,bndp,errp,sqlvar,progvl,ftype,indp,ctxp,\
              cbf_nodata,cbf_data) \
      DISCARD ocierror(server_logtrans,__FILE__,__LINE__,(errp), \

OCIHandleAlloc((stmp),(dvoid**)&(bndp),OCI_HTYPE_BIND,0,(dvoi
d**)0)); \
      DISCARD ocierror(server_logtrans,__FILE__,__LINE__,(errp), \
          OCIBindByName((stmp),&(bndp),(errp),(text *)(sqlvar), \
                    strlen((sqlvar)),0,(progvl),(ftype), \
                    indp,0,0,0,0,OCI_DATA_AT_EXEC)); \
      DISCARD ocierror(server_logtrans,__FILE__,__LINE__,(errp), \

OCIBindDynamic((bndp),(errp),(ctxp),(cbf_nodata),(ctxp),(cbf_data))
);

/* bind in/out for plsql without indicator and rcode */
#define OCIBNDPL(stmp,bndp,errp,sqlvar,progv,progvl,ftype,alen) \
    DISCARD ocierror(server_logtrans,__FILE__,__LINE__,(errp), \

OCIHandleAlloc((stmp),(dvoid**)&(bndp),OCI_HTYPE_BIND,0,(dvoi
d**)0)); \
    DISCARD ocierror(server_logtrans,__FILE__,__LINE__,(errp), \
      OCIBindByName((stmp),&(bndp),(errp),(CONST text *)(sqlvar), \
        (sb4)strlen((CONST char *)(sqlvar)),
(dvoid*)(progv),(progvl),(ftype),\
            NULLP(dvoid),(alen), NULLP(ub2),
0,NULLP(ub4),OCI_DEFAULT));

/* bind  in values for plsql with indicator and rcode */
#define
OCIBNDR(stmp,bndp,errp,sqlvar,progv,progvl,ftype,indp,alen,arcod
e) \
      DISCARD ocierror(server_logtrans,__FILE__,__LINE__,(errp), \

OCIHandleAlloc((stmp),(dvoid**)&(bndp),OCI_HTYPE_BIND,0,(dvoi
d**)0)); \
      DISCARD ocierror(server_logtrans,__FILE__,__LINE__,(errp), \
       OCIBindByName((stmp),&(bndp),(errp),(text
*)(sqlvar),strlen((sqlvar)),\
```

```
        (progv),(progvl),(ftype),(indp),(alen),(arcode),0,0, \
              OCI_DEFAULT));

/* bind in/out for plsql arrays witout indicator and rcode */
#define
OCIBNDPLA(stmp,bndp,errp,sqlvar,progv,progvl,ftype,alen,ms,cu) \
     DISCARD ocierror(server_logtrans,__FILE__,__LINE__, (errp),
\

OCIHandleAlloc((stmp),(dvoid**)&(bndp),OCI_HTYPE_BIND,0,(dvoi
d**)0));\
     DISCARD ocierror(server_logtrans,__FILE__,__LINE__,(errp),\
       OCIBindByName((stmp),&(bndp),(errp),(CONST text
*)(sqlvar), \
            (sb4)strlen((CONST char *) (sqlvar)),(void *)(progv), \

(progvl),(ftype),NULL,(alen),NULL,(ms),(cu),OCI_DEFAULT));

/* bind in/out values for plsql with indicator and rcode */
#define
OCIBNDRAA(stmp,bndp,errp,sqlvar,progv,progvl,ftype,indp,alen,arc
ode,\
               ms,cu) \
     ocierror(server_logtrans,__FILE__,__LINE__, (errp), \

OCIHandleAlloc((stmp),(dvoid**)&(bndp),OCI_HTYPE_BIND,0,(dvoi
d**)0));\
     ocierror(server_logtrans,__FILE__,__LINE__,(errp),\
       OCIBindByName((stmp),&(bndp),(errp),(text
*)(sqlvar),strlen((sqlvar)),\

(progv),(progvl),(ftype),(indp),(alen),(arcode),(ms),(cu),OCI_DEFAU
LT));

#define OCIDEFINE(stmp,dfnp,errp,pos,progv,progvl,ftype)\

OCIDefineByPos((stmp),&(dfnp),(errp),(pos),(progv),(progvl),(ftype),\
          0,0,0,OCI_DEFAULT);


#define OCIDEF(stmp,dfnp,errp,pos,progv,progvl,ftype) \

OCIHandleAlloc((stmp),(dvoid**)&(dfnp),OCI_HTYPE_DEFINE,0,\
               (dvoid**)0);\
     OCIDefineByPos((stmp),&(dfnp),(errp),(pos),(progv),(progvl),\
                    (ftype),NULL,NULL,NULL,OCI_DEFAULT); \


#define
OCIDFNRA(stmp,dfnp,errp,pos,progv,progvl,ftype,indp,alen,arcode)
\

OCIHandleAlloc((stmp),(dvoid**)&(dfnp),OCI_HTYPE_DEFINE,0,\
               (dvoid**)0);\
     OCIDefineByPos((stmp),&(dfnp),(errp),(pos),(progv),\
               (progvl),(ftype),(indp),(alen),\
               (arcode),OCI_DEFAULT);

#define
OCIDFNDYN(stmp,dfnp,errp,pos,progv,progvl,ftype,indp,ctxp,cbf_d
ata) \
     ocierror(server_logtrans,__FILE__,__LINE__,(errp), \

OCIHandleAlloc((stmp),(dvoid**)&(dfnp),OCI_HTYPE_DEFINE,0,\
               (dvoid**)0));\
     ocierror(server_logtrans,__FILE__,__LINE__,(errp), \
     OCIDefineByPos((stmp),&(dfnp),(errp),(pos),(progv),
(progvl),(ftype),\
                         (indp),NULL,NULL,
OCI_DYNAMIC_FETCH));\
     ocierror(server_logtrans,__FILE__,__LINE__,(errp), \
     OCIDefineDynamic((dfnp),(errp),(ctxp),(cbf_data)));
```

```
struct out_stocklev_struct {
   int32_t terror;
   int32_t s_low_stock;
   int32_t retry;
   int16_t  s_transtatus;
};

struct in_stocklev_struct {
   int32_t  s_threshold;
   int32_t  s_D_ID;
   int32_t    s_W_ID;
};

struct in_neword_struct {
  int32_t  s_OL_I_ID[15];
  int32_t  s_OL_SUPPLY_W_ID[15];
  int32_t  s_OL_QUANTITY[15];
  int32_t  s_C_ID;
  int32_t  s_W_ID;
  int32_t  s_D_ID;
  int32_t  s_O_OL_CNT;
  int32_t  s_all_local;
  int32_t  duplicate_items;
  OCIDate cr_date;
};

struct out_neword_struct {
  int32_t  s_I_PRICE[15];
  int32_t  s_OL_AMOUNT[15];
  int32_t  s_S_QUANTITY[15];
  char     s_I_NAME[15][25];
  char     s_brand_generic[15];
  char  s_O_ENTRY_D_time[22];
  float  s_W_TAX;
  float  s_D_TAX;
  float  s_C_DISCOUNT;
  float  s_total_amount;
  int32_t  s_O_ID;
  int32_t  s_O_OL_CNT;
  int16_t  s_transtatus;
  int16_t  deadlocks;
  int16_t  datelen;
  char     s_C_LAST[17];
  char     s_C_CREDIT[3];
  int32_t  terror;
  int32_t  status;
  int32_t  retry;
  int16_t  items_valid;
};

struct in_payment_struct {
  int  s_H_AMOUNT;
  int32_t  s_W_ID;
  int32_t  s_C_W_ID;
  int  s_C_ID;
  int32_t  s_C_D_ID;
  int32_t  s_D_ID;
  char     s_C_LAST[17];
  int32_t  bylastname;
  OCIDate cr_date;
};

struct out_payment_struct {
  char  s_H_DATE_time[22];
  OCIDate c_since;
  char c_since_d[12];
  double  s_C_CREDIT_LIM;
  double  s_C_BALANCE;
  float  s_C_DISCOUNT;
  int  s_C_ID;
```

```
  int16_t  s_transtatus;
  int16_t  since_len;
  int32_t  terror;
  int16_t  hlen;
  int32_t  retry;
  char     s_W_STREET_1[21];
  char     s_W_STREET_2[21];
  char     s_W_CITY[21];
  char     s_W_STATE[3];
  char     s_W_ZIP[10];
  char     s_D_STREET_1[21];
  char     s_D_STREET_2[21];
  char     s_D_CITY[21];
  char     s_D_STATE[3];
  char     s_D_ZIP[10];
  char     s_C_FIRST[17];
  char     s_C_MIDDLE[3];
  char     s_C_LAST[17];
  char     s_C_STREET_1[21];
  char     s_C_STREET_2[21];
  char     s_C_CITY[21];
  char     s_C_STATE[3];
  char     s_C_ZIP[10];
  char     s_C_PHONE[17];
  char     s_C_CREDIT[3];
  char     s_C_DATA[201];
};

struct in_ordstat_struct {
  int32_t  s_C_ID;
  int32_t  s_W_ID;
  int32_t  s_D_ID;
  int32_t  bylastname;
  char     s_C_LAST[17];
  OCIDate  cr_date;
};

struct out_ordstat_struct {
  double   s_C_BALANCE;
  char     s_O_ENTRY_D_time[22];
  int32_t  s_C_ID;
  int32_t  s_O_ID;
  int32_t  s_O_CARRIER_ID;
  int32_t  s_ol_cnt;
  int32_t  terror;
  char     s_OL_DELIVERY_D_time[15][22];
  OCIDate  s_OL_DELIVERY_D_base[15];
  int32_t  s_OL_AMOUNT[15];
  int32_t  s_OL_I_ID[15];
  int32_t  s_OL_SUPPLY_W_ID[15];
  int32_t  s_OL_QUANTITY[15];
  int32_t  ol_del_len[15];
  int16_t  s_transtatus;
  int32_t  retry;
  char     s_C_FIRST[17];
  char     s_C_MIDDLE[3];
  char     s_C_LAST[17];
};

struct in_delivery_struct {
  double  s_O_DELIVERY_D_time;
  int32_t  s_W_ID;
  int32_t  s_O_CARRIER_ID;
  int16_t  plsqlflag;
  OCIDate cr_date;
};

struct out_delivery_struct {
  int32_t  s_O_ID[10];
  int32_t  terror;
  int16_t  s_transtatus;
  int32_t  retry;
};

#endif
```

oratpcc.h

```
#ifndef ORATPCC_H
#define ORATPCC_H
   typedef struct {
      long int sec;
      long int usec;
   } time_type;
   typedef struct  {
      OCIDate cr_date;
      int  dtype;
      int  returncode;
      long int   sql_code;
      long int   isam_code;
      long int   num_rms;

      short int  stats;       /*  For instrument only */
      time_type  start_time;  /*  For Debug Purposes only  */
      time_type  end_time;    /*  For Debug Purposes only  */
   } data_header;

   struct stoinstruct {
      int w_id;
      int d_id;
#ifdef USE_IEEE_NUMBER
      float threshold;
#else
      int threshold;
#endif

   };

   struct stooutstruct {
      int terror;
      int low_stock;
      int retry;
   };

   struct stostruct {
      data_header header;
      struct stoinstruct stoin;
      struct stooutstruct stoout;
      int out_s_transtatus;
   };

   struct newinstruct {
      int w_id;
      int d_id;
      int c_id;
      int ol_i_id[15];
      int ol_supply_w_id[15];
#ifdef USE_IEEE_NUMBER
      float ol_quantity[15];
#else
      int ol_quantity[15];
#endif
   };

   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];
```

```
    int datelen;
#ifdef USE_IEEE_NUMBER
    float i_price[15];
    float ol_amount[15];
    float s_quantity[15];
#else
    int i_price[15];
    int ol_amount[15];
    int s_quantity[15];
#endif
    float total_amount;
    char i_name[15][25];
    char brand_generic[15];
    int status;
    int retry;
    int o_all_local;
  };

  struct newstruct {
    data_header header;
    struct newinstruct newin;
    struct newoutstruct newout;
    int out_s_transtatus;
    int items_valid;
  };

  struct payinstruct {
    int w_id;
    int d_id;
    int c_w_id;
    int c_d_id;
    int c_id;
    int bylastname;
#ifdef USE_IEEE_NUMBER
    float h_amount;
#else
    int h_amount;
#endif
    char c_last[17];
  };

  struct payoutstruct {
    int terror;
    int hlen;
    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];
    OCIDate c_since;
    char c_since_d[11];
    int since_len;
    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 {
    data_header header;
    struct payinstruct payin;
    struct payoutstruct payout;
    int out_s_transtatus;
  };

  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;
    OCIDate o_entry_d_base;
    OCIDate ol_d_base[15];
    char o_entry_d[20];
    int o_carrier_id;
    int o_ol_cnt;
    int ol_supply_w_id[15];
    int ol_i_id[15];
#ifdef USE_IEEE_NUMBER
    float ol_quantity[15];
    float ol_amount[15];
#else
    int ol_quantity[15];
    int ol_amount[15];
#endif
    char ol_delivery_d[15][11];
    int ol_del_len[15];
    int retry;
  };

  struct ordstruct {
    data_header header;
    struct ordinstruct ordin;
    struct ordoutstruct ordout;
    int out_s_transtatus;
  };

struct delinstruct {
  int w_id;
  int o_carrier_id;
  double qtime;
  int in_timing_int;
  int plsqlflag;
};

struct deloutstruct {
  int del_o_id[10];
  int terror;
  int retry;
};

struct delstruct {
  data_header header;
  struct delinstruct delin;
  struct deloutstruct delout;
  OCIDate cr_date;
```

```
  int out_s_transtatus;
};
#endif /* ORATPCC_H */
```

plora.h

```
/*
 * $Header: plora.h for Encina
 */
/*================================================
================+
|                    All Rights Reserved                    |

+================================================
===============+
| FILENAME
|    plora.h
| DESCRIPTION
|    Include file for TPC-C benchmark programs.

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


#ifndef TPCC_PLORA_H
#define TPCC_PLORA_H

#define serverDebug 1
//extern void logprintf(char *format, ...);
//#define DEBUGP(list) if (serverDebug) logprintf list
#define TIME_PREFIX_LEN 50
//extern FILE *server_logtrans;

#define NEWO_TRANS (1)
#define PAYMENT_TRANS (2)
#define ORDER_STAT_TRANS (3)
#define DELIVERY_TRANS (4)
#define STOCK_TRANS (5)
#define MAX_TRAN_TYPE (5)

/* Oracle handles and rest of thread specific vars(thread slot data ) */

struct ora_cn_data_t {
  OCIEnv *tpcenv;
  OCIServer *tpcsrv;
  dvoid *errhp;
  OCISvcCtx *tpcsvc;
  OCISession *tpcusr;
  OCIStmt *curi;
  dvoid *xmem;

  nord_wrapper globals;
  ords_wrapper ordP;
  stok_wrapper stoP;
  paym_wrapper payP;
  dlvy_wrapper delP;

  int tid;
  FILE* server_logtrans;

  void *nctx;
  void *pctx;
  void *octx;
  void *sctx;
  void *dctx;
  void *pldctx;
  void *actx;  /* for #ifdef DMLRETDEL */
  void *cbctx; /* for orderstatus */
  void *ctxp_octx; /* for orderstatus */
};

struct thread_info
{
   ora_cn_data_t        *curP;
   FILE                 *server_logtrans;
   int                  tid;
   int                  server_null_test;
   char                 oracle_home[255];
   char                 dbName[20];
};

typedef struct ora_cn_data_t ora_cn_data_t;
extern int tkvcninit (ora_cn_data_t *ora_SlotDataP);
extern int tkvcpinit (ora_cn_data_t *ora_SlotDataP);
extern int tkvcoinit (ora_cn_data_t *ora_SlotDataP);
extern int tkvcdinit (ora_cn_data_t *ora_SlotDataP);
extern int tkvcsinit (ora_cn_data_t *ora_SlotDataP);

extern int tkvcn (ora_cn_data_t *ora_SlotDataP);
extern int tkvcp (ora_cn_data_t *ora_SlotDataP);
extern int tkvco (ora_cn_data_t *ora_SlotDataP);
extern int tkvcd (ora_cn_data_t *ora_SlotDataP);
extern int tkvcs (ora_cn_data_t *ora_SlotDataP);

extern void tkvcndone (ora_cn_data_t *ora_SlotDataP);
extern void tkvcpdone (ora_cn_data_t *ora_SlotDataP);
extern void tkvcodone (ora_cn_data_t *ora_SlotDataP);
extern void tkvcddone (ora_cn_data_t *ora_SlotDataP);
extern void tkvcsdone (ora_cn_data_t *ora_SlotDataP);

#endif /* TPCC_PLORA_H */
```

stdafx.h

```
// stdafx.h : include file for standard system include files,
// or project specific include files that are used frequently, but
// are changed infrequently
//

#pragma once


#define WIN32_LEAN_AND_MEAN     // Exclude rarely-used stuff
from Windows headers
// Windows Header Files:
#include <windows.h>

// TODO: reference additional headers your program requires here
```

tpccflags.h

```
#define PLSQLNO
#define DMLRETDEL
```

tpcc_info.h

```
/*
 * $Header: tpcc_info.h 7030100.1 95/07/19 15:11:37 plai
Generic<base> $ Copyr (c) 1995 Oracle
 */
/*================================================
================+
|       Copyright (c) 1995  Oracle Corp, Redwood Shores, CA      |
|                OPEN SYSTEMS PERFORMANCE GROUP
|
|                    All Rights Reserved                    |

+================================================
===============+
| FILENAME
|    tpcc_info.h
| DESCRIPTION
|    Include file for TPC-C benchmark programs.
```

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

#ifndef TPCC_INFO_H
#define TPCC_INFO_H

/* this set is duplicated in c_Defs.h, c_Defs.h is used for batch driver
*/
#define MENTXN    0         /* menu txn */
#define NEWTXN    1         /* new order transaction */
#define PAYTXN    2         /* payment transaction */
#define ORDTXN    3         /* order status transaction */
#define DELTXN    4         /* delivery transaction */
#define STOTXN    5         /* stock level transaction */
#define ALLTXN    6         /* for processing all txns */
#define ALLTXNNODEL 7       /* for processing all txns except
delivery */
#endif
```

tpccOracleGlue.h

```
// The following ifdef block is the standard way of creating macros
which make exporting
// from a DLL simpler. All files within this DLL are compiled with the
TPCCORACLEGLUE_EXPORTS
// symbol defined on the command line. this symbol should not be
defined on any project
// that uses this DLL. This way any other project whose source files
include this file see
// TPCCORACLEGLUE_API functions as being imported from a
DLL, whereas this DLL sees symbols
// defined with this macro as being exported.
#ifdef TPCCORACLEGLUE_EXPORTS
#define TPCCORACLEGLUE_API __declspec(dllexport)
#else
#define TPCCORACLEGLUE_API __declspec(dllimport)
#endif

#include "../tpccisapi/tpcc.h"
#include "ora10_mt/ora_tpcc.h"
#include "ora10_mt/plora.h"

////////////////////////////////////////////////////////////////////
// Error/Debug log file defines
////////////////////////////////////////////////////////////////////
ofstream debugStream;
ofstream errorStream;

////////////////////////////////////////////////////////////////////
// Registery Values
////////////////////////////////////////////////////////////////////
#define    DB_USER_NAME              "dbUserName"
#define    DB_USER_PASSWORD          "dbPassword"
#define    DB_NAME                   "dbName"

char userName[16] = {NULL};
char userPassword[16] = {NULL};

HKEY   registeryKey;
DWORD  regType;
char   value[MAX_STRING_LEN];
DWORD  regValueSize = MAX_STRING_LEN;

////////////////////////////////////////////////////////////////////
// Oracle Glue Function Prototypes
////////////////////////////////////////////////////////////////////
extern "C" TPCCORACLEGLUE_API int connect_db(char
*dbName,void **ctx);
extern "C" TPCCORACLEGLUE_API int getContext(void **ctx);
extern "C" TPCCORACLEGLUE_API int detachContext(void *ctx);
extern "C" TPCCORACLEGLUE_API int attachContext(void *ctx);
extern "C" TPCCORACLEGLUE_API int disconnect_db(void *ctx);

extern "C" TPCCORACLEGLUE_API int do_nord(nord_wrapper
*nord,void *ctx);
extern "C" TPCCORACLEGLUE_API int do_pymt(paym_wrapper
*pymt,void *ctx);
extern "C" TPCCORACLEGLUE_API int do_ords(ords_wrapper
*ords,void *ctx);
extern "C" TPCCORACLEGLUE_API int do_dlvy(dlvy_wrapper
*dlvy,void *ctx);
extern "C" TPCCORACLEGLUE_API int do_stok(stok_wrapper
*stok,void *ctx);

////////////////////////////////////////////////////////////////////
// Function Prototypes
////////////////////////////////////////////////////////////////////
extern ora_cn_data_t *get_db_ready(ora_cn_data_t *ctx, char *uid,
char *pwd, char *dbName);
extern void clean_connection(FILE* server_logtrans,void *ptr);

extern int TPCnew (void *cnP);
extern int TPCpay (void *cnP);
extern int TPCord (void *cnP);
extern int TPCsto (void *cnP);
extern int TPCdel (void *cnP);

extern CRITICAL_SECTION debugMutex;

#define TPCC_SUCCESS 0

// This class is exported from the tpccOracleGlue.dll
class TPCCORACLEGLUE_API CtpccOracleGlue {
public:
   CtpccOracleGlue(void);
   // TODO: add your methods here.
};
```

tpccpl.h

```
/*
 * $Header: tpccpl.h 7030100.1 96/04/02 18:03:35 plai
Generic<base> $ Copyr (c) 1994 Oracle
 */
/*================================================
================+
 |      Copyright (c) 1994  Oracle Corp, Redwood Shores, CA      |
 |                 OPEN SYSTEMS PERFORMANCE GROUP
|
 |                    All Rights Reserved                        |

+================================================
================+
 | FILENAME
 |    tpccpl.h
 | DESCRIPTION
 |    Header file for TPC-C transactions in PL/SQL.

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

#ifndef TPCCPL_H
#define TPCCPL_H

#include <stdio.h>
#include "tpcc.h"

#ifdef TUX
#define DELRT 5.0
#else
#define DELRT 80.0
#endif
```

```
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 void logerr();
extern int ocierror(FILE *server_logtrans,char *fname, int
lineno,OCIError *errhp, sword status);


extern int sqlfile(char *fname, text *linebuf);

extern void cvtdmy ( unsigned char *orady, char *outdate);
extern void cvtdmyhms (unsigned char *orady, char *outdate);

extern FILE *lfp;
extern FILE *fopen ();
extern int proc_no;
extern int doid[];
extern int execstatus;
extern int errcode;

#ifndef DISCARD
# define DISCARD (void)
#endif

#ifndef sword
# define sword int
#endif

#define VER7           2

#define NA             -1      /* ANSI SQL NULL */
#define NLT            1       /* length for string null terminator */
#define DEADLOCK       60      /* ORA-00060: deadlock */
#define NO_DATA_FOUND   1403    /* ORA-01403: no data found
*/
#define NOT_SERIALIZABLE  8177  /* ORA-08177: transaction not
serializable */
#define SNAPSHOT_TOO_OLD  1555  /* ORA-01555: snapshot too
old */


#ifndef NULLP
# define NULLP (void *)NULL
#endif /* NULLP */

#define ADR(object) ((ub1 *)&(object))
#define SIZ(object) ((sword)sizeof(object))

typedef char date[24+NLT];
typedef char varchar2;

#define OCIERROR(errp,function)\
   ocierror(FILE *server_logtrans,__FILE__,__LINE__,(void
*)(errp),(function));

#define OCIBND(stmp, bndp, errp, sqlvar, progv, progvl, ftype)\
      ocierror(FILE *server_logtrans,__FILE__,__LINE__,(errp), \

OCIHandleAlloc((stmp),(dvoid**)&(bndp),OCI_HTYPE_BIND,0,(dvoi
d**)0)); \
      ocierror(FILE *server_logtrans,__FILE__,__LINE__, (errp), \
       OCIBindByName((stmp), &(bndp), (errp), \
          (text *)(sqlvar), strlen((sqlvar)),\
          (progv), (progvl), (ftype),0,0,0,0,0,OCI_DEFAULT));

#define
OCIBNDRA(stmp,bndp,errp,sqlvar,progv,progvl,ftype,indp,alen,arco
de) \
      ocierror(FILE *server_logtrans,__FILE__,__LINE__,(errp), \

OCIHandleAlloc((stmp),(dvoid**)&(bndp),OCI_HTYPE_BIND,0,(dvoi
d**)0)); \
      ocierror(FILE *server_logtrans,__FILE__,__LINE__,(errp), \
       OCIBindByName((stmp),&(bndp),(errp),(text
*)(sqlvar),strlen((sqlvar)),\

(progv),(progvl),(ftype),(indp),(alen),(arcode),0,0,OCI_DEFAULT));
#define
OCIBNDRAD(stmp,bndp,errp,sqlvar,progvl,ftype,indp,ctxp,cbf_noda
ta,cbf_data) \
      ocierror(FILE *server_logtrans,__FILE__,__LINE__,(errp), \

OCIHandleAlloc((stmp),(dvoid**)&(bndp),OCI_HTYPE_BIND,0,(dvoi
d**)0)); \
      ocierror(FILE *server_logtrans,__FILE__,__LINE__,(errp), \
       OCIBindByName((stmp),&(bndp),(errp),(text *)(sqlvar), \
          strlen((sqlvar)),0,(progvl),(ftype), \
          indp,0,0,0,0,OCI_DATA_AT_EXEC)); \
      ocierror(FILE *server_logtrans,__FILE__,__LINE__,(errp), \

OCIBindDynamic((bndp),(errp),(ctxp),(cbf_nodata),(ctxp),(cbf_data))
);


#define
OCIBNDR(stmp,bndp,errp,sqlvar,progv,progvl,ftype,indp,alen,arcod
e) \
      ocierror(FILE *server_logtrans,__FILE__,__LINE__,(errp), \

OCIHandleAlloc((stmp),(dvoid**)&(bndp),OCI_HTYPE_BIND,0,(dvoi
d**)0)); \
      ocierror(FILE *server_logtrans,__FILE__,__LINE__,(errp), \
     OCIBindByName((stmp),&(bndp),(errp),(text
*)(sqlvar),strlen((sqlvar)),\

(progv),(progvl),(ftype),(indp),(alen),(arcode),0,0,OCI_DEFAULT));

#define
OCIBNDRAA(stmp,bndp,errp,sqlvar,progv,progvl,ftype,indp,alen,arc
ode,ms,cu) \
      ocierror(FILE *server_logtrans,__FILE__,__LINE__, (errp), \

OCIHandleAlloc((stmp),&(bndp),OCI_HTYPE_BIND,0,(dvoid**)0)); \
      ocierror(FILE *server_logtrans,__FILE__,__LINE__,(errp),\
    OCIBindByName((stmp),&(bndp),(errp),(text
*)(sqlvar),strlen((sqlvar)),\

(progv),(progvl),(ftype),(indp),(alen),(arcode),(ms),(cu),OCI_DEFAU
LT));


#define OCIDEFINE(stmp,dfnp,errp,pos,progv,progvl,ftype)\

OCIDefineByPos((stmp),&(dfnp),(errp),(pos),(progv),(progvl),(ftype),\
          0,0,0,OCI_DEFAULT);
```

```
#define OCIDEF(stmp,dfnp,errp,pos,progv,progvl,ftype) \

OCIHandleAlloc((stmp),(dvoid**)&(dfnp),OCI_HTYPE_DEFINE,0,\
                (dvoid**)0);\
      OCIDefineByPos((stmp),&(dfnp),(errp),(pos),(progv),(progvl),\
          (ftype),NULL,NULL,NULL,OCI_DEFAULT); \

#define
OCIDFNRA(stmp,dfnp,errp,pos,progv,progvl,ftype,indp,alen,arcode)
\

OCIHandleAlloc((stmp),(dvoid**)&(dfnp),OCI_HTYPE_DEFINE,0,\
                (dvoid**)0);\
      OCIDefineByPos((stmp),&(dfnp),(errp),(pos),(progv),\
                (progvl),(ftype),(indp),(alen),\
                (arcode),OCI_DEFAULT);\
/*
      OCIDefineArrayOfStruct((dfnp),(errp),(progvl),\
                  sizeof((indp)[0]),\
                  sizeof((alen)[0]),\
                  sizeof((arcode)[0]));
*/
/*
#define
OCIDFNRA(stmp,dfnp,errp,pos,progv,progvl,ftype,indp,alen,arcode)
\
      ocierror(FILE *server_logtrans,__FILE__,__LINE__,(errp), \
       OCIHandleAlloc(tpcenv,&(dfnp),OCI_HTYPE_DEFINE,0,\
                (dvoid**)0));\
      ocierror(FILE *server_logtrans,__FILE__,__LINE__,(errp), \
       OCIDefineByPos((stmp),&(dfnp),(errp),(pos),(progv),\
                (progvl),(ftype),(indp),(alen),\
                (arcode),OCI_DEFAULT));\
      ocierror(FILE *server_logtrans,__FILE__,__LINE__,(errp),\
       OCIDefineArrayOfStruct((dfnp),(errp),(progvl),\
                  sizeof((indp)[0]),\
                  sizeof((alen)[0]),\
                  sizeof((arcode)[0])));
*/

#define OBNDRV(lda,cursor,sqlvar,progv,progvl,ftype)\
   if
(obndrv((cursor),(text*)(sqlvar),NA,(ub1*)(progv),(progvl),(ftype),NA,\
      (sb2 *)0, (text *)0, NA, NA))\
      {errrpt(lda,cursor);return(-1);}\
   else\
      DISCARD 0

#define
OBNDRA(lda,cursor,sqlvar,progv,progvl,ftype,indp,alen,arcode)\
   if
(obndra((cursor),(text*)(sqlvar),NA,(ub1*)(progv),(progvl),(ftype),NA,\
      (indp),(alen),(arcode),(ub4)0,(ub4*)0,(text*)0,NA,NA))\
      {errrpt(lda,cursor);return(-1);}\
   else\
      DISCARD 0

#define
OBNDRAA(lda,cursor,sqlvar,progv,progvl,ftype,indp,alen,arcode,ms
,cs)\
   if
(obndra((cursor),(text*)(sqlvar),NA,(ub1*)(progv),(progvl),(ftype),NA,\
      (indp),(alen),(arcode),(ub4)(ms),(ub4*)(cs),(text*)0,NA,NA))\
      {errrpt(lda,cursor);return(-1);}\
   else\
      DISCARD 0

#define
ODEFIN(lda,cursor,pos,buf,bufl,ftype,scale,indp,fmt,fmtl,fmtt,rlen,rco
de)\
   if (odefin((cursor),(pos),(ub1*)(buf),(bufl),(ftype),(scale),(indp),\
      (text*)(fmt),(fmtl),(fmtt),(rlen),(rcode)))\
      {errrpt(lda,cursor);return(-1);}\
   else\
      DISCARD 0

#define OEXFET(lda,cursor,nrows,cancel,exact)\
   if (oexfet((cursor),(nrows),(cancel),(exact)))\
      {if ((cursor)->rc == 1403) \
    {i=errrpt(lda,cursor); orol(lda); return(-1);} \
   else if (errrpt(lda,cursor)==RECOVERR) \
     {orol(lda);return(RECOVERR);} \
   else{orol(lda);return(-1);}}\
    else\
      DISCARD 0

#define OOPEN(lda,cursor)\
   if (oopen((cursor),(lda),(text*)0,NA,NA,(text*)0,NA))\
      {errrpt(lda,cursor);return(-1);}\
   else\
      DISCARD 0

#define OPARSE(lda,cursor,sqlstm,sqll,defflg,lngflg)\
   if (oparse((cursor),(sqlstm),(sb4)(sqll),(defflg),(ub4)(lngflg)))\
      {errrpt(lda,cursor);return(-1);}\
   else\
      DISCARD 0

#define OFEN(lda,cursor,nrows)\
   if (ofen((cursor),(nrows)))\
      {if (errrpt(lda,cursor)==RECOVERR) \
     {orol(lda);return(RECOVERR);} \
   else{orol(lda);return(-1);}}\
    else\
      DISCARD 0

#define OEXEC(lda,cursor)\
   if (oexec((cursor)))\
      {if (errrpt(lda,cursor)==RECOVERR) \
     {orol(lda);return(RECOVERR);} \
   else{orol(lda);return(-1);}}\
    else\
      DISCARD 0


#define OCOM(lda,cursor)\
   if (ocom((lda))) \
      {errrpt(lda,cursor);orol(lda);return(-1);}\
   else\
      DISCARD 0


#define OEXN(lda,cursor,iters,rowoff)\
   if (oexn((cursor),(iters),(rowoff))) \
      {if (errrpt(lda,cursor)==RECOVERR) \
     {orol(lda);return(RECOVERR);} \
   else{orol(lda);return(-1);}}\
    else\
      DISCARD 0

#endif
```

A.3 TM Code

Com file set 0,1 and 50 of Com files, 0 through 50.

tpccCom0/dlldata.c

```
/*********************************************************
   DllData file -- generated by MIDL compiler

        DO NOT ALTER THIS FILE
```

```
   This file is regenerated by MIDL on every IDL file compile.

   To completely reconstruct this file, delete it and rerun MIDL
   on all the IDL files in this DLL, specifying this file for the
   /dlldata command line option

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


#include <rpcproxy.h>

#ifdef __cplusplus
extern "C"   {
#endif

EXTERN_PROXY_FILE( tpccCom0 )


PROXYFILE_LIST_START
/* Start of list */
  REFERENCE_PROXY_FILE( tpccCom0 ),
/* End of list */
PROXYFILE_LIST_END


DLLDATA_ROUTINES( aProxyFileList, GET_DLL_CLSID )

#ifdef __cplusplus
}  /*extern "C" */
#endif

/* end of generated dlldata file */
```

tpccCom0/dlldatax.c

```
// wrapper for dlldata.c

#ifdef _MERGE_PROXYSTUB // merge proxy stub DLL

#define REGISTER_PROXY_DLL //DllRegisterServer, etc.

#define _WIN32_WINNT 0x0500   //for Win2000, change it to
0x0400 for NT4 or Win95 with DCOM
#define USE_STUBLESS_PROXY   //defined only with MIDL switch
/Oicf

#pragma comment(lib, "rpcns4.lib")
#pragma comment(lib, "rpcrt4.lib")

#define ENTRY_PREFIX  Prx

#include "dlldata.c"
#include "tpccCom0_p.c"

#endif //_MERGE_PROXYSTUB
```

tpccCom0/dlldatax.h

```
#pragma once

#ifdef _MERGE_PROXYSTUB

extern "C"
{
BOOL WINAPI PrxDllMain(HINSTANCE hInstance, DWORD
dwReason,
   LPVOID lpReserved);
STDAPI PrxDllCanUnloadNow(void);
STDAPI PrxDllGetClassObject(REFCLSID rclsid, REFIID riid,
LPVOID* ppv);
STDAPI PrxDllRegisterServer(void);
STDAPI PrxDllUnregisterServer(void);
}

#endif
```

tpccCom0/resource.h

```
//{{NO_DEPENDENCIES}}
// Microsoft Visual C++ generated include file.
// Used by tpccCom0.rc
//
#define IDS_PROJNAME                100
#define IDR_TPCCCOM0                101
#define IDR_TPCC_COM0               102

// Next default values for new objects
//
#ifdef APSTUDIO_INVOKED
#ifndef APSTUDIO_READONLY_SYMBOLS
#define _APS_NEXT_RESOURCE_VALUE        201
#define _APS_NEXT_COMMAND_VALUE         32768
#define _APS_NEXT_CONTROL_VALUE         201
#define _APS_NEXT_SYMED_VALUE           103
#endif
#endif
```

tpccCom0/stdafx.cpp

```
// stdafx.cpp : source file that includes just the standard includes
// tpccCom0.pch will be the pre-compiled header
// stdafx.obj will contain the pre-compiled type information

#include "stdafx.h"
```

tpccCom0/stdafx.h

```
// stdafx.h : include file for standard system include files,
// or project specific include files that are used frequently,
// but are changed infrequently

#pragma once

#ifndef STRICT
#define STRICT
#endif

// Modify the following defines if you have to target a platform prior to
the ones specified below.
// Refer to MSDN for the latest info on corresponding values for
different platforms.
#ifndef WINVER              // Allow use of features specific to Windows
95 and Windows NT 4 or later.
#define WINVER 0x0400      // Change this to the appropriate value
to target Windows 98 and Windows 2000 or later.
#endif

#ifndef _WIN32_WINNT    // Allow use of features specific to
Windows NT 4 or later.
#define _WIN32_WINNT 0x0400   // Change this to the appropriate
value to target Windows 2000 or later.
#endif

#ifndef _WIN32_WINDOWS    // Allow use of features specific to
Windows 98 or later.
#define _WIN32_WINDOWS 0x0410 // Change this to the
appropriate value to target Windows Me or later.
#endif

#ifndef _WIN32_IE         // Allow use of features specific to IE 4.0 or
later.
#define _WIN32_IE 0x0400 // Change this to the appropriate value
to target IE 5.0 or later.
```

```
#endif

#define _ATL_APARTMENT_THREADED
#define _ATL_NO_AUTOMATIC_NAMESPACE

#define _ATL_CSTRING_EXPLICIT_CONSTRUCTORS // some
CString constructors will be explicit

// turns off ATL's hiding of some common and often safely ignored
warning messages
#define _ATL_ALL_WARNINGS


#include <comsvcs.h>

#include "resource.h"
#include <atlbase.h>
#include <atlcom.h>

using namespace ATL;
```

tpccCom0/tpcc_com0.cpp

```
// tpcc_com0.cpp : Implementation of Ctpcc_com0

#include "stdafx.h"
#include "tpcc_com0.h"

#include "..\tpccIsapi\tpcc.h"

#include ".\tpcc_com0.h"
#ifdef DB2
#include <db2tpcc.h>
#endif
#ifdef ORA
#include <ora_tpcc.h>
#endif

#ifdef _DEBUG
  int debugFlag = 1;
#else
  int debugFlag = 0;
#endif

char tmpbuf[128];

// Ctpcc_com0
HRESULT Ctpcc_com0::Activate()
{
  HRESULT hr = GetObjectContext(&m_spObjectContext);
  if (SUCCEEDED(hr))
  {
    DEBUGMSG("Object assigned to thread."<<endl);
    return S_OK;
  }
  return hr;
}

BOOL Ctpcc_com0::CanBePooled()
{
  DEBUGMSG("CanBePooled() returning true"<<endl);
  return TRUE;
}

void Ctpcc_com0::Deactivate()
{
  DEBUGMSG("deactivated() releasing object back into
pool"<<endl);
  m_spObjectContext.Release();
}

/*
**********************************************************************
** Name        :  doSetComplete
** Description :
**             Release object back into com pool
** Parameters:
** Returns     :
**             int - return code
** Comments    :
**             Calls SetComplete on the object that the com
**             pool manager returned to the caller(isapi thread)
**********************************************************************
*/
STDMETHODIMP Ctpcc_com0::doSetComplete(void)
{
  // TODO: Add your implementation code here
  HRESULT hres = m_spObjectContext->SetComplete();
  if (SUCCEEDED(hres))
  {
    DEBUGMSG("SetComplete successful. object bit set to release
object into pool."<<endl);
  }
  else
  {
    DEBUGMSG("SetComplete failed. object bit set to release
object into pool."<<endl);
    ERRORMSG("SetComplete() failed,
code:"<<HRESULT_CODE(hres)<<"
facility:"<<HRESULT_FACILITY(hres)<<"
hres:"<<hex<<hres<<endl);
  }

  return S_OK;
}

/*
**********************************************************************
** Name        :  doStockLevel
** Description :
**             Call db2 dll entry point to execute txn
** Parameters:
**             int*    size of UCHAR buffer to pay attention to
**             UCHAR**    char buffer that holds txn wrapper struct
** Returns     :
**             int - return code
** Comments    :
**
**********************************************************************
*/
STDMETHODIMP Ctpcc_com0::doStockLevel(INT *size, UCHAR
**buffer)
{
  stok_wrapper * stok;
  stok = (stok_wrapper *) *buffer;
  if(!connectHandleInUse)
  {
    DEBUGMSG("Setting Context handle in use to true"<<endl);
    connectHandleInUse = 1;
  }
  else
  {
    DEBUGMSG("Context handle in use."<<endl);
    ERRORMSG("Context handle in use."<<endl);
    return ERR_HANDLE_IN_USE;
  }

  DEBUGMSG("Calling do_stok call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<stok->in_stok.s_W_ID<<" d_id:"<< stok->in_stok.s_D_ID<<
        " s_transtatus:"<<stok->out_stok.s_transtatus<<endl);

  do_stok(stok,connectHandle);
```

```
   DEBUGMSG("Return from do_stok call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<stok->in_stok.s_W_ID<<" d_id:"<< stok->in_stok.s_D_ID<<
         " s_transtatus:"<<stok->out_stok.s_transtatus<<endl);

   DEBUGMSG("Connection handle set to free" <<endl);
   connectHandleInUse = 0;

   return S_OK;
}

/*
**********************************************************************
** Name        :  doNewOrder
** Description :
**            Call db2 dll entry point to execute txn
** Parameters:
**            int*    size of UCHAR buffer to pay attention to
**            UCHAR**    char buffer that holds txn wrapper struct
** Returns     :
**            int - return code
** Comments    :
**
**********************************************************************
*/
STDMETHODIMP Ctpcc_com0::doNewOrder(INT* size, UCHAR**
buffer)
{
   nord_wrapper *nord;
   nord = (nord_wrapper *) *buffer;

   if(!connectHandleInUse)
   {
      DEBUGMSG("Setting Context handle in use to true"<<endl);
      connectHandleInUse = 1;
   }
   else
   {
      DEBUGMSG("Context handle in use."<<endl);
      ERRORMSG("Context handle in use."<<endl);
      return ERR_HANDLE_IN_USE;
   }

   DEBUGMSG("Calling do_nord call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<nord->in_nord.s_W_ID<<" d_id:"<< nord-
>in_nord.s_D_ID<<
         " s_transtatus:"<<nord->out_nord.s_transtatus<<endl);

   do_nord(nord,connectHandle);


   DEBUGMSG("Return from do_nord call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<nord->in_nord.s_W_ID<<" d_id:"<< nord-
>in_nord.s_D_ID<<
         " s_transtatus:"<<nord->out_nord.s_transtatus<<endl);

   DEBUGMSG("Connection handle set to free" <<endl);
   connectHandleInUse = 0;

   return S_OK;
}

/*
**********************************************************************
** Name        :  doPayment
** Description :
**            Call db2 dll entry point to execute txn
** Parameters:
**            int*    size of UCHAR buffer to pay attention to
**            UCHAR**    char buffer that holds txn wrapper struct
** Returns     :
**            int - return code
** Comments    :
**
**********************************************************************
*/
STDMETHODIMP Ctpcc_com0::doPayment(INT* size, UCHAR**
buffer)
{
   paym_wrapper  *pymt;
   pymt = (paym_wrapper *) *buffer;

   if(!connectHandleInUse)
   {
      DEBUGMSG("Setting Context handle in use to true"<<endl);
      connectHandleInUse = 1;
   }
   else
   {
      DEBUGMSG("Context handle in use."<<endl);
      ERRORMSG("Context handle in use."<<endl);
      return ERR_HANDLE_IN_USE;
   }


   DEBUGMSG("Calling do_pymt call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<pymt->in_paym.s_W_ID<<" d_id:"<< pymt-
>in_paym.s_D_ID<<
         " s_transtatus:"<<pymt->out_paym.s_transtatus<<endl);

   do_pymt(pymt,connectHandle);

   DEBUGMSG("Return from do_pymt call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<pymt->in_paym.s_W_ID<<" d_id:"<< pymt-
>in_paym.s_D_ID<<
         " s_transtatus:"<<pymt->out_paym.s_transtatus<<endl);

   DEBUGMSG("Connection handle set to free" <<endl);
   connectHandleInUse = 0;

   return S_OK;
}

/*
**********************************************************************
** Name        :  doOrderStatus
** Description :
**            Call db2 dll entry point to execute txn
** Parameters:
**            int*    size of UCHAR buffer to pay attention to
**            UCHAR**    char buffer that holds txn wrapper struct
** Returns     :
**            int - return code
** Comments    :
**
**********************************************************************
*/

STDMETHODIMP Ctpcc_com0::doOrderStatus(INT* size, UCHAR**
buffer)
{
   ords_wrapper *ords;
   ords = (ords_wrapper *) *buffer;

   if(!connectHandleInUse)
   {
      DEBUGMSG("Setting Context handle in use to true"<<endl);
      connectHandleInUse = 1;
   }
   else
```

```
  {
    DEBUGMSG("Context handle in use."<<endl);
    ERRORMSG("Context handle in use."<<endl);
    return ERR_HANDLE_IN_USE;
  }


  DEBUGMSG("Calling do_ords call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<ords->in_ords.s_W_ID<<" d_id:"<< ords-
>in_ords.s_D_ID<<
        " s_transtatus:"<<ords->out_ords.s_transtatus<<endl);

  do_ords(ords,connectHandle);

  DEBUGMSG("Return from do_ords call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<ords->in_ords.s_W_ID<<" d_id:"<< ords-
>in_ords.s_D_ID<<
        " s_transtatus:"<<ords->out_ords.s_transtatus<<endl);

  DEBUGMSG("Connection handle set to free" <<endl);
  connectHandleInUse = 0;

  return S_OK;
}

/*
********************************************************************
** Name        :  doDBInfo
** Description :
**            Function to test com interface
** Parameters:
** Returns     :
**            int - return code
** Comments    :
**
********************************************************************
*/

STDMETHODIMP Ctpcc_com0::doDBInfo(void)
{
  //DUMMY FUNCTION TO ALLOW ISAPI TO CALL COM
FUNCTION DURING LOGIN SO CONNECTIONS
  //TO DATABASE WILL BE SETUP.....I HOPE.
  DEBUGMSG("Stub function to warm object pool"<<endl);

  return S_OK;
}

/*
********************************************************************
** Name        :  loadLibrary
** Description :
**            Function loads apprioate db library based on
**            registry setting
** Parameters:
** Returns     :
**            int - return code
** Comments    :
**
********************************************************************
*/

Ctpcc_com0::loadLibrary()
{
  DEBUGMSG("Entered loadLibrary function"<<endl);
  //check to see if dbInstance is already loaded
  if(!dbInstance)
  {
    DEBUGMSG("Database dll not loaded. Loading dll."<<endl);
    if (nullDB)
    {
      DEBUGMSG("Loading "<<dbType << " nulldb dll." << endl);
      dbInstance =
LoadLibrary("c:\\inetpub\\wwwroot\\tpcc\\nullDB.dll");
      if(dbInstance == NULL)
      {
        DEBUGMSG("Unable to load null db dll,
rc:"<<GetLastError());
        ERRORMSG("Unable to load null db dll,
rc:"<<GetLastError());
        return ERR_NULL_DLL_NOT_LOADED;
      }
      DEBUGMSG(dbType << " nulldb dll loaded"<<endl);
    }
    else if(strcmp(dbType,"DB2") == 0)
    {
      DEBUGMSG("Loading "<<dbType << " dll." << endl);

      dbInstance =
LoadLibrary("c:\\inetpub\\wwwroot\\tpcc\\tpccDB2glue.dll");
      if(dbInstance == NULL)
      {
        DEBUGMSG("Unable to load library."<<endl);

        ERRORMSG("Unable to load com dll, rc:" << GetLastError()
<< endl);

        return ERR_DB2_DLL_NOT_LOADED;
      }
      DEBUGMSG(dbType<< " dll loaded"<<endl);
    }
    else if( strcmp(dbType,"ORACLE") == 0 )
    {
      DEBUGMSG("Loading "<<dbType << " dll." << endl);

      dbInstance =
LoadLibrary("c:\\inetpub\\wwwroot\\tpcc\\tpccOracleglue.dll");
      if(dbInstance == NULL)
      {
        DEBUGMSG("Unable to load oracle dll"<<endl);
        ERRORMSG("Unable to load oracle dll,
rc:"<<GetLastError()<<endl);
        return ERR_ORACLE_DLL_NOT_LOADED;
      }
      DEBUGMSG(dbType<< " dll loaded"<<endl);
    }
    else
    {
      DEBUGMSG("Unknown database type dll:"<<dbType<<endl);
      ERRORMSG("Unknown database type dll:"<<dbType<<endl);
      return ERR_UNKNOWN_DB;
    }

    //retrieve function addresses from instance loaded.
    DEBUGMSG("Getting do_connection function address from
"<<dbType<<" dll"<<endl);
    if( (do_connection =
(CONNECT_PTR)GetProcAddress(dbInstance,"connect_db")) ==
NULL )
      return ERR_CONNECT_ADDRESS_NOT_FOUND;
    DEBUGMSG("do_connection
address:"<<DEBUGADDRESS(do_connection)<<endl);

    DEBUGMSG("Getting do_disconnect function address from
"<<dbType<<" dll"<<endl);
    if( (do_disconnect =
(DISCONNECT_PTR)GetProcAddress(dbInstance,"disconnect_db")
) == NULL )
      return ERR_DISCONNECT_ADDRESS_NOT_FOUND;
    DEBUGMSG("do_disconnect
address:"<<DEBUGADDRESS(do_disconnect)<<endl);
```

```
    DEBUGMSG("Getting do_nord function address from
"<<dbType<<" dll"<<endl);
    if( (do_nord = (NORD_PTR)
GetProcAddress(dbInstance,"do_nord")) == NULL)
      return ERR_NORD_ADDRESS_NOT_FOUND;
    DEBUGMSG("do_nord function
address:"<<DEBUGADDRESS(do_nord)<<endl);

    DEBUGMSG("Getting do_pymt function address from
"<<dbType<<" dll"<<endl);
    if( (do_pymt = (PYMT_PTR)
GetProcAddress(dbInstance,"do_pymt")) == NULL)
      return ERR_PYMT_ADDRESS_NOT_FOUND;
    DEBUGMSG("do_pymt function
adddress:"<<DEBUGADDRESS(do_pymt)<<endl);

    DEBUGMSG("Getting do_ords function address from
"<<dbType<<" dll"<<endl);
    if( (do_ords = (ORDS_PTR)
GetProcAddress(dbInstance,"do_ords")) == NULL)
      return ERR_ORDS_ADDRESS_NOT_FOUND;
    DEBUGMSG("do_ords function
address:"<<DEBUGADDRESS(do_ords)<<endl);

    DEBUGMSG("Getting do_stok function address from
"<<dbType<<" dll"<<endl);
    if( (do_stok = (STOK_PTR)
GetProcAddress(dbInstance,"do_stok")) == NULL)
      return ERR_STOK_ADDRESS_NOT_FOUND;
    DEBUGMSG("do_stok function
address:"<<DEBUGADDRESS(do_stok)<<endl);

    DEBUGMSG("All function addresses retrieved
successfully."<<endl);

  }
  return OK;
}

/*
*********************************************************************
** Name        :  readRegistry()
** Description :
**            Function reads registry value
** Parameters:
** Returns     :
**            int - return code
** Comments    :
**            Values retrieved from registery
**            dbName, dbUserName, and dbUserPassword
*********************************************************************
*/

Ctpcc_com0::readRegistery()
{
  //open registery key
  HKEY   registeryKey;
  DWORD  regType;
  char   value[MAX_STRING_LEN];
  DWORD  regValue;
  DWORD  regValueSize = MAX_STRING_LEN;

  DEBUGMSG("Entered readRegistery(), opening key:"<<
REGISTERY_SUB_KEY <<endl);
  //open up registery key
  if(RegOpenKeyEx(HKEY_LOCAL_MACHINE,REGISTERY_SUB_
KEY,0,KEY_READ,&registeryKey) == ERROR_SUCCESS)
  {
    DEBUGMSG(REGISTERY_SUB_KEY<<" open, getting
database type from key"<<endl);
    regValueSize = sizeof(value);
    if
(RegQueryValueEx(registeryKey,DB_TYPE,0,&regType,(BYTE *)
&value,&regValueSize)== ERROR_SUCCESS )
      strcpy(dbType,value);
    DEBUGMSG("Database type:"<<dbType<<" from registery
key."<<endl);

    DEBUGMSG("Getting database name from registery
key."<<endl);
    regValueSize = sizeof(value);
    if
(RegQueryValueEx(registeryKey,DB_NAME,0,&regType,(BYTE *)
&value,&regValueSize)== ERROR_SUCCESS )
      strcpy(dbName,value);
    DEBUGMSG("Database name:"<<dbName<<endl);

    DEBUGMSG("Getting null database flag from key."<<endl);
    regValueSize = sizeof(regValue);
    if(RegQueryValueEx(registeryKey,NULL_DB,0,&regType,(BYTE
*)&regValue,&regValueSize) == ERROR_SUCCESS)
      nullDB = regValue;
    DEBUGMSG("Null database flag:"<<nullDB<<endl);

    return OK;
  }

  DEBUGMSG("Error, unable to open registery key."<<endl);
  return ERR_UNABLE_TO_OPEN_REG;
}

/*
*********************************************************************
** Name        :  connectDB
** Description :
**            Function connects to the db
** Parameters:
** Returns     :
**            int - return code
** Comments    :
**
*********************************************************************
*/
Ctpcc_com0::connectDB()
{
  DEBUGMSG("Entered connectDB(), checking if object is
connected."<<endl);
  if(!connected)
  {
    DEBUGMSG("Object not connected, calling do_connection with
dbName:"<<dbName<<" connectHandle:"<<
        DEBUGADDRESS(connectHandle)<<endl);
    if(!connectHandleInUse)
    {
      DEBUGMSG("Setting Context handle in use to true"<<endl);
      connectHandleInUse = 1;
      connected = do_connection(dbName,&connectHandle);
      if(connected != OK)
      {
        DEBUGMSG("Object do_connect failed,
rc:"<<connected<<endl);
        ERRORMSG("Object do_connect failed,
rc:"<<connected<<endl);
        return connected;
      }
      DEBUGMSG("Object connection complete,
connectHandle:"<<DEBUGADDRESS(connectHandle)<<endl);
      connectHandleInUse = 0;
      return OK;
    }
    else
    {
```

```
        DEBUGMSG("Object's connectHandle already in use, connect
failed"<<endl);
        ERRORMSG("Object's connectHandle already in use, connect
failed"<<endl);
        return ERR_HANDLE_IN_USE;
      }
   }
   DEBUGMSG("Object already has connection
established."<<endl);
   return OK;
}
```

tpccCom0/tpccCom0.cpp

```
// tpccCom0.cpp : Implementation of DLL Exports.
//
// Note: COM+ 1.0 Information:
//      Please remember to run Microsoft Transaction Explorer to
install the component(s).
//      Registration is not done by default.

#include "stdafx.h"
#include "resource.h"
#include "tpccCom0.h"
#include "dlldatax.h"

class CtpccCom0Module : public CAtlDllModuleT<
CtpccCom0Module >
{
public :
   DECLARE_LIBID(LIBID_tpccCom0Lib)
   DECLARE_REGISTRY_APPID_RESOURCEID(IDR_TPCCCOM0
, "{55A71599-F6F1-4AD9-BD70-E1B3178D5E9A}")
};

CtpccCom0Module _AtlModule;


// DLL Entry Point
extern "C" BOOL WINAPI DllMain(HINSTANCE hInstance, DWORD
dwReason, LPVOID lpReserved)
{
#ifdef _MERGE_PROXYSTUB
    if (!PrxDllMain(hInstance, dwReason, lpReserved))
        return FALSE;
#endif
   hInstance;
    return _AtlModule.DllMain(dwReason, lpReserved);
}


// Used to determine whether the DLL can be unloaded by OLE
STDAPI DllCanUnloadNow(void)
{
#ifdef _MERGE_PROXYSTUB
    HRESULT hr = PrxDllCanUnloadNow();
    if (FAILED(hr))
        return hr;
#endif
    return _AtlModule.DllCanUnloadNow();
}


// Returns a class factory to create an object of the requested type
STDAPI DllGetClassObject(REFCLSID rclsid, REFIID riid, LPVOID*
ppv)
{
#ifdef _MERGE_PROXYSTUB
    if (PrxDllGetClassObject(rclsid, riid, ppv) == S_OK)
        return S_OK;
#endif
    return _AtlModule.DllGetClassObject(rclsid, riid, ppv);
}


// DllRegisterServer - Adds entries to the system registry
STDAPI DllRegisterServer(void)
{
    // registers object, typelib and all interfaces in typelib
    HRESULT hr = _AtlModule.DllRegisterServer();
#ifdef _MERGE_PROXYSTUB
    if (FAILED(hr))
        return hr;
    hr = PrxDllRegisterServer();
#endif
   return hr;
}


// DllUnregisterServer - Removes entries from the system registry
STDAPI DllUnregisterServer(void)
{
   HRESULT hr = _AtlModule.DllUnregisterServer();
#ifdef _MERGE_PROXYSTUB
    if (FAILED(hr))
        return hr;
    hr = PrxDllRegisterServer();
    if (FAILED(hr))
        return hr;
    hr = PrxDllUnregisterServer();
#endif
   return hr;
}
```

tpccCom0/tpccCom0.def

```
; tpccCom0.def : Declares the module parameters.

LIBRARY      "tpccCom0.DLL"

EXPORTS
   DllCanUnloadNow      PRIVATE
   DllGetClassObject   PRIVATE
   DllRegisterServer PRIVATE
   DllUnregisterServer PRIVATE
```

