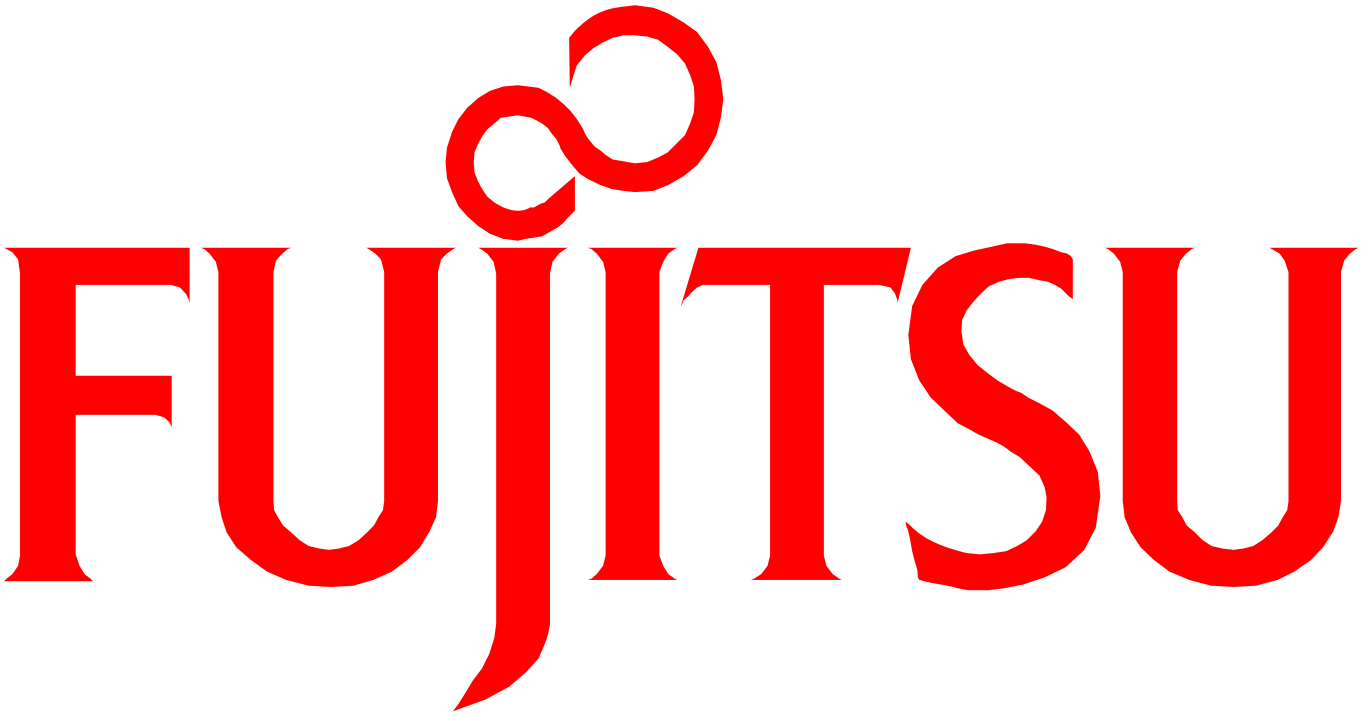


TPC Benchmark™ C

Full Disclosure Report

Fujitsu *team*server M796*i*

using

Microsoft SQL Server 6.5 Enterprise Edition

and

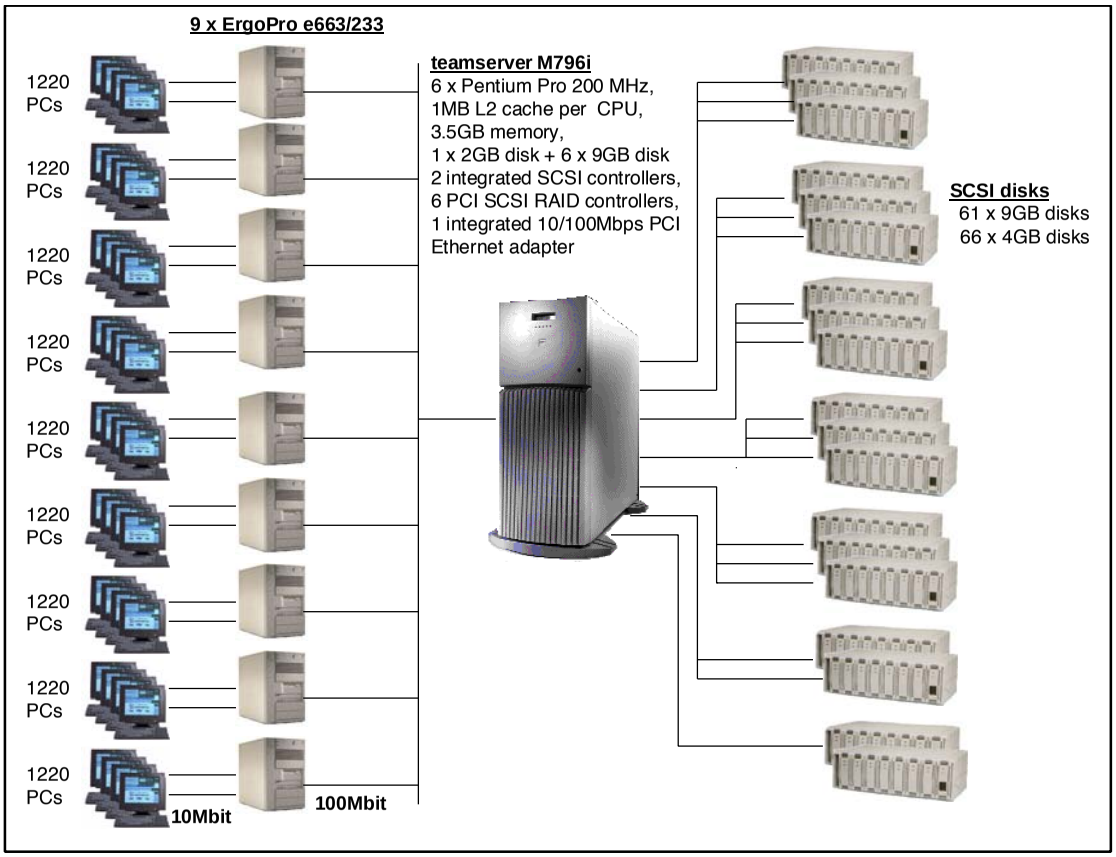
Microsoft Windows NT Server 4.0 Enterprise Edition

First Edition
Submitted for review 5th February 1998

First Printing, February 1998

FUJITSU	*team*server **M796*i*** C/S		TPC-C Rev 3.3 Report Date: 5th February 1998
Total System Cost	**TPC-C Throughput**	**Price/Performance**	**Availability Date**
$503,720	**13,391.13 tpmC**	**$37.62/tpmC**	**31st March 1998**

Processors	Database Manager	Operating System	Other Software	Number of Users
6 x 200MHz Pentium®Pro 1MB L2 cache	**Microsoft SQL Server 6.5 Enterprise Edition**	**Microsoft Windows NT Server 4.0 Enterprise Edition**	**Microsoft IIS 3.0** **BEA Tuxedo 6.3 CFS**	**10,980**



System Component	Server		Each Client (9 total)	
	Quantity	Description	Quantity	Description
Processors	6	200 MHz Pentium Pro	1	233 Mhz Pentium II
Cache Memory		1MB L2		512KB L2
Memory	1	3584MB	1	128MB
Disk Controller	6 2	3-channel Mylex DAC960PJ Integrated Adaptec 7880	1	Integrated IDE
Disk Drives	1 66 67	2 GB 4 GB 9 GB	1	2GB IDE Drive
Total Storage		837.54 GB	1	2GB
CD/Tape Drive	1	CD-ROM	1	CD-ROM

FUJITSU

*team*server M796*i*

C/S

TPC-C Rev 3.3
Report Date:
5th February 1998

Description	Part Number	Supplier		Unit Price	Qty	Extended Price	5 yr. Maint. Price
Server Hardware		Brand	Price/Maint				
teamserver M796i 6xPentium Pro 200MHz/1024KB 0GB 0MB	SV642073	Fujitsu	1/5	37495	1	37495	13089
Memory Board	SV642014	Fujitsu	1/5	360	1	360	126
512MB ECC RAM Upgrade	SV642015	Fujitsu	1/5	5000	7	35000	10065
Mylex DAC960PJ 3 channel RAID controller (including 2 spares)	DACPJ-3-8E-MY1	Mylex	6/6	1995	8	15960	400
Disk Shelf Kit	SV642052	Fujitsu	1/5	1125	19	21375	1018
TRI-Link Connector and Cable	SV642048	Fujitsu	1/5	270	1	270	24
3m VHD to VHD SCSI Cable	SV642055	Fujitsu	1/5	155	19	2945	265
2GB 7200 1" SCA DISK	SV642022	Fujitsu	1/5	525	1	525	184
9GB 10,000 1.6" SCA DISK EXP	SV565050	Fujitsu	1/5	1695	10	16950	2653
9GB 7200 1.6" SCA DISK	SV642024	Fujitsu	1/5	1450	6	8700	1362
9GB 7200 1.6" SCA DISK EXP	SV642032	Fujitsu	1/5	1450	51	73950	11575
4GB 7200 1" SCA DISK EXP	SV642031	Fujitsu	1/5	850	66	56100	9009
4GB Internal DDS-2 DAT Drive	SV520009	Fujitsu	1/5	1140	1	1140	399
ErgoPro e142 Colour Monitor	PD42E193	Fujitsu	1/5	265	1	265	93
ErgoPro e105 keyboard (US-104)	PK040657	Fujitsu	1/5	45	1	45	18
Mouse Kit	PK080130	Fujitsu	1/5	26	1	26	0
Power Lead (USA)	57495004	Fujitsu	1/5	30	1	30	30
					Subtotal	271136	50310
Server Software							
Microsoft Windows NT Server v 4.0 Enterprise Edition (inc 25 CAL)		Microsoft	2/2	3,999	1	3999	0
Microsoft SQL Server 6.5 Enterprise Edition unlimited user licence		Microsoft	2/2	28,999	1	28999	0
Microsoft Software Maintenance		Microsoft	2/2	10,475	1	0	10475
					Subtotal	32998	10475
Client Hardware							
ErgoPro e663/233	UID64ASE3001	Fujitsu	1/5	1884	9	16956	6782
64MB EDO Memory Module	PL060152	Fujitsu	1/5	336	18	6048	1814
Ether Express PRO/100B	PN010051	Fujitsu	1/5	104	27	2808	758
ErgoPro e142 Colour Monitor	PD42E193	Fujitsu	1/5	265	9	2385	811
ErgoPro e105 keyboard (US-104)	PK040657	Fujitsu	1/5	45	9	405	162
Fujitsu Mouse Kit	PK080130	Fujitsu	1/5	26	9	234	0
					Subtotal	28602	10327
Client Software							
Microsoft Windows NT Server v. 4.0		Microsoft	2/2	809	9	7281	0
Microsoft SQL Server Workstation (includes prog. toolkit)		Microsoft	2/2	499	1	499	0
Microsoft Visual C++ 32 bit edition (subscription)		Microsoft	2/2	499	1	499	0
Tuxedo 6.3 Client Threads for NT4.0		BEA	3/3	3000	9	27000	20250
					Subtotal	35279	20250
User Connectivity							
Compex MicroHub TP1008C 8 port 10BaseT Hubs (including 10% spares)		Compex	4/-	34	1515	52631	spared
Compex MicroHub MX1205 100TX 5 port Hubs (including 2 spares)		Compex	4/-	187	4	747	spared
					Subtotal	53378	0
			-/5	Other Discounts		0	**($9,036)**
					Total	$421,393	**$82,326**

Five-Year TCOP	**$503,720**
tpmC:	**13,391.13**
$ / tpmC:	**37.62**

Notes:

* Pricing: 1=FUJITSU ICL Computers LTD NAD Price book/Lexia, 2=Microsoft, 3=BEA, 4=NetSales, 5=Northern Telecom, 6=Mylex

* All Microsoft maintenance is covered by maintenance for SQL Server

* Northern Telecom discount of 15% is based on dollar volume discount and 5-year prepaid maintenance

* Benchmark results and test methodology were audited by Tom Sawyer of Performance Metrics, Inc.

Prices used in TPC benchmarks reflect the actual prices a customer would pay for a one-time purchase of the stated components. Individual negotiated discounts are not permitted. Special Prices based on assumptions about past or future purchases are not permitted. All discounts reflect standard pricing policies for the listed components. For complete details, see the pricing section of the TPC benchmark specifications.
If you find that the stated prices are not available according to these terms, please inform the TPC at pricing@tpc.org.
Thank you.

Numerical Quantities Summary

MQTh, computed Maximum Qualified Throughput			**13,391.13 tpmC**
% throughput difference, reported & reproducibility runs			1.37%
Response Times (in seconds)	**90th percentile**	**Average**	**Maximum**
New-Order	1.11	0.74	74.74
Payment	0.62	0.42	16.44
Order-Status	1.81	1.20	7.31
Delivery (interactive portion)	0.31	0.29	1.29
Delivery (deferred portion)	1.29	0.86	6329
Stock-Level	6.82	3.95	77.71
Menu	0.30	0.20	1.22
Response time delay added for emulated components		**Response Time**	**Menu**
New-Order		0.1	0.1
Payment		0.1	0.1
Order-Status		0.1	0.1
Delivery (interactive portion)		0.1	0.1
Stock-Level		0.1	0.1
Transaction Mix in percentage of total transactions			
New-Order			44.60%
Payment			43.17%
Order-Status			4.11%
Delivery			4.11%
Stock-Level			4.01%
Keying/Think Times (in seconds)	**Minimum**	**Average**	**Maximum**
New-Order	18.01/0.00	18.01/12.10	18.07/121.00
Payment	3.00/0.00	3.01/12.04	3.07/121.01
Order-Status	2.00/0.00	2.01/10.16	2.07/83.84
Delivery	2.00/0.00	2.01/5.10	2.05/40.47
Stock-Level	2.00/0.00	2.01/5.12	2.07/42.37
Test Duration and Checkpointing			
Measurement interval		30 mins	
Transactions (all types) completed during measurement interval		900,799	
Number of checkpoints		One	
Checkpoint interval		30 mins	
Ramp up period		59 mins	

ABSTRACT

This report documents the results of the TPC Benchmark C test conducted on the **Fujitsu *team*server M796*i*** according to the TPC Benchmark C Standard Specification, Revision 3.3, released April 8, 1997. The tests were performed using the Microsoft SQL Server 6.5 Enterprise Edition running under the Microsoft Windows NT Server 4.0 Enterprise Edition operating system.

Two standard metrics, transactions per minute (tpmC) and price per tpmC ($/tpmC), are reported.

Company	System Name	Database Software	Operating System Software
Fujitsu	***team*server M796*i***	Microsoft SQL Server 6.5 Enterprise Edition	Microsoft Windows NT Server 4.0 Enterprise Edition
Availability Date: 31st March 1998			

Total System Cost	TPC-C Throughput	Price Performance
Hardware Software 5 Years Maintenance	Sustained maximum throughput of system running TPC Benchmark C expressed in transactions per minute	Total system cost/tpmC throughput ($503,720/13,391.13 tpmC)
$503,720	13,391.13 tpmC	$37.62 per tpmC

CONTENTS

PREFACE

This is the full disclosure report for the TPC Benchmark C Benchmark test conducted on the **Fujitsu *team*server M796*i*** according to the TPC Benchmark C Standard Specification, Revision 3.3, released April 8 1997. The TPC Benchmark C Standard was developed by the Transaction Processing Performance Council (TPC). Fujitsu is an active member of the TPC.

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

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

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

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

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

Copies of this Full Disclosure Report are available on request from:

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777 North First Street
Suite 6000
San Jose
CA 95112-6311

Tel: 408 295 8894
Fax 408 295 9968

Copies of the Executive Summary can be downloaded from:

http://www.tpc.org/execsum.TPCC.html

1 GENERAL ITEMS

1.1 Application Code and Definition Statements

The applicable 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 all source code implemented in this benchmark.

1.2 Benchmark Sponsor

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

This TPC benchmark test was sponsored by FUJITSU ICL Computers LTD and Fujitsu Limited. The NT/SQL TPC-C benchmark kit was developed and supplied by Microsoft Corporation.

1.3 Parameter Settings

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

- ***Database tuning options***
- ***Recovery/Commit options***
- ***Consistency/locking options***
- ***Operating system and application configuration parameters.***
- ***Compilation and linkage options and run-time optimizations used to create/install applications, OS, and/or databases.***

Appendix D contains the tunable parameters for the database and the operating system.

1.4 Configuration Diagrams

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

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

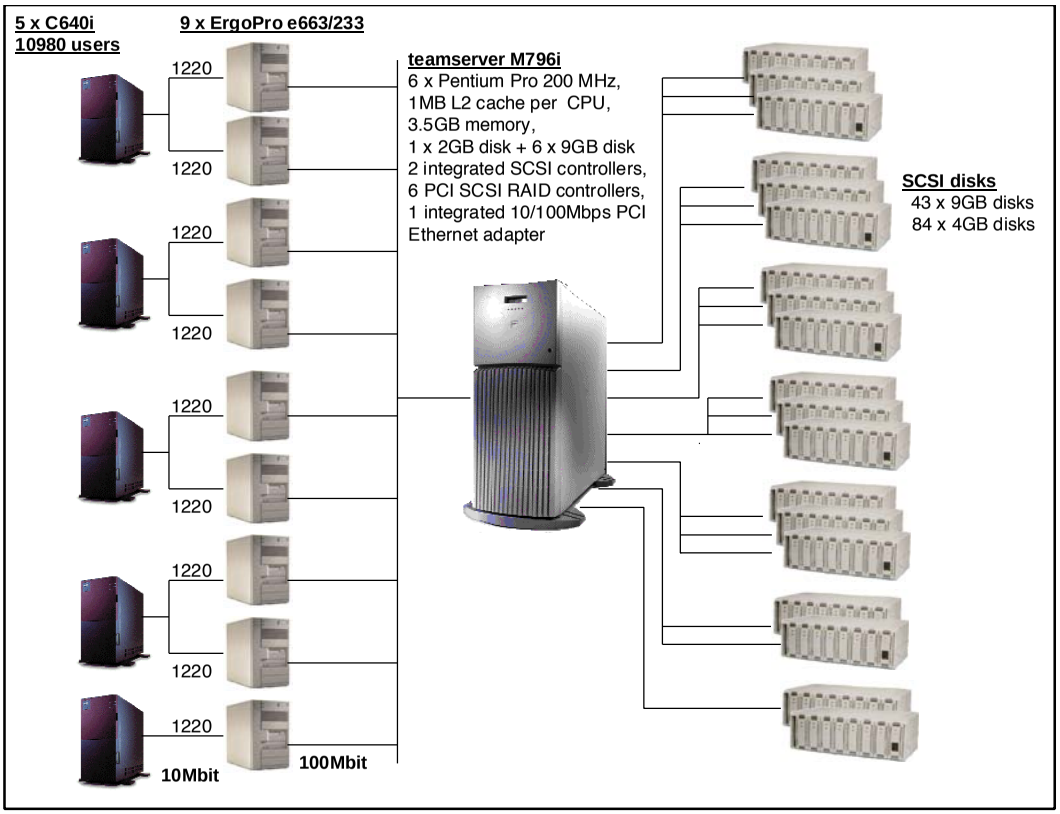


Figure 1.4.1 Benchmarked Configuration

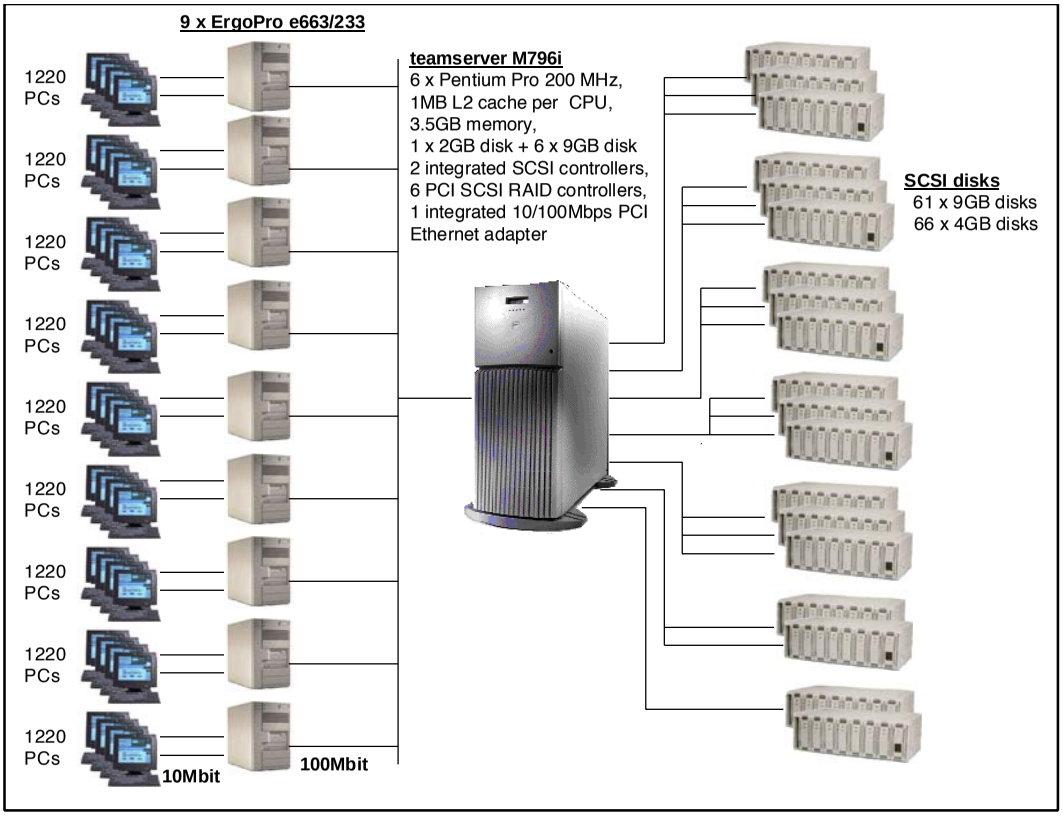


Figure 1.4.2 Priced Configuration

2 CLAUSE 1 Logical Database Design

2.1 Data and Space Definition

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

Appendix B contains the table definition code and the code used to define, create and populate the database. This information contains details of the indexing used on the database tables.

2.2 Physical Organisation of Data

The physical organisation of tables and indices, within the database, must be disclosed.

The disks space was allocated to SQL Server according to the data in Table 5.3. The SQL definitions are in Appendix B

2.3 Insert and/or Delete Operations

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

The database was set up and accessed using general purpose SQL statements and the TPC-C transaction mix can be run concurrently with other updates/deletes. There are no restrictions on insert and delete operations to any tables except where inserting a row would invalidate the unique indexing conditions of that table.

2.4 Partitioning

While there are a few restrictions placed upon horizontal or vertical partitioning of tables and rows in the TPC-C benchmark (see Clause 1.6), any such partitioning must be disclosed. Using the CUSTOMER table as an example, such partitioning could be denoted as:

This implementation does not use application level partitioning of data.

2.5 Table Replication

Replication of tables, if used, must be disclosed (see Clause 1.4.6).

Not applicable to this configuration.

2.6 Table Attributes

Additional and/or duplicated attributes in any table must be disclosed along with a statement on the impact on performance (see Clause 1.4.7).

Not applicable to this configuration.

3 CLAUSE 2 Transaction and Terminal Profile Related Items

3.1 Random Number Verification Method

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

3.2 Terminal Screen Layouts

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

The screen layouts are based on those in Clauses 2.4.3, 2.5.3, 2.6.3, 2.7.3, and 2.8.3 of the TPC Benchmark C standard specification. There are some minor differences due to the Web client implementation.

3.3 Priced Terminal Feature Verification

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

The terminal attributes were verified manually exercising each specification on a representative Fujitsu ***ErgoPro*** **d66/d** with Microsoft Windows 3.11, Netscape 2.0 and also with a Fujitsu ***ErgoPro*** **e663/233** with Microsoft Windows NT Server 4.0 Enterprise Edition and Microsoft Internet Explorer 3.0.

3.4 Presentation Manager or Intelligent Terminal

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

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

3.5 Transaction Statistics

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

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

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

The percentage of home and remote payment transaction must be disclosed.

The percentage of payment and Order-status transaction that used non-primary key (C_LAST) access to the database must be disclosed.

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

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

The following table lists the data required by Clauses 8.1.3.5 to 8.1.3.11:

Statistic	Value
New Order Home Warehouse	99.03%
New Order Remote Warehouse	0.97%
New Order Rollback Transactions	0.91%
New Order OrderLine Count	9.98
Payment Home Warehouse	85.11%
Payment Remote Warehouse	14.89%
Payment Customer Name Access	59.77%
OrderStatus Customer Name Access	61.66%
Skipped Delivery Transactions	None
Transaction Mix - New Order	44.60%
Transaction Mix - Payment	43.17%
Transaction Mix - Order Status	4.11%
Transaction Mix – Delivery	4.05%
Transaction Mix - Stock Level	4.01%

Table 3.5.1 Transaction Statistics

3.6 Queuing Mechanism of Delivery

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

Tuxedo provides the queuing mechanism for delivery servers. The client application process posts delivery transactions to the delivery queue using an asynchronous call with the TPNoReply option. The client then posts a 'delivery queued' response to the user. The delivery servers independently take deliveries off the queue and submit transactions against the database and record the results in a file. The source code for the delivery process is included in Appendix A.

4 CLAUSE 3 Transaction and System Properties

4.1 Transaction System Properties (ACID)

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

4.2 Atomicity Requirements

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

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 not been changed appropriately.

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

Aborted Transaction

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.

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

4.2 Consistency Requirements

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

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

A run was executed under full load lasting over 120 minutes and included 4 checkpoints.

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

4.3 Isolation

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

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

4.4 Durability Requirements

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

Durable Media Failure

Loss of data and loss of log tests were combined and performed on a 10 warehouse database.

Loss of Log and Loss of Data

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

1. The database was backed up to extra disks.
2. The total number of New Orders was determined by the sum of D_NEXT_O_ID of all rows in the DISTRICT table giving the beginning count.
3. The RTE was started with 100 users.
4. The test was allowed to run for a minimum of 5 minutes.
5. One of the log disks was removed.
6. An NT error message was displayed as the log disks are mirrored by NT. The benchmark run was not affected.
7. After another 5 minutes of running in a steady state one of the data disks was removed.
8. SQL Server recorded errors in NT and Application event log due to the missing disk.
9. The RTE systems were stopped and SQL Server was shut down.
10. SQL Server was restarted and marked the database as "suspect".
11. A dump of the transaction log was taken.
12. The database was dropped, SQL Server and the SUT were shut down.
13. A new data disk was inserted into the drive cabinet, powered back up and the SUT restarted.
14. The Mylex stripe set (of 2 disks) of which this disk was a member was reinitialised using a Mylex utility.
15. The SUT was restarted and the NT logical drives effected was recreated.
16. The database was dropped and recreated as an empty database.
17. The database was restored from the database backup, followed by the restore of the transaction log.
18. Consistency condition #3 was executed and verified.
19. Step 2 was repeated and the different between the first and second counts was noted.
20. An RTE report was generated for the entire run time giving the number of NEW-ORDERS successfully returned to the RTE.
21. The counts in step 19 and 20 were compared and the results verified that all committed transactions had been successfully recovered.
22. Samples were taken from the RTE files and used to query the database to demonstrate successful transactions had corresponding rows in the ORDER table.

Instantaneous Interruption and Loss of Memory

Because loss of power erases the contents of memory, the instantaneous interruption and the loss of memory tests were combined into a single test. This test was executed under a full load of 10980 users. The following steps were executed:

1. The total number of New Orders was determined by the sum of D_NEXT_O_ID of all rows in the DISTRICT table giving the beginning count.
2. The benchmark was executed at full load of 10980 users for a minimum of 10 minutes.

3. System crash and loss of memory were induced switching off the SUT. No battery backup or Uninterruptible Power Supply (UPS) were used to preserve the contents of memory.
4. The RTE and client systems were stopped.
5. Power was restored and the system restarted.
6. SQL Server was restarted and performed an automatic recovery.
7. Consistency condition #3 was executed and verified.
8. The total number of New Orders was determined and the difference between the first and the second counts was noted.
9. An RTE report was generated for the entire run time giving the number of New Orders successfully returned to the RTE.
10. The two New Order counts were compared and the results verified that all committed transactions had been successfully recovered.
11. Samples were taken from the RTE files and used to query the database to demonstrate successful transactions had corresponding rows in the ORDER table.

5 CLAUSE 4 Scaling and Database Population

5.1 Initial Cardinality of Tables

The cardinality (e.g., the number of rows) of each table, as it existed at the start of the benchmark run (see Clause 4.2), must be disclosed. If the database was over-scaled and inactive rows of the WAREHOUSE table were deleted (see Clause 4.2.2), the cardinality of the WAREHOUSE table as initially configured and the rows deleted must be disclosed.

The database was scaled for 1110 warehouses. 12 rows were deleted from the warehouse table prior to measured runs.

Table	Number of rows
Warehouse	1,110
District	11,100
Customer	33,300,000
History	33,300,000
Order	33,300,000
New Order	9,990,000
Order Line	332,999,230
Stock	111,000,000
Item	100,000

Table 5.1.1 Initial Cardinality of Tables

5.2 Data Layout

The distribution of tables and logs must be explicitly depicted for the tested and priced system.

Tables 5.2.1 and 5.3.1 show the distribution of the database over 123 disks and the transaction log over 5 mirrored pairs of disks. In addition there was 1 disk containing Windows NT Server 4.0 Enterprise Edition and SQL Server 6.5 Enterprise Edition. The database backup used an extra 20 disks (not included in the priced configuration). Eighteen (18) 9GB disks were exchanged for Eighteen (18) 4GB disks to meet the 180 day space requirements.

The Allocation of database devices to NT drive letters is contained in Appendix B.

RAID Disk Configuration for TPCC

Adapter		Channel 1	Channel 2	Channel 3
3	0	9GB	9GB	9GB
	1	9GB	9GB	9GB
	2	9GB	9GB	9GB
	3	9GB	9GB	9GB
	4	9GB	9GB	9GB
	5	9GB	9GB	9GB
	6	9GB	9GB	9GB
4	0	4GB	4GB	4GB
	1	4GB	4GB	4GB
	2	4GB	4GB	4GB
	3	4GB	4GB	4GB
	4	4GB	4GB	4GB
	5	4GB	4GB	4GB
	6	4GB	4GB	4GB
5	0	4GB	4GB	4GB
	1	4GB	4GB	4GB
	2	4GB	4GB	4GB
	3	4GB	4GB	4GB
	4	4GB	4GB	4GB
	5	4GB	4GB	4GB
	6	4GB	4GB	4GB
6	0	4GB	4GB	4GB
	1	4GB	4GB	4GB
	2	4GB	4GB	4GB
	3	4GB	4GB	4GB
	4	4GB	4GB	4GB
	5	4GB	4GB	4GB
	6	4GB	4GB	4GB
7	0	4GB	4GB	4GB
	1	4GB	4GB	4GB
	2	4GB	4GB	4GB
	3	4GB	4GB	4GB
	4	4GB	4GB	4GB
	5	4GB	4GB	4GB
	6	4GB	4GB	4GB
8	0	9GB	9GB	9GB
	1	9GB	9GB	9GB
	2	9GB	9GB	9GB
	3	9GB	9GB	9GB
	4	9GB	9GB	9GB
	5	9GB	9GB	9GB
	6			
	7	4GB	4GB	4GB
	8	4GB	4GB	4GB
	9	4GB	4GB	4GB
	#	4GB	10 4GB	10 4GB
	#	4GB	11 4GB	11 9GB
	#	4GB	12 4GB	12 9GB
	#	4GB	13 4GB	13

Table 5.2.1 RAID Disk Configuration for Benchmarked System

Disk Administrator Configuration							
Disk	**Partition 1**	**Partition 2**	**Partition 3**	**Unused Capacity**	**HA#**	**LD#**	**Usage**
0 2047MB	C: NTFS 2047MB			(none)	Adaptec 1	1	system
1,4 8699MB	V: (raw) 8699MB			(none)	Adaptec 2	1	log
2,5 8699MB	Q: (raw) 8699MB			(none)	Adaptec 2	2	log
3,6 8699MB	X: (raw) 8699MB			(none)	Adaptec 2	3	log
7,8 8699MB	Y: (raw) 8699MB			(none)	Adaptec 2	4	log
9,10 8699MB	W: (raw) 8699MB			(none)	Adaptec 2	5	log
11 182322MB	J: 10503MB	P: 7040MB		164779MB	3	1	data
12 87129MB	E: 1004MB	K: 13500MB		72625MB	4	1	data
13 87129MB	H: 1004MB	L: 10503MB	R: 5005MB	70617MB	5	1	data
14 87129MB	I: 1004MB	M: 10503MB	S: 5005MB	70617MB	6	1	data
15 87129MB	F: 1004MB	N: 10503MB	T: 5005	70617MB	7	1	data
16 156276MB	G: 1004MB	O: 10503MB	U: 5005MB	139764MB	8	1	data
17 74682MB	Z: NTFS 74682MB			(none)	8	2	dump space
18 17364MB	Z: NTFS 17364MB			(none)	8	3	dump space

Table 5.3.1 Disk Administrator Configuration

Refer to Appendix G 180 Day Space Calculations for specific details of the Priced configuration. The data distribution is identical to the Benchmarked system.

5.3 Database Model

A statement must be provided that describes:

1. ***The data model implemented by the DBMS used (e.g., relational, Codasyl, flat file etc.).***

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

Microsoft SQL Server 6.5 Enterprise Edition is a Relational Database Management System. Only general purpose methods were used to implement the transactions.

5.4 Database Mapping

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

The database was neither partitioned or replicated.

5.5 180 Day Space

Details of the 180 day space computations along with proof that the database is configured to sustain 8 hours of growth for the dynamic tables (Order, Order-Line, and History) must be disclosed (see Clause 4.2.3).

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

1. The free space on the logfile was queried using **dbcc checktable(syslogs)**

2. Transactions were run against the database with a full load of users

3. The free space was again queried using **dbcc checktable(syslogs)**

4. The space used was calculated as the difference between the two queries

5. The number of new order transactions was verified from the RTE report covering the whole run (including ramp up and ramp down)

The space used was divided by the number of new order transactions was multiplied by the tpmC rate) and then 480 minutes giving space required to sustain performance for eight hours.

Appendix G shows the space requirements for 180 day space as well as the logical log space for eight hours.