tpccCom0/tpcc_com0.h

```
// tpcc_com0.h : Declaration of the Ctpcc_com0

#pragma once
#include "tpccCom0.h"
#include "resource.h"// main symbols
#include <comsvcs.h>

#include "..\tpccIsapi\tpcc.h"
#ifdef ORACLE
#define ORA_NT
#include <stdio.h>
#include <time.h>
#include <ora_tpcc.h>
#include <plora.h>
#endif
#define NULL_DB         "nullDB"

static HINSTANCE dbInstance         = NULL;

static CRITICAL_SECTION debugMutex;
static CRITICAL_SECTION errorMutex;

static int comServerID         =   0;
static ofstream debugStream;
static ofstream errorStream;
```

```
static int debugFileOpen      = 0;
static int errorFileOpen      = 0;
static int nullDB             = 0;
static char dbType[32];
static char dbName[32];

typedef INT (*NORD_PTR)(nord_wrapper *nord,void
*connectHandle);
typedef INT (*PYMT_PTR)(paym_wrapper *pymt,void
*connectHandle);
typedef INT (*ORDS_PTR)(ords_wrapper *ords,void
*connectHandle);
typedef INT (*STOK_PTR)(stok_wrapper *stok,void
*connectHandle);
typedef INT (*CONNECT_PTR)(char *dbName,void
**connectHandle);
typedef INT (*DISCONNECT_PTR)(void *connectHandle);

NORD_PTR   do_nord;
PYMT_PTR do_pymt;
ORDS_PTR   do_ords;
STOK_PTR do_stok;
CONNECT_PTR  do_connection;
DISCONNECT_PTR do_disconnect;

// Ctpcc_com0
class ATL_NO_VTABLE Ctpcc_com0 :
   public CComObjectRootEx<CComMultiThreadModel>,
   public IObjectControl,
   public CComCoClass<Ctpcc_com0, &CLSID_tpcc_com0>,
   public Itpcc_com0
{
public:
   Ctpcc_com0()
   {
      int rc          = ERR;
      connected       = 0;
      connectHandleInUse  = 0;

      if(debugFlag)
      {
         if(!debugFileOpen)
         {
            InitializeCriticalSection(&debugMutex);
            //open comLog
            char comLogFile[128];

   sprintf(comLogFile,"C:\\Inetpub\\wwwroot\\tpcc\\comLog_debug.txt
");
            debugStream.rdbuf( )->open(comLogFile,ios_base::in |
ios_base::out | ios_base::app);

            debugFileOpen = 1;
         }
      }

      //open error log file
      if(!errorFileOpen)
      {
         InitializeCriticalSection(&errorMutex);

         char errorLogFile[128];

   sprintf(errorLogFile,"C:\\Inetpub\\wwwroot\\tpcc\\comLog_err.txt");

         errorStream.rdbuf( )->open(errorLogFile,ios_base::in |
ios_base::out | ios_base::app);

         errorFileOpen=1;
      }

      //get registry values
      if((rc = readRegistery()) != OK)
      {
         ERRORMSG("Unable to open registery key " <<
REGISTERY_SUB_KEY << " rc:" << rc <<endl);
         return;
      }

      DEBUGMSG("nullDB:" <<nullDB<<" dbType:"<<dbType<<"
dbName:"<<dbName<<endl);

      //load library based on registry
      if( (rc = loadLibrary()) != OK)
      {
         ERRORMSG("load library failure rc:" << rc << endl);
         return;
      }

      DEBUGMSG("dbtype:"<<dbType<<" instance:" <<
DEBUGADDRESS(dbInstance) << " loaded." << endl);

      //connect to db
      EnterCriticalSection(&errorMutex);
      if((rc = connectDB()) != OK)
      {
         ERRORMSG("unable to connect to db "<<dbName<<"
rc :"<<rc <<endl);
         LeaveCriticalSection(&errorMutex);
         return;
      }
      LeaveCriticalSection(&errorMutex);

      DEBUGMSG("connected to db " <<dbName<< " rc:"<< rc << "
context:" <<DEBUGADDRESS(connectHandle) << endl);
   }

   DECLARE_PROTECT_FINAL_CONSTRUCT()

   HRESULT FinalConstruct()
   {
      return S_OK;
   }

   void FinalRelease()
   {
   }

DECLARE_REGISTRY_RESOURCEID(IDR_TPCC_COM0)

BEGIN_COM_MAP(Ctpcc_com0)
   COM_INTERFACE_ENTRY(Itpcc_com0)
   COM_INTERFACE_ENTRY(IObjectControl)
END_COM_MAP()

// IObjectControl
public:
   STDMETHOD(Activate)();
   STDMETHOD_(BOOL, CanBePooled)();
   STDMETHOD_(void, Deactivate)();
   CComPtr<IObjectContext> m_spObjectContext;

// Itpcc_com0
public:
   STDMETHOD(doStockLevel)(INT *size, UCHAR **buffer);
   STDMETHOD(doNewOrder)(INT* size, UCHAR** buffer);
   STDMETHOD(doPayment)(INT* size, UCHAR** buffer);
   STDMETHOD(doOrderStatus)(INT* size, UCHAR** buffer);
   STDMETHOD(doDBInfo)(void);
   STDMETHOD(doSetComplete)(void);

   int connected;
   int connectHandleInUse;
```

```
private:
   //db2 specific context
   void *connectHandle;
   int loadLibrary();
   int readRegistery();
   int connectDB();


};

OBJECT_ENTRY_AUTO(__uuidof(tpcc_com0), Ctpcc_com0)
```

tpccCom0/tpccCom0.h

```
/* this ALWAYS GENERATED file contains the definitions for the
interfaces */


 /* File created by MIDL compiler version 6.00.0361 */
/* at Tue Jun 08 12:21:49 2004
 */
/* Compiler settings for .\tpccCom0.idl:
    Oicf, W1, Zp8, env=Win32 (32b run)
    protocol : dce , ms_ext, c_ext, robust
    error checks: allocation ref bounds_check enum stub_data
    VC __declspec() decoration level:
         __declspec(uuid()), __declspec(selectany),
__declspec(novtable)
         DECLSPEC_UUID(), MIDL_INTERFACE()
*/
//@@MIDL_FILE_HEADING(  )

#pragma warning( disable: 4049 )  /* more than 64k source lines */


/* verify that the <rpcndr.h> version is high enough to compile this
file*/
#ifndef __REQUIRED_RPCNDR_H_VERSION__
#define __REQUIRED_RPCNDR_H_VERSION__ 475
#endif

#include "rpc.h"
#include "rpcndr.h"

#ifndef __RPCNDR_H_VERSION__
#error this stub requires an updated version of <rpcndr.h>
#endif // __RPCNDR_H_VERSION__

#ifndef COM_NO_WINDOWS_H
#include "windows.h"
#include "ole2.h"
#endif /*COM_NO_WINDOWS_H*/

#ifndef __tpccCom0_h__
#define __tpccCom0_h__

#if defined(_MSC_VER) && (_MSC_VER >= 1020)
#pragma once
#endif

/* Forward Declarations */

#ifndef __Itpcc_com0_FWD_DEFINED__
#define __Itpcc_com0_FWD_DEFINED__
typedef interface Itpcc_com0 Itpcc_com0;
#endif   /* __Itpcc_com0_FWD_DEFINED__ */


#ifndef __tpcc_com0_FWD_DEFINED__
#define __tpcc_com0_FWD_DEFINED__
#ifdef __cplusplus
typedef class tpcc_com0 tpcc_com0;
#else
typedef struct tpcc_com0 tpcc_com0;
#endif /* __cplusplus */

#endif   /* __tpcc_com0_FWD_DEFINED__ */


/* header files for imported files */
#include "oaidl.h"
#include "ocidl.h"

#ifdef __cplusplus
extern "C"{
#endif

void * __RPC_USER MIDL_user_allocate(size_t);
void __RPC_USER MIDL_user_free( void * );

#ifndef __Itpcc_com0_INTERFACE_DEFINED__
#define __Itpcc_com0_INTERFACE_DEFINED__

/* interface Itpcc_com0 */
/* [unique][helpstring][uuid][object] */


EXTERN_C const IID IID_Itpcc_com0;

#if defined(__cplusplus) && !defined(CINTERFACE)

    MIDL_INTERFACE("98834483-D35E-4CB2-87F9-
85BABD2D914E")
    Itpcc_com0 : public IUnknown
    {
    public:
        virtual /* [helpstring] */ HRESULT STDMETHODCALLTYPE
doStockLevel(
            /* [in] */ INT *size,
            /* [size_is][size_is][out][in] */ UCHAR **buffer) = 0;

        virtual /* [helpstring] */ HRESULT STDMETHODCALLTYPE
doNewOrder(
            /* [in] */ INT *size,
            /* [size_is][size_is][out][in] */ UCHAR **buffer) = 0;

        virtual /* [helpstring] */ HRESULT STDMETHODCALLTYPE
doPayment(
            /* [in] */ INT *size,
            /* [size_is][size_is][out][in] */ UCHAR **buffer) = 0;

        virtual /* [helpstring] */ HRESULT STDMETHODCALLTYPE
doOrderStatus(
            /* [in] */ INT *size,
            /* [size_is][size_is][out][in] */ UCHAR **buffer) = 0;

        virtual /* [helpstring] */ HRESULT STDMETHODCALLTYPE
doDBInfo( void) = 0;

        virtual /* [helpstring] */ HRESULT STDMETHODCALLTYPE
doSetComplete( void) = 0;

    };

#else /* C style interface */

    typedef struct Itpcc_com0Vtbl
    {
        BEGIN_INTERFACE

        HRESULT ( STDMETHODCALLTYPE *QueryInterface )(
```

```
        Itpcc_com0 * This,
        /* [in] */ REFIID riid,
        /* [iid_is][out] */ void **ppvObject);

    ULONG ( STDMETHODCALLTYPE *AddRef )(
        Itpcc_com0 * This);

    ULONG ( STDMETHODCALLTYPE *Release )(
        Itpcc_com0 * This);

    /* [helpstring] */ HRESULT ( STDMETHODCALLTYPE
*doStockLevel )(
        Itpcc_com0 * This,
        /* [in] */ INT *size,
        /* [size_is][size_is][out][in] */ UCHAR **buffer);

    /* [helpstring] */ HRESULT ( STDMETHODCALLTYPE
*doNewOrder )(
        Itpcc_com0 * This,
        /* [in] */ INT *size,
        /* [size_is][size_is][out][in] */ UCHAR **buffer);

    /* [helpstring] */ HRESULT ( STDMETHODCALLTYPE
*doPayment )(
        Itpcc_com0 * This,
        /* [in] */ INT *size,
        /* [size_is][size_is][out][in] */ UCHAR **buffer);

    /* [helpstring] */ HRESULT ( STDMETHODCALLTYPE
*doOrderStatus )(
        Itpcc_com0 * This,
        /* [in] */ INT *size,
        /* [size_is][size_is][out][in] */ UCHAR **buffer);

    /* [helpstring] */ HRESULT ( STDMETHODCALLTYPE
*doDBInfo )(
        Itpcc_com0 * This);

    /* [helpstring] */ HRESULT ( STDMETHODCALLTYPE
*doSetComplete )(
        Itpcc_com0 * This);

    END_INTERFACE
  } Itpcc_com0Vtbl;

  interface Itpcc_com0
  {
    CONST_VTBL struct Itpcc_com0Vtbl *lpVtbl;
  };


#ifdef COBJMACROS


#define Itpcc_com0_QueryInterface(This,riid,ppvObject) \
  (This)->lpVtbl -> QueryInterface(This,riid,ppvObject)

#define Itpcc_com0_AddRef(This) \
  (This)->lpVtbl -> AddRef(This)

#define Itpcc_com0_Release(This)  \
  (This)->lpVtbl -> Release(This)


#define Itpcc_com0_doStockLevel(This,size,buffer)  \
  (This)->lpVtbl -> doStockLevel(This,size,buffer)

#define Itpcc_com0_doNewOrder(This,size,buffer) \
  (This)->lpVtbl -> doNewOrder(This,size,buffer)

#define Itpcc_com0_doPayment(This,size,buffer)  \
  (This)->lpVtbl -> doPayment(This,size,buffer)

#define Itpcc_com0_doOrderStatus(This,size,buffer) \
  (This)->lpVtbl -> doOrderStatus(This,size,buffer)

#define Itpcc_com0_doDBInfo(This) \
  (This)->lpVtbl -> doDBInfo(This)

#define Itpcc_com0_doSetComplete(This) \
  (This)->lpVtbl -> doSetComplete(This)

#endif /* COBJMACROS */


#endif   /* C style interface */



/* [helpstring] */ HRESULT STDMETHODCALLTYPE
Itpcc_com0_doStockLevel_Proxy(
  Itpcc_com0 * This,
  /* [in] */ INT *size,
  /* [size_is][size_is][out][in] */ UCHAR **buffer);


void __RPC_STUB Itpcc_com0_doStockLevel_Stub(
  IRpcStubBuffer *This,
  IRpcChannelBuffer *_pRpcChannelBuffer,
  PRPC_MESSAGE _pRpcMessage,
  DWORD *_pdwStubPhase);


/* [helpstring] */ HRESULT STDMETHODCALLTYPE
Itpcc_com0_doNewOrder_Proxy(
  Itpcc_com0 * This,
  /* [in] */ INT *size,
  /* [size_is][size_is][out][in] */ UCHAR **buffer);


void __RPC_STUB Itpcc_com0_doNewOrder_Stub(
  IRpcStubBuffer *This,
  IRpcChannelBuffer *_pRpcChannelBuffer,
  PRPC_MESSAGE _pRpcMessage,
  DWORD *_pdwStubPhase);


/* [helpstring] */ HRESULT STDMETHODCALLTYPE
Itpcc_com0_doPayment_Proxy(
  Itpcc_com0 * This,
  /* [in] */ INT *size,
  /* [size_is][size_is][out][in] */ UCHAR **buffer);


void __RPC_STUB Itpcc_com0_doPayment_Stub(
  IRpcStubBuffer *This,
  IRpcChannelBuffer *_pRpcChannelBuffer,
  PRPC_MESSAGE _pRpcMessage,
  DWORD *_pdwStubPhase);


/* [helpstring] */ HRESULT STDMETHODCALLTYPE
Itpcc_com0_doOrderStatus_Proxy(
  Itpcc_com0 * This,
  /* [in] */ INT *size,
  /* [size_is][size_is][out][in] */ UCHAR **buffer);


void __RPC_STUB Itpcc_com0_doOrderStatus_Stub(
  IRpcStubBuffer *This,
  IRpcChannelBuffer *_pRpcChannelBuffer,
  PRPC_MESSAGE _pRpcMessage,
  DWORD *_pdwStubPhase);
```

```
/* [helpstring] */ HRESULT STDMETHODCALLTYPE
Itpcc_com0_doDBInfo_Proxy(
    Itpcc_com0 * This);


void __RPC_STUB Itpcc_com0_doDBInfo_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring] */ HRESULT STDMETHODCALLTYPE
Itpcc_com0_doSetComplete_Proxy(
    Itpcc_com0 * This);


void __RPC_STUB Itpcc_com0_doSetComplete_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);



#endif   /* __Itpcc_com0_INTERFACE_DEFINED__ */



#ifndef __tpccCom0Lib_LIBRARY_DEFINED__
#define __tpccCom0Lib_LIBRARY_DEFINED__

/* library tpccCom0Lib */
/* [helpstring][version][uuid] */


EXTERN_C const IID LIBID_tpccCom0Lib;

EXTERN_C const CLSID CLSID_tpcc_com0;

#ifdef __cplusplus

class DECLSPEC_UUID("FB56BC3B-269F-4C81-907F-
08EC0936EADF")
tpcc_com0;
#endif
#endif /* __tpccCom0Lib_LIBRARY_DEFINED__ */

/* Additional Prototypes for ALL interfaces */

/* end of Additional Prototypes */

#ifdef __cplusplus
}
#endif

#endif
```

tpccCom0/tpccCom0_i.c

```
/* this ALWAYS GENERATED file contains the IIDs and CLSIDs */

/* link this file in with the server and any clients */


 /* File created by MIDL compiler version 6.00.0361 */
 /* at Tue Jun 08 12:21:49 2004
  */
/* Compiler settings for .\tpccCom0.idl:
    Oicf, W1, Zp8, env=Win32 (32b run)
    protocol : dce , ms_ext, c_ext, robust
    error checks: allocation ref bounds_check enum stub_data
    VC __declspec() decoration level:
         __declspec(uuid()), __declspec(selectany),
__declspec(novtable)
         DECLSPEC_UUID(), MIDL_INTERFACE()
*/
//@@MIDL_FILE_HEADING(  )

#if !defined(_M_IA64) && !defined(_M_AMD64)


#pragma warning( disable: 4049 )  /* more than 64k source lines */


#ifdef __cplusplus
extern "C"{
#endif


#include <rpc.h>
#include <rpcndr.h>

#ifdef _MIDL_USE_GUIDDEF_

#ifndef INITGUID
#define INITGUID
#include <guiddef.h>
#undef INITGUID
#else
#include <guiddef.h>
#endif

#define
MIDL_DEFINE_GUID(type,name,l,w1,w2,b1,b2,b3,b4,b5,b6,b7,b8) \
        DEFINE_GUID(name,l,w1,w2,b1,b2,b3,b4,b5,b6,b7,b8)

#else // !_MIDL_USE_GUIDDEF_

#ifndef __IID_DEFINED__
#define __IID_DEFINED__

typedef struct _IID
{
    unsigned long x;
    unsigned short s1;
    unsigned short s2;
    unsigned char  c[8];
} IID;

#endif // __IID_DEFINED__

#ifndef CLSID_DEFINED
#define CLSID_DEFINED
typedef IID CLSID;
#endif // CLSID_DEFINED

#define
MIDL_DEFINE_GUID(type,name,l,w1,w2,b1,b2,b3,b4,b5,b6,b7,b8) \
        const type name = {l,w1,w2,{b1,b2,b3,b4,b5,b6,b7,b8}}

#endif !_MIDL_USE_GUIDDEF_

MIDL_DEFINE_GUID(IID,
IID_Itpcc_com0,0x98834483,0xD35E,0x4CB2,0x87,0xF9,0x85,0xB
A,0xBD,0x2D,0x91,0x4E);
```

```
MIDL_DEFINE_GUID(IID,
LIBID_tpccCom0Lib,0x7280DF7D,0xDFEF,0x445F,0x89,0xA4,0x04,
0x98,0x82,0x78,0xF8,0xEE);


MIDL_DEFINE_GUID(CLSID,
CLSID_tpcc_com0,0xFB56BC3B,0x269F,0x4C81,0x90,0x7F,0x08,0
xEC,0x09,0x36,0xEA,0xDF);

#undef MIDL_DEFINE_GUID

#ifdef __cplusplus
}
#endif



#endif /* !defined(_M_IA64) && !defined(_M_AMD64)*/
```

tpccCom0/tpccCom0.idl

```
// tpccCom0.idl : IDL source for tpccCom0
//

// This file will be processed by the MIDL tool to
// produce the type library (tpccCom0.tlb) and marshalling code.

import "oaidl.idl";
import "ocidl.idl";

[
   object,
   uuid(98834483-D35E-4CB2-87F9-85BABD2D914E),
// oleautomation,
// nonextensible,
   helpstring("Itpcc_com0 Interface"),
   pointer_default(unique)
]
interface Itpcc_com0 : IUnknown{
   [helpstring("method doStockLevel")] HRESULT doStockLevel([in]
INT *size, [in,out, size_is(,*size)] UCHAR **buffer);
   [helpstring("method doNewOrder")] HRESULT doNewOrder([in]
INT* size, [in,out,size_is(,*size)] UCHAR** buffer);
   [helpstring("method doPayment")] HRESULT doPayment([in] INT*
size, [in,out,size_is(,*size)] UCHAR** buffer);
   [helpstring("method doOrderStatus")] HRESULT
doOrderStatus([in] INT* size, [in,out,size_is(,*size)] UCHAR**
buffer);
   [helpstring("method doDBInfo")] HRESULT doDBInfo(void);
   [helpstring("method doSetComplete")] HRESULT
doSetComplete(void);
};
[
   uuid(7280DF7D-DFEF-445F-89A4-04988278F8EE),
   version(1.0),
   helpstring("tpccCom0 1.0 Type Library")
]
library tpccCom0Lib
{
   importlib("stdole2.tlb");
   [
      uuid(FB56BC3B-269F-4C81-907F-08EC0936EADF),
      helpstring("tpcc_com0 Class")
   ]
   coclass tpcc_com0
   {
      [default] interface Itpcc_com0;
   };
};
```

tpccCom0/tpccCom0_p.c

```
/* this ALWAYS GENERATED file contains the proxy stub code */


 /* File created by MIDL compiler version 6.00.0361 */
/* at Tue Jun 08 12:21:49 2004
 */
/* Compiler settings for .\tpccCom0.idl:
    Oicf, W1, Zp8, env=Win32 (32b run)
    protocol : dce , ms_ext, c_ext, robust
    error checks: allocation ref bounds_check enum stub_data
    VC __declspec() decoration level:
         __declspec(uuid()), __declspec(selectany),
__declspec(novtable)
         DECLSPEC_UUID(), MIDL_INTERFACE()
*/
//@@MIDL_FILE_HEADING(  )

#if !defined(_M_IA64) && !defined(_M_AMD64)


#pragma warning( disable: 4049 )  /* more than 64k source lines */
#if _MSC_VER >= 1200
#pragma warning(push)
#endif
#pragma warning( disable: 4100 ) /* unreferenced arguments in x86
call */
#pragma warning( disable: 4211 )  /* redefine extent to static */
#pragma warning( disable: 4232 )  /* dllimport identity*/
#define USE_STUBLESS_PROXY


/* verify that the <rpcproxy.h> version is high enough to compile this
file*/
#ifndef __REDQ_RPCPROXY_H_VERSION__
#define __REQUIRED_RPCPROXY_H_VERSION__ 475
#endif


#include "rpcproxy.h"
#ifndef __RPCPROXY_H_VERSION__
#error this stub requires an updated version of <rpcproxy.h>
#endif // __RPCPROXY_H_VERSION__


#include "tpccCom0.h"

#define TYPE_FORMAT_STRING_SIZE   27
#define PROC_FORMAT_STRING_SIZE   229
#define TRANSMIT_AS_TABLE_SIZE    0
#define WIRE_MARSHAL_TABLE_SIZE   0

typedef struct _MIDL_TYPE_FORMAT_STRING
    {
    short          Pad;
    unsigned char  Format[ TYPE_FORMAT_STRING_SIZE ];
    } MIDL_TYPE_FORMAT_STRING;

typedef struct _MIDL_PROC_FORMAT_STRING
    {
    short          Pad;
    unsigned char  Format[ PROC_FORMAT_STRING_SIZE ];
    } MIDL_PROC_FORMAT_STRING;


static RPC_SYNTAX_IDENTIFIER  _RpcTransferSyntax =
{{0x8A885D04,0x1CEB,0x11C9,{0x9F,0xE8,0x08,0x00,0x2B,0x10,0
x48,0x60}},{2,0}};
```

```
extern const MIDL_TYPE_FORMAT_STRING
__MIDL_TypeFormatString;
extern const MIDL_PROC_FORMAT_STRING
__MIDL_ProcFormatString;


extern const MIDL_STUB_DESC Object_StubDesc;


extern const MIDL_SERVER_INFO ltpcc_com0_ServerInfo;
extern const MIDL_STUBLESS_PROXY_INFO
ltpcc_com0_ProxyInfo;



#if !defined(__RPC_WIN32__)
#error  Invalid build platform for this stub.
#endif

#if !(TARGET_IS_NT50_OR_LATER)
#error You need a Windows 2000 or later to run this stub because it
uses these features:
#error   /robust command line switch.
#error However, your C/C++ compilation flags indicate you intend to
run this app on earlier systems.
#error This app will die there with the
RPC_X_WRONG_STUB_VERSION error.
#endif


static const MIDL_PROC_FORMAT_STRING
__MIDL_ProcFormatString =
    {
        0,
        {

    /* Procedure doStockLevel */

            0x33,    /* FC_AUTO_HANDLE */
            0x6c,    /* Old Flags:  object, Oi2 */
/*  2 */    NdrFcLong( 0x0 ),/* 0 */
/*  6 */    NdrFcShort( 0x3 ),   /* 3 */
/*  8 */    NdrFcShort( 0x10 ), /* x86 Stack size/offset = 16 */
/* 10 */    NdrFcShort( 0x1c ), /* 28 */
/* 12 */    NdrFcShort( 0x8 ),   /* 8 */
/* 14 */    0x47,    /* Oi2 Flags:  srv must size, clt must size, has
return, has ext, */
            0x3,     /* 3 */
/* 16 */    0x8,     /* 8 */
            0x7,     /* Ext Flags:  new corr desc, clt corr check, srv corr
check, */
/* 18 */    NdrFcShort( 0x1 ),   /* 1 */
/* 20 */    NdrFcShort( 0x1 ),   /* 1 */
/* 22 */    NdrFcShort( 0x0 ),   /* 0 */

    /* Parameter size */

/* 24 */    NdrFcShort( 0x148 ),  /* Flags:  in, base type, simple ref, */
/* 26 */    NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 28 */    0x8,     /* FC_LONG */
            0x0,     /* 0 */

    /* Parameter buffer */

/* 30 */    NdrFcShort( 0x201b ),/* Flags:  must size, must free, in, out,
srv alloc size=8 */
/* 32 */    NdrFcShort( 0x8 ),   /* x86 Stack size/offset = 8 */
/* 34 */    NdrFcShort( 0x6 ),   /* Type Offset=6 */

    /* Return value */

/* 36 */    NdrFcShort( 0x70 ), /* Flags:  out, return, base type, */
/* 38 */    NdrFcShort( 0xc ),   /* x86 Stack size/offset = 12 */
/* 40 */    0x8,     /* FC_LONG */
            0x0,     /* 0 */

    /* Procedure doNewOrder */

/* 42 */    0x33,    /* FC_AUTO_HANDLE */
            0x6c,    /* Old Flags:  object, Oi2 */
/* 44 */    NdrFcLong( 0x0 ),/* 0 */
/* 48 */    NdrFcShort( 0x4 ),   /* 4 */
/* 50 */    NdrFcShort( 0x10 ), /* x86 Stack size/offset = 16 */
/* 52 */    NdrFcShort( 0x1c ), /* 28 */
/* 54 */    NdrFcShort( 0x8 ),   /* 8 */
/* 56 */    0x47,    /* Oi2 Flags:  srv must size, clt must size, has
return, has ext, */
            0x3,     /* 3 */
/* 58 */    0x8,     /* 8 */
            0x7,     /* Ext Flags:  new corr desc, clt corr check, srv corr
check, */
/* 60 */    NdrFcShort( 0x1 ),   /* 1 */
/* 62 */    NdrFcShort( 0x1 ),   /* 1 */
/* 64 */    NdrFcShort( 0x0 ),   /* 0 */

    /* Parameter size */

/* 66 */    NdrFcShort( 0x148 ),  /* Flags:  in, base type, simple ref, */
/* 68 */    NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 70 */    0x8,     /* FC_LONG */
            0x0,     /* 0 */

    /* Parameter buffer */

/* 72 */    NdrFcShort( 0x201b ),/* Flags:  must size, must free, in, out,
srv alloc size=8 */
/* 74 */    NdrFcShort( 0x8 ),   /* x86 Stack size/offset = 8 */
/* 76 */    NdrFcShort( 0x6 ),   /* Type Offset=6 */

    /* Return value */

/* 78 */    NdrFcShort( 0x70 ), /* Flags:  out, return, base type, */
/* 80 */    NdrFcShort( 0xc ),   /* x86 Stack size/offset = 12 */
/* 82 */    0x8,     /* FC_LONG */
            0x0,     /* 0 */

    /* Procedure doPayment */

/* 84 */    0x33,    /* FC_AUTO_HANDLE */
            0x6c,    /* Old Flags:  object, Oi2 */
/* 86 */    NdrFcLong( 0x0 ),/* 0 */
/* 90 */    NdrFcShort( 0x5 ),   /* 5 */
/* 92 */    NdrFcShort( 0x10 ), /* x86 Stack size/offset = 16 */
/* 94 */    NdrFcShort( 0x1c ), /* 28 */
/* 96 */    NdrFcShort( 0x8 ),   /* 8 */
/* 98 */    0x47,    /* Oi2 Flags:  srv must size, clt must size, has
return, has ext, */
            0x3,     /* 3 */
/* 100 */0x8,     /* 8 */
            0x7,     /* Ext Flags:  new corr desc, clt corr check, srv corr
check, */
/* 102 */NdrFcShort( 0x1 ),   /* 1 */
/* 104 */NdrFcShort( 0x1 ),   /* 1 */
/* 106 */NdrFcShort( 0x0 ),   /* 0 */

    /* Parameter size */

/* 108 */NdrFcShort( 0x148 ),  /* Flags:  in, base type, simple ref, */
/* 110 */NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 112 */0x8,     /* FC_LONG */
            0x0,     /* 0 */

    /* Parameter buffer */
```

```
/* 114 */NdrFcShort( 0x201b ),/* Flags:  must size, must free, in, out,
srv alloc size=8 */
/* 116 */NdrFcShort( 0x8 ),   /* x86 Stack size/offset = 8 */
/* 118 */NdrFcShort( 0x6 ),   /* Type Offset=6 */

   /* Return value */

/* 120 */NdrFcShort( 0x70 ), /* Flags:  out, return, base type, */
/* 122 */NdrFcShort( 0xc ),   /* x86 Stack size/offset = 12 */
/* 124 */0x8,      /* FC_LONG */
        0x0,      /* 0 */

   /* Procedure doOrderStatus */

/* 126 */0x33,    /* FC_AUTO_HANDLE */
        0x6c,     /* Old Flags:  object, Oi2 */
/* 128 */NdrFcLong( 0x0 ),/* 0 */
/* 132 */NdrFcShort( 0x6 ),   /* 6 */
/* 134 */NdrFcShort( 0x10 ), /* x86 Stack size/offset = 16 */
/* 136 */NdrFcShort( 0x1c ), /* 28 */
/* 138 */NdrFcShort( 0x8 ),   /* 8 */
/* 140 */0x47,    /* Oi2 Flags:  srv must size, clt must size, has
return, has ext, */
        0x3,      /* 3 */
/* 142 */0x8,      /* 8 */
        0x7,      /* Ext Flags:  new corr desc, clt corr check, srv corr
check, */
/* 144 */NdrFcShort( 0x1 ),   /* 1 */
/* 146 */NdrFcShort( 0x1 ),   /* 1 */
/* 148 */NdrFcShort( 0x0 ),   /* 0 */

   /* Parameter size */

/* 150 */NdrFcShort( 0x148 ),  /* Flags:  in, base type, simple ref, */
/* 152 */NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 154 */0x8,      /* FC_LONG */
        0x0,      /* 0 */

   /* Parameter buffer */

/* 156 */NdrFcShort( 0x201b ),/* Flags:  must size, must free, in, out,
srv alloc size=8 */
/* 158 */NdrFcShort( 0x8 ),   /* x86 Stack size/offset = 8 */
/* 160 */NdrFcShort( 0x6 ),   /* Type Offset=6 */

   /* Return value */

/* 162 */NdrFcShort( 0x70 ), /* Flags:  out, return, base type, */
/* 164 */NdrFcShort( 0xc ),   /* x86 Stack size/offset = 12 */
/* 166 */0x8,      /* FC_LONG */
        0x0,      /* 0 */

   /* Procedure doDBInfo */

/* 168 */0x33,    /* FC_AUTO_HANDLE */
        0x6c,     /* Old Flags:  object, Oi2 */
/* 170 */NdrFcLong( 0x0 ),/* 0 */
/* 174 */NdrFcShort( 0x7 ),   /* 7 */
/* 176 */NdrFcShort( 0x8 ),   /* x86 Stack size/offset = 8 */
/* 178 */NdrFcShort( 0x0 ),   /* 0 */
/* 180 */NdrFcShort( 0x8 ),   /* 8 */
/* 182 */0x44,    /* Oi2 Flags:  has return, has ext, */
        0x1,      /* 1 */
/* 184 */0x8,      /* 8 */
        0x1,      /* Ext Flags:  new corr desc, */
/* 186 */NdrFcShort( 0x0 ),   /* 0 */
/* 188 */NdrFcShort( 0x0 ),   /* 0 */
/* 190 */NdrFcShort( 0x0 ),   /* 0 */

   /* Return value */

/* 192 */NdrFcShort( 0x70 ), /* Flags:  out, return, base type, */
/* 194 */NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 196 */0x8,      /* FC_LONG */
        0x0,      /* 0 */

   /* Procedure doSetComplete */

/* 198 */0x33,    /* FC_AUTO_HANDLE */
        0x6c,     /* Old Flags:  object, Oi2 */
/* 200 */NdrFcLong( 0x0 ),/* 0 */
/* 204 */NdrFcShort( 0x8 ),   /* 8 */
/* 206 */NdrFcShort( 0x8 ),   /* x86 Stack size/offset = 8 */
/* 208 */NdrFcShort( 0x0 ),   /* 0 */
/* 210 */NdrFcShort( 0x8 ),   /* 8 */
/* 212 */0x44,    /* Oi2 Flags:  has return, has ext, */
        0x1,      /* 1 */
/* 214 */0x8,      /* 8 */
        0x1,      /* Ext Flags:  new corr desc, */
/* 216 */NdrFcShort( 0x0 ),   /* 0 */
/* 218 */NdrFcShort( 0x0 ),   /* 0 */
/* 220 */NdrFcShort( 0x0 ),   /* 0 */

   /* Return value */

/* 222 */NdrFcShort( 0x70 ), /* Flags:  out, return, base type, */
/* 224 */NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 226 */0x8,      /* FC_LONG */
        0x0,      /* 0 */

        0x0
      }
   };

static const MIDL_TYPE_FORMAT_STRING
__MIDL_TypeFormatString =
   {
      0,
      {
       NdrFcShort( 0x0 ),   /* 0 */
/*  2 */
        0x11, 0x8,   /* FC_RP [simple_pointer] */
/*  4 */   0x8,      /* FC_LONG */
        0x5c,     /* FC_PAD */
/*  6 */
        0x11, 0x14, /* FC_RP [alloced_on_stack] [pointer_deref] */
/*  8 */   NdrFcShort( 0x2 ),   /* Offset= 2 (10) */
/* 10 */
        0x13, 0x0,   /* FC_OP */
/* 12 */  NdrFcShort( 0x2 ),   /* Offset= 2 (14) */
/* 14 */
        0x1b,     /* FC_CARRAY */
        0x0,      /* 0 */
/* 16 */  NdrFcShort( 0x1 ),   /* 1 */
/* 18 */  0x28,     /* Corr desc:  parameter, FC_LONG */
        0x54,     /* FC_DEREFERENCE */
/* 20 */  NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 22 */  NdrFcShort( 0x1 ),   /* Corr flags:  early, */
/* 24 */  0x2,      /* FC_CHAR */
        0x5b,     /* FC_END */

        0x0
      }
   };


/* Object interface: IUnknown, ver. 0.0,

GUID={0x00000000,0x0000,0x0000,{0xC0,0x00,0x00,0x00,0x00,0x
00,0x00,0x46}} */


/* Object interface: Itpcc_com0, ver. 0.0,
```

```
GUID={0x98834483,0xD35E,0x4CB2,{0x87,0xF9,0x85,0xBA,0xBD,
0x2D,0x91,0x4E}} */

#pragma code_seg(".orpc")
static const unsigned short ltpcc_com0_FormatStringOffsetTable[] =
    {
    0,
    42,
    84,
    126,
    168,
    198
    };

static const MIDL_STUBLESS_PROXY_INFO
ltpcc_com0_ProxyInfo =
    {
    &Object_StubDesc,
    __MIDL_ProcFormatString.Format,
    &ltpcc_com0_FormatStringOffsetTable[-3],
    0,
    0,
    0
    };


static const MIDL_SERVER_INFO ltpcc_com0_ServerInfo =
    {
    &Object_StubDesc,
    0,
    __MIDL_ProcFormatString.Format,
    &ltpcc_com0_FormatStringOffsetTable[-3],
    0,
    0,
    0,
    0};
CINTERFACE_PROXY_VTABLE(9) _ltpcc_com0ProxyVtbl =
{
    &ltpcc_com0_ProxyInfo,
    &IID_ltpcc_com0,
    IUnknown_QueryInterface_Proxy,
    IUnknown_AddRef_Proxy,
    IUnknown_Release_Proxy ,
    (void *) (INT_PTR) -1 /* ltpcc_com0::doStockLevel */ ,
    (void *) (INT_PTR) -1 /* ltpcc_com0::doNewOrder */ ,
    (void *) (INT_PTR) -1 /* ltpcc_com0::doPayment */ ,
    (void *) (INT_PTR) -1 /* ltpcc_com0::doOrderStatus */ ,
    (void *) (INT_PTR) -1 /* ltpcc_com0::doDBInfo */ ,
    (void *) (INT_PTR) -1 /* ltpcc_com0::doSetComplete */
};

const CInterfaceStubVtbl _ltpcc_com0StubVtbl =
{
    &IID_ltpcc_com0,
    &ltpcc_com0_ServerInfo,
    9,
    0, /* pure interpreted */
    CStdStubBuffer_METHODS
};

static const MIDL_STUB_DESC Object_StubDesc =
    {
    0,
    NdrOleAllocate,
    NdrOleFree,
    0,
    0,
    0,
    0,
    0,
    __MIDL_TypeFormatString.Format,
    1, /* -error bounds_check flag */
    0x50002, /* Ndr library version */
    0,
    0x6000169, /* MIDL Version 6.0.361 */
    0,
    0,
    0,  /* notify & notify_flag routine table */
    0x1, /* MIDL flag */
    0, /* cs routines */
    0,   /* proxy/server info */
    0   /* Reserved5 */
    };

const CInterfaceProxyVtbl * _tpccCom0_ProxyVtblList[] =
{
    ( CInterfaceProxyVtbl *) &_ltpcc_com0ProxyVtbl,
    0
};

const CInterfaceStubVtbl * _tpccCom0_StubVtblList[] =
{
    ( CInterfaceStubVtbl *) &_ltpcc_com0StubVtbl,
    0
};

PCInterfaceName const _tpccCom0_InterfaceNamesList[] =
{
    "ltpcc_com0",
    0
};


#define _tpccCom0_CHECK_IID(n)
   IID_GENERIC_CHECK_IID( _tpccCom0, pIID, n)

int __stdcall _tpccCom0_IID_Lookup( const IID * pIID, int * pIndex )
{

    if(!_tpccCom0_CHECK_IID(0))
        {
        *pIndex = 0;
        return 1;
        }

    return 0;
}

const ExtendedProxyFileInfo tpccCom0_ProxyFileInfo =
{
    (PCInterfaceProxyVtblList *) & _tpccCom0_ProxyVtblList,
    (PCInterfaceStubVtblList *) & _tpccCom0_StubVtblList,
    (const PCInterfaceName * ) & _tpccCom0_InterfaceNamesList,
    0, // no delegation
    & _tpccCom0_IID_Lookup,
    1,
    2,
    0, /* table of [async_uuid] interfaces */
    0, /* Filler1 */
    0, /* Filler2 */
    0  /* Filler3 */
};
#if _MSC_VER >= 1200
#pragma warning(pop)
#endif


#endif /* !defined(_M_IA64) && !defined(_M_AMD64)*/
```

tpccCom0/tpccCom0.rc

```
// Microsoft Visual C++ generated resource script.
```

```
//
#include "resource.h"

#define APSTUDIO_READONLY_SYMBOLS
/////////////////////////////////////////////////////////////////////////////
//
// Generated from the TEXTINCLUDE 2 resource.
//
#include "winres.h"

/////////////////////////////////////////////////////////////////////////////
#undef APSTUDIO_READONLY_SYMBOLS

/////////////////////////////////////////////////////////////////////////////
// English (U.S.) resources

#if !defined(AFX_RESOURCE_DLL) || defined(AFX_TARG_ENU)
#ifdef _WIN32
LANGUAGE LANG_ENGLISH, SUBLANG_ENGLISH_US
#pragma code_page(1252)
#endif //_WIN32

#ifdef APSTUDIO_INVOKED
/////////////////////////////////////////////////////////////////////////////
//
// TEXTINCLUDE
//

1 TEXTINCLUDE
BEGIN
   "resource.h\0"
END

2 TEXTINCLUDE
BEGIN
   "#include ""winres.h""\r\n"
   "\0"
END

3 TEXTINCLUDE
BEGIN
   "1 TYPELIB ""tpccCom0.tlb""\r\n"
   "\0"
END

#endif    // APSTUDIO_INVOKED


/////////////////////////////////////////////////////////////////////////////
//
// Version
//

VS_VERSION_INFO VERSIONINFO
 FILEVERSION 1,0,0,1
 PRODUCTVERSION 1,0,0,1
 FILEFLAGSMASK 0x3fL
#ifdef _DEBUG
 FILEFLAGS 0x1L
#else
 FILEFLAGS 0x0L
#endif
 FILEOS 0x4L
 FILETYPE 0x2L
 FILESUBTYPE 0x0L
BEGIN
   BLOCK "StringFileInfo"
   BEGIN
      BLOCK "040904e4"
      BEGIN
         VALUE "CompanyName", "TODO: <Company name>"
         VALUE "FileDescription", "TODO: <File description>"
         VALUE "FileVersion", "1.0.0.1"
         VALUE "LegalCopyright", "TODO: (c) <Company name>.  All
rights reserved."
         VALUE "InternalName", "tpccCom0.dll"
         VALUE "OriginalFilename", "tpccCom0.dll"
         VALUE "ProductName", "TODO: <Product name>"
         VALUE "ProductVersion", "1.0.0.1"
      END
   END
   BLOCK "VarFileInfo"
   BEGIN
      VALUE "Translation", 0x409, 1252
   END
END


/////////////////////////////////////////////////////////////////////////////
//
// REGISTRY
//

IDR_TPCCCOM0          REGISTRY              "tpccCom0.rgs"
IDR_TPCC_COM0         REGISTRY              "tpcc_com0.rgs"

/////////////////////////////////////////////////////////////////////////////
//
// String Table
//

STRINGTABLE
BEGIN
   IDS_PROJNAME          "tpccCom0"
END

#endif    // English (U.S.) resources
/////////////////////////////////////////////////////////////////////////////



#ifndef APSTUDIO_INVOKED
/////////////////////////////////////////////////////////////////////////////
//
// Generated from the TEXTINCLUDE 3 resource.
//
1 TYPELIB "tpccCom0.tlb"

/////////////////////////////////////////////////////////////////////////////
#endif    // not APSTUDIO_INVOKED
```

tpccCom0/tpcc_com0.rgs

```
HKCR
{
   tpccCom0.tpcc_com0.1 = s 'tpcc_com0 Class'
   {
      CLSID = s '{FB56BC3B-269F-4C81-907F-08EC0936EADF}'
   }
   tpccCom0.tpcc_com0 = s 'tpcc_com0 Class'
   {
      CLSID = s '{FB56BC3B-269F-4C81-907F-08EC0936EADF}'
      CurVer = s 'tpccCom0.tpcc_com0.1'
   }
   NoRemove CLSID
   {
      ForceRemove {FB56BC3B-269F-4C81-907F-08EC0936EADF}
= s 'tpcc_com0 Class'
      {
         ProgID = s 'tpccCom0.tpcc_com0.1'
         VersionIndependentProgID = s 'tpccCom0.tpcc_com0'
         InprocServer32 = s '%MODULE%'
         {
```

```
        val ThreadingModel = s 'Both'
      }
      val AppID = s '%APPID%'
      'TypeLib' = s '{7280DF7D-DFEF-445F-89A4-04988278F8EE}'
    }
  }
}
```

tpccCom0/tpccCom0.rgs

```
HKCR
{
  NoRemove AppID
  {
    '%APPID%' = s 'tpccCom0'
    'tpccCom0.DLL'
    {
      val AppID = s '%APPID%'
    }
  }
}
```

tpccCom1/dlldata.c

```
/*********************************************************
   DllData file -- generated by MIDL compiler

       DO NOT ALTER THIS FILE

   This file is regenerated by MIDL on every IDL file compile.

   To completely reconstruct this file, delete it and rerun MIDL
   on all the IDL files in this DLL, specifying this file for the
   /dlldata command line option

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


#include <rpcproxy.h>

#ifdef __cplusplus
extern "C"   {
#endif

EXTERN_PROXY_FILE( tpccCom1 )


PROXYFILE_LIST_START
/* Start of list */
  REFERENCE_PROXY_FILE( tpccCom1 ),
/* End of list */
PROXYFILE_LIST_END


DLLDATA_ROUTINES( aProxyFileList, GET_DLL_CLSID )

#ifdef __cplusplus
}  /*extern "C" */
#endif

/* end of generated dlldata file */
```

tpccCom1/dlldatax.c

```
// wrapper for dlldata.c

#ifdef _MERGE_PROXYSTUB // merge proxy stub DLL

#define REGISTER_PROXY_DLL //DllRegisterServer, etc.

#define _WIN32_WINNT 0x0500   //for Win2000, change it to
0x0400 for NT4 or Win95 with DCOM
#define USE_STUBLESS_PROXY   //defined only with MIDL switch
/Oicf

#pragma comment(lib, "rpcns4.lib")
#pragma comment(lib, "rpcrt4.lib")

#define ENTRY_PREFIX  Prx

#include "dlldata.c"
#include "tpccCom1_p.c"

#endif //_MERGE_PROXYSTUB
```

tpccCom1/dlldatax.h

```
#pragma once

#ifdef _MERGE_PROXYSTUB

extern "C"
{
BOOL WINAPI PrxDllMain(HINSTANCE hInstance, DWORD
dwReason,
   LPVOID lpReserved);
STDAPI PrxDllCanUnloadNow(void);
STDAPI PrxDllGetClassObject(REFCLSID rclsid, REFIID riid,
LPVOID* ppv);
STDAPI PrxDllRegisterServer(void);
STDAPI PrxDllUnregisterServer(void);
}

#endif
```

tpccCom1/resource.h

```
//{{NO_DEPENDENCIES}}
// Microsoft Visual C++ generated include file.
// Used by tpccCom1.rc
//
#define IDS_PROJNAME                100
#define IDR_TPCCCOM1                101
#define IDR_TPCC_COM1               102

// Next default values for new objects
//
#ifdef APSTUDIO_INVOKED
#ifndef APSTUDIO_READONLY_SYMBOLS
#define _APS_NEXT_RESOURCE_VALUE       201
#define _APS_NEXT_COMMAND_VALUE        32768
#define _APS_NEXT_CONTROL_VALUE        201
#define _APS_NEXT_SYMED_VALUE          103
#endif
#endif
```

tpccCom1/stdafx.cpp

```
// stdafx.cpp : source file that includes just the standard includes
// tpccCom1.pch will be the pre-compiled header
// stdafx.obj will contain the pre-compiled type information

#include "stdafx.h"
```

tpccCom1/stdafx.h

```
// stdafx.h : include file for standard system include files,
// or project specific include files that are used frequently,
// but are changed infrequently

#pragma once

#ifndef STRICT
```

```
#define STRICT
#endif

// Modify the following defines if you have to target a platform prior to
the ones specified below.
// Refer to MSDN for the latest info on corresponding values for
different platforms.
#ifndef WINVER              // Allow use of features specific to Windows
95 and Windows NT 4 or later.
#define WINVER 0x0400       // Change this to the appropriate value
to target Windows 98 and Windows 2000 or later.
#endif

#ifndef _WIN32_WINNT        // Allow use of features specific to
Windows NT 4 or later.
#define _WIN32_WINNT 0x0400   // Change this to the appropriate
value to target Windows 2000 or later.
#endif

#ifndef _WIN32_WINDOWS      // Allow use of features specific to
Windows 98 or later.
#define _WIN32_WINDOWS 0x0410 // Change this to the
appropriate value to target Windows Me or later.
#endif

#ifndef _WIN32_IE           // Allow use of features specific to IE 4.0 or
later.
#define _WIN32_IE 0x0400 // Change this to the appropriate value
to target IE 5.0 or later.
#endif

#define _ATL_APARTMENT_THREADED
#define _ATL_NO_AUTOMATIC_NAMESPACE

#define _ATL_CSTRING_EXPLICIT_CONSTRUCTORS // some
CString constructors will be explicit

// turns off ATL's hiding of some common and often safely ignored
warning messages
#define _ATL_ALL_WARNINGS


#include <comsvcs.h>

#include "resource.h"
#include <atlbase.h>
#include <atlcom.h>

using namespace ATL;
```

tpccCom1/tpcc_com1.cpp

```
// tpcc_com1.cpp : Implementation of Ctpcc_com1

#include "stdafx.h"
#include "tpcc_com1.h"

#include "..\tpccIsapi\tpcc.h"

#ifdef DB2
#include <db2tpcc.h>
#endif
#ifdef ORA
#include <ora_tpcc.h>
#endif

#ifdef _DEBUG
  int debugFlag = 1;
#else
  int debugFlag = 0;
#endif

// Ctpcc_com1
HRESULT Ctpcc_com1::Activate()
{
  HRESULT hr = GetObjectContext(&m_spObjectContext);
  if (SUCCEEDED(hr))
  {
    DEBUGMSG("Object assigned to thread."<<endl);
    return S_OK;
  }
  return hr;
}

BOOL Ctpcc_com1::CanBePooled()
{
  DEBUGMSG("CanBePooled() returning true"<<endl);
  return TRUE;
}

void Ctpcc_com1::Deactivate()
{
  DEBUGMSG("deactivated() releasing object back into
pool"<<endl);
  m_spObjectContext.Release();
}

/*
********************************************************************
** Name        :  doSetComplete
** Description :
**            Release object back into com pool
** Parameters:
** Returns     :
**            int - return code
** Comments    :
**            Calls SetComplete on the object that the com
**            pool manager returned to the caller(isapi thread)
********************************************************************
*/
STDMETHODIMP Ctpcc_com1::doSetComplete(void)
{
  // TODO: Add your implementation code here
  HRESULT hres = m_spObjectContext->SetComplete();
  if (SUCCEEDED(hres))
  {
    DEBUGMSG("SetComplete successful. object bit set to release
object into pool."<<endl);
  }
  else
  {
    DEBUGMSG("SetComplete failed. object bit set to release
object into pool."<<endl);
    ERRORMSG("SetComplete() failed,
code:"<<HRESULT_CODE(hres)<<"
facility:"<<HRESULT_FACILITY(hres)<<"
hres:"<<hex<<hres<<endl);
  }

  return S_OK;
}

/*
********************************************************************
** Name        :  doStockLevel
** Description :
**            Call db2 dll entry point to execute txn
** Parameters:
**            int*    size of UCHAR buffer to pay attention to
**            UCHAR**    char buffer that holds txn wrapper struct
** Returns     :
**            int - return code
** Comments    :
**
```

```
*****************************************************************
*/
STDMETHODIMP Ctpcc_com1::doStockLevel(INT *size, UCHAR
**buffer)
{
  stok_wrapper * stok;
  stok = (stok_wrapper *) *buffer;

  if(!connectHandleInUse)
  {
    DEBUGMSG("Setting Context handle in use to true"<<endl);
    connectHandleInUse = 1;
  }
  else
  {
    DEBUGMSG("Context handle in use."<<endl);
    ERRORMSG("Context handle in use."<<endl);
    return ERR_HANDLE_IN_USE;
  }

  DEBUGMSG("Calling do_stok call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<stok->in_stok.s_W_ID<<" d_id:"<< stok->in_stok.s_D_ID<<
        " s_transtatus:"<<stok->out_stok.s_transtatus<<endl);

  do_stok(stok,connectHandle);

  DEBUGMSG("Return from do_stok call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<stok->in_stok.s_W_ID<<" d_id:"<< stok->in_stok.s_D_ID<<
        " s_transtatus:"<<stok->out_stok.s_transtatus<<endl);

  DEBUGMSG("Connection handle set to free" <<endl);
  connectHandleInUse = 0;

  return S_OK;
}

/*
*****************************************************************
** Name        :  doNewOrder
** Description :
**            Call db2 dll entry point to execute txn
** Parameters:
**            int*    size of UCHAR buffer to pay attention to
**            UCHAR**    char buffer that holds txn wrapper struct
** Returns     :
**            int - return code
** Comments    :
**
*****************************************************************
*/
STDMETHODIMP Ctpcc_com1::doNewOrder(INT* size, UCHAR**
buffer)
{
  nord_wrapper *nord;
  nord = (nord_wrapper *) *buffer;

  if(!connectHandleInUse)
  {
    DEBUGMSG("Setting Context handle in use to true"<<endl);
    connectHandleInUse = 1;
  }
  else
  {
    DEBUGMSG("Context handle in use."<<endl);
    ERRORMSG("Context handle in use."<<endl);
    return ERR_HANDLE_IN_USE;
  }

  DEBUGMSG("Calling do_nord call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<nord->in_nord.s_W_ID<<" d_id:"<< nord-
>in_nord.s_D_ID<<
        " s_transtatus:"<<nord->out_nord.s_transtatus<<endl);

  do_nord(nord,connectHandle);


  DEBUGMSG("Return from do_nord call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<nord->in_nord.s_W_ID<<" d_id:"<< nord-
>in_nord.s_D_ID<<
        " s_transtatus:"<<nord->out_nord.s_transtatus<<endl);

  DEBUGMSG("Connection handle set to free" <<endl);
  connectHandleInUse = 0;

  return S_OK;
}

/*
*****************************************************************
** Name        :  doPayment
** Description :
**            Call db2 dll entry point to execute txn
** Parameters:
**            int*    size of UCHAR buffer to pay attention to
**            UCHAR**    char buffer that holds txn wrapper struct
** Returns     :
**            int - return code
** Comments    :
**
*****************************************************************
*/
STDMETHODIMP Ctpcc_com1::doPayment(INT* size, UCHAR**
buffer)
{
  paym_wrapper  *pymt;
  pymt = (paym_wrapper *) *buffer;

  if(!connectHandleInUse)
  {
    DEBUGMSG("Setting Context handle in use to true"<<endl);
    connectHandleInUse = 1;
  }
  else
  {
    DEBUGMSG("Context handle in use."<<endl);
    ERRORMSG("Context handle in use."<<endl);
    return ERR_HANDLE_IN_USE;
  }


  DEBUGMSG("Calling do_pymt call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<pymt->in_paym.s_W_ID<<" d_id:"<< pymt-
>in_paym.s_D_ID<<
        " s_transtatus:"<<pymt->out_paym.s_transtatus<<endl);

  do_pymt(pymt,connectHandle);

  DEBUGMSG("Return from do_pymt call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<pymt->in_paym.s_W_ID<<" d_id:"<< pymt-
>in_paym.s_D_ID<<
        " s_transtatus:"<<pymt->out_paym.s_transtatus<<endl);

  DEBUGMSG("Connection handle set to free" <<endl);
  connectHandleInUse = 0;

  return S_OK;
}
```

```
/*
*********************************************************************
** Name         :  doOrderStatus
** Description :
**             Call db2 dll entry point to execute txn
** Parameters:
**             int*     size of UCHAR buffer to pay attention to
**             UCHAR**    char buffer that holds txn wrapper struct
** Returns      :
**             int - return code
** Comments     :
**
*********************************************************************
*/

STDMETHODIMP Ctpcc_com1::doOrderStatus(INT* size, UCHAR**
buffer)
{
   ords_wrapper *ords;
   ords = (ords_wrapper *) *buffer;

   if(!connectHandleInUse)
   {
      DEBUGMSG("Setting Context handle in use to true"<<endl);
      connectHandleInUse = 1;
   }
   else
   {
      DEBUGMSG("Context handle in use."<<endl);
      ERRORMSG("Context handle in use."<<endl);
      return ERR_HANDLE_IN_USE;
   }


   DEBUGMSG("Calling do_ords call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<ords->in_ords.s_W_ID<<" d_id:"<< ords-
>in_ords.s_D_ID<<
          " s_transtatus:"<<ords->out_ords.s_transtatus<<endl);

   do_ords(ords,connectHandle);

   DEBUGMSG("Return from do_ords call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<ords->in_ords.s_W_ID<<" d_id:"<< ords-
>in_ords.s_D_ID<<
          " s_transtatus:"<<ords->out_ords.s_transtatus<<endl);

   DEBUGMSG("Connection handle set to free" <<endl);
   connectHandleInUse = 0;

   return S_OK;
}

/*
*********************************************************************
** Name         :  doDBInfo
** Description :
**             Function to test com interface
** Parameters:
** Returns      :
**             int - return code
** Comments     :
**
*********************************************************************
*/

STDMETHODIMP Ctpcc_com1::doDBInfo(void)
{
   //DUMMY FUNCTION TO ALLOW ISAPI TO CALL COM
FUNCTION DURING LOGIN SO CONNECTIONS
   //TO DATABASE WILL BE SETUP.....I HOPE.
   DEBUGMSG("Stub function to warm object pool"<<endl);

   return S_OK;
}

/*
*********************************************************************
** Name         :  loadLibrary
** Description :
**             Function loads apprioate db library based on
**             registry setting
** Parameters:
** Returns      :
**             int - return code
** Comments     :
**
*********************************************************************
*/

Ctpcc_com1::loadLibrary()
{
   DEBUGMSG("Entered loadLibrary function"<<endl);
   //check to see if dbInstance is already loaded
   if(!dbInstance)
   {
      DEBUGMSG("Database dll not loaded. Loading dll."<<endl);
      if (nullDB)
      {
         DEBUGMSG("Loading "<<dbType << " nulldb dll." << endl);
         dbInstance =
LoadLibrary("c:\\inetpub\\wwwroot\\tpcc\\nullDB.dll");
         if(dbInstance == NULL)
         {
            DEBUGMSG("Unable to load null db dll,
rc:"<<GetLastError());
            ERRORMSG("Unable to load null db dll,
rc:"<<GetLastError());
            return ERR_NULL_DLL_NOT_LOADED;
         }
         DEBUGMSG(dbType << " nulldb dll loaded"<<endl);
      }
      else if(strcmp(dbType,"DB2") == 0)
      {
         DEBUGMSG("Loading "<<dbType << " dll." << endl);

         dbInstance =
LoadLibrary("c:\\inetpub\\wwwroot\\tpcc\\tpccDB2glue.dll");
         if(dbInstance == NULL)
         {
            DEBUGMSG("Unable to load library."<<endl);

            ERRORMSG("Unable to load com dll, rc:" << GetLastError()
<< endl);

            return ERR_DB2_DLL_NOT_LOADED;
         }
         DEBUGMSG(dbType<< " dll loaded"<<endl);
      }
      else if( strcmp(dbType,"ORACLE") == 0 )
      {
         DEBUGMSG("Loading "<<dbType << " dll." << endl);

         dbInstance =
LoadLibrary("c:\\inetpub\\wwwroot\\tpcc\\tpccOracleglue.dll");
         if(dbInstance == NULL)
         {
            DEBUGMSG("Unable to load oracle dll"<<endl);
            ERRORMSG("Unable to load oracle dll,
rc:"<<GetLastError()<<endl);
            return ERR_ORACLE_DLL_NOT_LOADED;
         }
         DEBUGMSG(dbType<< " dll loaded"<<endl);
```

```
    }
    else
    {
      DEBUGMSG("Unknown database type dll:"<<dbType<<endl);
      ERRORMSG("Unknown database type dll:"<<dbType<<endl);
      return ERR_UNKNOWN_DB;
    }

    //retrieve function addresses from instance loaded.
    DEBUGMSG("Getting do_connection function address from
"<<dbType<<" dll"<<endl);
    if( (do_connection =
(CONNECT_PTR)GetProcAddress(dbInstance,"connect_db")) ==
NULL )
      return ERR_CONNECT_ADDRESS_NOT_FOUND;
    DEBUGMSG("do_connection
address:"<<DEBUGADDRESS(do_connection)<<endl);

    DEBUGMSG("Getting do_disconnect function address from
"<<dbType<<" dll"<<endl);
    if( (do_disconnect =
(DISCONNECT_PTR)GetProcAddress(dbInstance,"disconnect_db")
) == NULL )
      return ERR_DISCONNECT_ADDRESS_NOT_FOUND;
    DEBUGMSG("do_disconnect
address:"<<DEBUGADDRESS(do_disconnect)<<endl);

    DEBUGMSG("Getting do_nord function address from
"<<dbType<<" dll"<<endl);
    if( (do_nord = (NORD_PTR)
GetProcAddress(dbInstance,"do_nord")) == NULL)
      return ERR_NORD_ADDRESS_NOT_FOUND;
    DEBUGMSG("do_nord function
address:"<<DEBUGADDRESS(do_nord)<<endl);

    DEBUGMSG("Getting do_pymt function address from
"<<dbType<<" dll"<<endl);
    if( (do_pymt = (PYMT_PTR)
GetProcAddress(dbInstance,"do_pymt")) == NULL)
      return ERR_PYMT_ADDRESS_NOT_FOUND;
    DEBUGMSG("do_pymt function
adddress:"<<DEBUGADDRESS(do_pymt)<<endl);

    DEBUGMSG("Getting do_ords function address from
"<<dbType<<" dll"<<endl);
    if( (do_ords = (ORDS_PTR)
GetProcAddress(dbInstance,"do_ords")) == NULL)
      return ERR_ORDS_ADDRESS_NOT_FOUND;
    DEBUGMSG("do_ords function
address:"<<DEBUGADDRESS(do_ords)<<endl);

    DEBUGMSG("Getting do_stok function address from
"<<dbType<<" dll"<<endl);
    if( (do_stok = (STOK_PTR)
GetProcAddress(dbInstance,"do_stok")) == NULL)
      return ERR_STOK_ADDRESS_NOT_FOUND;
    DEBUGMSG("do_stok function
address:"<<DEBUGADDRESS(do_stok)<<endl);

    DEBUGMSG("All function addresses retrieved
successfully."<<endl);

  }
  return OK;
}

/*
*****************************************************************
** Name        :  readRegistry()
** Description :
**            Function reads registry value
** Parameters:
** Returns     :
**            int - return code
** Comments    :
**            Values retrieved from registery
**            dbName, dbUserName, and dbUserPassword
*****************************************************************
*/

Ctpcc_com1::readRegistery()
{
  //open registery key
  HKEY   registeryKey;
  DWORD  regType;
  char   value[MAX_STRING_LEN];
  DWORD  regValue;
  DWORD  regValueSize = MAX_STRING_LEN;

  DEBUGMSG("Entered readRegistery(), opening key:"<<
REGISTERY_SUB_KEY <<endl);
  //open up registery key
  if(RegOpenKeyEx(HKEY_LOCAL_MACHINE,REGISTERY_SUB_
KEY,0,KEY_READ,&registeryKey) == ERROR_SUCCESS)
  {
    DEBUGMSG(REGISTERY_SUB_KEY<<" open, getting
database type from key"<<endl);
    regValueSize = sizeof(value);
    if
(RegQueryValueEx(registeryKey,DB_TYPE,0,&regType,(BYTE *)
&value,&regValueSize)== ERROR_SUCCESS )
      strcpy(dbType,value);
    DEBUGMSG("Database type:"<<dbType<<" from registery
key."<<endl);

    DEBUGMSG("Getting database name from registery
key."<<endl);
    regValueSize = sizeof(value);
    if
(RegQueryValueEx(registeryKey,DB_NAME,0,&regType,(BYTE *)
&value,&regValueSize)== ERROR_SUCCESS )
      strcpy(dbName,value);
    DEBUGMSG("Database name:"<<dbName<<endl);

    DEBUGMSG("Getting null database flag from key."<<endl);
    regValueSize = sizeof(regValue);
    if(RegQueryValueEx(registeryKey,NULL_DB,0,&regType,(BYTE
*)&regValue,&regValueSize) == ERROR_SUCCESS)
      nullDB = regValue;
    DEBUGMSG("Null database flag:"<<nullDB<<endl);

    return OK;
  }

  DEBUGMSG("Error, unable to open registery key."<<endl);
  return ERR_UNABLE_TO_OPEN_REG;
}

/*
*****************************************************************
** Name        :  connectDB
** Description :
**            Function connects to the db
** Parameters:
** Returns     :
**            int - return code
** Comments    :
**
*****************************************************************
*/
Ctpcc_com1::connectDB()
{
  DEBUGMSG("Entered connectDB(), checking if object is
connected."<<endl);
```

```
  if(!connected)
  {
    DEBUGMSG("Object not connected, calling do_connection with
dbName:"<<dbName<<" connectHandle:"<<
          DEBUGADDRESS(connectHandle)<<endl);
    if(!connectHandleInUse)
    {
      DEBUGMSG("Setting Context handle in use to true"<<endl);
      connectHandleInUse = 1;
      connected = do_connection(dbName,&connectHandle);
      if(connected != OK)
      {
        DEBUGMSG("Object do_connect failed,
rc:"<<connected<<endl);
        ERRORMSG("Object do_connect failed,
rc:"<<connected<<endl);
        return connected;
      }
      DEBUGMSG("Object connection complete,
connectHandle:"<<DEBUGADDRESS(connectHandle)<<endl);
      connectHandleInUse = 0;
      return OK;
    }
    else
    {
      DEBUGMSG("Object's connectHandle already in use, connect
failed"<<endl);
      ERRORMSG("Object's connectHandle already in use, connect
failed"<<endl);
      return ERR_HANDLE_IN_USE;
    }
  }
  DEBUGMSG("Object already has connection
established."<<endl);
  return OK;
}
```

tpccCom1/tpccCom1.cpp

```
// tpccCom1.cpp : Implementation of DLL Exports.
//
// Note: COM+ 1.0 Information:
//      Please remember to run Microsoft Transaction Explorer to
install the component(s).
//      Registration is not done by default.

#include "stdafx.h"
#include "resource.h"
#include "tpccCom1.h"
#include "dlldatax.h"

class CtpccCom1Module : public CAtlDllModuleT<
CtpccCom1Module >
{
public :
  DECLARE_LIBID(LIBID_tpccCom1Lib)
  DECLARE_REGISTRY_APPID_RESOURCEID(IDR_TPCCCOM1
, "{8D51801C-E25F-44E5-8309-4A6116A6B795}")
};

CtpccCom1Module _AtlModule;


// DLL Entry Point
extern "C" BOOL WINAPI DllMain(HINSTANCE hInstance, DWORD
dwReason, LPVOID lpReserved)
{
#ifdef _MERGE_PROXYSTUB
   if (!PrxDllMain(hInstance, dwReason, lpReserved))
      return FALSE;
#endif
   hInstance;
   return _AtlModule.DllMain(dwReason, lpReserved);
}


// Used to determine whether the DLL can be unloaded by OLE
STDAPI DllCanUnloadNow(void)
{
#ifdef _MERGE_PROXYSTUB
   HRESULT hr = PrxDllCanUnloadNow();
   if (FAILED(hr))
      return hr;
#endif
   return _AtlModule.DllCanUnloadNow();
}


// Returns a class factory to create an object of the requested type
STDAPI DllGetClassObject(REFCLSID rclsid, REFIID riid, LPVOID*
ppv)
{
#ifdef _MERGE_PROXYSTUB
   if (PrxDllGetClassObject(rclsid, riid, ppv) == S_OK)
      return S_OK;
#endif
   return _AtlModule.DllGetClassObject(rclsid, riid, ppv);
}


// DllRegisterServer - Adds entries to the system registry
STDAPI DllRegisterServer(void)
{
   // registers object, typelib and all interfaces in typelib
   HRESULT hr = _AtlModule.DllRegisterServer();
#ifdef _MERGE_PROXYSTUB
   if (FAILED(hr))
      return hr;
   hr = PrxDllRegisterServer();
#endif
  return hr;
}


// DllUnregisterServer - Removes entries from the system registry
STDAPI DllUnregisterServer(void)
{
  HRESULT hr = _AtlModule.DllUnregisterServer();
#ifdef _MERGE_PROXYSTUB
   if (FAILED(hr))
      return hr;
   hr = PrxDllRegisterServer();
   if (FAILED(hr))
      return hr;
   hr = PrxDllUnregisterServer();
#endif
  return hr;
}
```

tpccCom1/tpccCom1.def

```
; tpccCom1.def : Declares the module parameters.

LIBRARY      "tpccCom1.DLL"

EXPORTS
  DllCanUnloadNow      PRIVATE
  DllGetClassObject   PRIVATE
  DllRegisterServer PRIVATE
  DllUnregisterServer PRIVATE
```

tpccCom1/tpcc_com1.h

```
// tpcc_com1.h : Declaration of the Ctpcc_com1

#pragma once
#include "tpccCom1.h"
#include "resource.h"// main symbols
#include <comsvcs.h>

#include "..\tpccIsapi\tpcc.h"
#ifdef ORACLE
#define ORA_NT
#include <stdio.h>
#include <time.h>
#include <ora_tpcc.h>
#include <plora.h>
#endif
#define NULL_DB         "nullDB"

static HINSTANCE dbInstance         = NULL;

static CRITICAL_SECTION debugMutex;
static CRITICAL_SECTION errorMutex;

static int comServerID          =   0;
static ofstream debugStream;
static ofstream errorStream;
static int debugFileOpen        = 0;
static int errorFileOpen        = 0;
static int nullDB               = 0;
static char dbType[32];
static char dbName[32];

typedef INT (*NORD_PTR)(nord_wrapper *nord,void
*connectHandle);
typedef INT (*PYMT_PTR)(paym_wrapper *pymt,void
*connectHandle);
typedef INT (*ORDS_PTR)(ords_wrapper *ords,void
*connectHandle);
typedef INT (*STOK_PTR)(stok_wrapper *stok,void
*connectHandle);
typedef INT (*CONNECT_PTR)(char *dbName,void
**connectHandle);
typedef INT (*DISCONNECT_PTR)(void *connectHandle);

NORD_PTR   do_nord;
PYMT_PTR do_pymt;
ORDS_PTR   do_ords;
STOK_PTR do_stok;
CONNECT_PTR  do_connection;
DISCONNECT_PTR do_disconnect;

// Ctpcc_com1
class ATL_NO_VTABLE Ctpcc_com1 :
   public CComObjectRootEx<CComMultiThreadModel>,
   public IObjectControl,
   public CComCoClass<Ctpcc_com1, &CLSID_tpcc_com1>,
   public Itpcc_com1
{
public:
   Ctpcc_com1()
   {
      int rc           = ERR;
      connected        = 0;
      connectHandleInUse  = 0;

      if(debugFlag)
      {
         if(!debugFileOpen)
         {
            InitializeCriticalSection(&debugMutex);
            //open comLog
            char comLogFile[128];

   sprintf(comLogFile,"C:\\Inetpub\\wwwroot\\tpcc\\comLog_debug.txt
");
            debugStream.rdbuf( )->open(comLogFile,ios_base::in |
ios_base::out | ios_base::app);

            debugFileOpen = 1;
         }
      }

      //open error log file
      if(!errorFileOpen)
      {
         InitializeCriticalSection(&errorMutex);

         char errorLogFile[128];

   sprintf(errorLogFile,"C:\\Inetpub\\wwwroot\\tpcc\\comLog_err.txt");

         errorStream.rdbuf( )->open(errorLogFile,ios_base::in |
ios_base::out | ios_base::app);

         errorFileOpen=1;
      }

      //get registry values
      if((rc = readRegistery()) != OK)
      {
         ERRORMSG("Unable to open registery key " <<
REGISTERY_SUB_KEY << " rc:" << rc <<endl);
         return;
      }

      DEBUGMSG("nullDB:" <<nullDB<<" dbType:"<<dbType<<"
dbName:"<<dbName<<endl);

      //load library based on registry
      if( (rc = loadLibrary()) != OK)
      {
         ERRORMSG("load library failure rc:" << rc << endl);
         return;
      }

      DEBUGMSG("dbtype:"<<dbType<<" instance:" <<
DEBUGADDRESS(dbInstance) << " loaded." << endl);

      //connect to db
      EnterCriticalSection(&errorMutex);
      if((rc = connectDB()) != OK)
      {
         ERRORMSG("unable to connect to db "<<dbName<<"
rc :"<<rc <<endl);
         LeaveCriticalSection(&errorMutex);
         return;
      }
      LeaveCriticalSection(&errorMutex);

      DEBUGMSG("connected to db " <<dbName<< " rc:"<< rc << "
context:" <<DEBUGADDRESS(connectHandle) << endl);
   }

   DECLARE_PROTECT_FINAL_CONSTRUCT()

   HRESULT FinalConstruct()
   {
      return S_OK;
   }

   void FinalRelease()
   {
   }
```

```
DECLARE_REGISTRY_RESOURCEID(IDR_TPCC_COM1)

BEGIN_COM_MAP(Ctpcc_com1)
   COM_INTERFACE_ENTRY(Itpcc_com1)
   COM_INTERFACE_ENTRY(IObjectControl)
END_COM_MAP()

// IObjectControl
public:
   STDMETHOD(Activate)();
   STDMETHOD_(BOOL, CanBePooled)();
   STDMETHOD_(void, Deactivate)();
   CComPtr<IObjectContext> m_spObjectContext;

// Itpcc_com1
public:
   STDMETHOD(doStockLevel)(INT *size, UCHAR **buffer);
   STDMETHOD(doNewOrder)(INT* size, UCHAR** buffer);
   STDMETHOD(doPayment)(INT* size, UCHAR** buffer);
   STDMETHOD(doOrderStatus)(INT* size, UCHAR** buffer);
   STDMETHOD(doDBInfo)(void);
   STDMETHOD(doSetComplete)(void);

   int connected;
   int connectHandleInUse;

private:
   //db2 specific context
   void *connectHandle;
   int loadLibrary();
   int readRegistery();
   int connectDB();


};

OBJECT_ENTRY_AUTO(__uuidof(tpcc_com1), Ctpcc_com1)
```

tpccCom1/tpccCom1.h

```
/* this ALWAYS GENERATED file contains the definitions for the
interfaces */


 /* File created by MIDL compiler version 6.00.0361 */
/* at Fri May 07 15:35:12 2004
 */
/* Compiler settings for .\tpccCom1.idl:
    Oicf, W1, Zp8, env=Win32 (32b run)
    protocol : dce , ms_ext, c_ext, robust
    error checks: allocation ref bounds_check enum stub_data
    VC __declspec() decoration level:
         __declspec(uuid()), __declspec(selectany),
__declspec(novtable)
         DECLSPEC_UUID(), MIDL_INTERFACE()
*/
//@@MIDL_FILE_HEADING(  )

#pragma warning( disable: 4049 )  /* more than 64k source lines */


/* verify that the <rpcndr.h> version is high enough to compile this
file*/
#ifndef __REQUIRED_RPCNDR_H_VERSION__
#define __REQUIRED_RPCNDR_H_VERSION__ 475
#endif

#include "rpc.h"
#include "rpcndr.h"

#ifndef __RPCNDR_H_VERSION__
#error this stub requires an updated version of <rpcndr.h>
#endif // __RPCNDR_H_VERSION__

#ifndef COM_NO_WINDOWS_H
#include "windows.h"
#include "ole2.h"
#endif /*COM_NO_WINDOWS_H*/

#ifndef __tpccCom1_h__
#define __tpccCom1_h__

#if defined(_MSC_VER) && (_MSC_VER >= 1020)
#pragma once
#endif

/* Forward Declarations */

#ifndef __Itpcc_com1_FWD_DEFINED__
#define __Itpcc_com1_FWD_DEFINED__
typedef interface Itpcc_com1 Itpcc_com1;
#endif   /* __Itpcc_com1_FWD_DEFINED__ */


#ifndef __tpcc_com1_FWD_DEFINED__
#define __tpcc_com1_FWD_DEFINED__

#ifdef __cplusplus
typedef class tpcc_com1 tpcc_com1;
#else
typedef struct tpcc_com1 tpcc_com1;
#endif /* __cplusplus */

#endif   /* __tpcc_com1_FWD_DEFINED__ */


/* header files for imported files */
#include "oaidl.h"
#include "ocidl.h"

#ifdef __cplusplus
extern "C"{
#endif

void * __RPC_USER MIDL_user_allocate(size_t);
void __RPC_USER MIDL_user_free( void * );

#ifndef __Itpcc_com1_INTERFACE_DEFINED__
#define __Itpcc_com1_INTERFACE_DEFINED__

/* interface Itpcc_com1 */
/* [unique][helpstring][uuid][object] */


EXTERN_C const IID IID_Itpcc_com1;

#if defined(__cplusplus) && !defined(CINTERFACE)

   MIDL_INTERFACE("151287E4-C0DA-433C-A222-
522B848087A5")
   Itpcc_com1 : public IUnknown
   {
   public:
      virtual /* [helpstring] */ HRESULT STDMETHODCALLTYPE
doStockLevel(
         /* [in] */ INT *size,
         /* [size_is][size_is][out][in] */ UCHAR **buffer) = 0;

      virtual /* [helpstring] */ HRESULT STDMETHODCALLTYPE
doNewOrder(
         /* [in] */ INT *size,
```

```
        /* [size_is][size_is][out][in] */ UCHAR **buffer) = 0;

    virtual /* [helpstring] */ HRESULT STDMETHODCALLTYPE
doPayment(
        /* [in] */ INT *size,
        /* [size_is][size_is][out][in] */ UCHAR **buffer) = 0;

    virtual /* [helpstring] */ HRESULT STDMETHODCALLTYPE
doOrderStatus(
        /* [in] */ INT *size,
        /* [size_is][size_is][out][in] */ UCHAR **buffer) = 0;

    virtual /* [helpstring] */ HRESULT STDMETHODCALLTYPE
doDBInfo( void) = 0;

    virtual /* [helpstring] */ HRESULT STDMETHODCALLTYPE
doSetComplete( void) = 0;

  };

#else /* C style interface */

  typedef struct Itpcc_com1Vtbl
  {
    BEGIN_INTERFACE

    HRESULT ( STDMETHODCALLTYPE *QueryInterface )(
      Itpcc_com1 * This,
      /* [in] */ REFIID riid,
      /* [iid_is][out] */ void **ppvObject);

    ULONG ( STDMETHODCALLTYPE *AddRef )(
      Itpcc_com1 * This);

    ULONG ( STDMETHODCALLTYPE *Release )(
      Itpcc_com1 * This);

    /* [helpstring] */ HRESULT ( STDMETHODCALLTYPE
*doStockLevel )(
      Itpcc_com1 * This,
      /* [in] */ INT *size,
      /* [size_is][size_is][out][in] */ UCHAR **buffer);

    /* [helpstring] */ HRESULT ( STDMETHODCALLTYPE
*doNewOrder )(
      Itpcc_com1 * This,
      /* [in] */ INT *size,
      /* [size_is][size_is][out][in] */ UCHAR **buffer);

    /* [helpstring] */ HRESULT ( STDMETHODCALLTYPE
*doPayment )(
      Itpcc_com1 * This,
      /* [in] */ INT *size,
      /* [size_is][size_is][out][in] */ UCHAR **buffer);

    /* [helpstring] */ HRESULT ( STDMETHODCALLTYPE
*doOrderStatus )(
      Itpcc_com1 * This,
      /* [in] */ INT *size,
      /* [size_is][size_is][out][in] */ UCHAR **buffer);

    /* [helpstring] */ HRESULT ( STDMETHODCALLTYPE
*doDBInfo )(
      Itpcc_com1 * This);

    /* [helpstring] */ HRESULT ( STDMETHODCALLTYPE
*doSetComplete )(
      Itpcc_com1 * This);

    END_INTERFACE
  } Itpcc_com1Vtbl;

  interface Itpcc_com1
  {
    CONST_VTBL struct Itpcc_com1Vtbl *lpVtbl;
  };



#ifdef COBJMACROS


#define Itpcc_com1_QueryInterface(This,riid,ppvObject) \
  (This)->lpVtbl -> QueryInterface(This,riid,ppvObject)

#define Itpcc_com1_AddRef(This) \
  (This)->lpVtbl -> AddRef(This)

#define Itpcc_com1_Release(This)  \
  (This)->lpVtbl -> Release(This)


#define Itpcc_com1_doStockLevel(This,size,buffer)  \
  (This)->lpVtbl -> doStockLevel(This,size,buffer)

#define Itpcc_com1_doNewOrder(This,size,buffer) \
  (This)->lpVtbl -> doNewOrder(This,size,buffer)

#define Itpcc_com1_doPayment(This,size,buffer)  \
  (This)->lpVtbl -> doPayment(This,size,buffer)

#define Itpcc_com1_doOrderStatus(This,size,buffer) \
  (This)->lpVtbl -> doOrderStatus(This,size,buffer)

#define Itpcc_com1_doDBInfo(This) \
  (This)->lpVtbl -> doDBInfo(This)

#define Itpcc_com1_doSetComplete(This) \
  (This)->lpVtbl -> doSetComplete(This)

#endif /* COBJMACROS */


#endif  /* C style interface */



/* [helpstring] */ HRESULT STDMETHODCALLTYPE
Itpcc_com1_doStockLevel_Proxy(
  Itpcc_com1 * This,
  /* [in] */ INT *size,
  /* [size_is][size_is][out][in] */ UCHAR **buffer);


void __RPC_STUB Itpcc_com1_doStockLevel_Stub(
  IRpcStubBuffer *This,
  IRpcChannelBuffer *_pRpcChannelBuffer,
  PRPC_MESSAGE _pRpcMessage,
  DWORD *_pdwStubPhase);


/* [helpstring] */ HRESULT STDMETHODCALLTYPE
Itpcc_com1_doNewOrder_Proxy(
  Itpcc_com1 * This,
  /* [in] */ INT *size,
  /* [size_is][size_is][out][in] */ UCHAR **buffer);


void __RPC_STUB Itpcc_com1_doNewOrder_Stub(
  IRpcStubBuffer *This,
  IRpcChannelBuffer *_pRpcChannelBuffer,
  PRPC_MESSAGE _pRpcMessage,
  DWORD *_pdwStubPhase);
```

```
/* [helpstring] */ HRESULT STDMETHODCALLTYPE
ltpcc_com1_doPayment_Proxy(
    ltpcc_com1 * This,
    /* [in] */ INT *size,
    /* [size_is][size_is][out][in] */ UCHAR **buffer);


void __RPC_STUB ltpcc_com1_doPayment_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring] */ HRESULT STDMETHODCALLTYPE
ltpcc_com1_doOrderStatus_Proxy(
    ltpcc_com1 * This,
    /* [in] */ INT *size,
    /* [size_is][size_is][out][in] */ UCHAR **buffer);


void __RPC_STUB ltpcc_com1_doOrderStatus_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring] */ HRESULT STDMETHODCALLTYPE
ltpcc_com1_doDBInfo_Proxy(
    ltpcc_com1 * This);


void __RPC_STUB ltpcc_com1_doDBInfo_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring] */ HRESULT STDMETHODCALLTYPE
ltpcc_com1_doSetComplete_Proxy(
    ltpcc_com1 * This);


void __RPC_STUB ltpcc_com1_doSetComplete_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);



#endif   /* __ltpcc_com1_INTERFACE_DEFINED__ */


#ifndef __tpccCom1Lib_LIBRARY_DEFINED__
#define __tpccCom1Lib_LIBRARY_DEFINED__

/* library tpccCom1Lib */
/* [helpstring][version][uuid] */


EXTERN_C const IID LIBID_tpccCom1Lib;

EXTERN_C const CLSID CLSID_tpcc_com1;

#ifdef __cplusplus
class DECLSPEC_UUID("4549345B-0500-494F-AB02-
F7B4CB7AC1E2")
tpcc_com1;
#endif
#endif /* __tpccCom1Lib_LIBRARY_DEFINED__ */

/* Additional Prototypes for ALL interfaces */

/* end of Additional Prototypes */

#ifdef __cplusplus
}
#endif

#endif
```

tpccCom1/tpccCom1_i.c

```
/* this ALWAYS GENERATED file contains the IIDs and CLSIDs */

/* link this file in with the server and any clients */


 /* File created by MIDL compiler version 6.00.0361 */
/* at Fri May 07 15:35:12 2004
 */
/* Compiler settings for .\tpccCom1.idl:
    Oicf, W1, Zp8, env=Win32 (32b run)
    protocol : dce , ms_ext, c_ext, robust
    error checks: allocation ref bounds_check enum stub_data
    VC __declspec() decoration level:
         __declspec(uuid()), __declspec(selectany),
__declspec(novtable)
        DECLSPEC_UUID(), MIDL_INTERFACE()
*/
//@@MIDL_FILE_HEADING(  )

#if !defined(_M_IA64) && !defined(_M_AMD64)


#pragma warning( disable: 4049 )  /* more than 64k source lines */


#ifdef __cplusplus
extern "C"{
#endif


#include <rpc.h>
#include <rpcndr.h>

#ifdef _MIDL_USE_GUIDDEF_

#ifndef INITGUID
#define INITGUID
#include <guiddef.h>
#undef INITGUID
#else
#include <guiddef.h>
#endif

#define
MIDL_DEFINE_GUID(type,name,l,w1,w2,b1,b2,b3,b4,b5,b6,b7,b8) \
        DEFINE_GUID(name,l,w1,w2,b1,b2,b3,b4,b5,b6,b7,b8)

#else // !_MIDL_USE_GUIDDEF_

#ifndef __IID_DEFINED__
```

```
#define __IID_DEFINED__

typedef struct _IID
{
   unsigned long x;
   unsigned short s1;
   unsigned short s2;
   unsigned char  c[8];
} IID;

#endif // __IID_DEFINED__

#ifndef CLSID_DEFINED
#define CLSID_DEFINED
typedef IID CLSID;
#endif // CLSID_DEFINED

#define
MIDL_DEFINE_GUID(type,name,l,w1,w2,b1,b2,b3,b4,b5,b6,b7,b8) \
       const type name = {l,w1,w2,{b1,b2,b3,b4,b5,b6,b7,b8}}

#endif !_MIDL_USE_GUIDDEF_

MIDL_DEFINE_GUID(IID,
IID_ltpcc_com1,0x151287E4,0xC0DA,0x433C,0xA2,0x22,0x52,0x2
B,0x84,0x80,0x87,0xA5);


MIDL_DEFINE_GUID(IID,
LIBID_tpccCom1Lib,0x20D6DD23,0x491C,0x4F63,0xB2,0xE0,0xA6
,0x44,0xA4,0x83,0x53,0xB5);


MIDL_DEFINE_GUID(CLSID,
CLSID_tpcc_com1,0x4549345B,0x0500,0x494F,0xAB,0x02,0xF7,0x
B4,0xCB,0x7A,0xC1,0xE2);

#undef MIDL_DEFINE_GUID

#ifdef __cplusplus
}
#endif



#endif /* !defined(_M_IA64) && !defined(_M_AMD64)*/
```

tpccCom1/tpccCom1.idl

```
// tpccCom1.idl : IDL source for tpccCom1
//

// This file will be processed by the MIDL tool to
// produce the type library (tpccCom1.tlb) and marshalling code.

import "oaidl.idl";
import "ocidl.idl";

[
   object,
   uuid(151287E4-C0DA-433C-A222-522B848087A5),
// oleautomation,
// nonextensible,
   helpstring("Itpcc_com1 Interface"),
   pointer_default(unique)
]
interface Itpcc_com1 : IUnknown{
   [helpstring("method doStockLevel")] HRESULT doStockLevel([in]
INT *size, [in,out, size_is(,*size)] UCHAR **buffer);
   [helpstring("method doNewOrder")] HRESULT doNewOrder([in]
INT* size, [in,out,size_is(,*size)] UCHAR** buffer);
   [helpstring("method doPayment")] HRESULT doPayment([in] INT*
size, [in,out,size_is(,*size)] UCHAR** buffer);
   [helpstring("method doOrderStatus")] HRESULT
doOrderStatus([in] INT* size, [in,out,size_is(,*size)] UCHAR**
buffer);
   [helpstring("method doDBInfo")] HRESULT doDBInfo(void);
   [helpstring("method doSetComplete")] HRESULT
doSetComplete(void);
};
[
   uuid(20D6DD23-491C-4F63-B2E0-A644A48353B5),
   version(1.0),
   helpstring("tpccCom1 1.0 Type Library")
]
library tpccCom1Lib
{
   importlib("stdole2.tlb");
   [
      uuid(4549345B-0500-494F-AB02-F7B4CB7AC1E2),
      helpstring("tpcc_com1 Class")
   ]
   coclass tpcc_com1
   {
      [default] interface Itpcc_com1;
   };
};
```

tpccCom1/tpccCom1_p.c

```
/* this ALWAYS GENERATED file contains the proxy stub code */


 /* File created by MIDL compiler version 6.00.0361 */
/* at Fri May 07 15:35:12 2004
 */
/* Compiler settings for .\tpccCom1.idl:
    Oicf, W1, Zp8, env=Win32 (32b run)
    protocol : dce , ms_ext, c_ext, robust
    error checks: allocation ref bounds_check enum stub_data
    VC __declspec() decoration level:
         __declspec(uuid()), __declspec(selectany),
__declspec(novtable)
         DECLSPEC_UUID(), MIDL_INTERFACE()
*/
//@@MIDL_FILE_HEADING(  )

#if !defined(_M_IA64) && !defined(_M_AMD64)


#pragma warning( disable: 4049 )  /* more than 64k source lines */
#if _MSC_VER >= 1200
#pragma warning(push)
#endif
#pragma warning( disable: 4100 ) /* unreferenced arguments in x86
call */
#pragma warning( disable: 4211 )  /* redefine extent to static */
#pragma warning( disable: 4232 )  /* dllimport identity*/
#define USE_STUBLESS_PROXY


/* verify that the <rpcproxy.h> version is high enough to compile this
file*/
#ifndef __REDQ_RPCPROXY_H_VERSION__
#define __REQUIRED_RPCPROXY_H_VERSION__ 475
#endif


#include "rpcproxy.h"
#ifndef __RPCPROXY_H_VERSION__
#error this stub requires an updated version of <rpcproxy.h>
```

```
#endif // __RPCPROXY_H_VERSION__


#include "tpccCom1.h"

#define TYPE_FORMAT_STRING_SIZE   27
#define PROC_FORMAT_STRING_SIZE   229
#define TRANSMIT_AS_TABLE_SIZE    0
#define WIRE_MARSHAL_TABLE_SIZE   0

typedef struct _MIDL_TYPE_FORMAT_STRING
    {
    short          Pad;
    unsigned char  Format[ TYPE_FORMAT_STRING_SIZE ];
    } MIDL_TYPE_FORMAT_STRING;

typedef struct _MIDL_PROC_FORMAT_STRING
    {
    short          Pad;
    unsigned char  Format[ PROC_FORMAT_STRING_SIZE ];
    } MIDL_PROC_FORMAT_STRING;


static RPC_SYNTAX_IDENTIFIER  _RpcTransferSyntax =
{{0x8A885D04,0x1CEB,0x11C9,{0x9F,0xE8,0x08,0x00,0x2B,0x10,0
x48,0x60}},{2,0}};


extern const MIDL_TYPE_FORMAT_STRING
__MIDL_TypeFormatString;
extern const MIDL_PROC_FORMAT_STRING
__MIDL_ProcFormatString;


extern const MIDL_STUB_DESC Object_StubDesc;


extern const MIDL_SERVER_INFO Itpcc_com1_ServerInfo;
extern const MIDL_STUBLESS_PROXY_INFO
Itpcc_com1_ProxyInfo;



#if !defined(__RPC_WIN32__)
#error  Invalid build platform for this stub.
#endif

#if !(TARGET_IS_NT50_OR_LATER)
#error You need a Windows 2000 or later to run this stub because it
uses these features:
#error    /robust command line switch.
#error However, your C/C++ compilation flags indicate you intend to
run this app on earlier systems.
#error This app will die there with the
RPC_X_WRONG_STUB_VERSION error.
#endif


static const MIDL_PROC_FORMAT_STRING
__MIDL_ProcFormatString =
    {
        0,
        {

    /* Procedure doStockLevel */

            0x33,    /* FC_AUTO_HANDLE */
            0x6c,    /* Old Flags:  object, Oi2 */
/*  2 */    NdrFcLong( 0x0 ),/* 0 */
/*  6 */    NdrFcShort( 0x3 ),   /* 3 */
/*  8 */    NdrFcShort( 0x10 ), /* x86 Stack size/offset = 16 */
/* 10 */    NdrFcShort( 0x1c ), /* 28 */
/* 12 */    NdrFcShort( 0x8 ),   /* 8 */
/* 14 */    0x47,    /* Oi2 Flags:  srv must size, clt must size, has
return, has ext, */
            0x3,     /* 3 */
/* 16 */    0x8,     /* 8 */
            0x7,     /* Ext Flags:  new corr desc, clt corr check, srv corr
check, */
/* 18 */    NdrFcShort( 0x1 ),   /* 1 */
/* 20 */    NdrFcShort( 0x1 ),   /* 1 */
/* 22 */    NdrFcShort( 0x0 ),   /* 0 */

    /* Parameter size */

/* 24 */    NdrFcShort( 0x148 ),  /* Flags:  in, base type, simple ref, */
/* 26 */    NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 28 */    0x8,     /* FC_LONG */
            0x0,     /* 0 */

    /* Parameter buffer */

/* 30 */    NdrFcShort( 0x201b ),/* Flags:  must size, must free, in, out,
srv alloc size=8 */
/* 32 */    NdrFcShort( 0x8 ),   /* x86 Stack size/offset = 8 */
/* 34 */    NdrFcShort( 0x6 ),   /* Type Offset=6 */

    /* Return value */

/* 36 */    NdrFcShort( 0x70 ), /* Flags:  out, return, base type, */
/* 38 */    NdrFcShort( 0xc ),   /* x86 Stack size/offset = 12 */
/* 40 */    0x8,     /* FC_LONG */
            0x0,     /* 0 */

    /* Procedure doNewOrder */

/* 42 */    0x33,    /* FC_AUTO_HANDLE */
            0x6c,    /* Old Flags:  object, Oi2 */
/* 44 */    NdrFcLong( 0x0 ),/* 0 */
/* 48 */    NdrFcShort( 0x4 ),   /* 4 */
/* 50 */    NdrFcShort( 0x10 ), /* x86 Stack size/offset = 16 */
/* 52 */    NdrFcShort( 0x1c ), /* 28 */
/* 54 */    NdrFcShort( 0x8 ),   /* 8 */
/* 56 */    0x47,    /* Oi2 Flags:  srv must size, clt must size, has
return, has ext, */
            0x3,     /* 3 */
/* 58 */    0x8,     /* 8 */
            0x7,     /* Ext Flags:  new corr desc, clt corr check, srv corr
check, */
/* 60 */    NdrFcShort( 0x1 ),   /* 1 */
/* 62 */    NdrFcShort( 0x1 ),   /* 1 */
/* 64 */    NdrFcShort( 0x0 ),   /* 0 */

    /* Parameter size */

/* 66 */    NdrFcShort( 0x148 ),  /* Flags:  in, base type, simple ref, */
/* 68 */    NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 70 */    0x8,     /* FC_LONG */
            0x0,     /* 0 */

    /* Parameter buffer */

/* 72 */    NdrFcShort( 0x201b ),/* Flags:  must size, must free, in, out,
srv alloc size=8 */
/* 74 */    NdrFcShort( 0x8 ),   /* x86 Stack size/offset = 8 */
/* 76 */    NdrFcShort( 0x6 ),   /* Type Offset=6 */

    /* Return value */

/* 78 */    NdrFcShort( 0x70 ), /* Flags:  out, return, base type, */
/* 80 */    NdrFcShort( 0xc ),   /* x86 Stack size/offset = 12 */
/* 82 */    0x8,     /* FC_LONG */
            0x0,     /* 0 */
```

```
   /* Procedure doPayment */

/* 84 */  0x33,    /* FC_AUTO_HANDLE */
        0x6c,    /* Old Flags:  object, Oi2 */
/* 86 */  NdrFcLong( 0x0 ),/* 0 */
/* 90 */  NdrFcShort( 0x5 ),   /* 5 */
/* 92 */  NdrFcShort( 0x10 ), /* x86 Stack size/offset = 16 */
/* 94 */  NdrFcShort( 0x1c ), /* 28 */
/* 96 */  NdrFcShort( 0x8 ),   /* 8 */
/* 98 */  0x47,    /* Oi2 Flags:  srv must size, clt must size, has
return, has ext, */
        0x3,     /* 3 */
/* 100 */0x8,      /* 8 */
        0x7,     /* Ext Flags:  new corr desc, clt corr check, srv corr
check, */
/* 102 */NdrFcShort( 0x1 ),   /* 1 */
/* 104 */NdrFcShort( 0x1 ),   /* 1 */
/* 106 */NdrFcShort( 0x0 ),   /* 0 */

   /* Parameter size */

/* 108 */NdrFcShort( 0x148 ),  /* Flags:  in, base type, simple ref, */
/* 110 */NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 112 */0x8,      /* FC_LONG */
        0x0,     /* 0 */

   /* Parameter buffer */

/* 114 */NdrFcShort( 0x201b ),/* Flags:  must size, must free, in, out,
srv alloc size=8 */
/* 116 */NdrFcShort( 0x8 ),   /* x86 Stack size/offset = 8 */
/* 118 */NdrFcShort( 0x6 ),   /* Type Offset=6 */

   /* Return value */

/* 120 */NdrFcShort( 0x70 ), /* Flags:  out, return, base type, */
/* 122 */NdrFcShort( 0xc ),   /* x86 Stack size/offset = 12 */
/* 124 */0x8,      /* FC_LONG */
        0x0,     /* 0 */

   /* Procedure doOrderStatus */

/* 126 */0x33,    /* FC_AUTO_HANDLE */
        0x6c,    /* Old Flags:  object, Oi2 */
/* 128 */NdrFcLong( 0x0 ),/* 0 */
/* 132 */NdrFcShort( 0x6 ),   /* 6 */
/* 134 */NdrFcShort( 0x10 ), /* x86 Stack size/offset = 16 */
/* 136 */NdrFcShort( 0x1c ), /* 28 */
/* 138 */NdrFcShort( 0x8 ),   /* 8 */
/* 140 */0x47,    /* Oi2 Flags:  srv must size, clt must size, has
return, has ext, */
        0x3,     /* 3 */
/* 142 */0x8,      /* 8 */
        0x7,     /* Ext Flags:  new corr desc, clt corr check, srv corr
check, */
/* 144 */NdrFcShort( 0x1 ),   /* 1 */
/* 146 */NdrFcShort( 0x1 ),   /* 1 */
/* 148 */NdrFcShort( 0x0 ),   /* 0 */

   /* Parameter size */

/* 150 */NdrFcShort( 0x148 ),  /* Flags:  in, base type, simple ref, */
/* 152 */NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 154 */0x8,      /* FC_LONG */
        0x0,     /* 0 */

   /* Parameter buffer */

/* 156 */NdrFcShort( 0x201b ),/* Flags:  must size, must free, in, out,
srv alloc size=8 */
/* 158 */NdrFcShort( 0x8 ),   /* x86 Stack size/offset = 8 */
/* 160 */NdrFcShort( 0x6 ),   /* Type Offset=6 */

   /* Return value */

/* 162 */NdrFcShort( 0x70 ), /* Flags:  out, return, base type, */
/* 164 */NdrFcShort( 0xc ),   /* x86 Stack size/offset = 12 */
/* 166 */0x8,      /* FC_LONG */
        0x0,     /* 0 */

   /* Procedure doDBInfo */

/* 168 */0x33,    /* FC_AUTO_HANDLE */
        0x6c,    /* Old Flags:  object, Oi2 */
/* 170 */NdrFcLong( 0x0 ),/* 0 */
/* 174 */NdrFcShort( 0x7 ),   /* 7 */
/* 176 */NdrFcShort( 0x8 ),   /* x86 Stack size/offset = 8 */
/* 178 */NdrFcShort( 0x0 ),   /* 0 */
/* 180 */NdrFcShort( 0x8 ),   /* 8 */
/* 182 */0x44,    /* Oi2 Flags:  has return, has ext, */
        0x1,     /* 1 */
/* 184 */0x8,      /* 8 */
        0x1,     /* Ext Flags:  new corr desc, */
/* 186 */NdrFcShort( 0x0 ),   /* 0 */
/* 188 */NdrFcShort( 0x0 ),   /* 0 */
/* 190 */NdrFcShort( 0x0 ),   /* 0 */

   /* Return value */

/* 192 */NdrFcShort( 0x70 ), /* Flags:  out, return, base type, */
/* 194 */NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 196 */0x8,      /* FC_LONG */
        0x0,     /* 0 */

   /* Procedure doSetComplete */

/* 198 */0x33,    /* FC_AUTO_HANDLE */
        0x6c,    /* Old Flags:  object, Oi2 */
/* 200 */NdrFcLong( 0x0 ),/* 0 */
/* 204 */NdrFcShort( 0x8 ),   /* 8 */
/* 206 */NdrFcShort( 0x8 ),   /* x86 Stack size/offset = 8 */
/* 208 */NdrFcShort( 0x0 ),   /* 0 */
/* 210 */NdrFcShort( 0x8 ),   /* 8 */
/* 212 */0x44,    /* Oi2 Flags:  has return, has ext, */
        0x1,     /* 1 */
/* 214 */0x8,      /* 8 */
        0x1,     /* Ext Flags:  new corr desc, */
/* 216 */NdrFcShort( 0x0 ),   /* 0 */
/* 218 */NdrFcShort( 0x0 ),   /* 0 */
/* 220 */NdrFcShort( 0x0 ),   /* 0 */

   /* Return value */

/* 222 */NdrFcShort( 0x70 ), /* Flags:  out, return, base type, */
/* 224 */NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 226 */0x8,      /* FC_LONG */
        0x0,     /* 0 */

        0x0
       }
   };

static const MIDL_TYPE_FORMAT_STRING
__MIDL_TypeFormatString =
   {
      0,
      {
       NdrFcShort( 0x0 ),   /* 0 */
/*  2 */
        0x11, 0x8,   /* FC_RP [simple_pointer] */
/*  4 */   0x8,      /* FC_LONG */
        0x5c,    /* FC_PAD */
/*  6 */
        0x11, 0x14, /* FC_RP [alloced_on_stack] [pointer_deref] */
```

```
/*  8 */   NdrFcShort( 0x2 ),   /* Offset= 2 (10) */
/* 10 */
        0x13, 0x0,   /* FC_OP */
/* 12 */  NdrFcShort( 0x2 ),   /* Offset= 2 (14) */
/* 14 */
        0x1b,    /* FC_CARRAY */
        0x0,     /* 0 */
/* 16 */  NdrFcShort( 0x1 ),   /* 1 */
/* 18 */  0x28,    /* Corr desc:  parameter, FC_LONG */
        0x54,    /* FC_DEREFERENCE */
/* 20 */  NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 22 */  NdrFcShort( 0x1 ),   /* Corr flags:  early, */
/* 24 */  0x2,     /* FC_CHAR */
        0x5b,    /* FC_END */

        0x0
      }
   };


/* Object interface: IUnknown, ver. 0.0,

GUID={0x00000000,0x0000,0x0000,{0xC0,0x00,0x00,0x00,0x00,0x
00,0x00,0x46}} */


/* Object interface: Itpcc_com1, ver. 0.0,

GUID={0x151287E4,0xC0DA,0x433C,{0xA2,0x22,0x52,0x2B,0x84,
0x80,0x87,0xA5}} */

#pragma code_seg(".orpc")
static const unsigned short Itpcc_com1_FormatStringOffsetTable[] =
   {
   0,
   42,
   84,
   126,
   168,
   198
   };

static const MIDL_STUBLESS_PROXY_INFO
Itpcc_com1_ProxyInfo =
   {
   &Object_StubDesc,
   __MIDL_ProcFormatString.Format,
   &Itpcc_com1_FormatStringOffsetTable[-3],
   0,
   0,
   0
   };


static const MIDL_SERVER_INFO Itpcc_com1_ServerInfo =
   {
   &Object_StubDesc,
   0,
   __MIDL_ProcFormatString.Format,
   &Itpcc_com1_FormatStringOffsetTable[-3],
   0,
   0,
   0,
   0};
CINTERFACE_PROXY_VTABLE(9) _Itpcc_com1ProxyVtbl =
{
   &Itpcc_com1_ProxyInfo,
   &IID_Itpcc_com1,
   IUnknown_QueryInterface_Proxy,
   IUnknown_AddRef_Proxy,
   IUnknown_Release_Proxy ,
   (void *) (INT_PTR) -1 /* Itpcc_com1::doStockLevel */ ,
   (void *) (INT_PTR) -1 /* Itpcc_com1::doNewOrder */ ,
   (void *) (INT_PTR) -1 /* Itpcc_com1::doPayment */ ,
   (void *) (INT_PTR) -1 /* Itpcc_com1::doOrderStatus */ ,
   (void *) (INT_PTR) -1 /* Itpcc_com1::doDBInfo */ ,
   (void *) (INT_PTR) -1 /* Itpcc_com1::doSetComplete */
};

const CInterfaceStubVtbl _Itpcc_com1StubVtbl =
{
   &IID_Itpcc_com1,
   &Itpcc_com1_ServerInfo,
   9,
   0, /* pure interpreted */
   CStdStubBuffer_METHODS
};

static const MIDL_STUB_DESC Object_StubDesc =
   {
   0,
   NdrOleAllocate,
   NdrOleFree,
   0,
   0,
   0,
   0,
   0,
   __MIDL_TypeFormatString.Format,
   1, /* -error bounds_check flag */
   0x50002, /* Ndr library version */
   0,
   0x6000169, /* MIDL Version 6.0.361 */
   0,
   0,
   0,  /* notify & notify_flag routine table */
   0x1, /* MIDL flag */
   0, /* cs routines */
   0,   /* proxy/server info */
   0   /* Reserved5 */
   };

const CInterfaceProxyVtbl * _tpccCom1_ProxyVtblList[] =
{
   ( CInterfaceProxyVtbl *) &_Itpcc_com1ProxyVtbl,
   0
};

const CInterfaceStubVtbl * _tpccCom1_StubVtblList[] =
{
   ( CInterfaceStubVtbl *) &_Itpcc_com1StubVtbl,
   0
};

PCInterfaceName const _tpccCom1_InterfaceNamesList[] =
{
   "Itpcc_com1",
   0
};


#define _tpccCom1_CHECK_IID(n)
   IID_GENERIC_CHECK_IID( _tpccCom1, pIID, n)

int __stdcall _tpccCom1_IID_Lookup( const IID * pIID, int * pIndex )
{

   if(!_tpccCom1_CHECK_IID(0))
      {
      *pIndex = 0;
      return 1;
      }

   return 0;
```

```
}

const ExtendedProxyFileInfo tpccCom1_ProxyFileInfo =
{
    (PCInterfaceProxyVtblList *) & _tpccCom1_ProxyVtblList,
    (PCInterfaceStubVtblList *) & _tpccCom1_StubVtblList,
    (const PCInterfaceName * ) & _tpccCom1_InterfaceNamesList,
    0, // no delegation
    & _tpccCom1_IID_Lookup,
    1,
    2,
    0, /* table of [async_uuid] interfaces */
    0, /* Filler1 */
    0, /* Filler2 */
    0  /* Filler3 */
};
#if _MSC_VER >= 1200
#pragma warning(pop)
#endif


#endif /* !defined(_M_IA64) && !defined(_M_AMD64)*/
```

tpccCom1/tpccCom1.rc

```
// Microsoft Visual C++ generated resource script.
//
#include "resource.h"

#define APSTUDIO_READONLY_SYMBOLS
//////////////////////////////////////////////////////////////////////////////
//
// Generated from the TEXTINCLUDE 2 resource.
//
#include "winres.h"

//////////////////////////////////////////////////////////////////////////////
#undef APSTUDIO_READONLY_SYMBOLS

//////////////////////////////////////////////////////////////////////////////
// English (U.S.) resources

#if !defined(AFX_RESOURCE_DLL) || defined(AFX_TARG_ENU)
#ifdef _WIN32
LANGUAGE LANG_ENGLISH, SUBLANG_ENGLISH_US
#pragma code_page(1252)
#endif //_WIN32

#ifdef APSTUDIO_INVOKED
//////////////////////////////////////////////////////////////////////////////
//
// TEXTINCLUDE
//

1 TEXTINCLUDE
BEGIN
    "resource.h\0"
END

2 TEXTINCLUDE
BEGIN
    "#include ""winres.h""\r\n"
    "\0"
END

3 TEXTINCLUDE
BEGIN
    "1 TYPELIB ""tpccCom1.tlb""\r\n"
    "\0"
END

#endif    // APSTUDIO_INVOKED


//////////////////////////////////////////////////////////////////////////////
//
// Version
//

VS_VERSION_INFO VERSIONINFO
 FILEVERSION 1,0,0,1
 PRODUCTVERSION 1,0,0,1
 FILEFLAGSMASK 0x3fL
#ifdef _DEBUG
 FILEFLAGS 0x1L
#else
 FILEFLAGS 0x0L
#endif
 FILEOS 0x4L
 FILETYPE 0x2L
 FILESUBTYPE 0x0L
BEGIN
    BLOCK "StringFileInfo"
    BEGIN
        BLOCK "040904e4"
        BEGIN
            VALUE "CompanyName", "TODO: <Company name>"
            VALUE "FileDescription", "TODO: <File description>"
            VALUE "FileVersion", "1.0.0.1"
            VALUE "LegalCopyright", "TODO: (c) <Company name>.  All
rights reserved."
            VALUE "InternalName", "tpccCom1.dll"
            VALUE "OriginalFilename", "tpccCom1.dll"
            VALUE "ProductName", "TODO: <Product name>"
            VALUE "ProductVersion", "1.0.0.1"
        END
    END
    BLOCK "VarFileInfo"
    BEGIN
        VALUE "Translation", 0x409, 1252
    END
END


//////////////////////////////////////////////////////////////////////////////
//
// REGISTRY
//

IDR_TPCCCOM1            REGISTRY                "tpccCom1.rgs"
IDR_TPCC_COM1           REGISTRY                "tpcc_com1.rgs"

//////////////////////////////////////////////////////////////////////////////
//
// String Table
//

STRINGTABLE
BEGIN
    IDS_PROJNAME            "tpccCom1"
END

#endif    // English (U.S.) resources
//////////////////////////////////////////////////////////////////////////////



#ifndef APSTUDIO_INVOKED
//////////////////////////////////////////////////////////////////////////////
//
// Generated from the TEXTINCLUDE 3 resource.
//
1 TYPELIB "tpccCom1.tlb"
```

```
//////////////////////////////////////////////////////////////////////
#endif    // not APSTUDIO_INVOKED
```

tpccCom1/tpcc_com1.rgs

```
HKCR
{
  tpccCom1.tpcc_com1.1 = s 'tpcc_com1 Class'
  {
    CLSID = s '{4549345B-0500-494F-AB02-F7B4CB7AC1E2}'
  }
  tpccCom1.tpcc_com1 = s 'tpcc_com1 Class'
  {
    CLSID = s '{4549345B-0500-494F-AB02-F7B4CB7AC1E2}'
    CurVer = s 'tpccCom1.tpcc_com1.1'
  }
  NoRemove CLSID
  {
    ForceRemove {4549345B-0500-494F-AB02-F7B4CB7AC1E2} =
s 'tpcc_com1 Class'
    {
      ProgID = s 'tpccCom1.tpcc_com1.1'
      VersionIndependentProgID = s 'tpccCom1.tpcc_com1'
      InprocServer32 = s '%MODULE%'
      {
        val ThreadingModel = s 'Both'
      }
      val AppID = s '%APPID%'
      'TypeLib' = s '{20D6DD23-491C-4F63-B2E0-A644A48353B5}'
    }
  }
}
```

tpccCom1/tpccCom1.rgs

```
HKCR
{
  NoRemove AppID
  {
    '%APPID%' = s 'tpccCom1'
    'tpccCom1.DLL'
    {
      val AppID = s '%APPID%'
    }
  }
}
```

tpccCom50/dlldata.c

```
/*********************************************************
  DllData file -- generated by MIDL compiler

      DO NOT ALTER THIS FILE

  This file is regenerated by MIDL on every IDL file compile.

  To completely reconstruct this file, delete it and rerun MIDL
  on all the IDL files in this DLL, specifying this file for the
  /dlldata command line option

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


#include <rpcproxy.h>

#ifdef __cplusplus
extern "C"   {
#endif

EXTERN_PROXY_FILE( tpccCom50 )


PROXYFILE_LIST_START
/* Start of list */
  REFERENCE_PROXY_FILE( tpccCom50 ),
/* End of list */
PROXYFILE_LIST_END


DLLDATA_ROUTINES( aProxyFileList, GET_DLL_CLSID )

#ifdef __cplusplus
}  /*extern "C" */
#endif

/* end of generated dlldata file */
```

tpccCom50/dlldatax.c

```
// wrapper for dlldata.c

#ifdef _MERGE_PROXYSTUB // merge proxy stub DLL

#define REGISTER_PROXY_DLL //DllRegisterServer, etc.

#define _WIN32_WINNT 0x0500   //for Win2000, change it to
0x0400 for NT4 or Win95 with DCOM
#define USE_STUBLESS_PROXY   //defined only with MIDL switch
/Oicf

#pragma comment(lib, "rpcns4.lib")
#pragma comment(lib, "rpcrt4.lib")

#define ENTRY_PREFIX  Prx

#include "dlldata.c"
#include "tpccCom50_p.c"

#endif //_MERGE_PROXYSTUB
```

tpccCom50/dlldatax.h

```
#pragma once

#ifdef _MERGE_PROXYSTUB

extern "C"
{
BOOL WINAPI PrxDllMain(HINSTANCE hInstance, DWORD
dwReason,
   LPVOID lpReserved);
STDAPI PrxDllCanUnloadNow(void);
STDAPI PrxDllGetClassObject(REFCLSID rclsid, REFIID riid,
LPVOID* ppv);
STDAPI PrxDllRegisterServer(void);
STDAPI PrxDllUnregisterServer(void);
}

#endif
```

tpccCom50/resource.h

```
//{{NO_DEPENDENCIES}}
// Microsoft Visual C++ generated include file.
// Used by tpccCom50.rc
//
#define IDS_PROJNAME                100
#define IDR_TPCCCOM50               101
#define IDR_TPCC_COM50              102

// Next default values for new objects
//
```

```
#ifdef APSTUDIO_INVOKED
#ifndef APSTUDIO_READONLY_SYMBOLS
#define _APS_NEXT_RESOURCE_VALUE        201
#define _APS_NEXT_COMMAND_VALUE         32768
#define _APS_NEXT_CONTROL_VALUE         201
#define _APS_NEXT_SYMED_VALUE           103
#endif
#endif
```

tpccCom50/stdafx.cpp

```
// stdafx.cpp : source file that includes just the standard includes
// tpccCom50.pch will be the pre-compiled header
// stdafx.obj will contain the pre-compiled type information

#include "stdafx.h"
```

tpccCom50/stdafx.h

```
// stdafx.h : include file for standard system include files,
// or project specific include files that are used frequently,
// but are changed infrequently

#pragma once

#ifndef STRICT
#define STRICT
#endif

// Modify the following defines if you have to target a platform prior to
the ones specified below.
// Refer to MSDN for the latest info on corresponding values for
different platforms.
#ifndef WINVER              // Allow use of features specific to Windows
95 and Windows NT 4 or later.
#define WINVER 0x0400       // Change this to the appropriate value
to target Windows 98 and Windows 2000 or later.
#endif

#ifndef _WIN32_WINNT    // Allow use of features specific to
Windows NT 4 or later.
#define _WIN32_WINNT 0x0400   // Change this to the appropriate
value to target Windows 2000 or later.
#endif

#ifndef _WIN32_WINDOWS    // Allow use of features specific to
Windows 98 or later.
#define _WIN32_WINDOWS 0x0410 // Change this to the
appropriate value to target Windows Me or later.
#endif

#ifndef _WIN32_IE         // Allow use of features specific to IE 4.0 or
later.
#define _WIN32_IE 0x0400  // Change this to the appropriate value
to target IE 5.0 or later.
#endif

#define _ATL_APARTMENT_THREADED
#define _ATL_NO_AUTOMATIC_NAMESPACE

#define _ATL_CSTRING_EXPLICIT_CONSTRUCTORS // some
CString constructors will be explicit

// turns off ATL's hiding of some common and often safely ignored
warning messages
#define _ATL_ALL_WARNINGS


#include <comsvcs.h>

#include "resource.h"
#include <atlbase.h>
#include <atlcom.h>

using namespace ATL;
```