6 CLAUSE 5 Performance Metrics and Response Times

6.1 Measured tpmC

The Measured tpmC must be reported.

The measured tpmC was 13,391.13 tpmC. This figure was the result of 401,734 New Order transactions being serviced by the SUT within a 30 minute period.

6.2 Response Times

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

The table below shows response times for all the transaction types. The approved timing delays of 0.1 seconds for the Web Browser latency have been included in the response and menu times.

Type	Average	Maximum	90th Percentile
New Order	0.74	74.74	1.11
Payment	0.42	16.44	0.62
Order-Status	1.20	7.31	1.81
Interactive Delivery	0.29	1.29	0.31
Deferred Delivery	0.86	6329	1.29
Stock-Level	3.95	77.71	6.82
Menu	0.20	1.22	0.30

Table 6.2.1 Response Times

6.3 Keying and Think Times

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

Type	Minimum	Average	Maximum
New Order	18.01	18.01	18.07
Payment	3.00	3.01	3.07
Order-Status	2.00	2.01	2.07
Interactive Delivery	2.00	2.01	2.05
Stock-Level	2.00	2.01	2.07

Table 6.3.1 Keying Times

	Minimum	Average	Maximum
New-Order	0.00	12.10	121.00
Payment	0.00	12.04	121.01
Order-Status	0.00	10.16	83.84
Delivery	0.00	5.10	40.47
Stock-Level	0.00	5.12	42.37

Table 6.3.2 Think Times

6.4 Response Time Frequency Distributions

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

Figure 6.4.1 New Order Response Time Distribution

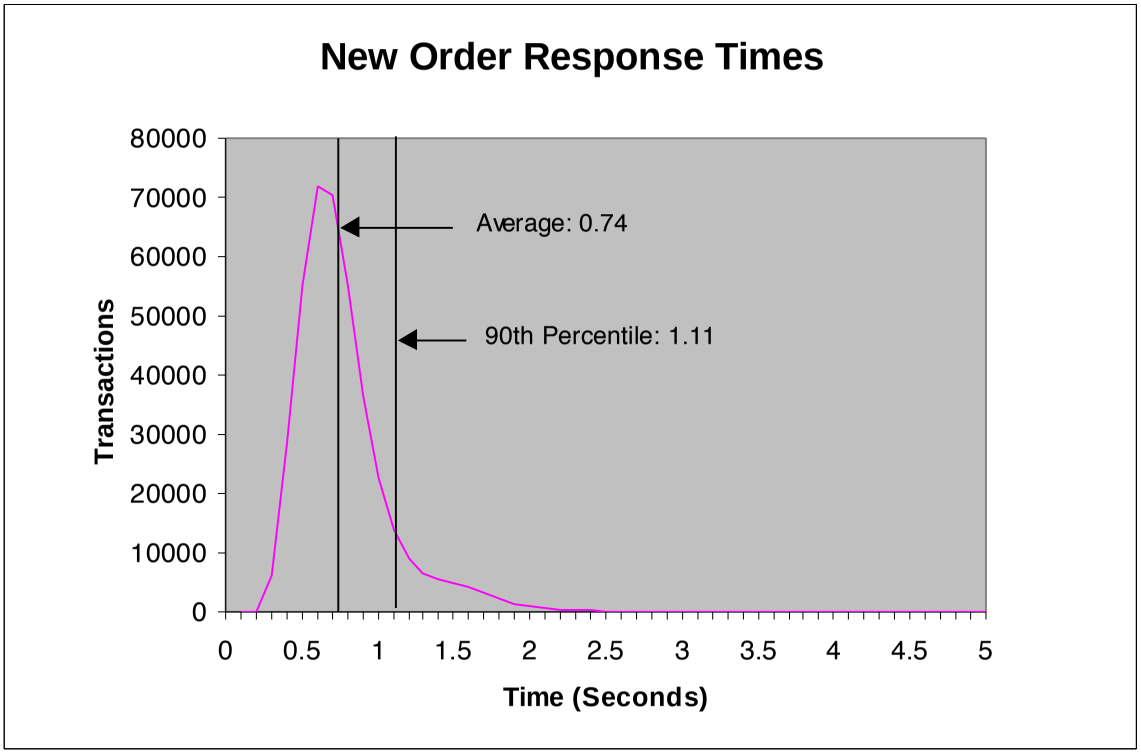


Figure 6.4.2 Payment Response Time Distribution

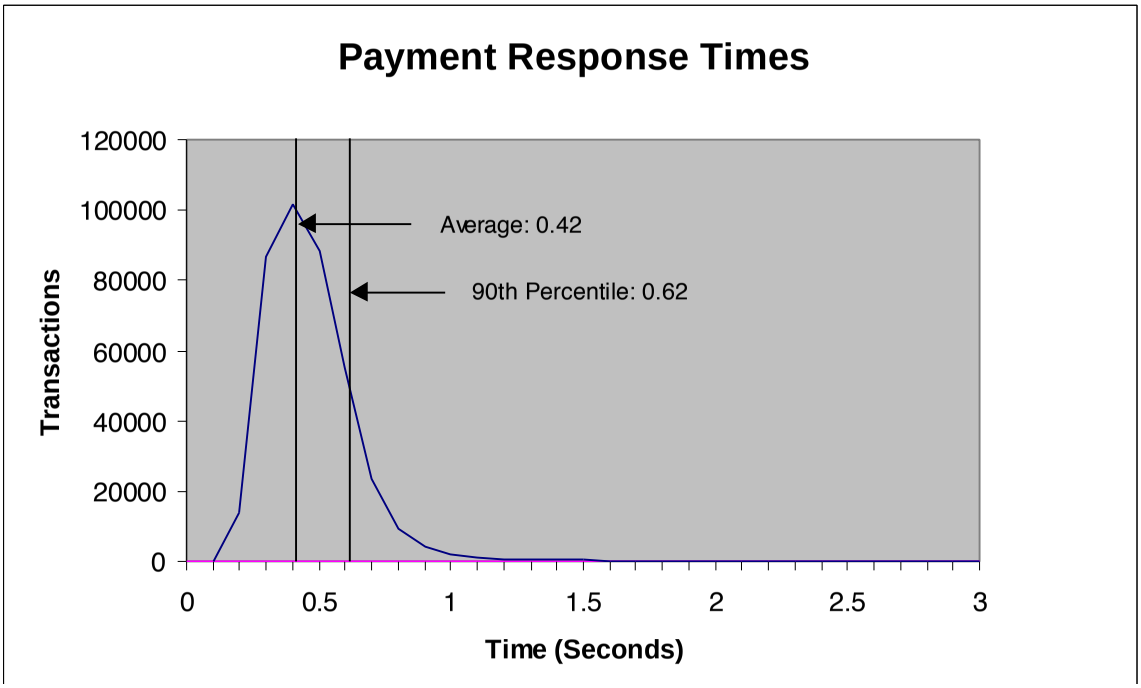


Figure 6.4.3 Order Status Response Time Distribution

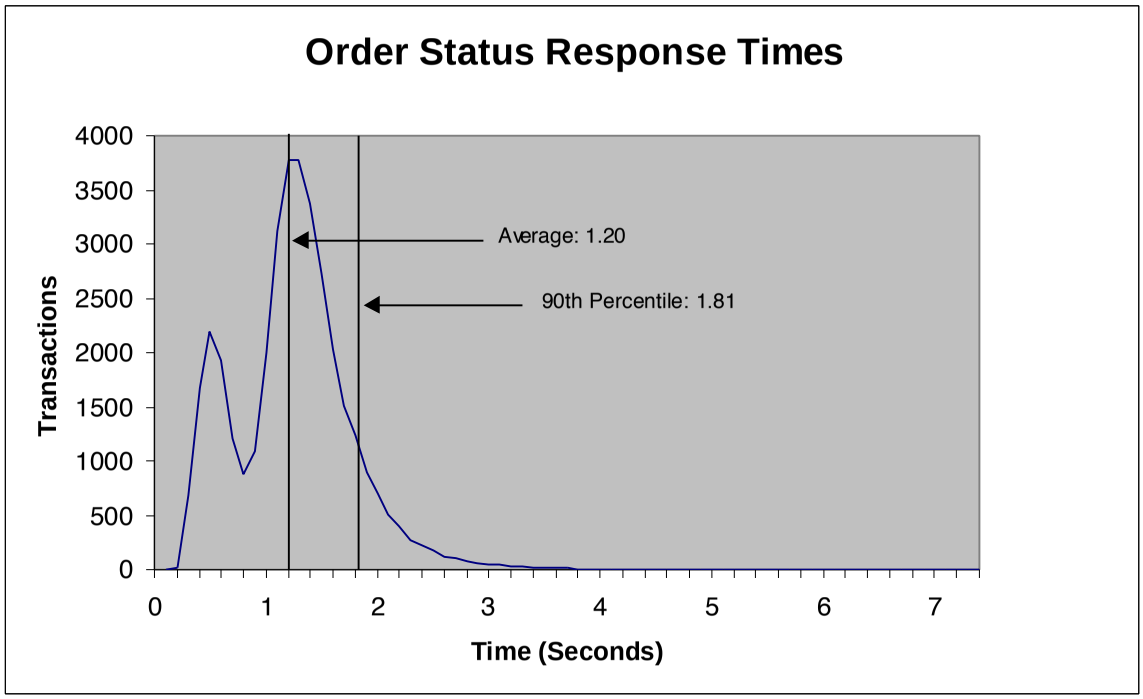


Figure 6.4.4 Delivery Response Time Distribution

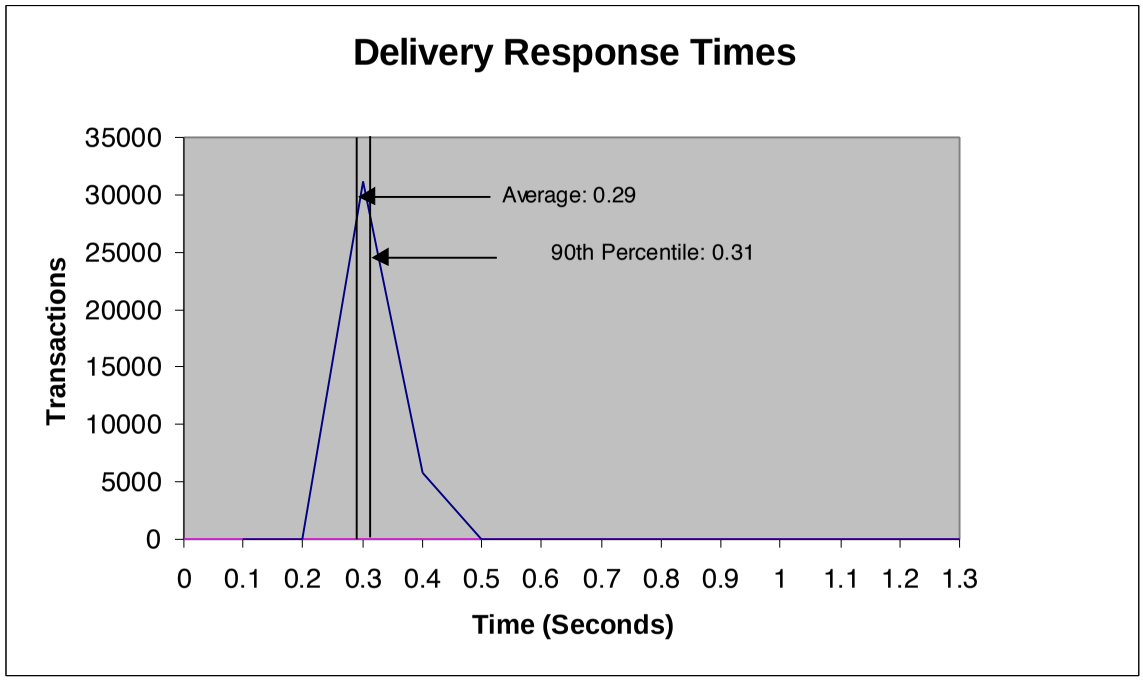
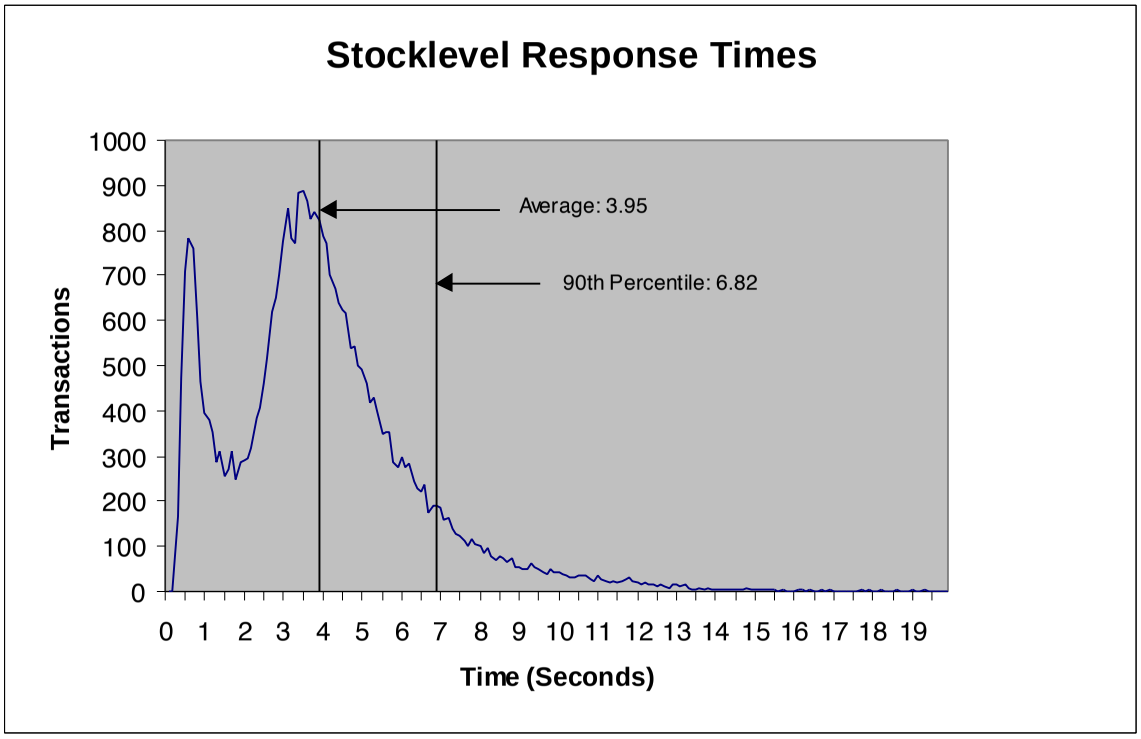


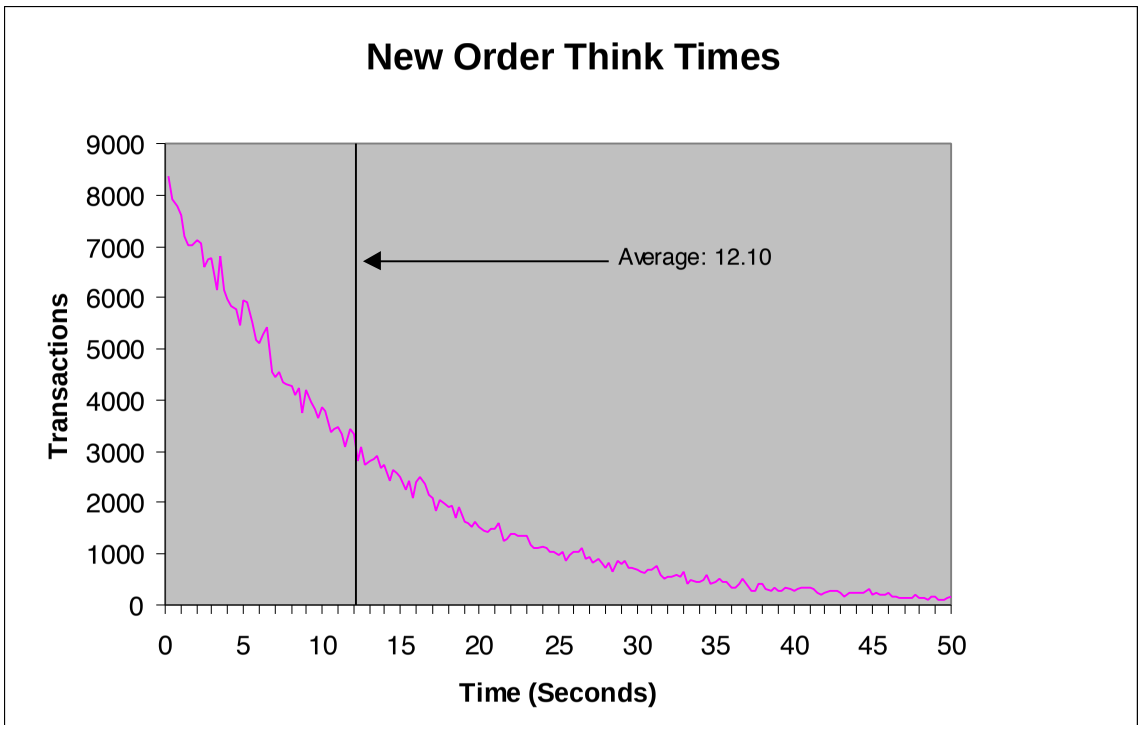
Figure 6.4.5 Stock Level Response Time Distribution



6.5 Think Time Frequency Distributions

ThinkTime frequency distribution curves (see Clause 5.6.3) must be reported for the New-Order transaction.

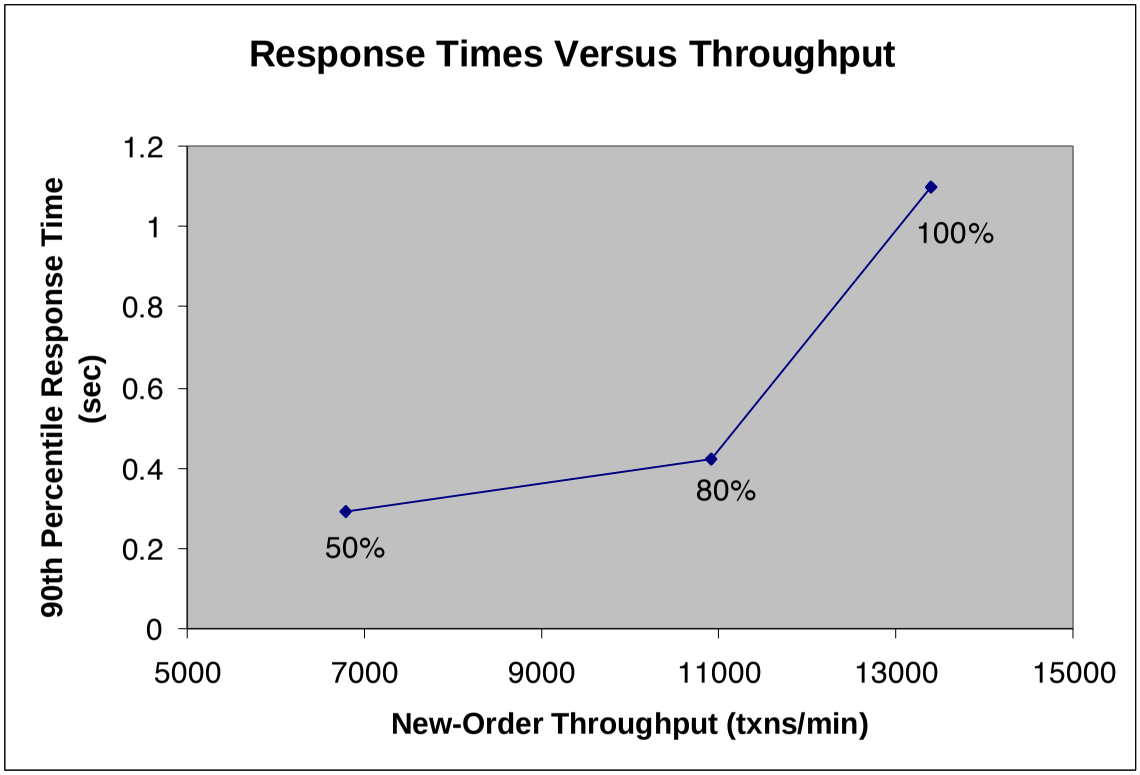
Figure 6.5.1 New Order Think Time Distribution



6.6 Performance Curve for Response Time vs. Throughput

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

Figure 6.6.1 Response Times versus Throughput

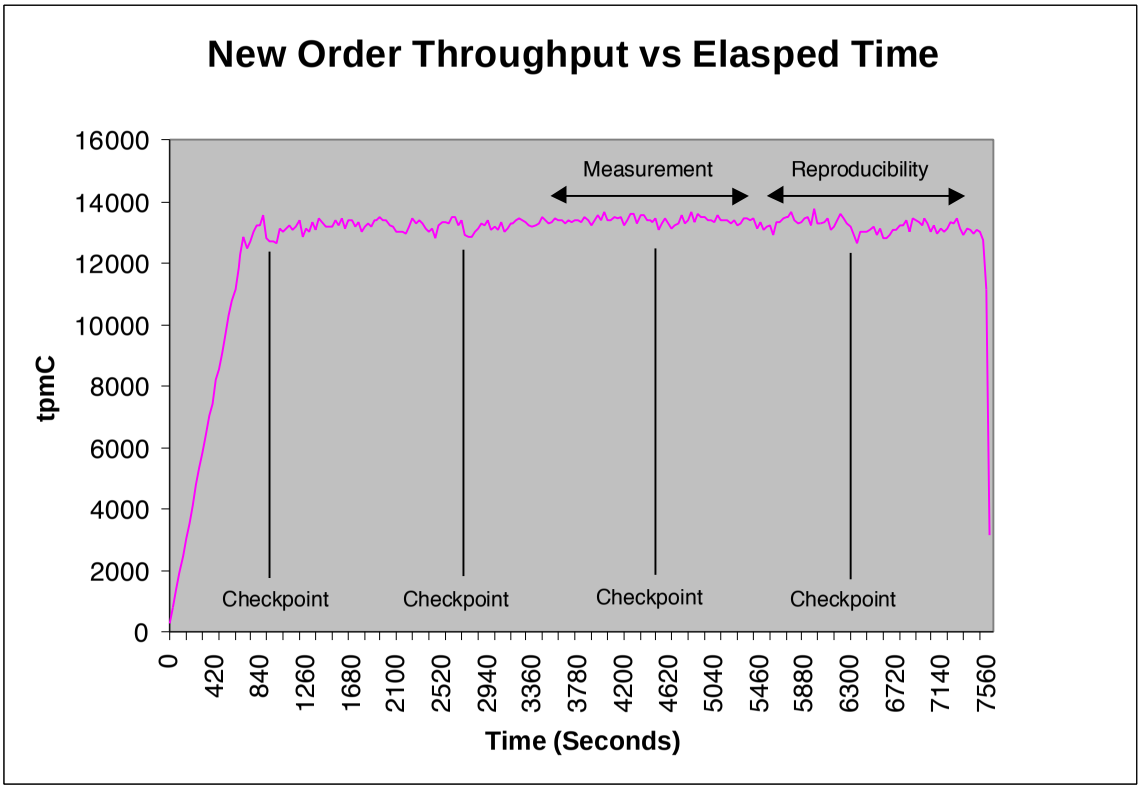


The relevant timing delays for the Web Browser latency have been included in the response times.

6.7 Throughput vs. Elapsed Time: New-Order Transaction

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

Figure 6.7.1 New Order Throughput vs Elapsed Time



6.8 Steady State Method

The method used to determine that the SUT had reached a steady state prior to commencing the measurement interval (see Clause 5.5) must be described.

Steady state can be seen on the graph in section 6.8. Both the client machines and the SUT were inspected to ensure that the operating system resource usage was constant.

6.9 Work Performed During Steady State

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

The RTE selects a transaction type from the menu. A time stamp is logged before this request is sent and when the response comes back. The difference between these timestamps is logged as the menu response time. The RTE then generates the appropriate data to fill in the form and waits for the key time for that transaction before sending the data. A timestamp is taken before the data is sent and after the response is received. The difference between these timestamps is logged as the response time. A delay of 0.1 seconds is included in each of these response times to reflect the delay associated with a web browser. The required transaction data and response times are logged to a file on each RTE driver machine and the RTEs wait for the required think time before submitting the next transaction.

The contents of the RTE log files are consolidated during the reporting phase.

The RTE emulates web browsers. It sends and receives HTTP data via an Ethernet LAN. The RTE systems communicate with an application running under Microsoft IIS in the client machines. This application passes requests to a Tuxedo TPC-C server queue and waits for the request to be processed (except in the case of deliveries) before responding with a formatted HTML page to the RTE. The Tuxedo TPC-C application takes requests from the Tuxedo queues and processes the request by running a stored procedure on the SUT using DBLIB over another Ethernet LAN. SQL Server sends responses back to the client application via Tuxedo.

Delivery transactions are deferred and the client application does not wait for the Tuxedo application to respond. The delivery is processed later and the information required is logged to a file on each of the client machines for processing in the reporting phase.

A script was written to perform checkpoints at specific intervals, the Microsoft SQL Server parameter **recovery interval** was set to its maximum allowable value. By setting the trace flag **3502** SQL Server logged the checkpoint beginning and end times to the Microsoft SQL Server log file **ERRORLOG**. The script included a delay between each script initiated checkpoint of 30 minutes which is equal to the measurement interval. The positioning of the checkpoint was verified to be clear of the guard zones.

At each checkpoint Microsoft SQL Server wrote to disk all memory pages that had been updated but not yet physically written to disk..

6.10 Reproducibility Method

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

The reproducibility measurement was part of the same run that gave the reported result. The two intervals did not overlap. The reproducibility run gave a throughput of 13,208.10 tpmC which is within 2% of the reported tpmC.

6.11 Duration of Measurement

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

The measurement period was 30 minutes. Two checkpoints occurred before this period and another started approximately 16 minutes into it.

6.12 Regulation of Transaction Mix

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

The RTE was given a weighted random distribution which was not altered during the run.

6.13 Transaction Statistics

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

The percentage of the New-Order transaction rolled back as a result of invalid item number must be disclosed.

The average number of order-lines entered per New-Order transaction must be disclosed.

The percentage of remote order-lines entered per New-Order transaction must be disclosed.

The percentage of remote payment transaction must be disclosed.

The percentage of customer selections by customer last name in the Payment and Order-Status transaction must be disclosed.

The percentage of Delivery transaction skipped due to there being fewer than necessary orders in the New-Order table must be disclosed.

Statistic	Value
New Order Home Warehouse	99.03%
New Order Remote Warehouse	0.97%
New Order Rollback Transactions	0.91%
New Order OrderLine Count	9.98
Payment Home Warehouse	85.11%
Payment Remote Warehouse	14.89%
Payment Customer Name Access	59.77%
OrderStatus Customer Name Access	61.66%
Skipped Delivery Transactions	None
Transaction Mix - New Order	44.60%
Transaction Mix - Payment	43.17%
Transaction Mix - Order Status	4.11%
Transaction Mix – Delivery	4.05%
Transaction Mix - Stock Level	4.01%

Table 6.13.1 Transaction Statistics

6.14 Checkpoint Statistics

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

The was one checkpoint in the measurement interval. This started 954 seconds into the interval. The checkpoint interval (time from the start of one to the start of the next) is 30 minutes. The duration of a checkpoint is approximately 6 minutes. It has been verified that there is no checkpoint within 7.5 minutes of the start or the end of the measurement interval.

7 CLAUSE 6 SUT, Driver and Communication Definition

7.1 RTE inputs

The RTE input parameters, code fragments, functions, etc. used to generate each transaction input field must be disclosed.

The RTE used in this benchmark was Benchcraft which is proprietary to Microsoft. Appendix C contains all the RTE configuration information.

7.2 Functions and Performance of Emulated Components

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

The RTE driver systems consisted of five (5) Fujitsu ***team*server C640š** .These driver machines were connected to the nine (9) Fujitsu ***ErgoPro* e663/233** through five (5) Ethernet LANs.

The only difference between the benchmarked and price configuration are the addition of one (1) 10Mbit/sec LAN adapter in the client machines to support the number of connections and the lack of a latency delay on the emulated workstations. The Web browser delay was emulated by including a 0.1 second Web browser delay in the RTE.

7.3 Functional Diagrams

A complete functional diagram of both the benchmark configuration and the configuration of the proposed (target) system must be disclosed. A detail list of all software and hardware functionality being performed on the Driver System, and its interface to the SUT must be disclosed (see Clause 6.6.3.6).

Section 1.4 describes and shows functional diagrams for the benchmarked and price systems.

7.4 Network Bandwidth and Configuration

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

The tested system consisted of seven (7) Ethernet LANs, five (5) linking the RTE systems to the client systems, one (1) linking the RTE systems together and one (1) connecting the nine (9) client machines to the server.

The priced configuration consists of nineteen (19) Ethernet LANs. The 10980 physical workstations are connected to the client machines via eighteen (18) LAN segments with 1220 physical workstations per client machine (2 LAN segments per client with 616 and 604 workstations respectively). The client machines are connected to the server via one (1) LAN segment. The 18 workstation-client LAN segments have a bandwidth of 10 Megabits per second and the client-Server LAN has a bandwidth of 100Megabits per second. From the analysis of network utilisation, we believe that the priced configuration would support 10980 physical workstations at the reported transaction rate and still have network capacity available.

7.5 Operator Intervention

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

No operator intervention was required.

8 CLAUSE 7 Pricing

8.1 System Pricing

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

The total 5-year price of the entire configuration must be reported, including: hardware, software, and maintenance charges. Separate component pricing is recommended. The basis of all discounts used must be disclosed.

System pricing should include subtotals for the following components: server Hardware, server Software, Client Hardware, Client Software, and Network components used for terminal connection (see Clause 7.2.2.3). Clause 6.1 describes the Server and Client components.

System pricing must include line item indication where non-sponsoring companies'brands are used. System pricing must also include line item indication of third party pricing.

The detailed list of hardware and software used in the priced system is included in the Executive Summary at the beginning of this report. The recommended list prices for the Fujitsu branded items are taken from the Fujitsu PC Pricebook for North America valid from 2nd February 1998 and the Servers Pricebook for North America valid from 5th February 1998 and are available in the USA via numerous Fujitsu channel partners including Lexia Inc.

The teamserver M796i (SV642073) contains :-

6 x 200MHz Pentium Pro Processor
1MB second level cache per processor
2 x integrated Adaptec 7880 single-ended Ultra SCSI controllers
1 x integrated SVGA controller
1 x integrated 10/100Mbps PCI Ethernet adapter
3 x 5.25" Exchangeable bays (1 occupied)
9 x hot pull disk bays
8 x DIMM slots expandable to 16 with extra board
6 x dedicated PCI adapter card slots
4 x dedicated EISA adapter card slots
2 x asynchronous comms ports
1 x parallel port
1 x 1.44MB 3.5" floppy disk drive
1 x Eight speed SCSI-2 CD-ROM drive

The maintenance pricing for the Fujitsu branded items has been supplied by Northern Telecom who are the recommended maintenance supplier for Fujitsu branded items supplied by Lexia Inc. The Northern Telecom maintenance discounts are based on a volume discount and 5 year prepayment discount which, in this case, equates to a total of 15% discount.

The maintenance for the third party items has been priced as follows:

- The Compex hubs have a lifetime warranty and an additional 10% (or 2) spares have also been priced
- All Microsoft maintenance is covered by the 5 year maintenance priced for Microsoft SQL Server.
- Mylex DAC960PJ controllers have a 3 year warranty the additional 2 years costs $50. An additional 2 spares have also been priced.

8.2 Availability, Throughput and Price/Performance

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.

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

All the items used in the priced system are currently available with the exception of:

9GB 10,000RPM 1.6" SCA DISK (SV565050) which will be available from Fujitsu by 31st March 1998.

Mylex DAC960PJ 3 channel RAID controller which will be available from Mylex by 27st February 1998.

The Fujitsu *team*server **M796*i***, with Microsoft NT Server 4.0 Enterprise Edition and SQL Server 6.5 Enterprise Edition, achieved 13,391.13 tpmC @ $37.62 per tpmC.

8.3 Country Specific Pricing

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

The system is priced for the USA.

8.4 Usage Pricing

For any usage pricing, the sponsor must disclose:

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

The component pricing based on usage is shown below:

- 1 Microsoft Windows NT Server 4.0 Enterprise Edition licence
- 1 Microsoft SQL Server 6.5 Enterprise Edition licence
- 9 Microsoft Windows NT Server 4.0 Licences
- 1 Microsoft SQL Server Programmers Toolkit
- 1 Microsoft Visual C++ Subscription
- 9 BEA Tuxedo 6.3 CFS for NT licences.

Microsoft SQL Server and Internet Information Server and BEA Tuxedo were priced for an unlimited number of users.

9 CLAUSE 9 Audit

An independent audit of the benchmark results, by an auditor certified by the TPC, is required.

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

A review of the pricing model is required to ensure that all components required are priced (see Clause 9.2.8). The auditor is not required to review the final Full Disclosure Report or the final pricing prior to issuing the attestations letter.

This benchmark was independently audited by:

Tom Sawyer
Performance Metrics Inc.
2229 Benita Dr., Suite 101
Rancho Cordova
CA 95670

Phone: (916) 635-2822
Fax: (916) 858-0109

See appendix H for the auditors attestation letter.

The addresses for obtaining copies of this report is on page 5

Appendix A Source Code

The client source code is listed below.