tpccCom50/tpcc_com50.cpp

```
// tpcc_com50.cpp : Implementation of Ctpcc_com50

#include "stdafx.h"
#include "tpcc_com50.h"

#include "..\tpccIsapi\tpcc.h"

#ifdef DB2
#include <db2tpcc.h>
#endif
#ifdef ORA
#include <ora_tpcc.h>
#endif

#ifdef _DEBUG
  int debugFlag = 1;
#else
  int debugFlag = 0;
#endif

// Ctpcc_com50
HRESULT Ctpcc_com50::Activate()
{
  HRESULT hr = GetObjectContext(&m_spObjectContext);
  if (SUCCEEDED(hr))
  {
    DEBUGMSG("Object assigned to thread."<<endl);
    return S_OK;
  }
  return hr;
}

BOOL Ctpcc_com50::CanBePooled()
{
  DEBUGMSG("CanBePooled() returning true"<<endl);
  return TRUE;
}

void Ctpcc_com50::Deactivate()
{
  DEBUGMSG("deactivated() releasing object back into
pool"<<endl);
  m_spObjectContext.Release();
}

/*
*********************************************************************
** Name        :  doSetComplete
** Description :
**             Release object back into com pool
** Parameters:
** Returns     :
**             int - return code
** Comments    :
**             Calls SetComplete on the object that the com
**             pool manager returned to the caller(isapi thread)
*********************************************************************
*/
STDMETHODIMP Ctpcc_com50::doSetComplete(void)
{
  // TODO: Add your implementation code here
  HRESULT hres = m_spObjectContext->SetComplete();
  if (SUCCEEDED(hres))
  {
    DEBUGMSG("SetComplete successful. object bit set to release
object into pool."<<endl);
```

```
  }
  else
  {
    DEBUGMSG("SetComplete failed. object bit set to release
object into pool."<<endl);
    ERRORMSG("SetComplete() failed,
code:"<<HRESULT_CODE(hres)<<"
facility:"<<HRESULT_FACILITY(hres)<<"
hres:"<<hex<<hres<<endl);
  }

  return S_OK;
}

/*
******************************************************************
** Name        :  doStockLevel
** Description :
**           Call db2 dll entry point to execute txn
** Parameters:
**           int*    size of UCHAR buffer to pay attention to
**           UCHAR**    char buffer that holds txn wrapper struct
** Returns     :
**           int - return code
** Comments    :
**
******************************************************************
*/
STDMETHODIMP Ctpcc_com50::doStockLevel(INT *size, UCHAR
**buffer)
{
  stok_wrapper * stok;
  stok = (stok_wrapper *) *buffer;

  if(!connectHandleInUse)
  {
    DEBUGMSG("Setting Context handle in use to true"<<endl);
    connectHandleInUse = 1;
  }
  else
  {
    DEBUGMSG("Context handle in use."<<endl);
    ERRORMSG("Context handle in use."<<endl);
    return ERR_HANDLE_IN_USE;
  }

  DEBUGMSG("Calling do_stok call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<stok->in_stok.s_W_ID<<" d_id:"<< stok->in_stok.s_D_ID<<
        " s_transtatus:"<<stok->out_stok.s_transtatus<<endl);

  do_stok(stok,connectHandle);

  DEBUGMSG("Return from do_stok call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<stok->in_stok.s_W_ID<<" d_id:"<< stok->in_stok.s_D_ID<<
        " s_transtatus:"<<stok->out_stok.s_transtatus<<endl);

  DEBUGMSG("Connection handle set to free" <<endl);
  connectHandleInUse = 0;

  return S_OK;
}

/*
******************************************************************
** Name        :  doNewOrder
** Description :
**           Call db2 dll entry point to execute txn
** Parameters:
**           int*    size of UCHAR buffer to pay attention to
**           UCHAR**    char buffer that holds txn wrapper struct
** Returns     :
**           int - return code
** Comments    :
**
******************************************************************
*/
STDMETHODIMP Ctpcc_com50::doNewOrder(INT* size, UCHAR**
buffer)
{
  nord_wrapper *nord;
  nord = (nord_wrapper *) *buffer;

  if(!connectHandleInUse)
  {
    DEBUGMSG("Setting Context handle in use to true"<<endl);
    connectHandleInUse = 1;
  }
  else
  {
    DEBUGMSG("Context handle in use."<<endl);
    ERRORMSG("Context handle in use."<<endl);
    return ERR_HANDLE_IN_USE;
  }

  DEBUGMSG("Calling do_nord call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<nord->in_nord.s_W_ID<<" d_id:"<< nord-
>in_nord.s_D_ID<<
        " s_transtatus:"<<nord->out_nord.s_transtatus<<endl);

  do_nord(nord,connectHandle);


  DEBUGMSG("Return from do_nord call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<nord->in_nord.s_W_ID<<" d_id:"<< nord-
>in_nord.s_D_ID<<
        " s_transtatus:"<<nord->out_nord.s_transtatus<<endl);

  DEBUGMSG("Connection handle set to free" <<endl);
  connectHandleInUse = 0;

  return S_OK;
}

/*
******************************************************************
** Name        :  doPayment
** Description :
**           Call db2 dll entry point to execute txn
** Parameters:
**           int*    size of UCHAR buffer to pay attention to
**           UCHAR**    char buffer that holds txn wrapper struct
** Returns     :
**           int - return code
** Comments    :
**
******************************************************************
*/
STDMETHODIMP Ctpcc_com50::doPayment(INT* size, UCHAR**
buffer)
{
  paym_wrapper  *pymt;
  pymt = (paym_wrapper *) *buffer;

  if(!connectHandleInUse)
  {
    DEBUGMSG("Setting Context handle in use to true"<<endl);
    connectHandleInUse = 1;
  }
  else
  {
```

```
    DEBUGMSG("Context handle in use."<<endl);
    ERRORMSG("Context handle in use."<<endl);
    return ERR_HANDLE_IN_USE;
  }


  DEBUGMSG("Calling do_pymt call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<pymt->in_paym.s_W_ID<<" d_id:"<< pymt-
>in_paym.s_D_ID<<
        " s_transtatus:"<<pymt->out_paym.s_transtatus<<endl);

  do_pymt(pymt,connectHandle);

  DEBUGMSG("Return from do_pymt call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<pymt->in_paym.s_W_ID<<" d_id:"<< pymt-
>in_paym.s_D_ID<<
        " s_transtatus:"<<pymt->out_paym.s_transtatus<<endl);

  DEBUGMSG("Connection handle set to free" <<endl);
  connectHandleInUse = 0;

  return S_OK;
}

/*
**********************************************************************
** Name        :  doOrderStatus
** Description :
**            Call db2 dll entry point to execute txn
** Parameters:
**            int*    size of UCHAR buffer to pay attention to
**            UCHAR**    char buffer that holds txn wrapper struct
** Returns     :
**            int - return code
** Comments    :
**
**********************************************************************
*/

STDMETHODIMP Ctpcc_com50::doOrderStatus(INT* size,
UCHAR** buffer)
{
  ords_wrapper *ords;
  ords = (ords_wrapper *) *buffer;

  if(!connectHandleInUse)
  {
    DEBUGMSG("Setting Context handle in use to true"<<endl);
    connectHandleInUse = 1;
  }
  else
  {
    DEBUGMSG("Context handle in use."<<endl);
    ERRORMSG("Context handle in use."<<endl);
    return ERR_HANDLE_IN_USE;
  }


  DEBUGMSG("Calling do_ords call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<ords->in_ords.s_W_ID<<" d_id:"<< ords-
>in_ords.s_D_ID<<
        " s_transtatus:"<<ords->out_ords.s_transtatus<<endl);

  do_ords(ords,connectHandle);

  DEBUGMSG("Return from do_ords call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<ords->in_ords.s_W_ID<<" d_id:"<< ords-
>in_ords.s_D_ID<<
        " s_transtatus:"<<ords->out_ords.s_transtatus<<endl);

  DEBUGMSG("Connection handle set to free" <<endl);
  connectHandleInUse = 0;

  return S_OK;
}

/*
**********************************************************************
** Name        :  doDBInfo
** Description :
**            Function to test com interface
** Parameters:
** Returns     :
**            int - return code
** Comments    :
**
**********************************************************************
*/

STDMETHODIMP Ctpcc_com50::doDBInfo(void)
{
  //DUMMY FUNCTION TO ALLOW ISAPI TO CALL COM
FUNCTION DURING LOGIN SO CONNECTIONS
  //TO DATABASE WILL BE SETUP.....I HOPE.
  DEBUGMSG("Stub function to warm object pool"<<endl);

  return S_OK;
}

/*
**********************************************************************
** Name        :  loadLibrary
** Description :
**            Function loads apprioate db library based on
**            registry setting
** Parameters:
** Returns     :
**            int - return code
** Comments    :
**
**********************************************************************
*/

Ctpcc_com50::loadLibrary()
{
  DEBUGMSG("Entered loadLibrary function"<<endl);
  //check to see if dbInstance is already loaded
  if(!dbInstance)
  {
    DEBUGMSG("Database dll not loaded. Loading dll."<<endl);
    if (nullDB)
    {
      DEBUGMSG("Loading "<<dbType << " nulldb dll." << endl);
      dbInstance =
LoadLibrary("c:\\inetpub\\wwwroot\\tpcc\\nullDB.dll");
      if(dbInstance == NULL)
      {
        DEBUGMSG("Unable to load null db dll,
rc:"<<GetLastError());
        ERRORMSG("Unable to load null db dll,
rc:"<<GetLastError());
        return ERR_NULL_DLL_NOT_LOADED;
      }
      DEBUGMSG(dbType << " nulldb dll loaded"<<endl);
    }
    else if(strcmp(dbType,"DB2") == 0)
    {
      DEBUGMSG("Loading "<<dbType << " dll." << endl);
```

```
        dbInstance =
LoadLibrary("c:\\inetpub\\wwwroot\\tpcc\\tpccDB2glue.dll");
        if(dbInstance == NULL)
        {
          DEBUGMSG("Unable to load library."<<endl);

          ERRORMSG("Unable to load com dll, rc:" << GetLastError()
<< endl);

          return ERR_DB2_DLL_NOT_LOADED;
        }
        DEBUGMSG(dbType<< " dll loaded"<<endl);
      }
      else if( strcmp(dbType,"ORACLE") == 0 )
      {
        DEBUGMSG("Loading "<<dbType << " dll." << endl);

        dbInstance =
LoadLibrary("c:\\inetpub\\wwwroot\\tpcc\\tpccOracleglue.dll");
        if(dbInstance == NULL)
        {
          DEBUGMSG("Unable to load oracle dll"<<endl);
          ERRORMSG("Unable to load oracle dll,
rc:"<<GetLastError()<<endl);
          return ERR_ORACLE_DLL_NOT_LOADED;
        }
        DEBUGMSG(dbType<< " dll loaded"<<endl);
      }
      else
      {
        DEBUGMSG("Unknown database type dll:"<<dbType<<endl);
        ERRORMSG("Unknown database type dll:"<<dbType<<endl);
        return ERR_UNKNOWN_DB;
      }

      //retrieve function addresses from instance loaded.
      DEBUGMSG("Getting do_connection function address from
"<<dbType<<" dll"<<endl);
      if( (do_connection =
(CONNECT_PTR)GetProcAddress(dbInstance,"connect_db")) ==
NULL )
        return ERR_CONNECT_ADDRESS_NOT_FOUND;
      DEBUGMSG("do_connection
address:"<<DEBUGADDRESS(do_connection)<<endl);

      DEBUGMSG("Getting do_disconnect function address from
"<<dbType<<" dll"<<endl);
      if( (do_disconnect =
(DISCONNECT_PTR)GetProcAddress(dbInstance,"disconnect_db")
) == NULL )
        return ERR_DISCONNECT_ADDRESS_NOT_FOUND;
      DEBUGMSG("do_disconnect
address:"<<DEBUGADDRESS(do_disconnect)<<endl);

      DEBUGMSG("Getting do_nord function address from
"<<dbType<<" dll"<<endl);
      if( (do_nord = (NORD_PTR)
GetProcAddress(dbInstance,"do_nord")) == NULL)
        return ERR_NORD_ADDRESS_NOT_FOUND;
      DEBUGMSG("do_nord function
address:"<<DEBUGADDRESS(do_nord)<<endl);

      DEBUGMSG("Getting do_pymt function address from
"<<dbType<<" dll"<<endl);
      if( (do_pymt = (PYMT_PTR)
GetProcAddress(dbInstance,"do_pymt")) == NULL)
        return ERR_PYMT_ADDRESS_NOT_FOUND;
      DEBUGMSG("do_pymt function
adddress:"<<DEBUGADDRESS(do_pymt)<<endl);

      DEBUGMSG("Getting do_ords function address from
"<<dbType<<" dll"<<endl);
      if( (do_ords = (ORDS_PTR)
GetProcAddress(dbInstance,"do_ords")) == NULL)
        return ERR_ORDS_ADDRESS_NOT_FOUND;
      DEBUGMSG("do_ords function
address:"<<DEBUGADDRESS(do_ords)<<endl);

      DEBUGMSG("Getting do_stok function address from
"<<dbType<<" dll"<<endl);
      if( (do_stok = (STOK_PTR)
GetProcAddress(dbInstance,"do_stok")) == NULL)
        return ERR_STOK_ADDRESS_NOT_FOUND;
      DEBUGMSG("do_stok function
address:"<<DEBUGADDRESS(do_stok)<<endl);

      DEBUGMSG("All function addresses retrieved
successfully."<<endl);

    }
    return OK;
}

/*
*********************************************************************
** Name         :  readRegistry()
** Description :
**             Function reads registry value
** Parameters:
** Returns      :
**             int - return code
** Comments     :
**             Values retrieved from registery
**             dbName, dbUserName, and dbUserPassword
*********************************************************************
*/

Ctpcc_com50::readRegistery()
{
    //open registery key
    HKEY   registeryKey;
    DWORD  regType;
    char   value[MAX_STRING_LEN];
    DWORD  regValue;
    DWORD  regValueSize = MAX_STRING_LEN;

    DEBUGMSG("Entered readRegistery(), opening key:"<<
REGISTERY_SUB_KEY <<endl);
    //open up registery key
    if(RegOpenKeyEx(HKEY_LOCAL_MACHINE,REGISTERY_SUB_
KEY,0,KEY_READ,&registeryKey) == ERROR_SUCCESS)
    {
      DEBUGMSG(REGISTERY_SUB_KEY<<" open, getting
database type from key"<<endl);
      regValueSize = sizeof(value);
      if
(RegQueryValueEx(registeryKey,DB_TYPE,0,&regType,(BYTE *)
&value,&regValueSize)== ERROR_SUCCESS )
        strcpy(dbType,value);
      DEBUGMSG("Database type:"<<dbType<<" from registery
key."<<endl);

      DEBUGMSG("Getting database name from registery
key."<<endl);
      regValueSize = sizeof(value);
      if
(RegQueryValueEx(registeryKey,DB_NAME,0,&regType,(BYTE *)
&value,&regValueSize)== ERROR_SUCCESS )
        strcpy(dbName,value);
      DEBUGMSG("Database name:"<<dbName<<endl);

      DEBUGMSG("Getting null database flag from key."<<endl);
      regValueSize = sizeof(regValue);
```

```
    if(RegQueryValueEx(registeryKey,NULL_DB,0,&regType,(BYTE
*)&regValue,&regValueSize) == ERROR_SUCCESS)
        nullDB = regValue;
    DEBUGMSG("Null database flag:"<<nullDB<<endl);

    return OK;
  }

  DEBUGMSG("Error, unable to open registery key."<<endl);
  return ERR_UNABLE_TO_OPEN_REG;
}

/*
********************************************************************
** Name        :  connectDB
** Description :
**             Function connects to the db
** Parameters:
** Returns     :
**             int - return code
** Comments    :
**
********************************************************************
*/
Ctpcc_com50::connectDB()
{
  DEBUGMSG("Entered connectDB(), checking if object is
connected."<<endl);
  if(!connected)
  {
    DEBUGMSG("Object not connected, calling do_connection with
dbName:"<<dbName<<" connectHandle:"<<
          DEBUGADDRESS(connectHandle)<<endl);
    if(!connectHandleInUse)
    {
      DEBUGMSG("Setting Context handle in use to true"<<endl);
      connectHandleInUse = 1;
      connected = do_connection(dbName,&connectHandle);
      if(connected != OK)
      {
        DEBUGMSG("Object do_connect failed,
rc:"<<connected<<endl);
        ERRORMSG("Object do_connect failed,
rc:"<<connected<<endl);
        return connected;
      }
      DEBUGMSG("Object connection complete,
connectHandle:"<<DEBUGADDRESS(connectHandle)<<endl);
      connectHandleInUse = 0;
      return OK;
    }
    else
    {
      DEBUGMSG("Object's connectHandle already in use, connect
failed"<<endl);
      ERRORMSG("Object's connectHandle already in use, connect
failed"<<endl);
      return ERR_HANDLE_IN_USE;
    }
  }
  DEBUGMSG("Object already has connection
established."<<endl);
  return OK;
}
```

tpccCom50/tpccCom50.cpp

```
// tpccCom50.cpp : Implementation of DLL Exports.
//
// Note: COM+ 1.0 Information:
//      Please remember to run Microsoft Transaction Explorer to
install the component(s).
//      Registration is not done by default.

#include "stdafx.h"
#include "resource.h"
#include "tpccCom50.h"
#include "dlldatax.h"

class CtpccCom50Module : public CAtlDllModuleT<
CtpccCom50Module >
{
public :
  DECLARE_LIBID(LIBID_tpccCom50Lib)
  DECLARE_REGISTRY_APPID_RESOURCEID(IDR_TPCCCOM5
0, "{C5FF7862-C99E-4A03-828C-2513A1B8A90D}")
};

CtpccCom50Module _AtlModule;


// DLL Entry Point
extern "C" BOOL WINAPI DllMain(HINSTANCE hInstance, DWORD
dwReason, LPVOID lpReserved)
{
#ifdef _MERGE_PROXYSTUB
    if (!PrxDllMain(hInstance, dwReason, lpReserved))
        return FALSE;
#endif
  hInstance;
    return _AtlModule.DllMain(dwReason, lpReserved);
}


// Used to determine whether the DLL can be unloaded by OLE
STDAPI DllCanUnloadNow(void)
{
#ifdef _MERGE_PROXYSTUB
    HRESULT hr = PrxDllCanUnloadNow();
    if (FAILED(hr))
        return hr;
#endif
    return _AtlModule.DllCanUnloadNow();
}


// Returns a class factory to create an object of the requested type
STDAPI DllGetClassObject(REFCLSID rclsid, REFIID riid, LPVOID*
ppv)
{
#ifdef _MERGE_PROXYSTUB
    if (PrxDllGetClassObject(rclsid, riid, ppv) == S_OK)
        return S_OK;
#endif
    return _AtlModule.DllGetClassObject(rclsid, riid, ppv);
}


// DllRegisterServer - Adds entries to the system registry
STDAPI DllRegisterServer(void)
{
    // registers object, typelib and all interfaces in typelib
    HRESULT hr = _AtlModule.DllRegisterServer();
#ifdef _MERGE_PROXYSTUB
    if (FAILED(hr))
        return hr;
    hr = PrxDllRegisterServer();
#endif
  return hr;
}
```

```
// DllUnregisterServer - Removes entries from the system registry
STDAPI DllUnregisterServer(void)
{
  HRESULT hr = _AtlModule.DllUnregisterServer();
#ifdef _MERGE_PROXYSTUB
   if (FAILED(hr))
      return hr;
   hr = PrxDllRegisterServer();
   if (FAILED(hr))
      return hr;
   hr = PrxDllUnregisterServer();
#endif
  return hr;
}
```

tpccCom50/tpccCom50.def

```
; tpccCom50.def : Declares the module parameters.

LIBRARY      "tpccCom50.DLL"

EXPORTS
  DllCanUnloadNow      PRIVATE
  DllGetClassObject   PRIVATE
  DllRegisterServer PRIVATE
  DllUnregisterServer PRIVATE
```

tpccCom50/tpcc_com50.h

```
// tpcc_com50.h : Declaration of the Ctpcc_com50

#pragma once
#include "tpccCom50.h"
#include "resource.h"// main symbols
#include <comsvcs.h>

#include "..\tpccIsapi\tpcc.h"
#ifdef ORACLE
#define ORA_NT
#include <stdio.h>
#include <time.h>
#include <ora_tpcc.h>
#include <plora.h>
#endif
#define NULL_DB         "nullDB"

static HINSTANCE dbInstance         = NULL;

static CRITICAL_SECTION debugMutex;
static CRITICAL_SECTION errorMutex;

static int comServerID          =   0;
static ofstream debugStream;
static ofstream errorStream;
static int debugFileOpen       = 0;
static int errorFileOpen        = 0;
static int nullDB              = 0;
static char dbType[32];
static char dbName[32];

typedef INT (*NORD_PTR)(nord_wrapper *nord,void
*connectHandle);
typedef INT (*PYMT_PTR)(paym_wrapper *pymt,void
*connectHandle);
typedef INT (*ORDS_PTR)(ords_wrapper *ords,void
*connectHandle);
typedef INT (*STOK_PTR)(stok_wrapper *stok,void
*connectHandle);
typedef INT (*CONNECT_PTR)(char *dbName,void
**connectHandle);
typedef INT (*DISCONNECT_PTR)(void *connectHandle);
NORD_PTR   do_nord;
PYMT_PTR do_pymt;
ORDS_PTR   do_ords;
STOK_PTR do_stok;
CONNECT_PTR  do_connection;
DISCONNECT_PTR do_disconnect;

// Ctpcc_com50
class ATL_NO_VTABLE Ctpcc_com50 :
   public CComObjectRootEx<CComMultiThreadModel>,
   public IObjectControl,
   public CComCoClass<Ctpcc_com50, &CLSID_tpcc_com50>,
   public Itpcc_com50
{
public:
   Ctpcc_com50()
   {
      int rc           = ERR;
      connected        = 0;
      connectHandleInUse  = 0;

      if(debugFlag)
      {
         if(!debugFileOpen)
         {
            InitializeCriticalSection(&debugMutex);
            //open comLog
            char comLogFile[128];

   sprintf(comLogFile,"C:\\Inetpub\\wwwroot\\tpcc\\comLog_debug.txt
");
            debugStream.rdbuf( )->open(comLogFile,ios_base::in |
ios_base::out | ios_base::app);

            debugFileOpen = 1;
         }
      }

      //open error log file
      if(!errorFileOpen)
      {
         InitializeCriticalSection(&errorMutex);

         char errorLogFile[128];

   sprintf(errorLogFile,"C:\\Inetpub\\wwwroot\\tpcc\\comLog_err.txt");

         errorStream.rdbuf( )->open(errorLogFile,ios_base::in |
ios_base::out | ios_base::app);

         errorFileOpen=1;
      }

      //get registry values
      if((rc = readRegistery()) != OK)
      {
         ERRORMSG("Unable to open registery key " <<
REGISTERY_SUB_KEY << " rc:" << rc <<endl);
         return;
      }

      DEBUGMSG("nullDB:" <<nullDB<<" dbType:"<<dbType<<"
dbName:"<<dbName<<endl);

      //load library based on registry
      if( (rc = loadLibrary()) != OK)
      {
         ERRORMSG("load library failure rc:" << rc << endl);
         return;
      }
```

```
    DEBUGMSG("dbtype:"<<dbType<<" instance:" <<
DEBUGADDRESS(dbInstance) << " loaded." << endl);

    //connect to db
    EnterCriticalSection(&errorMutex);
    if((rc = connectDB()) != OK)
    {
      ERRORMSG("unable to connect to db "<<dbName<<"
rc :"<<rc <<endl);
      LeaveCriticalSection(&errorMutex);
      return;
    }
    LeaveCriticalSection(&errorMutex);

    DEBUGMSG("connected to db " <<dbName<< " rc:"<< rc << "
context:" <<DEBUGADDRESS(connectHandle) << endl);
  }

  DECLARE_PROTECT_FINAL_CONSTRUCT()

  HRESULT FinalConstruct()
  {
    return S_OK;
  }

  void FinalRelease()
  {
  }

DECLARE_REGISTRY_RESOURCEID(IDR_TPCC_COM50)

BEGIN_COM_MAP(Ctpcc_com50)
  COM_INTERFACE_ENTRY(Itpcc_com50)
  COM_INTERFACE_ENTRY(IObjectControl)
END_COM_MAP()

// IObjectControl
public:
  STDMETHOD(Activate)();
  STDMETHOD_(BOOL, CanBePooled)();
  STDMETHOD_(void, Deactivate)();
  CComPtr<IObjectContext> m_spObjectContext;

// Itpcc_com50
public:
  STDMETHOD(doStockLevel)(INT *size, UCHAR **buffer);
  STDMETHOD(doNewOrder)(INT* size, UCHAR** buffer);
  STDMETHOD(doPayment)(INT* size, UCHAR** buffer);
  STDMETHOD(doOrderStatus)(INT* size, UCHAR** buffer);
  STDMETHOD(doDBInfo)(void);
  STDMETHOD(doSetComplete)(void);

  int connected;
  int connectHandleInUse;

private:
  //db2 specific context
  void *connectHandle;
  int loadLibrary();
  int readRegistery();
  int connectDB();


};

OBJECT_ENTRY_AUTO(__uuidof(tpcc_com50), Ctpcc_com50)
```

tpccCom50/tpccCom50.h

```
/* this ALWAYS GENERATED file contains the definitions for the
interfaces */


 /* File created by MIDL compiler version 6.00.0361 */
/* at Sat May 08 22:55:51 2004
 */
/* Compiler settings for .\tpccCom50.idl:
    Oicf, W1, Zp8, env=Win32 (32b run)
    protocol : dce , ms_ext, c_ext, robust
    error checks: allocation ref bounds_check enum stub_data
    VC __declspec() decoration level:
         __declspec(uuid()), __declspec(selectany),
__declspec(novtable)
         DECLSPEC_UUID(), MIDL_INTERFACE()
*/
//@@MIDL_FILE_HEADING(  )

#pragma warning( disable: 4049 )  /* more than 64k source lines */


/* verify that the <rpcndr.h> version is high enough to compile this
file*/
#ifndef __REQUIRED_RPCNDR_H_VERSION__
#define __REQUIRED_RPCNDR_H_VERSION__ 475
#endif

#include "rpc.h"
#include "rpcndr.h"

#ifndef __RPCNDR_H_VERSION__
#error this stub requires an updated version of <rpcndr.h>
#endif // __RPCNDR_H_VERSION__

#ifndef COM_NO_WINDOWS_H
#include "windows.h"
#include "ole2.h"
#endif /*COM_NO_WINDOWS_H*/

#ifndef __tpccCom50_h__
#define __tpccCom50_h__

#if defined(_MSC_VER) && (_MSC_VER >= 1020)
#pragma once
#endif

/* Forward Declarations */

#ifndef __Itpcc_com50_FWD_DEFINED__
#define __Itpcc_com50_FWD_DEFINED__
typedef interface Itpcc_com50 Itpcc_com50;
#endif   /* __Itpcc_com50_FWD_DEFINED__ */


#ifndef __tpcc_com50_FWD_DEFINED__
#define __tpcc_com50_FWD_DEFINED__

#ifdef __cplusplus
typedef class tpcc_com50 tpcc_com50;
#else
typedef struct tpcc_com50 tpcc_com50;
#endif /* __cplusplus */

#endif   /* __tpcc_com50_FWD_DEFINED__ */


/* header files for imported files */
#include "oaidl.h"
#include "ocidl.h"

#ifdef __cplusplus
extern "C"{
```

```
#endif

void * __RPC_USER MIDL_user_allocate(size_t);
void __RPC_USER MIDL_user_free( void * );

#ifndef __Itpcc_com50_INTERFACE_DEFINED__
#define __Itpcc_com50_INTERFACE_DEFINED__

/* interface Itpcc_com50 */
/* [unique][helpstring][uuid][object] */


EXTERN_C const IID IID_Itpcc_com50;

#if defined(__cplusplus) && !defined(CINTERFACE)

   MIDL_INTERFACE("DBA619F6-1BDE-4E34-800E-
3723C4BA95C1")
   Itpcc_com50 : public IUnknown
   {
   public:
      virtual /* [helpstring] */ HRESULT STDMETHODCALLTYPE
doStockLevel(
         /* [in] */ INT *size,
         /* [size_is][size_is][out][in] */ UCHAR **buffer) = 0;

      virtual /* [helpstring] */ HRESULT STDMETHODCALLTYPE
doNewOrder(
         /* [in] */ INT *size,
         /* [size_is][size_is][out][in] */ UCHAR **buffer) = 0;

      virtual /* [helpstring] */ HRESULT STDMETHODCALLTYPE
doPayment(
         /* [in] */ INT *size,
         /* [size_is][size_is][out][in] */ UCHAR **buffer) = 0;

      virtual /* [helpstring] */ HRESULT STDMETHODCALLTYPE
doOrderStatus(
         /* [in] */ INT *size,
         /* [size_is][size_is][out][in] */ UCHAR **buffer) = 0;

      virtual /* [helpstring] */ HRESULT STDMETHODCALLTYPE
doDBInfo( void) = 0;

      virtual /* [helpstring] */ HRESULT STDMETHODCALLTYPE
doSetComplete( void) = 0;

   };

#else /* C style interface */

   typedef struct Itpcc_com50Vtbl
   {
      BEGIN_INTERFACE

      HRESULT ( STDMETHODCALLTYPE *QueryInterface )(
         Itpcc_com50 * This,
         /* [in] */ REFIID riid,
         /* [iid_is][out] */ void **ppvObject);

      ULONG ( STDMETHODCALLTYPE *AddRef )(
         Itpcc_com50 * This);

      ULONG ( STDMETHODCALLTYPE *Release )(
         Itpcc_com50 * This);

      /* [helpstring] */ HRESULT ( STDMETHODCALLTYPE
*doStockLevel )(
         Itpcc_com50 * This,
         /* [in] */ INT *size,
         /* [size_is][size_is][out][in] */ UCHAR **buffer);

      /* [helpstring] */ HRESULT ( STDMETHODCALLTYPE
*doNewOrder )(
         Itpcc_com50 * This,
         /* [in] */ INT *size,
         /* [size_is][size_is][out][in] */ UCHAR **buffer);

      /* [helpstring] */ HRESULT ( STDMETHODCALLTYPE
*doPayment )(
         Itpcc_com50 * This,
         /* [in] */ INT *size,
         /* [size_is][size_is][out][in] */ UCHAR **buffer);

      /* [helpstring] */ HRESULT ( STDMETHODCALLTYPE
*doOrderStatus )(
         Itpcc_com50 * This,
         /* [in] */ INT *size,
         /* [size_is][size_is][out][in] */ UCHAR **buffer);

      /* [helpstring] */ HRESULT ( STDMETHODCALLTYPE
*doDBInfo )(
         Itpcc_com50 * This);

      /* [helpstring] */ HRESULT ( STDMETHODCALLTYPE
*doSetComplete )(
         Itpcc_com50 * This);

      END_INTERFACE
   } Itpcc_com50Vtbl;

   interface Itpcc_com50
   {
      CONST_VTBL struct Itpcc_com50Vtbl *lpVtbl;
   };



#ifdef COBJMACROS


#define Itpcc_com50_QueryInterface(This,riid,ppvObject)   \
   (This)->lpVtbl -> QueryInterface(This,riid,ppvObject)

#define Itpcc_com50_AddRef(This)  \
   (This)->lpVtbl -> AddRef(This)

#define Itpcc_com50_Release(This) \
   (This)->lpVtbl -> Release(This)


#define Itpcc_com50_doStockLevel(This,size,buffer) \
   (This)->lpVtbl -> doStockLevel(This,size,buffer)

#define Itpcc_com50_doNewOrder(This,size,buffer)  \
   (This)->lpVtbl -> doNewOrder(This,size,buffer)

#define Itpcc_com50_doPayment(This,size,buffer) \
   (This)->lpVtbl -> doPayment(This,size,buffer)

#define Itpcc_com50_doOrderStatus(This,size,buffer)  \
   (This)->lpVtbl -> doOrderStatus(This,size,buffer)

#define Itpcc_com50_doDBInfo(This)  \
   (This)->lpVtbl -> doDBInfo(This)

#define Itpcc_com50_doSetComplete(This)  \
   (This)->lpVtbl -> doSetComplete(This)

#endif /* COBJMACROS */


#endif   /* C style interface */
```

```
/* [helpstring] */ HRESULT STDMETHODCALLTYPE
Itpcc_com50_doStockLevel_Proxy(
    Itpcc_com50 * This,
    /* [in] */ INT *size,
    /* [size_is][size_is][out][in] */ UCHAR **buffer);


void __RPC_STUB Itpcc_com50_doStockLevel_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring] */ HRESULT STDMETHODCALLTYPE
Itpcc_com50_doNewOrder_Proxy(
    Itpcc_com50 * This,
    /* [in] */ INT *size,
    /* [size_is][size_is][out][in] */ UCHAR **buffer);


void __RPC_STUB Itpcc_com50_doNewOrder_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring] */ HRESULT STDMETHODCALLTYPE
Itpcc_com50_doPayment_Proxy(
    Itpcc_com50 * This,
    /* [in] */ INT *size,
    /* [size_is][size_is][out][in] */ UCHAR **buffer);


void __RPC_STUB Itpcc_com50_doPayment_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring] */ HRESULT STDMETHODCALLTYPE
Itpcc_com50_doOrderStatus_Proxy(
    Itpcc_com50 * This,
    /* [in] */ INT *size,
    /* [size_is][size_is][out][in] */ UCHAR **buffer);


void __RPC_STUB Itpcc_com50_doOrderStatus_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring] */ HRESULT STDMETHODCALLTYPE
Itpcc_com50_doDBInfo_Proxy(
    Itpcc_com50 * This);


void __RPC_STUB Itpcc_com50_doDBInfo_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);


/* [helpstring] */ HRESULT STDMETHODCALLTYPE
Itpcc_com50_doSetComplete_Proxy(
    Itpcc_com50 * This);


void __RPC_STUB Itpcc_com50_doSetComplete_Stub(
    IRpcStubBuffer *This,
    IRpcChannelBuffer *_pRpcChannelBuffer,
    PRPC_MESSAGE _pRpcMessage,
    DWORD *_pdwStubPhase);



#endif   /* __Itpcc_com50_INTERFACE_DEFINED__ */



#ifndef __tpccCom50Lib_LIBRARY_DEFINED__
#define __tpccCom50Lib_LIBRARY_DEFINED__

/* library tpccCom50Lib */
/* [helpstring][version][uuid] */


EXTERN_C const IID LIBID_tpccCom50Lib;

EXTERN_C const CLSID CLSID_tpcc_com50;

#ifdef __cplusplus

class DECLSPEC_UUID("76F680E9-0C71-4AF3-B9F1-
6B0A3AC4E1B8")
tpcc_com50;
#endif
#endif /* __tpccCom50Lib_LIBRARY_DEFINED__ */

/* Additional Prototypes for ALL interfaces */

/* end of Additional Prototypes */

#ifdef __cplusplus
}
#endif

#endif
```

tpccCom50/tpccCom50_i.c

```
/* this ALWAYS GENERATED file contains the IIDs and CLSIDs */

/* link this file in with the server and any clients */


 /* File created by MIDL compiler version 6.00.0361 */
/* at Sat May 08 22:55:51 2004
 */
/* Compiler settings for .\tpccCom50.idl:
    Oicf, W1, Zp8, env=Win32 (32b run)
    protocol : dce , ms_ext, c_ext, robust
    error checks: allocation ref bounds_check enum stub_data
    VC __declspec() decoration level:
         __declspec(uuid()), __declspec(selectany),
__declspec(novtable)
         DECLSPEC_UUID(), MIDL_INTERFACE()
*/
//@@MIDL_FILE_HEADING(  )

#if !defined(_M_IA64) && !defined(_M_AMD64)
```

```
#pragma warning( disable: 4049 )  /* more than 64k source lines */


#ifdef __cplusplus
extern "C"{
#endif


#include <rpc.h>
#include <rpcndr.h>

#ifdef _MIDL_USE_GUIDDEF_

#ifndef INITGUID
#define INITGUID
#include <guiddef.h>
#undef INITGUID
#else
#include <guiddef.h>
#endif

#define
MIDL_DEFINE_GUID(type,name,l,w1,w2,b1,b2,b3,b4,b5,b6,b7,b8) \
        DEFINE_GUID(name,l,w1,w2,b1,b2,b3,b4,b5,b6,b7,b8)

#else // !_MIDL_USE_GUIDDEF_

#ifndef __IID_DEFINED__
#define __IID_DEFINED__

typedef struct _IID
{
    unsigned long x;
    unsigned short s1;
    unsigned short s2;
    unsigned char  c[8];
} IID;

#endif // __IID_DEFINED__

#ifndef CLSID_DEFINED
#define CLSID_DEFINED
typedef IID CLSID;
#endif // CLSID_DEFINED

#define
MIDL_DEFINE_GUID(type,name,l,w1,w2,b1,b2,b3,b4,b5,b6,b7,b8) \
        const type name = {l,w1,w2,{b1,b2,b3,b4,b5,b6,b7,b8}}

#endif !_MIDL_USE_GUIDDEF_

MIDL_DEFINE_GUID(IID,
IID_Itpcc_com50,0xDBA619F6,0x1BDE,0x4E34,0x80,0x0E,0x37,0x
23,0xC4,0xBA,0x95,0xC1);


MIDL_DEFINE_GUID(IID,
LIBID_tpccCom50Lib,0x7BD99942,0x8C52,0x4AEE,0x9B,0x82,0xB
E,0xCC,0x2C,0x7B,0x12,0x07);


MIDL_DEFINE_GUID(CLSID,
CLSID_tpcc_com50,0x76F680E9,0x0C71,0x4AF3,0xB9,0xF1,0x6B,
0x0A,0x3A,0xC4,0xE1,0xB8);

#undef MIDL_DEFINE_GUID

#ifdef __cplusplus
}
#endif
```

```
#endif /* !defined(_M_IA64) && !defined(_M_AMD64)*/
```

tpccCom50/tpccCom50.idl

```
// tpccCom50.idl : IDL source for tpccCom50
//

// This file will be processed by the MIDL tool to
// produce the type library (tpccCom50.tlb) and marshalling code.

import "oaidl.idl";
import "ocidl.idl";

[
   object,
   uuid(DBA619F6-1BDE-4E34-800E-3723C4BA95C1),
// oleautomation,
// nonextensible,
   helpstring("Itpcc_com50 Interface"),
   pointer_default(unique)
]
interface Itpcc_com50 : IUnknown{
   [helpstring("method doStockLevel")] HRESULT doStockLevel([in]
INT *size, [in,out, size_is(,*size)] UCHAR **buffer);
   [helpstring("method doNewOrder")] HRESULT doNewOrder([in]
INT* size, [in,out,size_is(,*size)] UCHAR** buffer);
   [helpstring("method doPayment")] HRESULT doPayment([in] INT*
size, [in,out,size_is(,*size)] UCHAR** buffer);
   [helpstring("method doOrderStatus")] HRESULT
doOrderStatus([in] INT* size, [in,out,size_is(,*size)] UCHAR**
buffer);
   [helpstring("method doDBInfo")] HRESULT doDBInfo(void);
   [helpstring("method doSetComplete")] HRESULT
doSetComplete(void);
};
[
   uuid(7BD99942-8C52-4AEE-9B82-BECC2C7B1207),
   version(1.0),
   helpstring("tpccCom50 1.0 Type Library")
]
library tpccCom50Lib
{
   importlib("stdole2.tlb");
   [
      uuid(76F680E9-0C71-4AF3-B9F1-6B0A3AC4E1B8),
      helpstring("tpcc_com50 Class")
   ]
   coclass tpcc_com50
   {
      [default] interface Itpcc_com50;
   };
};
```

tpccCom50/tpccCom50_p.c

```
/* this ALWAYS GENERATED file contains the proxy stub code */


 /* File created by MIDL compiler version 6.00.0361 */
/* at Sat May 08 22:55:51 2004
 */
/* Compiler settings for .\tpccCom50.idl:
    Oicf, W1, Zp8, env=Win32 (32b run)
    protocol : dce , ms_ext, c_ext, robust
    error checks: allocation ref bounds_check enum stub_data
    VC __declspec() decoration level:
         __declspec(uuid()), __declspec(selectany),
__declspec(novtable)
```

```
       DECLSPEC_UUID(), MIDL_INTERFACE()
*/
//@@MIDL_FILE_HEADING(  )

#if !defined(_M_IA64) && !defined(_M_AMD64)


#pragma warning( disable: 4049 )  /* more than 64k source lines */
#if _MSC_VER >= 1200
#pragma warning(push)
#endif
#pragma warning( disable: 4100 ) /* unreferenced arguments in x86
call */
#pragma warning( disable: 4211 )  /* redefine extent to static */
#pragma warning( disable: 4232 )  /* dllimport identity*/
#define USE_STUBLESS_PROXY


/* verify that the <rpcproxy.h> version is high enough to compile this
file*/
#ifndef __REDQ_RPCPROXY_H_VERSION__
#define __REQUIRED_RPCPROXY_H_VERSION__ 475
#endif


#include "rpcproxy.h"
#ifndef __RPCPROXY_H_VERSION__
#error this stub requires an updated version of <rpcproxy.h>
#endif // __RPCPROXY_H_VERSION__


#include "tpccCom50.h"

#define TYPE_FORMAT_STRING_SIZE   27
#define PROC_FORMAT_STRING_SIZE   229
#define TRANSMIT_AS_TABLE_SIZE    0
#define WIRE_MARSHAL_TABLE_SIZE   0

typedef struct _MIDL_TYPE_FORMAT_STRING
    {
    short          Pad;
    unsigned char  Format[ TYPE_FORMAT_STRING_SIZE ];
    } MIDL_TYPE_FORMAT_STRING;

typedef struct _MIDL_PROC_FORMAT_STRING
    {
    short          Pad;
    unsigned char  Format[ PROC_FORMAT_STRING_SIZE ];
    } MIDL_PROC_FORMAT_STRING;


static RPC_SYNTAX_IDENTIFIER  _RpcTransferSyntax =
{{0x8A885D04,0x1CEB,0x11C9,{0x9F,0xE8,0x08,0x00,0x2B,0x10,0
x48,0x60}},{2,0}};


extern const MIDL_TYPE_FORMAT_STRING
__MIDL_TypeFormatString;
extern const MIDL_PROC_FORMAT_STRING
__MIDL_ProcFormatString;


extern const MIDL_STUB_DESC Object_StubDesc;


extern const MIDL_SERVER_INFO Itpcc_com50_ServerInfo;
extern const MIDL_STUBLESS_PROXY_INFO
Itpcc_com50_ProxyInfo;



#if !defined(__RPC_WIN32__)
#error  Invalid build platform for this stub.
#endif

#if !(TARGET_IS_NT50_OR_LATER)
#error You need a Windows 2000 or later to run this stub because it
uses these features:
#error   /robust command line switch.
#error However, your C/C++ compilation flags indicate you intend to
run this app on earlier systems.
#error This app will die there with the
RPC_X_WRONG_STUB_VERSION error.
#endif


static const MIDL_PROC_FORMAT_STRING
__MIDL_ProcFormatString =
    {
        0,
        {

    /* Procedure doStockLevel */

            0x33,    /* FC_AUTO_HANDLE */
            0x6c,    /* Old Flags:  object, Oi2 */
/*  2 */    NdrFcLong( 0x0 ),/* 0 */
/*  6 */    NdrFcShort( 0x3 ),   /* 3 */
/*  8 */    NdrFcShort( 0x10 ), /* x86 Stack size/offset = 16 */
/* 10 */    NdrFcShort( 0x1c ), /* 28 */
/* 12 */    NdrFcShort( 0x8 ),   /* 8 */
/* 14 */    0x47,    /* Oi2 Flags:  srv must size, clt must size, has
return, has ext, */
            0x3,     /* 3 */
/* 16 */    0x8,     /* 8 */
            0x7,     /* Ext Flags:  new corr desc, clt corr check, srv corr
check, */
/* 18 */    NdrFcShort( 0x1 ),   /* 1 */
/* 20 */    NdrFcShort( 0x1 ),   /* 1 */
/* 22 */    NdrFcShort( 0x0 ),   /* 0 */

    /* Parameter size */

/* 24 */    NdrFcShort( 0x148 ),  /* Flags:  in, base type, simple ref, */
/* 26 */    NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 28 */    0x8,     /* FC_LONG */
            0x0,     /* 0 */

    /* Parameter buffer */

/* 30 */    NdrFcShort( 0x201b ),/* Flags:  must size, must free, in, out,
srv alloc size=8 */
/* 32 */    NdrFcShort( 0x8 ),   /* x86 Stack size/offset = 8 */
/* 34 */    NdrFcShort( 0x6 ),   /* Type Offset=6 */

    /* Return value */

/* 36 */    NdrFcShort( 0x70 ), /* Flags:  out, return, base type, */
/* 38 */    NdrFcShort( 0xc ),   /* x86 Stack size/offset = 12 */
/* 40 */    0x8,     /* FC_LONG */
            0x0,     /* 0 */

    /* Procedure doNewOrder */

/* 42 */    0x33,    /* FC_AUTO_HANDLE */
            0x6c,    /* Old Flags:  object, Oi2 */
/* 44 */    NdrFcLong( 0x0 ),/* 0 */
/* 48 */    NdrFcShort( 0x4 ),   /* 4 */
/* 50 */    NdrFcShort( 0x10 ), /* x86 Stack size/offset = 16 */
/* 52 */    NdrFcShort( 0x1c ), /* 28 */
/* 54 */    NdrFcShort( 0x8 ),   /* 8 */
/* 56 */    0x47,    /* Oi2 Flags:  srv must size, clt must size, has
return, has ext, */
            0x3,     /* 3 */
```

```
/* 58 */  0x8,      /* 8 */
        0x7,      /* Ext Flags:  new corr desc, clt corr check, srv corr
check, */
/* 60 */  NdrFcShort( 0x1 ),   /* 1 */
/* 62 */  NdrFcShort( 0x1 ),   /* 1 */
/* 64 */  NdrFcShort( 0x0 ),   /* 0 */

   /* Parameter size */

/* 66 */  NdrFcShort( 0x148 ),  /* Flags:  in, base type, simple ref, */
/* 68 */  NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 70 */  0x8,      /* FC_LONG */
        0x0,      /* 0 */

   /* Parameter buffer */

/* 72 */  NdrFcShort( 0x201b ),/* Flags:  must size, must free, in, out,
srv alloc size=8 */
/* 74 */  NdrFcShort( 0x8 ),   /* x86 Stack size/offset = 8 */
/* 76 */  NdrFcShort( 0x6 ),   /* Type Offset=6 */

   /* Return value */

/* 78 */  NdrFcShort( 0x70 ), /* Flags:  out, return, base type, */
/* 80 */  NdrFcShort( 0xc ),   /* x86 Stack size/offset = 12 */
/* 82 */  0x8,      /* FC_LONG */
        0x0,      /* 0 */

   /* Procedure doPayment */

/* 84 */  0x33,     /* FC_AUTO_HANDLE */
        0x6c,     /* Old Flags:  object, Oi2 */
/* 86 */  NdrFcLong( 0x0 ),/* 0 */
/* 90 */  NdrFcShort( 0x5 ),   /* 5 */
/* 92 */  NdrFcShort( 0x10 ), /* x86 Stack size/offset = 16 */
/* 94 */  NdrFcShort( 0x1c ), /* 28 */
/* 96 */  NdrFcShort( 0x8 ),   /* 8 */
/* 98 */  0x47,     /* Oi2 Flags:  srv must size, clt must size, has
return, has ext, */
        0x3,      /* 3 */
/* 100 */0x8,      /* 8 */
        0x7,      /* Ext Flags:  new corr desc, clt corr check, srv corr
check, */
/* 102 */NdrFcShort( 0x1 ),   /* 1 */
/* 104 */NdrFcShort( 0x1 ),   /* 1 */
/* 106 */NdrFcShort( 0x0 ),   /* 0 */

   /* Parameter size */

/* 108 */NdrFcShort( 0x148 ),  /* Flags:  in, base type, simple ref, */
/* 110 */NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 112 */0x8,      /* FC_LONG */
        0x0,      /* 0 */

   /* Parameter buffer */

/* 114 */NdrFcShort( 0x201b ),/* Flags:  must size, must free, in, out,
srv alloc size=8 */
/* 116 */NdrFcShort( 0x8 ),   /* x86 Stack size/offset = 8 */
/* 118 */NdrFcShort( 0x6 ),   /* Type Offset=6 */

   /* Return value */

/* 120 */NdrFcShort( 0x70 ), /* Flags:  out, return, base type, */
/* 122 */NdrFcShort( 0xc ),   /* x86 Stack size/offset = 12 */
/* 124 */0x8,      /* FC_LONG */
        0x0,      /* 0 */

   /* Procedure doOrderStatus */

/* 126 */0x33,     /* FC_AUTO_HANDLE */
        0x6c,     /* Old Flags:  object, Oi2 */
/* 128 */NdrFcLong( 0x0 ),/* 0 */
/* 132 */NdrFcShort( 0x6 ),   /* 6 */
/* 134 */NdrFcShort( 0x10 ), /* x86 Stack size/offset = 16 */
/* 136 */NdrFcShort( 0x1c ), /* 28 */
/* 138 */NdrFcShort( 0x8 ),   /* 8 */
/* 140 */0x47,     /* Oi2 Flags:  srv must size, clt must size, has
return, has ext, */
        0x3,      /* 3 */
/* 142 */0x8,      /* 8 */
        0x7,      /* Ext Flags:  new corr desc, clt corr check, srv corr
check, */
/* 144 */NdrFcShort( 0x1 ),   /* 1 */
/* 146 */NdrFcShort( 0x1 ),   /* 1 */
/* 148 */NdrFcShort( 0x0 ),   /* 0 */

   /* Parameter size */

/* 150 */NdrFcShort( 0x148 ),  /* Flags:  in, base type, simple ref, */
/* 152 */NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 154 */0x8,      /* FC_LONG */
        0x0,      /* 0 */

   /* Parameter buffer */

/* 156 */NdrFcShort( 0x201b ),/* Flags:  must size, must free, in, out,
srv alloc size=8 */
/* 158 */NdrFcShort( 0x8 ),   /* x86 Stack size/offset = 8 */
/* 160 */NdrFcShort( 0x6 ),   /* Type Offset=6 */

   /* Return value */

/* 162 */NdrFcShort( 0x70 ), /* Flags:  out, return, base type, */
/* 164 */NdrFcShort( 0xc ),   /* x86 Stack size/offset = 12 */
/* 166 */0x8,      /* FC_LONG */
        0x0,      /* 0 */

   /* Procedure doDBInfo */

/* 168 */0x33,     /* FC_AUTO_HANDLE */
        0x6c,     /* Old Flags:  object, Oi2 */
/* 170 */NdrFcLong( 0x0 ),/* 0 */
/* 174 */NdrFcShort( 0x7 ),   /* 7 */
/* 176 */NdrFcShort( 0x8 ),   /* x86 Stack size/offset = 8 */
/* 178 */NdrFcShort( 0x0 ),   /* 0 */
/* 180 */NdrFcShort( 0x8 ),   /* 8 */
/* 182 */0x44,     /* Oi2 Flags:  has return, has ext, */
        0x1,      /* 1 */
/* 184 */0x8,      /* 8 */
        0x1,      /* Ext Flags:  new corr desc, */
/* 186 */NdrFcShort( 0x0 ),   /* 0 */
/* 188 */NdrFcShort( 0x0 ),   /* 0 */
/* 190 */NdrFcShort( 0x0 ),   /* 0 */

   /* Return value */

/* 192 */NdrFcShort( 0x70 ), /* Flags:  out, return, base type, */
/* 194 */NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 196 */0x8,      /* FC_LONG */
        0x0,      /* 0 */

   /* Procedure doSetComplete */

/* 198 */0x33,     /* FC_AUTO_HANDLE */
        0x6c,     /* Old Flags:  object, Oi2 */
/* 200 */NdrFcLong( 0x0 ),/* 0 */
/* 204 */NdrFcShort( 0x8 ),   /* 8 */
/* 206 */NdrFcShort( 0x8 ),   /* x86 Stack size/offset = 8 */
/* 208 */NdrFcShort( 0x0 ),   /* 0 */
/* 210 */NdrFcShort( 0x8 ),   /* 8 */
/* 212 */0x44,     /* Oi2 Flags:  has return, has ext, */
        0x1,      /* 1 */
/* 214 */0x8,      /* 8 */
```

```
        0x1,      /* Ext Flags:  new corr desc, */
/* 216 */NdrFcShort( 0x0 ),   /* 0 */
/* 218 */NdrFcShort( 0x0 ),   /* 0 */
/* 220 */NdrFcShort( 0x0 ),   /* 0 */

    /* Return value */

/* 222 */NdrFcShort( 0x70 ), /* Flags:  out, return, base type, */
/* 224 */NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 226 */0x8,      /* FC_LONG */
        0x0,      /* 0 */

        0x0
      }
    };

static const MIDL_TYPE_FORMAT_STRING
__MIDL_TypeFormatString =
    {
      0,
      {
        NdrFcShort( 0x0 ),   /* 0 */
/*  2 */
        0x11, 0x8,   /* FC_RP [simple_pointer] */
/*  4 */   0x8,      /* FC_LONG */
        0x5c,     /* FC_PAD */
/*  6 */
        0x11, 0x14, /* FC_RP [alloced_on_stack] [pointer_deref] */
/*  8 */   NdrFcShort( 0x2 ),   /* Offset= 2 (10) */
/* 10 */
        0x13, 0x0,   /* FC_OP */
/* 12 */  NdrFcShort( 0x2 ),   /* Offset= 2 (14) */
/* 14 */
        0x1b,     /* FC_CARRAY */
        0x0,      /* 0 */
/* 16 */  NdrFcShort( 0x1 ),   /* 1 */
/* 18 */  0x28,     /* Corr desc:  parameter, FC_LONG */
        0x54,     /* FC_DEREFERENCE */
/* 20 */  NdrFcShort( 0x4 ),   /* x86 Stack size/offset = 4 */
/* 22 */  NdrFcShort( 0x1 ),   /* Corr flags:  early, */
/* 24 */  0x2,      /* FC_CHAR */
        0x5b,     /* FC_END */

        0x0
      }
    };


/* Object interface: IUnknown, ver. 0.0,

GUID={0x00000000,0x0000,0x0000,{0xC0,0x00,0x00,0x00,0x00,0x00,0x
00,0x00,0x46}} */


/* Object interface: Itpcc_com50, ver. 0.0,

GUID={0xDBA619F6,0x1BDE,0x4E34,{0x80,0x0E,0x37,0x23,0xC4,
0xBA,0x95,0xC1}} */

#pragma code_seg(".orpc")
static const unsigned short Itpcc_com50_FormatStringOffsetTable[]
=
    {
    0,
    42,
    84,
    126,
    168,
    198
    };

static const MIDL_STUBLESS_PROXY_INFO
Itpcc_com50_ProxyInfo =
    {
    &Object_StubDesc,
    __MIDL_ProcFormatString.Format,
    &Itpcc_com50_FormatStringOffsetTable[-3],
    0,
    0,
    0
    };


static const MIDL_SERVER_INFO Itpcc_com50_ServerInfo =
    {
    &Object_StubDesc,
    0,
    __MIDL_ProcFormatString.Format,
    &Itpcc_com50_FormatStringOffsetTable[-3],
    0,
    0,
    0,
    0};
CINTERFACE_PROXY_VTABLE(9) _Itpcc_com50ProxyVtbl =
{
    &Itpcc_com50_ProxyInfo,
    &IID_Itpcc_com50,
    IUnknown_QueryInterface_Proxy,
    IUnknown_AddRef_Proxy,
    IUnknown_Release_Proxy ,
    (void *) (INT_PTR) -1 /* Itpcc_com50::doStockLevel */ ,
    (void *) (INT_PTR) -1 /* Itpcc_com50::doNewOrder */ ,
    (void *) (INT_PTR) -1 /* Itpcc_com50::doPayment */ ,
    (void *) (INT_PTR) -1 /* Itpcc_com50::doOrderStatus */ ,
    (void *) (INT_PTR) -1 /* Itpcc_com50::doDBInfo */ ,
    (void *) (INT_PTR) -1 /* Itpcc_com50::doSetComplete */
};

const CInterfaceStubVtbl _Itpcc_com50StubVtbl =
{
    &IID_Itpcc_com50,
    &Itpcc_com50_ServerInfo,
    9,
    0, /* pure interpreted */
    CStdStubBuffer_METHODS
};

static const MIDL_STUB_DESC Object_StubDesc =
    {
    0,
    NdrOleAllocate,
    NdrOleFree,
    0,
    0,
    0,
    0,
    0,
    __MIDL_TypeFormatString.Format,
    1, /* -error bounds_check flag */
    0x50002, /* Ndr library version */
    0,
    0x6000169, /* MIDL Version 6.0.361 */
    0,
    0,
    0,  /* notify & notify_flag routine table */
    0x1, /* MIDL flag */
    0, /* cs routines */
    0,   /* proxy/server info */
    0   /* Reserved5 */
    };

const CInterfaceProxyVtbl * _tpccCom50_ProxyVtblList[] =
{
```

```
    ( CInterfaceProxyVtbl *) &_ltpcc_com50ProxyVtbl,
    0
};

const CInterfaceStubVtbl * _tpccCom50_StubVtblList[] =
{
    ( CInterfaceStubVtbl *) &_ltpcc_com50StubVtbl,
    0
};

PCInterfaceName const _tpccCom50_InterfaceNamesList[] =
{
    "ltpcc_com50",
    0
};


#define _tpccCom50_CHECK_IID(n)
   IID_GENERIC_CHECK_IID( _tpccCom50, pIID, n)

int __stdcall _tpccCom50_IID_Lookup( const IID * pIID, int * pIndex )
{

    if(!_tpccCom50_CHECK_IID(0))
        {
        *pIndex = 0;
        return 1;
        }

    return 0;
}

const ExtendedProxyFileInfo tpccCom50_ProxyFileInfo =
{
    (PCInterfaceProxyVtblList *) & _tpccCom50_ProxyVtblList,
    (PCInterfaceStubVtblList *) & _tpccCom50_StubVtblList,
    (const PCInterfaceName * ) & _tpccCom50_InterfaceNamesList,
    0, // no delegation
    & _tpccCom50_IID_Lookup,
    1,
    2,
    0, /* table of [async_uuid] interfaces */
    0, /* Filler1 */
    0, /* Filler2 */
    0  /* Filler3 */
};
#if _MSC_VER >= 1200
#pragma warning(pop)
#endif


#endif /* !defined(_M_IA64) && !defined(_M_AMD64)*/
```