A.1 delirpt.c

```
/*      FILE:           DELIRPT.C
 *                      Microsoft TPC-C Kit Ver. 3.00.000
 *
 *                      Copyright Microsoft, 1996
 *
 *      PURPOSE:        Delivery report processing application
 *      Author:         Philip Durr
 *                      philipdu@Microsoft.com
 */

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

#define LOGFILE_READ_EOF        0
                        //check log file flag return current state
#define LOGFILE_CLEAR_EOF       1
                        //clear end of log file flag
#define LOGFILE_SET_EOF         2
                        //set flag end of log file reached

#define INTERVAL                .01
                        //90th percentile calculation bucket interval

#define ERR_SUCCESS                                                     1000
                        //success no error
#define ERR_READING_LOGFILE                                     1001
                //io errors occured reading delivery log file
#define ERR_INSUFFICIENT_MEMORY                 1002
        //insuficient memory to process 90th percentile report
#define ERR_CANNOT_OPEN_RESULTS_FILE    1005
        //Cannot open delivery results file delilog.

typedef struct _RPTLINE
{
        SYSTEMTIME      start;
                        //delilog report line start time
            SYSTEMTIME          end;
                                //delilog report line end time
        int                     response;
                        //delilog report line time delivery took in millisecond
        int                     w_id;
                                //delilog report line warehouse id for deliv
        int                     o_carrier_id;
                        //delilog report line carier id for delivery
        int                     items[10];
                        //delilog report line delivery line items
} RPTLINE, *PRPTLINE;

//error message structure used in ErrorMessage API
typedef struct _SERRORMSG
{
        int             iError;                         //error id of message
        char    szMsg[80];                      //message to sent to browser
} SERRORMSG;

int                     versionMS = 3;
                //delirpt version
int                     versionMM = 0;
int                     versionLS = 2;
int                     iReport;
                //delirpt report to process
int                     iStartTime;
                        //begin times to accept for report
int                     iEndTime;
                //end times to accept for report
FILE                    *fpLog;
                //log file stream

//Local function prototypes
void            main(int argc, char *argv[]);
static int  Init(void);
static void Restore(void);
static int  DoReport(void);
int                     AverageResponse(void);
int                     SkippedDelivery(void);
int                     Percentile90th(void);
BOOL            CheckTimes(PRPTLINE pRptLine);
static int  OpenLogFile(void);
static void CloseLogFile(void);
static void ResetLogFile(void);
static BOOL     LogEOF(int iOperation);
static BOOL     ReadReportLine(char *szBuffer, PRPTLINE pRptLine);
static BOOL     ParseReportLine(char *szLine, PRPTLINE pRptLine);
static BOOL     ParseDate(char *szDate, LPSYSTEMTIME pTime);
static BOOL     ParseTime(char *szTime, LPSYSTEMTIME pTime);
static void ErrorMessage(int iError);
static BOOL     GetParameters(int argc, char *argv[]);
static void PrintParameters(void);
static void PrintHeader(void);
```

```
static void cls(void);
static BOOL         IsNumeric(char *ptr);


/* FUNCTION: int main(int argc, char *argv[])
 *
 * PURPOSE:      This function is the beginning execution point for the delivery executable.
 *
 * ARGUMENTS:    int           argc      number of command line arguments passed
to delivery
 *                             char      *argv[]   array of commandline argument
pointers
 *
 * RETURNS:              None
 *
 * COMMENTS:     None
 *
 */

void main(int argc, char *argv[])
{
        int         iError;

        PrintHeader();

        if ( GetParameters(argc, argv) )
        {
                PrintParameters();
                return;
            }

        if ( (iError=Init()) != ERR_SUCCESS )
        {
                ErrorMessage(iError);
                Restore();
                return;
        }

        if ( (iError = DoReport()) != ERR_SUCCESS )
                ErrorMessage(iError);

        Restore();

        return;
}

/* FUNCTION: static int Init(void)
 *
 * PURPOSE:      This function initializes the delirtp application.
 *
 * ARGUMENTS:    None
 *
 * RETURNS:              None
 *
 * COMMENTS:     None
 *
 */

static int Init(void)
{
        int iError;

        if ( (iError = OpenLogFile()) )
                return iError;
        return TRUE;
}

/* FUNCTION: static void Restore(void)
 *
 * PURPOSE:      This function cleans up the delirptapplication before termination.
 *
 * ARGUMENTS:    None
 *
 * RETURNS:              None
 *
 * COMMENTS:     None
 *
 */

static void Restore(void)
{
        CloseLogFile();
        return;
}

/* FUNCTION: static int DoReport(void)
 *
 * PURPOSE:              This function dispatches the requested eport.
 *
 * ARGUMENTS:    None
 *
 * RETURNS:              ERR_SUCCESS if successfull or error code if an error occurs
 *
 * COMMENTS:     None
 *
 */
```

```
static int DoReport(void)
{
        int iRc;

        switch(iReport)
        {
                case 1:
                        iRc = AverageResponse();
                        break;
                case 2:
                        iRc = Percentile90th();
                        break;
                case 3:
                        iRc = SkippedDelivery();
                        break;
                case 4:
                        if ( (iRc = AverageResponse()) != ERR_SUCCESS )
                                break;
                        if ( (iRc = Percentile90th()) != ERR_SUCCESS )
                                break;
                        if ( (iRc = SkippedDelivery()) != ERR_SUCCESS )
                                break;
                        break;
        }
        return iRc;
}

/* FUNCTION: int AverageResponse(void)
 *
 * PURPOSE:             This function processes the AverageResponse report.
 *
 * ARGUMENTS:   None
 *
 * RETURNS:             ERR_SUCCESS if successfull or error code if an error occurs.
 *
 * COMMENTS:    None
 *
 */

int AverageResponse(void)
{
        RPTLINE reportLine;
        int             iTotalResponse;
        int             iLines;
        double  fAverage;
        char    szDelivery[128];

        ResetLogFile();

        iTotalResponse = 0;
        iLines = 0;
        printf("\n\n******** Average Response Time Report *******\n");
        while ( !LogEOF(LOGFILE_READ_EOF) )
        {
                if ( ReadReportLine(szDelivery, &reportLine) )
                        return ERR_READING_LOGFILE;
                if ( szDelivery[0] == '*' )
                        continue;
                if ( !LogEOF(LOGFILE_READ_EOF) )
                {
                        if ( CheckTimes(&reportLine) )
                                continue;
                        iLines++;
                        iTotalResponse += reportLine.response;

                        if ( iLines % 10 == 0 )
                                printf("Reading Report Line:\t%d\r", iLines);
                }
        }
        printf("                                \r");
        if ( iLines == 0 )
        {
                printf("No deliveries found.\n");
        }
        else
        {
                fAverage = ((double)iTotalResponse / (double)iLines)/(double)1000;
                printf("Total Deliveries:      %10.0f\n", (float)iLines);
                printf("Total Response Times:  %10.3f\n",
((float)iTotalResponse/(float)1000));
                printf("Average Response Time: %10.3f\n", fAverage);
        }

        return ERR_SUCCESS;
}

/* FUNCTION: int Percentile90th(void)
 *
 * PURPOSE:             This function processes the 90th percentile report.
 *
 * ARGUMENTS:   None
 *
 * RETURNS:             ERR_SUCCESS if successfull or error code if an error occurs.
 *
 * COMMENTS:    This function requires enough space to allocate needed
```

```
 *                                      buckets which will be 2 * max response time in
 *                                      deci-seconds.
 *
 */

int Percentile90th(void)
{
        RPTLINE reportLine;
        int             iBucketSize;
        int             i;
        int             iResponseSeconds;
        int             iMaxSeconds;
        int             iTotalBuckets;
        double  iTotal;
        double  i90thPercent;
        short   *psBuckets;
        char    szDelivery[128];

        printf("\n\n******** 90th Percentile *******\n");
        printf("Calculating Max Response Seconds...\n");

        ResetLogFile();

        iMaxSeconds = -1;
        while ( !LogEOF(LOGFILE_READ_EOF) )
        {
                if ( ReadReportLine(szDelivery, &reportLine) )
                        return ERR_READING_LOGFILE;
                if ( szDelivery[0] == '*' )
                        continue;
                if ( !LogEOF(LOGFILE_READ_EOF) )
                {
                        if ( iMaxSeconds < reportLine.response )
                                iMaxSeconds = reportLine.response;
                }
        }

        iTotalBuckets = iMaxSeconds + 1;

        printf("Allocating Buckets...\n");

        iBucketSize = iTotalBuckets * sizeof(short);

        if ( !(psBuckets = (short *)malloc(iBucketSize)) )
                return ERR_INSUFFICIENT_MEMORY;

        ZeroMemory(psBuckets, iBucketSize);

        iTotal = 0;

        ResetLogFile();
        printf("Calculating Distribution...\n");

        while ( !LogEOF(LOGFILE_READ_EOF) )
        {
                if ( ReadReportLine(szDelivery, &reportLine) )
                        return ERR_READING_LOGFILE;
                if ( szDelivery[0] == '*' )
                        continue;
                if ( !LogEOF(LOGFILE_READ_EOF) )
                {
                        if ( CheckTimes(&reportLine) )
                                continue;
                        psBuckets[reportLine.response]++;
                        iTotal++;
                }
        }

        i90thPercent = iTotal * .9;

        for(i=0, iTotal = 0.0; iTotal < i90thPercent; iTotal += (double)psBuckets[i] )
                i++;

        printf("90th Percentile = %d.%d\n", i/1000, (i % 1000));

        free(psBuckets);

        return ERR_SUCCESS;
}

/* FUNCTION: int SkippedDelivery(void)
 *
 * PURPOSE:                     This function processes the Skipped Deliveries report.
 *
 * ARGUMENTS:   None
 *
 * RETURNS:                     ERR_SUCCESS if successfull or error code if an error occurs
 *
 * COMMENTS:    None
 *
 */

int SkippedDelivery(void)
{
        RPTLINE reportLine;
        char    szDelivery[128];
```

```
	int			i;
	int			items[10];

	ResetLogFile();

	printf("\n\n******** Skipped Delivery Report *******\n");
	memset(items, 0, sizeof(items));
	printf("Reading Delivery Log File...");

	while ( !LogEOF(LOGFILE_READ_EOF) )
	{
		if ( ReadReportLine(szDelivery, &reportLine) )
			return ERR_READING_LOGFILE;
		if ( szDelivery[0] == '*' )
			continue;
		if ( !LogEOF(LOGFILE_READ_EOF) )
		{
			if ( CheckTimes(&reportLine) )
				continue;
			for(i=0; i<10; i++)
			{
				if ( !reportLine.items[i] )
					items[i]++;
			}
		}
	}
	printf("\n");
	printf("Skipped delivery table.\n");
	printf("  1    2    3    4    5    6    7    8    9   10 \n");
	printf("---- ---- ---- ---- ---- ---- ---- ---- ---- ----\n");
	for(i=0; i<10; i++)
		printf("%4.4d ", items[i]);
	printf("\n");

	return ERR_SUCCESS;
}

/* FUNCTION: BOOL CheckTimes(PRPTLINE pRptLine)
 *
 * PURPOSE:		This function checks to see of the delilog record falls withing the
 *			begin and end time from the command line.
 *
 * ARGUMENTS:	PRPTLINE		pRptLine  delilog processed report line.
 *
 * RETURNS:		BOOL	FALSE	if report line is not within the
 *                                                                              requested
start and end times.
 *                                                      TRUE	if the report line is
within the
 *                                                                              requested
start and end times.
 *
 * COMMENTS:	If startTime and endTime are both 0 then the user requested
 *                                      the default behavior which is all records in delilog are
 *                                      valid.
 */

BOOL CheckTimes(PRPTLINE pRptLine)
{
	int		iRptEndTime;
	int		iRptStartTime;

	iRptStartTime = (pRptLine->start.wHour * 3600000) + (pRptLine->start.wMinute *
60000) + (pRptLine->start.wSecond * 1000) + pRptLine->start.wMilliseconds;
	iRptEndTime = (pRptLine->end.wHour * 3600000) + (pRptLine->end.wMinute *
60000) + (pRptLine->end.wSecond * 1000) + pRptLine->end.wMilliseconds;

	if ( iStartTime == 0 && iEndTime == 0 )
		return FALSE;

	if ( iStartTime <= iRptStartTime && iEndTime >= iRptEndTime )
		return FALSE;

	return TRUE;
}

/* FUNCTION: int OpenLogFile(void)
 *
 * PURPOSE:		This function opens the delivery log file for use.
 *
 * ARGUMENTS:	None
 *
 * RETURNS:			int		ERR_CANNOT_OPEN_RESULTS_FILE
	Cannot create results log file.
 *                                              ERR_SUCCESS
                                        Log file successfully opened
 *
 *
 * COMMENTS:	None
 *
 */

static int OpenLogFile(void)
{
	fpLog = fopen("delilog.", "rb");
```

```
	if ( !fpLog )
		return ERR_CANNOT_OPEN_RESULTS_FILE;

	return ERR_SUCCESS;
}

/* FUNCTION: int CloseLogFile(void)
 *
 * PURPOSE:	This function closes the delivery log file.
 *
 * ARGUMENTS:	None
 *
 * RETURNS:		None
 *
 * COMMENTS:	None
 *
 */

static void CloseLogFile(void)
{
	if ( fpLog )
		fclose(fpLog);

	return;
}


/* FUNCTION: static void ResetLogFile(void)
 *
 * PURPOSE:	This function prepares the delilog. file for reading
 *
 * ARGUMENTS:	None
 *
 * RETURNS:		None
 *
 * COMMENTS:	None
 *
 */

static void ResetLogFile(void)
{
	fseek(fpLog, 0L, SEEK_SET);
	LogEOF(LOGFILE_CLEAR_EOF);

	return;
}
```

```
/* FUNCTION: static BOOL LogEOF(int iOperation)
 *
 * PURPOSE:	This function tracks and reports the end of file condition
 *			on the delilog file.
 *
 * ARGUMENTS:	int iOperation	requested operation this can be:
 *
	LOGFILE_READ_EOF	check log file flag return current state
 *
	LOGFILE_CLEAR_EOF	clear end of log file flag
 *
	LOGFILE_SET_EOF		set flag end of log file reached
 *
 *
 * RETURNS:		None
 *
 * COMMENTS:	None
 *
 */

static BOOL LogEOF(int iOperation)
{
	static BOOL bEOF;

	switch(iOperation)
	{
		case LOGFILE_READ_EOF:
			return bEOF;
			break;
		case LOGFILE_CLEAR_EOF:
			bEOF = FALSE;
			break;
		case LOGFILE_SET_EOF:
			bEOF = TRUE;
			break;
	}
	return FALSE;
}

/* FUNCTION: static BOOL ReadReportLine(char *szBuffer, PRPTLINE pRptLine)
 *
 * PURPOSE:	This function reads a text line from the delilog file.
 *			on the delilog file.
 *
 * ARGUMENTS:	char		*szBuffer  buffer to placed read delilog file line into.
 *			PRPTLINE	pRptLine  returned structure
containing parsed delilog
 *
```

```
        report line.
 *
 * RETURNS:              FALSE   if successfull or TRUE if an error occurs.
 *
 * COMMENTS:     None
 *
 */

static BOOL ReadReportLine(char *szBuffer, PRPTLINE pRptLine)
{
        int i = 0;
        int ch;
        int iEof;

        while( i < 128 )
        {
                ch = fgetc(fpLog);
                if ( iEof = feof(fpLog) )
                        break;
                if ( ch == '\r' )
                {
                        if ( i )
                                break;
                        continue;
                }
                if ( ch == '\n' )
                        continue;
                szBuffer[i++] = ch;

        }

        //delivery item format is to long cannot be a valid delivery item
        if ( i >= 128 )
                return TRUE;

        szBuffer[i] = 0;
        if ( iEof )
        {
                LogEOF(LOGFILE_SET_EOF);
                if ( i == 0 )
                        return FALSE;
        }
        if ( szBuffer[0] == '*' )
        {
                //error line ignore
                return FALSE;
        }
        return ParseReportLine(szBuffer, pRptLine);
}

/* FUNCTION: static BOOL ParseReportLine(char *szLine, PRPTLINE pRptLine)
 *
 * PURPOSE:      This function reads a text line from the delilog file.
 *                       on the delilog file.
 *
 * ARGUMENTS:    char            *szLine         buffer containing the delilog file
line to be parsed.
 *                               PRPTLINE        pRptLine  returned structure
containing parsed delilog
 *
        report line values.
 *
 * RETURNS:              FALSE   if successfull or TRUE if an error occurs.
 *
 * COMMENTS:     None
 *
 */

static BOOL ParseReportLine(char *szLine, PRPTLINE pRptLine)
{
        int i;

        if ( ParseDate(szLine, &pRptLine->start) )
                return TRUE;

        pRptLine->end.wYear = pRptLine->start.wYear;
        pRptLine->end.wMonth = pRptLine->start.wMonth;
        pRptLine->end.wDay = pRptLine->start.wDay;

        if ( !(szLine = strchr(szLine, ',')) )
                return TRUE;
        szLine++;

        if ( ParseTime(szLine, &pRptLine->start) )
                return TRUE;

        if ( !(szLine = strchr(szLine, ',')) )
                return TRUE;
        szLine++;

        if ( ParseTime(szLine, &pRptLine->end) )
                return TRUE;

        if ( !(szLine = strchr(szLine, ',')) )
                return TRUE;
        szLine++;
```

```
        if ( !IsNumeric(szLine) )
                return TRUE;
        pRptLine->response = atoi(szLine);

        if ( !(szLine = strchr(szLine, ',')) )
                return TRUE;
        szLine++;

        if ( !IsNumeric(szLine) )
                return TRUE;
        pRptLine->w_id = atoi(szLine);

        if ( !(szLine = strchr(szLine, ',')) )
                return TRUE;
        szLine++;

        if ( !IsNumeric(szLine) )
                return TRUE;
        pRptLine->o_carrier_id = atoi(szLine);

        if ( !(szLine = strchr(szLine, ',')) )
                return TRUE;
        szLine++;

        for(i=0; i<10; i++)
        {
                if ( !IsNumeric(szLine) )
                        return TRUE;
                pRptLine->items[i] = atoi(szLine);

                if ( i<9 && !(szLine = strchr(szLine, ',')) )
                        return TRUE;
                szLine++;
        }

        return FALSE;
}

/* FUNCTION: static BOOL ParseDate(char *szDate, LPSYSTEMTIME pTime)
 *
 * PURPOSE:      This function validates and extracts a date string in the format
 *                       yy/mm/dd into an SYSTEMTIME structure.
 *
 * ARGUMENTS:    char                    *szDate         buffer containing the
date to be parsed.
 *                                       LPSYSTEMTIME    pTime           system time
structure where date will be placed.
 *
 * RETURNS:              FALSE if successfull or TRUE if an error occurs.
 *
 * COMMENTS:     None
 *
 */

static BOOL ParseDate(char *szDate, LPSYSTEMTIME pTime)
{
        if ( !isdigit(*szDate) || !isdigit(*(szDate+1)) || *(szDate+2) != '/' ||
                !isdigit(*(szDate+3)) || !isdigit(*(szDate+4)) || *(szDate+5) != '/' ||
                !isdigit(*(szDate+6)) || !isdigit(*(szDate+7)) )
                return TRUE;

        pTime->wYear = atoi(szDate);

        pTime->wMonth = atoi(szDate+3);

        pTime->wDay = atoi(szDate+6);

        if ( pTime->wMonth > 12 || pTime->wMonth < 0 || pTime->wDay > 31 || pTime->wD
< 0 )
                return TRUE;

        return FALSE;
}

/* FUNCTION: static BOOL ParseTime(char *szTime, LPSYSTEMTIME pTime)
 *
 * PURPOSE:      This function validates and extracts a time string in the format
 *                       hh:mm:ss:mmm into an SYSTEMTIME structure.
 *
 * ARGUMENTS:    char                    *szTime         buffer containing the
time to be parsed.
 *                                       LPSYSTEMTIME    pTime           system tim
structure where date will be placed.
 *
 * RETURNS:              FALSE if successfull or TRUE if an error occurs.
 *
 * COMMENTS:     None
 *
 */

static BOOL ParseTime(char *szTime, LPSYSTEMTIME pTime)
{
        if ( !isdigit(*szTime) || !isdigit(*(szTime+1)) || *(szTime+2) != ':' ||
                !isdigit(*(szTime+3)) || !isdigit(*(szTime+4)) || *(szTime+5) != ':' ||
                !isdigit(*(szTime+6)) || !isdigit(*(szTime+7)) || *(szTime+8) != ':' ||
```

```
                !isdigit(*(szTime+9)) || !isdigit(*(szTime+10)) || !isdigit(*(szTime+11)) )
                return TRUE;

        pTime->wHour = atoi(szTime);
        pTime->wMinute = atoi(szTime+3);
        pTime->wSecond = atoi(szTime+6);
        pTime->wMilliseconds  = atoi(szTime+9);

        if ( pTime->wHour > 23 || pTime->wHour < 0 ||
                pTime->wMinute > 59 || pTime->wMinute < 0 ||
                pTime->wSecond > 59 || pTime->wSecond < 0 ||
                pTime->wMilliseconds < 0 )
                return TRUE;

        if ( pTime->wMilliseconds > 999 )
        {
                pTime->wSecond += (pTime->wMilliseconds/1000);
                pTime->wMilliseconds = pTime->wMilliseconds  % 1000;
        }

        return FALSE;
}

/* FUNCTION: void ErrorMessage(int iError)
 *
 * PURPOSE:      This function displays an error message in the delivery executable's console
window.
 *
 * ARGUMENTS:    int             iError      error id to be displayed
 *
 * RETURNS:              None
 *
 * COMMENTS:     None
 *
 */

static void ErrorMessage(int iError)
{
        int i;

        static SERRORMSG errorMsgs[] =
        {
                {       ERR_SUCCESS,
                "Success, no error."
                                        },
                {       ERR_CANNOT_OPEN_RESULTS_FILE,
        "Cannot open delivery results file delilog."                                    },
                {       ERR_READING_LOGFILE,
        "Reading delivery log file, Delivery item format incorrect."    },
                {       ERR_INSUFFICIENT_MEMORY,
        "insufficient memory to process 90th percentile report."                },
                {       0,
                        ""


                }
        };

        for(i=0; errorMsgs[i].szMsg[0]; i++)
        {
                if ( iError == errorMsgs[i].iError )
                {
                        printf("\nError(%d): %s", iError, errorMsgs[i].szMsg);
                        return;
                }
        }
        printf("Error(%d): %s", errorMsgs[0].szMsg);
        return;
}

/* FUNCTION: BOOL GetParameters(int argc, char *argv[])
 *
 * PURPOSE:      This function parses the command line passed in to the delivery executa
initializing
 *                      and filling in global variable parameters.
 *
 * ARGUMENTS:    int             argc        number of command line arguments pas
to delivery
 *                      char        *argv[]     array of command line argume
pointers
 *
 * RETURNS:              BOOL    FALSE   parameter read successfull
 *                                               TRUE    user has requested
parameter information screen be displayed.
 *
 * COMMENTS:     None
 *
 */

static BOOL GetParameters(int argc, char *argv[])
{
        int                     i;
        SYSTEMTIME      startTime;
        SYSTEMTIME      endTime;

        iStartTime = 0;
```

```
        iEndTime = 0;
        iReport = 4;

        for(i=0; i<argc; i++)
        {
                if ( argv[i][0] == '-' || argv[i][0] == '/' )
                {
                        switch(argv[i][1])
                        {
                                case 'S':
                                case 's':
                                        if ( ParseTime(argv[i]+2, &startTime) )
                                                return TRUE;
                                        iStartTime = (startTime.wHour * 3600000) +
(startTime.wMinute * 60000) + (startTime.wSecond * 1000) + startTime.wMilliseconds;
                                        break;
                                case 'E':
                                case 'e':
                                        if ( ParseTime(argv[i]+2, &endTime) )
                                                return TRUE;
                                        iEndTime = (endTime.wHour * 3600000) +
(endTime.wMinute * 60000) + (endTime.wSecond * 1000) + endTime.wMilliseconds;
                                        break;
                                case 'R':
                                case 'r':
                                        iReport = atoi(argv[i]+2);
                                        if ( iReport > 4 || iReport < 1 )
                                                iReport = 4;
                                        break;
                                case '?':
                                        return TRUE;
                        }
                }
        }
        return FALSE;
}

/* FUNCTION: void PrintParameters(void)
 *
 * PURPOSE:        This function displays the supported command line flags.
 *
 * ARGUMENTS:    None
 *
 * RETURNS:                None
 *
 * COMMENTS:      None
 *
 */

static void PrintParameters(void)
{
        PrintHeader();
        printf("DELIRPT:\n\n");
        printf("Parameter                                                Default\n");
        printf("-------------------------------------------------------------------------\n");
        printf("-S Start Time HH:MM:SS:MMM                                All    \n");
        printf("-E End Time HH:MM:SS:MMM                                  All    \n");
        printf("-R 1)Average Response, 2)90th 3) Skipped 4) All                All    \n");
        printf("-? This help screen\n\n");
        printf("Note:  Command line switches are NOT case sensitive.\n");

        return;
}

/* FUNCTION: void PrintHeader(void)
 *
 * PURPOSE:        This function displays the delivery report applications banner informatio
 *
 * ARGUMENTS:    None
 *
 * RETURNS:                None
 *
 * COMMENTS:      None
 *
 */

static void PrintHeader(void)
{
        cls();

        printf("**************************************************\n");
        printf("*                                                *\n");
        printf("*  Microsoft SQL Server 6.5                      *\n");
        printf("*                                                *\n");
        printf("*  HTML TPC-C BENCHMARK KIT: Delivery Report     *\n");
        printf("*  Version %d.%2.2d.%3.3d                          *\n", versionMS, versionMM,
versionLS);
        printf("*                                                *\n");
        printf("**************************************************\n\n");

        return;
}

/* FUNCTION: void cls(void)
 *
 * PURPOSE:        This function clears the console window
```

```
 *
 * ARGUMENTS:    None
 *
 * RETURNS:                None
 *
 * COMMENTS:     None
 *
 */

static void cls(void)
{
        HANDLE  hConsole;
        COORD   coordScreen = { 0, 0 };                         //here's where we'll
home the cursor
        DWORD  cCharsWritten;
        CONSOLE_SCREEN_BUFFER_INFO    csbi;             //to get buffer info
        DWORD                                                   dwConSize;
        //number of character cells in the current buffer

        hConsole = GetStdHandle(STD_OUTPUT_HANDLE);

        //get the number of character cells in the current buffer

        GetConsoleScreenBufferInfo( hConsole, &csbi );
        dwConSize = csbi.dwSize.X * csbi.dwSize.Y;

        //fill the entire screen with blanks
        FillConsoleOutputCharacter( hConsole, (TCHAR) ' ', dwConSize, coordScreen,
&cCharsWritten );
        GetConsoleScreenBufferInfo( hConsole, &csbi );

        //now set the buffer's attributes accordingly
        FillConsoleOutputAttribute( hConsole, csbi.wAttributes,dwConSize, coordScreen,
&cCharsWritten );

        //put the cursor at (0, 0)
        SetConsoleCursorPosition( hConsole, coordScreen );

        return;
}

/* FUNCTION: BOOL IsNumeric(char *ptr)
 *
 * PURPOSE:      This function determines if a string is numeric. It fails if any characters
other
 *                      than numeric and null terminator are present.
 *
 * ARGUMENTS:    char                    *ptr        pointer to string to check.
 *
 * RETURNS:              BOOL    FALSE   if string is not all numeric
 *                                                       TRUE    if string contains onl
numeric characters i.e. '0' - '9'
 *
 * COMMENTS:     A comma is counted as a valid delimiter.
 *
 */

static BOOL IsNumeric(char *ptr)
{
        if ( *ptr == 0 )
                return FALSE;

        while( *ptr && isdigit(*ptr) )
                ptr++;
        if ( !*ptr || *ptr == ',' )
                return TRUE;
        else
                return FALSE;
}
```

A.2 delivery.c

```
/*      FILE:           DELIVERY.C
 *
 *      Based on:Microsoft TPC-C Kit Ver. 3.00.000
 *
 *                              Copyright Microsoft, 1996
 *                              Copyright Performance Tuning Corporation, 1997
 *
 *      PURPOSE:        New Order Tuxedo Server.
 *      Author:         Philip Durr
 *                              philipdu@Microsoft.com
 *
 *  MODIFIED    Changed for modularity and to allow for the Tuxedo TM
 *
 *  Author:         Edward Whalen
 *                              Performance Tuning Corporation
 *                              ewhalen@perftuning.com
 */

#include <windows.h>
#include <process.h>
#include <stdio.h>
#include <stdarg.h>
#include <malloc.h>
```

```
#include <stdlib.h>
#include <string.h>
#include <time.h>
#include <sys\timeb.h>
#include <io.h>

#define DBNTWIN32
#include <sqlfront.h>
#include <sqldb.h>

#include "trans.h"                                          //tpckit transaction
header contains definations of structures specific to TPC-C
#include "httpext.h"                                        //ISAPI DLL information header

#include "tpcc.h"                                           //this dlls specific
structure, value e.t. header.

#include <tmenv.h>
#include <xa.h>
#include <atmi.h>

BOOL    bLog                    = FALSE;
BOOL    bFlush;                                                     //Flush
delivery log info when written.
BOOL    verbose                 = FALSE;
BOOL    bError                  = FALSE;

int             iThreads        = 5;
int             iMaxWareHouses  = 500;
int             iDelayMs        = 100;
short   iMaxConnections = (short)1;
short   iDeadlockRetry  = (short)3;

DBPROCESS *pdbproc;

char                                    szServer[32];
        //SQL server name
char                                    szDatabase[32];
        //tpcc database name
char                                    szUser[32];
                //user name
char                                    szPassword[32];
        //user password
int spId;

#ifdef LOCAL_ALLOC
DELIVERY_DATA DeliveryData;
#else
TUX_DATA TuxData;
#endif
TERM Term;

static charszTpccLogPath[256];          //path to html log file if logging turned on in registry.
static char szErrorLogPath[256];        //path to error log file.

static  CRITICAL_SECTION                CriticalSection;
static  CRITICAL_SECTION                ErrorLogCriticalSection;
static  EXTENSION_CONTROL_BLOCK         *gpECB = NULL;
static  int                                             bTpccExit;
        //exit delivery disconnect loop as dll exiting.

extern void TMLog();
extern BOOL SQLInit();
extern void UtilStrCpy();
extern void UtilStrCpy();
extern BOOL SQLOpenConnection();
extern BOOL SQLCloseConnection();

//BOOL                                  bDone;
                        //delivery executable termination request flag
BOOL                                    bFlush;
                        //Flush delivery log info when written.

#define ERR_CANNOT_CREATE_THREAD                1000    //Cannot create thre
#define ERR_DBGETDATA_FAILED                    1001    //Get data failed.
#define ERR_REGISTRY_NOT_SETUP                          1002    //Registry
not setup for tpcc.
#define ERR_CANNOT_ACCESS_DELIVERY_FN           1003    //Cannot access
ReadDelivery cache.
#define ERR_CANNOT_ACCESS_REGISTRY              1004    //Cannot access
registry key TPCC.
#define ERR_CANNOT_CREATE_RESULTS_FILE          1005    //Cannot create resu
file.

FILE    *fpLog;

/* FUNCTION: tpsvrinit ( int argc, char *argv[])
 *
 * PURPOSE:     Initialize the Server to Database connection.
 *
 * RETURNS:             int     0       Success
 *                                      -1      Failure
 *
 *
 * COMMENTS:    None
 *
```

```
 */

int tpsvrinit ( int argc, char *argv[] )
{

        if ( GetParameters(argc, argv) )
        {
                PrintParameters();
                return -1;
        }

        if ( verbose )
                TMLog("TPSVRINIT: Delivery: Server %s, Database %s, User %s,
Password %s, Flush %d.",
                        szServer, szDatabase, szUser, szPassword, bFlush);

        if ( ! SQLInit() )
        {
                TMLog( "DELIVERY: SQLInit Failed" );
                return -1;
        }

        if ( SQLOpenConnection ( NULL, 0, 0, &pdbproc, szServer, szDatabase, szUser,
szPassword, szDatabase, &spId))
        {
                TMLog ( "DELIVERY: SQLOpenConnection Failed" );
                dbexit();
                return -1;
        }

        OpenLogFile();

        return 0;
}

/* FUNCTION: tpsvrdone ( void )
 *
 * PURPOSE:     Initialize the Server to Database connection.
 *
 * RETURNS:             int     0       Success
 *                                      -1      Failure
 *
 *
 * COMMENTS:    None
 *
 */

void tpsvrdone ( void )
{
        SQLCloseConnection( NULL, pdbproc);
        dbexit();
}

/* FUNCTION: DELIVERY ( TPSVCINFO *rqst )
 *
 * PURPOSE:     Process a New Order request.
 *
 * RETURNS:             int     0       Success
 *                                      -1      Failure
 *
 *
 * COMMENTS:    None
 *
 */

void DELIVERY ( TPSVCINFO *rqst )
{
        PECBINFO pECBInfo = dbgetuserdata(pdbproc);
        int size = rqst->len;

        if (verbose)
                TMLog(" DELIVERY: Begin transaction");

#ifdef LOCAL_ALLOC
        memcpy(&DeliveryData, rqst->data, size);

        if (verbose )
        {
                TMLog(" DELIVERY: w_id %d ", DeliveryData.w_id);
                TMLog(" DELIVERY: d_id %d ", DeliveryData.o_carrier_id);
        }

        bError = FALSE;

        DeliveryData.retval = SQLDelivery( pdbproc, &DeliveryData, iDeadlockRetry);

        if (bError == TRUE)
                DeliveryData.retval = -1;

        memcpy( rqst->data, &DeliveryData, size);
#else
        memcpy(&TuxData, rqst->data, size);

        if (verbose )
        {
                TMLog(" DELIVERY: w_id %d ", TuxData.DeliveryData.w_id);
```

```
                TMLog(" DELIVERY: d_id %d ", TuxData.DeliveryData.o_carrier_id);
        }

        bError = FALSE;

        TuxData.DeliveryData.retval = SQLDelivery( pdbproc, &TuxData.DeliveryData,
iDeadlockRetry);

        if (bError == TRUE)
                TuxData.DeliveryData.retval = -1;

        memcpy( rqst->data, &TuxData, size);
#endif
        tpreturn( TPSUCCESS, 0, rqst->data, size, 0);
}


/* FUNCTION: void CalculateElapsedTime(int *pElapsed, LPSYSTEMTIME lpBegin,
LPSYSTEMTIME lpEnd)
 *
 * PURPOSE:     This function calculates the elapsed time a delivery transaction took.
 *
 * ARGUMENTS:   int                                 *pElapsedpointer to int variable to
receive calculated elapsed
 *
                time in milliseconds.
 *                              LPSYSTEMTIME    lpBegin         Pointer to
system time structure containing
 *
                transaction beginning time.
 *                              LPSYSTEMTIME    lpEnd           Pointer to
system time structure containing
 *
                transaction ending time.
 * RETURNS:             None
 *
 * COMMENTS:    None
 *
 */

static void CalculateElapsedTime(int *pElapsed, LPSYSTEMTIME lpBegin, LPSYSTEMTIME
lpEnd)
{
        int                     beginSeconds;
        int                     endSeconds;

        beginSeconds = (lpBegin->wHour * 3600000) + (lpBegin->wMinute * 60000) +
(lpBegin->wSecond * 1000) + lpBegin->wMilliseconds;
        endSeconds = (lpEnd->wHour * 3600000) + (lpEnd->wMinute * 60000) + (lpEnd-
>wSecond * 1000) + lpEnd->wMilliseconds;
        *pElapsed = endSeconds - beginSeconds;

        //check for day boundry, this will function for 24 hour period however it will not work
over 48 hours.
        if ( *pElapsed < 0 )
                *pElapsed = *pElapsed + (24 * 60 * 60 * 1000);

        return;
}

/* FUNCTION: int SQLDelivery(DBPROCESS *dbproc, DELIVERY *pDelivery, short
deadlock_retry )
 *
 * PURPOSE:     This function processes the delivery transaction.
 *
 * ARGUMENTS:   DELIVERY                *pDelivery      Pointer to delivery
transaction structure
 *
 * RETURNS:             int     ERR_DBGETDATA_FAILED            Delivery g
data operation failed.
 *                                                      ERR_SUCCESS
                Delivery successfull, no error
 *
 *
 * COMMENTS:    None
 *
 */

static int SQLDelivery(DBPROCESS *dbproc, DELIVERY_DATA *pDelivery, short
deadlock_retry)
{
        RETCODE         rc;
        int             i;
        int             deadlock_count;
        BYTE    *pData;
        SYSTEMTIME      trans_end;              //delivery transaction finished
time
        int     elapsed;                        //delivery transaction time

        deadlock_count = 0;


        // Start new delivery
        while ( TRUE )
```

```
	{
		if (dbrpcinit(dbproc, "tpcc_delivery", 0) == SUCCEED)
		{
			dbrpcparam(dbproc, NULL, 0, SQLINT2, -1, -1, (BYTE
*)&pDelivery->w_id);
			dbrpcparam(dbproc, NULL, 0, SQLINT1, -1, -1, (BYTE
*)&pDelivery->o_carrier_id);

			if (dbrpcexec(dbproc) == SUCCEED)
			{
				while (((rc = dbresults(dbproc)) !=
NO_MORE_RESULTS) && (rc != FAIL))
				{
					while (((rc = dbnextrow(dbproc)) !=
NO_MORE_ROWS) && (rc != FAIL))
					{
						for (i=0;i<10;i++)
						{

	if(pData=dbdata(dbproc, i+1))
							pDelivery-
>o_id[i] = *((DBINT *)pData);
						else
							pDelivery-
>o_id[i] = 0;
						}
					}
				}
			}
			if ( !SQLDetectDeadlock(dbproc))
				break;
			deadlock_count++;
			Sleep(10 * deadlock_count);
	}
	GetLocalTime(&trans_end);

	CalculateElapsedTime(&elapsed, &pDelivery->queue_time, &trans_end);

	fprintf(fpLog,
"%2.2d/%2.2d/%2.2d,%2.2d:%2.2d:%2.2d:%3.3d,%2.2d:%2.2d:%2.2d:%3.3d,%d,%d,%d,%d,%
d,%d,%d,%d,%d,%d,%d,%d,%d\r\n",
			trans_end.wYear - 1900, trans_end.wMonth, trans_end.wDay,
			pDelivery->queue_time.wHour, pDelivery->queue_time.wMinute,
			pDelivery->queue_time.wSecond, pDelivery->queue_time.wMilliseconds,
			trans_end.wHour, trans_endwMinute, trans_end.wSecond,
trans_end.wMilliseconds,
			elapsed,
			pDelivery->w_id, pDelivery->o_carrier_id,
			pDelivery->o_id[0], pDelivery->o_id[1], pDelivery->o_id[2], pDelivery-
>o_id[3],
			pDelivery->o_id[4], pDelivery->o_id[5], pDelivery->o_id[6], pDelivery-
>o_id[7],
			pDelivery->o_id[8], pDelivery->o_id[9] );

	if ( bFlush )
		fflush(fpLog);


	return ERR_SUCCESS;
}

/* FUNCTION: BOOL SQLDetectDeadlock(DBPROCESS *dbproc)
 *
 * PURPOSE:	This function is used to check for deadlock conditions.
 *
 * ARGUMENTS:	DBPROCESS		*dbproc		DBPROCESS to
check
 *
 * RETURNS:		BOOL	FALSE				No lock
condition present
 *					TRUE
	Lock condition detected
 *
 * COMMENTS:	None
 *
 */

static BOOL SQLDetectDeadlock(DBPROCESS *dbproc)
{
	if (*((BOOL *) dbgetuserdata(dbproc)) == TRUE)
  {
		*((BOOL *) dbgetuserdata(dbproc)) = FALSE;
		return TRUE;
	}
	return FALSE;
}

/* FUNCTION: int OpenLogFile(void)
 *
 * PURPOSE:	This function opens the delivery log file for use.
 *
 * ARGUMENTS:	None
 *
 * RETURNS:		int	ERR_REGISTRY_NOT_SETUP
	Registry not setup.
```

```
 *
        ERR_CANNOT_CREATE_RESULTS_FILE          Cannot create results log file.
 *                                              ERR_SUCCESS
                                Log file successfully opened
 *
 *
 * COMMENTS:      None
 *
 */

static int OpenLogFile(void)
{
        HKEY    hKey;
        BOOL    bRc;
        BYTE    szTmp[256];
        char    szKey[256];
        char    szLogPath[256];
        DWORD   size;
        DWORD   sv;
        int             len;
        char    *ptr;

        szLogPath[0] =  0;
        bRc = TRUE;
        if ( RegOpenKeyEx(HKEY_LOCAL_MACHINE,
"SYSTEM\\CurrentControlSet\\Services\\W3SVC\\Parameters\\Virtual Roots", 0,
KEY_ALL_ACCESS, &hKey) == ERROR_SUCCESS )
        {
                sv = sizeof(szKey);
                size = sizeof(szTmp);

                if ( RegEnumValue(hKey, 0, szKey, &sv, NULL, NULL, szTmp, &size) ==
ERROR_SUCCESS )
                {
                        strcpy(szLogPath, szTmp);
                        bRc = FALSE;
                }
                RegCloseKey(hKey);
        }

        if ( bRc )
                return ERR_REGISTRY_NOT_SETUP;

        if ( (ptr = strchr(szLogPath, ',')) )
                *ptr = 0;

        len = strlen(szLogPath);
        if ( szLogPath[len-1] != '\\' )
        {
                szLogPath[len] = '\\';
                szLogPath[len+1] = 0;
        }
        strcat(szLogPath, "delilog.");

        fpLog = fopen(szLogPath, "ab");

        if ( !fpLog )
                return ERR_CANNOT_CREATE_RESULTS_FILE;

        return ERR_SUCCESS;
}

/*
 *      Common Code for all Servers
 */

 /* FUNCTION: BOOL SQLInit()
 *
 * PURPOSE:      This function initializes SQL Server for later use.
 *
 *
 * RETURNS:              BOOL    FALSE   if successfull
 *                                               TRUE    if an error occurs an
connection cannot be established.
 *
 * COMMENTS:     None
 *
 */
BOOL SQLInit ()
{
        dbinit();

        if ( dbgetmaxprocs() < iMaxConnections )
        {
                if ( dbsetmaxprocs(iMaxConnections) == FAIL )
                {
                        //set for fail error message when HttpExtensionProc() is called
because
                        //at this point we don't have a pECB so no way to show error
message.
                        iMaxConnections = -1;
                }
        }

        // install error and message handlers
        dbmsghandle((DBMSGHANDLE_PROC)msg_handler);
```

```
	dberrhandle((DBERRHANDLE_PROC)err_handler);

	return TRUE;
}


/* FUNCTION: BOOL SQLOpenConnection(EXTENSION_CONTROL_BLOCK	*pECB, int
iTermId, int iSyncId, DBPROCESS **dbproc, char *server, char *database, char *user, char
*password, char *app, int *spid, long *pack_size)
 *
 * PURPOSE:		This function opens the sql connection for use.
 *
 * ARGUMENTS:	EXTENSION_CONTROL_BLOCK		*pECB	passed in structure
pointer from inetsrv.
 *				int					iTermId
	terminal id of browser
 *				int					iSyncId
	sync id of browser
 *				DBPROCESS			**dbproc	pointer to
returned DBPROCESS
 *				char				*server
	SQL server name
 *				char				*databaseSQL server
database
 *				char				*user
	user name
 *				char				*password
	user password
 *				char				*app
	pointer to returned application array
 *				int					*spid
	pointer to returned spid
 *				long				*pack_size
	pointer to returned default pack size
 *
 * RETURNS:			BOOL	FALSE	if successfull
 *							TRUE	if an error occurs
 *
 * COMMENTS:	None
 *
 */


#ifdef USE_ODBC
	static BOOL SQLOpenConnection(EXTENSION_CONTROL_BLOCK *pECB, int
iTermId, int iSyncId, DBPROCESS **dbproc, char *server, char *database, char *user, char
*password, char *app, int *spid, long *pack_size)
	{
		RETCODE		rc;
		char		buffer[30];

		*dbproc = (DBPROCESS *)malloc(sizeof(DBPROCESS));
		if ( !*dbproc )
			return TRUE;

		//set pECB data into dbproc
		(*dbproc)->bDeadlock = FALSE;
		(*dbproc)->bFailed = FALSE;
		(*dbproc)->pECB = pECB;
		(*dbproc)->iTermId = iTermId;
		(*dbproc)->iSyncId = iSyncId;


		if ( SQLAllocConnect(henv, &(*dbproc)->hdbc) == SQL_ERROR )
			return TRUE;

		if ( SQLSetConnectOption((*dbproc)->hdbc, SQL_PACKET_SIZE,
pack_size) == SQL_ERROR )
			return TRUE;

		rc = SQLConnect((*dbproc)->hdbc, server, SQL_NTS, user, SQL_NTS,
password, SQL_NTS);
		if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
			return TRUE;
		rc = SQLAllocStmt((*dbproc)->hdbc, &(*dbproc)->hstmt);
		if (rc == SQL_ERROR)
			return TRUE;

		sprintf(buffer,"use %s", Client->database);

		rc = SQLExecDirect((*dbproc)->hstmt, buffer, SQL_NTS);
		if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
			return TRUE;

		SQLFreeStmt((*dbproc)->hstmt, SQL_CLOSE);
		sprintf(buffer,"set nocount on");
		rc = SQLExecDirect((*dbproc)->hstmt, buffer, SQL_NTS);
		if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
			return TRUE;
		SQLFreeStmt((*dbproc)->hstmt, SQL_CLOSE);

		sprintf(buffer,"select @@spid");

		rc = SQLExecDirect((*dbproc)->hstmt, buffer, SQL_NTS);
		if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
```

```
                return TRUE;

        if ( SQLBindCol((*dbproc)->hstmt, 1, SQL_C_SSHORT, &(*dbproc)->spid,
0, NULL) == SQL_ERROR )
                return TRUE;

        if ( SQLFetch((*dbproc)->hstmt) == SQL_ERROR )
                return TRUE;

        SQLFreeStmt((*dbproc)->hstmt, SQL_CLOSE);

        return FALSE;
    }

#else

    static BOOL SQLOpenConnection(EXTENSION_CONTROL_BLOCK *pECB, int
iTermId, int iSyncId, DBPROCESS **dbproc, char *server, char *database, char *user, char
*password, char *app, int *spid)
    {
        LOGINREC        *login;
        PECBINFO        pEcbInfo;

        //set local msg proc for login record
        //attach pECB record

        //this is necessary as dblib provides no way to pass user data in a login
structure. So until
        //there is an allocated dbproc we need to use a static which means that the
login attempt must
        //be serialized.

        gpECB = pECB;

        login = dblogin();
        if ( !*user )
                DBSETLUSER(login, "sa");
        else
                DBSETLUSER(login, user);

        DBSETLPWD(login,  password);
        DBSETLHOST(login, app);

//      Do not set the packet size.  Use the size set up in SQL Server.
//      DBSETLPACKET(login, (unsigned short)DEFCLPACKSIZE);

//      This can potentially cut down on data conversion
        DBSETLVERSION(login, DBVER60);

        if ((*dbproc = dbopen(login, server )) == NULL)
                return TRUE;

        //set pECB data into dbproc
        pEcbInfo = (PECBINFO)malloc(sizeof(ECBINFO));
        pEcbInfo->bDeadlock = FALSE;
        pEcbInfo->pECB = pECB;
        pEcbInfo->iTermId = iTermId;
        pEcbInfo->iSyncId = iSyncId;
        dbsetuserdata(*dbproc, pEcbInfo);

        // Use the the right database
        dbuse(*dbproc, database);

        dbcmd(*dbproc, "select @@spid");

        dbsqlexec(*dbproc);
        while (dbresults(*dbproc) != NO_MORE_RESULTS)
        {
                dbbind(*dbproc, 1, SMALLBIND, (DBINT) 0, (BYTE *) spid);
                while (dbnextrow(*dbproc) != NO_MORE_ROWS)
                ;
        }
        dbcmd(*dbproc, "set nocount on");

        dbsqlexec(*dbproc);
        while (dbresults(*dbproc) != NO_MORE_RESULTS)
        {
                while (dbnextrow(*dbproc) != NO_MORE_ROWS)
                ;
        }

        //rollback transaction on abort
        dbcmd(*dbproc, "set XACT_ABORT ON");

        dbsqlexec(*dbproc);
        while (dbresults(*dbproc) != NO_MORE_RESULTS)
        {
                while (dbnextrow(*dbproc) != NO_MORE_ROWS)
                ;
        }

        return FALSE;
    }

#endif
```

```
/* FUNCTION: BOOL SQLCloseConnection(EXTENSION_CONTROL_BLOCK *pECB,
DBPROCESS *dbproc)
 *
 * PURPOSE:        This function closes the sql connection.
 *
 * ARGUMENTS:    EXTENSION_CONTROL_BLOCK        *pECB     passed in structure
pointer from inetsrv.
 *                                DBPROCESS                *dbproc    pointer to
DBPROCESS
 *
 * RETURNS:                BOOL     FALSE    if successfull
 *                                                    TRUE     if an error occurs
 *
 * COMMENTS:      None
 *
 */

#ifdef USE_ODBC
        static BOOL SQLCloseConnection(EXTENSION_CONTROL_BLOCK *pECB,
DBPROCESS *dbproc)
        {
                if ( dbproc )
                {
                        SQLFreeStmt(dbproc->hstmt, SQL_DROP);
                        SQLDisconnect(dbproc->hdbc);
                        SQLFreeConnect(dbproc->hdbc);
                        free(dbproc);
                        dbproc = NULL;
                }
                return FALSE;
        }
#else
        static BOOL SQLCloseConnection(EXTENSION_CONTROL_BLOCK *pECB,
DBPROCESS *dbproc)
        {
                if (dbclose(dbproc) == FAIL)
                        return TRUE;
                return FALSE;
        }
#endif

// Lifted from HP FDR since they did such a nice job
void TMLog( char *format, ... )
{
        va_list args;
        char buf[4096];
        int len;
        va_start( args, format );
        _strtime( buf );
        strcat( buf," ");
        len = strlen( buf );
        (void)_vsnprintf( buf+ len, sizeof( buf) - len - 1, format, args);
        buf[sizeof( buf )- 1]= '\0';
        va_end( args );
        userlog( buf );
}

/* FUNCTION: void UtilStrCpy(char *pDest, char *pSrc, int n)
 *
 * PURPOSE:        This function copies n characters from string pSrc to pDst and places a
 *                        null character at the end of the destination string.
 *
 * ARGUMENTS:    char                                *pDest     destination string pointer
 *                                        char                                *pSrc      source
string pointer
 *                                        int                                        n
        number of characters to copy
 *
 * RETURNS:                None
 *
 * COMMENTS:      Unlike strncpy this function ensures that the result string is
 *                                        always null terminated.
 *
 */

static void UtilStrCpy(char *pDest, char *pSrc, int n)
{
   strncpy(pDest, pSrc, n);
   pDest[n] = '\0';

        return;
}

/* FUNCTION: int err_handler(DBPROCESS *dbproc, int severity, int dberr, int oserr, char
*dberrstr, char *oserrstr)
 *
 * PURPOSE:        This function handles DB-Libraryerrors
 *
 * ARGUMENTS:    DBPROCESS                *dbproc
        DBPROCESS id pointer
 *                                        int                                        severity
        severity of error
 *                                        int                                        dberr
                error id
 *                                        int                                        oserr
                operating system specific error code
```

```
*                                       char                    *dberrstr
        printable error description of dberr
*                                       char                    *oserrstr
        printable error description of oserr
*
* RETURNS:              int                                     INT_CONTINUE
        continue if error is SQLETIME else INT_CANCEL action
*
* COMMENTS:     None
*
*/


int err_handler(DBPROCESS *dbproc, int severity, int dberr, int oserr, char *dberrstr, char
*oserrstr)
{
        PECBINFO                                        pEcbInfo;
        EXTENSION_CONTROL_BLOCK         *pECB;
        FILE                                            *fp;
        SYSTEMTIME                                      systemTime;
        char                                            szTmp[256];
        int                                                     iTermId;
        int                                                     iSyncId;

        pEcbInfo = NULL;

        if ((dbproc == NULL) || (DBDEAD(dbproc)))
        {
                TMLog("DBPROC is invalid");
                return INT_CANCEL;
        }

        if ( !(pEcbInfo = (PECBINFO)dbgetuserdata(dbproc)) )
        {
                pECB = gpECB;
                iTermId = 0;
                iSyncId = 0;
        }
        else
        {
                pECB = pEcbInfo->pECB;
                iTermId = pEcbInfo->iTermId;
                iSyncId = pEcbInfo->iSyncId;
        }

        if ( pEcbInfo && pEcbInfo->bFailed )
        {
                bError == FALSE;
                return INT_CANCEL;
        }

        if ( oserr != DBNOERR )
        {
                TMLog("DBLIB Error %s", oserrstr);
                if ( pEcbInfo )
                {
                        pEcbInfo->bFailed = TRUE;
                        bError = TRUE;
                }

                GetLocalTime(&systemTime);
                fp = fopen(szErrorLogPath, "ab");

                sprintf(szTmp, "ErrorHandler: DBLIB(%d): %s", oserr, oserrstr);

                TMLog("%2.2d/%2.2d/%2.2d %2.2d:%2.2d:%2.2d\r\n\r\n%s\r\n\r\n",
                        systemTime.wYear, systemTime.wMonth, systemTime.wDay
                        systemTime.wHour, systemTimewMinute,
systemTime.wSecond,
                        szTmp);

                fclose(fp);
        }

        return INT_CANCEL;
}


/* FUNCTION: int msg_handler(DBPROCESS *dbproc, DBINT msgno, int msgstate, int
severity, char *msgtext)
 *
 * PURPOSE:     This function handles DB-Library SQL Server error messages
 *
 * ARGUMENTS:   DBPROCESS               *dbproc
        DBPROCESS id pointer
*                                       DBINT                   msgno
        message number
*                                       int                             msgstate
        message state
*                                       int                             severity
        message severity
*                                       char                    *msgtext
        printable message description
*
* RETURNS:              int                                     INT_CONTINUE
        continue if error is SQLETIME else INT_CANCEL action
```

```
 *
        INT_CANCEL              cancel operation
 *
 * COMMENTS:    This function also sets the dead lock dbproc variable if necessary.
 *
 */

int msg_handler(DBPROCESS *dbproc, DBINT msgno, int msgstate, int severity, char
*msgtext)
{
        PECBINFO                                pEcbInfo;
        EXTENSION_CONTROL_BLOCK         *pECB;
        FILE                                    *fp;
        SYSTEMTIME                              systemTime;
        char                                    szTmp[256];
        int                                             iTermId;
        int                                             iSyncId;

        if ( !(pEcbInfo = (PECBINFO)dbgetuserdata(dbproc)) )
        {
                pECB = gpECB;
                iTermId = 0;
                iSyncId = 0;
        }
        else
        {
                pECB = pEcbInfo->pECB;
                iTermId = pEcbInfo->iTermId;
                iSyncId = pEcbInfo->iSyncId;
        }


        if ( (msgno == 5701) || (msgno == 2528) || (msgno == 5703) || (msgno == 6006) )
                return INT_CONTINUE;

        // deadlock message
        if (msgno == 1205)
        {
                // set the deadlock indicator
                if ( pEcbInfo )
                        pEcbInfo->bDeadlock = TRUE;
                else
                        TMLog("Error, dbgetuserdata returned NULL.");
                return INT_CONTINUE;
        }
        if ( pEcbInfo && pEcbInfo->bFailed )
        {
                TMLog("SQL Error ");
                return INT_CANCEL;
        }

        if (msgno == 0)
                return INT_CONTINUE;
        else
        {
                TMLog("MsgHandler: SQL Error %s", msgtext);

                if ( pEcbInfo )
                        pEcbInfo->bFailed = TRUE;

                bError = TRUE;

                sprintf(szTmp, "Error: SQLSVR(%d): %s", msgno, msgtext);

                TMLog("%2.2d/%2.2d/%2.2d %2.2d:%2.2d:%2.2d\r\n\r\n%s\r\n\r\n",
                        systemTime.wYear, systemTime.wMonth, systemTime.wDay
                        systemTime.wHour, systemTime.wMinute,
systemTime.wSecond,
                        szTmp);
        }
        return INT_CANCEL;
}


/* FUNCTION: BOOL GetParameters(int argc, char *argv[])
 *
 * PURPOSE:     This function parses the command line passed in to the delivery executa
initializing
 *                      and filling in global variable parameters.
 *
 * ARGUMENTS:   int             argc    number of command line arguments pas
to delivery
 *                              char    *argv[]     array of command line argume
pointers
 *
 * RETURNS:             BOOL    FALSE   parameter read successfull
 *                                              TRUE    user has requested
parameter information screen be displayed.
 *
 * COMMENTS:    None
 *
 */

static BOOL GetParameters(int argc, char *argv[])
{
        int i;
```

```
        szServer[0]                     = 0;
        szPassword[0]       = 0;
        bFlush                          = FALSE;
        strcpy(szDatabase, "tpcc");
        strcpy(szUser, "sa");

        for(i=0; i<argc; i++)
        {
                if ( argv[i][0] == '-' || argv[i][0] == '/' )
                {
                        switch(argv[i][1])
                        {
                                case 'S':
                                case 's':
                                        strcpy(szServer, argv[i]+2);
                                        break;
                                case 'V':
                                case 'v':
                                        verbose = TRUE;
                                        break;
                                case 'F':
                                case 'f':
                                        bFlush = TRUE;      //turn on delilog flush
when written.
                                        break;
                                case '?':
                                        return TRUE;
                        }
                }
        }
        return FALSE;
}

/* FUNCTION: void PrintParameters(void)
 *
 * PURPOSE:         This function displays the supported command line flags.
 *
 * ARGUMENTS:       None
 *
 * RETURNS:                 None
 *
 * COMMENTS:        None
 *
 */

static void PrintParameters(void)
{
        TMLog("PerformanceTuning Corporation Tuxedo Kit");
        TMLog("   www.perftuning.com   (281) 251-3495  ");
        TMLog("Delivery: -S Server [-v (verbose)] [-F (Flush delilog)]" );
        TMLog("Delivery: Server %s Flush %d.", szServer, bFlush);

}
```

A.3 HttpExt.h

```
/********
*
*  Copyright (c) 1995  Process Software Corporation
*
*  Copyright (c) 1995  Microsoft Corporation
*
*
*  Module Name  : HttpExt.h
*
*  Abstract :
*
*    This module contains  the structure definitions and prototypes for the
*    version 1.0 HTTP Server Extension interface.
*
*****************/

#ifndef _HTTPEXT_H_
#define _HTTPEXT_H_

#include <windows.h>

#ifdef __cplusplus
extern "C" {
#endif

#define   HSE_VERSION_MAJOR          1      // major version of this spec
#define   HSE_VERSION_MINOR          0      // minor version of this spec
#define   HSE_LOG_BUFFER_LEN         80
#define   HSE_MAX_EXT_DLL_NAME_LEN  256

typedef   LPVOID  HCONN;

// the following are the status codes returned by the Extension DLL

#define   HSE_STATUS_SUCCESS                    1
#define   HSE_STATUS_SUCCESS_AND_KEEP_CONN      2
#define   HSE_STATUS_PENDING                    3
#define   HSE_STATUS_ERROR                      4
```

```
// The following are the values to request services with the ServerSupportFunction.
//  Values from 0 to 1000 are reserved for future versions of the interface

#define   HSE_REQ_BASE                          0
#define   HSE_REQ_SEND_URL_REDIRECT_RESP        ( HSE_REQ_BASE + 1 )
#define   HSE_REQ_SEND_URL                      ( HSE_REQ_BASE + 2 )
#define   HSE_REQ_SEND_RESPONSE_HEADER          ( HSE_REQ_BASE + 3 )
#define   HSE_REQ_DONE_WITH_SESSION             ( HSE_REQ_BASE + 4 )
#define   HSE_REQ_END_RESERVED                  1000

//
//  These are Microsoft specific extensions
//

#define   HSE_REQ_MAP_URL_TO_PATH               (HSE_REQ_END_RESERVED+1)
#define   HSE_REQ_GET_SSPI_INFO                 (HSE_REQ_END_RESERVED+2)


//
// passed to GetExtensionVersion
//

typedef struct   _HSE_VERSION_INFO {

    DWORD  dwExtensionVersion;
    CHAR   lpszExtensionDesc[HSE_MAX_EXT_DLL_NAME_LEN];

} HSE_VERSION_INFO, *LPHSE_VERSION_INFO;

//
// passed to extension procedure on a new request
//
typedef struct _EXTENSION_CONTROL_BLOCK {

    DWORD     cbSize;               // size of this struct.
    DWORD     dwVersion;            // version info of this spec
    HCONN     ConnID;               // Context number not to be modified!
    DWORD     dwHttpStatusCode;     // HTTP Status code
    CHAR      lpszLogData[HSE_LOG_BUFFER_LEN];// null terminated log info specific to this
Extension DLL

    LPSTR     lpszMethod;           // REQUEST_METHOD
    LPSTR     lpszQueryString;      // QUERY_STRING
    LPSTR     lpszPathInfo;         // PATH_INFO
    LPSTR     lpszPathTranslated;   // PATH_TRANSLATED

    DWORD     cbTotalBytes;         // Total bytes indicated from client
    DWORD     cbAvailable;          // Available number of bytes
    LPBYTE    lpbData;              // pointer to cbAvailable bytes

    LPSTR     lpszContentType;      // Content type of client data

    BOOL (WINAPI * GetServerVariable) ( HCONN      hConn,
                                        LPSTR      lpszVariableName,


                                                   LPVOID     lpvBuffer,
                                        LPDWORD    lpdwSize );

    BOOL (WINAPI * WriteClient)  ( HCONN      ConnID,
                                   LPVOID     Buffer,
                                   LPDWORD    lpdwBytes,
                                   DWORD      dwReserved );

    BOOL (WINAPI * ReadClient)  ( HCONN      ConnID,
                                  LPVOID     lpvBuffer,
                                  LPDWORD    lpdwSize );

    BOOL (WINAPI * ServerSupportFunction)( HCONN      hConn,
                                           DWORD      dwHSERRequest,
                                           LPVOID     lpvBuffer,
                                           LPDWORD    lpdwSize,
                                           LPDWORD    lpdwDataType );

} EXTENSION_CONTROL_BLOCK, *LPEXTENSION_CONTROL_BLOCK;

//
//  these are the prototypes that must be exported from the extension DLL
//

BOOL  WINAPI   GetExtensionVersion( HSE_VERSION_INFO  *pVer );
DWORD WINAPI   HttpExtensionProc(  EXTENSION_CONTROL_BLOCK *pECB );

// the following type declarations is for the server side

typedef BOOL  (WINAPI * PFN_GETEXTENSIONVERSION)( HSE_VERSION_INFO  *pVer
typedef DWORD (WINAPI * PFN_HTTPEXTENSIONPROC )(
EXTENSION_CONTROL_BLOCK *pECB );

#ifdef __cplusplus
}
#endif

#endif  // end definition _HTTPEXT_H_
```