tpccCom50/tpccCom50.rc

```
// Microsoft Visual C++ generated resource script.
//
#include "resource.h"

#define APSTUDIO_READONLY_SYMBOLS
//////////////////////////////////////////////////////////////////////////////
//
// Generated from the TEXTINCLUDE 2 resource.
//
#include "winres.h"

//////////////////////////////////////////////////////////////////////////////
#undef APSTUDIO_READONLY_SYMBOLS

//////////////////////////////////////////////////////////////////////////////
// English (U.S.) resources

#if !defined(AFX_RESOURCE_DLL) || defined(AFX_TARG_ENU)
#ifdef _WIN32
LANGUAGE LANG_ENGLISH, SUBLANG_ENGLISH_US
#pragma code_page(1252)
#endif //_WIN32

#ifdef APSTUDIO_INVOKED
//////////////////////////////////////////////////////////////////////////////
//
// TEXTINCLUDE
//

1 TEXTINCLUDE
BEGIN
    "resource.h\0"
END

2 TEXTINCLUDE
BEGIN
    "#include ""winres.h""\r\n"
    "\0"
END

3 TEXTINCLUDE
BEGIN
    "1 TYPELIB ""tpccCom50.tlb""\r\n"
    "\0"
END

#endif    // APSTUDIO_INVOKED


//////////////////////////////////////////////////////////////////////////////
//
// Version
//

VS_VERSION_INFO VERSIONINFO
 FILEVERSION 1,0,0,1
 PRODUCTVERSION 1,0,0,1
 FILEFLAGSMASK 0x3fL
#ifdef _DEBUG
 FILEFLAGS 0x1L
#else
 FILEFLAGS 0x0L
#endif
 FILEOS 0x4L
 FILETYPE 0x2L
 FILESUBTYPE 0x0L
BEGIN
    BLOCK "StringFileInfo"
    BEGIN
        BLOCK "040904e4"
        BEGIN
            VALUE "CompanyName", "TODO: <Company name>"
            VALUE "FileDescription", "TODO: <File description>"
            VALUE "FileVersion", "1.0.0.1"
            VALUE "LegalCopyright", "TODO: (c) <Company name>.  All
rights reserved."
            VALUE "InternalName", "tpccCom50.dll"
            VALUE "OriginalFilename", "tpccCom50.dll"
            VALUE "ProductName", "TODO: <Product name>"
            VALUE "ProductVersion", "1.0.0.1"
        END
    END
    BLOCK "VarFileInfo"
    BEGIN
        VALUE "Translation", 0x409, 1252
    END
END
```

```
/////////////////////////////////////////////////////////////////////////////
//
// REGISTRY
//

IDR_TPCCCOM50          REGISTRY              "tpccCom50.rgs"
IDR_TPCC_COM50         REGISTRY              "tpcc_com50.rgs"

/////////////////////////////////////////////////////////////////////////////
//
// String Table
//

STRINGTABLE
BEGIN
   IDS_PROJNAME           "tpccCom50"
END

#endif    // English (U.S.) resources
/////////////////////////////////////////////////////////////////////////////



#ifndef APSTUDIO_INVOKED
/////////////////////////////////////////////////////////////////////////////
//
// Generated from the TEXTINCLUDE 3 resource.
//
1 TYPELIB "tpccCom50.tlb"

/////////////////////////////////////////////////////////////////////////////
#endif    // not APSTUDIO_INVOKED
```

tpccCom50/tpcc_com50.rgs

```
HKCR
{
   tpccCom50.tpcc_com50.1 = s 'tpcc_com50 Class'
   {
      CLSID = s '{76F680E9-0C71-4AF3-B9F1-6B0A3AC4E1B8}'
   }
   tpccCom50.tpcc_com50 = s 'tpcc_com50 Class'
   {
      CLSID = s '{76F680E9-0C71-4AF3-B9F1-6B0A3AC4E1B8}'
      CurVer = s 'tpccCom50.tpcc_com50.1'
   }
   NoRemove CLSID
   {
      ForceRemove {76F680E9-0C71-4AF3-B9F1-6B0A3AC4E1B8}
= s 'tpcc_com50 Class'
      {
         ProgID = s 'tpccCom50.tpcc_com50.1'
         VersionIndependentProgID = s 'tpccCom50.tpcc_com50'
         InprocServer32 = s '%MODULE%'
         {
            val ThreadingModel = s 'Both'
         }
         val AppID = s '%APPID%'
         'TypeLib' = s '{7BD99942-8C52-4AEE-9B82-
BECC2C7B1207}'
      }
   }
}
```

tpccCom50/tpccCom50.rgs

```
HKCR
{
   NoRemove AppID
   {
      '%APPID%' = s 'tpccCom50'
      'tpccCom50.DLL'
      {
         val AppID = s '%APPID%'
      }
   }
}
```

tpccCom50/tpcc_com9.cpp

```
// tpcc_com9.cpp : Implementation of Ctpcc_com9

#include "stdafx.h"
#include "tpcc_com9.h"

#include "..\tpccIsapi\tpcc.h"

#ifdef DB2
#include <db2tpcc.h>
#endif
#ifdef ORA
#include <ora_tpcc.h>
#endif

#ifdef _DEBUG
   int debugFlag = 1;
#else
   int debugFlag = 0;
#endif

// Ctpcc_com9
HRESULT Ctpcc_com9::Activate()
{
   HRESULT hr = GetObjectContext(&m_spObjectContext);
   if (SUCCEEDED(hr))
   {
      DEBUGMSG("Object assigned to thread."<<endl);
      return S_OK;
   }
   return hr;
}

BOOL Ctpcc_com9::CanBePooled()
{
   DEBUGMSG("CanBePooled() returning true"<<endl);
   return TRUE;
}

void Ctpcc_com9::Deactivate()
{
   DEBUGMSG("deactivated() releasing object back into
pool"<<endl);
   m_spObjectContext.Release();
}

/*
************************************************************************
** Name         :  doSetComplete
** Description :
**             Release object back into com pool
** Parameters:
** Returns      :
**             int - return code
** Comments     :
**             Calls SetComplete on the object that the com
**             pool manager returned to the caller(isapi thread)
************************************************************************
*/
STDMETHODIMP Ctpcc_com9::doSetComplete(void)
{
   // TODO: Add your implementation code here
   HRESULT hres = m_spObjectContext->SetComplete();
```

```
  if (SUCCEEDED(hres))
  {
    DEBUGMSG("SetComplete successful. object bit set to release
object into pool."<<endl);
  }
  else
  {
    DEBUGMSG("SetComplete failed. object bit set to release
object into pool."<<endl);
    ERRORMSG("SetComplete() failed,
code:"<<HRESULT_CODE(hres)<<"
facility:"<<HRESULT_FACILITY(hres)<<"
hres:"<<hex<<hres<<endl);
  }

  return S_OK;
}

/*
**********************************************************************
** Name        :  doStockLevel
** Description :
**            Call db2 dll entry point to execute txn
** Parameters:
**            int*    size of UCHAR buffer to pay attention to
**            UCHAR**    char buffer that holds txn wrapper struct
** Returns     :
**            int - return code
** Comments    :
**
**********************************************************************
*/
STDMETHODIMP Ctpcc_com9::doStockLevel(INT *size, UCHAR
**buffer)
{
  stok_wrapper * stok;
  stok = (stok_wrapper *) *buffer;

  if(!connectHandleInUse)
  {
    DEBUGMSG("Setting Context handle in use to true"<<endl);
    connectHandleInUse = 1;
  }
  else
  {
    DEBUGMSG("Context handle in use."<<endl);
    ERRORMSG("Context handle in use."<<endl);
    return ERR_HANDLE_IN_USE;
  }

  DEBUGMSG("Calling do_stok call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<stok->in_stok.s_W_ID<<" d_id:"<< stok->in_stok.s_D_ID<<
        " s_transtatus:"<<stok->out_stok.s_transtatus<<endl);

  do_stok(stok,connectHandle);

  DEBUGMSG("Return from do_stok call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<stok->in_stok.s_W_ID<<" d_id:"<< stok->in_stok.s_D_ID<<
        " s_transtatus:"<<stok->out_stok.s_transtatus<<endl);

  DEBUGMSG("Connection handle set to free" <<endl);
  connectHandleInUse = 0;

  return S_OK;
}

/*
**********************************************************************
** Name        :  doNewOrder
** Description :
**            Call db2 dll entry point to execute txn
** Parameters:
**            int*    size of UCHAR buffer to pay attention to
**            UCHAR**    char buffer that holds txn wrapper struct
** Returns     :
**            int - return code
** Comments    :
**
**********************************************************************
*/
STDMETHODIMP Ctpcc_com9::doNewOrder(INT* size, UCHAR**
buffer)
{
  nord_wrapper *nord;
  nord = (nord_wrapper *) *buffer;

  if(!connectHandleInUse)
  {
    DEBUGMSG("Setting Context handle in use to true"<<endl);
    connectHandleInUse = 1;
  }
  else
  {
    DEBUGMSG("Context handle in use."<<endl);
    ERRORMSG("Context handle in use."<<endl);
    return ERR_HANDLE_IN_USE;
  }

  DEBUGMSG("Calling do_nord call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<nord->in_nord.s_W_ID<<" d_id:"<< nord-
>in_nord.s_D_ID<<
        " s_transtatus:"<<nord->out_nord.s_transtatus<<endl);

  do_nord(nord,connectHandle);


  DEBUGMSG("Return from do_nord call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<nord->in_nord.s_W_ID<<" d_id:"<< nord-
>in_nord.s_D_ID<<
        " s_transtatus:"<<nord->out_nord.s_transtatus<<endl);

  DEBUGMSG("Connection handle set to free" <<endl);
  connectHandleInUse = 0;

  return S_OK;
}

/*
**********************************************************************
** Name        :  doPayment
** Description :
**            Call db2 dll entry point to execute txn
** Parameters:
**            int*    size of UCHAR buffer to pay attention to
**            UCHAR**    char buffer that holds txn wrapper struct
** Returns     :
**            int - return code
** Comments    :
**
**********************************************************************
*/
STDMETHODIMP Ctpcc_com9::doPayment(INT* size, UCHAR**
buffer)
{
  paym_wrapper  *pymt;
  pymt = (paym_wrapper *) *buffer;

  if(!connectHandleInUse)
  {
    DEBUGMSG("Setting Context handle in use to true"<<endl);
```

```
    connectHandleInUse = 1;
  }
  else
  {
    DEBUGMSG("Context handle in use."<<endl);
    ERRORMSG("Context handle in use."<<endl);
    return ERR_HANDLE_IN_USE;
  }


  DEBUGMSG("Calling do_pymt call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<pymt->in_paym.s_W_ID<<" d_id:"<< pymt-
>in_paym.s_D_ID<<
        " s_transtatus:"<<pymt->out_paym.s_transtatus<<endl);

  do_pymt(pymt,connectHandle);

  DEBUGMSG("Return from do_pymt call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<pymt->in_paym.s_W_ID<<" d_id:"<< pymt-
>in_paym.s_D_ID<<
        " s_transtatus:"<<pymt->out_paym.s_transtatus<<endl);

  DEBUGMSG("Connection handle set to free" <<endl);
  connectHandleInUse = 0;

  return S_OK;
}

/*
*********************************************************************
** Name        :  doOrderStatus
** Description :
**           Call db2 dll entry point to execute txn
** Parameters:
**           int*    size of UCHAR buffer to pay attention to
**           UCHAR**    char buffer that holds txn wrapper struct
** Returns     :
**           int - return code
** Comments    :
**
*********************************************************************
*/

STDMETHODIMP Ctpcc_com9::doOrderStatus(INT* size, UCHAR**
buffer)
{
  ords_wrapper *ords;
  ords = (ords_wrapper *) *buffer;

  if(!connectHandleInUse)
  {
    DEBUGMSG("Setting Context handle in use to true"<<endl);
    connectHandleInUse = 1;
  }
  else
  {
    DEBUGMSG("Context handle in use."<<endl);
    ERRORMSG("Context handle in use."<<endl);
    return ERR_HANDLE_IN_USE;
  }


  DEBUGMSG("Calling do_ords call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<ords->in_ords.s_W_ID<<" d_id:"<< ords-
>in_ords.s_D_ID<<
        " s_transtatus:"<<ords->out_ords.s_transtatus<<endl);

  do_ords(ords,connectHandle);

  DEBUGMSG("Return from do_ords call using
connectHandle:"<<DEBUGADDRESS(connectHandle)<<"
w_id:"<<ords->in_ords.s_W_ID<<" d_id:"<< ords-
>in_ords.s_D_ID<<
        " s_transtatus:"<<ords->out_ords.s_transtatus<<endl);

  DEBUGMSG("Connection handle set to free" <<endl);
  connectHandleInUse = 0;

  return S_OK;
}

/*
*********************************************************************
** Name        :  doDBInfo
** Description :
**           Function to test com interface
** Parameters:
** Returns     :
**           int - return code
** Comments    :
**
*********************************************************************
*/

STDMETHODIMP Ctpcc_com9::doDBInfo(void)
{
  //DUMMY FUNCTION TO ALLOW ISAPI TO CALL COM
FUNCTION DURING LOGIN SO CONNECTIONS
  //TO DATABASE WILL BE SETUP.....I HOPE.
  DEBUGMSG("Stub function to warm object pool"<<endl);

  return S_OK;
}

/*
*********************************************************************
** Name        :  loadLibrary
** Description :
**           Function loads apprioate db library based on
**           registry setting
** Parameters:
** Returns     :
**           int - return code
** Comments    :
**
*********************************************************************
*/

Ctpcc_com9::loadLibrary()
{
  DEBUGMSG("Entered loadLibrary function"<<endl);
  //check to see if dbInstance is already loaded
  if(!dbInstance)
  {
    DEBUGMSG("Database dll not loaded. Loading dll."<<endl);
    if (nullDB)
    {
      DEBUGMSG("Loading "<<dbType << " nulldb dll." << endl);
      dbInstance =
LoadLibrary("c:\\inetpub\\wwwroot\\tpcc\\nullDB.dll");
      if(dbInstance == NULL)
      {
        DEBUGMSG("Unable to load null db dll,
rc:"<<GetLastError());
        ERRORMSG("Unable to load null db dll,
rc:"<<GetLastError());
        return ERR_NULL_DLL_NOT_LOADED;
      }
      DEBUGMSG(dbType << " nulldb dll loaded"<<endl);
    }
    else if(strcmp(dbType,"DB2") == 0)
```

```
    {
      DEBUGMSG("Loading "<<dbType << " dll." << endl);

      dbInstance =
LoadLibrary("c:\\inetpub\\wwwroot\\tpcc\\tpccDB2glue.dll");
      if(dbInstance == NULL)
      {
        DEBUGMSG("Unable to load library."<<endl);

        ERRORMSG("Unable to load com dll, rc:" << GetLastError()
<< endl);

        return ERR_DB2_DLL_NOT_LOADED;
      }
      DEBUGMSG(dbType<< " dll loaded"<<endl);
    }
    else if( strcmp(dbType,"ORACLE") == 0 )
    {
      DEBUGMSG("Loading "<<dbType << " dll." << endl);

      dbInstance =
LoadLibrary("c:\\inetpub\\wwwroot\\tpcc\\tpccOracleglue.dll");
      if(dbInstance == NULL)
      {
        DEBUGMSG("Unable to load oracle dll"<<endl);
        ERRORMSG("Unable to load oracle dll,
rc:"<<GetLastError()<<endl);
        return ERR_ORACLE_DLL_NOT_LOADED;
      }
      DEBUGMSG(dbType<< " dll loaded"<<endl);
    }
    else
    {
      DEBUGMSG("Unknown database type dll:"<<dbType<<endl);
      ERRORMSG("Unknown database type dll:"<<dbType<<endl);
      return ERR_UNKNOWN_DB;
    }

    //retrieve function addresses from instance loaded.
    DEBUGMSG("Getting do_connection function address from
"<<dbType<<" dll"<<endl);
    if( (do_connection =
(CONNECT_PTR)GetProcAddress(dbInstance,"connect_db")) ==
NULL )
      return ERR_CONNECT_ADDRESS_NOT_FOUND;
    DEBUGMSG("do_connection
address:"<<DEBUGADDRESS(do_connection)<<endl);

    DEBUGMSG("Getting do_disconnect function address from
"<<dbType<<" dll"<<endl);
    if( (do_disconnect =
(DISCONNECT_PTR)GetProcAddress(dbInstance,"disconnect_db")
) == NULL )
      return ERR_DISCONNECT_ADDRESS_NOT_FOUND;
    DEBUGMSG("do_disconnect
address:"<<DEBUGADDRESS(do_disconnect)<<endl);

    DEBUGMSG("Getting do_nord function address from
"<<dbType<<" dll"<<endl);
    if( (do_nord = (NORD_PTR)
GetProcAddress(dbInstance,"do_nord")) == NULL)
      return ERR_NORD_ADDRESS_NOT_FOUND;
    DEBUGMSG("do_nord function
address:"<<DEBUGADDRESS(do_nord)<<endl);

    DEBUGMSG("Getting do_pymt function address from
"<<dbType<<" dll"<<endl);
    if( (do_pymt = (PYMT_PTR)
GetProcAddress(dbInstance,"do_pymt")) == NULL)
      return ERR_PYMT_ADDRESS_NOT_FOUND;
    DEBUGMSG("do_pymt function
adddress:"<<DEBUGADDRESS(do_pymt)<<endl);

    DEBUGMSG("Getting do_ords function address from
"<<dbType<<" dll"<<endl);
    if( (do_ords = (ORDS_PTR)
GetProcAddress(dbInstance,"do_ords")) == NULL)
      return ERR_ORDS_ADDRESS_NOT_FOUND;
    DEBUGMSG("do_ords function
address:"<<DEBUGADDRESS(do_ords)<<endl);

    DEBUGMSG("Getting do_stok function address from
"<<dbType<<" dll"<<endl);
    if( (do_stok = (STOK_PTR)
GetProcAddress(dbInstance,"do_stok")) == NULL)
      return ERR_STOK_ADDRESS_NOT_FOUND;
    DEBUGMSG("do_stok function
address:"<<DEBUGADDRESS(do_stok)<<endl);

    DEBUGMSG("All function addresses retrieved
successfully."<<endl);

  }
  return OK;
}

/*
*********************************************************************
** Name        :  readRegistry()
** Description :
**            Function reads registry value
** Parameters:
** Returns     :
**            int - return code
** Comments    :
**            Values retrieved from registery
**            dbName, dbUserName, and dbUserPassword
*********************************************************************
*/

Ctpcc_com9::readRegistery()
{
  //open registery key
  HKEY   registeryKey;
  DWORD  regType;
  char   value[MAX_STRING_LEN];
  DWORD  regValue;
  DWORD  regValueSize = MAX_STRING_LEN;

  DEBUGMSG("Entered readRegistery(), opening key:"<<
REGISTERY_SUB_KEY <<endl);
  //open up registery key
  if(RegOpenKeyEx(HKEY_LOCAL_MACHINE,REGISTERY_SUB_
KEY,0,KEY_READ,&registeryKey) == ERROR_SUCCESS)
  {
    DEBUGMSG(REGISTERY_SUB_KEY<<" open, getting
database type from key"<<endl);
    regValueSize = sizeof(value);
    if
(RegQueryValueEx(registeryKey,DB_TYPE,0,&regType,(BYTE *)
&value,&regValueSize)== ERROR_SUCCESS )
      strcpy(dbType,value);
    DEBUGMSG("Database type:"<<dbType<<" from registery
key."<<endl);

    DEBUGMSG("Getting database name from registery
key."<<endl);
    regValueSize = sizeof(value);
    if
(RegQueryValueEx(registeryKey,DB_NAME,0,&regType,(BYTE *)
&value,&regValueSize)== ERROR_SUCCESS )
      strcpy(dbName,value);
    DEBUGMSG("Database name:"<<dbName<<endl);
```

```
    DEBUGMSG("Getting null database flag from key."<<endl);
    regValueSize = sizeof(regValue);
    if(RegQueryValueEx(registeryKey,NULL_DB,0,&regType,(BYTE
*)&regValue,&regValueSize) == ERROR_SUCCESS)
      nullDB = regValue;
    DEBUGMSG("Null database flag:"<<nullDB<<endl);

    return OK;
  }

  DEBUGMSG("Error, unable to open registery key."<<endl);
  return ERR_UNABLE_TO_OPEN_REG;
}

/*
*********************************************************************
** Name        :  connectDB
** Description :
**             Function connects to the db
** Parameters:
** Returns     :
**             int - return code
** Comments    :
**
*********************************************************************
*/
Ctpcc_com9::connectDB()
{
  DEBUGMSG("Entered connectDB(), checking if object is
connected."<<endl);
  if(!connected)
  {
    DEBUGMSG("Object not connected, calling do_connection with
dbName:"<<dbName<<" connectHandle:"<<
        DEBUGADDRESS(connectHandle)<<endl);
    if(!connectHandleInUse)
    {
      DEBUGMSG("Setting Context handle in use to true"<<endl);
      connectHandleInUse = 1;
      connected = do_connection(dbName,&connectHandle);
      if(connected != OK)
      {
        DEBUGMSG("Object do_connect failed,
rc:"<<connected<<endl);
        ERRORMSG("Object do_connect failed,
rc:"<<connected<<endl);
        return connected;
      }
      DEBUGMSG("Object connection complete,
connectHandle:"<<DEBUGADDRESS(connectHandle)<<endl);
      connectHandleInUse = 0;
      return OK;
    }
    else
    {
      DEBUGMSG("Object's connectHandle already in use, connect
failed"<<endl);
      ERRORMSG("Object's connectHandle already in use, connect
failed"<<endl);
      return ERR_HANDLE_IN_USE;
    }
  }
  DEBUGMSG("Object already has connection
established."<<endl);
  return OK;
}
```

tpccCom50/tpcc_com9.h

```
// tpcc_com9.h : Declaration of the Ctpcc_com9

#pragma once
#include "tpccCom9.h"
#include "resource.h"// main symbols
#include <comsvcs.h>

#include "..\tpccIsapi\tpcc.h"
#ifdef ORACLE
#define ORA_NT
#include <stdio.h>
#include <time.h>
#include <ora_tpcc.h>
#include <plora.h>
#endif
#define NULL_DB         "nullDB"

static HINSTANCE dbInstance         = NULL;

static CRITICAL_SECTION debugMutex;
static CRITICAL_SECTION errorMutex;

static int comServerID          =   0;
static ofstream debugStream;
static ofstream errorStream;
static int debugFileOpen       = 0;
static int errorFileOpen       = 0;
static int nullDB              = 0;
static char dbType[32];
static char dbName[32];

typedef INT (*NORD_PTR)(nord_wrapper *nord,void
*connectHandle);
typedef INT (*PYMT_PTR)(paym_wrapper *pymt,void
*connectHandle);
typedef INT (*ORDS_PTR)(ords_wrapper *ords,void
*connectHandle);
typedef INT (*STOK_PTR)(stok_wrapper *stok,void
*connectHandle);
typedef INT (*CONNECT_PTR)(char *dbName,void
**connectHandle);
typedef INT (*DISCONNECT_PTR)(void *connectHandle);

NORD_PTR   do_nord;
PYMT_PTR do_pymt;
ORDS_PTR   do_ords;
STOK_PTR do_stok;
CONNECT_PTR  do_connection;
DISCONNECT_PTR do_disconnect;

// Ctpcc_com9
class ATL_NO_VTABLE Ctpcc_com9 :
  public CComObjectRootEx<CComMultiThreadModel>,
  public IObjectControl,
  public CComCoClass<Ctpcc_com9, &CLSID_tpcc_com9>,
  public Itpcc_com9
{
public:
  Ctpcc_com9()
  {
    int rc          = ERR;
    connected       = 0;
    connectHandleInUse  = 0;

    if(debugFlag)
    {
      if(!debugFileOpen)
      {
        InitializeCriticalSection(&debugMutex);
        //open comLog
        char comLogFile[128];

  sprintf(comLogFile,"C:\\Inetpub\\wwwroot\\tpcc\\comLog_debug.txt
");
```

```
        debugStream.rdbuf( )->open(comLogFile,ios_base::in |
ios_base::out | ios_base::app);

        debugFileOpen = 1;
      }
    }

    //open error log file
    if(!errorFileOpen)
    {
      InitializeCriticalSection(&errorMutex);

      char errorLogFile[128];

  sprintf(errorLogFile,"C:\\Inetpub\\wwwroot\\tpcc\\comLog_err.txt");

      errorStream.rdbuf( )->open(errorLogFile,ios_base::in |
ios_base::out | ios_base::app);

      errorFileOpen=1;
    }

    //get registry values
    if((rc = readRegistery()) != OK)
    {
      ERRORMSG("Unable to open registery key " <<
REGISTERY_SUB_KEY << " rc:" << rc <<endl);
      return;
    }

    DEBUGMSG("nullDB:" <<nullDB<<" dbType:"<<dbType<<"
dbName:"<<dbName<<endl);

    //load library based on registry
    if( (rc = loadLibrary()) != OK)
    {
      ERRORMSG("load library failure rc:" << rc << endl);
      return;
    }

    DEBUGMSG("dbtype:"<<dbType<<" instance:" <<
DEBUGADDRESS(dbInstance) << " loaded." << endl);

    //connect to db
    EnterCriticalSection(&errorMutex);
    if((rc = connectDB()) != OK)
    {
      ERRORMSG("unable to connect to db "<<dbName<<"
rc :"<<rc <<endl);
      LeaveCriticalSection(&errorMutex);
      return;
    }
    LeaveCriticalSection(&errorMutex);

    DEBUGMSG("connected to db " <<dbName<< " rc:"<< rc << "
context:" <<DEBUGADDRESS(connectHandle) << endl);
  }

  DECLARE_PROTECT_FINAL_CONSTRUCT()

  HRESULT FinalConstruct()
  {
    return S_OK;
  }

  void FinalRelease()
  {
  }

DECLARE_REGISTRY_RESOURCEID(IDR_TPCC_COM9)

BEGIN_COM_MAP(Ctpcc_com9)
  COM_INTERFACE_ENTRY(Itpcc_com9)
  COM_INTERFACE_ENTRY(IObjectControl)
END_COM_MAP()

// IObjectControl
public:
  STDMETHOD(Activate)();
  STDMETHOD_(BOOL, CanBePooled)();
  STDMETHOD_(void, Deactivate)();
  CComPtr<IObjectContext> m_spObjectContext;

// Itpcc_com9
public:
  STDMETHOD(doStockLevel)(INT *size, UCHAR **buffer);
  STDMETHOD(doNewOrder)(INT* size, UCHAR** buffer);
  STDMETHOD(doPayment)(INT* size, UCHAR** buffer);
  STDMETHOD(doOrderStatus)(INT* size, UCHAR** buffer);
  STDMETHOD(doDBInfo)(void);
  STDMETHOD(doSetComplete)(void);

  int connected;
  int connectHandleInUse;

private:
  //db2 specific context
  void *connectHandle;
  int loadLibrary();
  int readRegistery();
  int connectDB();


};

OBJECT_ENTRY_AUTO(__uuidof(tpcc_com9), Ctpcc_com9)
```

Appendix - B: Tunable Parameters

B.1 Database Parameters.

p_run.ora

```
compatible = 10.1.0.0.0
_NUMA_pool_size =  536870912
timed_statistics                = FALSE
query_rewrite_enabled=false
db_name = tpcc
control_files = /dev/rtpc_lvcntl1

recovery_parallelism  = 96
dml_locks             = 500
log_buffer            = 16777216 # 1048576x cpu

parallel_max_servers  = 16

db_files              = 800
fast_start_io_target =  0

db_cache_size         =   35000M
db_2k_cache_size      =   256M
db_8k_cache_size      =    456M
db_16k_cache_size     =   24100M
db_keep_cache_size    =   142100M
db_recycle_cache_size =   24000M
enqueue_resources     = 60000
processes             = 500
sessions              = 500
transactions          = 346
shared_pool_size      = 4000M
cursor_space_for_time = TRUE
db_block_size         = 4096
undo_management       = auto

UNDO_TABLESPACE       = undo_1

_db_cache_pre_warm=FALSE

trace_enabled = FALSE
db_block_checksum = FALSE
trace_enabled = FALSE
statistics_level                = basic

plsql_optimize_level     = 2
pga_aggregate_target             = 0

#undo/dbwr management
undo_retention             = 2
_imu_pools         = 358
_optimizer_cache_stats           = false
_optimizer_cost_model            = io
fast_start_mttr_target           = 0

db_writer_processes              = 4
log_checkpoint_interval          = 86413230 # redo blocks per sec *
60 * 27 minutes
log_checkpoints_to_alert     = TRUE
log_checkpoint_timeout     = 1700 #Continual checkpoint
java_pool_size                 = 0
remote_login_passwordfile        = shared
disk_asynch_io                 = TRUE
db_block_checking                = FALSE
cursor_space_for_time            = TRUE
lock_sga                       = TRUE
hash_join_enabled                = FALSE
replication_dependency_tracking   = FALSE
db_file_multiblock_read_count     = 1
_cursor_cache_frame_bind_memory = true
max_dump_file_size=5M
# To avoid buffer copying
_db_writer_coalesce_area_size = 0
_db_writer_coalesce_write_limit = 0
aq_tm_processes = 0
# reduce the number of subpools
_kghdsidx_count = 1
_two_pass=false
_session_idle_bit_latches=555
```

B.2 Transaction Monitor Parameters

tpccCom0-26.tpcc_com_settings.txt

```
Windows Registry Editor Version 5.00

tpccCom0-26.tpcc_com_settings.txt

Transactions not supported
Enable object pooling
Minimum pool size 1
Maximum pool size 1
Creation timeout 180,000
Enable Object Construction
Enable Just in time activation
Concurrency Required
```

InetInfo_registry.reg

```
Windows Registry Editor Version 5.00

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\InetIn
fo\Parameters]
"ListenBackLog"=dword:000000fa
"DispatchEntries"=hex(7):4c,00,44,00,41,00,50,00,53,00,56,00,43,00,00,00
,00,00
"MaxConnections"=dword:00007918
"PoolThreadLimit"=dword:00000190
"ThreadTimeout"=dword:00015180
"MaxConcurrency"=dword:ffffffff
```

tcpip_parameters_registry.reg

```
Windows Registry Editor Version 5.00

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tc
pip\Parameters\Interfaces]

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tc
pip\Parameters\Interfaces\{0435C97F-9186-473F-B181-
5449A2CF0042}]
"UseZeroBroadcast"=dword:00000000
"EnableDeadGWDetect"=dword:00000001
"EnableDHCP"=dword:00000000
"IPAddress"=hex(7):31,00,33,00,35,00,2e,00,31,00,2e,00,31,00,2e,
00,32,00,00,00,\
  00,00
"SubnetMask"=hex(7):32,00,35,00,35,00,2e,00,32,00,35,00,35,00,2
e,00,32,00,35,\
  00,35,00,2e,00,30,00,00,00,00,00
"DefaultGateway"=hex(7):00,00
"DefaultGatewayMetric"=hex(7):00,00
"NameServer"=""
"Domain"=""
```

"DisableDynamicUpdate"=dword:00000000
"EnableAdapterDomainNameRegistration"=dword:00000000
"InterfaceMetric"=dword:00000001
"TCPAllowedPorts"=hex(7):30,00,00,00,00,00
"UDPAllowedPorts"=hex(7):30,00,00,00,00,00
"RawIPAllowedProtocols"=hex(7):30,00,00,00,00,00
"NTEContextList"=hex(7):30,00,78,00,30,00,30,00,30,00,30,00,30,0
0,30,00,30,00,\
  34,00,00,00,00,00
"TcpWindowSize"=dword:00008000

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tc
pip\Parameters\Interfaces\{1E07A95A-92A0-4836-BF73-
7AE38F8ACA07}]
"UseZeroBroadcast"=dword:00000000
"EnableDeadGWDetect"=dword:00000001
"EnableDHCP"=dword:00000001
"IPAddress"=hex(7):30,00,2e,00,30,00,2e,00,30,00,2e,00,30,00,00,
00,00,00
"SubnetMask"=hex(7):30,00,2e,00,30,00,2e,00,30,00,2e,00,30,00,0
0,00,00,00
"DefaultGateway"=hex(7):00,00
"DefaultGatewayMetric"=hex(7):00,00
"NameServer"=""
"Domain"=""
"DisableDynamicUpdate"=dword:00000000
"EnableAdapterDomainNameRegistration"=dword:00000000
"InterfaceMetric"=dword:00000001
"TCPAllowedPorts"=hex(7):30,00,00,00,00,00
"UDPAllowedPorts"=hex(7):30,00,00,00,00,00
"RawIPAllowedProtocols"=hex(7):30,00,00,00,00,00
"NTEContextList"=hex(7):00,00
"DhcpIPAddress"="0.0.0.0"
"DhcpSubnetMask"="255.0.0.0"

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tc
pip\Parameters\Interfaces\{2EA04AA5-93A6-437F-9153-
2F6834D3B795}]
"UseZeroBroadcast"=dword:00000000
"EnableDeadGWDetect"=dword:00000001
"EnableDHCP"=dword:00000000
"IPAddress"=hex(7):31,00,30,00,2e,00,32,00,2e,00,31,00,2e,00,31,
00,00,00,00,00
"SubnetMask"=hex(7):32,00,35,00,35,00,2e,00,32,00,35,00,35,00,2
e,00,32,00,35,\
  00,35,00,2e,00,30,00,00,00,00,00
"DefaultGateway"=hex(7):00,00
"DefaultGatewayMetric"=hex(7):00,00
"NameServer"=""
"Domain"=""
"DisableDynamicUpdate"=dword:00000000
"EnableAdapterDomainNameRegistration"=dword:00000000
"InterfaceMetric"=dword:00000001
"TCPAllowedPorts"=hex(7):30,00,00,00,00,00
"UDPAllowedPorts"=hex(7):30,00,00,00,00,00
"RawIPAllowedProtocols"=hex(7):30,00,00,00,00,00
"NTEContextList"=hex(7):30,00,78,00,30,00,30,00,30,00,30,00,30,0
0,30,00,30,00,\
  33,00,00,00,00,00
"DhcpServer"="255.255.255.255"
"Lease"=dword:00000e10
"LeaseObtainedTime"=dword:40b39c06
"T1"=dword:40b3a30e
"T2"=dword:40b3a854
"LeaseTerminatesTime"=dword:40b3aa16
"IPAutoconfigurationAddress"="0.0.0.0"
"IPAutoconfigurationMask"="255.255.0.0"
"IPAutoconfigurationSeed"=dword:00000000
"AddressType"=dword:00000000
"DhcpClassIdBin"=hex:
"TcpWindowSize"=dword:00040000

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tc
pip\Parameters\Interfaces\{61D33977-710F-4A7E-8D47-
4B482BC523F8}]
"UseZeroBroadcast"=dword:00000000
"EnableDHCP"=dword:00000000
"IPAddress"=hex(7):30,00,2e,00,30,00,2e,00,30,00,2e,00,30,00,00,
00,00,00
"SubnetMask"=hex(7):30,00,2e,00,30,00,2e,00,30,00,2e,00,30,00,0
0,00,00,00
"DefaultGateway"=hex(7):00,00
"EnableDeadGWDetect"=dword:00000001
"DontAddDefaultGateway"=dword:00000000

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tc
pip\Parameters\Interfaces\{7B215199-A3F3-4836-89A6-
390C5E70E801}]
"UseZeroBroadcast"=dword:00000000
"EnableDeadGWDetect"=dword:00000001
"EnableDHCP"=dword:00000001
"IPAddress"=hex(7):30,00,2e,00,30,00,2e,00,30,00,2e,00,30,00,00,
00,00,00
"SubnetMask"=hex(7):30,00,2e,00,30,00,2e,00,30,00,2e,00,30,00,0
0,00,00,00
"DefaultGateway"=hex(7):00,00
"DefaultGatewayMetric"=hex(7):00,00
"NameServer"=""
"Domain"=""
"DisableDynamicUpdate"=dword:00000000
"EnableAdapterDomainNameRegistration"=dword:00000000
"InterfaceMetric"=dword:00000001
"TCPAllowedPorts"=hex(7):30,00,00,00,00,00
"UDPAllowedPorts"=hex(7):30,00,00,00,00,00
"RawIPAllowedProtocols"=hex(7):30,00,00,00,00,00
"NTEContextList"=hex(7):00,00

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tc
pip\Parameters\Interfaces\{9A3AA6AC-5846-407E-8250-
F03B604966DC}]
"UseZeroBroadcast"=dword:00000000
"EnableDHCP"=dword:00000000
"IPAddress"=hex(7):30,00,2e,00,30,00,2e,00,30,00,2e,00,30,00,00,
00,00,00
"SubnetMask"=hex(7):30,00,2e,00,30,00,2e,00,30,00,2e,00,30,00,0
0,00,00,00
"DefaultGateway"=hex(7):00,00
"EnableDeadGWDetect"=dword:00000001
"DontAddDefaultGateway"=dword:00000000

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tc
pip\Parameters\Interfaces\{A32BB4A3-C9B2-4ADB-A65D-
18BB314BF7F0}]
"UseZeroBroadcast"=dword:00000000
"EnableDeadGWDetect"=dword:00000001
"EnableDHCP"=dword:00000000
"IPAddress"=hex(7):31,00,30,00,2e,00,31,00,2e,00,33,00,2e,00,31,
00,00,00,00,00
"SubnetMask"=hex(7):32,00,35,00,35,00,2e,00,32,00,35,00,35,00,2
e,00,32,00,35,\
  00,35,00,2e,00,30,00,00,00,00,00
"DefaultGateway"=hex(7):00,00
"DefaultGatewayMetric"=hex(7):00,00
"NameServer"=""
"Domain"=""
"DisableDynamicUpdate"=dword:00000000
"EnableAdapterDomainNameRegistration"=dword:00000000
"InterfaceMetric"=dword:00000001
"TCPAllowedPorts"=hex(7):30,00,00,00,00,00
"UDPAllowedPorts"=hex(7):30,00,00,00,00,00
"RawIPAllowedProtocols"=hex(7):30,00,00,00,00,00
"NTEContextList"=hex(7):00,00
"TcpWindowSize"=dword:00008000

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters\Interfaces\{A71EB7B5-37C6-42DB-BE8F-BB231FD1BE00}]
"UseZeroBroadcast"=dword:00000000
"EnableDeadGWDetect"=dword:00000001
"EnableDHCP"=dword:00000000
"IPAddress"=hex(7):31,00,30,00,30,00,2e,00,31,00,2e,00,31,00,2e,00,32,00,00,00,\
  00,00
"SubnetMask"=hex(7):32,00,35,00,35,00,2e,00,32,00,35,00,35,00,2e,00,32,00,35,\
  00,35,00,2e,00,30,00,00,00,00,00
"DefaultGateway"=hex(7):00,00
"DefaultGatewayMetric"=hex(7):00,00
"NameServer"=""
"Domain"=""
"DisableDynamicUpdate"=dword:00000000
"EnableAdapterDomainNameRegistration"=dword:00000000
"InterfaceMetric"=dword:00000001
"TCPAllowedPorts"=hex(7):30,00,00,00,00,00
"UDPAllowedPorts"=hex(7):30,00,00,00,00,00
"RawIPAllowedProtocols"=hex(7):30,00,00,00,00,00
"NTEContextList"=hex(7):30,00,78,00,30,00,30,00,30,00,30,00,30,00,30,00,\
  32,00,00,00,00,00
"DhcpServer"="255.255.255.255"
"Lease"=dword:00000e10
"LeaseObtainedTime"=dword:40b5ddc1
"T1"=dword:40b5e4c9
"T2"=dword:40b5ea0f
"LeaseTerminatesTime"=dword:40b5ebd1
"IPAutoconfigurationAddress"="0.0.0.0"
"IPAutoconfigurationMask"="255.255.0.0"
"IPAutoconfigurationSeed"=dword:00000000
"AddressType"=dword:00000000
"TcpWindowSize"=dword:00040000

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters\Interfaces\{BEABCC14-9C0A-4BE9-9817-14C4092418D3}]
"UseZeroBroadcast"=dword:00000000
"EnableDeadGWDetect"=dword:00000001
"EnableDHCP"=dword:00000000
"IPAddress"=hex(7):31,00,30,00,2e,00,31,00,2e,00,32,00,2e,00,31,00,00,00,00,00
"SubnetMask"=hex(7):32,00,35,00,35,00,2e,00,32,00,35,00,35,00,2e,00,32,00,35,\
  00,35,00,2e,00,30,00,00,00,00,00
"DefaultGateway"=hex(7):00,00
"DefaultGatewayMetric"=hex(7):00,00
"NameServer"=""
"Domain"=""
"DisableDynamicUpdate"=dword:00000000
"EnableAdapterDomainNameRegistration"=dword:00000000
"InterfaceMetric"=dword:00000001
"TCPAllowedPorts"=hex(7):30,00,00,00,00,00
"UDPAllowedPorts"=hex(7):30,00,00,00,00,00
"RawIPAllowedProtocols"=hex(7):30,00,00,00,00,00
"NTEContextList"=hex(7):00,00
"TcpWindowSize"=dword:00008000

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters\Interfaces\{CD3F7746-9E60-4E22-9A40-7BC6CC6B2E2E}]
"UseZeroBroadcast"=dword:00000000
"EnableDeadGWDetect"=dword:00000001
"EnableDHCP"=dword:00000001
"IPAddress"=hex(7):30,00,2e,00,30,00,2e,00,30,00,2e,00,30,00,00,00,00,00
"SubnetMask"=hex(7):30,00,2e,00,30,00,2e,00,30,00,2e,00,30,00,00,00,00,00
"DefaultGateway"=hex(7):00,00
"DefaultGatewayMetric"=hex(7):00,00
"NameServer"=""
"Domain"=""
"DisableDynamicUpdate"=dword:00000000
"EnableAdapterDomainNameRegistration"=dword:00000000
"InterfaceMetric"=dword:00000001
"TCPAllowedPorts"=hex(7):30,00,00,00,00,00
"UDPAllowedPorts"=hex(7):30,00,00,00,00,00
"RawIPAllowedProtocols"=hex(7):30,00,00,00,00,00
"NTEContextList"=hex(7):00,00
"TcpWindowSize"=dword:00008000
"DhcpIPAddress"="0.0.0.0"
"DhcpSubnetMask"="255.0.0.0"

tpcc_software_registry.reg

Windows Registry Editor Version 5.00

[HKEY_LOCAL_MACHINE\SOFTWARE\TPCC]
"dlvyLogPath"="c:\\InetPub\\wwwroot\\tpcc\\"
"dlvyQueueLen"=dword:00004e20
"nullDB"=dword:00000001
"htmlTrace"=dword:00000000
"dbName"="oratpcc.world"
"errorLogFile"="c:\\inetpub\\wwwroot\\tpcc\\isapi_err.log"
"htmlTraceLogFile"="c:\\inetpub\\wwwroot\\tpcc\\isapi.log"
"numUsers"=dword:00007918
"dbType"="ORACLE"
"dbUserName"="tpcc"
"dbPassword"="tpcc"
"dbInterfacePath"="C:\\inetpub\\wwwroot\\tpcc\\oracleglue.dll"
"dlvyQueueThreshold"=dword:0000000a
"dlvyThreads"=dword:00000003
"dynamicDlvy"=dword:00000001
"OraComServLog"="c:\\inetpub\\wwwroot\\tpcc\\server_print.out"
"OracleHome"="c:/Ora10g/"
"isapi_trace"=dword:00000000
"numPools"=dword:00000001
"numServers"=dword:00000001
"numWarehouse"=dword:00000a88

W3SVC_registry.reg

W3SVC_registry.reg

Windows Registry Editor Version 5.00

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC]
"Type"=dword:00000020
"Start"=dword:00000002
"ErrorControl"=dword:00000001
"ImagePath"=hex(2):43,00,3a,00,5c,00,57,00,49,00,4e,00,4e,00,54,00,5c,00,53,00,\

79,00,73,00,74,00,65,00,6d,00,33,00,32,00,5c,00,69,00,6e,00,65,00,74,00,73,\

00,72,00,76,00,5c,00,69,00,6e,00,65,00,74,00,69,00,6e,00,66,00,6f,00,2e,00,\
  65,00,78,00,65,00,00,00
"DisplayName"="World Wide Web Publishing Service"
"DependOnService"=hex(7):49,00,49,00,53,00,41,00,44,00,4d,00,49,00,4e,00,00,00,\
  00,00
"DependOnGroup"=hex(7):00,00
"ObjectName"="LocalSystem"
"Description"="Provides Web connectivity and administration through the Internet Information Services snap-in."
"FailureActions"=hex:ff,ff,ff,ff,00,00,00,00,00,00,00,00,03,00,00,00,60,84,0b,\

00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00
,00,00,00

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\ASP]
"NOTE"="This is for backward compatibility only."

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\ASP\Parameters]

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\Parameters]
"MajorVersion"=dword:00000005
"MinorVersion"=dword:00000000
"InstallPath"="C:\\WINNT\\System32\\inetsrv"
"CertMapList"="C:\\WINNT\\System32\\inetsrv\\iiscrmap.dll"
"AccessDeniedMessage"="Error: Access is Denied."
"Filter DLLs"=""
"LogFileDirectory"="C:\\WINNT\\System32\\LogFiles"

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\Parameters\ADCLaunch]

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\Parameters\ADCLaunch\AdvancedDataFactory]

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\Parameters\ADCLaunch\RDSServer.DataFactory]

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\Parameters\Script Map]

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\Parameters\Virtual Roots]
"/"="c:\\inetpub\\wwwroot,,201"
"/Scripts"="c:\\inetpub\\scripts,,204"
"/IISHelp"="c:\\winnt\\help\\iishelp,,201"
"/IISAdmin"="C:\\WINNT\\System32\\inetsrv\\iisadmin,,201"
"/IISSamples"="c:\\inetpub\\iissamples,,201"
"/MSADC"="c:\\program files\\common files\\system\\msadc,,205"
"/_vti_bin"="C:\\Program Files\\Common Files\\Microsoft Shared\\Web Server Extensions\\40\\isapi,,205"
"/Printers"="C:\\WINNT\\web\\printers,,201"
"/tpcc"="C:\\Inetpub\\wwwroot\\tpcc,,207"

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\Performance]
"Library"="w3ctrs.dll"
"Open"="OpenW3PerformanceData"
"Close"="CloseW3PerformanceData"
"Collect"="CollectW3PerformanceData"
"Last Counter"=dword:000008e6
"Last Help"=dword:000008e7
"First Counter"=dword:00000844
"First Help"=dword:00000845
"Library Validation Code"=hex:4a,82,e5,79,9f,41,c4,01,10,3d,00,00,00,00,00,00
"WbemAdapFileTime"=hex:00,9a,a9,c0,5f,3f,c4,01
"WbemAdapFileSize"=dword:00003d10
"WbemAdapStatus"=dword:00000000

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\Security]
"Security"=hex:01,00,14,80,a0,00,00,00,ac,00,00,00,14,00,00,00,30,00,00,00,02,\

00,1c,00,01,00,00,00,02,80,14,00,ff,01,0f,00,01,01,00,00,00,00,00,01,00,00,\

00,00,02,00,70,00,04,00,00,00,00,00,18,00,fd,01,02,00,01,01,00,00,00,00,00,\

05,12,00,00,00,74,00,6f,00,00,00,1c,00,ff,01,0f,00,01,02,00,00,00,00,00,05,\

20,00,00,00,20,02,00,00,72,00,73,00,00,00,18,00,8d,01,02,00,01,01,00,00,00,\

00,00,05,0b,00,00,00,20,02,00,00,00,00,1c,00,fd,01,02,00,01,02,00,00,00,00,\

00,05,20,00,00,00,23,02,00,00,72,00,73,00,01,01,00,00,00,00,00,05,12,00,00,\
00,01,01,00,00,00,00,00,05,12,00,00,00

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\Enum]
"0"="Root\\LEGACY_W3SVC\\0000"
"Count"=dword:00000001
"NextInstance"=dword:00000001

B.3 AIX Parameters

IBM eServer p5 570

IBM eServer pSeries modelname IBM,9117-570

OS PARAMETERS

SW_dist_intr false Enable SW distribution of interrupts True
autorestart true Automatically REBOOT system after a crash True
boottype disk N/A False
capacity_inc 100 Processor capacity increment False
capped true Partition is capped False
conslogin enable System Console Login False
cpuguard enable CPU Guard True
dedicated true Partition is dedicated False
ent_capacity 800 Entitled processor capacity False
frequency 0 System Bus Frequency False
fullcore false Enable full CORE dump True
fwversion IBM,SF220_001 Firmware version and revision levels False
id_to_partition 0X800003C9D0B00002 Partition ID False
id_to_system 0X800003C9D0B00000 System ID False
iostat false Continuously maintain DISK I/O history True
keylock normal State of system keylock at boot time False
max_capacity 800 Maximum potential processor capacity False
max_logname 9 Maximum login name length at boot time True
maxbuf 20 Maximum number of pages in block I/O BUFFER CACHE True
maxmbuf 0 Maximum Kbytes of real memory allowed for MBUFS True
maxpout 0 HIGH water mark for pending write I/Os per file True
maxuproc 28000 Maximum number of PROCESSES allowed per user True

```
min_capacity    100             Minimum potential processor capacity
False
minpout         0               LOW water mark for pending write I/Os
per file    True
modelname       IBM,9117-570    Machine name
False
ncargs          20              ARG/ENV list size in 4K byte blocks
True
pre430core      false           Use pre-430 style CORE dump
True
pre520tune      disable         Pre-520 tuning compatibility mode
True
realmem         263716864       Amount of usable physical memory
in Kbytes       False
rtasversion     1               Open Firmware RTAS version
False
systemid        IBM,02102D53F   Hardware system identifier
False
variable_weight 0               Variable processor capacity weight
False
        memory_frames = 65929216
      pinnable_frames = 4439838
              maxfree = 128
              minfree = 120
             minperm% = 20
              minperm = 937696
             maxperm% = 80
              maxperm = 3750790
       strict_maxperm = 0
              maxpin% = 99
               maxpin = 65859748
           maxclient% = 80
            lrubucket = 131072
                defps = 1
            nokilluid = 0
            numpsblks = 131072
              npskill = 1024
              npswarn = 4096
             v_pinshm = 1
pta_balance_threshold = n/a
          pagecoloring = n/a
             framesets = 2
              mempools = 1
            lgpg_size = 16777216
         lgpg_regions = 14998
     num_spec_dataseg = 0
     spec_dataseg_int = 512
      memory_affinity = 1
            htabscale = n/a
  force_relalias_lite = 0
  relalias_percentage = 0
           rpgcontrol = 2
             rpgclean = 0
            npsrpgmin = 6144
            npsrpgmax = 8192
                scrub = 0
           scrubclean = 0
          npsscrubmin = 6144
          npsscrubmax = 8192
data_stagger_interval = 161
 large_page_heap_size = 1073741824
    kernel_heap_psize = 16777216
soft_min_lgpgs_vmpool = 1
 vm_modlist_threshold = -1
      vmm_fork_policy = 1
```

Appendix - C: Database Setup Code

C.1 Database Creation Scripts

createuser.sh

```
#!/bin/sh
echo Creating user tpcc...
$tpcc_sqlplus $tpcc_dba_user_pass @$tpcc_sql_dir/createuser >
junk 2>&1
if test $? -ne 0
then
  exit 1;
else
  exit 0;
fi
```

createts.sh

```
#created automatically by
/home/oracle/bench/tpcc31000/scripts/buildcreatets.sh Wed Oct 29
18:06:59 CST 2003
# Tablespace ware, ts size 125M (127720K)
# each file 130M (133120K)
# extents 131072K (131072K)
# 1 files

$tpcc_createts ware 1 1       65M 65535K  unix 0       0 1 2K t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for ware failed.  Exiting.
      exit 0
    fi
# Tablespace cust, ts size 739G (774060608K)
# each file 16090M (16476160K)
# extents 154401K (154401K)
# 47 files

$tpcc_createts cust 49 1       15603M 149727K unix 0       1 1 auto t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for cust failed.  Exiting.
      exit 0
    fi
# Tablespace dist, ts size 2G (1277200K)
# each file 1260M (1290240K)
# extents 1288192K (1288192K)
# 1 files

$tpcc_createts dist 1 1       72M 73610K unix 0       48 1 2K t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for dist failed.  Exiting.
      exit 0
    fi
# Tablespace hist, ts size 95G (98997570K)
# each file 16120M (16506880K)
# extents 100864K (100864K)
# 6 files

$tpcc_createts hist 8 1       15346M 96021K unix 0       49 1 auto t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for hist failed.  Exiting.
      exit 0
    fi
# Tablespace stok, ts size 1108G (1161090908K)
# each file 16210M (16599040K)
# extents 232750K (232750K)
# 70 files

$tpcc_createts stok 74 1       15644M 224623K unix 0       55 1 auto t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for stok failed.  Exiting.
      exit 0
    fi
# Tablespace item, ts size 16M (15868K)
# each file 30M (30720K)
# extents 28672K (28672K)
# 1 files

$tpcc_createts item 1 1       30M 28672K unix 0       125 1 2K t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for item failed.  Exiting.
      exit 0
    fi
# Tablespace ordr, ts size 1367G (1433112950K)
# each file 63620M (65146880K)
# extents 101245K (101245K)
# 22 files

$tpcc_createts ordr 22 1       63620M 101245K unix 0       126 1 16K
t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for ordr failed.  Exiting.
      exit 0
    fi

# Tablespace nord, ts size 27G (27694160K)
# each file 13530M (13854720K)
# extents 100841K (100841K)
# 2 files

$tpcc_createts nord 2 1       4884M 36406K unix 0       148 1 auto t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for nord failed.  Exiting.
      exit 0
    fi
# Tablespace iware, ts size 38M (38750K)
# each file 50M (51200K)
# extents 745K (745K)
# 1 files

$tpcc_createts iware 1 1       50M  745K unix 0       150 1 auto t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for iware failed.  Exiting.
      exit 0
    fi
# Tablespace icust1, ts size 28G (28520000K)
# each file 13940M (14274560K)
# extents 222000K (222000K)
# 2 files

$tpcc_createts icust1 2 1       12224M 194672K unix 0       151 1
auto t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for icust1 failed.  Exiting.
      exit 0
    fi
# Tablespace icust2, ts size 170G (177901250K)
# each file 15800M (16179200K)
# extents 251760K (251760K)
# 11 files

$tpcc_createts icust2 11 1       4693M  74779K unix 0       153 1 auto
t
    if expr $? != 0 > /dev/null; then
      echo Creating tablespace for icust2 failed.  Exiting.
      exit 0
    fi
# Tablespace idist, ts size 152M (155000K)
# each file 160M (163840K)
```

```
# extents 2417K (2417K)
# 1 files

$tpcc_createts idist 1 1       7M   105K unix 0       164 1 auto t
   if expr $? != 0 > /dev/null; then
     echo Creating tablespace for idist failed.  Exiting.
     exit 0
   fi
# Tablespace istok, ts size 78G (80987500K)
# each file 15830M (16209920K)
# extents 252240K (252240K)
# 5 files

$tpcc_createts istok 5 1       14035M 223637K unix 0       165 1 auto
t
   if expr $? != 0 > /dev/null; then
     echo Creating tablespace for istok failed.  Exiting.
     exit 0
   fi
# Tablespace iitem, ts size 3M (2560K)
# each file 10M (10240K)
# extents 2189K (2189K)
# 1 files

$tpcc_createts iitem 1 1       2M 437K unix 0       170 1 auto t
   if expr $? != 0 > /dev/null; then
     echo Creating tablespace for iitem failed.  Exiting.
     exit 0
   fi
# Tablespace iordr2, ts size 54G (55587650K)
# each file 13580M (13905920K)
# extents 101217K (101217K)
# 4 files

$tpcc_createts iordr2 4 1       13489M 100538K unix 0       171 1
auto t
   if expr $? != 0 > /dev/null; then
     echo Creating tablespace for iordr2 failed.  Exiting.
     exit 0
   fi
# Tablespace temp, ts size 340G (355802500K)
# each file 15800M (16179200K)
# extents 203763K (203763K)
# 22 files

$tpcc_createts temp 22 1       15800M 203763K unix 1       175 1
auto t
   if expr $? != 0 > /dev/null; then
     echo Creating tablespace for temp failed.  Exiting.
     exit 0
   fi
```

addfile.sh

```
#!/bin/sh
# $1 = tablespace name
# $2 = filename
# $3 = size
# $4 = temporary ts (1) or not (0)
# global variable $tpcc_listfiles, does not execute sql

if expr x$tpcc_listfiles = xt > /dev/null; then
  echo $2 $3 >> $tpcc_bench/files.dat
  exit 0
fi

if expr $4 = 1 > /dev/null; then
  altersql="alter tablespace $1 add tempfile '$2' size $3 reuse;"
else
  altersql="alter tablespace $1 add datafile '$2' size $3 reuse
autoextend on;"
fi

$tpcc_sqlplus $tpcc_user_pass <<!
   spool addfile_$1.log
   set echo on
  $altersql
   set echo off
   spool off
   exit ;
!
```

addts.sh

```
#!/bin/sh
# $1 = tablespace name
# $2 = filename
# $3 = size
# $4 = uniform size
# $5 = block size
# $6 = temporary ts (1) or not (0)
# $7 = bitmapped manage (t) or not (f) or (d) for dictionary
# global variable $tpcc_listfiles, does not execute sql

if expr x$tpcc_listfiles = xt > /dev/null; then
  echo $2 $3 >> $tpcc_bench/files.dat
  exit 0
fi

if expr $5 = auto > /dev/null; then
  bssql=
else
  bssql="blocksize $5"
fi

if expr $6 = 1 > /dev/null; then
  createsql="create temporary tablespace $1 tempfile '$2' size $3
reuse extent management local uniform size $4;"
else
  if expr x$7 = xt > /dev/null; then
    createsql="create tablespace $1 datafile '$2' size $3 reuse extent
management local uniform size $4 segment space management
auto $bssql nologging ;"
  else
    if expr x$7 = xd > /dev/null; then
      createsql="create tablespace $1 datafile '$2' size $3 reuse
extent management dictionary nologging $bssql;"
    else
      createsql="create tablespace $1 datafile '$2' size $3 reuse
extent management local uniform size $4 segment space
management manual $bssql nologging ;"
    fi
  fi
fi

$tpcc_sqlplus $tpcc_user_pass <<!
   spool createts_$1.log
   set echo on
   drop tablespace $1 including contents;
 $createsql
   set echo off
   spool off
   exit ;
!
```

assigntemp.sh

```
#!/bin/sh

echo Assigning temporary tablespace to user tpcc...
$tpcc_sqlplus $tpcc_dba_user_pass @$tpcc_sql_dir/assigntemp >
junk 2>&1
```

```
if test $? -ne 0
then
  exit 1;
else
  exit 0;
fi
```

stepenv.sh

```
# forces any env variables we set to be exported
set -a
tpcc_kit=t
tpcc_bench=$PWD
tpcc_scripts=$tpcc_bench/scripts
tpcc_require=$tpcc_scripts/require_vars.sh
tpcc_lcm=$tpcc_scripts/lcm.sh
tpcc_tokilobytes=$tpcc_scripts/tokilobytes.sh
tpcc_fromkilobytes=$tpcc_scripts/fromkilobytes.sh
tpcc_estsize=$tpcc_scripts/estsize.sh
tpcc_notneg=$tpcc_scripts/notneg.sh
tpcc_isneg=$tpcc_scripts/isneg.sh


# need a better way to check for bc, may
# resort to checking each directory in path
# if this doesn't work
#11/7/02 - alex.ni this is causing too many problems
#because systems have bc in some odd place.  typically
#mangled cygwin installs w/ mksnt/cygwin mixes
#if test -x /usr/bin/bc -o -x /bin/bc; then
tpcc_bcexpr=$tpcc_scripts/bcexpr.sh
#else
#tpcc_bcexpr=expr
#fi


# the ksh version is a bit faster, so we want
# to use it if we have ksh.  Otherwise we have
# a compatible version.
#if test -x /bin/ksh; then
#tpcc_createts=$tpcc_scripts/createts.ksh
#else
tpcc_createts=$tpcc_scripts/createts.sh
#fi

tpcc_tabledata=$tpcc_scripts/tabledata.sh
tpcc_load=$tpcc_bench/benchrun/bin/tpccload.exe
tpcc_createtablespaces=$tpcc_scripts/createtablespaces.sh

##
tpcc_sqlplus=cat
tpcc_sqlplus_args='/nolog'
tpcc_internal_connect='connect / as sysdba'
tpcc_user_pass='tpcc/tpcc'
tpcc_dba_user_pass='system/manager'
oracle_dba=system
oracle_dba_password=manager
tpcc_sqlplus_args=
tpcc_user_pass=
tpcc_sqlplus=sqlplus
tpcc_user_pass='tpcc/tpcc'

# import options generated by gui
. ${tpcc_bench}/options.sh

#8gb oracle filesize limit (in k)
tpcc_fsize_limit_k=8388608
#2gb - 1k oracle extent limit (in k)
tpcc_extent_limit_k=2097151

# Runlen calculations should be in hours, but
# this was the old calculation, which assumed
# minutes, and also 8 times:
# tpcc_runlen=`$tpcc_bcexpr 8 \* 60 \* $tpcc_runlen`
# we just want to keep the value as it is.

tpcc_system_size=200M
tpcc_logfile_size=`$tpcc_bcexpr 20 + \( $tpcc_scale \)`M

tpcc_undo_size=`$tpcc_bcexpr 2 \* $tpcc_scale`
if test $tpcc_undo_size -gt 8096; then
  tpcc_undo_size=8096
fi
tpcc_undo_size="${tpcc_undo_size}M"

tpcc_undo_bs=8K

tpcc_statspack_size=`$tpcc_bcexpr 1 \* $tpcc_scale`
if test $tpcc_statspack_size -gt 2048; then
  tpcc_statspack_size=2048
fi
tpcc_statspack_size="${tpcc_statspack_size}M"

tpcc_sysaux_size=120M

# fixed table params

#table list (note temp is always at the end since it may use numbers
from other tables, and it's not included in these lists)
tpcc_table_list='ware cust dist hist stok item ordr ordl nord'
tpcc_index_list='iware icust1 icust2 idist istok iitem iordr1 iordr2 iordl
inord'
#for these I use average row length, calculated from multi-blocksize
stats.
#we figure out how many new rows we will gain in a run (in
createtablesspaces.sh)
#and add that much to the base tablespace size.
tpcc_hist_growth=51
tpcc_ordr_growth=35
tpcc_nord_growth=13
#tpcc_ordl_growth=660
tpcc_ordl_growth=900

#i started indices at 1/10th... need an exact figure
tpcc_iordr1_growth=20
tpcc_iordr2_growth=20
tpcc_iordl_growth=66
tpcc_inord_growth=2

tpcc_item_growth=0
tpcc_iitem_growth=0
tpcc_temp_growth=0

tpcc_cust_growth=regular
tpcc_icust1_growth=regular
tpcc_icust2_growth=regular

tpcc_stok_growth=regular
tpcc_istok_growth=regular

tpcc_ware_growth=regular
tpcc_iware_growth=regular

tpcc_dist_growth=regular
tpcc_idist_growth=regular

# minimum size of temp tablespace
tpcc_tempts_min=10240

# for Linux, set appropriate tablespace heuristics
# to set high io tables to have 64 files, and minimize
# others.
if expr $tpcc_os = linux > /dev/null; then
```

```
#  for table in $tpcc_table_list $tpcc_index_list temp; do
#    eval "tpcc_${table}_tsfileinc=1"
#  done
  tpcc_os=unix

#  tpcc_stok_tsfileinc=64
#  tpcc_cust_tsfileinc=64
#  tpcc_iordl2_tsfileinc=16
#  tpcc_icust2_tsfileinc=16
#  tpcc_iordl_tsfileinc=16
else
#in case someone changes out of linux, and the shell is stuck
  for table in $tpcc_table_list $tpcc_index_list temp; do
    eval "tpcc_${table}_tsfileinc="
  done
fi
  tpcc_stok_tsfileinc=
  tpcc_cust_tsfileinc=
  tpcc_iordl2_tsfileinc=
  tpcc_icust2_tsfileinc=
  tpcc_iordl_tsfileinc=
#fi



# import local options
. ${tpcc_bench}/localoptions.sh

if expr `echo x$tpcc_no_options` = xt > /dev/null; then
  echo Please modify ${tpcc_bench}/localoptions.sh to configure the
generator.
  exit 1
fi

tpcc_fixordrordl=${tpcc_genscripts_dir}/loadfixordrordl.sh
tpcc_updateordrordl=${tpcc_scripts}/updateordrordl.sh

#tp- get table param.  (that is, $tpcc_tablename_tableparam)
tp(){
  eval echo \"\"\$tpcc_$1_$2\"\"
}

# automatically generated variables
if expr `echo $tpcc_version | cut -b1` = t > /dev/null; then
  tpcc_auto_undo=t
else
  tpcc_auto_undo=f
fi
if expr `echo $tpcc_version | cut -b2` = t > /dev/null; then
  tpcc_autospace_avail=t
else
  tpcc_autospace_avail=f
fi
if expr `echo $tpcc_version | cut -b3` = t > /dev/null; then
  tpcc_queue_avail=t
  tpcc_use_sysaux=t
else
  tpcc_queue_avail=f
  tpcc_use_sysaux=f
fi

# for NT, ORACLE does not like $variables in sql scripts, so we
must
# hardcode these things for it.
if test x$tpcc_os = xnt; then
  tpcc_hardcode=t
else
  tpcc_hardcode=f
fi

# if this is unset we need to make sure it's something anyway
if test x$tpcc_defbs = x; then
  tpcc_defbs=2
fi

# used for loading program
if test x$tpcc_hash_overflow = xt; then
  tpcc_hash_overflow=t
else
  unset tpcc_hash_overflow
fi
if test x$tpcc_overflow = xt; then
  tpcc_hash_overflow=t
else
  unset tpcc_hash_overflow
fi

tpcc_create_steps="buildtpccflags buildora buildcreatets
buildcreatedb \
buildcreatetable-ware buildcreatetable-cust buildcreatetable-dist
buildcreatetable-hist buildcreatetable-stok buildcreatetable-item
buildcreatetable-ordr buildcreatetable-ordl buildcreatetable-nord \
buildloadware buildloaddist buildloaditem buildloadhist buildloadnord
buildloadordrordl buildloadcust buildloadstok \
buildcreateindex-iware buildcreateindex-icust1 buildcreateindex-
icust2 buildcreateindex-idist buildcreateindex-istok buildcreateindex-
iitem buildcreateindex-iordr1 buildcreateindex-iordr2
buildcreateindex-iordl buildcreateindex-inord \
buildstoreprocsql buildspacestats listfiles
"

# remove runscript-loadfixordrordl - shuang, 030626

tpcc_steps="runsqllocal-createdb shutdowndb startupdb-p_build
createuser runscript-createts assigntemp ddview \
  runsql-createtable_ware runsql-createtable_cust runsql-
createtable_dist runsql-createtable_hist runsql-createtable_stok
runsql-createtable_item runsql-createtable_ordr runsql-
createtable_ordl runsql-createtable_nord \
runscript-loadware runscript-loaddist runscript-loaditem runscript-
loadhist runscript-loadnord runscript-loadordrordl runscript-loadcust
runscript-loadstok \
analyze runsql-createindex_iware runsql-createindex_icust1 runsql-
createindex_icust2 runsql-createindex_idist runsql-createindex_istok
runsql-createindex_iitem runsql-createindex_iordr1 runsql-
createindex_iordr2 runsql-createindex_iordl runsql-
createindex_inord \
createstats createstoredprocs createspacestats createmisc"



# no longer automatically exports env variables
set +a

# check for problems with configuration
badconf=
for table in $tpcc_table_list; do
  if expr `tp $table imp` = queue > /dev/null; then
    if expr $tpcc_queue_avail = f > /dev/null; then
    echo Table $table may not be a queue, since queues are
    echo are unavailable in the selected Oracle version.
    badconf=t
    fi
  fi
  if expr $tpcc_autospace_avail = f \& `tp $table autospace` = t >
/dev/null; then
     echo Table $table may not use bitmapped space management
     echo since it is not available in the selected Oracle version.
     badconf=t
  fi
done

if test -n "$badconf"; then
  exit 1
fi
```

```
# make sure we have everything
if $tpcc_require ORACLE_SID \
 tpcc_tokilobytes tpcc_createts tpcc_lcm\
 tpcc_sqlplus tpcc_internal_connect\
 tpcc_np tpcc_cpu tpcc_os tpcc_runlen tpcc_ldrive tpcc_scale
tpcc_disks_location tpcc_auto_undo tpcc_tempts_min\
 tpcc_system_size tpcc_logfile_size\
 tpcc_undo_size tpcc_undo_bs\
 oracle_dba oracle_dba_password tpcc_dba_user_pass
then exit 1; fi

if test x$tpcc_hardcode != xt; then
  tpcc_disks_location=${tpcc_disks_location}/
#  tpcc_sql_dir='$tpcc_sql_dir'
#  tpcc_statspack_size='$tpcc_statspack_size'
#  tpcc_genscripts_dir='$tpcc_genscripts_dir'
fi
```

driver.sh

```
#!/bin/sh

. ./stepenv.sh

if expr $# \< 1 > /dev/null; then
  echo "$0 <starting stepname> <optional: only>"
  echo OR use:
  echo "$0 buildcreate  - to build the database creation scripts"
  echo "$0 create       - to create the database (after buildcreate)"
  echo "$0 steps        - to list individual steps"
  exit 1
fi

if expr x$1 = xsteps > /dev/null; then
  echo stepnames are from creation scripts: $tpcc_create_steps
  echo
  echo or running steps: $tpcc_steps
  echo "use the 'only' option to only do that step (otherwise all steps
after will also be executed.)"
  echo "   (e.g.  $0 listfiles only)"
  echo "use the 'through' option to do a sequence of steps
(inclusively.)"
  echo "   (e.g.  $0 shutdowndb through startupdb-p_build)"
  exit 1
fi

startstep=$1
controlcmd=$2
endstep=$3

# Aliases for special steps
if test $startstep = buildcreate; then
  startstep=`echo $tpcc_create_steps | cut -d' ' -f1`
fi

if test $startstep = create; then
  startstep=`echo $tpcc_steps | cut -d' ' -f1`
fi

if test "x$controlcmd" = x; then
  endstep=
  # Since endstep is null it won't match any other steps, so we keep
going.
elif test "x$controlcmd" = xonly; then
  controlcmd=only
  # this is allowed
elif test "x$controlcmd" = xthrough; then
  actualstep=f
  for step in $tpcc_create_steps $tpcc_steps ; do
    if test "x$step" = "x$endstep"; then
      actualstep=t
    fi
  done
  if test $actualstep = f; then
    echo "Invalid step $endstep.  Use $0 steps  to show steps."
    exit 1
  fi
else
  echo "Invalid syntax.  Use $0 by itself for help."
  exit 1
fi

echo Starting from step: $startstep

dostep=f
for step in $tpcc_create_steps $tpcc_steps ; do
  if expr $step = $startstep > /dev/null; then
    dostep=t
  fi

  if expr $dostep = t > /dev/null; then
    echo $step
    cd $tpcc_bench
    $tpcc_scripts/`echo $step | cut -d- -f1`.sh `echo $step | sed -e's/-
*$/-/' | cut -d- -f2- | sed -e's/-/ /g'`
    lasterror=$?
    cd $tpcc_bench
    if test -n "`find $tpcc_bench/scripts -name '*.log'`"; then
   mv -f *.log `find $tpcc_bench/scripts -name '*.log'`
$tpcc_bench/log/
    else
        mv -f *.log $tpcc_bench/log/
    fi

    if expr $lasterror != 0 > /dev/null; then
      if expr $lasterror != 99 > /dev/null; then
        echo Step $step failed.  Stopping driver.
        exit 1
      else
        echo Step $step has completed and requested stop.  Stopping
driver.
        exit 0
      fi
    fi
    if test "x$controlcmd" = xonly; then
      exit 0
    fi
    if test "x$endstep" = "x$step"; then
      echo The driver reached the last desired step.  Stopping driver.
      exit 0
    fi
  fi
done

if expr $dostep = f > /dev/null; then
  echo No such step: $1
fi
```

loadware.sh

```
cd $tpcc_bench
$tpcc_load -M $tpcc_scale -w > loadware.log 2>&1
```

loaddist.sh

```
cd $tpcc_bench
$tpcc_load -M $tpcc_scale -d > loaddist.log 2>&1
```

loaditem.sh

```
cd $tpcc_bench
```

```
$tpcc_load -M $tpcc_scale -i > loaditem.log 2>&1
```

loadhist.sh

```
#created automatically by
/home/oracle/bench/tpcc31000/scripts/evenload.sh Wed Oct 29
18:08:08 CST 2003
rm -f loadhist*.log
cd $tpcc_bench
allprocs=
$tpcc_load -M 31000 -h  -b 1 -e 15500 >> loadhist0.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 31000 -h  -b 15501 -e 31000 >> loadhist1.log 2>&1 &
allprocs="$allprocs ${!}"
error=0
for curproc in $allprocs; do
  wait $curproc
  error=`expr $? + $error`
done
exit `expr $error != 0`
```

loadnord.sh

```
#created automatically by
/home/oracle/bench/tpcc31000/scripts/evenload.sh Wed Oct 29 18:08:08
CST 2003
rm -f loadnord*.log
cd $tpcc_bench
allprocs=
$tpcc_load -M 31000 -n  -b 1 -e 3875 >> loadnord0.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 31000 -n  -b 3876 -e 7750 >> loadnord1.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 31000 -n  -b 7751 -e 11625 >> loadnord2.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 31000 -n  -b 11626 -e 15500 >> loadnord3.log 2>&1
&
allprocs="$allprocs ${!}"
$tpcc_load -M 31000 -n  -b 15501 -e 19375 >> loadnord4.log 2>&1
&
allprocs="$allprocs ${!}"
$tpcc_load -M 31000 -n  -b 19376 -e 23250 >> loadnord5.log 2>&1
&
allprocs="$allprocs ${!}"
$tpcc_load -M 31000 -n  -b 23251 -e 27125 >> loadnord6.log 2>&1
&
allprocs="$allprocs ${!}"
$tpcc_load -M 31000 -n  -b 27126 -e 31000 >> loadnord7.log 2>&1
&
allprocs="$allprocs ${!}"
error=0
for curproc in $allprocs; do
  wait $curproc
  error=`expr $? + $error`
done
exit `expr $error != 0`
```

loadordrordl.sh

```
#created automatically by
/home/oracle/bench/tpcc31000/scripts/evenload.sh Wed Oct 29 18:08:08
CST 2003
rm -f loadordrordl3.log
cd $tpcc_bench
allprocs=
$tpcc_load -M 31000 -o ${tpcc_disks_location}dummy3.dat -b
11626 -e 15500 >> loadordrordl3.log 2>&1 &
error=0
for curproc in $allprocs; do
  wait $curproc
  error=`expr $? + $error`
done
exit `expr $error != 0`
```

loadcust.sh

```
#created automatically by
/home/oracle/bench/tpcc31000/scripts/evenload.sh Wed Oct 29 18:08:08
CST 2003
rm -f loadcust*.log
cd $tpcc_bench
allprocs=
$tpcc_load -M 31000 -c  -b 1 -e    3875 >> loadcust0.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 31000 -c  -b 3876 -e 7750 >> loadcust1.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 31000 -c  -b 7751 -e 11625 >> loadcust2.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 31000 -c  -b 11626 -e 15500 >> loadcust3.log 2>&1
&
allprocs="$allprocs ${!}"
$tpcc_load -M 31000 -c  -b 15501 -e 19375 >> loadcust4.log 2>&1
&
allprocs="$allprocs ${!}"
$tpcc_load -M 31000 -c  -b 19376 -e 23250 >> loadcust5.log 2>&1
&
allprocs="$allprocs ${!}"
$tpcc_load -M 31000 -c  -b 23251 -e 27125 >> loadcust6.log 2>&1
&
allprocs="$allprocs ${!}"
$tpcc_load -M 31000 -c  -b 27126 -e 31000 >> loadcust7.log 2>&1
&
allprocs="$allprocs ${!}"
error=0
for curproc in $allprocs; do
  wait $curproc
```

loadstoksh

```
#created automatically by
/home/oracle/bench/tpcc31000/scripts/evenload.sh Wed Oct 29 18:08:09
CST 2003
rm -f loadstok*.log
cd $tpcc_bench
allprocs=
$tpcc_load -M 31000 -S  -j 1 -k 50000 >> loadstok0.log 2>&1 &
allprocs="$allprocs ${!}"
$tpcc_load -M 31000 -S  -j 50001 -k 100000 >> loadstok1.log 2>&1
&
allprocs="$allprocs ${!}"
error=0
for curproc in $allprocs; do
  wait $curproc
  error=`expr $? + $error`
done
exit `expr $error != 0`
```

C.2 SQL Creation Scripts

createdb.sql

```
/* created automatically by
/home/oracle/bench/tpcc31000/scripts/buildcreatedb.sh Wed Oct 29
18:07:51 CST 2003 */
spool createdb.log

set echo on

shutdown abort
```

```
startup pfile=p_create.ora nomount
create database tpcc
  controlfile reuse
  maxinstances 1
  datafile
   '/dev/rtpc_lvsys1' size 200M reuse
  logfile '/dev/rtpc_lvlog1' size 31020M reuse,
          '/dev/rtpc_lvlog2' size 31020M reuse
  sysaux datafile '/dev/rtpc_lvaux1' size 120M reuse ;



create undo tablespace undo_1 datafile
  '/dev/rtpc_lvroll1' size 8096M reuse blocksize 8K;

set echo off
exit sql.sqlcode
```

createuser.sql

```
spool createusertpcc.log;

set echo on;

create user tpcc identified by tpcc;

grant dba to tpcc;

set echo off;
spool off;

exit ;
```

assigntemp.sql

```
spool assigntemp.log;

set echo on;

alter user tpcc temporary tablespace temp_0;

set echo off;
spool off;

exit ;
```

createtable_ware.sql

```
/* created automatically by
/home/oracle/bench/tpcc31000/scripts/buildcreatetable.sh Wed Oct 29
18:07:52 CST 2003 */
set timing on
    set sqlblanklines on
    spool createtable_ware.log
    set echo on
      drop cluster warecluster including tables ;

create cluster warecluster (
  w_id number
  )
  single table
  hashkeys 31000
  hash is ( (w_id - 1) )
  size 1536
    initrans 2
  storage ( buffer_pool default )
  tablespace ware_0;

create table ware (
   w_id number
 , w_ytd number
 , w_tax number
 , w_name varchar2(10)
 , w_street_1 varchar2(20)
 , w_street_2 varchar2(20)
 , w_city varchar2(20)
 , w_state char(2)
 , w_zip char(9)
 )
 cluster warecluster (
   w_id
 );
    set echo off
    spool off
    exit sql.sqlcode;
```

createtable_cust.sql

```
/* created automatically by
/home/oracle/bench/tpcc31000/scripts/buildcreatetable.sh Wed Oct 29
18:07:54 CST 2003 */
set timing on
    set sqlblanklines on
    spool createtable_cust.log
    set echo on
      drop cluster custcluster including tables ;

create cluster custcluster (
  c_id number
, c_d_id number
, c_w_id number
  )
  single table
  hashkeys 930000000
  hash is ( (c_id * ( 31000 * 10 ) + c_w_id * 10 + c_d_id) )
  size 350
  pctfree 0  initrans 3
  parallel 16
  storage ( buffer_pool recycle )
  tablespace cust_0;

create table cust (
  c_id number
, c_d_id number
, c_w_id number
, c_discount number
, c_credit char(2)
, c_last varchar2(16)
, c_first varchar2(16)
, c_credit_lim number
, c_balance number
, c_ytd_payment number
, c_payment_cnt number
, c_delivery_cnt number
, c_street_1 varchar2(20)
, c_street_2 varchar2(20)
, c_city varchar2(20)
, c_state char(2)
, c_zip char(9)
, c_phone char(16)
, c_since date
, c_middle char(2)
, c_data char(500)
)
cluster custcluster (
  c_id
, c_d_id
, c_w_id
);
    set echo off
```

```
   spool off
   exit sql.sqlcode;
```

createtable_dist.sql

```
/* created automatically by
/home/oracle/bench/tpcc31000/scripts/buildcreatetable.sh Wed Oct
29 18:07:57 CST 2003 */
set timing on
   set sqlblanklines on
   spool createtable_dist.log
   set echo on
     drop cluster distcluster including tables ;

create cluster distcluster (
  d_id number
, d_w_id number
  )
  single table
  hashkeys 310000
  hash is ( ((d_w_id * 10) + d_id) )
  size 170
    initrans 4
  storage ( buffer_pool default )
  tablespace dist_0;

create table dist (
  d_id number
, d_w_id number
, d_ytd number
, d_next_o_id number
, d_tax number
, d_name varchar2(10)
, d_street_1 varchar2(20)
, d_street_2 varchar2(20)
, d_city varchar2(20)
, d_state char(2)
, d_zip char(9)
)
cluster distcluster (
  d_id
, d_w_id
);
   set echo off
   spool off
   exit sql.sqlcode;
```

createtable_hist.sql

```
/* created automatically by
/home/oracle/bench/tpcc31000/scripts/buildcreatetable.sh Wed Oct
29 18:07:59 CST 2003 */
set timing on
   set sqlblanklines on
   spool createtable_hist.log
   set echo on
     drop table hist ;

create table hist (
  h_c_id number
, h_c_d_id number
, h_c_w_id number
, h_d_id number
, h_w_id number
, h_date date
, h_amount number
, h_data varchar2(24)
)
  pctfree 5  initrans 4
  storage ( buffer_pool recycle )
  tablespace hist_0 ;
    set echo off
    spool off
    exit sql.sqlcode;
```

createtable_stok.sql

```
/* created automatically by
/home/oracle/bench/tpcc31000/scripts/buildcreatetable.sh Wed Oct 29
18:08:00 CST 2003 */
set timing on
   set sqlblanklines on
   spool createtable_stok.log
   set echo on
     drop cluster stokcluster including tables ;

create cluster stokcluster (
  s_i_id number
, s_w_id number
  )
  single table
  hashkeys 3100000000
  hash is ( (s_i_id * 31000 + s_w_id) )
  size 350
  pctfree 0  initrans 3
  storage ( buffer_pool keep )
  tablespace stok_0;

create table stok (
  s_i_id number
, s_w_id number
, s_quantity number
, s_ytd number
, s_order_cnt number
, s_remote_cnt number
, s_data varchar2(50)
, s_dist_01 char(24)
, s_dist_02 char(24)
, s_dist_03 char(24)
, s_dist_04 char(24)
, s_dist_05 char(24)
, s_dist_06 char(24)
, s_dist_07 char(24)
, s_dist_08 char(24)
, s_dist_09 char(24)
, s_dist_10 char(24)
)
cluster stokcluster (
  s_i_id
, s_w_id
);
   set echo off
   spool off
   exit sql.sqlcode;
```

createtable_item.sql

```
/* created automatically by
/home/oracle/bench/tpcc31000/scripts/buildcreatetable.sh Wed Oct 29
18:08:03 CST 2003 */
set timing on
   set sqlblanklines on
   spool createtable_item.log
   set echo on
     drop cluster itemcluster including tables ;
```

```
create cluster itemcluster (
  i_id number(6,0)
  )
  single table
  hashkeys 100000
  hash is ( (i_id) )
  size 120
  pctfree 0  initrans 3
  storage ( buffer_pool keep )
  tablespace item_0;

create table item (
  i_id number(6,0)
, i_name varchar2(24)
, i_price number
, i_data varchar2(50)
```

createtable_ordl.sql

```
/* created automatically by
/home/oracle/bench/tpcc31000/scripts/buildcreatetable.sh Wed Oct 29
18:08:06 CST 2003 */
set timing on
    set sqlblanklines on
    spool createtable_ordl.log
    set echo on
        create table ordl (
    ol_w_id number
, ol_d_id number
, ol_o_id number sort
, ol_number number sort
, ol_i_id number
, ol_delivery_d date
, ol_amount number
, ol_supply_w_id number
, ol_quantity number
, ol_dist_info char(24)
   , constraint ordl_uk primary key (ol_w_id, ol_d_id, ol_o_id,
ol_number  )) CLUSTER ordrcluster_queue(ol_w_id, ol_d_id,
ol_o_id, ol_number) ;
    set echo off
    spool off
    exit sql.sqlcode;
```

createtable_nord.sql

```
/* created automatically by
/home/oracle/bench/tpcc31000/scripts/buildcreatetable.sh Wed Oct 29
18:08:07 CST 2003 */
set timing on
    set sqlblanklines on
    spool createtable_nord.log
    set echo on
        drop cluster nordcluster_queue including tables ;

  create cluster nordcluster_queue (
    no_w_id number
, no_d_id number
, no_o_id number SORT
    )

    hashkeys 310000
    hash is ( (no_w_id - 1) * 10 + no_d_id - 1 )
    size 190
    tablespace nord_0;

  create table nord (
    no_w_id number
, no_d_id number
, no_o_id number sort
    , constraint nord_uk primary key ( no_w_id
, no_d_id
, no_o_id )
  )
  cluster nordcluster_queue (
    no_w_id
, no_d_id
, no_o_id
  );
    set echo off
    spool off
    exit sql.sqlcode;
```

createindex_iware.sql

```
/* created automatically by
/home/oracle/bench/tpcc31000/scripts/buildcreateindex.sh Wed Oct 29
18:08:09 CST 2003 */
set timing on
    set sqlblanklines on
    spool createindex_iware.log ;
    set echo on ;
    drop index iware ;
      create unique index iware on ware ( w_id )
  pctfree 1  initrans 3
  storage ( buffer_pool default )
  parallel 4
  compute statistics
  tablespace iware_0 ;
    set echo off
    spool off
    exit sql.sqlcode;
```

createtable_icust1.sql

```
/* created automatically by
/home/oracle/bench/tpcc31000/scripts/buildcreateindex.sh Wed Oct 29
18:08:10 CST 2003 */
set timing on
    set sqlblanklines on
    spool createindex_icust1.log ;
    set echo on ;
    drop index icust1 ;
      create unique index icust1 on cust ( c_w_id
, c_d_id
, c_id )
  pctfree 1  initrans 3
  storage ( buffer_pool default )
  parallel 4
  compute statistics
  tablespace icust1_0 ;
    set echo off
    spool off
    exit sql.sqlcode;
```

createtable_icust2.sql

```
/* created automatically by
/home/oracle/bench/tpcc31000/scripts/buildcreateindex.sh Wed Oct 29
18:08:11 CST 2003 */
set timing on
    set sqlblanklines on
    spool createindex_icust2.log ;
    set echo on ;
    drop index icust2 ;
      create unique index icust2 on cust ( c_last
, c_w_id
, c_d_id
, c_first
, c_id )
  pctfree 1  initrans 3
  storage ( buffer_pool default )
  parallel 4
  compute statistics
```

```
  tablespace icust2_0 ;
    set echo off
    spool off
    exit sql.sqlcode;
```

createindex_idist.sql

```
/* created automatically by
/home/oracle/bench/tpcc31000/scripts/buildcreateindex.sh Wed Oct 29
18:08:12 CST 2003 */
set timing on
    set sqlblanklines on
    spool createindex_idist.log ;
    set echo on ;
    drop index idist ;
      create unique index idist on dist ( d_w_id
, d_id )
  pctfree 5  initrans 3
  storage ( buffer_pool default )
  parallel 4
  compute statistics
  tablespace idist_0 ;
    set echo off
    spool off
    exit sql.sqlcode;
```

createindex_istok.sql

```
/* created automatically by
/home/oracle/bench/tpcc31000/scripts/buildcreateindex.sh Wed Oct 29
18:08:12 CST 2003 */
set timing on
    set sqlblanklines on
    spool createindex_istok.log ;
    set echo on ;
    drop index istok ;
      create unique index istok on stok ( s_i_id
, s_w_id )
  pctfree 1  initrans 3
  storage ( buffer_pool default )
  parallel 4
  compute statistics
  tablespace istok_0 ;
    set echo off
    spool off
    exit sql.sqlcode;
```

createindex_iitem.sql

```
/* created automatically by
/home/oracle/bench/tpcc31000/scripts/buildcreateindex.sh Wed Oct 29
18:08:13 CST 2003 */
set timing on
    set sqlblanklines on
    spool createindex_iitem.log ;
    set echo on ;
    drop index iitem ;
      create unique index iitem on item ( i_id )
  pctfree 5  initrans 4
  storage ( buffer_pool default )
/*  parallel 4 */
  compute statistics
  tablespace iitem_0 ;
    set echo off
    spool off
    exit sql.sqlcode;
```

createindex_iordr2.sql

```
/* created automatically by
/home/oracle/bench/tpcc31000/scripts/buildcreateindex.sh Wed Oct 29
18:08:15 CST 2003 */
set timing on
    set sqlblanklines on
    spool createindex_iordr2.log ;
    set echo on ;
    drop index iordr2 ;
      create unique index iordr2 on ordr ( o_c_id
, o_d_id
, o_w_id
, o_id )
  pctfree 25  initrans 4
  storage ( buffer_pool default )
  parallel 4
  compute statistics
  tablespace iordr2_0 ;
    set echo off
    spool off
    exit sql.sqlcode;
```

createtable_ordr.sql

```
/* created automatically by
/home/oracle/bench/tpcc31000/scripts/buildcreatetable.sh Wed Oct 29
18:08:04 CST 2003 */
set timing on
    set sqlblanklines on
    spool createtable_ordr.log
    set echo on
       drop cluster ordrcluster_queue including tables ;

  create cluster ordrcluster_queue (
    o_w_id number
, o_d_id number
, o_id number SORT
, o_number number SORT
    )

    hashkeys 310000
    hash is ( (o_w_id - 1) * 10 + o_d_id - 1 )
    size 1490
    tablespace ordr_0;

  create table ordr (
    o_id number sort
, o_w_id number
, o_d_id number
, o_c_id number
, o_carrier_id number
, o_ol_cnt number
, o_all_local number
, o_entry_d date
    , constraint ordr_uk primary key ( o_w_id
, o_d_id
, o_id )
  )
  cluster ordrcluster_queue (
    o_w_id
, o_d_id
, o_id
  );
    set echo off
    spool off
    exit sql.sqlcode;
```

analyze.sql

```
spool analyze.log;
set echo on;
```

```
connect tpcc/tpcc


execute dbms_stats.GATHER_TABLE_STATS
(OWNNAME=>'TPCC', -
                        TABNAME=>'NORD', -
                        PARTNAME=>NULL, -
                        ESTIMATE_PERCENT=>1, -
                        BLOCK_SAMPLE=>TRUE, -
                        METHOD_OPT=>'FOR ALL COLUMNS
SIZE 1', -
                        DEGREE=>10, -
                        GRANULARITY=>'DEFAULT', -
                        CASCADE=>TRUE);




set echo off;
spool off;

exit sql.sqlcode;
```

createspacestats.sql

```
@space_init
@space_get 371044 31000
@space_rpt
spool off
exit sql.sqlcode;
```

createstoredprocs.sql

```
spool createstoreprocs.log
@tkvcinin.sql
spool off
exit sql.sqlcode;
```