A.4 install.c

```
/*      FILE:           INSTALL.C
 *                      Microsoft TPC-C Kit Ver. 3.00.000
 *                      Audited 08/23/96, By Francois Raab
 *
 *                      Copyright Microsoft, 1996
 *
 *      PURPOSE:        Automated installation application for TPC-C Web Kit
 *      Author:         Philip Durr
 *                      philipdu@Microsoft.com
 */

#include <windows.h>
#include <direct.h>
#include  <io.h>
#include <stdlib.h>
#include <stdio.h>
#include <commctrl.h>
#include "install.h"

HICON           hIcon;
HINSTANCE       hInst;

DWORD                   versionExeMS;
DWORD                   versionExeLS;
DWORD                   versionDllMS;
DWORD                   versionDllLS;

static  BOOL    bLog;
static  int             iThreads;
static  int             iMaxWareHouse;
static  int             iDelayMs;
static  int             iDeadlockRetry;
static  int             iMaxConnections;
static  int             iPoolThreadsLimit;
static  int             iThreadTimeout;
static  int             iListenBackLog;
static  int             iAcceptExOutstanding;
static  int             iQSlotts;

static  int             iMaxPhysicalMemory;             //max physical memory
in MB

BOOL    CALLBACK        UpdatedDlgProc(HWND hwnd, UINT uMsg, WPARAM wParam,
LPARAM lParam);
BOOL    CALLBACK        MainDlgProc(HWND hwnd, UINT uMsg, WPARAM wParam,
LPARAM lParam);
BOOL    CALLBACK        CopyDlgProc(HWND hwnd, UINT uMsg, WPARAM wParam,
LPARAM lParam);
static  void            ReadRegistrySettings(void);
static  void            WriteRegistrySettings(char *szDllPath);
static  int                     CopyFiles(HWND hDlg, char *szDllPath);
static  BOOL            GetInstallPath(char *szDllPath);
static  void            GetVersionInfo(char *szDLLPath, char *szExePath);
static  BOOL            StartWWWebService(void);
static  BOOL            StopWWWebService(void);
static  void            UpdateDialog(HWND hDlg);

int WINAPI WinMain( HINSTANCE hInstance, HINSTANCE hPrevInstance, LPSTR
lpCmdLine, int nCmdShow )
{
        int iRc;

        hInst = hInstance;

        InitCommonControls();

        hIcon = LoadIcon(hInstance, MAKEINTRESOURCE(IDI_ICON1));

        iRc = DialogBox(hInstance, MAKEINTRESOURCE(IDD_DIALOG1),
GetDesktopWindow(), MainDlgProc);
        if ( iRc )
                DialogBoxParam(hInstance,
MAKEINTRESOURCE(IDD_DIALOG2), GetDesktopWindow(), UpdatedDlgProc,
(LPARAM)iRc);
        DestroyIcon(hIcon);

        return 0;
}

BOOL CALLBACK UpdatedDlgProc(HWND hwnd, UINT uMsg, WPARAM wParam, LPARAI
lParam)
{
        switch(uMsg)
        {
                case WM_INITDIALOG:
                        if ( lParam == 1 )
                                SetDlgItemText(hwnd, IDC_RESULTS, "HTML TPC
Installation Successfull");
                        else
                                SetDlgItemText(hwnd,IDC_RESULTS, "HTML TPC
Registry Updated");
                        return TRUE;
                case WM_COMMAND:
                        if ( wParam == IDOK )
```

```
                                EndDialog(hwnd, TRUE);
                        break;
                default:
                        break;
        }
        return FALSE;
}

BOOL CALLBACK MainDlgProc(HWND hwnd, UINT uMsg, WPARAM wParam, LPARAM
lParam)
{
        PAINTSTRUCT             ps;
        MEMORYSTATUS  memoryStatus;
        int                     d;
        int                     rc;
        HWND                    hDlg;
        char                    szTmp[256];
        static char             szDllPath[256];
        static char             szExePath[256];

        switch(uMsg)
        {
                case WM_INITDIALOG:
                        GlobalMemoryStatus(&memoryStatus);
                        iMaxPhysicalMemory      = (memoryStatus.dwTotalPhys/
1048576);

                        if ( GetInstallPath(szDllPath) )
                        {
                                MessageBox(hwnd, "Error internet service inetsrv is
not installed.", NULL, MB_ICONSTOP | MB_OK);
                                EndDialog(hwnd, FALSE);
                                return TRUE;
                        }

                        bLog                                    = FALSE;
                        iThreads                        = 4;
                        iMaxWareHouse                   = 500;
                        iDelayMs                        = 500;
                        iDeadlockRetry                  = 3;
                        iMaxConnections                 = 25;
                        iPoolThreadsLimit       = iMaxPhysicalMemory * 2;
                        iThreadTimeout                  = 86400;
                        iListenBackLog                  = 15;
                        iAcceptExOutstanding    = 40;

                        ReadRegistrySettings();
                        GetModuleFileName(hInst, szExePath, sizeof(szExePath));
                        GetVersionInfo(szDllPath, szExePath);
                        if ( bLog )
                                CheckDlgButton(hwnd, BN_LOG, 1);

                        wsprintf(szTmp, "Version %d.00.%3.3d", versionExeMS,
versionExeLS);
                        SetDlgItemText(hwnd, IDC_VERSION, szTmp);

                        SetDlgItemText(hwnd, IDC_PATH, szDllPath);
                        SetDlgItemInt(hwnd, ED_MAXWARE, iMaxWareHouse,
FALSE);
                        SetDlgItemInt(hwnd, ED_THREADS, iThreads, FALSE);
                        SetDlgItemInt(hwnd, ED_MAXCONNECTION,
iMaxConnections, FALSE);
                        SetDlgItemInt(hwnd, ED_IIS_MAX_THEAD_POOL_LIMIT,
iPoolThreadsLimit, FALSE);
                        SetDlgItemInt(hwnd, ED_IIS_THREAD_TIMEOUT,
iThreadTimeout, FALSE);
                        SetDlgItemInt(hwnd, ED_IIS_LISTEN_BACKLOG,
iListenBackLog, FALSE);
                        SetDlgItemInt(hwnd,
ED_WEB_SERVICE_BACKLOG_QUEUE_SIZE, iAcceptExOutstanding, FALSE);

                        return TRUE;
                case WM_PAINT:
                        if ( IsIconic(hwnd) )
                        {
                                BeginPaint(hwnd, &ps);
                                DrawIcon(ps.hdc, 0, 0, hIcon);
                                EndPaint(hwnd, &ps);
                                return TRUE;
                        }
                        break;
                case WM_COMMAND:
                        if ( wParam == IDOK )
                        {
                                if ( IsDlgButtonChecked(hwnd, BN_LOG) )
                                        bLog = TRUE;
                                else
                                        bLog = FALSE;
                                iThreads  = GetDlgItemInt(hwnd, ED_THREADS, &
FALSE);
                                iMaxWareHouse = GetDlgItemInt(hwnd,
ED_MAXWARE, &d, FALSE);
                                iMaxConnections = GetDlgItemInt(hwnd,
ED_MAXCONNECTION, &d, FALSE);
```

```
                                        iPoolThreadsLimit = GetDlgItemInt(hwnd,
ED_IIS_MAX_THEAD_POOL_LIMIT, &d, FALSE);
                                        iThreadTimeout = GetDlgItemInt(hwnd,
ED_IIS_THREAD_TIMEOUT,  &d, FALSE);
                                        iListenBackLog = GetDlgItemInt(hwnd,
ED_IIS_LISTEN_BACKLOG, &d, FALSE);
                                        iAcceptExOutstanding = GetDlgItemInt(hwnd,
ED_WEB_SERVICE_BACKLOG_QUEUE_SIZE, &d, FALSE);

                                        ShowWindow(hwnd, SW_HIDE);
                                        hDlg = CreateDialog(hInst,
MAKEINTRESOURCE(IDD_DIALOG3), hwnd, CopyDlgProc);
                                        ShowWindow(hDlg, SW_SHOWNA);
                                        UpdateDialog(hDlg);
                                        rc = CopyFiles(hDlg, szDllPath);
                                        if ( !rc )
                                        {
                                                ShowWindow(hwnd, SW_SHOWNA);
                                                DestroyWindow(hDlg);
                                                MessageBox(hwnd, "Error(s) occured when
creating tpcc.dll", NULL, MB_ICONSTOP | MB_OK);
                                                EndDialog(hwnd, 0);
                                                return TRUE;
                                        }
                                        SetDlgItemText(hDlg, IDC_STATUS, "Updating
Registry.");
                                        SendDlgItemMessage(hDlg, IDC_PROGRESS1,
PBM_STEPIT, 0, 0);
                                        UpdateDialog(hDlg);

                                        WriteRegistrySettings(szDllPath);

                                        Sleep(100);

                                        ShowWindow(hwnd, SW_SHOWNA);
                                        DestroyWindow(hDlg);

                                        EndDialog(hwnd, rc);
                                        return TRUE;
                                }
                                if ( wParam == IDCANCEL )
                                {
                                        EndDialog(hwnd, FALSE);
                                        return TRUE;
                                }
                                break;
                        default:
                                        break;
                }
                return FALSE;
}

static void ReadRegistrySettings(void)
{
        HKEY    hKey;
        DWORD   size;
        DWORD   type;
        char    szTmp[256];

        if ( RegOpenKeyEx(HKEY_LOCAL_MACHINE, "SOFTWARE\\Microsoft\\TPCC", (
KEY_READ, &hKey) == ERROR_SUCCESS )
        {
                size = sizeof(szTmp);

                bLog = FALSE;
                if ( RegQueryValueEx(hKey, "LOG", 0, &type, szTmp, &size) ==
ERROR_SUCCESS )
                        if ( !stricmp(szTmp, "ON") )
                                bLog = TRUE;
                iThreads = 4;
                size = sizeof(szTmp);
                if ( RegQueryValueEx(hKey, "NumberOfDeliveryThreads", 0, &type, szT
&size) == ERROR_SUCCESS )
                        iThreads = atoi(szTmp);
                if ( iThreads == 0 )
                        iThreads = 4;

                iMaxWareHouse = 500;
                size = sizeof(szTmp);
                if ( RegQueryValueEx(hKey, "MaximumWarehouses", 0, &type, szTmp,
&size) == ERROR_SUCCESS )
                        iMaxWareHouse = atoi(szTmp);
                if ( iMaxWareHouse == 0 )
                        iMaxWareHouse = 500;

                iDelayMs = 500;
                size = sizeof(szTmp);
                if ( RegQueryValueEx(hKey, "BackoffDelay", 0, &type, szTmp, &size) =
ERROR_SUCCESS )
                        iDelayMs = atoi(szTmp);
                if ( iDelayMs == 0 )
                        iDelayMs = 500;

                iDeadlockRetry = 3;
                size = sizeof(szTmp);
```

```
		if ( RegQueryValueEx(hKey, "DeadlockRetry", 0, &type, szTmp, &size) ==
ERROR_SUCCESS )
			iDeadlockRetry = atoi(szTmp);
			if ( !iDeadlockRetry )
				iDeadlockRetry = 3;

		iMaxConnections = 25;
		size = sizeof(szTmp);
		if ( RegQueryValueEx(hKey, "MaxConnections", 0, &type, szTmp, &size)
== ERROR_SUCCESS )
			iMaxConnections = atoi(szTmp);
			if ( !iMaxConnections )
				iMaxConnections = 25;

		iQSlotts = 3000;
		size = sizeof(szTmp);
		if ( RegQueryValueEx(hKey, "QueueSlotts", 0, &type, szTmp, &size) ==
ERROR_SUCCESS )
			iQSlotts = atoi(szTmp);
		if ( iQSlotts == 0 )
			iQSlotts = 3000;

		RegCloseKey(hKey);

		if ( RegOpenKeyEx(HKEY_LOCAL_MACHINE,
"SYSTEM\\CurrentControlSet\\Services\\Inetinfo\\Parameters", 0, KEY_READ, &hKey) ==
ERROR_SUCCESS )
		{
			iPoolThreadsLimit =  iMaxPhysicalMemory * 2;
			size = sizeof(iPoolThreadsLimit);
			if ( RegQueryValueEx(hKey, "PoolThreadsLimit", 0, &type, (char
*)&iPoolThreadsLimit, &size) == ERROR_SUCCESS )
			if ( !iPoolThreadsLimit )
				iPoolThreadsLimit =  iMaxPhysicalMemory * 2;

			iThreadTimeout = 86400;
			size = sizeof(iThreadTimeout);
			if ( RegQueryValueEx(hKey, "ThreadTimeout", 0, &type, (char
*)&iThreadTimeout, &size) == ERROR_SUCCESS )
				if ( !iThreadTimeout )
					iThreadTimeout = 86400;

			iListenBackLog = 15;
			size = sizeof(iListenBackLog);
			if ( RegQueryValueEx(hKey, "ListenBackLog", 0, &type, (char
*)&iListenBackLog, &size) == ERROR_SUCCESS )
				if ( !iListenBackLog )
					iListenBackLog = 15;
		}

		RegCloseKey(hKey);

		if ( RegOpenKeyEx(HKEY_LOCAL_MACHINE,
"SYSTEM\\CurrentControlSet\\Services\\W3SVC\\Parameters", 0, KEY_READ, &hKey) ==
ERROR_SUCCESS )
		{
			iAcceptExOutstanding = 40;
			size = sizeof(iAcceptExOutstanding);
			if ( RegQueryValueEx(hKey, "AcceptExOutstanding", 0, &type
(char *)&iAcceptExOutstanding, &size) == ERROR_SUCCESS )
				if ( !iAcceptExOutstanding )
					iAcceptExOutstanding = 40;
		}

		RegCloseKey(hKey);
	}

	return;
}

static void WriteRegistrySettings(char *szDllPath)
{
	HKEY	hKey;
	DWORD	dwDisposition;
	char	szTmp[256];
	char	*ptr;
	int		iRc;

	if ( RegCreateKeyEx(HKEY_LOCAL_MACHINE, "SOFTWARE\\Microsoft\\TPCC",
NULL, REG_OPTION_NON_VOLATILE, KEY_ALL_ACCESS, NULL, &hKey, &dwDispositio
== ERROR_SUCCESS )
	{
		strcpy(szTmp, szDllPath);
		ptr = strstr(szTmp, "tpcc");
		if ( ptr )
			*ptr = 0;

		RegSetValueEx(hKey, "PATH", 0, REG_SZ, szTmp, strlen(szTmp));

		if ( bLog )
			RegSetValueEx(hKey, "LOG", 0, REG_SZ, "ON", 2);
		else
			RegSetValueEx(hKey, "LOG", 0, REG_SZ, "OFF", 3);

		itoa(iThreads, szTmp, 10);
```

```
                RegSetValueEx(hKey, "NumberOfDeliveryThreads", 0, REG_SZ, szTmp,
strlen(szTmp));

                itoa(iMaxWareHouse, szTmp, 10);
                RegSetValueEx(hKey, "MaximumWarehouses", 0, REG_SZ, szTmp,
strlen(szTmp));

                itoa(iDelayMs, szTmp, 10);
                RegSetValueEx(hKey, "BackoffDelay", 0, REG_SZ, szTmp,
strlen(szTmp));

                itoa(iDeadlockRetry, szTmp, 10);
                RegSetValueEx(hKey, "DeadlockRetry", 0, REG_SZ, szTmp,
strlen(szTmp));

                itoa(iMaxConnections, szTmp, 10);
                RegSetValueEx(hKey, "MaxConnections", 0, REG_SZ, szTmp,
strlen(szTmp));

                itoa(iQSlotts, szTmp, 10);
                RegSetValueEx(hKey, "QueueSlotts", 0, REG_SZ, szTmp, strlen(szTmp));

                RegFlushKey(hKey);

                RegCloseKey(hKey);
        }

        if ( (iRc=RegCreateKeyEx(HKEY_LOCAL_MACHINE,
"SYSTEM\\CurrentControlSet\\Services\\Inetinfo\\Parameters", 0, NULL,
REG_OPTION_NON_VOLATILE, KEY_ALL_ACCESS, NULL, &hKey, &dwDisposition)) ==
ERROR_SUCCESS )
        {
                RegSetValueEx(hKey, "PoolThreadsLimit", 0, REG_DWORD, (char
*)&iPoolThreadsLimit, sizeof(iPoolThreadsLimit));
                RegSetValueEx(hKey, "ThreadTimeout", 0, REG_DWORD, (char
*)&iThreadTimeout, sizeof(iThreadTimeout));
                RegSetValueEx(hKey, "ListenBackLog", 0, REG_DWORD, (char
*)&iListenBackLog, sizeof(iListenBackLog));

                RegFlushKey(hKey);
                RegCloseKey(hKey);
        }

        if ( (iRc=RegCreateKeyEx(HKEY_LOCAL_MACHINE,
"SYSTEM\\CurrentControlSet\\Services\\W3SVC\\Parameters", 0, NULL,
REG_OPTION_NON_VOLATILE, KEY_ALL_ACCESS, NULL, &hKey, &dwDisposition)) ==
ERROR_SUCCESS )
        {
                RegSetValueEx(hKey, "AcceptExOutstanding", 0, REG_DWORD, (char
*)&iAcceptExOutstanding, sizeof(iAcceptExOutstanding));

                RegFlushKey(hKey);
                RegCloseKey(hKey);
        }

        return;
}

BOOL CALLBACK CopyDlgProc(HWND hwnd, UINT uMsg, WPARAM wParam, LPARAM
lParam)
{
        if ( uMsg == WM_INITDIALOG )
        {
                SendDlgItemMessage(hwnd, IDC_PROGRESS1, PBM_SETRANGE, 0,
MAKELPARAM(0, 8));
                SendDlgItemMessage(hwnd, IDC_PROGRESS1, PBM_SETSTEP,
(WPARAM)1, 0);
                return TRUE;
        }
        return FALSE;
}

static int CopyFiles(HWND hDlg, char *szDllPath)
{
        HGLOBAL                 hDLL;
        HGLOBAL                 hExe;
        HRSRC                   hResInfo;
        BYTE                    *pSrc;
        HANDLE                  hFile;
        DWORD                   dwSize;
        DWORD                   d;
        char                    szTmp[256];
        char                    *ptr;
        BOOL                    bSvcRunning;

        SetDlgItemText(hDlg, IDC_STATUS, "Stopping Web Service.");
        SendDlgItemMessage(hDlg, IDC_PROGRESS1, PBM_STEPIT, 0, 0);
        UpdateDialog(hDlg);

        bSvcRunning = !StopWWWebService();
        SendDlgItemMessage(hDlg, IDC_PROGRESS1, PBM_STEPIT, 0, 0);
        UpdateDialog(hDlg);

        hResInfo = FindResource(hInst, MAKEINTRESOURCE(IDR_TPCCDLL1),
"TPCCDLL");
        SetDlgItemText(hDlg, IDC_STATUS, "Copying Files...");
```

```
	SendDlgItemMessage(hDlg, IDC_PROGRESS1, PBM_STEPIT, 0, 0);
	UpdateDialog(hDlg);

	dwSize = SizeofResource(hInst, hResInfo);
	hDLL = LoadResource(hInst, hResInfo );
	pSrc = (BYTE *)LockResource(hDLL);
	remove(szDllPath);

	if ( !(hFile = CreateFile(szDllPath, GENERIC_WRITE, 0, NULL, CREATE_ALWAYS,
FILE_ATTRIBUTE_NORMAL, NULL)) )
		return 0;

	if ( !WriteFile(hFile, pSrc, dwSize, &d, NULL) )
		return 0;

	CloseHandle(hFile);

	UnlockResource(hDLL);
	FreeResource(hDLL);

	SendDlgItemMessage(hDlg, IDC_PROGRESS1, PBM_STEPIT, 0, 0);
	UpdateDialog(hDlg);

	hResInfo = FindResource(hInst, MAKEINTRESOURCE(IDR_DELIVERY1),
"DELIVERY");

	dwSize = SizeofResource(hInst, hResInfo);
	hExe = LoadResource(hInst, hResInfo );
	pSrc = (BYTE *)LockResource(hExe);

	strcpy(szTmp, szDllPath);
	ptr = strstr(szTmp, "tpcc");
	if ( ptr )
		*ptr = 0;
	strcat(szTmp, "delisrv.exe");

	remove(szTmp);

	if ( !(hFile = CreateFile(szTmp, GENERIC_WRITE, 0, NULL, CREATE_ALWAYS,
FILE_ATTRIBUTE_NORMAL, NULL)) )
		return 0;

	if ( !WriteFile(hFile, pSrc, dwSize, &d, NULL) )
		return 0;

	CloseHandle(hFile);

	UnlockResource(hExe);
	FreeResource(hExe);

	SendDlgItemMessage(hDlg, IDC_PROGRESS1, PBM_STEPIT, 0, 0);
	UpdateDialog(hDlg);

	//if we stopped service restart it.
	if ( !bSvcRunning )
	{
		SetDlgItemText(hDlg, IDC_STATUS, "Starting Web Service.");
		SendDlgItemMessage(hDlg, IDC_PROGRESS1, PBM_STEPIT, 0, 0);
		UpdateDialog(hDlg);
		StartWWWebService();
	}

	SendDlgItemMessage(hDlg, IDC_PROGRESS1, PBM_STEPIT, 0, 0);
	UpdateDialog(hDlg);

	return 1;
}

static BOOL GetInstallPath(char *szDllPath)
{
   HKEY	hKey;
	BYTE	szTmp[256];
	char	szKey[256];
	DWORD	size;
	DWORD	sv;
	BOOL	bRc;
	int		len;
	char	*ptr;

	szDllPath[0] =  0;
	bRc = TRUE;
	if ( RegOpenKeyEx(HKEY_LOCAL_MACHINE,
"SYSTEM\\CurrentControlSet\\Services\\W3SVC\\Parameters\\Virtual Roots", 0,
KEY_ALL_ACCESS, &hKey) == ERROR_SUCCESS )
	{
		sv = sizeof(szKey);
		size = sizeof(szTmp);

		if ( RegEnumValue(hKey, 0, szKey, &sv, NULL, NULL, szTmp, &size) =
ERROR_SUCCESS )
		{
			strcpy(szDllPath, szTmp);
			bRc = FALSE;
		}
		RegCloseKey(hKey);
	}
```

```
	if ( (ptr = strchr(szDllPath, ',')) )
		*ptr = 0;

	len = strlen(szDllPath);
	if ( szDllPath[len-1] != '\\' )
	{
		szDllPath[len] = '\\';
		szDllPath[len+1] = 0;
	}
	strcat(szDllPath, "tpcc.dll");

	return bRc;
}

static void GetVersionInfo(char *szDLLPath, char *szExePath)
{
	DWORD				d;
	DWORD				dwSize;
	DWORD				dwBytes;
	char				*ptr;
	VS_FIXEDFILEINFO		*vs;

	versionDllMS = 0;
	versionDllLS = 0;
	if ( _access(szDLLPath, 00) == 0 )
	{
		dwSize = GetFileVersionInfoSize(szDLLPath, &d);
		if ( dwSize )
		{
			ptr = (char *)malloc(dwSize);
			GetFileVersionInfo(szDLLPath, 0, dwSize, ptr);
			VerQueryValue(ptr, "\\",&vs, &dwBytes);
			versionDllMS = vs->dwProductVersionMS;
			versionDllLS = vs->dwProductVersionLS;
			free(ptr);
		}
	}

	versionExeMS = 0x7FFF;
	versionExeLS = 0x7FFF;
	dwSize = GetFileVersionInfoSize(szExePath, &d);
	if ( dwSize )
	{
		ptr = (char *)malloc(dwSize);
		GetFileVersionInfo(szExePath, 0, dwSize, ptr);
		VerQueryValue(ptr, "\\",&vs, &dwBytes);

		versionExeMS = vs->dwProductVersionMS;
		versionExeLS = vs->dwProductVersionLS;
		free(ptr);
	}
	return;
}

static BOOL StartWWWebService(void)
{
	SC_HANDLE		schSCManager;
	SC_HANDLE		schService;
	SERVICE_STATUS	ssStatus;
	DWORD			dwOldCheckPoint;

	schSCManager = OpenSCManager(NULL, NULL, SC_MANAGER_ALL_ACCESS
	schService = OpenService(schSCManager, TEXT("W3SVC"),
SERVICE_ALL_ACCESS);
	if (schService == NULL)
		return FALSE;

	if (! StartService(schService, 0,NULL) )
		goto StartWWWebErr;
	//start Service pending, Check the status until the service is running.
	if (! QueryServiceStatus(schService, &ssStatus) )
		goto StartWWWebErr;
	while( ssStatus.dwCurrentState != SERVICE_RUNNING)
	{

		dwOldCheckPoint = ssStatus.dwCheckPoint;
	//Save the current checkpoint.
		Sleep(ssStatus.dwWaitHint);
		//Wait for the specified interval.
		if ( !QueryServiceStatus(schService, &ssStatus) )	//Check the status
again.
			break;
		if (dwOldCheckPoint >= ssStatus.dwCheckPoint)		//Break if
the checkpoint has not been incremented.
			break;
	}

	if (ssStatus.dwCurrentState == SERVICE_RUNNING)
		goto StartWWWebErr;

	CloseServiceHandle(schService);
	return TRUE;

StartWWWebErr:
	CloseServiceHandle(schService);
	return FALSE;
```

```
}

static BOOL StopWWWebService(void)
{
	SC_HANDLE		schSCManager;
	SC_HANDLE		schService;
	SERVICE_STATUS ssStatus;
	DWORD			dwOldCheckPoint;

	schSCManager = OpenSCManager(NULL, NULL, SC_MANAGER_ALL_ACCESS);
	schService = OpenService(schSCManager, TEXT("W3SVC"),
SERVICE_ALL_ACCESS);
	if (schService == NULL)
		return FALSE;

	if (! QueryServiceStatus(schService, &ssStatus) )
		goto StopWWWebErr;

	if ( !ControlService(schService, SERVICE_CONTROL_STOP, &ssStatus) )
		goto StopWWWebErr;
	//start Service pending, Check the status until the service is running.
	if (! QueryServiceStatus(schService, &ssStatus) )
		goto StopWWWebErr;
	while( ssStatus.dwCurrentState == SERVICE_RUNNING)
	{

		dwOldCheckPoint = ssStatus.dwCheckPoint;
	//Save the current checkpoint.
		Sleep(ssStatus.dwWaitHint);
		//Wait for the specified interval.
		if ( !QueryServiceStatus(schService, &ssStatus) )	//Check the status
again.
			break;
		if (dwOldCheckPoint >= ssStatus.dwCheckPoint)		//Break if
the checkpoint has not been incremented.
			break;
	}

	if (ssStatus.dwCurrentState == SERVICE_RUNNING)
		goto StopWWWebErr;

	CloseServiceHandle(schService);
	return TRUE;

StopWWWebErr:
	CloseServiceHandle(schService);
	return FALSE;
}
```

```
static void UpdateDialog(HWND hDlg)
{
	MSG msg;

	UpdateWindow(hDlg);
	while( PeekMessage(&msg, hDlg, 0, 0, PM_REMOVE) )
	{
		TranslateMessage(&msg);
		DispatchMessage(&msg);
	}
	Sleep(250);
	return;
}
```

A.5 install.h

```
//{{NO_DEPENDENCIES}}
// Microsoft Developer Studio generated include file.
// Used by install.rc
//
#define IDD_DIALOG1			101
#define IDI_ICON1			102
#define IDR_TPCCDLL1			103
#define IDD_DIALOG2			104
#define IDI_ICON2			105
#define IDR_DELIVERY1			109
#define IDD_DIALOG3			110
#define BN_LOG				1001
#define ED_KEEP				1002
#define ED_THREADS			1003
#define ED_THREADS2			1004
#define ED_MAXWARE			1006
#define IDC_PATH			1007
#define IDC_VERSION			1009
#define IDC_RESULTS			1010
#define IDC_PROGRESS1			1011
#define IDC_STATUS			1012
#define IDC_BUTTON1			1013
#define ED_MAXCONNECTION		1014
#define ED_IIS_MAX_THEAD_POOL_LIMIT	1015
#define ED_WEB_SERVICE_BACKLOG_QUEUE_SIZE	1017
#define ED_IIS_THREAD_TIMEOUT		1018
#define ED_IIS_LISTEN_BACKLOG		1019

// Next default values for new objects
//
```

```
#ifdef APSTUDIO_INVOKED
#ifndef APSTUDIO_READONLY_SYMBOLS
#define _APS_NEXT_RESOURCE_VALUE        111
#define _APS_NEXT_COMMAND_VALUE         40001
#define _APS_NEXT_CONTROL_VALUE         1015
#define _APS_NEXT_SYMED_VALUE           101
#endif
#endif
```

A.6 install.rc

```
//Microsoft Developer Studio generated resource script.
//
#include "install.h"

#define APSTUDIO_READONLY_SYMBOLS
//////////////////////////////////////////////////////////////////////////////
//
// Generated from the TEXTINCLUDE 2 resource.
//
#include "afxres.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

//////////////////////////////////////////////////////////////////////////////
//
// Dialog
//

IDD_DIALOG1 DIALOGEX 0, 0, 234, 174
STYLE DS_MODALFRAME | DS_CENTER | WS_MINIMIZEBOX | WS_POPUP |
WS_CAPTION |
    WS_SYSMENU
CAPTION "TPCC Web Client Installation Utility"
FONT 8, "MS Sans Serif"
BEGIN
    EDITTEXT        ED_MAXWARE,199,37,21,12,ES_NUMBER,WS_EX_RTLREADING
    CONTROL         "",BN_LOG,"Button",BS_AUTOCHECKBOX | BS_LEFTTEXT |
                    BS_LEFT | BS_VCENTER | WS_TABSTOP,205,51,15,13,
                    WS_EX_STATICEDGE
    EDITTEXT        ED_THREADS,205,66,15,12,ES_NUMBER,WS_EX_RTLREADING
    EDITTEXT
ED_MAXCONNECTION,186,80,34,12,ES_NUMBER,WS_EX_RTLREADING
    EDITTEXT        ED_IIS_MAX_THEAD_POOL_LIMIT,186,94,34,12,ES_NUMBER,
                    WS_EX_RTLREADING
    EDITTEXT        ED_WEB_SERVICE_BACKLOG_QUEUE_SIZE,186,108,34,12,
                    ES_NUMBER,WS_EX_RTLREADING
    EDITTEXT        ED_IIS_THREAD_TIMEOUT,186,122,34,12,ES_NUMBER,
                    WS_EX_RTLREADING
    EDITTEXT        ED_IIS_LISTEN_BACKLOG,186,136,34,12,ES_NUMBER,
                    WS_EX_RTLREADING
    DEFPUSHBUTTON   "OK",IDOK,59,153,50,14
    PUSHBUTTON      "Cancel",IDCANCEL,125,153,50,14
    EDITTEXT        IDC_PATH,42,22,178,13,ES_AUTOHSCROLL | ES_READONLY
    LTEXT           "Max Number of Warehouses:",IDC_STATIC,42,37,115,12,
                    SS_SUNKEN
    LTEXT           "Write HTML To Log file:",IDC_STATIC,42,51,115,12,
                    SS_SUNKEN
    LTEXT           "Number of Delivery Threads:",IDC_STATIC,42,66,115,12,
                    SS_SUNKEN
    LTEXT           "Max Number of Connections:",IDC_STATIC,41,80,115,12,
                    SS_SUNKEN
    CTEXT           "Version 1.00.001",IDC_VERSION,42,6,178,14,SS_SUNKEN |
                    WS_BORDER,WS_EX_CLIENTEDGE
    ICON            IDI_ICON1,IDC_STATIC,9,6,21,20,0,WS_EX_CLIENTEDGE
    LTEXT           "IIS Max Thread Pool Limit:",IDC_STATIC,41,94,115,12,
                    SS_SUNKEN
    LTEXT           "Web Service Backlog Queue Size:",IDC_STATIC,41,108,115,
                    12,SS_SUNKEN
    LTEXT           "IIS Thread Timeout:",IDC_STATIC,41,122,115,12,SS_SUNKEN
    LTEXT           "IIS Listen Backlog:",IDC_STATIC,41,136,115,12,SS_SUNKEN
END

IDD_DIALOG2 DIALOGEX 0, 0, 117, 62
STYLE DS_SETFOREGROUND | DS_3DLOOK | DS_CENTER | WS_POPUP |
WS_BORDER
EXSTYLE WS_EX_STATICEDGE
FONT 12, "MS Sans Serif", 0, 0, 0x1
BEGIN
    DEFPUSHBUTTON   "OK",IDOK,33,45,50,9
    CTEXT           "HTML TPCC Installation Successfull",IDC_RESULTS,7,22,
                    102,18,0,WS_EX_CLIENTEDGE
    ICON            IDI_ICON2,IDC_STATIC,50,7,18,20,SS_REALSIZEIMAGE,
                    WS_EX_TRANSPARENT
END
```

```
IDD_DIALOG3 DIALOG DISCARDABLE  0, 0, 91, 40
STYLE DS_SYSMODAL | DS_MODALFRAME | DS_3DLOOK | DS_CENTER |
WS_CAPTION
CAPTION "Installing TPCC Web Service"
FONT 12, "Arial Black"
BEGIN
    CONTROL         "Progress1",IDC_PROGRESS1,"msctls_progress32",WS_BORDER,
                    7,20,77,13
    CTEXT           "Static",IDC_STATUS,7,7,77,12,SS_SUNKEN
END


/////////////////////////////////////////////////////////////////////////////
//
// DESIGNINFO
//

#ifdef APSTUDIO_INVOKED
GUIDELINES DESIGNINFO DISCARDABLE
BEGIN
    IDD_DIALOG1, DIALOG
    BEGIN
        LEFTMARGIN, 9
        RIGHTMARGIN, 220
        TOPMARGIN, 6
        BOTTOMMARGIN, 167
    END

    IDD_DIALOG2, DIALOG
    BEGIN
        LEFTMARGIN, 7
        RIGHTMARGIN, 109
        TOPMARGIN, 7
        BOTTOMMARGIN, 54
    END

    IDD_DIALOG3, DIALOG
    BEGIN
        LEFTMARGIN, 7
        RIGHTMARGIN, 84
        TOPMARGIN, 7
        BOTTOMMARGIN, 33
    END
END
#endif    // APSTUDIO_INVOKED
```

```
#ifdef APSTUDIO_INVOKED
/////////////////////////////////////////////////////////////////////////////
//
// TEXTINCLUDE
//

1 TEXTINCLUDE DISCARDABLE
BEGIN
    "resource.h\0"
END

2 TEXTINCLUDE DISCARDABLE
BEGIN
    "#include ""afxres.h""\r\n"
    "\0"
END

3 TEXTINCLUDE DISCARDABLE
BEGIN
    "\r\n"
    "\0"
END

#endif    // APSTUDIO_INVOKED


/////////////////////////////////////////////////////////////////////////////
//
// Icon
//

// Icon with lowest ID value placed first to ensure application icon
// remains consistent on all systems.
IDI_ICON1               ICON    DISCARDABLE     "icon1.ico"
IDI_ICON2               ICON    DISCARDABLE     "icon2.ico"

/////////////////////////////////////////////////////////////////////////////
//
// TPCCDLL
//

IDR_TPCCDLL1            TPCCDLL DISCARDABLE     "tpcc.dll"

#ifndef _MAC
/////////////////////////////////////////////////////////////////////////////
//
// Version
//
```

```
VS_VERSION_INFO VERSIONINFO
 FILEVERSION 0,3,0,2
 PRODUCTVERSION 0,3,0,2
 FILEFLAGSMASK 0x3fL
#ifdef _DEBUG
 FILEFLAGS 0x1L
#else
 FILEFLAGS 0x0L
#endif
 FILEOS 0x40004L
 FILETYPE 0x1L
 FILESUBTYPE 0x0L
BEGIN
    BLOCK "StringFileInfo"
    BEGIN
        BLOCK "040904b0"
        BEGIN
            VALUE "CompanyName", "Microsoft\0"
            VALUE "FileDescription", "install\0"
            VALUE "FileVersion", "0, 3, 0, 2\0"
            VALUE "InternalName", "install\0"
            VALUE "LegalCopyright", "Copyright © 1996\0"
            VALUE "OriginalFilename", "install.exe\0"
            VALUE "ProductName", "Microsoft install\0"
            VALUE "ProductVersion", "0, 3, 0, 2\0"
        END
    END
    BLOCK "VarFileInfo"
    BEGIN
        VALUE "Translation", 0x409, 1200
    END
END

#endif    // !_MAC


/////////////////////////////////////////////////////////////////////////////
//
// DELIVERY
//

IDR_DELIVERY1           DELIVERY DISCARDABLE    "delisrv.exe"
#endif    // English (U.S.) resources
/////////////////////////////////////////////////////////////////////////////
```

```
#ifndef APSTUDIO_INVOKED
/////////////////////////////////////////////////////////////////////////////
//
// Generated from the TEXTINCLUDE 3 resource.
//


/////////////////////////////////////////////////////////////////////////////
#endif    // not APSTUDIO_INVOKED
```

A.7 resource.H

```
//{{NO_DEPENDENCIES}}
// Microsoft Developer Studio generated include file.
// Used by TPCC.rc
//

// Next default values for new objects
//
#ifdef APSTUDIO_INVOKED
#ifndef APSTUDIO_READONLY_SYMBOLS
#define _APS_NEXT_RESOURCE_VALUE        101
#define _APS_NEXT_COMMAND_VALUE         40001
#define _APS_NEXT_CONTROL_VALUE         1000
#define _APS_NEXT_SYMED_VALUE           101
#endif
#endif
```

A.8 makefile

```
!IF "$(CFG)" == ""
CFG=Release
!MESSAGE No configuration specified.  Defaulting to Debug
!ENDIF

!IF "$(SQL_LOC)" == ""
SQL_LOC=D:\mssql\dblib
!MESSAGE No SQL_LOC specified.  Defaulting to D:\MSSQL\DBLIB
!ENDIF

!IF "$(TUXDIR)" == ""
TUXDIR   = E:\TUXEDO
!MESSAGE No TUXDIR specified.  Defaulting to E:\TUXEDO
!ENDIF
```

```
!IF "$(CFG)" != "Release" && "$(CFG)" != "Debug"
!MESSAGE Invalid configuration "$(CFG)" specified.
!MESSAGE You can specify a configuration when running NMAKE on this makefile
!MESSAGE by defining the macro CFG on the command line.  For example:
!MESSAGE
!MESSAGE NMAKE CFG="Debug"
!MESSAGE
!MESSAGE Possible choices for configuration are:
!MESSAGE
!MESSAGE "Release"
!MESSAGE "Debug"
!MESSAGE
!ERROR An invalid configuration is specified.
!ENDIF

OUTDIR          = .
SRCDIR          = .\Src
OBJDIR          = .\Objs
OUTDIR          = .\Bin
DBLIB           = $(SQL_LOC)
DBLIBINC        = $(DBLIB)\include
DBLIBDIR        = $(DBLIB)\lib

!IF "$(CFG)" != "Debug"
LDEBUG      =
CDEBUG      =
LDEBUG_RG    =
CDEBUG_RG    =
DEBUG       =
FLAGS       = /D "WIN32" /D "_WINDOWS" /D "_TMSTHREADS"
#FLAGS       = /D "WIN32" /D "_WINDOWS" /D "_TMSTHREADS" /D "LOCAL_ALLOC"
CFLAGS      = /D "WIN32" /D "_WINDOWS" /D "_TMSTHREADS"
OPT         = /Ot
!ELSE
LDEBUG      = /debug /pdb:$(OBJDIR)\tpcc.pdb
CDEBUG      = /Zi /Yd /Fd$(OBJDIR)\tpcc.pdb
LDEBUG_RG    = /debug /pdb:$(OBJDIR)\install.pdb
CDEBUG_RG    = /Zi /Yd /Fd$(OBJDIR)\install.pdb
FLAGS       = /D "WIN32" /D "_WINDOWS" /D "_TMSTHREADS"
#FLAGS       = /D "WIN32" /D "_WINDOWS" /D "_TMSTHREADS" /D "LOCAL_ALLOC"
CFLAGS      = /D "WIN32" /D "_WINDOWS" /D "_TMSTHREADS"
OPT         = /Od
!ENDIF


LINK32_LIBS     = user32.lib msacm32.lib advapi32.lib $(DBLIBDIR)\ntwdblib.lib
TUX_LIBS                = $(TUXDIR)\lib\libtux.lib $(TUXDIR)\lib\libbuft.lib $(TUXDIR)\lib\libtux2.l
\
$(TUXDIR)\lib\libfml.lib $(TUXDIR)\lib\libfml32.lib $(TUXDIR)\lib\libgp.lib
OTHER_LIBS          = wsock32.lib kernel32.lib gdi32.lib comdlg32.lib winspool.lib
LINK32_OBJS     = "$(OBJDIR)\tpcc.obj" "$(OBJDIR)\tpcc.res"
LINK32_DEF      = "$(SRCDIR)\tpcc.def"
LINK32_FLAGS    = /nologo /subsystem:windows /dll /incremental:no $(LDEBUG)
/def:"$(LINK32_DEF)" /out:"$(OUTDIR)\tpcc.dll"

LINK32_LIBS_RG  = user32.lib gdi32.lib advapi32.lib version.lib comctl32.lib
LINK32_OBJS_RG  = "$(OBJDIR)\install.obj" "$(OBJDIR)\install.res"
LINK32_FLAGS_RG = /nologo /subsystem:windows /incremental:no $(LDEBUG_RG)
/out:$(OUTDIR)\install.exe

ALL:    $(OBJDIR)\. $(OUTDIR)\. $(OUTDIR)\tpcc.dll $(OUTDIR)\Neworder.exe
$(OUTDIR)\Payment.exe \
        $(OUTDIR)\Stocklevel.exe $(OUTDIR)\Orderstatus.exe $(OUTDIR)\Delivery.exe
$(OUTDIR)\Delirpt.exe

$(OBJDIR)\.:
        if not exist $(OBJDIR) md $(OBJDIR)

$(OUTDIR)\.:
        if not exist $(OUTDIR) md $(OUTDIR)

"$(OBJDIR)\tpcc.obj":   "$(SRCDIR)\tpcc.c" "$(SRCDIR)\tpcc.h"
        cl.exe /nologo /MT /W3 $(CDEBUG) $(OPT) /I $(DBLIBINC) /I $(TUXDIR)\include
$(FLAGS) /Fo$(OBJDIR)\tpcc.obj /c "$(SRCDIR)\tpcc.c"

$(OBJDIR)\tpcc.res:     $(SRCDIR)\tpcc.rc
        rc.exe /l 0x409 /fo $(OBJDIR)\tpcc.res $(FLAGS) $(SRCDIR)\tpcc.rc

$(OUTDIR)\tpcc.dll:     $(LINK32_OBJS) $(LINK32_DEF)
        link.exe   $(LINK32_FLAGS) $(LINK32_OBJS) $(LINK32_LIBS) $(TUX_LIBS)
$(OTHER_LIBS)

$(OUTDIR)\Neworder.exe: $(SRCDIR)\neworder.c
        $(TUXDIR)\bin\buildserver /f $(SRCDIR)\neworder.c /o $(OUTDIR)\Neworder.exe
/s NEWORDER /l "$(LINK32_LIBS) /l $(DBLIBINC)"
        del neworder.obj

$(OUTDIR)\Payment.exe: $(SRCDIR)\payment.c
        $(TUXDIR)\bin\buildserver /f $(SRCDIR)\payment.c /o $(OUTDIR)\Payment.exe \
/s PAYMENT /l "$(LINK32_LIBS) /l $(DBLIBINC)"
        del payment.obj

$(OUTDIR)\Orderstatus.exe: $(SRCDIR)\orderstatus.c
```

```
	$(TUXDIR)\bin\buildserver /f $(SRCDIR)\orderstatus.c /o $(OUTDIR)\Orderstatus.exe
\
/s ORDERSTATUS /l "$(LINK32_LIBS) /l  $(DBLIBINC)"
	del orderstatus.obj

$(OUTDIR)\Stocklevel.exe: $(SRCDIR)\stocklevel.c
	$(TUXDIR)\bin\buildserver /f $(SRCDIR)\stocklevel.c /o $(OUTDIR)\Stocklevel.exe \
/s STOCKLEVEL /l "$(LINK32_LIBS) /l $(DBLIBINC)"
	del stocklevel.obj

$(OUTDIR)\Delivery.exe: $(SRCDIR)\delivery.c
	$(TUXDIR)\bin\buildserver /f $(SRCDIR)\delivery.c /o $(OUTDIR)\Delivery.exe \
/s DELIVERY /l "$(LINK32_LIBS) /l  $(DBLIBINC)"
	del delivery.obj

$(OUTDIR)\Delirpt.exe: $(SRCDIR)\delirpt.c
	cl.exe $(SRCDIR)\delirpt.c /o "$(OUTDIR)\Delirpt.exe"
	del delirpt.obj
```

A.9 neworder.c

```
/*	FILE:		NEWORDER.C
 *
 *	Based on:Microsoft TPC-C Kit Ver. 3.00.000
 *
 *				Copyright Microsoft, 1996
 *				Copyright Performance Tuning Corporation, 1997
 *
 *	PURPOSE:	New Order Tuxedo Server.
 *	Author:		Philip Durr
 *				philipdu@Microsoft.com
 *
 *  MODIFIED	Changed for modularity and to allow for the Tuxedo TM
 *
 *  Author:		Edward Whalen
 *				Performance Tuning Corporation
 *				ewhalen@perftuning.com
 */

#include <windows.h>
#include <process.h>
#include <stdio.h>
#include <stdarg.h>
#include <malloc.h>
#include <stdlib.h>
#include <string.h>
#include <time.h>
#include <sys\timeb.h>
#include <io.h>

#define DBNTWIN32
#include <sqlfront.h>
#include <sqldb.h>

#include "trans.h"				//tpckit transaction
header contains definations of structures specific to TPC-C
#include "httpext.h"			//ISAPI DLL information heade

#include "tpcc.h"				//this dlls specific
structure, value e.t. header.

#include <tmenv.h>
#include <xa.h>
#include <atmi.h>

BOOL	bLog			= FALSE;
BOOL	bFlush;					//Flush
delivery log info when written.
BOOL	verbose			= FALSE;
BOOL	bError			= FALSE;

int		iThreads		= 5;
int		iMaxWareHouses	= 500;
int		iDelayMs		= 100;
short	iMaxConnections = (short)1;
short	iDeadlockRetry	= (short)3;

DBPROCESS *pdbproc;

static char			szServer[32];
	//SQL server name
static char			szDatabase[32];
	//tpcc database name
static char			szUser[32];
	//user name
static char			szPassword[32];
	//user password
int spId;

#ifdef LOCAL_ALLOC
NEW_ORDER_DATA		NewOrderData;
#else
TUX_DATA TuxData;
#endif
TERM Term;
```

```
static charszTpccLogPath[256];          //path to html log file if logging turned on in registry.
static char szErrorLogPath[256];        //path to error log file.

static      CRITICAL_SECTION                    CriticalSection;
static      CRITICAL_SECTION                    ErrorLogCriticalSection;
static      EXTENSION_CONTROL_BLOCK     *gpECB = NULL;
static      int                                                 bTpccExit;
            //exit delivery disconnect loop as dll exiting.

extern void TMLog();
extern BOOL SQLInit();
extern void UtilStrCpy();
extern void UtilStrCpy();
extern BOOL SQLOpenConnection();
extern BOOL SQLCloseConnection();
extern BOOL SQLDetectDeadlock();

/* FUNCTION: tpsvrinit ( int argc, char *argv[])
 *
 * PURPOSE:         Initialize the Server to Database connection.
 *
 * RETURNS:                 int         0           Success
 *                                                  -1          Failure
 *
 *
 * COMMENTS:        None
 *
 */

int tpsvrinit ( int argc, char *argv[] )
{

            if ( GetParameters(argc, argv) )
            {
                        PrintParameters();
                        return -1;
            }

            if ( verbose )
                        TMLog("TPSVRINIT: NewOrder: Server %s, Database %s, User %s,
Password %s, Flush %d.",
                                    szServer, szDatabase, szUser, szPassword, bFlush);


            if ( ! SQLInit() )
            {
                        TMLog( "NEWORDER: SQLInit Failed" );
                        return -1;
            }

            if ( SQLOpenConnection ( NULL, 0, 0, &pdbproc, szServer, szDatabase, szUser,
szPassword, szDatabase, &spId))
            {
                        TMLog ( "NEWORDER: SQLOpenConnection Failed" );
                        dbexit();
                        return -1;
            }
            return 0;
}

/* FUNCTION: tpsvrdone ( void )
 *
 * PURPOSE:         Initialize the Server to Database connection.
 *
 * RETURNS:                 int         0           Success
 *                                                  -1          Failure
 *
 *
 * COMMENTS:        None
 *
 */

void tpsvrdone ( void )
{
            SQLCloseConnection( NULL, pdbproc);
            dbexit();
}

/* FUNCTION: NEWORDER ( TPSVCINFO *rqst )
 *
 * PURPOSE:         Process a New Order request.
 *
 * RETURNS:                 int         0           Success
 *                                                  -1          Failure
 *
 *
 * COMMENTS:        None
 *
 */

void NEWORDER ( TPSVCINFO *rqst )
{
            PECBINFO pECBInfo = dbgetuserdata(pdbproc);
            int size = rqst->len;

#ifdef LOCAL_ALLOC
```

```
        memcpy(&NewOrderData, rqst->data, size);

        if (verbose )
        {
                TMLog(" NEWORDER: w_id %d ", NewOrderData.w_id);
                TMLog(" NEWORDER: d_id %d ", NewOrderData.d_id);
                TMLog(" NEWORDER: c_id %d ", NewOrderData.c_id);
        }

        bError = FALSE;

        NewOrderData.retval = SQLNewOrder( NULL, 0, 0, pdbproc, &NewOrderData,
iDeadlockRetry);

        if (bError == TRUE)
                NewOrderData.retval = -1;

        if (verbose )
                TMLog(" NEWORDER: Return Value %d", NewOrderData.retval);

        memcpy( rqst->data, &NewOrderData, size);
#else
        memcpy(&TuxData, rqst->data, size);

        if (verbose )
        {
                TMLog(" NEWORDER: w_id %d ", TuxData.NewOrderData.w_id);
                TMLog(" NEWORDER: d_id %d ", TuxData.NewOrderData.d_id);
                TMLog(" NEWORDER: c_id %d ", TuxData.NewOrderData.c_id);
        }

        bError = FALSE;

        TuxData.NewOrderData.retval = SQLNewOrder( NULL, 0, 0, pdbproc,
&TuxData.NewOrderData, iDeadlockRetry);

        if (bError == TRUE)
                TuxData.NewOrderData.retval = -1;

        if (verbose )
                TMLog(" NEWORDER: Return Value %d", TuxDataNewOrderData.retval);

        memcpy( rqst->data, &TuxData.NewOrderData, size);
#endif
        tpreturn( TPSUCCESS, 0, rqst->data, size, 0);
}
```

```
/* FUNCTION: int SQLNewOrder(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int
iSyncId, int iTermId, int iSyncId, DBPROCESS *dbproc, NEW_ORDER_DATA  *pNewOrder
short deadlock_retry)
 *
 * PURPOSE:        This function handles the new order transaction.
 *
 * ARGUMENTS:    EXTENSION_CONTROL_BLOCK         *pECB
        passed in structure pointer from inetsrv.
 *                                      int
        iTermId                         terminal id of browser
 *                                      int
        iSyncId                         sync id of browser
 *                                      DBPROCESS
        *dbproc                         connection db process id
 *                                      NEW_ORDER_DATA
        *pNewOrder                      pointer to new order structure for input/output data
 *                                      short
        deadlock_retry      retry count if deadlocked
 *
 * RETURNS:                     int        TRUE     transaction committed
 *                                                  FALSE    item number not valid
 *                                                  -1                deadlock max retry
reached
 *
 *
 * COMMENTS:      None
 *
 */

static int SQLNewOrder(EXTENSION_CONTROL_BLOCK    *pECB, int iTermId, int iSyncId
DBPROCESS *dbproc, NEW_ORDER_DATA  *pNewOrder, short deadlock_retry)
{
        RETCODE                         rc;
        int                             i;
        DBINT                   commit_flag;
        int                             tryit;
        char                    printbuf[25];
        char                    tmpbuf[30];
        DBDATETIME              datetime;
        BYTE                    *pData;
        PECBINFO                pEcbInfo;

        if ( (pEcbInfo = (PECBINFO)dbgetuserdata(dbproc)))
        {
                pEcbInfo->pECB = pECB;
                pEcbInfo->bFailed = FALSE;
                pEcbInfo->iTermId = iTermId;
                pEcbInfo->iSyncId = iSyncId;
```

```
	}

	pNewOrder->num_deadlocks = 0;

	strcpy(tmpbuf, "tpcc_neworder");

	for (tryit=0; tryit < deadlock_retry; tryit++)
	{
		if (dbrpcinit(dbproc, tmpbuf, 0) == SUCCEED)
		{
			dbrpcparam(dbproc, NULL, 0, SQLINT2, -1, -1, (BYTE *)
&pNewOrder->w_id);
			dbrpcparam(dbproc, NULL, 0, SQLINT1, -1, -1, (BYTE *)
&pNewOrder->d_id);
			dbrpcparam(dbproc, NULL, 0, SQLINT4, -1, -1, (BYTE *)
&pNewOrder->c_id);
			dbrpcparam(dbproc, NULL, 0, SQLINT1, -1, -1, (BYTE *)
&pNewOrder->o_ol_cnt);
//			dbrpcparam(dbproc, NULL, 0, SQLINT1, -1, -1, (BYTE *)
&pNewOrder->o_all_local);

			pNewOrder->o_all_local = 1;
			for (i = 0; i < pNewOrder->o_ol_cnt; i++)
			{
				if ( pNewOrder->o_all_local && pNewOrder-
>Ol[i].ol_supply_w_id != pNewOrder->w_id )
					pNewOrder->o_all_local = 0;
			}
			dbrpcparam(dbproc, NULL, 0, SQLINT1, -1, -1, (BYTE *)
&pNewOrder->o_all_local);

			for (i = 0; i < pNewOrder->o_ol_cnt; i++)
			{
				dbrpcparam(dbproc, NULL, 0, SQLINT4, -1, -1,
(BYTE *) &pNewOrder->Ol[i].ol_i_id);
				dbrpcparam(dbproc, NULL, 0, SQLINT2, -1, -1,
(BYTE *) &pNewOrder->Ol[i].ol_supply_w_id);
				dbrpcparam(dbproc, NULL, 0, SQLINT2, -1, -1,
(BYTE *) &pNewOrder->Ol[i].ol_quantity);
			}

			if (dbrpcexec(dbproc) == SUCCEED)
			{
				pNewOrder->total_amount=0;

				// Get resutls from order line
				for (i = 0; i<pNewOrder->o_ol_cnt; i++)
				{
					if (((rc = dbresults(dbproc)) !=
NO_MORE_RESULTS) && (rc != FAIL))
					{
						if (DBROWS(dbproc) &&
(dbnumcols(dbproc) == 5))
						{
							while
(dbnextrow(dbproc) != NO_MORE_ROWS)
							{

	if(pData=dbdata(dbproc, 1))

	UtilStrCpy(pNewOrder->Ol[i].ol_i_name, pData, dbdatlen(dbproc, 1));

	if(pData=dbdata(dbproc, 2))

	pNewOrder->Ol[i].ol_stock = (*(DBSMALLINT *) pData);

	if(pData=dbdata(dbproc, 3))

	UtilStrCpy(pNewOrder->Ol[i].ol_brand_generic, pData, dbdatlen(dbproc, 3));

	if(pData=dbdata(dbproc, 4))

	pNewOrder->Ol[i].ol_i_price = (*(DBFLT8 *) pData);


	if(pData=dbdata(dbproc, 5))


	pNewOrder->Ol[i].ol_amount = (*(DBFLT8 *) pData);



pNewOrd
>total_amount = pNewOrder->total_amount + pNewOrder->Ol[i].ol_amount;
							}
						}
					}
				}
				while (((rc = dbresults(dbproc)) !=
NO_MORE_RESULTS) && (rc != FAIL))
				{
					if (DBROWS(dbproc) &&
(dbnumcols(dbproc) == 8))
					{
						while (((rc = dbnextrow(dbproc
!= NO_MORE_ROWS) && (rc != FAIL))
```

```
                                                {
        if(pData=dbdata(dbproc, 1))
                                                                pNewOrder-
>w_tax = (*(DBFLT8 *) pData);




        if(pData=dbdata(dbproc, 2))
                                                                pNewOrder-
>d_tax = (*(DBFLT8 *) pData);




        if(pData=dbdata(dbproc, 3))
                                                                pNewOrder-
>o_id = (*(DBINT *) pData);
        if(pData=dbdata(dbproc, 4))
        UtilStrCpy(pNewOrder->c_last, pData, dbdatlen(dbproc, 4));
        if(pData=dbdata(dbproc, 5))
                                                                pNewOrder-
>c_discount = (*(DBFLT8 *) pData);




        if(pData=dbdata(dbproc, 6))
        UtilStrCpy(pNewOrder->c_credit, pData, dbdatlen(dbproc, 6));
        if(pData=dbdata(dbproc, 7))
                                                        {
                                                                datetime =
*((DBDATETIME *) pData);
        dbdatecrack(dbproc, &pNewOrder->o_entry_d, &datetime);
                                                        }
        if(pData=dbdata(dbproc, 8))commit_flag = (*(DBTINYINT *) pData);
                                                                }
                                                        }
                                }
                                }
                        }
                        if (SQLDetectDeadlock(dbproc))
                        {
                                pNewOrder->num_deadlocks++;
                                sprintf(printbuf,"deadlock: retry: %d",pNewOrder-
>num_deadlocks);
                                Sleep(DEADLOCKWAIT*tryit);
                        }
                        else
                        {
                                if (commit_flag == 1)
                                {
                                        pNewOrder->total_amount = pNewOrder-
>total_amount * ((1 + pNewOrder->w_tax + pNewOrder->d_tax) * (1 - pNewOrder->c_discou
                                        strcpy(pNewOrder->execution_status,"Transaction
commited.");
                                        return TRUE;
                                }
                                else
                                {
                                        strcpy(pNewOrder->execution_status,"Item numbe
not valid.");
                                        pNewOrder->error=ERR_BAD_ITEM_ID;
                                        return FALSE;
                                }
                        }
        }

        // If we reached here, it means we quit after MAX_RETRY deadlocks
        strcpy(pNewOrder->execution_status,"Hit deadlock max.  ");
        pNewOrder->error=ERR_TYPE_DEADLOCK;
        if ( verbose )
                TMLog(" NEWORDER: SQLNewOrder Max Deadlocks %d", tryit);

        return -1;  //          "deadlock max retry reached!"
}

/*
 *      Common Code for all Servers
 */

 /* FUNCTION: BOOL SQLInit()
```

```
 *
 * PURPOSE:        This function initializes SQL Server for later use.
 *
 *
 * RETURNS:                BOOL    FALSE   if successfull
 *                                         TRUE    if an error occurs and
connection cannot be established.
 *
 * COMMENTS:       None
 *
 */
BOOL SQLInit ()
{

        dbinit();

        if ( dbgetmaxprocs() < iMaxConnections )
        {
                if ( dbsetmaxprocs(iMaxConnections) == FAIL )
                {
                        //set for fail error message when HttpExtensionProc() is called
because
                        //at this point we don't have a pECB so no way to show error
message.
                        iMaxConnections = -1;
                }
        }

        // install error and message handlers
        dbmsghandle((DBMSGHANDLE_PROC)msg_handler);
        dberrhandle((DBERRHANDLE_PROC)err_handler);

        return TRUE;
}


/* FUNCTION: BOOL SQLOpenConnection(EXTENSION_CONTROL_BLOCK      *pECB, int
iTermId, int iSyncId, DBPROCESS **dbproc, char *server, char *database, char *user, char
*password, char *app, int *spid, long *pack_size)
 *
 * PURPOSE:        This function opens the sql connection for use.
 *
 * ARGUMENTS:     EXTENSION_CONTROL_BLOCK         *pECB     passed in structure
pointer from inetsrv.
 *                                 int                                     iTermId
        terminal id of browser
 *                                 int                                     iSyncId
        sync id of browser
 *                                 DBPROCESS               **dbproc  pointer to
returned DBPROCESS
 *                                 char                    *server
        SQL server name
 *                                 char                    *database SQL serve
database
 *                                 char                    *user
        user name
 *                                 char                    *password
        user password
 *                                 char                    *app
        pointer to returned application array
 *                                 int                             *spid
        pointer to returned spid
 *                                 long                    *pack_size
        pointer to returned default pack size
 *
 * RETURNS:                BOOL    FALSE   if successfull
 *                                         TRUE    if an error occurs
 *
 * COMMENTS:       None
 *
 */


#ifdef USE_ODBC
        static BOOL SQLOpenConnection(EXTENSION_CONTROL_BLOCK *pECB, int
iTermId, int iSyncId, DBPROCESS **dbproc, char *server, char *database, char *user, char
*password, char *app, int *spid, long *pack_size)
        {

                RETCODE         rc;
                char    buffer[30];

                *dbproc = (DBPROCESS *)malloc(sizeof(DBPROCESS));
                if ( !*dbproc )
                        return TRUE;

                //set pECB data into dbproc
                (*dbproc)->bDeadlock = FALSE;
                (*dbproc)->bFailed = FALSE;
                (*dbproc)->pECB = pECB;
                (*dbproc)->iTermId = iTermId;
                (*dbproc)->iSyncId = iSyncId;


                if ( SQLAllocConnect(henv,&(*dbproc)->hdbc) == SQL_ERROR )
                        return TRUE;
```

```
                if ( SQLSetConnectOption((*dbproc)->hdbc, SQL_PACKET_SIZE,
pack_size) == SQL_ERROR )
                        return TRUE;

                rc = SQLConnect((*dbproc)->hdbc, server, SQL_NTS, user, SQL_NTS,
password, SQL_NTS);
                if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
                        return TRUE;
                rc = SQLAllocStmt((*dbproc)->hdbc, &(*dbproc)->hstmt);
                if (rc == SQL_ERROR)
                        return TRUE;

                sprintf(buffer,"use %s", Client->database);

                rc = SQLExecDirect((*dbproc)->hstmt, buffer, SQL_NTS);
                if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
                        return TRUE;

                SQLFreeStmt((*dbproc)->hstmt, SQL_CLOSE);
                sprintf(buffer,"set nocount on");
                rc = SQLExecDirect((*dbproc)->hstmt, buffer, SQL_NTS);
                if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
                        return TRUE;
                SQLFreeStmt((*dbproc)->hstmt, SQL_CLOSE);

                sprintf(buffer,"select @@spid");

                rc = SQLExecDirect((*dbproc)->hstmt, buffer, SQL_NTS);
                if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
                        return TRUE;

                if ( SQLBindCol((*dbproc)->hstmt, 1, SQL_C_SSHORT, &(*dbproc)->spid,
0, NULL) == SQL_ERROR )
                        return TRUE;

                if ( SQLFetch((*dbproc)->hstmt) == SQL_ERROR )
                        return TRUE;

                SQLFreeStmt((*dbproc)->hstmt, SQL_CLOSE);

                return FALSE;
        }

#else

        static BOOL SQLOpenConnection(EXTENSION_CONTROL_BLOCK *pECB, int
iTermId, int iSyncId, DBPROCESS **dbproc, char *server, char *database, char *user, char
*password, char *app, int *spid)
        {
                LOGINREC        *login;
                PECBINFO        pEcbInfo;

                //set local msg proc for login record
                //attach pECB record

                //this is necessary as dblib provides no way to pass user data in a login
structure. So until
                //there is an allocated dbproc we need to use a static which means that
login attempt must
                //be serialized.

                gpECB = pECB;

                login = dblogin();
                if ( !*user )
                        DBSETLUSER(login, "sa");
                else
                        DBSETLUSER(login, user);

                DBSETLPWD(login,  password);
                DBSETLHOST(login, app);

//              Do not set the packet size.  Use the size set up in SQL Server.
//              DBSETLPACKET(login, (unsigned short)DEFCLPACKSIZE);

//              This can potentially cut down on data conversion
                DBSETLVERSION(login, DBVER60);

                if ((*dbproc = dbopen(login, server )) == NULL)
                        return TRUE;

                //set pECB data into dbproc
                pEcbInfo = (PECBINFO)malloc(sizeof(ECBINFO));
                pEcbInfo->bDeadlock = FALSE;
                pEcbInfo->pECB = pECB;
                pEcbInfo->iTermId = iTermId;
                pEcbInfo->iSyncId = iSyncId;
                dbsetuserdata(*dbproc, pEcbInfo);

                // Use the the right database
                dbuse(*dbproc, database);

                dbcmd(*dbproc, "select @@spid");
```

```
		dbsqlexec(*dbproc);
		while (dbresults(*dbproc) != NO_MORE_RESULTS)
		{
			dbbind(*dbproc, 1, SMALLBIND, (DBINT) 0, (BYTE *) spid);
			while (dbnextrow(*dbproc) != NO_MORE_ROWS)
			;
		}
		dbcmd(*dbproc, "set nocount on");

		dbsqlexec(*dbproc);
		while (dbresults(*dbproc) != NO_MORE_RESULTS)
		{
			while (dbnextrow(*dbproc) != NO_MORE_ROWS)
			;
		}

		//rollback transaction on abort
		dbcmd(*dbproc, "set XACT_ABORT ON");

		dbsqlexec(*dbproc);
		while (dbresults(*dbproc) != NO_MORE_RESULTS)
		{
			while (dbnextrow(*dbproc) != NO_MORE_ROWS)
			;
		}

		return FALSE;
	}

#endif

/* FUNCTION: BOOL SQLCloseConnection(EXTENSION_CONTROL_BLOCK *pECB,
DBPROCESS *dbproc)
 *
 * PURPOSE:	This function closes the sql connection.
 *
 * ARGUMENTS:	EXTENSION_CONTROL_BLOCK	*pECB	passed in structure
pointer from inetsrv.
 *			DBPROCESS		*dbproc	pointer to
DBPROCESS
 *
 * RETURNS:		BOOL	FALSE	if successfull
 *					TRUE	if an error occurs
 *
 * COMMENTS:	None
 *
 */

#ifdef USE_ODBC
	static BOOL SQLCloseConnection(EXTENSION_CONTROL_BLOCK *pECB,
DBPROCESS *dbproc)
	{
		if ( dbproc )
		{
			SQLFreeStmt(dbproc->hstmt, SQL_DROP);
			SQLDisconnect(dbproc->hdbc);
			SQLFreeConnect(dbproc->hdbc);
			free(dbproc);
			dbproc = NULL;
		}
		return FALSE;
	}
#else
	static BOOL SQLCloseConnection(EXTENSION_CONTROL_BLOCK *pECB,
DBPROCESS *dbproc)
	{
		if (dbclose(dbproc) == FAIL)
			return TRUE;
		return FALSE;
	}
#endif

/* FUNCTION: BOOL SQLDetectDeadlock(DBPROCESS *dbproc)
 *
 * PURPOSE:	This function checks to see if a sql server deadlock condition exists.
 *
 * ARGUMENTS:	DBPROCESS			*dbproc
	connection db process id to check
 *
 * RETURNS:		BOOL	FALSE		no deadlock detected
 *					TRUE		deadlock
condition exists
 *
 * COMMENTS:	None
 *
 */

BOOL SQLDetectDeadlock(DBPROCESS *dbproc)
{
	PECBINFO	pEcbInfo;

	if ( (pEcbInfo = (PECBINFO)dbgetuserdata(dbproc)) )
	{
		if ( pEcbInfo->bDeadlock )
		{
```

```
                                pEcbInfo->bDeadlock = FALSE;
                                return TRUE;
                        }
                }
                return FALSE;
}

// Lifted from HP FDR since they did such a nice job
void TMLog( char *format, ... )
{
        va_list args;
        char buf[4096];
        int len;
        va_start( args, format );
        _strtime( buf );
        strcat( buf," ");
        len = strlen( buf );
        (void)_vsnprintf( buf+ len, sizeof( buf) - len - 1, format, args);
        buf[sizeof( buf )- 1]= '\0';
        va_end( args );
        userlog( buf );
}

/* FUNCTION: void UtilStrCpy(char *pDest, char *pSrc, int n)
 *
 * PURPOSE:      This function copies n characters from string pSrc to pDst and places a
 *                      null character at the end of the destination string.
 *
 * ARGUMENTS:    char                    *pDest     destination string pointer
 *                      char                    *pSrc      source
string pointer
 *                      int                     n
        number of characters to copy
 *
 * RETURNS:              None
 *
 * COMMENTS:     Unlike strncpy this function ensures that the result string is
 *                      always null terminated.
 *
 */

static void UtilStrCpy(char *pDest, char *pSrc, int n)
{
   strncpy(pDest, pSrc, n);
   pDest[n] = '\0';

        return;
}
```

```
/* FUNCTION: int err_handler(DBPROCESS *dbproc, int severity, int dberr, int oserr, char
*dberrstr, char *oserrstr)
 *
 * PURPOSE:      This function handles DB-Library errors
 *
 * ARGUMENTS:    DBPROCESS               *dbproc
        DBPROCESS id pointer
 *                      int                     severity
        severity of error
 *                      int                     dberr
                error id
 *                      int                     oserr
                operating system specific error code
 *                      char                    *dberrstr
        printable error description of dberr
 *                      char                    *oserrstr
        printable error description of oserr
 *
 * RETURNS:              int                     INT_CONTINUE
        continue if error is SQLETIME else INT_CANCEL action
 *
 * COMMENTS:     None
 *
 */


int err_handler(DBPROCESS *dbproc, int severity, int dberr, int oserr, char *dberrstr, char
*oserrstr)
{
        PECBINFO                                pEcbInfo;
        EXTENSION_CONTROL_BLOCK         *pECB;
        FILE                                    *fp;
        SYSTEMTIME                              systemTime;
        char                                    szTmp[256];
        int                                             iTermId;
        int                                             iSyncId;

        pEcbInfo = NULL;

        if ((dbproc == NULL) || (DBDEAD(dbproc)))
        {
                TMLog("DBPROC is invalid");
                return INT_CANCEL;
        }

        if ( !(pEcbInfo = (PECBINFO)dbgetuserdata(dbproc)) )
        {
```

```
		pECB = gpECB;
		iTermId = 0;
		iSyncId = 0;
	}
	else
	{
		pECB = pEcbInfo->pECB;
		iTermId = pEcbInfo->iTermId;
		iSyncId = pEcbInfo->iSyncId;
	}

	if ( pEcbInfo && pEcbInfo->bFailed )
	{
		bError == FALSE;
		return INT_CANCEL;
	}

	if ( oserr != DBNOERR )
	{
		TMLog("DBLIB Error %s", oserrstr);
		if ( pEcbInfo )
		{
			pEcbInfo->bFailed = TRUE;
			bError = TRUE;
		}

		GetLocalTime(&systemTime);
		fp = fopen(szErrorLogPath, "ab");

		sprintf(szTmp, "ErrorHandler: DBLIB(%d): %s", oserr, oserrstr);

		TMLog("%2.2d/%2.2d/%2.2d %2.2d:%2.2d:%2.2d\r\n\r\n%s\r\n\r\n",
			systemTime.wYear, systemTime.wMonth, systemTime.wDay,
			systemTime.wHour, systemTime.wMinute,
systemTime.wSecond,
			szTmp);

		fclose(fp);
	}

	return INT_CANCEL;
}


/* FUNCTION: int msg_handler(DBPROCESS *dbproc, DBINT msgno, int msgstate, int
severity, char *msgtext)
 *
 * PURPOSE:	This function handles DB-Library SQL Server error messages
 *
 * ARGUMENTS:	DBPROCESS		*dbproc
		DBPROCESS id pointer
 *		DBINT			msgno
		message number
 *		int			msgstate
		message state
 *		int			severity
		message severity
 *		char			*msgtext
		printable message description
 *
 * RETURNS:		int			INT_CONTINUE
		continue if error is SQLETIME else INT_CANCEL action
 *
		INT_CANCEL		cancel operation
 *
 * COMMENTS:	This function also sets the dead lock dbproc variable if necessary.
 *
 */

int msg_handler(DBPROCESS *dbproc, DBINT msgno, int msgstate, int severity, char
*msgtext)
{
	PECBINFO			pEcbInfo;
	EXTENSION_CONTROL_BLOCK	*pECB;
	FILE				*fp;
	SYSTEMTIME			systemTime;
	char				szTmp[256];
	int				iTermId;
	int				iSyncId;

	if ( !(pEcbInfo = (PECBINFO)dbgetuserdata(dbproc)) )
	{
		pECB = gpECB;
		iTermId = 0;
		iSyncId = 0;
	}
	else
	{
		pECB = pEcbInfo->pECB;
		iTermId = pEcbInfo->iTermId;
		iSyncId = pEcbInfo->iSyncId;
	}


	if ( (msgno == 5701) || (msgno == 2528) || (msgno == 5703) || (msgno == 6006) )
		return INT_CONTINUE;
```

```
		// deadlock message
		if (msgno == 1205)
		{
			// set the deadlock indicator
			if ( pEcbInfo )
				pEcbInfo->bDeadlock = TRUE;
			else
				TMLog("Error, dbgetuserdata returned NULL.");
			return INT_CONTINUE;
		}
		if ( pEcbInfo && pEcbInfo->bFailed )
		{
			TMLog("SQL Error ");
			return INT_CANCEL;
		}

		if (msgno == 0)
			return INT_CONTINUE;
		else
		{
			TMLog("MsgHandler: SQL Error %s", msgtext);

			if ( pEcbInfo )
				pEcbInfo->bFailed = TRUE;

			bError = TRUE;

			sprintf(szTmp, "Error: SQLSVR(%d): %s", msgno, msgtext);

			TMLog("%2.2d/%2.2d/%2.2d %2.2d:%2.2d:%2.2d\r\n\r\n%s\r\n\r\n",
				systemTime.wYear, systemTime.wMonth, systemTime.wDay,
				systemTime.wHour, systemTime.wMinute,
systemTime.wSecond,
				szTmp);
		}
		return INT_CANCEL;
}


/* FUNCTION: BOOL GetParameters(int argc, char *argv[])
 *
 * PURPOSE:	This function parses the command line passed in to the delivery executable,
initializing
 *		and filling in global variable parameters.
 *
 * ARGUMENTS:	int		argc	number of command line arguments passed
to delivery
 *		char	*argv[]	array of command line argume
pointers
 *
 * RETURNS:		BOOL	FALSE	parameter read successfull
 *			TRUE	user has requested
parameter information screen be displayed.
 *
 * COMMENTS:	None
 *
 */

static BOOL GetParameters(int argc, char *argv[])
{
		int i;

		szServer[0]		= 0;
		szPassword[0]	= 0;
		bFlush			= FALSE;
		strcpy(szDatabase, "tpcc");
		strcpy(szUser, "sa");

		for(i=0; i<argc; i++)
		{
			if ( argv[i][0] == '-' II argv[i][0] == '/' )
			{
				switch(argv[i][1])
				{
					case 'S':
					case 's':
						strcpy(szServer, argv[i]+2);
						break;
					case 'V':
					case 'v':
						verbose = TRUE;
						break;
					case '?':
						return TRUE;
				}
			}
		}
		return FALSE;
}

/* FUNCTION: void PrintParameters(void)
 *
 * PURPOSE:	This function displays the supported command line flags.
 *
 * ARGUMENTS:	None
```

```
 *
 * RETURNS:              None
 *
 * COMMENTS:     None
 *
 */

static void PrintParameters(void)
{
        TMLog("Performance Tuning Corporation Tuxedo Kit");
        TMLog("   www.perftuning.com   (281) 251-3495  ");
        TMLog("NewOrder: -S Server [-v (verbose)]" );
        TMLog("NewOrder: Server %s", szServer);

}
```