C.3 Data Generation Code

tpccload.c

```
#ifdef RCSID
static char *RCSid =
  "$Header: tpccload.c 7030100.1 96/05/13 16:20:36 plai
Generic<base> $ Copyr (c) 1993 Oracle";
#endif /* RCSID */

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

+================================================
================+
| FILENAME
|   tpccload.c
| DESCRIPTION
|   Load or generate TPC-C database tables.
|   Usage: tpccload -M <# of wares> [options]
|            options: -A  load all tables
|                     -w  load ware table
|                     -d  load dist table
|                     -c  load cust table
|                     -i  load item table
|                     -s  load stok table (cluster around s_w_id)
|                     -S  load stok table (cluster around s_i_id)
|                     -h  load hist table
|                     -n  load new-order table
|                     -o <oline file> load order and order-line table
|                     -b <ware#>  beginning ware number
|                     -e <ware#>  ending ware 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 <time.h>
#include <sys/types.h>
#include "tpcc.h"

#ifdef ORA_NT
#undef boolean
#include <process.h>
#include "dpbcore.h"
# define gettime dpbtimef
# define getcpu  dpbcpu
#define lrand48() ((long)rand() <<15 | rand())
#ifdef __STDC__
#  define PROTO(args)    args
#else
#  define PROTO(args)    ()
#endif
#endif

#define DISTARR 10      /* dist insert array size*/
#define CUSTARR 100     /* cust insert array size  */
#define STOCARR 100     /* stok insert array size  */
#define ITEMARR 100     /* item insert array size  */
#define HISTARR 100             /* hist insert array size    */
#define ORDEARR 100             /* order insert array size      */
#define NEWOARR 100             /* new order insert array size  */

#define DISTFAC 10      /* max. dist id */
#define CUSTFAC 3000    /* max. cust id*/
#define STOCFAC 100000      /* max. stok 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 NOT_SERIALIZABLE  8177  /* ORA-08177: transaction not
serializable */
#define SNAPSHOT_TOO_OLD  1555  /* ORA-01555: snapshot too
old */
#define RECOVERR -10
#define IRRECERR -20

#define SQLTXTW "INSERT INTO ware (w_id, w_ytd, w_tax,
w_name, w_street_1, w_street_2, w_city, w_state, w_zip) VALUES
(:w_id, 30000000, :w_tax, :w_name, :w_street_1, \
   :w_street_2, :w_city, :w_state, :w_zip)"
```

```
#define SQLTXTD "INSERT INTO dist (d_id, d_w_id, d_ytd, d_tax,
d_next_o_id, d_name, d_street_1, d_street_2, d_city, d_state,
d_zip) VALUES (:d_id, :d_w_id,3000000, :d_tax, \

3001, :d_name, :d_street_1, :d_street_2, :d_city, :d_state, :d_zip)"

#define SQLTXTCQUERY "select count(*) from cust where c_w_id
= :s_c_w_id and c_d_id = :s_c_d_id and c_id = :s_c_id"

#define SQLTXTC "INSERT INTO cust (C_ID, C_D_ID, C_W_ID,
C_FIRST, C_MIDDLE, C_LAST, C_STREET_1, C_STREET_2,
C_CITY, C_STATE, C_ZIP, C_PHONE, C_SINCE, C_CREDIT,
C_CREDIT_LIM, C_DISCOUNT, C_BALANCE, C_YTD_PAYMENT,
C_PAYMENT_CNT, C_DELIVERY_CNT, C_DATA) VALUES
(:c_id, :c_d_id, :c_w_id, \
  :c_first, 'OE', :c_last, :c_street_1, :c_street_2, :c_city, :c_state, \
  :c_zip, :c_phone, SYSDATE, :c_credit, 5000000, :c_discount, -
1000, 1000, 1, \
  0, :c_data)"

#define SQLTXTH "INSERT INTO hist (h_c_id, h_c_d_id, h_c_w_id,
h_d_id, h_w_id, h_date, h_amount, h_data) VALUES
(:h_c_id, :h_c_d_id, :h_c_w_id, \
  :h_d_id, :h_w_id, SYSDATE, 1000, :h_data)"

#define SQLTXTSQUERY "select count(*) from stok where s_w_id
= :s_s_w_id and s_i_id = :s_s_i_id "

#define SQLTXTS "INSERT INTO stok (s_i_id, s_w_id,
s_quantity,s_dist_01, s_dist_02, s_dist_03, s_dist_04, s_dist_05 ,
s_dist_06, s_dist_07, s_dist_08, s_dist_09, s_dist_10, s_ytd,
s_order_cnt, s_remote_cnt, s_data) \
VALUES (:s_i_id, :s_w_id, :s_quantity, \
  :s_dist_01, :s_dist_02, :s_dist_03, :s_dist_04, :s_dist_05, :s_dist_
06, \
  :s_dist_07, :s_dist_08, :s_dist_09, :s_dist_10, 0, 0, 0, :s_data)" \

#define SQLTXTI "INSERT INTO item
(I_ID,I_IM_ID,I_NAME,I_PRICE,I_DATA) VALUES
(:i_id, :i_im_id, :i_name, :i_price, \
  :i_data)"

#define SQLTXTO1 "INSERT INTO ordr (O_ID,
O_D_ID,O_W_ID,O_C_ID,O_ENTRY_D,O_CARRIER_ID,O_OL_C
NT,O_ALL_LOCAL) \
  VALUES (:o_id, :o_d_id, :o_w_id, :o_c_id, \
  SYSDATE, :o_carrier_id, :o_ol_cnt, 1)"

#define SQLTXTO2 "INSERT INTO ordr (O_ID,
O_D_ID,O_W_ID,O_C_ID,O_ENTRY_D,O_CARRIER_ID,O_OL_C
NT,O_ALL_LOCAL) \
  VALUES (:o_id, :o_d_id, :o_w_id, :o_c_id, \
  SYSDATE, 11, :o_ol_cnt, 1)"

#define SQLTXTOL1 "INSERT INTO ordl (OL_O_ID, OL_D_ID,
OL_W_ID, OL_NUMBER, OL_DELIVERY_D, OL_I_ID,
OL_SUPPLY_W_ID, OL_QUANTITY, OL_AMOUNT,
OL_DIST_INFO) \
  VALUES (:ol_o_id, :ol_d_id, \
  :ol_w_id, :ol_number, SYSDATE, :ol_i_id, :ol_supply_w_id, 5, 0, \
  :ol_dist_info)"

#define SQLTXTOL2 "INSERT INTO ordl (OL_O_ID, OL_D_ID,
OL_W_ID, OL_NUMBER, OL_DELIVERY_D, OL_I_ID,
OL_SUPPLY_W_ID, OL_QUANTITY, OL_AMOUNT,
OL_DIST_INFO) \
  VALUES (:ol_o_id, :ol_d_id, \
  :ol_w_id, :ol_number, to_date('01-Jan-
1811'), :ol_i_id, :ol_supply_w_id, 5, :ol_amount, \
  :ol_dist_info)"

#define SQLTXTNO "INSERT INTO nord (no_o_id, no_d_id,
no_w_id) VALUES (:no_o_id, :no_d_id, :no_w_id)"

#define SQLTXTENHA "alter session set
\"_enable_hash_overflow\"=true"
#define SQLTXTDIHA "alter session set
\"_enable_hash_overflow\"=false"

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];

void initperm();
void randstr();
void randdatastr();
void randnum();
void randlastname (char*, int);
int NURand();
void sysdate();

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

OCIStmt *curw;
OCIStmt *curd;
OCIStmt *curc;
OCIStmt *curcs;
OCIStmt *curh;
OCIStmt *curs;
OCIStmt *curss;
OCIStmt *curi;
OCIStmt *curo1;
OCIStmt *curo2;
OCIStmt *curol1;
OCIStmt *curol2;
OCIStmt *curno;

OCIBind *w_id_bp = (OCIBind *) 0;
OCIBind *w_name_bp = (OCIBind *) 0;
OCIBind *w_street1_bp = (OCIBind *) 0;
OCIBind *w_street2_bp = (OCIBind *) 0;
OCIBind *w_city_bp = (OCIBind *) 0;
OCIBind *w_state_bp = (OCIBind *) 0;
OCIBind *w_zip_bp = (OCIBind *) 0;
OCIBind *w_tax_bp = (OCIBind *) 0;

OCIBind *d_id_bp = (OCIBind *) 0;
OCIBind *d_w_id_bp = (OCIBind *) 0;
OCIBind *d_name_bp = (OCIBind *) 0;
OCIBind *d_street1_bp = (OCIBind *) 0;
OCIBind *d_street2_bp = (OCIBind *) 0;
OCIBind *d_city_bp = (OCIBind *) 0;
OCIBind *d_state_bp = (OCIBind *) 0;
OCIBind *d_zip_bp = (OCIBind *) 0;
```

```
OCIBind *d_tax_bp = (OCIBind *) 0;

OCIDefine *s_c_ret_bp = (OCIDefine *) 0;
OCIBind *s_c_id_bp = (OCIBind *) 0;
OCIBind *s_c_d_id_bp = (OCIBind *) 0;
OCIBind *s_c_w_id_bp = (OCIBind *) 0;

OCIBind *c_id_bp = (OCIBind *) 0;
OCIBind *c_d_id_bp = (OCIBind *) 0;
OCIBind *c_w_id_bp = (OCIBind *) 0;
OCIBind *c_first_bp = (OCIBind *) 0;
OCIBind *c_last_bp = (OCIBind *) 0;
OCIBind *c_street1_bp = (OCIBind *) 0;
OCIBind *c_street2_bp = (OCIBind *) 0;
OCIBind *c_city_bp = (OCIBind *) 0;
OCIBind *c_state_bp = (OCIBind *) 0;
OCIBind *c_zip_bp = (OCIBind *) 0;
OCIBind *c_phone_bp = (OCIBind *) 0;
OCIBind *c_discount_bp = (OCIBind *) 0;
OCIBind *c_credit_bp = (OCIBind *) 0;
OCIBind *c_data_bp = (OCIBind *) 0;

OCIBind *i_id_bp = (OCIBind *) 0;
OCIBind *i_im_id_bp = (OCIBind *) 0;
OCIBind *i_name_bp = (OCIBind *) 0;
OCIBind *i_price_bp = (OCIBind *) 0;
OCIBind *i_data_bp = (OCIBind *) 0;

OCIDefine *s_s_ret_bp = (OCIDefine *) 0;
OCIBind *s_s_i_id_bp = (OCIBind *) 0;
OCIBind *s_s_w_id_bp = (OCIBind *) 0;

OCIBind *s_i_id_bp = (OCIBind *) 0;
OCIBind *s_w_id_bp = (OCIBind *) 0;
OCIBind *s_quantity_bp = (OCIBind *) 0;
OCIBind *s_dist_01_bp = (OCIBind *) 0;
OCIBind *s_dist_02_bp = (OCIBind *) 0;
OCIBind *s_dist_03_bp = (OCIBind *) 0;
OCIBind *s_dist_04_bp = (OCIBind *) 0;
OCIBind *s_dist_05_bp = (OCIBind *) 0;
OCIBind *s_dist_06_bp = (OCIBind *) 0;
OCIBind *s_dist_07_bp = (OCIBind *) 0;
OCIBind *s_dist_08_bp = (OCIBind *) 0;
OCIBind *s_dist_09_bp = (OCIBind *) 0;
OCIBind *s_dist_10_bp = (OCIBind *) 0;
OCIBind *s_data_bp = (OCIBind *) 0;

OCIBind *h_c_id_bp = (OCIBind *) 0;
OCIBind *h_c_d_id_bp = (OCIBind *) 0;
OCIBind *h_c_w_id_bp = (OCIBind *) 0;
OCIBind *h_d_id_bp = (OCIBind *) 0;
OCIBind *h_w_id_bp = (OCIBind *) 0;
OCIBind *h_data_bp = (OCIBind *) 0;

OCIBind *ol_o_id_bp = (OCIBind *) 0;
OCIBind *ol_d_id_bp = (OCIBind *) 0;
OCIBind *ol_w_id_bp = (OCIBind *) 0;
OCIBind *ol_i_id_bp = (OCIBind *) 0;
OCIBind *ol_number_bp = (OCIBind *) 0;
OCIBind *ol_supply_w_id_bp = (OCIBind *) 0;
OCIBind *ol_dist_info_bp = (OCIBind *) 0;
OCIBind *ol_amount_bp = (OCIBind *) 0;

OCIBind *o_id_bp = (OCIBind *) 0;
OCIBind *o_d_id_bp = (OCIBind *) 0;
OCIBind *o_w_id_bp = (OCIBind *) 0;
OCIBind *o_c_id_bp = (OCIBind *) 0;
OCIBind *o_carrier_id_bp = (OCIBind *) 0;
OCIBind *o_ol_cnt_bp  = (OCIBind *) 0;
OCIBind *o_ocnt_bp = (OCIBind *) 0;
OCIBind *o_olcnt_bp  = (OCIBind *) 0;
OCIBind *no_o_id_bp  = (OCIBind *) 0;
OCIBind *no_d_id_bp  = (OCIBind *) 0;
OCIBind *no_w_id_bp  = (OCIBind *) 0;

void 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 ware table\n");
   fprintf (stderr, "\t-d :\tload dist table\n");
   fprintf (stderr, "\t-c :\tload cust table\n");
   fprintf (stderr, "\t-i :\tload item table\n");
   fprintf (stderr, "\t-s :\tload stok table (cluster around s_w_id)\n");
   fprintf (stderr, "\t-S :\tload stok table (cluster around s_i_id)\n");
   fprintf (stderr, "\t-h :\tload hist 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 ware number\n");
   fprintf (stderr, "\t-e <ware#> :\tending ware 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,"\t   $tpcc_bench must be set to the location of the
kit\n");
   fprintf (stderr, "\n");
   exit(1);
}

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

    sprintf(realfile,"%s",fnam);
    fd = fopen(realfile,"r");
    if (!fd)
    {
      return (0);
    }
    while (fgets((char *)linebuf+nulpt, SQL_BUF_SIZE, fd))
    {
        nulpt = strlen((char *)linebuf);
    }
    return(nulpt);
}

void quit()
{
   OCIERROR(errhp,OCISessionEnd ( tpcsvc,errhp, tpcusr,
OCI_DEFAULT));
   OCIERROR(errhp,OCIServerDetach ( tpcsrv, errhp,
OCI_DEFAULT));
   OCIHandleFree((dvoid *)tpcusr, OCI_HTYPE_SESSION);
   OCIHandleFree((dvoid *)tpcsvc, OCI_HTYPE_SVCCTX);
   OCIHandleFree((dvoid *)errhp, OCI_HTYPE_ERROR);
   OCIHandleFree((dvoid *)tpcsrv, OCI_HTYPE_SERVER);
   OCIHandleFree((dvoid *)tpcenv, OCI_HTYPE_ENV);
}

void main (argc, argv)
int argc;
char *argv[];
{
   char *uid="tpcc";
   char *pwd="tpcc";
   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 s_c_id;
int s_c_d_id;
int s_c_w_id;
int s_c_count;

int c_id[100];
int c_d_id[100];
int c_w_id[100];
char c_first[100][17];
char c_last[100][17];
char c_street_1[100][21];
char c_street_2[100][21];
char c_city[100][21];
char c_state[100][2];
char c_zip[100][9];
char c_phone[100][16];
char c_credit[100][2];
float c_discount[100];
char c_data[100][501];

int i_id[100];
int i_im_id[100];
int i_price[100];
char i_name[100][25];
char i_data[100][51];

int s_s_count;
int s_s_i_id;
int s_s_w_id;

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[1500];
int ol_d_id[1500];
int ol_w_id[1500];
int ol_number[1500];
int ol_i_id[1500];
int ol_supply_w_id[1500];
int ol_amount[1500];
char ol_dist_info[1500][24];
int o_cnt;
int ol_cnt;

ub2 ol_o_id_len[1500];
ub2 ol_d_id_len[1500];
ub2 ol_w_id_len[1500];
ub2 ol_number_len[1500];
ub2 ol_i_id_len[1500];
ub2 ol_supply_w_id_len[1500];
ub2 ol_dist_info_len[1500];
ub2 ol_amount_len[1500];

ub4 ol_o_id_clen;
ub4 ol_d_id_clen;
ub4 ol_w_id_clen;
ub4 ol_number_clen;
ub4 ol_i_id_clen;
ub4 ol_supply_w_id_clen;
ub4 ol_dist_info_clen;
ub4 ol_amount_clen;

ub2 o_id_len[100];
ub2 o_d_id_len[100];
ub2 o_w_id_len[100];
ub2 o_c_id_len[100];
ub2 o_carrier_id_len[100];
ub2 o_ol_cnt_len[100];

ub4 o_id_clen;
ub4 o_d_id_clen;
ub4 o_w_id_clen;
ub4 o_c_id_clen;
ub4 o_carrier_id_clen;
ub4 o_ol_cnt_clen;

text stmbuf[16*1024];

int no_o_id[100];
int no_d_id[100];
int no_w_id[100];

char sdate[30];

#ifdef ORA_NT
  clock_t begin_time, end_time;
  clock_t begin_cpu, end_cpu;
```

```
   char *arg_ptr,  **end_args;
#else
   double begin_time, end_time;
   double begin_cpu, end_cpu;
   double gettime(), getcpu();

   extern int getopt();
   extern char *optarg;
   extern int optind, opterr;
   int opt;
#endif

   char   *argstr="M:AwdcisShno:b:e:j:k:g";
   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];
   char* basename;
   int status;
#ifdef ORA_NT
   char fname[100];
   FILE *logfile;
#endif /* ORA_NT */

/*---------------------------------------------------------------+
 | Parse command line -- look for scale factor.                  |
 +---------------------------------------------------------------*/

   if (argc == 1) {
      myusage ();
   }

#ifdef ORA_NT
   end_args = argv + argc;
   for (++argv; argv < end_args; )
   {
      arg_ptr = *argv++;

         if (*arg_ptr != '-')
         {
            myusage ();
         } else
         {
        switch (arg_ptr[1]) {
         case '?': myusage ();
                   break;
         case 'M': scale = atoi (*argv++);
                   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, *argv++);
                   break;
         case 'b': bware = atoi (*argv++);
                   break;
         case 'e': eware = atoi (*argv++);
                   break;
         case 'j': bitem = atoi (*argv++);
                   break;
         case 'k': eitem = atoi (*argv++);
                   break;
         case 'g': gen = 1;
                   strcpy (fname, *argv++);
                   break;
         case 'l': logfile=fopen(*argv++,"w");
                   break;
         default: fprintf (stderr, "THIS SHOULD NEVER HAPPEN!!!\n");
                  fprintf (stderr, "(reached default case in getopt ())\n");
                  myusage ();
        }
         }
   }


#else

   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 ();
        }
    }

# endif /* ORA_NT */

/*----------------------------------------------------------------*|
|  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 (do_o) {
        if ((basename = getenv ("tpcc_bench")) == NULL)
        {
            fprintf (stderr, "$tpcc_bench is not set");
            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 */

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

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

        fprintf (stderr, "\nConnected to Oracle userid '%s/%s'.\n", uid,
pwd);

        /* open cursors and parse statement */
        if (do_A || do_w)  {
            OCIERROR(errhp,OCIHandleAlloc(tpcenv,(dvoid **)(&curw),
OCI_HTYPE_STMT, 0, (dvoid**)0));
            OCIERROR(errhp,OCIStmtPrepare(curw, errhp, (text
*)SQLTXTW,
                    strlen((char *)SQLTXTW), (ub4) OCI_NTV_SYNTAX,
(ub4) OCI_DEFAULT));
        }

        if (do_A || do_d) {
            OCIERROR(errhp,OCIHandleAlloc(tpcenv,(dvoid **)(&curd),
OCI_HTYPE_STMT, 0, (dvoid**)0));
            OCIERROR(errhp,OCIStmtPrepare(curd, errhp, (text
*)SQLTXTD,
                    strlen((char *)SQLTXTD), (ub4) OCI_NTV_SYNTAX,
(ub4) OCI_DEFAULT));
        }

        if (do_A || do_c) {
            OCIERROR(errhp,OCIHandleAlloc(tpcenv,(dvoid **)(&curc),
OCI_HTYPE_STMT, 0, (dvoid**)0));
            OCIERROR(errhp,OCIStmtPrepare(curc, errhp, (text
*)SQLTXTC,
```

```
                strlen((char *)SQLTXTC), (ub4) OCI_NTV_SYNTAX,
(ub4) OCI_DEFAULT));
        OCIERROR(errhp,OCIHandleAlloc(tpcenv,(dvoid **)(&curcs),
OCI_HTYPE_STMT, 0, (dvoid**)0));
        OCIERROR(errhp,OCIStmtPrepare(curcs, errhp, (text
*)SQLTXTCQUERY,
                strlen((char *)SQLTXTCQUERY), (ub4)
OCI_NTV_SYNTAX, (ub4) OCI_DEFAULT));
      }

      if (do_A || do_h) {
        OCIERROR(errhp,OCIHandleAlloc(tpcenv,(dvoid **)(&curh),
OCI_HTYPE_STMT, 0, (dvoid**)0));
        OCIERROR(errhp,OCIStmtPrepare(curh, errhp, (text
*)SQLTXTH,
                strlen((char *)SQLTXTH), (ub4) OCI_NTV_SYNTAX,
(ub4) OCI_DEFAULT));
      }

      if (do_A || do_s || do_S) {
        OCIERROR(errhp,OCIHandleAlloc(tpcenv,(dvoid **)(&curs),
OCI_HTYPE_STMT, 0, (dvoid**)0));
        OCIERROR(errhp,OCIStmtPrepare(curs, errhp, (text
*)SQLTXTS,
                strlen((char *)SQLTXTS), (ub4) OCI_NTV_SYNTAX,
(ub4) OCI_DEFAULT));
        OCIERROR(errhp,OCIHandleAlloc(tpcenv,(dvoid **)(&curss),
OCI_HTYPE_STMT, 0, (dvoid**)0));
        OCIERROR(errhp,OCIStmtPrepare(curss, errhp, (text
*)SQLTXTSQUERY,
                strlen((char *)SQLTXTSQUERY), (ub4)
OCI_NTV_SYNTAX, (ub4) OCI_DEFAULT));
      }

      if (do_A || do_i) {
        OCIERROR(errhp,OCIHandleAlloc(tpcenv,(dvoid **)(&curi),
OCI_HTYPE_STMT, 0, (dvoid**)0));
        OCIERROR(errhp,OCIStmtPrepare(curi, errhp, (text
*)SQLTXTI,
                strlen((char *)SQLTXTI), (ub4) OCI_NTV_SYNTAX,
(ub4) OCI_DEFAULT));
      }

      if (do_A || do_o) {
        int stat;
        char fname[160];
        OCIERROR(errhp,OCIHandleAlloc(tpcenv,(dvoid **)(&curo1),
OCI_HTYPE_STMT, 0, (dvoid**)0));
        DISCARD strcpy(fname,basename);
        DISCARD strcat(fname, "/");
        DISCARD strcat(fname, "benchrun/blocks/load_ordordl.sql");
        stat = sqlfile(fname, stmbuf);
        if (!stat)
        {
          fprintf (stderr, "unable to open %s \n",fname);
          quit();
          exit(1);
        }
        OCIERROR(errhp,OCIStmtPrepare(curo1, errhp, stmbuf,
                strlen((char *)stmbuf), (ub4) OCI_NTV_SYNTAX, (ub4)
OCI_DEFAULT));
      }

      if (do_A || do_n) {
        OCIERROR(errhp,OCIHandleAlloc(tpcenv,(dvoid **)(&curno),
OCI_HTYPE_STMT, 0, (dvoid**)0));
        OCIERROR(errhp,OCIStmtPrepare(curno, errhp, (text
*)SQLTXTNO,
                strlen((char *)SQLTXTNO), (ub4) OCI_NTV_SYNTAX,
(ub4) OCI_DEFAULT));
      }

      /* bind variables */

      /* warehouse */

      if (do_A || do_w) {
        OCIERROR(errhp, OCIBindByName(curw, &w_id_bp, errhp,
(text *)(":w_id"), strlen((":w_id")),
                (ub1 *)&(w_id), sizeof(w_id), SQLT_INT, (dvoid *) 0,
(ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curw, &w_name_bp,
errhp,(text *)":w_name", strlen(":w_name"),
                (ub1 *)w_name, 11, SQLT_STR, (dvoid *) 0, (ub2 *)0,
(ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curw, &w_street1_bp,
errhp, (text *)":w_street_1",
          strlen(":w_street_1"), (ub1 *)w_street_1, 21, SQLT_STR,
          (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curw, &w_street2_bp,
errhp, (text *)":w_street_2",
          strlen(":w_street_2"), (ub1 *)w_street_2, 21, SQLT_STR,
          (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curw, &w_city_bp, errhp,
(text *)":w_city",
          strlen(":w_city"), (ub1 *)w_city, 21, SQLT_STR,
          (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curw, &w_state_bp,
errhp, (text *)":w_state",
          strlen(":w_state"), (ub1 *)w_state, 2, SQLT_CHR,
          (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curw, &w_zip_bp, errhp,
(text *)":w_zip",
          strlen(":w_zip"), (ub1 *)w_zip, 9, SQLT_CHR,
          (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curw, &w_tax_bp, errhp,
(text *)":w_tax",
          strlen(":w_tax"), (ub1 *) & w_tax, sizeof(w_tax), SQLT_FLT,
          (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));
      }

      /* district */

      if (do_A || do_d) {
        OCIERROR(errhp, OCIBindByName(curd, &d_id_bp, errhp,
(text *)":d_id",
          strlen(":d_id"), (ub1 *)d_id, sizeof(int), SQLT_INT,
          (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curd, &d_w_id_bp, errhp,
(text *)":d_w_id",
          strlen(":d_w_id"), (ub1 *)d_w_id, sizeof(int), SQLT_INT,
          (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curd, &d_name_bp,
errhp, (text *)":d_name",
          strlen(":d_name"), (ub1 *)d_name, 11, SQLT_STR,
```

```
        (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curd, &d_street1_bp,
errhp, (text *)":d_street_1",
          strlen(":d_street_1"), (ub1 *)d_street_1, 21, SQLT_STR,
          (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curd, &d_street2_bp,
errhp, (text *)":d_street_2",
          strlen(":d_street_2"), (ub1 *)d_street_2, 21, SQLT_STR,
          (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curd, &d_city_bp, errhp,
(text *)":d_city",
          strlen(":d_city"), (ub1 *)d_city, 21, SQLT_STR,
          (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curd, &d_state_bp, errhp,
(text *)":d_state",
                strlen(":d_state"), (ub1 *)d_state, 2, SQLT_CHR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curd, &d_zip_bp, errhp,
(text *)":d_zip",
                strlen(":d_zip"), (ub1 *)d_zip, 9, SQLT_CHR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curd, &d_tax_bp, errhp,
(text *)":d_tax",
                strlen(":d_tax"), (ub1 *)d_tax, sizeof(float), SQLT_FLT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));
    }

    /* customer */

    if (do_A || do_c) {
      OCIERROR(errhp, OCIBindByName(curcs, &s_c_id_bp,
errhp, (text *)":s_c_id",
                strlen(":s_c_id"), (ub1 *)&s_c_id, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curcs, &s_c_w_id_bp,
errhp, (text *)":s_c_w_id",
                strlen(":s_c_w_id"), (ub1 *)&s_c_w_id, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curcs, &s_c_d_id_bp,
errhp, (text *)":s_c_d_id",
                strlen(":s_c_d_id"), (ub1 *)&s_c_d_id, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));


OCIDefineByPos(curcs,&s_c_ret_bp,errhp,1,&s_c_count,sizeof(int),
SQLT_INT,\
                0,0,0,OCI_DEFAULT);

        OCIERROR(errhp, OCIBindByName(curc, &c_id_bp, errhp,
(text *)":c_id",
                strlen(":c_id"), (ub1 *)c_id, sizeof(int), SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curc, &c_d_id_bp, errhp,
(text *)":c_d_id",
                strlen(":c_d_id"), (ub1 *)c_d_id, sizeof(int), SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curc, &c_w_id_bp, errhp,
(text *)":c_w_id",
                strlen(":c_w_id"), (ub1 *)c_w_id, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curc, &c_first_bp, errhp,
(text *)":c_first",
          strlen(":c_first"), (ub1 *)c_first, 17, SQLT_STR,
          (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curc, &c_last_bp, errhp,
(text *)":c_last",
          strlen(":c_last"), (ub1 *)c_last, 17, SQLT_STR,
          (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curc, &c_street1_bp,
errhp, (text *)":c_street_1",
                strlen(":c_street_1"), (ub1 *)c_street_1, 21,
SQLT_STR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curc, &c_street2_bp,
errhp, (text *)":c_street_2",
                strlen(":c_street_2"), (ub1 *)c_street_2, 21,
SQLT_STR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curc, &c_city_bp, errhp,
(text *)":c_city",
                strlen(":c_city"), (ub1 *)c_city, 21, SQLT_STR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curc, &c_state_bp, errhp,
(text *)":c_state",
                strlen(":c_state"), (ub1 *)c_state, 2, SQLT_CHR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curc, &c_zip_bp, errhp,
(text *)":c_zip",
                strlen(":c_zip"), (ub1 *)c_zip, 9, SQLT_CHR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curc, &c_phone_bp,
errhp, (text *)":c_phone",
                strlen(":c_phone"), (ub1 *)c_phone, 16, SQLT_CHR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curc, &c_credit_bp,
errhp, (text *)":c_credit",
                strlen(":c_credit"), (ub1 *)c_credit, 2, SQLT_CHR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));
```

```
    OCIERROR(errhp, OCIBindByName(curc, &c_discount_bp,
errhp, (text *)":c_discount",
                strlen(":c_discount"), (ub1 *)c_discount, sizeof(float),
SQLT_FLT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

    OCIERROR(errhp, OCIBindByName(curc, &c_data_bp, errhp,
(text *)":c_data",
                strlen(":c_data"), (ub1 *)c_data, 501, SQLT_STR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));
  }

  /* item */

  if (do_A || do_i) {
    OCIERROR(errhp, OCIBindByName(curi, &i_id_bp, errhp,
(text *)":i_id",
                strlen(":i_id"), (ub1 *)i_id, sizeof(int), SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

    OCIERROR(errhp, OCIBindByName(curi, &i_im_id_bp, errhp,
(text *)":i_im_id",
                strlen(":i_im_id"), (ub1 *)i_im_id, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

    OCIERROR(errhp, OCIBindByName(curi, &i_name_bp, errhp,
(text *)":i_name",
                strlen(":i_name"), (ub1 *)i_name, 25, SQLT_STR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

    OCIERROR(errhp, OCIBindByName(curi, &i_price_bp, errhp,
(text *)":i_price",
                strlen(":i_price"), (ub1 *)i_price, sizeof(int), SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

    OCIERROR(errhp, OCIBindByName(curi, &i_data_bp, errhp,
(text *)":i_data",
                strlen(":i_data"), (ub1 *)i_data, 51, SQLT_STR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));
  }

  /* stock */

  if (do_A || do_s || do_S) {
    OCIERROR(errhp, OCIBindByName(curss, &s_s_i_id_bp,
errhp, (text *)":s_s_i_id",
                strlen(":s_s_i_id"), (ub1 *)&s_s_i_id, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

    OCIERROR(errhp, OCIBindByName(curss, &s_s_w_id_bp,
errhp, (text *)":s_s_w_id",
                strlen(":s_s_w_id"), (ub1 *)&s_s_w_id, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

OCIDefineByPos(curss,&s_s_ret_bp,errhp,1,&s_s_count,sizeof(int),
SQLT_INT,\
                0,0,0,OCI_DEFAULT);

    OCIERROR(errhp, OCIBindByName(curs, &s_i_id_bp, errhp,
(text *)":s_i_id",
                strlen(":s_i_id"), (ub1 *)s_i_id, sizeof(int), SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

    OCIERROR(errhp, OCIBindByName(curs, &s_w_id_bp, errhp,
(text *)":s_w_id",
                strlen(":s_w_id"), (ub1 *)s_w_id, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

    OCIERROR(errhp, OCIBindByName(curs, &s_quantity_bp,
errhp, (text *)":s_quantity",
                strlen(":s_quantity"), (ub1 *)s_quantity, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

    OCIERROR(errhp, OCIBindByName(curs, &s_dist_01_bp,
errhp, (text *)":s_dist_01",
                strlen(":s_dist_01"), (ub1 *)s_dist_01, 24, SQLT_CHR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));


    OCIERROR(errhp, OCIBindByName(curs, &s_dist_02_bp,
errhp, (text *)":s_dist_02",
                strlen(":s_dist_02"), (ub1 *)s_dist_02, 24, SQLT_CHR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));


    OCIERROR(errhp, OCIBindByName(curs, &s_dist_03_bp,
errhp, (text *)":s_dist_03",
                strlen(":s_dist_03"), (ub1 *)s_dist_03, 24, SQLT_CHR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));


    OCIERROR(errhp, OCIBindByName(curs, &s_dist_04_bp,
errhp, (text *)":s_dist_04",
                strlen(":s_dist_04"), (ub1 *)s_dist_04, 24, SQLT_CHR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));


    OCIERROR(errhp, OCIBindByName(curs, &s_dist_05_bp,
errhp, (text *)":s_dist_05",
                strlen(":s_dist_05"), (ub1 *)s_dist_05, 24, SQLT_CHR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));


    OCIERROR(errhp, OCIBindByName(curs, &s_dist_06_bp,
errhp, (text *)":s_dist_06",
                strlen(":s_dist_06"), (ub1 *)s_dist_06, 24, SQLT_CHR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));


    OCIERROR(errhp, OCIBindByName(curs, &s_dist_07_bp,
errhp, (text *)":s_dist_07",
                strlen(":s_dist_07"), (ub1 *)s_dist_07, 24, SQLT_CHR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));


    OCIERROR(errhp, OCIBindByName(curs, &s_dist_08_bp,
errhp, (text *)":s_dist_08",
                strlen(":s_dist_08"), (ub1 *)s_dist_08, 24, SQLT_CHR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));
```

```
        OCIERROR(errhp, OCIBindByName(curs, &s_dist_09_bp,
errhp, (text *)":s_dist_09",
                strlen(":s_dist_09"), (ub1 *)s_dist_09, 24, SQLT_CHR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));


        OCIERROR(errhp, OCIBindByName(curs, &s_dist_10_bp,
errhp, (text *)":s_dist_10",
                strlen(":s_dist_10"), (ub1 *)s_dist_10, 24, SQLT_CHR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curs, &s_data_bp, errhp,
(text *)":s_data",
                strlen(":s_data"), (ub1 *)s_data, 51, SQLT_STR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));
    }

    /* history */

    if (do_A || do_h) {
      OCIERROR(errhp, OCIBindByName(curh, &h_c_id_bp, errhp,
(text *)":h_c_id",
                strlen(":h_c_id"), (ub1 *)h_c_id, sizeof(int), SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curh, &h_c_d_id_bp,
errhp, (text *)":h_c_d_id",
                strlen(":h_c_d_id"), (ub1 *)h_d_id, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curh, &h_c_w_id_bp,
errhp, (text *)":h_c_w_id",
                strlen(":h_c_w_id"), (ub1 *)h_w_id, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curh, &h_d_id_bp, errhp,
(text *)":h_d_id",
                strlen(":h_d_id"), (ub1 *)h_d_id, sizeof(int), SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curh, &h_w_id_bp, errhp,
(text *)":h_w_id",
                strlen(":h_w_id"), (ub1 *)h_w_id, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curh, &h_data_bp, errhp,
(text *)":h_data",
                strlen(":h_data"), (ub1 *)h_data, 25, SQLT_STR,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

    }

    /* order and order_line (delivered) */

    if (do_A || do_o) {

      for (i = 0; i < ORDEARR; i++ ) {
        o_id_len[i] = sizeof(int);
        o_d_id_len[i] = sizeof(int);
        o_w_id_len[i] = sizeof(int);
        o_c_id_len[i] = sizeof(int);
        o_carrier_id_len[i] = sizeof(int);
        o_ol_cnt_len[i] = sizeof(int);
      }

        OCIERROR(errhp, OCIBindByName(curo1, &ol_o_id_bp,
errhp, (text *)":ol_o_id",
                strlen(":ol_o_id"), (ub1 *)ol_o_id, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)ol_o_id_len, (ub2 *)0,
                (ub4) 15*ORDEARR, (ub4 *)&ol_o_id_clen, (ub4)
OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curo1, &ol_d_id_bp,
errhp, (text *)":ol_d_id",
                strlen(":ol_d_id"), (ub1 *)ol_d_id, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)ol_d_id_len, (ub2 *)0,
                (ub4) 15*ORDEARR, (ub4 *) &ol_d_id_clen, (ub4)
OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curo1, &ol_w_id_bp,
errhp, (text *)":ol_w_id",
                strlen(":ol_w_id"), (ub1 *)ol_w_id, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)ol_w_id_len, (ub2 *)0,
                (ub4) 15*ORDEARR, (ub4 *) &ol_w_id_clen, (ub4)
OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curo1, &ol_number_bp,
errhp, (text *)":ol_number",
                strlen(":ol_number"), (ub1 *)ol_number, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)ol_number_len, (ub2 *)0,
                (ub4) 15*ORDEARR, (ub4 *) &ol_number_clen, (ub4)
OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curo1, &ol_i_id_bp,
errhp, (text *)":ol_i_id",
                strlen(":ol_i_id"), (ub1 *)ol_i_id, sizeof(int), SQLT_INT,
                (dvoid *) 0, (ub2 *)ol_i_id_len, (ub2 *)0,
                (ub4) 15*ORDEARR, (ub4 *) &ol_i_id_clen, (ub4)
OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curo1,
&ol_supply_w_id_bp, errhp, (text *)":ol_supply_w_id",
                strlen(":ol_supply_w_id"), (ub1 *)ol_supply_w_id,
sizeof(int), SQLT_INT,
                (dvoid *) 0, (ub2 *)ol_supply_w_id_len, (ub2 *)0,
                (ub4) 15*ORDEARR, (ub4 *) &ol_supply_w_id_clen,
(ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curo1, &ol_dist_info_bp,
errhp, (text *)":ol_dist_info",
                strlen(":ol_dist_info"), (ub1 *)ol_dist_info, 24,
SQLT_CHR,
                (dvoid *) 0, (ub2 *)ol_dist_info_len, (ub2 *)0,
                (ub4) 15*ORDEARR, (ub4 *) &ol_dist_info_clen, (ub4)
OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curo1, &ol_amount_bp,
errhp, (text *)":ol_amount",
                strlen(":ol_amount"), (ub1 *)ol_amount, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)ol_amount_len, (ub2 *)0,
                (ub4) 15*ORDEARR, (ub4 *) &ol_amount_clen, (ub4)
OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curo1, &o_id_bp, errhp,
(text *)":o_id",
```

```
                strlen(":o_id"), (ub1 *)o_id, sizeof(int), SQLT_INT,
                (dvoid *) 0, (ub2 *)o_id_len, (ub2 *)0,
                (ub4) ORDEARR, (ub4 *) &o_id_clen, (ub4)
OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curo1, &o_d_id_bp,
errhp, (text *)":o_d_id",
                strlen(":o_d_id"), (ub1 *)o_d_id, sizeof(int), SQLT_INT,
                (dvoid *) 0, (ub2 *)o_d_id_len, (ub2 *)0,
                (ub4) ORDEARR, (ub4 *) &o_d_id_clen, (ub4)
OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curo1, &o_w_id_bp,
errhp, (text *)":o_w_id",
                strlen(":o_w_id"), (ub1 *)o_w_id, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)o_w_id_len, (ub2 *)0,
                (ub4) ORDEARR, (ub4 *) &o_w_id_clen, (ub4)
OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curo1, &o_c_id_bp,
errhp, (text *)":o_c_id",
                strlen(":o_c_id"), (ub1 *)o_c_id, sizeof(int), SQLT_INT,
                (dvoid *) 0, (ub2 *)o_c_id_len, (ub2 *)0,
                (ub4) ORDEARR, (ub4 *) &o_c_id_clen, (ub4)
OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curo1, &o_carrier_id_bp,
errhp, (text *)":o_carrier_id",
                strlen(":o_carrier_id"), (ub1 *)o_carrier_id, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)o_carrier_id_len, (ub2 *)0,
                (ub4) ORDEARR, (ub4 *) &o_carrier_id_clen, (ub4)
OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curo1, &o_ol_cnt_bp,
errhp, (text *)":o_ol_cnt",
                strlen(":o_ol_cnt"), (ub1 *)o_ol_cnt, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)o_ol_cnt_len, (ub2 *)0,
                (ub4) ORDEARR, (ub4 *) &o_ol_cnt_clen, (ub4)
OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curo1, &o_ocnt_bp,
errhp, (text *)":order_rows",
                strlen(":order_rows"), (ub1 *)&o_cnt, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curo1, &o_olcnt_bp,
errhp, (text *)":ordl_rows",
                strlen(":ordl_rows"), (ub1 *)&ol_cnt, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));
    }

    /* new order */

    if (do_A || do_n) {
      OCIERROR(errhp, OCIBindByName(curno, &no_o_id_bp,
errhp, (text *)":no_o_id",
                strlen(":no_o_id"), (ub1 *)no_o_id, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curno, &no_d_id_bp,
errhp, (text *)":no_d_id",
                strlen(":no_d_id"), (ub1 *)no_d_id, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));

        OCIERROR(errhp, OCIBindByName(curno, &no_w_id_bp,
errhp, (text *)":no_w_id",
                strlen(":no_w_id"), (ub1 *)no_w_id, sizeof(int),
SQLT_INT,
                (dvoid *) 0, (ub2 *)0, (ub2 *)0,
                (ub4) 0, (ub4 *) 0, (ub4) OCI_DEFAULT));
    }
  }

/*---------------------------------------------------------------+
 | Initialize random number generator            |
 +---------------------------------------------------------------*/

  srand (SEED);
#ifndef ORA_NT
  srand48 (SEED);
#endif
  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 = (float) ((lrand48 () % 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 30000000 %6.4f %s %s %s %s %s %s\n", loop,
w_tax,
                w_name, w_street_1, w_street_2, w_city, str2, num9);
        fflush (stdout);
      }
      else {
        w_id = loop;
        strncpy (w_state, str2, 2);
        strncpy (w_zip, num9, 9);

      status = OCIStmtExecute(tpcsvc, curw, errhp, (ub4) 1, (ub4) 0,
                  (CONST OCISnapshot*) 0, (OCISnapshot*) 0,
                  (ub4) OCI_DEFAULT |
OCI_COMMIT_ON_SUCCESS);
      if (status != OCI_SUCCESS) {
        fprintf (stderr, "Error at ware %d\n", loop);
        OCIERROR(errhp, status);
        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] = (float) ((lrand48 () % 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 3000000 %6.4f 3001 %s %s %s %s %s
%s\n",
                  i + 1, dwid, d_tax[i], d_name[i], d_street_1[i],
           d_street_2[i], d_city[i], str2, num9 );
        }
        else {
          d_id[i] = i + 1;
          d_w_id[i] = dwid;
          strncpy (d_state[i], str2, 2);
          strncpy (d_zip[i], num9, 9);
        }
      }

      if (gen) {
        fflush (stdout);
      }
      else {
        status = OCIStmtExecute(tpcsvc, curd, errhp, (ub4)
DISTARR, (ub4) 0,
                  (CONST OCISnapshot*) 0, (OCISnapshot*) 0,
                  (ub4) OCI_DEFAULT |
OCI_COMMIT_ON_SUCCESS);
        if (status != OCI_SUCCESS) {
      fprintf (stderr, "Aborted at ware %d, dist 1\n", dwid);
            OCIERROR(errhp, status);
            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);

    if (getenv("tpcc_hash_overflow")) {
      fprintf(stderr,"Hash overflow is enabled\n");
      OCIHandleAlloc(tpcenv, (dvoid **)&curi, OCI_HTYPE_STMT,
0, (dvoid**)0);
      sprintf ((char *) stmbuf, SQLTXTENHA);
      OCIStmtPrepare(curi, errhp, stmbuf, strlen((char *)stmbuf),
                OCI_NTV_SYNTAX, OCI_DEFAULT);
      OCIERROR(errhp,OCIStmtExecute(tpcsvc, curi,
errhp,1,0,0,0,OCI_DEFAULT));
      OCIHandleFree(curi, OCI_HTYPE_STMT);
      fprintf (stderr,"Customer loaded for horizontal partitioning\n");
    }
    else
    {
      fprintf (stderr,"Customer not loaded for horizontal
partitioning\n");
    }
    begin_time = gettime ();
    begin_cpu = getcpu ();

    s_c_id = 1;
    s_c_d_id = 1;
    s_c_w_id = bware;

    while (s_c_w_id <= eware) {
      status = OCIStmtExecute(tpcsvc, curcs, errhp, (ub4) 1, (ub4)
0,
            (CONST OCISnapshot*) 0, (OCISnapshot*) 0,
            (ub4) OCI_DEFAULT | OCI_COMMIT_ON_SUCCESS);
        if (status != OCI_SUCCESS) {
            OCIERROR(errhp, status);
            quit ();
            exit (1);
        }

        if (s_c_count == 0) {
          s_c_w_id--;
          break;
        }
        else s_c_w_id++;
    }

    if (s_c_w_id < bware ) s_c_w_id = bware;
    else {
      if (s_c_w_id > eware ) s_c_w_id = eware;
      while (s_c_d_id <= DISTFAC) {
        status = OCIStmtExecute(tpcsvc, curcs, errhp, (ub4) 1, (ub4)
0,
              (CONST OCISnapshot*) 0, (OCISnapshot*) 0,
              (ub4) OCI_DEFAULT | OCI_COMMIT_ON_SUCCESS);
          if (status != OCI_SUCCESS) {
        fprintf (stderr, "Select failed\n");
              OCIERROR(errhp, status);
              quit ();
              exit (1);
          }
          if (s_c_count == 0) {
```

```
            s_c_d_id--;
            break;
          }
          else s_c_d_id++;
        }
        if (s_c_d_id > DISTFAC) s_c_d_id = DISTFAC;

        while (s_c_id <= CUSTFAC) {
          status = OCIStmtExecute(tpcsvc, curcs, errhp, (ub4) 1, (ub4)
0,
                (CONST OCISnapshot*) 0, (OCISnapshot*) 0,
                (ub4) OCI_DEFAULT | OCI_COMMIT_ON_SUCCESS);
          if (status != OCI_SUCCESS) {
            OCIERROR(errhp, status);
            quit ();
            exit (1);
          }
          if (s_c_count == 0) break;
          else s_c_id++;
        }
      }
      if (s_c_id > CUSTFAC) {
        s_c_d_id=1;
        s_c_w_id++;
        s_c_id=1;
      }

      fprintf (stderr, "start at wid: %d, did: %d, cid: %d\n   ",s_c_w_id,
s_c_d_id, s_c_id);
      cid = s_c_id - 1;
      cdid = s_c_d_id;
      cwid = s_c_w_id;
      nrows = (eware - s_c_w_id + 1) * DISTFAC * CUSTFAC -
(s_c_d_id - 1) * CUSTFAC - s_c_id + 1;
      fprintf (stderr, "remaining rows: %d\n   ", nrows);
      loopcount = 0;

      for (row = 0; row < nrows; ) {
        for (i = 0; i < CUSTARR && row < nrows; i++, row++) {
          cid++;
          if (cid > CUSTFAC) {        /* cycle cust id */
            cid = 1;                  /* cheap mod */
            cdid++;                   /* shift dist cycle */
            if (cdid > DISTFAC) {
              cdid = 1;
              cwid++;                 /* shift ware 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 (lrand48 () % 10)
            c_credit[i][0] = 'G';
          else
            c_credit[i][0] = 'B';
          c_discount[i] = (float)((lrand48 () % 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 5000000 %6.4f -1000 1000 1 0 %s\n",
                    cid, cdid, cwid, c_first[i], c_last[i],
                    c_street_1[i], c_street_2[i], c_city[i], str2, num9,
                    num16, sdate, c_credit[i][0], c_discount[i], c_data[i]);
          }
          else {
            strncpy (c_state[i], str2, 2);
            strncpy (c_zip[i], num9, 9);
            strncpy (c_phone[i], num16, 16);
          }
        }

        if (gen) {
          fflush (stdout);
        }
        else {
          status = OCIStmtExecute(tpcsvc, curc, errhp, (ub4) i, (ub4)
0,
                  (CONST OCISnapshot*) 0, (OCISnapshot*) 0,
                  (ub4) OCI_DEFAULT |
OCI_COMMIT_ON_SUCCESS);

          if (status != OCI_SUCCESS) {
        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]);
              OCIERROR(errhp, status);
              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 < 0 ? 0 : nrows, end_time - begin_time, end_cpu -
begin_cpu);
      if (getenv("tpcc_hash_overflow")) {
        fprintf(stderr,"Hash overflow is disabled\n");
        OCIHandleAlloc(tpcenv, (dvoid **)&curi, OCI_HTYPE_STMT,
0, (dvoid**)0);
        sprintf ((char *) stmbuf, SQLTXTDIHA);
        OCIStmtPrepare(curi, errhp, stmbuf, strlen((char *)stmbuf),
                    OCI_NTV_SYNTAX, OCI_DEFAULT);
        OCIERROR(errhp,OCIStmtExecute(tpcsvc, curi,
errhp,1,0,0,0,OCI_DEFAULT));
        OCIHandleFree(curi, OCI_HTYPE_STMT);
      }
    }


/*---------------------------------------------------------------+
 | 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] = (lrand48 () % 10000) + 1;
        i_price[i] = ((lrand48 () % 9901) + 100);
        randstr (i_name[i], 14, 24);
        randdatastr (i_data[i], 26, 50);

        if (gen) {
          printf ("%d %d %s %d %s\n", row + 1, i_im_id[i], i_name[i],
                  i_price[i], i_data[i]);
        }
        else {
          i_id[i] = row + 1;
        }
      }

      if (gen) {
        fflush (stdout);
      }
      else {
        status = OCIStmtExecute(tpcsvc, curi, errhp, (ub4)
ITEMARR, (ub4) 0,
                  (CONST OCISnapshot*) 0, (OCISnapshot*) 0,
                  (ub4) OCI_DEFAULT |
OCI_COMMIT_ON_SUCCESS);
        if (status != OCI_SUCCESS) {
      fprintf (stderr, "Aborted at i_id %d\n", i_id[0]);
            OCIERROR(errhp, status);
            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 ();

    s_s_i_id = 1;
    s_s_w_id = bware;

    while (s_s_w_id <= eware) {
      status = OCIStmtExecute(tpcsvc, curss, errhp, (ub4) 1, (ub4)
0,
            (CONST OCISnapshot*) 0, (OCISnapshot*) 0,
            (ub4) OCI_DEFAULT | OCI_COMMIT_ON_SUCCESS);
        if (status != OCI_SUCCESS) {
            OCIERROR(errhp, status);
            quit ();
            exit (1);
        }
        if (s_s_count == 0) {
          s_s_w_id--;
          break;
        }
        else s_s_w_id++;
    }

    if (s_s_w_id < bware ) s_s_w_id = bware;
    else {
      if (s_s_w_id > eware) s_s_w_id = eware;
      while (s_s_i_id<=STOCFAC) {
        status = OCIStmtExecute(tpcsvc, curss, errhp, (ub4) 1, (ub4)
0,
            (CONST OCISnapshot*) 0, (OCISnapshot*) 0,
            (ub4) OCI_DEFAULT | OCI_COMMIT_ON_SUCCESS);
        if (status != OCI_SUCCESS) {
            OCIERROR(errhp, status);
            quit ();
            exit (1);
        }
        if (s_s_count == 0) {
          break;
        }
        else s_s_i_id++;
      }
    }
    if (s_s_i_id > STOCFAC) {
      s_s_i_id=1;
      s_s_w_id++;
    }

    fprintf(stderr,"start at s_i_id: %d, s_w_id: %d\n   ", s_s_i_id,
s_s_w_id);

    sid = s_s_i_id - 1;
    swid = s_s_w_id;
    nrows = (eware - s_s_w_id + 1) * STOCFAC - ( s_s_i_id - 1);
    fprintf (stderr, "remaining rows: %d\n   ", nrows);
    loopcount = 0;

    for (row = 0; row < nrows; ) {
       /* added row < nrows condition on next line - alex.ni */
  for (i = 0; (i < STOCARR) && (row < nrows); i++, row++) {
        if (++sid > STOCFAC) {        /* cheap mod */
          sid = 1;
          swid++;
        }
        s_quantity[i] = (lrand48 () % 91) + 10;
        randstr (s_dist_01[i], 24, 24);
        randstr (s_dist_02[i], 24, 24);
        randstr (s_dist_03[i], 24, 24);
        randstr (s_dist_04[i], 24, 24);
        randstr (s_dist_05[i], 24, 24);
        randstr (s_dist_06[i], 24, 24);
        randstr (s_dist_07[i], 24, 24);
        randstr (s_dist_08[i], 24, 24);
        randstr (s_dist_09[i], 24, 24);
        randstr (s_dist_10[i], 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], s_dist_01[i], s_dist_02[i],
                  s_dist_03[i], s_dist_04[i], s_dist_05[i], s_dist_06[i],
                  s_dist_07[i], s_dist_08[i], s_dist_09[i], s_dist_10[i],
                  s_data[i]);
        }
        else {
```

```
            s_i_id[i] = sid;
            s_w_id[i] = swid;
          }
        }

        if (gen) {
          fflush (stdout);
        }
        else {
      /* Changed to STOCKARR to i - alex.ni */
          status = OCIStmtExecute(tpcsvc, curs, errhp, (ub4) i, (ub4)
0,
                    (CONST OCISnapshot*) 0, (OCISnapshot*) 0,
                    (ub4) OCI_DEFAULT |
OCI_COMMIT_ON_SUCCESS);
          if (status != OCI_SUCCESS) {
           fprintf (stderr, "Aborted at w_id %d, s_i_id %d\n", s_w_id[0],
s_i_id[0]);
              OCIERROR(errhp, status);
              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 < 0 ? 0 : 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 ();

      s_s_i_id = bitem;
      s_s_w_id = bware;

      while (s_s_i_id <= eitem) {
        status = OCIStmtExecute(tpcsvc, curss, errhp, (ub4) 1, (ub4)
0,
                (CONST OCISnapshot*) 0, (OCISnapshot*) 0,
                (ub4) OCI_DEFAULT | OCI_COMMIT_ON_SUCCESS);
          if (status != OCI_SUCCESS) {
                OCIERROR(errhp, status);
                quit ();
                exit (1);
          }
          if (s_s_count == 0) {
            s_s_i_id--;
            break;
          }
          else s_s_i_id++;
      }

      if (s_s_i_id < bitem ) s_s_i_id = bitem;
      else {
        if (s_s_i_id > eitem) s_s_i_id = eitem;
        while (s_s_w_id <= eware) {
          status = OCIStmtExecute(tpcsvc, curss, errhp, (ub4) 1, (ub4)
0,
                (CONST OCISnapshot*) 0, (OCISnapshot*) 0,
                (ub4) OCI_DEFAULT | OCI_COMMIT_ON_SUCCESS);
            if (status != OCI_SUCCESS) {
                OCIERROR(errhp, status);
                quit ();
                exit (1);
            }
            if (s_s_count == 0) {
              break;
            }
            else s_s_w_id++;
        }
      }
      if (s_s_w_id > eware) {
        s_s_w_id=bware;
        s_s_i_id++;
      }

      fprintf(stderr,"start at s_i_id: %d, s_w_id: %d\n   ", s_s_i_id,
s_s_w_id);

      sid = s_s_i_id;
      swid = s_s_w_id - 1;
      nrows = (eitem - s_s_i_id + 1) * (eware - bware + 1) - (s_s_w_id
- bware);
      fprintf (stderr, "remaining rows: %d\n   ", nrows);
      loopcount = 0;

      for (row = 0; row < nrows; ) {
        for (i = 0; i < STOCARR && row < nrows; i++, row++) {
          if (++swid > eware) {          /* cheap mod */
            swid = bware;
            sid++;
          }
          s_quantity[i] = (lrand48 () % 91) + 10;
          randstr (s_dist_01[i], 24, 24);
          randstr (s_dist_02[i], 24, 24);
          randstr (s_dist_03[i], 24, 24);
          randstr (s_dist_04[i], 24, 24);
          randstr (s_dist_05[i], 24, 24);
          randstr (s_dist_06[i], 24, 24);
          randstr (s_dist_07[i], 24, 24);
          randstr (s_dist_08[i], 24, 24);
          randstr (s_dist_09[i], 24, 24);
          randstr (s_dist_10[i], 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], s_dist_01[i], s_dist_02[i],
                    s_dist_03[i], s_dist_04[i], s_dist_05[i], s_dist_06[i],
                    s_dist_07[i], s_dist_08[i], s_dist_09[i], s_dist_10[i],
                    s_data[i]);
          }
          else {
            s_i_id[i] = sid;
            s_w_id[i] = swid;
          }
        }

        if (gen) {
          fflush (stdout);
        }
        else {
```

```
        status = OCIStmtExecute(tpcsvc, curs, errhp, (ub4) i, (ub4)
0,
                    (CONST OCISnapshot*) 0, (OCISnapshot*) 0,
                    (ub4) OCI_DEFAULT |
OCI_COMMIT_ON_SUCCESS);
          if (status != OCI_SUCCESS) {
              fprintf (stderr, "Aborted at w_id %d, s_i_id %d\n",
s_w_id[0], s_i_id[0]);
              OCIERROR(errhp, status);
              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 < 0 ? 0 : nrows, end_time - begin_time, end_cpu -
begin_cpu);
    }

/*---------------------------------------------------------------+
 | Load the HISTORY table.                |
 +---------------------------------------------------------------*/

    if (do_A || do_h) {
      nrows = (eware - bware + 1) * HISTFAC;

      fprintf (stderr, "Loading/generating history: w%d - w%d (%d
rows)\n   ",
              bware, eware, nrows);

      begin_time = gettime ();
      begin_cpu = getcpu ();

      cid = 0;
      cdid = 1;
      cwid = bware;
      loopcount = 0;

      for (row = 0; row < nrows; ) {
        for (i = 0; i < HISTARR; i++, row++) {
          cid++;
          if (cid > CUSTFAC) {        /* cycle cust id */
            cid = 1;                  /* cheap mod */
            cdid++;                   /* shift district cycle */
            if (cdid > DISTFAC) {
              cdid = 1;
              cwid++;                 /* shift warehouse cycle */
            }
          }
          h_c_id[i] = cid;
          h_d_id[i] = cdid;
          h_w_id[i] = cwid;
          randstr (h_data[i], 12, 24);
          if (gen) {
            printf ("%d %d %d %d %d %s 1000 %s\n", cid, cdid, cwid,
cdid,
                    cwid, sdate, h_data[i]);
          }
        }

        if (gen) {
          fflush (stdout);
        }
```

```
        else {
          status = OCIStmtExecute(tpcsvc, curh, errhp, (ub4)
HISTARR, (ub4) 0,
                    (CONST OCISnapshot*) 0, (OCISnapshot*) 0,
                    (ub4) OCI_DEFAULT |
OCI_COMMIT_ON_SUCCESS);
          if (status != OCI_SUCCESS) {
            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]);
              OCIERROR(errhp, status);
              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) {

      int batch_olcnt;

      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; ) {

        batch_olcnt = 0;

        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] = lrand48 () % 10 + 1;
          o_ol_cnt[i] = olcnt = lrand48 () % 11 + 5;

          if (gen) {
            if (cid < 2101) {
              printf ("%d %d %d %d %s %d %d 1\n", cid, cdid, cwid,
                      randperm3000[cid - 1], sdate,o_carrier_id[i],
                      o_ol_cnt[i]);
```

```
            }
            else {
           /* set carrierid to 11 instead of null */
              printf ("%d %d %d %d %s 11 %d 1\n", cid, cdid, cwid,
                    randperm3000[cid - 1], sdate, o_ol_cnt[i]);
            }
          }
          else {
            o_id[i] = cid;
            o_d_id[i] = cdid;
            o_w_id[i] = cwid;
            o_c_id[i] = randperm3000[cid - 1];
            if (cid >= 2101 ) {
               o_carrier_id[i] = 11;
            }
          }

          for (j = 0; j < o_ol_cnt[i]; j++, batch_olcnt++ ) {
            ol_i_id[batch_olcnt] = sid = lrand48 () % 100000 + 1;
            if (cid < 2101)
              ol_amount[batch_olcnt] = 0;
            else
              ol_amount[batch_olcnt] = (lrand48 () % 999999 + 1) ;
            randstr (str24[j], 24, 24);

            if (gen) {
              if (cid < 2101) {
                fprintf (olfp, "%d %d %d %d %s %d %d 5 %ld %s\n",
cid,
                      cdid, cwid, j + 1, sdate, ol_i_id[batch_olcnt], cwid,
                      ol_amount[batch_olcnt], str24[j]);
              }
              else {
                /* Insert a default date instead of null date */
                fprintf (olfp, "%d %d %d %d 01-Jan-1811 %d %d 5 %ld
%s\n", cid,
                      cdid, cwid, j + 1, ol_i_id[batch_olcnt], cwid,
                      ol_amount[batch_olcnt], str24[j]);
              }
            }
            else {
              ol_o_id[batch_olcnt] = cid;
              ol_d_id[batch_olcnt] = cdid;
              ol_w_id[batch_olcnt] = cwid;
              ol_number[batch_olcnt] = j + 1;
              ol_supply_w_id[batch_olcnt] = cwid;
              strncpy (ol_dist_info[batch_olcnt], str24[j], 24);
            }
          }
          if (gen) {
            fflush (olfp);
          }
        }

        o_cnt =  ORDEARR;
        ol_cnt =  batch_olcnt;

        for (j = 0; j < batch_olcnt; j++) {
          ol_o_id_len[j] = sizeof(int);
          ol_d_id_len[j] = sizeof(int);
          ol_w_id_len[j] = sizeof(int);
          ol_number_len[j] = sizeof(int);
          ol_i_id_len[j] = sizeof(int);
          ol_supply_w_id_len[j] = sizeof(int);
          ol_dist_info_len[j] = 24;
          ol_amount_len[j] = sizeof(int);
        }
        for (j = batch_olcnt; j < 15*ORDEARR; j++) {
          ol_o_id_len[j] = 0;
          ol_d_id_len[j] = 0;
          ol_w_id_len[j] = 0;
          ol_number_len[j] = 0;
          ol_i_id_len[j] = 0;
          ol_supply_w_id_len[j] = 0;
          ol_dist_info_len[j] = 0;
          ol_amount_len[j] = 0;
        }

        o_id_clen = ORDEARR;
        o_d_id_clen = ORDEARR;
        o_w_id_clen = ORDEARR;
        o_c_id_clen = ORDEARR;
        o_carrier_id_clen = ORDEARR;
        o_ol_cnt_clen = ORDEARR;

        ol_o_id_clen = batch_olcnt;
        ol_d_id_clen = batch_olcnt;
        ol_w_id_clen = batch_olcnt;
        ol_number_clen = batch_olcnt;
        ol_i_id_clen = batch_olcnt;
        ol_supply_w_id_clen = batch_olcnt;
        ol_dist_info_clen = batch_olcnt;
        ol_amount_clen = batch_olcnt;

        OCIERROR(errhp, OCIStmtExecute(tpcsvc, curo1, errhp,
(ub4) 1, (ub4) 0,
                      (CONST OCISnapshot*) 0, (OCISnapshot*) 0,
                      (ub4) OCI_DEFAULT |
OCI_COMMIT_ON_SUCCESS ));

        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 {
          status = OCIStmtExecute(tpcsvc, curno, errhp, (ub4)
NEWOARR, (ub4) 0,
                                  (CONST OCISnapshot*) 0, (OCISnapshot*)
0,
                                  (ub4) OCI_DEFAULT |
OCI_COMMIT_ON_SUCCESS);
          if (status != OCI_SUCCESS) {
      fprintf (stderr, "Aborted at w_id %d, d_id %d, o_id %d\n", cwid,
cdid, cid + 2100);
            OCIERROR(errhp, status);
            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);

}

void 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 = lrand48 () % i;
      temp = randperm3000[i - 1];
      randperm3000[i - 1] = randperm3000[pos];
      randperm3000[pos] = temp;
    }
}

void randstr (str, x, y)
char *str;
int x;
int y;
{
    int i, j;
    int len;

    len = (lrand48 () % (y - x + 1)) + x;
    for (i = 0; i < len; i++) {
      j = lrand48 () % 62;
      if (j < 26)
        str[i] = (char) (j + 'a');
      else if (j < 52)
        str[i] = (char) (j - 26 + 'A');
      else
        str[i] = (char) (j - 52 + '0');
    }
    str[len] = '\0';

}

void randdatastr (str, x, y)
char *str;
int x;
int y;
{
    int i, j;
    int len;
    int pos;

    len = (lrand48 () % (y - x + 1)) + x;
    for (i = 0; i < len; i++) {
      j = lrand48 () % 62;
      if (j < 26)
        str[i] = (char) (j + 'a');
      else if (j < 52)
        str[i] = (char) (j - 26 + 'A');
      else
        str[i] = (char) (j - 52 + '0');
    }
    str[len] = '\0';
    if ((lrand48 () % 10) == 0) {
      pos = (lrand48 () % (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';
    }
}

void randnum (str, len)
char *str;
int len;
{
    int i;

    for (i = 0; i < len; i++)
      str[i] = (char) (lrand48 () % 10 + '0');
    str[len] = '\0';

}

void 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]);
}

int 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);

}

void sysdate (sdate)
char *sdate;
{
  time_t tp;
  struct tm *tmptr;

  time (&tp);
  tmptr = localtime (&tp);
  strftime (sdate, 29, "%d-%b-%Y", tmptr);
}

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

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

Appendix - D: RTE Scripts

D.1 RTE Parameters

rteparams

```
/* For Oracle in the tpccload program C_LAST =1.              */
/* C-Delta be the difference between C-LOAD and C-Run.        */
/* C-Delta must be a value between 65..119 including the      */
/* values of 65 and 119 and excluding the value of 96 and 112 */

#define MASTER_NUM1 1
#define MASTER_NUM2 0
#define MASTER_NUM3 0

#if MASTER_NUM1
MASTER "master1"
#elif MASTER_NUM2
MASTER "master2"
#elif MASTER_NUM3
MASTER "master3"
#endif
/*---- SUT ----------------------------------------------*/
SUT="milo"
/*-------------------------------------------------------*/
LASTC=88
MEASUREMENT="1"
WAREHOUSES=29760
/*----- SLAVES -------------------------------------------*/
#if MASTER_NUM1
SLAVES driver1a, driver1b, driver1c, driver1d, driver2a, driver2b,
driver2c, driver2d, driver3a, driver3b, driver3c, driver3d, driver4a,
driver4b, driver4c, driver4d
#elif MASTER_NUM2
#if MASTER_NUM2
SLAVES driver5a, driver5b, driver5c, driver5d, driver6a, driver6b,
driver6c, driver6d, driver7a, driver7b, driver7c, driver7d, driver8a,
driver8b, driver8c, driver8d
#elif MASTER_NUM3
SLAVES driver9a, driver9b, driver9c, driver9d, driver10a, driver10b,
driver10c, driver10d, driver11a, driver11b, driver11c, driver11d,
driver12a, driver12b, driver12c, driver12d
#endif
/* ---- CLIENTS ------------------------------------------*/
#if MASTER_NUM1
MAIN_CLIENT = client1
CLIENT_REAL = "client1 client2 client3 client4"
#elif MASTER_NUM2
MAIN_CLIENT = client5
CLIENT_REAL = "client5 client6 client7 client8"
#elif MASTER_NUM3
MAIN_CLIENT = client9
CLIENT_REAL = "client9 client10 client11 client12"
#endif

/*---- more client ctuff -------------------------------*/
#if MASTER_NUM1
CLIENT client1a tpcc tpcc
CLIENT client2a tpcc tpcc
CLIENT client3a tpcc tpcc
CLIENT client4a tpcc tpcc
#elif MASTER_NUM2
CLIENT client5a tpcc tpcc
CLIENT client6a tpcc tpcc
CLIENT client7a tpcc tpcc
CLIENT client8a tpcc tpcc
#elif MASTER_NUM3
CLIENT client9a tpcc tpcc
CLIENT client10a tpcc tpcc
CLIENT client11a tpcc tpcc
CLIENT client12a tpcc tpcc
#endif
/*-------------------------------------------------------*/
TELNET telnet 23
SOCKET socket 199703
/* --- Sockets ----------------------------------------*/
#if MASTER_NUM1

SOCKET_NETWORK socket1   80 driver1a
SOCKET_NETWORK socket2   80 driver1b
SOCKET_NETWORK socket3   80 driver1c
SOCKET_NETWORK socket4   80 driver1d

SOCKET_NETWORK socket33   80 driver2a
SOCKET_NETWORK socket34   80 driver2b
SOCKET_NETWORK socket35   80 driver2c
SOCKET_NETWORK socket36   80 driver2d

SOCKET_NETWORK socket65   80 driver3a
SOCKET_NETWORK socket66   80 driver3b
SOCKET_NETWORK socket67   80 driver3c
SOCKET_NETWORK socket68   80 driver3d

SOCKET_NETWORK socket97   80 driver4a
SOCKET_NETWORK socket98   80 driver4b
SOCKET_NETWORK socket99   80 driver4c
SOCKET_NETWORK socket100   80 driver4d
#elif MASTER_NUM2
SOCKET_NETWORK socket1   80 driver5a
SOCKET_NETWORK socket2   80 driver5b
SOCKET_NETWORK socket3   80 driver5c
SOCKET_NETWORK socket4   80 driver5d

SOCKET_NETWORK socket33   80 driver6a
SOCKET_NETWORK socket34   80 driver6b
SOCKET_NETWORK socket35   80 driver6c
SOCKET_NETWORK socket36   80 driver6d

SOCKET_NETWORK socket65   80 driver7a
SOCKET_NETWORK socket66   80 driver7b
SOCKET_NETWORK socket67   80 driver7c
SOCKET_NETWORK socket68   80 driver7d

SOCKET_NETWORK socket97   80 driver8a
SOCKET_NETWORK socket98   80 driver8b
SOCKET_NETWORK socket99   80 driver8c
SOCKET_NETWORK socket100   80 driver8d
#elif MASTER_NUM3
SOCKET_NETWORK socket1   80 driver9a
SOCKET_NETWORK socket2   80 driver9b
SOCKET_NETWORK socket3   80 driver9c
SOCKET_NETWORK socket4   80 driver9d

SOCKET_NETWORK socket33   80 driver10a
SOCKET_NETWORK socket34   80 driver10b
SOCKET_NETWORK socket35   80 driver10c
SOCKET_NETWORK socket36   80 driver10d

SOCKET_NETWORK socket65   80 driver11a
SOCKET_NETWORK socket66   80 driver11b
SOCKET_NETWORK socket67   80 driver11c
SOCKET_NETWORK socket68   80 driver11d

SOCKET_NETWORK socket97   80 driver12a
SOCKET_NETWORK socket98   80 driver12b
SOCKET_NETWORK socket99   80 driver12c
SOCKET_NETWORK socket100   80 driver12d
#endif
/*-------------------------------------------------------*/
OUTPUTNAME="regattaH"
CPU=48
```

```
#if 0
BEGIN_WAIT=5:00
RAMPUP=43:30
RUNTIME=15:00
RAMPDOWN_WAIT=5:00
RAMPDOWN=17:00
#else
BEGIN_WAIT=20:00
RAMPUP=1:27:00
RUNTIME=2:00:00
RAMPDOWN_WAIT=5:00
RAMPDOWN=20:00
#endif
INTERVAL=1:00 /* Interval to calculate mix from */
LOGIN_MAX_LOAD = 10
LOGIN_BEGIN = 0 /* skip login state if set to 1 */
LOGIN_TIMEOUT = 600 /* Timeout in seconds for user to login */
NOBEGIN = 1
KEYSTROKE_PACKET_SIZE = 0
MAX_CONCURRENT_SPAWN = 25
SPAWN_COUNT = 25
MIN_PORT = 8088
MAX_PORT = 8089
/* User variables. Think, Emulex Delay, %desired, %min, %max */
#if 1 /* Testing */
NEWORDER = "12.02, 0, 0"
PAYMENT = "12.02, 0, 0, 43.02, 43.02, 43.02 "
ORDSTAT = "10.01, 0, 0, 4.02, 4.02, 4.02 "
DELIVERY = "05.02, 0, 0, 4.02, 4.02, 4.02 "
STOCKLEV = "05.02, 0, 0, 4.02, 4.02, 4.02 "
#elif 0 /* From rteparams.null */
NEWORDER = "12.25, 0.42, 0.38"
PAYMENT = "12.25, 0.19, 0.23, 43.2, 41.1, 45.3 "
ORDSTAT = "10.50, 0.39, 0.21, 4.1, 3.9, 4.3 "
DELIVERY = "05.5, 0.19, 0.15, 4.1, 3.9, 4.3 "
STOCKLEV = "05.5, 0.25, 0.18, 4.1, 3.9, 4.3 "
#elif 0 /* From Pookeepsie */
NEWORDER = "16.25, 0.42, 0.38"
PAYMENT = "16.25, 0.19, 0.23, 43.15, 43.15, 43.15 "
ORDSTAT = "14.50, 0.39, 0.21, 4.03, 4.03, 4.03 "
DELIVERY = "09.50, 0.19, 0.15, 4.03, 4.03, 4.03 "
STOCKLEV = "09.50, 0.25, 0.18, 4.03, 4.03, 4.03 "
#endif
/*---- Starting users on sockets ------------------------------------*/
#if MASTER_NUM1
START_RANGE client1a socket1 6200 0-620
START_RANGE client1a socket2 6200 620-1240
START_RANGE client1a socket3 6200 1240-1860
START_RANGE client1a socket4 6200 1860-2480

START_RANGE client2a socket33 6200 2480-3100
START_RANGE client2a socket34 6200 3100-3720
START_RANGE client2a socket35 6200 3720-4340
START_RANGE client2a socket36 6200 4340-4960

START_RANGE client3a socket65 6200 4960-5580
START_RANGE client3a socket66 6200 5580-6200
START_RANGE client3a socket67 6200 6200-6820
START_RANGE client3a socket68 6200 6820-7440

START_RANGE client4a socket97 6200 7440-8060
START_RANGE client4a socket98 6200 8060-8680
START_RANGE client4a socket99 6200 8680-9300
START_RANGE client4a socket100 6200 9300-9920
#elif MASTER_NUM2
START_RANGE client5a socket1 6200 9920-10540
START_RANGE client5a socket2 6200 10540-11160
START_RANGE client5a socket3 6200 11160-11780
START_RANGE client5a socket4 6200 11780-12400

START_RANGE client6a socket33 6200 12400-13020
START_RANGE client6a socket34 6200 13020-13640
START_RANGE client6a socket35 6200 13640-14260
START_RANGE client6a socket36 6200 14260-14880

START_RANGE client7a socket65 6200 14880-15500
START_RANGE client7a socket66 6200 15500-16120
START_RANGE client7a socket67 6200 16120-16740
START_RANGE client7a socket68 6200 16740-17360

START_RANGE client8a socket97 6200 17360-17980
START_RANGE client8a socket98 6200 17980-18600
START_RANGE client8a socket99 6200 18600-19220
START_RANGE client8a socket100 6200 19220-19840
#elif MASTER_NUM3
START_RANGE client9a socket1 6200 19840-20460
START_RANGE client9a socket2 6200 20460-21080
START_RANGE client9a socket3 6200 21080-21700
START_RANGE client9a socket4 6200 21700-22320

START_RANGE client10a socket33 6200 22320-22940
START_RANGE client10a socket34 6200 22940-23560
START_RANGE client10a socket35 6200 23560-24180
START_RANGE client10a socket36 6200 24180-24800

START_RANGE client11a socket65 6200 24800-25420
START_RANGE client11a socket66 6200 25420-26040
START_RANGE client11a socket67 6200 26040-26660
START_RANGE client11a socket68 6200 26660-27280

START_RANGE client12a socket97 6200 27280-27900
START_RANGE client12a socket98 6200 27900-28520
START_RANGE client12a socket99 6200 28520-29140
START_RANGE client12a socket100 6200 29140-29760
#endif
/*-------------------------------------------------------------------*/
#define TES_FLAG_TRACE 0x00000010
#define TES_FLAG_KEYSTROKE_TIME 0x00000200
#define TES_FLAG_LOCAL_LOG 0x00000400
#define TES_FLAG_LOCAL_TRACE 0x00000800
#define TES_FLAG_LOCAL_IPRINT 0x00004000
#if 0
/* SETFLAG ALL TES_FLAG_TRACE */
SETFLAG ALL TES_FLAG_LOCAL_TRACE
SETFLAG ALL TES_FLAG_LOCAL_IPRINT
#endif
#if 0
SETFLAG client31 telnet 1 TES_FLAG_KEYSTROKE_TIME
#endif


#if 0
SETFLAG client31 telnet 1 TES_FLAG_KEYSTROKE_TIME
#endif
```

D.2 RTE Scripts

tpccWeb.h