A.10 payment.c

```
/*      FILE:           PAYMENT.C
 *
 *      Based on:Microsoft TPC-C Kit Ver. 3.00.000
 *
 *                              Copyright Microsoft, 1996
 *                              Copyright Performance Tuning Corporation, 1997
 *
 *      PURPOSE:        New Order Tuxedo Server.
 *      Author:         Philip Durr
 *                              philipdu@Microsoft.com
 *
 *  MODIFIED    Changed for modularity and to allow for the Tuxedo TM
 *
 *  Author:         Edward Whalen
 *                              Performance Tuning Corporation
 *                              ewhalen@perftuning.com
 */

#include <windows.h>
#include <process.h>
#include <stdio.h>
#include <stdarg.h>
#include <malloc.h>
#include <stdlib.h>
#include <string.h>
#include <time.h>
#include <sys\timeb.h>
#include <io.h>

#define DBNTWIN32
#include <sqlfront.h>
#include <sqldb.h>

#include "trans.h"                                      //tpckit transaction
header contains definations of structures specific to TPC-C
#include "httpext.h"                                    //ISAPI DLL information heade

#include "tpcc.h"                                       //this dlls specific
structure, value e.t. header.

#include <tmenv.h>
#include <xa.h>
#include <atmi.h>

BOOL    bLog                    = FALSE;
BOOL    bFlush;                                         //Flush
delivery log info when written.
BOOL    verbose                 = FALSE;
BOOL    bError                  = FALSE;

int             iThreads        = 5;
int             iMaxWareHouses  = 500;
int             iDelayMs        = 100;
short   iMaxConnections = (short)1;
short   iDeadlockRetry  = (short)3;

DBPROCESS *pdbproc;

char                                    szServer[32];
        //SQL server name
char                                    szDatabase[32];
        //tpcc database name
char                                    szUser[32];
                //user name
char                                    szPassword[32];
        //user password
int spId;

#ifdef LOCAL_ALLOC
PAYMENT_DATA PaymentData;
#else
TUX_DATA TuxData;
#endif
TERM Term;

static charszTpccLogPath[256];          //path to html log file if logging turned on in registry.
static char szErrorLogPath[256];        //path to error log file.
```

```
static	CRITICAL_SECTION		CriticalSection;
static	CRITICAL_SECTION		ErrorLogCriticalSection;
static	EXTENSION_CONTROL_BLOCK	*gpECB = NULL;
static	int					bTpccExit;
	//exit delivery disconnect loop as dll exiting.

extern void TMLog();
extern BOOL SQLInit();
extern void UtilStrCpy();
extern void UtilStrCpy();
extern BOOL SQLOpenConnection();
extern BOOL SQLCloseConnection();
extern BOOL SQLDetectDeadlock();

/* FUNCTION: tpsvrinit ( int argc, char *argv[])
 *
 * PURPOSE:	Initialize the Server to Database connection.
 *
 * RETURNS:		int	0	Success
 *				-1	Failure
 *
 *
 * COMMENTS:	None
 *
 */

int tpsvrinit ( int argc, char *argv[] )
{

	if ( GetParameters(argc, argv) )
	{
		PrintParameters();
		return -1;
	}

	if ( verbose )
		TMLog("TPSVRINIT: Payment: Server %s, Database %s, User %s,
Password %s, Flush %d.",
			szServer, szDatabase, szUser, szPassword, bFlush);


	if ( ! SQLInit() )
	{
		TMLog( "PAYMENT: SQLInit Failed" );
		return -1;
	}

	if ( SQLOpenConnection ( NULL, 0,0, &pdbproc, szServer, szDatabase, szUser,
szPassword, szDatabase, &spId))
	{
		TMLog ( "PAYMENT: SQLOpenConnection Failed" );
		dbexit();
		return -1;
	}
	return 0;
}

/* FUNCTION: tpsvrdone ( void )
 *
 * PURPOSE:	Initialize the Server to Database connection.
 *
 * RETURNS:		int	0	Success
 *				-1	Failure
 *
 *
 * COMMENTS:	None
 *
 */

void tpsvrdone ( void )
{
	SQLCloseConnection( NULL, pdbproc);
	dbexit();
}

/* FUNCTION: PAYMENT ( TPSVCINFO *rqst )
 *
 * PURPOSE:	Process a Payment request.
 *
 * RETURNS:		int	0	Success
 *				-1	Failure
 *
 *
 * COMMENTS:	None
 *
 */

void PAYMENT ( TPSVCINFO *rqst )
{
	PECBINFO pECBInfo = dbgetuserdata(pdbproc);
	int size = rqst->len;

#ifdef LOCAL_ALLOC
	memcpy(&PaymentData, rqst->data, size);
```

```
	if (verbose )
	{
		TMLog(" PAYMENT: w_id %d ", PaymentData.w_id);
		TMLog(" PAYMENT: d_id %d ", PaymentData.d_id);
	}

	bError = FALSE;

	PaymentData.retval = SQLPayment( NULL, 0, 0, pdbproc, &PaymentData,
iDeadlockRetry);

	if (bError == TRUE)
		PaymentData.retval = -1;

	if (verbose )
		TMLog(" PAYMENT: Return Value %d", PaymentData.retval);

	memcpy( rqst->data, &PaymentData, size);
#else
	memcpy(&TuxData, rqst->data, size);

	if (verbose )
	{
		TMLog(" PAYMENT: w_id %d ", TuxData.PaymentData.w_id);
		TMLog(" PAYMENT: d_id %d ", TuxData.PaymentData.d_id);
	}

	bError = FALSE;

	TuxData.PaymentData.retval = SQLPayment( NULL, 0, 0, pdbproc,
&TuxData.PaymentData, iDeadlockRetry);

	if (bError == TRUE)
		TuxData.PaymentData.retval = -1;

	if (verbose )
		TMLog(" PAYMENT: Return Value %d error %d",
TuxData.PaymentData.retval, TuxData.PaymentData.error);

	memcpy( rqst->data, &TuxData, size);
#endif
	tpreturn( TPSUCCESS, 0, rqst->data, size, 0);
}

/* FUNCTION: int SQLPayment(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int
iSyncId, DBPROCESS *dbproc, PAYMENT_DATA *pPayment, short deadlock_retry)
 *
 * PURPOSE:	This function handles the payment transaction.
 *
 * ARGUMENTS:	EXTENSION_CONTROL_BLOCK	*pECB
	passed in structure pointer from inetsrv.
 *				int
	iTermId			terminal id of browser
 *				int
	iSyncId			sync id of browser
 *				DBPROCESS
	*dbproc			connection db process id
 *				PAYMENT_DATA			*pPaymer
		pointer to payment input/output data structure
 *				short
	deadlock_retry	deadlock retry count
 *
 * RETURNS:			int	TRUE		success
 *					-1				max
deadlocked reached
 *
 * COMMENTS:	None
 *
 */

static int SQLPayment(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int iSyncId,
DBPROCESS *dbproc, PAYMENT_DATA *pPayment, short deadlock_retry)
{
	RETCODE			rc;
	int			tryit;
	char		printbuf[26];
//	BOOL		by_name;
	DBDATETIME	datetime;
	BYTE		*pData;
	PECBINFO	pEcbInfo;

	if ( (pEcbInfo = (PECBINFO)dbgetuserdata(dbproc)) )
	{
		pEcbInfo->pECB = pECB;
		pEcbInfo->bFailed = FALSE;
		pEcbInfo->iTermId = iTermId;
		pEcbInfo->iSyncId = iSyncId;
	}

	pPayment->num_deadlocks = 0;

//	if (pPayment->c_id == 0)
//		by_name = TRUE;
//	else
//		by_name = FALSE;
//
```

```
	for (tryit=0; tryit < deadlock_retry; tryit++)
	{
		if (dbrpcinit(dbproc, "tpcc_payment", 0) == SUCCEED)
		{
			dbrpcparam(dbproc, NULL, 0, SQLINT2, -1, -1, (BYTE *)
&pPayment->w_id);
			dbrpcparam(dbproc, NULL, 0, SQLINT2, -1, -1, (BYTE *)
&pPayment->c_w_id);
			dbrpcparam(dbproc, NULL, 0, SQLFLT8, -1, -1, (BYTE *)
&pPayment->h_amount);
			dbrpcparam(dbproc, NULL, 0, SQLINT1, -1, -1, (BYTE *)
&pPayment->d_id);
			dbrpcparam(dbproc, NULL, 0, SQLINT1, -1, -1, (BYTE *)
&pPayment->c_d_id);
			dbrpcparam(dbproc, NULL, 0, SQLINT4, -1, -1, (BYTE *)
&pPayment->c_id);
			if (pPayment->c_id == 0)
			{
				dbrpcparam(dbproc, NULL, 0, SQLCHAR, -1,
strlen(pPayment->c_last), pPayment->c_last);
			}
		}
		if (dbrpcexec(dbproc) == SUCCEED)
		{
			while (((rc = dbresults(dbproc)) != NO_MORE_RESULTS) &&
(rc != FAIL))
			{
				if (DBROWS(dbproc) && (dbnumcols(dbproc) == 27))
				{
					while (((rc = dbnextrow(dbproc)) !=
NO_MORE_ROWS) && (rc != FAIL))
					{
						if(pData=dbdata(dbproc, 1))
							pPayment->c_id =
*((DBINT *) pData);
						if(pData=dbdata(dbproc, 2))
							UtilStrCpy(pPayment-
>c_last, pData, dbdatlen(dbproc, 2));
						if(pData=dbdata(dbproc, 3))
						{
							datetime =
*((DBDATETIME *) pData);
							dbdatecrack(dbproc,
&pPayment->h_date, &datetime);
						}
						if(pData=dbdata(dbproc, 4))
							UtilStrCpy(pPayment-
>w_street_1, pData, dbdatlen(dbproc, 4));
						if(pData=dbdata(dbproc, 5))
							UtilStrCpy(pPaymer
>w_street_2, pData, dbdatlen(dbproc, 5));
						if(pData=dbdata(dbproc, 6))
							UtilStrCpy(pPaymer
>w_city, pData, dbdatlen(dbproc, 6));
						if(pData=dbdata(dbproc, 7))
							UtilStrCpy(pPaymer
>w_state, pData, dbdatlen(dbproc, 7));
						if(pData=dbdata(dbproc, 8))
							UtilStrCpy(pPaymer
>w_zip, pData, dbdatlen(dbproc, 8));
						if(pData=dbdata(dbproc, 9))
							UtilStrCpy(pPaymer
>d_street_1, pData, dbdatlen(dbproc, 9));
						if(pData=dbdata(dbproc, 10))
							UtilStrCpy(pPaymer
>d_street_2, pData, dbdatlen(dbproc, 10));
						if(pData=dbdata(dbproc, 11))
							UtilStrCpy(pPaymer
>d_city, pData, dbdatlen(dbproc, 11));
						if(pData=dbdata(dbproc, 12))
							UtilStrCpy(pPaymer
>d_state, pData, dbdatlen(dbproc, 12));
						if(pData=dbdata(dbproc, 13))
							UtilStrCpy(pPaymer
>d_zip, pData, dbdatlen(dbproc, 13));
						if(pData=dbdata(dbproc, 14))
							UtilStrCpy(pPaymer
>c_first, pData, dbdatlen(dbproc, 14));
						if(pData=dbdata(dbproc, 15))
							UtilStrCpy(pPaymer
>c_middle, pData, dbdatlen(dbproc, 15));
						if(pData=dbdata(dbproc, 16))
							UtilStrCpy(pPaymer
>c_street_1, pData, dbdatlen(dbproc, 16));
						if(pData=dbdata(dbproc, 17))
							UtilStrCpy(pPaymer
>c_street_2, pData, dbdatlen(dbproc, 17));
						if(pData=dbdata(dbproc, 18)
							UtilStrCpy(pPaymer
>c_city, pData, dbdatlen(dbproc, 18));
						if(pData=dbdata(dbproc, 19))
							UtilStrCpy(pPaymer
>c_state, pData, dbdatlen(dbproc, 19));
						if(pData=dbdata(dbproc, 20))
							UtilStrCpy(pPaymer
>c_zip, pData, dbdatlen(dbproc, 20));
```

```
                                                        if(pData=dbdata(dbproc, 21))
                                                                UtilStrCpy(pPayment-
>c_phone, pData, dbdatlen(dbproc, 21));
                                                        if(pData=dbdata(dbproc, 22))
                                                        {
                                                                datetime =
*((DBDATETIME *) pData);
                                                                dbdatecrack(dbproc,
&pPayment->c_since, &datetime);
                                                        }
                                                        if(pData=dbdata(dbproc, 23))
                                                                UtilStrCpy(pPayment-
>c_credit, pData, dbdatlen(dbproc, 23));
                                                        if(pData=dbdata(dbproc, 24))
                                                                pPayment-
>c_credit_lim = (*(DBFLT8 *) pData);
                                                        if(pData=dbdata(dbproc, 25))
                                                                pPayment->c_discount
= (*(DBFLT8 *) pData);
                                                        if(pData=dbdata(dbproc, 26))
                                                                pPayment->c_balance
= (*(DBFLT8 *) pData);
                                                        if(pData=dbdata(dbproc, 27))
                                                                UtilStrCpy(pPayment-
>c_data, pData, dbdatlen(dbproc, 27));
                                                }
                                        }
                                }
                        }
                        if (SQLDetectDeadlock(dbproc))
                        {
                                pPayment->num_deadlocks++;
                                sprintf(printbuf,"deadlock: retry: %d",pPayment-
>num_deadlocks);
                                Sleep(DEADLOCKWAIT*tryit);
                        }
                        else
                        {
                                if ( pPayment->c_id == 0 )
                                {
                                        strcpy(pPayment->execution_status,"Invalid Customer
id,name.");
                                        pPayment->error=ERR_NOSUCH_CUSTOMER;

                                        TMLog(" PAYMENT: No such customer ");
                                        return 0;
                                }
                                else
                                        strcpy(pPayment->execution_status,"Transaction
commited.");
                                        return TRUE;
                                }
                        }
                        // If we reached here, it means we quit after MAX_RETRY deadlocks
                        strcpy(pPayment->execution_status,"Hit deadlock max.  ");
                        pPayment->error=ERR_TYPE_DEADLOCK;
                        return -1; //"deadlock max retry reached!"
}


/*
 *      Common Code for all Servers
 */

 /* FUNCTION: BOOL SQLInit()
 *
 * PURPOSE:      This function initializes SQL Server for later use.
 *
 *
 * RETURNS:              BOOL    FALSE   if successfull
 *                                                       TRUE    if an error occurs an
connection cannot be established.
 *
 * COMMENTS:     None
 *
 */
BOOL SQLInit ()
{

        dbinit();

        if ( dbgetmaxprocs() < iMaxConnections )
        {
                if ( dbsetmaxprocs(iMaxConnections) == FAIL )
                {
                        //set for fail error message when HttpExtensionProc() is called
because
                        //at this point we don't have a pECB so no way to show error
message.
                        iMaxConnections = -1;
                }
        }

        // install error and message handlers
        dbmsghandle((DBMSGHANDLE_PROC)msg_handler);
        dberrhandle((DBERRHANDLE_PROC)err_handler);
```

```
	return TRUE;
}


/* FUNCTION: BOOL SQLOpenConnection(EXTENSION_CONTROL_BLOCK	*pECB, int
iTermId, int iSyncId, DBPROCESS **dbproc, char *server, char *database, char *user, char
*password, char *app, int *spid, long *pack_size)
 *
 * PURPOSE:		This function opens the sql connection for use.
 *
 * ARGUMENTS:	EXTENSION_CONTROL_BLOCK		*pECB	passed in structure
pointer from inetsrv.
 *					int					iTermId
	terminal id of browser
 *					int					iSyncId
	sync id of browser
 *					DBPROCESS			**dbproc	pointer to
returned DBPROCESS
 *					char				*server
	SQL server name
 *					char				*databaseSQL server
database
 *					char				*user
	user name
 *					char				*password
	user password
 *					char				*app
	pointer to returned application array
 *					int					*spid
	pointer to returned spid
 *					long				*pack_size
	pointer to returned default pack size
 *
 * RETURNS:			BOOL	FALSE	if successfull
 *							TRUE	if an error occurs
 *
 * COMMENTS:	None
 *
 */


#ifdef USE_ODBC
	static BOOL SQLOpenConnection(EXTENSION_CONTROL_BLOCK *pECB, int
iTermId, int iSyncId, DBPROCESS **dbproc, char *server, char *database, char *user, char
*password, char *app, int *spid, long *pack_size)
	{
		RETCODE		rc;
		char		buffer[30];

		*dbproc = (DBPROCESS *)malloc(sizeof(DBPROCESS));
		if ( !*dbproc )
			return TRUE;

		//set pECB data into dbproc
		(*dbproc)->bDeadlock = FALSE;
		(*dbproc)->bFailed = FALSE;
		(*dbproc)->pECB = pECB;
		(*dbproc)->iTermId = iTermId;
		(*dbproc)->iSyncId = iSyncId;


		if ( SQLAllocConnect(henv, &(*dbproc)->hdbc) == SQL_ERROR )
			return TRUE;

		if ( SQLSetConnectOption((*dbproc)->hdbc, SQL_PACKET_SIZE,
pack_size) == SQL_ERROR )
			return TRUE;

		rc = SQLConnect((*dbproc)->hdbc, server, SQL_NTS, user, SQL_NTS,
password, SQL_NTS);
		if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
			return TRUE;
		rc = SQLAllocStmt((*dbproc)->hdbc, &(*dbproc)->hstmt);
		if (rc == SQL_ERROR)
			return TRUE;

		sprintf(buffer,"use %s", Client->database);

		rc = SQLExecDirect((*dbproc)->hstmt, buffer, SQL_NTS);
		if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
			return TRUE;

		SQLFreeStmt((*dbproc)->hstmt, SQL_CLOSE);
		sprintf(buffer,"set nocount on");
		rc = SQLExecDirect((*dbproc)->hstmt, buffer, SQL_NTS);
		if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
			return TRUE;
		SQLFreeStmt((*dbproc)->hstmt, SQL_CLOSE);

		sprintf(buffer,"select @@spid");

		rc = SQLExecDirect((*dbproc)->hstmt, buffer, SQL_NTS);
		if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
			return TRUE;
```

```
                if ( SQLBindCol((*dbproc)->hstmt, 1, SQL_C_SSHORT, &(*dbproc)->spid,
0, NULL) == SQL_ERROR )
                        return TRUE;

                if ( SQLFetch((*dbproc)->hstmt) == SQL_ERROR )
                        return TRUE;

                SQLFreeStmt((*dbproc)->hstmt, SQL_CLOSE);

                return FALSE;
        }

#else

        static BOOL SQLOpenConnection(EXTENSION_CONTROL_BLOCK *pECB, int
iTermId, int iSyncId, DBPROCESS **dbproc, char *server, char *database, char *user, char
*password, char *app, int *spid)
        {
                LOGINREC        *login;
                PECBINFO        pEcbInfo;

                //set local msg proc for login record
                //attach pECB record

                //this is necessary as dblib provides no way to pass user data in a login
structure. So until
                //there is an allocated dbproc we need to use a static which means that the
login attempt must
                //be serialized.

                gpECB = pECB;

                login = dblogin();
                if ( !*user )
                        DBSETLUSER(login, "sa");
                else
                        DBSETLUSER(login, user);

                DBSETLPWD(login,  password);
                DBSETLHOST(login, app);

//              Do not set the packet size.  Use the size set up in SQL Server.
//              DBSETLPACKET(login, (unsigned short)DEFCLPACKSIZE);

//              This can potentially cut down on data conversion
                DBSETLVERSION(login, DBVER60);

                if ((*dbproc = dbopen(login, server )) == NULL)
                        return TRUE;


                //set pECB data into dbproc
                pEcbInfo = (PECBINFO)malloc(sizeof(ECBINFO));
                pEcbInfo->bDeadlock = FALSE;
                pEcbInfo->pECB = pECB;
                pEcbInfo->iTermId = iTermId;
                pEcbInfo->iSyncId = iSyncId;
                dbsetuserdata(*dbproc, pEcbInfo);


                // Use the the right database
                dbuse(*dbproc, database);


                dbcmd(*dbproc, "select @@spid");


                dbsqlexec(*dbproc);
                while (dbresults(*dbproc) != NO_MORE_RESULTS)
                {
                        dbbind(*dbproc, 1, SMALLBIND, (DBINT) 0, (BYTE *) spid);
                        while (dbnextrow(*dbproc) != NO_MORE_ROWS)
                        ;
                }
                dbcmd(*dbproc, "set nocount on");

                dbsqlexec(*dbproc);
                while (dbresults(*dbproc) != NO_MORE_RESULTS)
                {
                        while (dbnextrow(*dbproc) != NO_MORE_ROWS)
                        ;
                }

                //rollback transaction on abort
                dbcmd(*dbproc, "set XACT_ABORT ON");

                dbsqlexec(*dbproc);
                while (dbresults(*dbproc) != NO_MORE_RESULTS)
                {
                        while (dbnextrow(*dbproc) != NO_MORE_ROWS)
                        ;
                }

                return FALSE;
}
```

```
#endif

/* FUNCTION: BOOL SQLCloseConnection(EXTENSION_CONTROL_BLOCK *pECB,
DBPROCESS *dbproc)
 *
 * PURPOSE:        This function closes the sql connection.
 *
 * ARGUMENTS:    EXTENSION_CONTROL_BLOCK        *pECB     passed in structure
pointer from inetsrv.
 *                                DBPROCESS                *dbproc    pointer to
DBPROCESS
 *
 * RETURNS:                BOOL     FALSE    if successfull
 *                                                        TRUE     if an error occurs
 *
 * COMMENTS:      None
 *
 */

#ifdef USE_ODBC
        static BOOL SQLCloseConnection(EXTENSION_CONTROL_BLOCK *pECB,
DBPROCESS *dbproc)
        {
                if ( dbproc )
                {
                        SQLFreeStmt(dbproc->hstmt, SQL_DROP);
                        SQLDisconnect(dbproc->hdbc);
                        SQLFreeConnect(dbproc->hdbc);
                        free(dbproc);
                        dbproc = NULL;
                }
                return FALSE;
        }
#else
        static BOOL SQLCloseConnection(EXTENSION_CONTROL_BLOCK *pECB,
DBPROCESS *dbproc)
        {
                if (dbclose(dbproc) == FAIL)
                        return TRUE;
                return FALSE;
        }
#endif

/* FUNCTION: BOOL SQLDetectDeadlock(DBPROCESS *dbproc)
 *
 * PURPOSE:        This function checks to see if a sql server deadlock condition exists.
 *
 * ARGUMENTS:    DBPROCESS                        *dbproc
        connection db process id to check
 *
 * RETURNS:                BOOL     FALSE            no deadlock detected
 *                                                        TRUE             deadlock
condition exists
 *
 * COMMENTS:      None
 *
 */

BOOL SQLDetectDeadlock(DBPROCESS *dbproc)
{
        PECBINFO        pEcbInfo;

        if ( (pEcbInfo = (PECBINFO)dbgetuserdata(dbproc)) )
        {
                if ( pEcbInfo->bDeadlock )
                {
                        pEcbInfo->bDeadlock = FALSE;
                        return TRUE;
                }
        }
        return FALSE;
}

// Lifted from HP FDR since they did such a nice job
void TMLog( char *format, ... )
{
        va_list args;
        char buf[4096];
        int len;
        va_start( args, format );
        _strtime( buf );
        strcat( buf," ");
        len = strlen( buf );
        (void)_vsnprintf( buf+ len, sizeof( buf) - len - 1, format, args);
        buf[sizeof( buf )- 1]= '\0';
        va_end( args );
        userlog( buf );
}

/* FUNCTION: void UtilStrCpy(char *pDest, char *pSrc, int n)
 *
 * PURPOSE:        This function copies n characters from string pSrc to pDst and places a
 *                        null character at the end of the destination string.
 *
 * ARGUMENTS:    char                        *pDest     destination string pointer
```

```
 *                                      char                    *pSrc       source
string pointer
 *                                      int                     n
        number of characters to copy
 *
 * RETURNS:              None
 *
 * COMMENTS:     Unlike strncpy this function ensures that the result string is
 *                                      always null terminated.
 *
 */

static void UtilStrCpy(char *pDest, char *pSrc, int n)
{
   strncpy(pDest, pSrc, n);
   pDest[n] = '\0';

        return;
}

/* FUNCTION: int err_handler(DBPROCESS *dbproc, int severity, int dberr, int oserr, char
*dberrstr, char *oserrstr)
 *
 * PURPOSE:      This function handles DB-Library errors
 *
 * ARGUMENTS:    DBPROCESS               *dbproc
        DBPROCESS id pointer
 *                                      int                     severity
        severity of error
 *                                      int                     dberr
                error id
 *                                      int                     oserr
                operating system specific error code
 *                                      char                    *dberrstr
        printable error description of dberr
 *                                      char                    *oserrstr
        printable error description of oserr
 *
 * RETURNS:              int                     INT_CONTINUE
        continue if error is SQLETIME else INT_CANCEL action
 *
 * COMMENTS:     None
 *
 */


int err_handler(DBPROCESS *dbproc, int severity, int dberr, int oserr, char *dberrstr, char
*oserrstr)
{
        PECBINFO                                pEcbInfo;
        EXTENSION_CONTROL_BLOCK         *pECB;
        FILE                                    *fp;
        SYSTEMTIME                              systemTime;
        char                                    szTmp[256];
        int                                             iTermId;
        int                                             iSyncId;

        pEcbInfo = NULL;

        if ((dbproc == NULL) || (DBDEAD(dbproc)))
        {
                TMLog("DBPROC is invalid");
                return INT_CANCEL;
        }

        if ( !(pEcbInfo = (PECBINFO)dbgetuserdata(dbproc)) )
        {
                pECB = gpECB;
                iTermId = 0;
                iSyncId = 0;
        }
        else
        {
                pECB = pEcbInfo->pECB;
                iTermId = pEcbInfo->iTermId;
                iSyncId = pEcbInfo->iSyncId;
        }

        if ( pEcbInfo && pEcbInfo->bFailed )
        {
                bError == FALSE;
                return INT_CANCEL;
        }

        if ( oserr != DBNOERR )
        {
                TMLog("DBLIB Error %s", oserrstr);
                if ( pEcbInfo )
                {
                        pEcbInfo->bFailed = TRUE;
                        bError = TRUE;
                }

                GetLocalTime(&systemTime);
                fp = fopen(szErrorLogPath, "ab");
```

```
                sprintf(szTmp, "ErrorHandler: DBLIB(%d): %s", oserr, oserrstr);

                TMLog("%2.2d/%2.2d/%2.2d %2.2d:%2.2d:%2.2d\r\n\r\n%s\r\n\r\n",
                        systemTime.wYear, systemTime.wMonth, systemTime.wDay,
                        systemTime.wHour, systemTime.wMinute,
systemTime.wSecond,
                        szTmp);

                fclose(fp);
        }

        return INT_CANCEL;
}


/* FUNCTION: int msg_handler(DBPROCESS *dbproc, DBINT msgno, int msgstate, int
severity, char *msgtext)
 *
 * PURPOSE:     This function handles DB-Library SQL Server error messages
 *
 * ARGUMENTS:   DBPROCESS           *dbproc
        DBPROCESS id pointer
 *                              DBINT                   msgno
        message number
 *                              int                             msgstate
        message state
 *                              int                             severity
        message severity
 *                              char                    *msgtext
        printable message description
 *
 * RETURNS:             int                             INT_CONTINUE
        continue if error is SQLETIME else INT_CANCEL action
 *
        INT_CANCEL              cancel operation
 *
 * COMMENTS:    This function also sets the dead lock dbproc variable if necessary.
 *
 */

int msg_handler(DBPROCESS *dbproc, DBINT msgno, int msgstate, int severity, char
*msgtext)
{
        PECBINFO                                pEcbInfo;
        EXTENSION_CONTROL_BLOCK         *pECB;
        FILE                                    *fp;
        SYSTEMTIME                              systemTime;
        char                                    szTmp[256];
        int                                     iTermId;
        int                                     iSyncId;

        if ( !(pEcbInfo = (PECBINFO)dbgetuserdata(dbproc)) )
        {
                pECB = gpECB;
                iTermId = 0;
                iSyncId = 0;
        }
        else
        {
                pECB = pEcbInfo->pECB;
                iTermId = pEcbInfo->iTermId;
                iSyncId = pEcbInfo->iSyncId;
        }


        if ( (msgno == 5701) || (msgno == 2528) || (msgno == 5703) || (msgno == 6006))
                return INT_CONTINUE;

        // deadlock message
        if (msgno == 1205)
        {
                // set the deadlock indicator
                if ( pEcbInfo )
                        pEcbInfo->bDeadlock = TRUE;
                else
                        TMLog("Error, dbgetuserdata returned NULL.");
                return INT_CONTINUE;
        }
        if ( pEcbInfo && pEcbInfo->bFailed )
        {
                TMLog("SQL Error ");
                return INT_CANCEL;
        }

        if (msgno == 0)
                return INT_CONTINUE;
        else
        {
                TMLog("MsgHandler: SQL Error %s", msgtext);

                if ( pEcbInfo )
                        pEcbInfo->bFailed = TRUE;

                bError = TRUE;

                sprintf(szTmp, "Error: SQLSVR(%d): %s", msgno, msgtext);
```

```
                TMLog("%2.2d/%2.2d/%2.2d %2.2d:%2.2d:%2.2d\r\n\r\n%s\r\n\r\n",
                        systemTime.wYear, systemTime.wMonth, systemTime.wDay,
                        systemTime.wHour, systemTime.wMinute,
systemTime.wSecond,
                        szTmp);
        }
        return INT_CANCEL;
}

/* FUNCTION: BOOL GetParameters(int argc, char *argv[])
 *
 * PURPOSE:     This function parses the command line passed in to the delivery executable,
initializing
 *              and filling in global variable parameters.
 *
 * ARGUMENTS:   int             argc    number of command lineargurments passed
to delivery
 *              char    *argv[]  array of command line argument
pointers
 *
 * RETURNS:             BOOL    FALSE   parameter read successfull
 *                                      TRUE    user has requested
parameter information screen be displayed.
 *
 * COMMENTS:    None
 *
 */

static BOOL GetParameters(int argc, char *argv[])
{
        int i;


        szServer[0]                     = 0;
        szPassword[0]   = 0;
        bFlush                          = FALSE;
        strcpy(szDatabase, "tpcc");
        strcpy(szUser, "sa");

        for(i=0; i<argc; i++)
        {
                if ( argv[i][0] == '-' II argv[i][0] == '/' )
                {
                        switch(argv[i][1])
                        {
                                case 'S':
                                case 's':
                                        strcpy(szServer, argv[i]+2);
                                        break;
                                case 'V':
                                case 'v':
                                        verbose = TRUE;
                                        break;
                                case '?':
                                        return TRUE;
                        }
                }
        }
        return FALSE;
}

/* FUNCTION: void PrintParameters(void)
 *
 * PURPOSE:     This function displays the supported command line flags.
 *
 * ARGUMENTS:   None
 *
 * RETURNS:             None
 *
 * COMMENTS:    None
 *
 */

static void PrintParameters(void)
{
        TMLog("Performance Tuning Corporation Tuxedo Kit");
        TMLog("   www.perftuning.com  (281) 251-3495  ");
        TMLog("Payment: -S Server  [-v (verbose)]" );
        TMLog("Payment: Server %s",szServer);

}
```