```
/*
*********************************************************************
** Project     : AIX TPC-C
** Component   : TPC-C/Client
** Name        : tpccWeb.h
** Title       : rte web defines
*********************************************************************
** Copyright (c) IBM US - AUSTIN 2000
** Classification : IBM Internal Use Only
**
** History       :
**                Develop by Austin RISC/6000 Performance Team
**
** Comments      :
```

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

/* $Id: socket.h,v 1.1 2004/06/25 17:21:56 klavsp Exp $ */

////////////////////////////////////////////////////////////
// Transaction Codes
////////////////////////////////////////////////////////////

#define       TXN_LOGIN                0
#define       TXN_NEW_ORDER            1
#define       TXN_PAYMENT              2
#define       TXN_ORDER_STATUS         3
#define       TXN_DELIVERY             4
#define       TXN_STOCK                5
#define       TXN_EXIT                 6
#define       TXN_LOGIN_RESULTS        7
#define       TXN_NEW_ORDER_RESULTS    8
#define       TXN_PAYMENT_RESULTS      9
#define       TXN_ORDER_STATUS_RESULTS 10
#define       TXN_DELIVERY_RESULTS     11
#define       TXN_STOCK_RESULTS        12

#define       TXN_NORD                 "nord"
#define       TXN_PYMT                 "pymt"
#define       TXN_ORDS                 "ords"
#define       TXN_DLVY                 "dlvy"
#define       TXN_STOK                 "stok"
#define       TXN_sEXIT                "exit"
#define       TXN_MENU                 "menu"

#define       ITEM_CMD_ID_START        11
#define       ITEM_CMD_ID_END          55

#define       APP_NAME                 "tpcc"

////////////////////////////////////////////////////////////
// Transaction Result Search Strings
////////////////////////////////////////////////////////////

#define   LOGIN_TITLE       "Home Page"
#define   MENU_TITLE      "Main Menu"
#define   NORD_TITLE      "New Order"
#define   PYMT_TITLE      "Payment"
#define   ORDS_TITLE      "Order Status"
#define   DLVY_TITLE      "Delivery"
#define   STOK_TITLE      "Stock Level"

#define   LOGIN_TITLE_LEN   9
#define   MENU_TITLE_LEN      9
#define   NORD_TITLE_LEN      9
#define   PYMT_TITLE_LEN      7
#define   ORDS_TITLE_LEN      12
#define   DLVY_TITLE_LEN      8
#define   STOK_TITLE_LEN      10

#define   NORD_RESULTS_TITLE "New Order Results"
#define   PYMT_RESULTS_TITLE  "Payment Results"
#define   ORDS_RESULTS_TITLE "Order Status Results"
#define   DLVY_RESULTS_TITLE  "Delivery Results"
#define   STOK_RESULTS_TITLE  "Stock Level Results"

#define   NORD_RESULTS_TITLE_LEN       17
#define   PYMT_RESULTS_TITLE_LEN       15
#define   ORDS_RESULTS_TITLE_LEN       20
#define   DLVY_RESULTS_TITLE_LEN       16
#define   STOK_RESULTS_TITLE_LEN       19

#define   CONTENT_LENGTH    "Content-Length: "
#define   HEADER_TERMINATOR "\r\n\r\n"

////////////////////////////////////////////////////////////
// Field Lengths
////////////////////////////////////////////////////////////
#define   HEADER_TERMINATOR_LENGTH   4
#define   CONTENT_LENGTH_STR_LEN       16

////////////////////////////////////////////////////////////
// Transaction Request URLs
////////////////////////////////////////////////////////////

#define GET_REQUEST          "GET %s HTTP/1.1\r\nHost:
%s\r\nConnection: Keep-Alive\r\nAccept: text/*\r\n\r\n"
#define GET_REQUEST_EXIT     "GET %s HTTP/1.1\r\nHost:
%s\r\nConnection: close\r\nAccept: text/*\r\n\r\n"

#define LOGIN_URL           "/tpcc/tpcc.html"
#define MENU_URL
  "/tpcc/tpcc.html?00=menu&02=%d&03=%d"

#define NEW_ORDER_FORM_URL
  "/tpcc/tpcc.html?00=nord&01=%d"
#define PAYMENT_FORM_URL
  "/tpcc/tpcc.html?00=pymt&01=%d"
#define ORDER_STATUS_FORM_URL
  "/tpcc/tpcc.html?00=ords&01=%d"
#define DELIVERY_FORM_URL
  "/tpcc/tpcc.html?00=dlvy&01=%d"
#define STOCK_FORM_URL
  "/tpcc/tpcc.html?00=stok&01=%d"
#define EXIT_FORM_URL          "/tpcc/tpcc.html?00=exit&01=%d"

#define NEW_ORDER_RESULTS_URL
  "/tpcc/tpcc.html?00=nord&01=%d&03=%d&04=%d%s"

#define PAYMENT_RESULTS_CID_URL
  "/tpcc/tpcc.html?00=pymt&01=%d&03=%d&04=%d&05=&06=%d&
07=%d&08=%d.%02.2d"
#define PAYMENT_RESULTS_CLAST_URL
  "/tpcc/tpcc.html?00=pymt&01=%d&03=%d&04=&05=%s&06=%d&
07=%d&08=%d.%02.2d"

#define ORDER_STATUS_RESULTS_CLAST_URL
"/tpcc/tpcc.html?00=ords&01=%d&03=%d&04=&05=%s"
#define ORDER_STATUS_RESULTS_CID_URL
"/tpcc/tpcc.html?00=ords&01=%d&03=%d&04=%d&05="

#define  DELIVERY_RESULTS_URL
"/tpcc/tpcc.html?00=dlvy&01=%d&10=%d"
#define  STOCK_RESULTS_URL
"/tpcc/tpcc.html?00=stok&01=%d&09=%d"

#define NEW_ORDER_ITEM       "&%d=%d"
#define NEW_ORDER_ITEM_ENTRY"&%d=%d&%d=%d&%d=%d"
#define NEW_ORDER_EMPTY_ITEM"&%d="
```

user_master.C

```
/****************************************************************
****************/
/* user_master.C                                Audit: 05/30/96 */
/*****************************************************************************/

static char *rcsid="$Id: user_master.C,v 1.1 2004/06/25 17:25:42
klavsp Exp $";

#include <iostream.h>
#include <stdio.h>
#include <strings.h>
#include <stdlib.h>
#include <unistd.h>
#define _H_CUR01
```

```
#include <cur00.h>
#undef _H_CUR01
extern "C" {
#include "data/cur01.h"
int wrefresh (WINDOW *);
int wclrtoeol(WINDOW *);
int setupterm(char*,FILE*,int*);
int nodelay(int);
int keypad(int);
int wgetch(WINDOW *);
}
#include "data/rte.h"
#include "data/Stats.h"
#include "data/misc.h"
#include "user_tpcc.h"

struct header_s {
   int slave;
   int num;
   int type;
   int num_timestamps;
   int user_data_length;
   int data_type;
};


char *get_variable(char *name);
int get_variable(char *name, int *number);
int send_global_data(void);
int make_ratios (double *buffer);
extern int ramp_up_complete;
extern int interval_start_time, interval_stop_time;
//extern "C" int strcasecmp(char *s1, char *s2);
//extern "C" int strncasecmp(char *s1, char *s2, int n);

struct UserSpawnData {
   int Warehouse;
   int District;
};

/* user_master.C */
int user_statistics_print(void);
// int user_spawn(int *length, char *buffer);
int user_spawn(int min, int max, int number, int *length, char
*buffer);
int user_finished(int length, char *buffer);

extern SlaveStatus slave_status[MAX_SLAVES];

extern Stats status[MAX_TRAN_TYPE][MAX_TIMES];
extern WINDOW *statistics_win;
extern UserGlobal *shmglobal;

/* Transaction mix parameters */
double ratio_desired[6], ratio_min[6], ratio_max[6], ratio_range[6];
char *ratio_names[] = { "RTE", "NEWORDER", "PAYMENT",
"ORDSTAT", "DELIVERY",
                        "STOCKLEV", NULL };
char *Status_Names[] = {"Menu", "Keying", "Response", "Think"};


char *transaction_names[] = { "RTE", "New Order", "Payment",
"Order Stat",
                          "Delivery", "Stock Level", NULL };

static int current_status = 2, status_needs_refresh = 1;

int user_statistics_print(void) {
   int i;
   static int count = 0;
   double ratios[6];
   if (status_needs_refresh) {
     count = 0;
     status_needs_refresh = 0;
     wmove   (statistics_win, 0, 0);
     wprintw (statistics_win, "%11s %8s %8s %8s %8s %8s %6s %6s
%6s",
        Status_Names[current_status], "90%", "Avg", "Min", "Max",
        "Samples", "Ratio", "Mix", "Think");
     }
     make_ratios(ratios);


     for (i = 1; i <= 5; i++) {
     /* The reason we do this is because calculating the percentiles
        is expensive */
     if (count % 10 == 0) {
         wmove   (statistics_win, i, 0);
         wprintw (statistics_win, "%11s %8.2f",
           transaction_names[i],
status[i][current_status].ninety()/1000.0);
         count = 0;
     }
     wmove   (statistics_win, i, 21);
     wprintw (statistics_win, "%8.2f %8.2f %8.2f %8d %6.2f %6.2f
%6.2f",
        status[i][current_status].average()/1000.0,
        status[i][current_status].min()/1000.0,
        status[i][current_status].max()/1000.0,
        status[i][current_status].samples(),
        ratios[i], shmglobal->chances[i],
        status[i][3].average()/1000.0);
     }
     wmove   (statistics_win, 7, 0);

     extern int runtime_counts[MAX_TRAN_TYPE];
     extern int begin_time, ramp_up, run_time;
     int start = interval_start_time;
     int stop  = interval_stop_time;
     double interval = ((double)(stop-start) / (1000*60));
     double samples = status[1][2].samples();
     if (interval <= 0 || samples <= 0) {
     wprintw (statistics_win, "TPM-C: %7s / ", "-------");
     } else {
     wprintw (statistics_win, "TPM-C: %7.2f / ", samples/interval);
     }
     samples = runtime_counts[1];
     if (samples > 0) {
     start = begin_time+((ramp_up>=0)?ramp_up:0);
     if (run_time > 0 && stop > begin_time + ramp_up + run_time) {
        stop = begin_time + ramp_up + run_time;
     }
     interval = (double)(stop - start)/(1000.0*60.0);
     wprintw (statistics_win, "%7.2f", samples/interval);
     } else {
     wprintw (statistics_win, "-------");
     }

     count++;
     return RTE_OK;
}

extern int login_begin;
int login_max_load;

#ifdef WHSEARRAYDBG
int outofboundwarn;
#endif
extern int min_warehouse;
extern int max_warehouse;

const int MAX_WAREHOUSES=100000;
/* All of this 10 stuff is district size.  Should be a constant.
   Maybe fix that later */
```

```
int num_warehouses = -1;
int warehouses[MAX_WAREHOUSES*10];
int user_spawn(int min, int max, int number, int *length, char *buffer)
{
//int user_spawn(int number, int *length, char *buffer) {
    int i, min_index;
    int adj_wh = num_warehouses;     // adjusted warehouse number
    UserSpawnData *ptr = (UserSpawnData *)buffer;
    *length = sizeof(*ptr);

//    min_index = 0;
//    for (i = 1; i < (num_warehouses)*10 && i <
MAX_WAREHOUSES*10; i++) {
//
//  if both min and max are zero, running START, otherwise running
// START_RANGE.  Must also determine what the ending
warehouse number
// will be for said range
//

   if (min ==0 && max == 0) {
      min++;
      min_index =  0 ;
   } else {
      adj_wh = max;   // inclusive range of wh-s
      min = min * 10;
      min_index = min;
   }
    for (i = min ; i < (adj_wh)*10 && i <
((MAX_WAREHOUSES+min_warehouse)*10); i++) {
   if (warehouses[i - (min_warehouse*10)] < warehouses[min_index -
(min_warehouse*10)]) {
       min_index = i;
   }
    }

    ptr->Warehouse = min_index / 10 + 1;
    ptr->District  = min_index % 10 + 1;
#ifdef WHSEARRAYDBG
    if ((min_index - (min_warehouse*10) < 0) || (min_index -
(min_warehouse*10) >= (MAX_WAREHOUSES*10))) {
      if (outofboundwarn) {
   iprint (IPRINT_INFO, "(spawn) Out of range warehouse number
%d, (%d-%d (start) = %d (rel. num)\n",
      min_index, min_index, min_warehouse, min_index -
(min_warehouse*10));
   outofboundwarn=0;
      }
    }
#endif

    warehouses[min_index - (min_warehouse*10)]++;
/*     iprint (IPRINT_INFO, "Driver for Warehouse %d, District %d
started.  warehouses[%d]++ = %d\n",
           ptr->Warehouse, ptr->District, min_index,
warehouses[min_index - (min_warehouse*10)]); */
    return RTE_OK;
}

int user_finished(int length, char *buffer) {
    UserSpawnData *ptr = (UserSpawnData *)buffer;
    int temp = (ptr->Warehouse-1)*10+ptr->District-1;

#ifdef WHSEARRAYDBG
    if ((temp - min_warehouse*10 < 0) || (temp - min_warehouse*10
>= MAX_WAREHOUSES*10)) {
      if (outofboundwarn) {
   iprint (IPRINT_INFO, "(finish) Out of range warehouse number
%d, (%d-%d (start) = %d (rel. num)\n",
      min_index, min_index, min_warehouse, min_index -
(min_warehouse*10));
   outofboundwarn=0;
      }
    }
#endif

    warehouses[temp - (min_warehouse*10)]--;
/*     iprint (IPRINT_INFO, "Driver for Warehouse %d, District %d
died.  warehouses[%d]-- = %d\n",
           ptr->Warehouse, ptr->District, temp, warehouses[temp -
(min_warehouse*10)]); */
    return RTE_OK;
}


double limit(double min, double max, double val) {
    if (val < min)
   return min;
    if (val > max)
   return max;
    return val;
}


int make_ratios (double *buffer) {
    int neword   = status[NEWORDER][0].samples();
    int payment  = status[PAYMENT] [0].samples();
    int ordstat  = status[ORDSTAT] [0].samples();
    int delivery = status[DELIVERY][0].samples();
    int stocklev = status[STOCKLEV][0].samples();
    int total    = neword + payment + ordstat + delivery + stocklev;
    int i;

    if (total == 0) {
   buffer[NEWORDER] = 100.0;
   for (i = 2; i < 6; i++) {
      buffer[i] = ratio_desired[i];
      buffer[NEWORDER] -= buffer[i];
   }
   return 0;
    }

    buffer[PAYMENT]  = (double)payment  / (double)total * 100.0;
    buffer[ORDSTAT]  = (double)ordstat  / (double)total * 100.0;
    buffer[DELIVERY] = (double)delivery / (double)total * 100.0;
    buffer[STOCKLEV] = (double)stocklev / (double)total * 100.0;
    buffer[NEWORDER] = 100.0- buffer[PAYMENT] -
buffer[ORDSTAT] -
              buffer[DELIVERY] - buffer[STOCKLEV];

    return total;
}

int user_global_update(int *length, char *buffer) {
    UserGlobal *shmglobal = (UserGlobal *)buffer;
    static double last[6];
    static last_test_state = 0;
    static int users_last=-1;
    double ratios[6];
    double current[6];
    int i, different = 0;
    int desired = 0;
    int host_busy, all_zero;

    *length = sizeof(*shmglobal);

    make_ratios(ratios);

    /* Calculate ratios we want for next time */
    /* Note: we just keep on with the desired values until ramp-up is
complete
          this at least starts us out without any humps or spikes in the
       graph */
    if (ramp_up_complete) {
```

```
    current[NEWORDER] = 100.0;
    for (i = 2; i < 6; i++) {
        if (ratio_desired[i] > ratios[i]) {
       current[i] = ratio_max[i];
        } else {
       current[i] = 2*ratio_desired[i] - ratios[i];
       if (current[i] < ratio_min[i])
           current[i] = ratio_min[i];
        }
        current[NEWORDER] -= current[i];
    }
    } else {
    for (i = 1; i < 6; i++) {
        current[i] = ratio_desired[i];
    }
    }

    /* Add up all the users */
    /* This needs to be changed to be more transparent */
    shmglobal->total_users = 0;
    for (i = 0; i < MAX_SLAVES; i++) {
    shmglobal->total_users += slave_status[i].active;
    desired                += slave_status[i].desired;
    }
    /* Count up number of warehouses we WANT to have */
    if (num_warehouses < 0) {
    num_warehouses = (desired-1)/10+1;
    }
    shmglobal->max_warehouses = num_warehouses;

    host_busy = 0;
    all_zero = 1;
    for (i = 1; i <= 5; i++) {
    if (status[i][current_status].average() != 0) {
        all_zero = 0;
    }
    if ( status[i][current_status].average()/1000.0 > login_max_load ) {
        host_busy = 1;
    }
    }
    if (shmglobal->host_busy && all_zero) {
    host_busy = 1;
    }

    if (host_busy != shmglobal->host_busy) {
    shmglobal->host_busy = host_busy;
    different = 1;
    }

    for (i = 2; i < 6; i++) {
    if (current[i] != last[i])
        different = 1;
    }

    if (last_test_state != shmglobal->test_state) {
    different = 1;
    last_test_state = shmglobal->test_state;
    }

    // Don't send if it's the same as last time
    if ( !different && shmglobal->total_users == users_last ) {
    return RTE_ERROR;
    }

    users_last = shmglobal->total_users;
    for (i = 1; i < 6; i++) {
    shmglobal->chances[i] = last[i] = current[i];
    }

    return RTE_OK;
}

int user_isbusy() {
    return shmglobal->host_busy;
}


int parse_array(char *string, int max, int *buffer) {
    int i, rc;
    char *ptr;
    char *temp = strdup(string);
    ptr = strtok(temp, ",");
    for (i = 0; ptr && i < max; i++) {
    rc = sscanf(ptr, "%d", &buffer[i]);
    if (rc < 1) {
        free(temp);
        return i;
    }
    ptr = strtok(NULL, ",");
    }
    free(temp);
    return i;
}

int parse_array(char *string, int max, double *buffer) {
    int i, rc;
    char *ptr;
    char *temp = strdup(string);
    ptr = strtok(temp, ",");
    for (i = 0; ptr && i < max; i++) {
    rc = sscanf(ptr, "%lf", &buffer[i]);
    if (rc < 1) {
        free(temp);
        return i;
    }
    ptr = strtok(NULL, ",");
    }
    free(temp);
    return i;
}


int user_init() {
    double  dbuffer[32];
    int   rc, i;
    char *ptr;

    if (get_variable("KEYSTROKE_SLEEP", &shmglobal-
>keystroke_sleep) != RTE_OK) {
    shmglobal->keystroke_sleep = 0;
    }
    if (get_variable("LOGIN_TIMEOUT", &shmglobal-
>login_timeout) != RTE_OK) {
    shmglobal->login_timeout = 120; /* 2 minutes */
    }
    if (get_variable("KEYSTROKE_PACKET_SIZE", &shmglobal-
>keystroke_packet_size) != RTE_OK) {
    shmglobal->keystroke_packet_size = 0;
    }
    shmglobal->login_timeout *= 1000;
    if (get_variable("LOGIN_MAX_LOAD", &login_max_load) !=
RTE_OK) {
    login_max_load = 2;
    }
    if (get_variable("WAREHOUSES", &num_warehouses) !=
RTE_OK) {
    num_warehouses = -1;
    }
    if (get_variable("LASTC", &shmglobal->lastc) != RTE_OK) {
    shmglobal->lastc = 193; /* 2 minutes */
    }
    iprint(IPRINT_INFO, "Login Timeout = %s\n",
      mstoa_withfrac(shmglobal->login_timeout, 0));
    iprint(IPRINT_INFO, "Keystroke Sleep = %s\n",
```

```
      mstoa_withfrac(shmglobal->keystroke_sleep*1000, 0));
    iprint(IPRINT_INFO, "Keystroke Packet Size= %d\n", shmglobal-
>keystroke_packet_size);
    if (num_warehouses >= 0) {
   iprint(IPRINT_INFO, "Fixed Warehouses to = %d\n",
num_warehouses);
    }

    if (!(ptr = get_variable("NEWORDER"))) {
   iprint_error ("Error. NEWORDER variable not found\n");
   exit (1);
    }
    if (parse_array(ptr, 3, dbuffer)!=3) {
   iprint_error ("Error. NEWORDER should be think, emulex_menu,
emulex_response");
   exit (1);
    }
    shmglobal->think          [NEWORDER] = dbuffer[0];
    shmglobal->emulex_menu    [NEWORDER] = dbuffer[1];
    shmglobal->emulex_response[NEWORDER] = dbuffer[2];
    shmglobal->test_state = 0;

    for (i = 2; i < 6; i++) {
   if (!(ptr = get_variable(ratio_names[i])) ||
       (parse_array(ptr, 6, dbuffer)!=6)) {
       iprint(__FILE__, __LINE__, IPRINT_ERROR,
            "Error. %s should be think, emulex_menu,
emulex_response, desired, min, max",
         ratio_names[i]);
       exit (1);
   }
   shmglobal->think[i]          = dbuffer[0];
   shmglobal->emulex_menu[i]    = dbuffer[1];
   shmglobal->emulex_response[i] = dbuffer[2];
   ratio_desired[i]             = dbuffer[3];
   ratio_min[i]                 = dbuffer[4];
   ratio_max[i]                 = dbuffer[5];
   ratio_range[i]               = ratio_max[i]-ratio_min[i];
    }

    for (i=0; i < (MAX_WAREHOUSES*10); i++) {
      warehouses[i] = 0;
    }

#ifdef WHSEARRAYDBG
    outofboundwarn=1;
#endif

    return RTE_OK;
}

int user_extra_data(header_s *header) {
    int i;
    int num_timestamps;

    if (header->data_type != RTE_ITEM_KEYSTROKE_TIMES)
   return RTE_OK;
    int *times = (int *)((char *)header+sizeof(struct header_s));
    num_timestamps = header->user_data_length / 4 - 1;

    iprint (IPRINT_TRACE, "Keystroke times = ");
    for (i = 0 ; i < num_timestamps; i++) {
   iprint (IPRINT_TRACE, "%d ", times[i]);
    }
    iprint (IPRINT_TRACE, "\n", times[i]);

    return RTE_OK;
}

int user_process_command(char *command) {
    char buffer[256], *ptr;
    int i, found, len;

    strncpy (buffer, command, 256);
    ptr = strtok (buffer, " \t");
    found = 0;
    printf ("user_process_command('%s')\n",ptr);
    if (!strcasecmp (ptr, "pause")) {
   shmglobal->test_state = 1;
    } else if (!strcasecmp (ptr, "warmup")) {
   shmglobal->test_state = 2;
    } else if (!strcasecmp (ptr, "notest")) {
   shmglobal->test_state = 0;
    } else if (!strcasecmp (ptr, "login_max_load?")) {
   iprint (IPRINT_WARNING, "Current LOGIN_MAX_LOAD = %d\n",
login_max_load);
    } else if (!strncasecmp (command, "login_max_load=",15)) {
   login_max_load=atoi(command+15);
   iprint (IPRINT_WARNING, "Set LOGIN_MAX_LOAD = %d\n",
login_max_load);
    } else if (!strcasecmp (ptr, "display")) {
        while (ptr && (ptr = strtok(NULL, " \t"))) {
            if (*ptr == '\0')
                continue;
            for (i = 0; i < 5; i++) {
                len = min(strlen(Status_Names[i]), strlen(ptr));
                if (!strncasecmp (ptr, Status_Names[i], len)) {
                    status_needs_refresh = found = 1;
                    current_status = i;
                    return RTE_OK;
                }
            }
            iprint (IPRINT_WARNING, "Unknown type to display: %s\n",
ptr);
        }
    } else {
   iprint (IPRINT_WARNING, "Unknown Command: '%s'\n",
command);
   return RTE_ERROR;
    }
    return RTE_OK;
}

int transaction_process () {
    return RTE_OK;
}

int user_begin() {
    return RTE_OK;
}

/*
void user_make_header(char *buffer) {
    int i;
    struct user_data_header *data = (struct user_data_header
*)buffer;
}
*/
```

user_slave.C

```
/*****************************************************************************/
/* user_slave.C                                    Audit: 05/30/96 */
/*****************************************************************************/

static char *rcsid="$Id: user_slave.C,v 1.1 2004/06/25 17:25:42
klavsp Exp $";

/*****************************************************************************/
/***                TPCC FILE FOR ALL USERS                        ***/
/*****************************************************************************/
#include <stdio.h>
#include <stdlib.h>
```

```
#include <unistd.h>
#include <string.h>
#include <sys/time.h>
#include "rte_slave.h"
#include "user_tpcc.h"

/* This MUST match the corresponding one in client's inout.h file! */
#define TRIGGER "\021"
//#define NOSLEEP
// Increased EXPECT_TIMEOUT from 600000 - oz 10/20/97
#define EXPECT_TIMEOUT 6000000
#define KEYWAIT_FUDGE  5000

extern SHM_Slave *shm;
extern TableEntrySlave *shmentry;
extern DriverStatus    *status;
extern echo_trace(char *);
extern echo_trace();
extern char *expect_save;

extern char *expect_buffer_return();



const char *SQL_TPERRNO_MESSAGE = "tperrno";
const char *SQL_RTN_MESSAGE =     "rtn:";
const char *SQL_FATAL_MESSAGE =   "SQL Fatal Error";
const char *ROLLBACK_MESSAGE      =    "Item number is not
valid";
const char *CUSTOMER_ID_STRING    =   "Customer: ";

int             WHSEID;   /* warehouse number for each users */

/*******************************************************************************/
/* The "uniform()" function has range of the absolute value of the
*/
/* difference between the min. and the max values upto
2147483647.      */
/*******************************************************************************/
/*-------------------------------------------------------*/
/* NURand                        */
/*-------------------------------------------------------*/
/* A: 255 for C_LAST, 1023 for C_ID, 8191 for OL_I_ID   */
/* x: 0 for C_LAST, 1 for C_ID and OL_I_ID              */
/* y: 999 for C_LAST, 3000 for C_ID, 100000 for OL_I_ID */
/*-------------------------------------------------------*/
long
NURand(int A, int x, int y, long cval)
{
   return ((((long) uniform((long) 0, (long) A) | (long) uniform((long) x,
(long) y)) + cval) % (y - x + 1)) + x;
}

/*-------------------------------------------------------*/
/* getname                       */
/*-------------------------------------------------------*/
/* generates a random number from 0 to 999 inclusive    */
/* a random name is generated by associating a random   */
/* string with each digit of the generated number       */
/* three strings are concatenated to generate lastname  */
/*-------------------------------------------------------*/
char          *
getname()
{
   char          *last_name_parts[] =
   {
    "BAR",
    "OUGHT",
    "ABLE",
    "PRI",
    "PRES",
    "ESE",
    "ANTI",
    "CALLY",
    "ATION",
    "EING"
   };
   static char     lastname[128];
   int             random_num;

#if 1
   random_num = NURand(255, 0, 999, shmglobal->lastc);
#else
   random_num = NURand(255, 0, 999, LASTC);
#endif
   strcpy(lastname, last_name_parts[random_num / 100]);
   random_num %= 100;
   strcat(lastname, last_name_parts[random_num / 10]);
   random_num %= 10;
   strcat(lastname, last_name_parts[random_num]);
   return (lastname);
}

typedef struct gen_tran_s {
   int invalid;
   void *data;
   long len;
   long keywait;
   long type;
   char *menu;
   char *results_request;
   char *form_request;
} gen_tran_t;


//Joe N.
typedef struct gen_tran_url_s
{
  char *txn_form_url;
  char *txn_results_url;
}gen_tran_url_s;

int generic_transaction( gen_tran_t *data,char *host)
{
   char buffer[2048];
   static int consecutive_errs = 0;
   int rc;
   set_typing_delay(0);
   //iprint(IPRINT_TRACE, "> generic_transaction sleep (%d)
type(%d) *data (%d)\n", data->type,data->menu,data);
#ifndef NOSLEEP
   if (shmglobal->test_state == 0)
     transaction_sleep_do();
#endif

#ifdef EXPECT_TIMEOUT
   int timeout = EXPECT_TIMEOUT;
#else
   int timeout = 0;
#endif

   // Start the transaction (MENU)
//iprint(IPRINT_TRACE, "> generic_transaction start (%d)\n", data-
>type);
   transaction_start(data->type, data->len, data->data);

   //send menu request page
//iprint(IPRINT_TRACE, "> transmit data->menu: (%s)\n
request :(%s)",data->menu,data->form_request);
//iprint(IPRINT_TRACE, "> transmit data->menu: (%s)\n
request :(%s)",data->menu);
   transmit(data->form_request);

echo_trace ("Waiting for Menu");
```

```
   switch (*data->menu)
   {
     case '1':
        rc = expect_html(NORD_TITLE,timeout,NORD_TITLE_LEN);
        break;
     case '2':
        rc = expect_html(PYMT_TITLE,timeout,PYMT_TITLE_LEN);
        break;
     case '3':
        rc = expect_html(ORDS_TITLE,timeout,ORDS_TITLE_LEN);
        break;
     case '4':
        rc = expect_html(DLVY_TITLE,timeout,DLVY_TITLE_LEN);
        break;
     case '5':
        rc = expect_html(STOK_TITLE,timeout,STOK_TITLE_LEN);
        break;
     default:
        rc = ERROR;
   }

   if(rc == ERROR)
   {
     iprint (IPRINT_ERROR, "Slave %d:Failed to receive %s input
form\n**Request:-->%s<--\n",
                  shmentry->num, data->menu,data->form_request);
        return (ERROR);

   }

//if (expect_html(TRIGGER, timeout) == ERROR)
//{
// iprint (IPRINT_ERROR, "Slave %d: Failed to receive %s
screen\n",
//      shmentry->num, data->menu);
// return (ERROR);
//}


#ifndef NOSLEEP
   usleep(shmglobal->emulex_menu[data->type]*1000000.0+0.9);
#endif

   // Send our request (KEYING)
   transaction_mark(WHERE_NOW);
   echo_trace ("Keying");

#ifndef NOSLEEP
   usleep(data->keywait*1000000+KEYWAIT_FUDGE); // Keying
delay
#endif
   // Wait for response (RESPONSE)
   transaction_mark(WHERE_NOW);

   //iprint(IPRINT_TRACE, "> transmit request :(%s)\n",data-
>results_request);
   transmit(data->results_request);

  echo_trace ("Wait for Response");
  switch (*data->menu)
  {
     case '1':
        rc =
expect_html(NORD_RESULTS_TITLE,timeout,NORD_RESULTS_T
ITLE_LEN);
        break;
     case '2':
        rc =
expect_html(PYMT_RESULTS_TITLE,timeout,PYMT_RESULTS_TI
TLE_LEN);
        break;
     case '3':
        rc =
expect_html(ORDS_RESULTS_TITLE,timeout,ORDS_RESULTS_T
ITLE_LEN);
        break;
     case '4':
        rc =
expect_html(DLVY_RESULTS_TITLE,timeout,DLVY_RESULTS_TI
TLE_LEN);
        break;
     case '5':
        rc =
expect_html(STOK_RESULTS_TITLE,timeout,STOK_RESULTS_TI
TLE_LEN);
        break;
     default:
        rc = ERROR;
  }

  if(rc == ERROR)
  {
     iprint (IPRINT_ERROR, "Slave %d:Failed to receive %s result
page\n**Request:-->%s<--\n",
                  shmentry->num, data->menu,data->form_request);
     return (ERROR);
  }


// if (expect_html(TRIGGER, timeout) == ERROR) {
//iprint (IPRINT_ERROR, "Slave %d: Failed to receive %s
response\n",
//    shmentry->num, data->menu);
// return (ERROR);
// }

#ifndef NOSLEEP
   usleep(shmglobal->emulex_response[data-
>type]*1000000.0+0.9);
#endif

   // Look for errors and set our think time (THINK)
   transaction_mark(WHERE_NOW);
   if (expect_buffer_search("ERROR:",6))
   {
    data->invalid = 1;
    iprint (IPRINT_ERROR, "Slave %d: %s found '%s'\n%s\n",
         shmentry->num, data->menu,
"ERROR:",expect_buffer_return());
     // Very dangerous, keep going rather than exiting...
     //return RTE_ERROR;
     // Check for consecutive errors and if there are more than
     // 4 of them exit - allow for transient errors to make
     // tuning and testing easier   -oz
     // In either case the transaction is marked as invalid and
     // will be reported as an error by the analyze program.
     if (consecutive_errs++ > 4)
       return RTE_ERROR;
   }
   else
   {
    consecutive_errs = 0;
   }
   echo_trace ("Thinking");
   transaction_sleep_set(neg_exp_4(shmglobal->think[data-
>type])*1000.0);
   //iprint(IPRINT_TRACE, "< generic_transaction finish\n");
   return (RTE_OK);
}

/*****************************************************************************/
/***                  Delivery Transaction                         ***/
/*****************************************************************************/
int
```

```
Delivery(char *host,int terminal)
{
   static struct delivery_struct delivery, delivery_new;
   int            rc;
   char           *ptr;
// char       buffer[256];
   gen_tran_t      tran;

   tran.invalid = 0;
   tran.data    = &delivery;
   tran.len     = sizeof(delivery);
   tran.keywait = 2;
   tran.type    = DELIVERY;
   tran.menu    = "4";
//tran.request = buffer;

  //Joe N.
  char  dlvy_url[128];
  char   form_buffer[256];
  char   results_buffer[256];

  tran.form_request = form_buffer;
  tran.results_request = results_buffer;

  //create dlvy form request
  sprintf(dlvy_url,DELIVERY_FORM_URL,terminal);
  sprintf(form_buffer,GET_REQUEST,dlvy_url,host);

   // Set up all data for new transactions
  delivery_new.carrier = uniform(1, 10);  // carrier # 1 to 10

  //create dlvy results request
  sprintf(dlvy_url,DELIVERY_RESULTS_URL,terminal,delivery_new
.carrier);
  sprintf(results_buffer,GET_REQUEST,dlvy_url,host);

   // Now create the actual request
   //ptr = buffer;
   //ptr += sprintf(ptr, "%d\n", delivery_new.carrier);

   // Go do the transaction
   rc = generic_transaction(&tran,host);
   delivery         = delivery_new;
   delivery.invalid = tran.invalid;

   //iprint(IPRINT_TRACE,"dlvy txn finished, rc:%d
tran.invalid:%d\n",rc,delivery.invalid);

   return (rc);
}

/*****************************************************************************/
/***                  New Order Transaction                              ***/
/*****************************************************************************/
int NewOrder(char *host,int terminal)
{
  static struct neword_struct neword, neword_new;
  int            i, rc, whses, low_whse=1;
//char           buffer[2048];

//Joe N.
  char  nord_form_url[128];
  char   form_buffer[512];

  char   nord_results_url[2048];
  char   results_buffer[4096];

  char          *ptr;
  char         *ptr2;
  const char      *err_ptr;

  gen_tran_t      tran;

  tran.invalid     = 0;
  tran.data        = &neword;
  tran.len         = sizeof(neword);
  tran.keywait     = 18;
  tran.type        = NEWORDER;
  tran.menu        = "1";

  //Joe N.
  tran.form_request    = form_buffer;
  tran.results_request = results_buffer;

  neword_new.rollback=0;

  /*** SECTION TO DETERMINE ROLLBACK TRANSACTION FOR
1% OF NEW ORDERS ***/
  neword_new.did      = uniform(1, 10);                 // district number
  neword_new.cid      = NURand(1023, 1, 3000, CUSTC);    //
customer # 1 to 3000
  neword_new.nloop    = uniform(5, 15);                 // number of
items to order (5-15)
  neword_new.olremote = 0;                              // find total number
of remote order-lines

  whses = shmglobal->max_warehouses;

  for (i = 0; i < neword_new.nloop; i++)
  {
     // Warehouse Number
     neword_new.item[i].olswid = WHSEID;
     if (whses > 1 && (uniform(0.0, 100.0) < 1.0))
     {
        /* for 1% of items (if * uniform()==0) */
        /* Generate a uniform whse number that's different from
WHSEID */
        neword_new.item[i].olswid =
        (long) uniform((long) low_whse, (long)whses-1);
        if (neword_new.item[i].olswid >= WHSEID)
           neword_new.item[i].olswid++;
        neword_new.olremote++;  // find total number of remote order-
lines
     }
     // Item number 1-100000
     neword_new.item[i].oliid = NURand(8191, 1, 100000, ITEMC);
     // Quantity 1-10
     neword_new.item[i].olquantity = uniform(1, 10);
  }          /* end of for n_loop */

  // We occasionally force a transaction to have invalid data to force
a
  // rollback
  if (uniform(1, 5000) <= 50)
     neword_new.item[neword_new.nloop-1].oliid = 999999;

  neword_new.oremote = (neword_new.olremote > 0);

  //create new order form request
  sprintf(nord_form_url,NEW_ORDER_FORM_URL,terminal);

  //create get form request
  sprintf(form_buffer,GET_REQUEST,nord_form_url,host);

  //create new order results url
  char itemString[1024];
  ptr2=itemString;
  short item_cmd_start = ITEM_CMD_ID_START;
  for (i = 0; i < neword_new.nloop; i++)
  {
     //ptr2 += sprintf(ptr, NEW_ORDER_ITEM_ENTRY,
     //     item_cmd_start++,
     //     neword_new.item[i].olswid,
     //     item_cmd_start++,
```

```
    //      neword_new.item[i].oliid,
    //      item_cmd_start++,
    //      neword_new.item[i].olquantity);

     ptr2 += sprintf(ptr2, NEW_ORDER_ITEM,
                  item_cmd_start++,
                 neword_new.item[i].olswid);

     ptr2 += sprintf(ptr2,NEW_ORDER_ITEM,
                   item_cmd_start++,
                  neword_new.item[i].oliid);

     ptr2 += sprintf(ptr2, NEW_ORDER_ITEM,
                    item_cmd_start++,
                   neword_new.item[i].olquantity);

   }
   //seal up url w/ empty items
   for (i = item_cmd_start;i <= ITEM_CMD_ID_END; i++)
   {
      ptr2 += sprintf(ptr2,NEW_ORDER_EMPTY_ITEM,i);
   }

   sprintf(nord_results_url,NEW_ORDER_RESULTS_URL,terminal,
                                  neword_new.did,neword_new.cid,
                                  itemString);


   //create get results request
   sprintf(results_buffer,GET_REQUEST,nord_results_url,host);


//ptr = buffer;
//ptr += sprintf(ptr, "%d\t%d", neword_new.did, neword_new.cid);
//  for (i = 0; i < neword_new.nloop; i++)
//  {
//     ptr += sprintf(ptr, "\t%d\t%d\t%d",
//     neword_new.item[i].olswid,
//     neword_new.item[i].oliid,
//     neword_new.item[i].olquantity);
//  }
//  ptr += sprintf(ptr, "\n");

   // Go do the transaction
   rc = generic_transaction(&tran,host);
   neword         = neword_new;
   neword.invalid = tran.invalid;

   // Check for a rollback
   if ((err_ptr = expect_buffer_search("Item number is not valid",24)))
   {
      neword.rollback=1;
      echo_trace ("Found rollback!\n");
   }

   // Grab the orderID from the
   if (!(err_ptr = expect_buffer_search("Order Number: ",14)))
   {
      echo_trace ("Didn't find order-id for neworder");
      iprint (IPRINT_ERROR, "Neworder didn't have Order-
ID\n%s\n",expect_buffer_return());
      //iprint (IPRINT_ERROR, "Neworder didn't have Order-ID\n");
      neword.oid = -1;
   }
   else
   {
      neword.oid = atoi(err_ptr+14);
      //     iprint(IPRINT_ERROR,"New order order
id:%d\n",neword.oid);
   }

   // Grab the orderID from the
   //if (!(ptr2 = expect_after_match("\033[6;15H")))
   //{
   // echo_trace ("Didn't find order-id for neworder");
   // iprint (IPRINT_ERROR, "Neworder didn't have Order-ID");
   // neword.oid = -1;
    //} else {
   //neword.oid = atoi(ptr2+8);
   // }

      // This is really not useful since we aren't going to be sending
   individual
      // keystrokes anymore
      if (shmentry->flags & TES_FLAG_KEYSTROKE_TIME) {
     log_data(RTE_ITEM_KEYSTROKE_TIMES,
   keystroke_length*sizeof(int),keystroke_times);
      }

      //iprint(IPRINT_TRACE,"nord txn finished, rc:%d
   tran.invalid:%d\n",rc,tran.invalid);
      return (rc);
   }


   /*************************************************************************/
   /***                Order Status Transaction                           ***/
   /*************************************************************************/
   int OrderStatus(char *host,int terminal) {
      static struct ordstat_struct ordstat, ordstat_new;
      //char            buffer[2048];
      int             rc;
      char            *ptr;
      gen_tran_t      tran;

      tran.invalid = 0;
      tran.data    = &ordstat;
      tran.len     = sizeof(ordstat);
      tran.keywait = 2;
      tran.type    = ORDSTAT;
      tran.menu    = "3";
      //tran.request = buffer;

     //Joe N.
     char   ords_url[256];
     char   form_buffer[512];
     char   results_buffer[2048];

     tran.results_request = results_buffer;
     tran.form_request = form_buffer;

     //create order status form request
     sprintf(ords_url,ORDER_STATUS_FORM_URL,terminal);
     sprintf(form_buffer,GET_REQUEST,ords_url,host);


      // Set up all data for new transactions
      ordstat_new.did = uniform(1, 10); /* district number 1 to 10 */
     if (uniform(1, 100) <= 60)
     {
        /* for 60% of transactions */
        char *tmp = getname();
        strcpy(ordstat_new.clast, tmp);   /* by customer last name */
        if (ordstat_new.clast[0] < 'A' || ordstat_new.clast[0] > 'Z')
        {
           iprint (IPRINT_ERROR,
            "ASSERTION: OrderStatus getname() returns invalid name!
   '%s'\n",
           ordstat_new.clast);
           return RTE_ERROR;
        }
        ordstat_new.byname = 1;
        ordstat_new.cid = 0;
```

```
  }
  else
  {
     ordstat_new.cid = NURand(1023, 1, 3000, CUSTC); /* cust. # 1
to 3000 */
     ordstat_new.byname = 0;
     ordstat_new.clast[0] = (char) NULL;
  }

  //iprint(IPRINT_TRACE,"Order status fields,w_id:%d d_id:%d
n_d_id:%d c_id:%d \n", data->Warehouse,data-
>District,ordstat_new.did,ordstat_new.cid);

  //create order status url request
  if (ordstat_new.byname)

  sprintf(ords_url,ORDER_STATUS_RESULTS_CLAST_URL,termi
nal,ordstat_new.did,
                                    ordstat_new.clast);
  else

  sprintf(ords_url,ORDER_STATUS_RESULTS_CID_URL,terminal,
ordstat_new.did,
                                    ordstat_new.cid);

  sprintf(results_buffer,GET_REQUEST,ords_url,host);

//Now create the actual request
//ptr = results_buffer;
//ptr += sprintf(ptr, "%d\t", ordstat_new.did);
//if (ordstat_new.byname)
//{
// ptr += sprintf(ptr, "\t%s\n", ordstat_new.clast);
//}
//else
//{
// ptr += sprintf(ptr, "%d\n", ordstat_new.cid);
//}

   // Go do the transaction
   rc = generic_transaction(&tran,host);
   ordstat        = ordstat_new;
   ordstat.invalid = tran.invalid;

   //iprint(IPRINT_TRACE,"ords txn finished, rc:%d
tran.invalid:%d\n",rc,tran.invalid);
   return (rc);
}

/*****************************************************************************/
/***                  Payment Transaction                                  ***/
/*****************************************************************************/
int
Payment(char *host,int terminal)
{
   static struct payment_struct payment, payment_new;
   int            dollars, cents, rc, whses, low_whse = 1;
  // char           buffer[2048];
   char          *ptr;
   gen_tran_t     tran;

   tran.invalid = 0;
   tran.data    = &payment;
   tran.len     = sizeof(payment);
   tran.keywait = 3;
   tran.type    = PAYMENT;
   tran.menu    = "2";
   //tran.request = buffer;

  //Joe N.
  char pymt_url[128];
  char form_buffer[256];
  char results_buffer[2048];

  tran.results_request = results_buffer;
  tran.form_request = form_buffer;

  //create pymt form url
  sprintf(pymt_url,PAYMENT_FORM_URL,terminal);
  sprintf(form_buffer,GET_REQUEST,pymt_url,host);


   payment_new.did = uniform(1, 10);  /* district number 1 to 10 */
   if (uniform(1, 100) <= 60) {/* for 60% of transactions */
  strncpy(payment_new.clast, getname(), 17);    // by customer last
name
  if (payment_new.clast[0] < 'A' || payment_new.clast[0] > 'Z') {
      iprint (IPRINT_ERROR,
         "ASSERTION: payment_new getname() returns invalid
name! '%s'\n",
      payment_new.clast);
      return RTE_ERROR;
  }
  payment_new.byname = 1;
  payment_new.cid = 0;
   } else {
  payment_new.cid = NURand(1023, 1, 3000, CUSTC);  /* cust. # 1
to 3000 */
  payment_new.byname = 0;
  payment_new.clast[0] = (char) NULL;
   }

   whses = shmglobal->max_warehouses;

   if (whses < 2 || uniform(1, 100) <= 85) {/* for 85 % of transactions
*/
  payment_new.cwid = WHSEID;
  payment_new.cdid = payment_new.did;
  payment_new.remote = 0;
   } else {       /* for 15 % of transactions */
  payment_new.cwid = (long) uniform((long)low_whse, (long)
whses-1);
  if (payment_new.cwid >= WHSEID)
      payment_new.cwid++;

  payment_new.remote = 1;
  payment_new.cdid = uniform(1, 10); /* district 1 to 10 */
   }

   dollars = uniform(1, 5000);   /* dollar amt = 1 to 5000 */
   if (dollars == 5000)
  cents = 0;
   else
  cents = uniform(0, 99);

   payment_new.amount = ((double) dollars) + ((double) cents) /
100.0;


  //create payment results url
  if (payment_new.byname)
     sprintf(pymt_url,PAYMENT_RESULTS_CLAST_URL,terminal,

payment_new.did,payment_new.clast,payment_new.cwid,
                  payment_new.cdid,dollars,cents);
  else
     sprintf(pymt_url,PAYMENT_RESULTS_CID_URL,terminal,

payment_new.did,payment_new.cid,payment_new.cwid,
                  payment_new.cdid,dollars,cents);
  sprintf(results_buffer,GET_REQUEST,pymt_url,host);


//Now create the actual request
```

```
//ptr = buffer;
//ptr += sprintf(ptr, "%d\t", payment_new.did);
//if (payment_new.byname) {
//ptr += sprintf(ptr, "\t%s\t", payment_new.clast);
//} else {
//ptr += sprintf(ptr, "%d\t\t", payment_new.cid);
//}
//ptr += sprintf(ptr, "%d\t%d\t", payment_new.cwid,
payment_new.cdid);
//ptr += sprintf(ptr, "%d.%02.2d\n", dollars, cents);

    // Go do the transaction

    rc = generic_transaction(&tran,host);
    payment         = payment_new;
    payment.invalid = tran.invalid;

    //iprint(IPRINT_TRACE,"pymt txn finished, rc:%d
tran.invalid:%d\n",rc,tran.invalid);

   return (rc);
}

/*****************************************************************************/
/***                Stock Level Transaction                            ***/
/*****************************************************************************/
int
StockLevel(char *host,int terminal)
{
    static struct stocklev_struct stocklevel, stocklevel_new;
    //char            buffer[2048];
    int             rc;
    char           *ptr;
    gen_tran_t      tran;

    tran.invalid = 0;
    tran.data    = &stocklevel;
    tran.len     = sizeof(stocklevel);
    tran.keywait = 2;
    tran.type    = STOCKLEV;
    tran.menu    = "5";
    //tran.request = buffer;

   //Joe N.
    char stok_url[128];
    char form_buffer[256];
    char results_buffer[2048];

    tran.results_request = results_buffer;
    tran.form_request = form_buffer;

    //create stok form url
    sprintf(stok_url,STOCK_FORM_URL,terminal);
    sprintf(form_buffer,GET_REQUEST,stok_url,host);

    stocklevel_new.invalid = 0;
    stocklevel_new.threshold = uniform(10, 20);  /* uniform no.
between 10 and
                * 20 */

    //create stok results url
    sprintf(stok_url,STOCK_RESULTS_URL,terminal,stocklevel_new.t
hreshold);
    sprintf(results_buffer,GET_REQUEST,stok_url,host);

// Now create the actual request
//ptr = buffer;
//ptr += sprintf(ptr, "%d\n", stocklevel_new.threshold);

    // Go do the transaction
    rc = generic_transaction(&tran,host);
    stocklevel         = stocklevel_new;
    stocklevel.invalid = tran.invalid;

    //iprint(IPRINT_TRACE,"stok txn finished, rc:%d
tran.invalid:%d\n",rc,tran.invalid);
    return (rc);
}


/*****************************************************************************/
/***  MAIN()                                                               ***/
/*****************************************************************************/
int
user_transaction(char *host,void *data,int terminal)
{
   UserLocal *localdata = (UserLocal *)data;

   char            logout[32];
   double           ntask;
   int             resp;
   static int task = 0;

   if (shmentry->flags & TES_FLAG_KEYSTROKE_TIME)
   {
      int rc;
      /* Wait for specified period of time */
      sleep (shmglobal->keystroke_sleep);
      /* Quit after one transaction */
      shm->lock(shmentry->pid);
      shmentry->flags |= TES_FLAG_DIE;
      shm->unlock(shmentry->pid);
      rc = NewOrder(host,terminal);
      iprint (IPRINT_INFO, "Slave %d: Keystroke timing setting die
flag\n", shmentry->num);
      return rc;
   }

#if 1
   switch (shmglobal->test_state)
   {
   case 0: // Normal
        break;
      case 1: // pause
        sleep (1);
        return RTE_OK;
      case 2: // warmup
      switch(task++)
      {
        case 0: return Delivery(host,terminal);
        case 1: return OrderStatus(host,terminal);
        case 2: return Payment(host,terminal);
        case 3: return StockLevel(host,terminal);
        case 4: task = 0; return NewOrder(host,terminal);
        return NewOrder(host,terminal);
      }
   }
   /*****************************************************************************/
   /***  CHOOSE ONE OF THE TRANSACTIONS
***/
   /*****************************************************************************/
   ntask = (double) uniform(0.0, 100.0);
   if (ntask <= shmglobal->chances[DELIVERY])
   {
   return Delivery(host,terminal);
      //return NewOrder(host,terminal);
   }
   ntask -= shmglobal->chances[DELIVERY];
   if (ntask <= shmglobal->chances[ORDSTAT])
   {
      return OrderStatus(host,terminal);
   }
   ntask -= shmglobal->chances[ORDSTAT];
   if (ntask <= shmglobal->chances[PAYMENT])
```

```
  {
    return Payment(host,terminal);
  }
  ntask -= shmglobal->chances[PAYMENT];
  if (ntask <= shmglobal->chances[STOCKLEV])
  {
    return StockLevel(host,terminal);
  }
  return NewOrder(host,terminal);

#else
  // this code should be shared between all of the users on a slave
  // int the best case it should be shared between all of the slaves,
  // but that would be too costly.
  // for now it is done on a per user basis.  If this thing is ever
  // modified to be threaded then it will probably go to the per-
process
  // basis.  Although with shared memory, it would be possible to go
to
  // per-slave.  Actually, before this code is put into use it must be
  // fixed up to share across processes.  Right now it will take, on
average,
  // 22 minutes for one user to just key in the 100 entries.

  // use a card deck with no replacement to fulfill the requirements
   {
  int deck[100], count=-1, i, size=1, tmp;
  // lock deck
  if (count < 0) {
     // deck is empty fill it up
     count = 0;
     for (i = 0; i < 43 * size; i++) {
    deck[count++] = Payment;
     }
     for (i = 0; i < 4 * size; i++) {
    deck[count++] = StockLevel;
     }
     for (i = 0; i < 4 * size; i++) {
    deck[count++] = OrderStatus;
     }
     for (i = 0; i < 4 * size; i++) {
    deck[count++] = Delivery;
     }
     for (; count < 100 * size; i++) {
    deck[count++] = NewOrder;
     }
     // randomize the deck
     for (i = 0; i < 100 * size; i++) {
    int tmp;
    int pick = uniform(i+1, 100);
    tmp = deck[i];
    deck[i] = deck[pick];
    deck[pick] = tmp;
     }
  }
  tmp = deck[count--];
  // unlock deck

  switch(tmp) {
  case Delivery:    return Delivery(host,terminal);
  case OrderStatus: return OrderStatus(host,terminal);
  case Payment:     return Payment(host,terminal);
  case StockLevel:  return StockLevel(host,terminal);
  case NewOrder:    return NewOrder(host,terminal);
  }

  /*
  switch(tmp) {
  case Delivery:    return Payment(host,terminal);
  case OrderStatus: return Payment(host,terminal);
  case Payment:     return Payment(host,terminal);
  case StockLevel:  return Payment(host,terminal);
  case NewOrder:    return NewOrder(host,terminal);
  */
  }
   }
#endif

#if 0
   if (resp != RTE_OK) {    /* logoff if response is not correct */
  strcpy(logout, "9\n");/* menu option 9 */
  transmit(logout);
  resp = expect("tpcc_cstux_inf:");
  return (ERROR);
   } else
  return (RTE_OK);
#endif
}          /* end of Main */

int user_parameter_change(void) {
   #if 0
   int i;
   iprint(IPRINT_TRACE, "Slave %d: total_users = %d\n", shmentry-
>num);
   iprint(IPRINT_TRACE, "Slave %d: chances     = ", shmentry-
>num);
   for (i = 0; i < MAX_TRAN_TYPE; i++)
  iprint(IPRINT_TRACE, "%6.2f ", shmglobal->chances[i]);
   iprint(IPRINT_TRACE, "\nSlave %d: think       = ", shmentry-
>num);
   for (i = 0; i < MAX_TRAN_TYPE; i++)
  iprint(IPRINT_TRACE, "%6.2f ", shmglobal->think[i]);
   iprint(IPRINT_TRACE, "\n");
   #endif
   return RTE_OK;
}

int user_login(char *user, char *password, void *data) {
   UserLocal *localdata = (UserLocal *)data;
   int rc;
   int timeout_value = shmglobal->login_timeout;
   char buffer[32];
   set_typing_delay(0);

   rc = expect   (TRIGGER, timeout_value);
   if (rc == RTE_ERROR) {
     iprint (IPRINT_ERROR, "Slave %d: didn't find Warehouse
prompt\n", shmentry->num);
   }

   sprintf(buffer, "%d\t%d\n", localdata->Warehouse, localdata-
>District);
   transmit(buffer);
   iprint (IPRINT_TRACE, "Slave %d: Warehouse=%d, District=%d,
pid=%d\n", shmentry->num, localdata->Warehouse, localdata-
>District, getpid());

   rc = expect (TRIGGER, timeout_value);
   if (rc != RTE_OK) {
      iprint (IPRINT_ERROR, "Slave %d: Failed logging in\n",
shmentry->num);
  return RTE_ERROR;
   }
   return RTE_OK;
}

int user_login_html(char *host,void *data,int *terminal)
{
  UserLocal *localdata = (UserLocal *)data;
  int rc;
  int timeout_value = shmglobal->login_timeout;
  char request[256];
  char url[30];
  set_typing_delay(0);
```

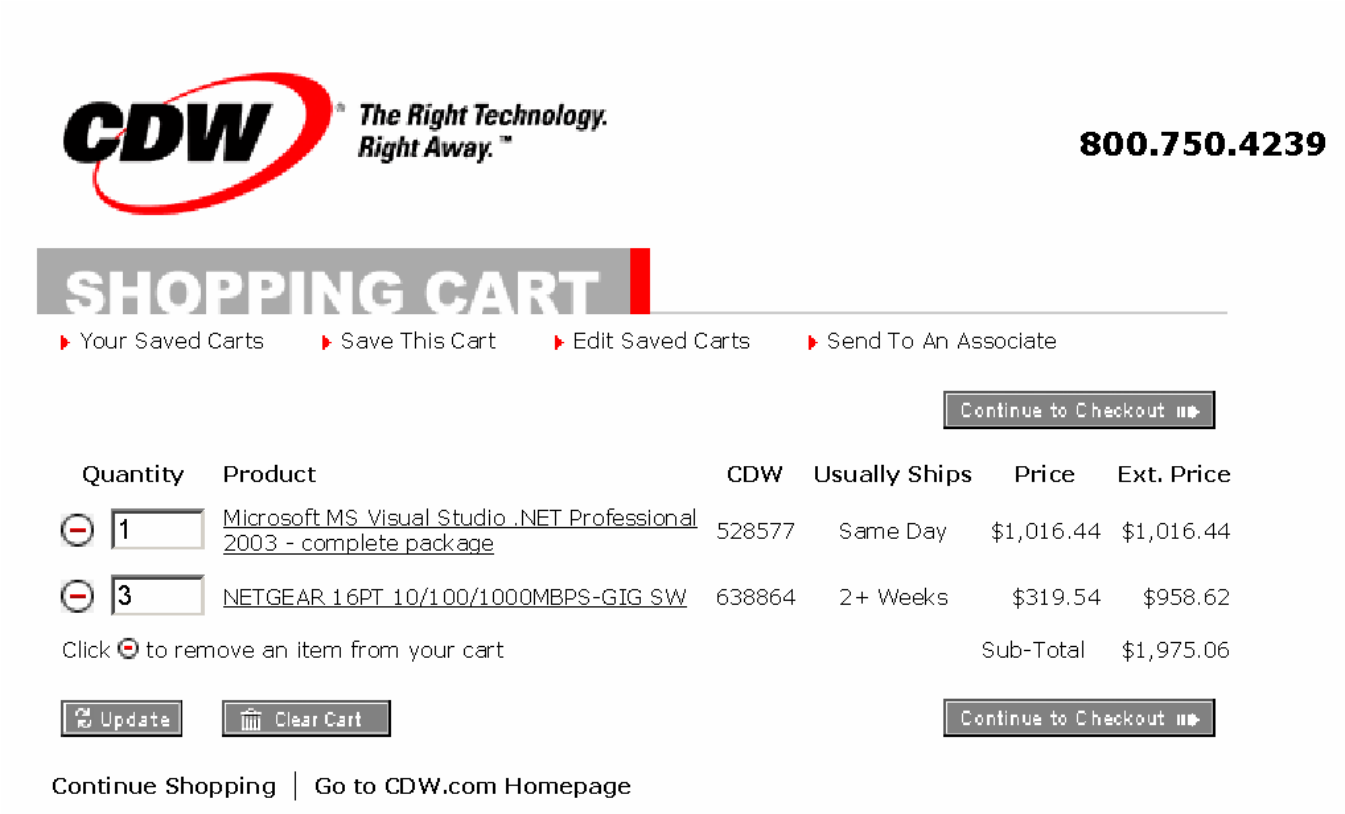
```
//iprint(IPRINT_ERROR,"Generating login request for
host:%s\n",host);

    //generate login page request
   sprintf(request,GET_REQUEST,LOGIN_URL,host);

//iprint(IPRINT_ERROR,"sending login form request:%s\n",request);

   //send the request
   transmit(request);
//iprint(IPRINT_ERROR,"login request sent, reading response in
expect_html()\n");

   //read the request
   rc =
expect_html(LOGIN_TITLE,timeout_value,LOGIN_TITLE_LEN);
   if (rc != RTE_OK)
   {
      iprint(IPRINT_ERROR,"Login request failed, unable to find login
key words:%s\n",LOGIN_TITLE);
      return RTE_ERROR;
   }


//iprint(IPRINT_ERROR,"login request read\n");

   //generate url and page get request
   sprintf(url,MENU_URL,localdata->Warehouse, localdata->District);
   sprintf(request,GET_REQUEST,url,host);

//iprint(IPRINT_ERROR,"sending login results
request:%s\n",request);

   transmit(request);

//iprint (IPRINT_TRACE, "Slave %d: Warehouse=%d, District=%d,
pid=%d\n", shmentry->num, localdata->Warehouse, localdata-
>District, getpid());
   rc = expect_html(MENU_TITLE,
timeout_value,MENU_TITLE_LEN);
   if (rc != RTE_OK)
   {
       iprint (IPRINT_ERROR, "Slave %d: Failed logging in\n",
shmentry->num);
       return RTE_ERROR;
   }
//iprint (IPRINT_TRACE, "User login successful Slave%d:
Warehouse=%d, District=%d, pid=%d\n",shmentry->num, localdata-
>Warehouse, localdata->District, getpid());

   rc = get_term_id(terminal);
   if(rc != RTE_OK)
      return RTE_ERROR;

iprint(IPRINT_TRACE, "Terimnal set for this user:%d w/
warehouse:%d district:%d\n",*terminal,localdata-
>Warehouse,localdata->District);

   return RTE_OK;
}

int get_term_id(int *terminal)
{
   //search for terminal id
   const char *termID_ptr;
   if (!(termID_ptr = expect_buffer_search("NAME=\"01\"
VALUE=\"",17)))
   {
      echo_trace ("Did not find terminal id in response....");
      iprint (IPRINT_ERROR, "No terminal id specified.");
      return RTE_ERROR;
   }
   else
   {
      *terminal = atoi(termID_ptr+17);
      iprint(IPRINT_ERROR,"Terminal id:%d\n",terminal);
   }
   return RTE_OK;
}

int user_init () {
    extern int expect_save_active;
    WHSEID = shmlocal->Warehouse;

    status->max_transmit =  shmglobal->keystroke_packet_size;
    expect_save_active = 1;
    return RTE_OK;
}

int user_logout () {
    //transmit("9");
   //transmit("GET /tpcc/tpcc.html?00=exit\r\nConnection:
Close\r\n\r\n");
    iprint (IPRINT_TRACE, "Slave %d: Warehouse=%d, District=%d
logging out\n", shmentry->num, shmlocal->Warehouse, shmlocal-
>District);
    return RTE_OK;
}

int user_cleanup () {
    transaction_sleep_do();
    transaction_start(0, 0, NULL); // Just something to clear out the
buffer...
    return RTE_OK;
}

int user_spawn_ok() {
    int rc, hb;
    hb = ((UserGlobal *)(shm->global_data))->host_busy;
    rc = hb?RTE_ERROR:RTE_OK;
    return rc;
}
```

user_tpcc.h

```
/*****************************************************************
*****************/
/* user_tpcc.h                                    Audit: 05/30/96 */
/*****************************************************************************/

/* $Id: user_tpcc.h,v 1.1 2004/06/25 17:25:42 klavsp Exp $ */

#ifndef USER_TPCC_H
#define USER_TPCC_H

#include "data/rte_common.h"

/*****************************************************************************/
/***   run-time constant for customer last name from 0 to 255,
***/
/***   run-time constant for customer id from 0 to 1023,              ***/
/***   run-time constant for item id from 0 to 8191.                  ***/
/*****************************************************************************/
/* #define LASTC 117 */
/* Change for 3.1 */
#define LASTC 193
#define CUSTC 319
#define ITEMC  3849

/*****************************************************************************/
/***   response type                  ***/
/*****************************************************************************/
```

```
/* #define OK 1  */
/* #define ERROR   -1 */

/*****************************************************************************/
/***   transaction type                    ***/
/*****************************************************************************/
#define NEWORDER 1
#define PAYMENT     2
#define ORDSTAT     3
#define DELIVERY 4
#define STOCKLEV5

/*****************************************************************************/
/***   transaction structures                ***/
/*****************************************************************************/
struct neword_struct {
    char            invalid;/* transaction completed sucessfully */
    long            did;
    long            cid;
    long            oid;       /* Order-ID returned from client */
    long            nloop;  /* number of order line, avg = 15 */
    char            oremote; /* 1 for remote order, 10% */
    long            olremote;/* number of remote order line, 1% */
    char            rollback;  /* actually saw rollback text on screen */
    struct items_struct {
   long            olswid;
   long            oliid;
   long            olquantity;
    } item[15];
};

struct payment_struct {
    char            invalid;/* transaction completed sucessfully */
    long did;
    long cid;
    long cwid;
    long cdid;
    char clast[17];
    double amount;
    char byname;       /* 1 for by last name, 0 for by id */
    char remote;       /* 1 for remote wardhouse, 0 otherwise */
};

struct ordstat_struct {
    char            invalid;/* transaction completed sucessfully */
    long did;
    long cid;
    char clast[17];
    char byname;       /* 1 for by last name, 0 for by id */
};

struct delivery_struct {
    char            invalid;/* transaction completed sucessfully */
    char carrier;
};

struct stocklev_struct {
    char            invalid;/* transaction completed sucessfully */
    long threshold;
};

struct generic_struct {
    char            invalid;/* transaction completed sucessfully */
};

typedef union transaction_info {
    char   invalid;
    struct generic_struct  generic;
    struct neword_struct   neword;
    struct payment_struct  payment;
    struct ordstat_struct  ordstat;
    struct delivery_struct delivery;
    struct stocklev_struct stocklev;
} transaction_info;

struct UserGlobal {
    int total_users;
    int max_warehouses;
    int keystroke_sleep;
    int login_timeout;
    int keystroke_packet_size;
    int lastc;
    int test_state;
    int host_busy;
    double chances[MAX_TRAN_TYPE];
    double think[MAX_TRAN_TYPE];
    double emulex_response[MAX_TRAN_TYPE];
    double emulex_menu    [MAX_TRAN_TYPE];
};

struct UserLocal {
    int Warehouse;
    int District;
};

/*
struct user_data_header {
};
*/

extern struct UserGlobal *shmglobal;
extern struct UserLocal  *shmlocal;

#endif
```

Appendix - E: Third Party Pricing



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