A.11 orderstatus.c

```
/*      FILE:           ORDERSTATUS.C
 *
 *      Based on:Microsoft TPC-C Kit Ver. 3.00.000
 *
 *                              Copyright Microsoft, 1996
 *                              Copyright Performance Tuning Corporation, 1997
 *
 *      PURPOSE:        New Order Tuxedo Server.
 *      Author:         Philip Durr
 *                              philipdu@Microsoft.com
```

```
 *
 * MODIFIED      Changed for modularity and to allow for the Tuxedo TM
 *
 * Author:       Edward Whalen
 *                                   Performance Tuning Corporation
 *                                   ewhalen@perftuning.com
 */

#include <windows.h>
#include <process.h>
#include <stdio.h>
#include <stdarg.h>
#include <malloc.h>
#include <stdlib.h>
#include <string.h>
#include <time.h>
#include <sys\timeb.h>
#include <io.h>

#define DBNTWIN32
#include <sqlfront.h>
#include <sqldb.h>

#include "trans.h"                                          //tpckit transaction
header contains definations of structures specific to TPC-C
#include "httpext.h"                                        //ISAPI DLL information header

#include "tpcc.h"                                           //this dlls specific
structure, value e.t. header.

#include <tmenv.h>
#include <xa.h>
#include <atmi.h>

BOOL    bLog                    = FALSE;
BOOL    bFlush;                                                     //Flush
delivery log info when written.
BOOL    verbose                 = FALSE;
BOOL    bError                  = FALSE;

int             iThreads        = 5;
int             iMaxWareHouses  = 500;
int             iDelayMs        = 100;
short   iMaxConnections = (short)1;
short   iDeadlockRetry  = (short)3;

DBPROCESS *pdbproc;

char                                    szServer[32];
        //SQL server name
char                                    szDatabase[32];
        //tpcc database name
char                                    szUser[32];
                //user name
char                                    szPassword[32];
        //user password
int spId;

#ifdef LOCAL_ALLOC
ORDER_STATUS_DATA OrderStatusData;
#else
TUX_DATA TuxData;
#endif
TERM Term;

static charszTpccLogPath[256];          //path to html log file if logging turned on in registry.
static char szErrorLogPath[256];        //path to error log file.

static  CRITICAL_SECTION                CriticalSection;
static  CRITICAL_SECTION                ErrorLogCriticalSection;
static  EXTENSION_CONTROL_BLOCK         *gpECB = NULL;
static  int                                                     bTpccExit;
        //exit delivery disconnect loop as dll exiting.

extern void TMLog();
extern BOOL SQLInit();
extern void UtilStrCpy();
extern void UtilStrCpy();
extern BOOL SQLOpenConnection();
extern BOOL SQLCloseConnection();
extern BOOL SQLDetectDeadlock();

/* FUNCTION: tpsvrinit ( int argc, char *argv[])
 *
 * PURPOSE:      Initialize the Server to Database connection.
 *
 * RETURNS:              int     0       Success
 *                                       -1      Failure
 *
 *
 * COMMENTS:     None
 *
 */

int tpsvrinit ( int argc, char *argv[] )
{
```

```
	if ( GetParameters(argc, argv) )
	{
		PrintParameters();
		return -1;
	}

	if ( verbose )
		TMLog("TPSVRINIT: OrderStatus: Server %s, Database %s, User %s,
Password %s, Flush %d.",
			szServer, szDatabase, szUser, szPassword, bFlush);


	if ( ! SQLInit() )
	{
		TMLog( "ORDERSTATUS: SQLInit Failed" );
		return -1;
	}
	if ( SQLOpenConnection( NULL, 0, 0, &pdbproc, szServer, szDatabase, szUser,
szPassword, szDatabase, &spId))
	{
		TMLog ( "ORDERSTATUS: SQLOpenConnection Failed" );
		dbexit();
		return -1;
	}
	return 0;
}

/* FUNCTION: tpsvrdone ( void )
 *
 * PURPOSE:	Initialize the Server to Database connection.
 *
 * RETURNS:		int	0	Success
 *					-1	Failure
 *
 *
 * COMMENTS:	None
 *
 */

void tpsvrdone ( void )
{
	SQLCloseConnection( NULL, pdbproc);
	dbexit();
}

/* FUNCTION: ORDERSTATUS ( TPSVCINFO *rqst )
 *
 * PURPOSE:	Process an Order Status request.
 *
 * RETURNS:		int	0	Success
 *					-1	Failure
 *
 *
 * COMMENTS:	None
 *
 */

void ORDERSTATUS ( TPSVCINFO *rqst )
{
	PECBINFO pECBInfo = dbgetuserdata(pdbproc);
	int size = rqst->len;

#ifdef LOCAL_ALLOC
	memcpy(&OrderStatusData, rqst->data, size);

	if (verbose )
	{
		TMLog(" ORDERSTATUS: w_id %d ", OrderStatusData.w_id);
		TMLog(" ORDERSTATUS: d_id %d ", OrderStatusData.d_id);
		TMLog(" ORDERSTATUS: c_id %d ", OrderStatusData.c_id);
	}

	bError = FALSE;

	OrderStatusData.retval = SQLOrderStatus( NULL, 0, 0, pdbproc, &OrderStatusDat
iDeadlockRetry);

	if (bError == TRUE)
		OrderStatusData.retval = -1;

	if ( verbose )
		TMLog(" ORDERSTATUS: Return Value %d", OrderStatusData.retval);

	memcpy( rqst->data, &OrderStatusData, size);
#else
	memcpy(&TuxData, rqst->data, size);

	if (verbose )
	{
		TMLog(" ORDERSTATUS: w_id %d ", TuxData.OrderStatusData.w_id);
		TMLog(" ORDERSTATUS: d_id %d ", TuxData.OrderStatusData.d_id);
		TMLog(" ORDERSTATUS: c_id %d ", TuxData.OrderStatusData.c_id);
	}

	bError = FALSE;
```

```
	TuxData.OrderStatusData.retval = SQLOrderStatus( NULL, 0, 0, pdbproc,
&TuxData.OrderStatusData, iDeadlockRetry);

	if (bError == TRUE)
		TuxData.OrderStatusData.retval = -1;

	if ( verbose )
		TMLog(" ORDERSTATUS: Return Value %d  error =%d",
			TuxData.OrderStatusData.retval,
TuxData.OrderStatusData.error);

	memcpy( rqst->data, &TuxData, size);
#endif
	tpreturn( TPSUCCESS, 0, rqst->data, size, 0);
}

/* FUNCTION: int SQLOrderStatus(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int
iSyncId, DBPROCESS *dbproc, ORDER_STATUS_DATA *pOrderStatus, short
deadlock_retry)
 *
 * PURPOSE:	This function processes the Order Status transaction.
 *
 * ARGUMENTS:	EXTENSION_CONTROL_BLOCK	*pECB
	passed in structure pointer from inetsrv.
 *			int
	iTermId			terminal id of browser
 *			int
	iSyncId			sync id of browser
 *			DBPROCESS
	*dbproc			connection db process id
 *			ORDER_STATUS_DATA
	*pOrderStatus	pointer to Order Status data input/output structure
 *			short
	deadlock_retry	deadlock retry count
 *
 * RETURNS:		int	-1		max deadlock reached
 *				0		No orders found for
customer
 *				1		Transaction
successfull
 *
 * COMMENTS:	None
 *
 */

static int SQLOrderStatus(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int iSyncId,
DBPROCESS *dbproc, ORDER_STATUS_DATA *pOrderStatus, short deadlock_retry)
{
	RETCODE			rc;
	int			tryit;
	int			i;
	char		printbuf[25];
//	BOOL		by_name;
	DBDATETIME	datetime;
	BYTE		*pData;
	PECBINFO	pEcbInfo;

	if ( (pEcbInfo = (PECBINFO)dbgetuserdata(dbproc) )
	{
		pEcbInfo->pECB = pECB;
		pEcbInfo->bFailed = FALSE;
		pEcbInfo->iTermId = iTermId;
		pEcbInfo->iSyncId = iSyncId;
	}

	pOrderStatus->num_deadlocks = 0;
//	if (pOrderStatus->c_id == 0)
//		by_name = TRUE;
//	else
//		by_name = FALSE;

	for (tryit=0; tryit < deadlock_retry; tryit++)
	{
		if (dbrpcinit(dbproc, "tpcc_orderstatus", 0) == SUCCEED)
		{
			dbrpcparam(dbproc, NULL, 0, SQLINT2, -1, -1, (BYTE *)
&pOrderStatus->w_id);
			dbrpcparam(dbproc, NULL, 0, SQLINT1, -1, -1, (BYTE *)
&pOrderStatus->d_id);
			dbrpcparam(dbproc, NULL, 0, SQLINT4, -1, -1, (BYTE *)
&pOrderStatus->c_id);
			if (pOrderStatus->c_id == 0)
			{
				dbrpcparam(dbproc, NULL, 0, SQLCHAR, -1,
strlen(pOrderStatus->c_last), pOrderStatus->c_last);
			}
		}
		if (dbrpcexec(dbproc) == SUCCEED)
		{
			while (((rc = dbresults(dbproc)) != NO_MORE_RESULTS) &&
(rc != FAIL))
			{
				if (DBROWS(dbproc) && (dbnumcols(dbproc) == 5)
				{
					i=0;
```

```
                                        while (((rc = dbnextrow(dbproc)) !=
NO_MORE_ROWS) && (rc != FAIL))
                                        {
                                                if(pData=dbdata(dbproc, 1))
                                                        pOrderStatus-
>OlOrderStatusData[i].ol_supply_w_id = (*(DBSMALLINT *) pData);
                                                if(pData=dbdata(dbproc, 2))
                                                        pOrderStatus-
>OlOrderStatusData[i].ol_i_id = (*(DBINT *) pData);
                                                if(pData=dbdata(dbproc, 3))
                                                        pOrderStatus-
>OlOrderStatusData[i].ol_quantity = (*(DBSMALLINT *) pData);
                                                if(pData=dbdata(dbproc, 4)
                                                        pOrderStatus-
>OlOrderStatusData[i].ol_amount = (*(DBFLT8 *) pData);
                                                if(pData=dbdata(dbproc, 5))
                                                {
                                                        datetime =
*((DBDATETIME *) pData);
                                                        dbdatecrack(dbproc,
&pOrderStatus->OlOrderStatusData[i].ol_delivery_d, &datetime);
                                                }
                                                i++;
                                        }
                                        pOrderStatus->o_ol_cnt = i;
                                }
                                else if (DBROWS(dbproc) && (dbnumcols(dbproc) ==
8))
                                {
                                        while (((rc = dbnextrow(dbproc)) !=
NO_MORE_ROWS) && (rc != FAIL))
                                        {
                                                if(pData=dbdata(dbproc, 1))
                                                        pOrderStatus->c_id =
(*(DBINT *) pData);
                                                if(pData=dbdata(dbproc, 2))

        UtilStrCpy(pOrderStatus->c_last, pData, dbdatlen(dbproc,2));
                                                if(pData=dbdata(dbproc, 3))

        UtilStrCpy(pOrderStatus->c_first, pData, dbdatlen(dbproc,3));
                                                if(pData=dbdata(dbproc, 4))

        UtilStrCpy(pOrderStatus->c_middle, pData, dbdatlen(dbproc, 4));
                                                if(pData=dbdata(dbproc, 5))
                                                {
                                                        datetime =
*((DBDATETIME *) pData);
                                                        dbdatecrack(dbproc
&pOrderStatus->o_entry_d, &datetime);
                                                }
                                                if(pData=dbdata(dbproc, 6))
                                                        pOrderStatus-
>o_carrier_id = (*(DBSMALLINT *) pData);
                                                if(pData=dbdata(dbproc, 7))
                                                        pOrderStatus-
>c_balance = (*(DBFLT8 *) pData);
                                                if(pData=dbdata(dbproc, 8))
                                                        pOrderStatus->o_id
(*(DBINT *) pData);
                                        }
                                }
                                if (i==0)
                                        return 0; //"No orders found for customer
                        }
                }
                if (SQLDetectDeadlock(dbproc))
                {
                        pOrderStatus->num_deadlocks++;
                        sprintf(printbuf,"deadlock: retry: %d",pOrderStatus-
>num_deadlocks);
                        Sleep(DEADLOCKWAIT*tryit);
                }
                else
                {
                        if (pOrderStatus->c_id == 0 && pOrderStatus->c_last[0] == 0)
                        {
                                strcpy(pOrderStatus->execution_status,"Invalid
Customer id,name.");
                                pOrderStatus->error=ERR_NOSUCH_CUSTOMEF

                                TMLog(" ORDERSTATUS: No such customer ");
                        }
                        else
                                strcpy(pOrderStatus->execution_status,"Transactio
commited.");
                        return 1;
                }
        }
        // If we reached here, it means we quit after MAX_RETRY deadlocks
        strcpy(pOrderStatus->execution_status,"Hit deadlock max.  ");
        pOrderStatus->error=ERR_TYPE_DEADLOCK;
        return -1; //"deadlock max retry reached!"
}

/*
```

```
 *          Common Code for all Servers
 */

 /* FUNCTION: BOOL SQLInit()
 *
 * PURPOSE:        This function initializes SQL Server for later use.
 *
 *
 * RETURNS:                BOOL    FALSE   if successfull
 *                                                 TRUE    if an error occurs and
connection cannot be established.
 *
 * COMMENTS:       None
 *
 */
BOOL SQLInit ()
{

        dbinit();

        if ( dbgetmaxprocs() < iMaxConnections )
        {
                if ( dbsetmaxprocs(iMaxConnections) == FAIL )
                {
                        //set for fail error message when HttpExtensionProc() is called
because
                        //at this point we don't have a pECB so no way to show error
message.
                        iMaxConnections = -1;
                }
        }

        // install error and message handlers
        dbmsghandle((DBMSGHANDLE_PROC)msg_handler);
        dberrhandle((DBERRHANDLE_PROC)err_handler);

        return TRUE;
}


/* FUNCTION: BOOL SQLOpenConnection(EXTENSION_CONTROL_BLOCK      *pECB, int
iTermId, int iSyncId, DBPROCESS **dbproc, char *server, char *database, char *user, char
*password, char *app, int *spid, long *pack_size)
 *
 * PURPOSE:        This function opens the sqlconnection for use.
 *
 * ARGUMENTS:     EXTENSION_CONTROL_BLOCK          *pECB     passed in structure
pointer from inetsrv.
 *                                                 int                             iTermId
        terminal id of browser
 *                                                 int                             iSyncId
        sync id of browser
 *                                                 DBPROCESS               **dbproc  pointer to
returned DBPROCESS
 *                                                 char                    *server
        SQL server name
 *                                                 char                    *databaseSQL serv
database
 *                                                 char                    *user
        user name
 *                                                 char                    *password
        user password
 *                                                 char                    *app
        pointer to returned application array
 *                                                 int                             *spid
        pointer to returned spid
 *                                                 long                    *pack_size
        pointer to returned default pack size
 *
 * RETURNS:                BOOL    FALSE   if successfull
 *                                                         TRUE    if an error occurs
 *
 * COMMENTS:       None
 *
 */


#ifdef USE_ODBC
        static BOOL SQLOpenConnection(EXTENSION_CONTROL_BLOCK *pECB, int
iTermId, int iSyncId, DBPROCESS **dbproc, char *server, char *database, char *user, char
*password, char *app, int *spid, long *pack_size)
        {

                RETCODE         rc;
                char    buffer[30];

                *dbproc = (DBPROCESS *)malloc(sizeof(DBPROCESS));
                if ( !*dbproc )
                        return TRUE;

                //set pECB data into dbproc
                (*dbproc)->bDeadlock = FALSE;
                (*dbproc)->bFailed = FALSE;
                (*dbproc)->pECB = pECB;
                (*dbproc)->iTermId = iTermId;
                (*dbproc)->iSyncId = iSyncId;
```

```
                if ( SQLAllocConnect(henv, &(*dbproc)->hdbc) == SQL_ERROR )
                        return TRUE;

                if ( SQLSetConnectOption((*dbproc)->hdbc, SQL_PACKET_SIZE,
pack_size) == SQL_ERROR )
                        return TRUE;

                rc = SQLConnect((*dbproc)->hdbc, server, SQL_NTS, user, SQL_NTS,
password, SQL_NTS);
                if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
                        return TRUE;
                rc = SQLAllocStmt((*dbproc)->hdbc, &(*dbproc)->hstmt);
                if (rc == SQL_ERROR)
                        return TRUE;

                sprintf(buffer,"use %s", Client->database);

                rc = SQLExecDirect((*dbproc)->hstmt, buffer, SQL_NTS);
                if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
                        return TRUE;

                SQLFreeStmt((*dbproc)->hstmt, SQL_CLOSE);
                sprintf(buffer,"set nocount on");
                rc = SQLExecDirect((*dbproc)->hstmt, buffer, SQL_NTS);
                if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
                        return TRUE;
                SQLFreeStmt((*dbproc)->hstmt, SQL_CLOSE);

                sprintf(buffer,"select @@spid");

                rc = SQLExecDirect((*dbproc)->hstmt, buffer, SQL_NTS);
                if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
                        return TRUE;

                if ( SQLBindCol((*dbproc)->hstmt, 1, SQL_C_SSHORT, &(*dbproc)->spid,
0, NULL) == SQL_ERROR )
                        return TRUE;

                if ( SQLFetch((*dbproc)->hstmt) == SQL_ERROR )
                        return TRUE;

                SQLFreeStmt((*dbproc)->hstmt, SQL_CLOSE);

                return FALSE;
        }
```

```
#else

        static BOOL SQLOpenConnection(EXTENSION_CONTROL_BLOCK *pECB,int
iTermId, int iSyncId, DBPROCESS **dbproc, char *server, char *database, char *user, char
*password, char *app, int *spid)
        {
                LOGINREC        *login;
                PECBINFO        pEcbInfo;

                //set local msg proc for login record
                //attach pECB record

                //this is necessary as dblib provides no way to pass user data in a login
structure. So until
                //there is an allocated dbproc we need to use a static which means that
login attempt must
                //be serialized.

                gpECB = pECB;

                login = dblogin();
                if ( !*user )
                        DBSETLUSER(login, "sa");
                else
                        DBSETLUSER(login, user);

                DBSETLPWD(login,  password);
                DBSETLHOST(login, app);

//              Do not set the packet size.  Use the size set up in SQL Server.
//              DBSETLPACKET(login, (unsigned short)DEFCLPACKSIZE);

//              This can potentially cut down on data conversion
                DBSETLVERSION(login, DBVER60);

                if ((*dbproc = dbopen(login, server )) == NULL)
                        return TRUE;

                //set pECB data into dbproc
                pEcbInfo = (PECBINFO)malloc(sizeof(ECBINFO));
                pEcbInfo->bDeadlock = FALSE;
                pEcbInfo->pECB = pECB;
                pEcbInfo->iTermId = iTermId;
                pEcbInfo->iSyncId = iSyncId;
                dbsetuserdata(*dbproc, pEcbInfo);

                // Use the the right database
                dbuse(*dbproc, database);
```

```
		dbcmd(*dbproc, "select @@spid");

		dbsqlexec(*dbproc);
		while (dbresults(*dbproc) != NO_MORE_RESULTS)
		{
			dbbind(*dbproc, 1, SMALLBIND, (DBINT) 0, (BYTE *) spid);
			while (dbnextrow(*dbproc) != NO_MORE_ROWS)
			;
		}
		dbcmd(*dbproc, "set nocount on");
		dbsqlexec(*dbproc);
		while (dbresults(*dbproc) != NO_MORE_RESULTS)
		{
			while (dbnextrow(*dbproc) != NO_MORE_ROWS)
			;
		}

		//rollback transaction on abort
		dbcmd(*dbproc, "set XACT_ABORT ON");

		dbsqlexec(*dbproc);
		while (dbresults(*dbproc) != NO_MORE_RESULTS)
		{
			while (dbnextrow(*dbproc) != NO_MORE_ROWS)
			;
		}

		return FALSE;
	}

#endif

/* FUNCTION: BOOL SQLCloseConnection(EXTENSION_CONTROL_BLOCK *pECB,
DBPROCESS *dbproc)
 *
 * PURPOSE:	This function closes the sql connection.
 *
 * ARGUMENTS:	EXTENSION_CONTROL_BLOCK	*pECB	passed in structure
pointer from inetsrv.
 *			DBPROCESS		*dbproc	pointer to
DBPROCESS
 *
 * RETURNS:		BOOL	FALSE	if successfull
 *					TRUE	if an error occurs
 *
 * COMMENTS:	None
 *
 */

#ifdef USE_ODBC
	static BOOL SQLCloseConnection(EXTENSION_CONTROL_BLOCK *pECB,
DBPROCESS *dbproc)
	{
		if ( dbproc )
		{
			SQLFreeStmt(dbproc->hstmt, SQL_DROP);
			SQLDisconnect(dbproc->hdbc);
			SQLFreeConnect(dbproc->hdbc);
			free(dbproc);
			dbproc = NULL;
		}
		return FALSE;
	}
#else
	static BOOL SQLCloseConnection(EXTENSION_CONTROL_BLOCK *pECB,
DBPROCESS *dbproc)
	{
		if (dbclose(dbproc) == FAIL)
			return TRUE;
		return FALSE;
	}
#endif

/* FUNCTION: BOOL SQLDetectDeadlock(DBPROCESS *dbproc)
 *
 * PURPOSE:	This function checks to see if a sql server deadlock condition exists.
 *
 * ARGUMENTS:	DBPROCESS			*dbproc
	connection db process id to check
 *
 * RETURNS:		BOOL	FALSE		no deadlock detected
 *					TRUE		deadlock
condition exists
 *
 * COMMENTS:	None
 *
 */

BOOL SQLDetectDeadlock(DBPROCESS *dbproc)
{
	PECBINFO	pEcbInfo;

	if ( (pEcbInfo = (PECBINFO)dbgetuserdata(dbproc)) )
	{
		if ( pEcbInfo->bDeadlock )
```

```
                {
                        pEcbInfo->bDeadlock = FALSE;
                        return TRUE;
                }
        }
        return FALSE;
}

// Lifted from HP FDR since they did such a nice job
void TMLog( char *format, ... )
{
        va_list args;
        char buf[4096];
        int len;
        va_start( args, format );
        _strtime( buf );
        strcat( buf," ");
        len = strlen( buf );
        (void)_vsnprintf( buf+ len, sizeof( buf) - len - 1, format, args);
        buf[sizeof( buf )- 1]= '\0';
        va_end( args );
        userlog( buf );
}

/* FUNCTION: void UtilStrCpy(char *pDest, char *pSrc, int n)
 *
 * PURPOSE:      This function copies n characters from string pSrc to pDst and places a
 *                      null character at the end of the destination string.
 *
 * ARGUMENTS:    char                    *pDest     destination string pointer
 *                      char                    *pSrc      source
string pointer
 *                      int                     n
        number of characters to copy
 *
 * RETURNS:              None
 *
 * COMMENTS:     Unlike strncpy this function ensures that the result string is
 *                      always null terminated.
 *
 */

static void UtilStrCpy(char *pDest, char *pSrc, int n)
{
   strncpy(pDest, pSrc, n);
   pDest[n] = '\0';

        return;
}

/* FUNCTION: int err_handler(DBPROCESS *dbproc, int severity, int dberr, int oserr, char
*dberrstr, char *oserrstr)
 *
 * PURPOSE:      This function handles DB-Library errors
 *
 * ARGUMENTS:    DBPROCESS               *dbproc
        DBPROCESS id pointer
 *                      int                     severity
        severity of error
 *                      int                     dberr
                error id
 *                      int                     oserr
                operating system specific error code
 *                      char                    *dberrstr
        printable error description of dberr
 *                      char                    *oserrstr
        printable error description of oserr
 *
 * RETURNS:              int                     INT_CONTINUE
        continue if error is SQLETIME else INT_CANCEL action
 *
 * COMMENTS:     None
 *
 */


int err_handler(DBPROCESS *dbproc, int severity, int dberr, int oserr, char *dberrstr, char
*oserrstr)
{
        PECBINFO                                pEcbInfo;
        EXTENSION_CONTROL_BLOCK         *pECB;
        FILE                                    *fp;
        SYSTEMTIME                              systemTime;
        char                                    szTmp[256];
        int                                             iTermId;
        int                                             iSyncId;

        pEcbInfo = NULL;

        if ((dbproc == NULL) || (DBDEAD(dbproc)))
        {
                TMLog("DBPROC is invalid");
                return INT_CANCEL;
        }

        if ( !(pEcbInfo = (PECBINFO)dbgetuserdata(dbproc)) )
```

```
	{
		pECB = gpECB;
		iTermId = 0;
		iSyncId = 0;
	}
	else
	{
		pECB = pEcbInfo->pECB;
		iTermId = pEcbInfo->iTermId;
		iSyncId = pEcbInfo->iSyncId;
	}

	if ( pEcbInfo && pEcbInfo->bFailed )
	{
		bError == FALSE;
		return INT_CANCEL;
	}

	if ( oserr != DBNOERR )
	{
		TMLog("DBLIB Error %s", oserrstr);
		if ( pEcbInfo )
		{
			pEcbInfo->bFailed = TRUE;
			bError = TRUE;
		}

		GetLocalTime(&systemTime);
		fp = fopen(szErrorLogPath, "ab");

		sprintf(szTmp, "ErrorHandler: DBLIB(%d): %s", oserr, oserrstr);

		TMLog("'%2.2d/%2.2d/%2.2d %2.2d:%2.2d:%2.2d\r\n\r\n%s\r\n\r\n",
			systemTime.wYear, systemTime.wMonth, systemTime.wDay,
			systemTime.wHour, systemTime.wMinute,
systemTime.wSecond,
			szTmp);

		fclose(fp);
	}
	return INT_CANCEL;
}


/* FUNCTION: int msg_handler(DBPROCESS *dbproc, DBINT msgno, int msgstate, int
severity, char *msgtext)
 *
 * PURPOSE:	This function handles DB-Library SQL Server error messages
 *
 * ARGUMENTS:	DBPROCESS		*dbproc
		DBPROCESS id pointer
 *		DBINT			msgno
		message number
 *		int			msgstate
		message state
 *		int			severity
		message severity
 *		char			*msgtext
		printable message description
 *
 * RETURNS:		int			INT_CONTINUE
		continue if error is SQLETIME else INT_CANCEL action
 *
		INT_CANCEL		cancel operation
 *
 * COMMENTS:	This function also sets the dead lock dbproc variable if necessary.
 *
 */

int msg_handler(DBPROCESS *dbproc, DBINT msgno, int msgstate, int severity, char
*msgtext)
{
	PECBINFO				pEcbInfo;
	EXTENSION_CONTROL_BLOCK		*pECB;
	FILE					*fp;
	SYSTEMTIME				systemTime;
	char					szTmp[256];
	int					iTermId;
	int					iSyncId;

	if ( !(pEcbInfo = (PECBINFO)dbgetuserdata(dbproc)) )
	{
		pECB = gpECB;
		iTermId = 0;
		iSyncId = 0;
	}
	else
	{
		pECB = pEcbInfo->pECB;
		iTermId = pEcbInfo->iTermId;
		iSyncId = pEcbInfo->iSyncId;
	}


	if ( (msgno == 5701) || (msgno == 2528) || (msgno == 5703) || (msgno == 6006) )
		return INT_CONTINUE;
```

```
	// deadlock message
	if (msgno == 1205)
	{
		// set the deadlock indicator
		if ( pEcbInfo )
			pEcbInfo->bDeadlock = TRUE;
		else
			TMLog("Error, dbgetuserdata returned NULL.");
		return INT_CONTINUE;
	}
	if ( pEcbInfo && pEcbInfo->bFailed )
	{
		TMLog("SQL Error ");
		return INT_CANCEL;
	}

	if (msgno == 0)
		return INT_CONTINUE;
	else
	{
		TMLog("MsgHandler: SQL Error %s", msgtext);

		if ( pEcbInfo )
			pEcbInfo->bFailed = TRUE;

		bError = TRUE;

		sprintf(szTmp, "Error: SQLSVR(%d): %s", msgno, msgtext);

		TMLog("%2.2d/%2.2d/%2.2d %2.2d:%2.2d:%2.2d\r\n\r\n%s\r\n\r\n",
			systemTime.wYear, systemTime.wMonth, systemTime.wDay,
			systemTime.wHour, systemTime.wMinute,
systemTime.wSecond,
			szTmp);
	}
	return INT_CANCEL;
}


/* FUNCTION: BOOL GetParameters(int argc, char *argv[])
 *
 * PURPOSE:	This function parses the command line passed in to the delivery executable,
initializing
 *		and filling in global variable parameters.
 *
 * ARGUMENTS:	int		argc	number of command line arguments passed
to delivery
 *		char	*argv[]	array of command line argume
pointers
 *
 * RETURNS:		BOOL	FALSE	parameter read successfull
 *			TRUE	user has requested
parameter information screen be displayed.
 *
 * COMMENTS:	None
 *
 */

static BOOL GetParameters(int argc, char *argv[])
{
	int i;


	szServer[0]		= 0;
	szPassword[0]	= 0;
	bFlush			= FALSE;
	strcpy(szDatabase, "tpcc");
	strcpy(szUser, "sa");

	for(i=0; i<argc; i++)
	{
		if ( argv[i][0] == '-' || argv[i][0] == '/' )
		{
			switch(argv[i][1])
			{
				case 'S':
				case 's':
					strcpy(szServer, argv[i]+2);
					break;
				case 'V':
				case 'v':
					verbose = TRUE;
					break;
				case '?':
					return TRUE;
			}
		}
	}
	return FALSE;
}

/* FUNCTION: void PrintParameters(void)
 *
 * PURPOSE:	This function displays the supported command line flags.
 *
```

```
 * ARGUMENTS:     None
 *
 * RETURNS:               None
 *
 * COMMENTS:      None
 *
 */

static void PrintParameters(void)
{
        TMLog("Performance Tuning Corporation Tuxedo Kit");
        TMLog("   www.perftuning.com   (281) 251-3495  ");
        TMLog("OrderStatus: -S Server  [-v (verbose)]" );
        TMLog("OrderStatus: Server %s",         szServer);

}
```

A.12 stocklevel.c

```
/*      FILE:           STOCKLEVEL.C
 *
 *      Based on:Microsoft TPC-C Kit Ver. 3.00.000
 *
 *                              Copyright Microsoft, 1996
 *                              Copyright Performance Tuning Corporation, 1997
 *
 *      PURPOSE:        New Order Tuxedo Server.
 *      Author:         Philip Durr
 *                              philipdu@Microsoft.com
 *
 *  MODIFIED    Changed for modularity and to allow for the Tuxedo TM
 *
 *  Author:         Edward Whalen
 *                              Performance Tuning Corporation
 *                              ewhalen@perftuning.com
 */

#include <windows.h>
#include <process.h>
#include <stdio.h>
#include <stdarg.h>
#include <malloc.h>
#include <stdlib.h>
#include <string.h>
#include <time.h>
#include <sys\timeb.h>
#include <io.h>

#define DBNTWIN32
#include <sqlfront.h>
#include <sqldb.h>

#include "trans.h"                                              //tpckit transaction
header contains definations of structures specific to TPC-C
#include "httpext.h"                                    //ISAPI DLL information heade

#include "tpcc.h"                                               //this dlls specific
structure, value e.t. header.

#include <tmenv.h>
#include <xa.h>
#include <atmi.h>

BOOL    bLog                    = FALSE;
BOOL    bFlush;                                                 //Flush
delivery log info when written.
BOOL    verbose                 = FALSE;
BOOL    bError                  = FALSE;

int             iThreads        = 5;
int             iMaxWareHouses  = 500;
int             iDelayMs        = 100;
short   iMaxConnections = (short)1;
short   iDeadlockRetry  = (short)3;

DBPROCESS *pdbproc;

char                                    szServer[32];
        //SQL server name
char                                    szDatabase[32];
        //tpcc database name
char                                    szUser[32];
                //user name
char                                    szPassword[32];
        //user password
int spId;

#ifdef LOCAL_ALLOC
STOCK_LEVEL_DATA StockLevelData;
#else
TUX_DATA TuxData;
#endif
TERM Term;

static charszTpccLogPath[256];          //path to html log file if logging turned on in registry.
```

```
static char szErrorLogPath[256];          //path to error log file

static    CRITICAL_SECTION                CriticalSection;
static    CRITICAL_SECTION                ErrorLogCriticalSection;
static    EXTENSION_CONTROL_BLOCK         *gpECB = NULL;
static    int                                                    bTpccExit;
          //exit delivery disconnect loop as dll exiting.

extern void TMLog();
extern BOOL SQLInit();
extern void UtilStrCpy();
extern void UtilStrCpy();
extern BOOL SQLOpenConnection();
extern BOOL SQLCloseConnection();
extern BOOL SQLDetectDeadlock();

/* FUNCTION: tpsvrinit ( int argc, char *argv[])
 *
 * PURPOSE:       Initialize the Server to Database connection.
 *
 * RETURNS:                int          0          Success
 *                                                 -1         Failure
 *
 *
 * COMMENTS:      None
 *
 */

int tpsvrinit ( int argc, char *argv[] )
{

          if ( GetParameters(argc, argv) )
          {
                    PrintParameters();
                    return -1;
          }

          if ( verbose )
                    TMLog("TPSVRINIT: StockLevel: Server %s, Database %s, User %s,
Password %s, Flush %d.",
                              szServer, szDatabase, szUser, szPassword, bFlush);


          if ( ! SQLInit() )
          {
                    TMLog( "STOCKLEVEL: SQLInit Failed" );
                    return -1;
          }

          if ( SQLOpenConnection ( NULL, 0, 0, &pdbproc, szServer, szDatabase, szUser,
szPassword, szDatabase, &spId))
          {
                    TMLog ( "STOCKLEVEL: SQLOpenConnection Failed" );
                    dbexit();
                    return -1;
          }
          return 0;
}

/* FUNCTION: tpsvrdone ( void )
 *
 * PURPOSE:       Initialize the Server to Database connection.
 *
 * RETURNS:                int          0          Success
 *                                                 -1         Failure
 *
 *
 * COMMENTS:      None
 *
 */

void tpsvrdone ( void )
{
          SQLCloseConnection( NULL, pdbproc);
          dbexit();
}


/* FUNCTION: STOCKLEVEL ( TPSVCINFO *rqst )
 *
 * PURPOSE:       Process a Stock Level request.
 *
 * RETURNS:                int          0          Success
 *                                                 -1         Failure
 *
 *
 * COMMENTS:      None
 *
 */

void STOCKLEVEL ( TPSVCINFO *rqst )
{
          PECBINFO pECBInfo = dbgetuserdata(pdbproc);
          int size = rqst->len;

#ifdef LOCAL_ALLOC
```

```
	memcpy(&StockLevelData, rqst->data, size);

	if (verbose )
	{
		TMLog(" STOCKLEVEL: w_id %d ", StockLevelData.w_id);
		TMLog(" STOCKLEVEL: d_id %d ", StockLevelData.d_id);
		TMLog(" STOCKLEVEL: c_id %d ", StockLevelData.thresh_hold);
	}

	bError = FALSE;

	StockLevelData.retval = SQLStockLevel( NULL, 0, 0, pdbproc, &StockLevelData,
iDeadlockRetry);


	if (bError == TRUE)
		StockLevelData.retval = -1;

	if ( verbose )
		TMLog(" STOCKLEVEL: Return Value %d", StockLevelData.retval);

	memcpy( rqst->data, &StockLevelData, size);
#else
	memcpy(&TuxData, rqst->data, size);

	if (verbose )
	{
		TMLog(" STOCKLEVEL: w_id %d ", TuxData.StockLevelData.w_id);
		TMLog(" STOCKLEVEL: d_id %d ", TuxData.StockLevelData.d_id);
		TMLog(" STOCKLEVEL: c_id %d ", TuxData.StockLevelData.thresh_hold);
	}

	bError = FALSE;

	TuxData.StockLevelData.retval = SQLStockLevel( NULL, 0, 0, pdbproc,
&TuxData.StockLevelData, iDeadlockRetry);


	if (bError == TRUE)
		TuxData.StockLevelData.retval = -1;

	if ( verbose )
		TMLog(" STOCKLEVEL: Return Value %d",
TuxData.StockLevelData.retval);

	memcpy( rqst->data,&TuxData, size);
#endif
	tpreturn( TPSUCCESS, 0, rqst->data, size, 0);
}

/* FUNCTION: SQLStockLevel(EXTENSION_CONTROL_BLOCK	*pECB, int iTermId,
iSyncId, DBPROCESS *dbproc, STOCK_LEVEL_DATA *pStockLevel, short deadlock_retry)
 *
 * PURPOSE:	This function handles the stock level transaction.
 *
 * ARGUMENTS:	EXTENSION_CONTROL_BLOCK	*pECB
	passed in structure pointer from inetsrv.
 *				int
	iTermId			terminal id of browser
 *				int
	iSyncId			sync id of browser
 *				DBPROCESS
	*dbproc			connection db process id
 *				STOCK_LEVEL_DATA
	*pStockLevel	stock level input / output data structure
 *				short
	deadlock_retry	retry count if deadlocked
 *
 * RETURNS:		BOOL	FALSE		if successfull
 *					TRUE		if
deadlocked
 *
 * COMMENTS:	None
 *
 */

static BOOL SQLStockLevel(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int iSync
DBPROCESS *dbproc, STOCK_LEVEL_DATA *pStockLevel, short deadlock_retry)
{
	int			tryit;
	RETCODE			rc;
	char		printbuf[25];
	BYTE		*pData;
	PECBINFO	pEcbInfo;

	//update pECB and bFailed flag
	if ( (pEcbInfo = (PECBINFO)dbgetuserdata(dbproc)) )
	{
		pEcbInfo->pECB = pECB;
		pEcbInfo->bFailed = FALSE;
		pEcbInfo->iTermId = iTermId;
		pEcbInfo->iSyncId = iSyncId;
	}

	pStockLevel->num_deadlocks = 0;
```

```
	for (tryit=0; tryit < deadlock_retry; tryit++)
	{
		if (dbrpcinit(dbproc, "tpcc_stocklevel", 0) == SUCCEED)
		{
			dbrpcparam(dbproc, NULL, 0, SQLINT2, -1, -1, (BYTE *)
&pStockLevel->w_id);
			dbrpcparam(dbproc, NULL, 0, SQLINT1, -1, -1, (BYTE *)
&pStockLevel->d_id);
			dbrpcparam(dbproc, NULL, 0, SQLINT2, -1, -1, (BYTE *)
&pStockLevel->thresh_hold);

			if (dbrpcexec(dbproc) == SUCCEED)
			{
				while (((rc = dbresults(dbproc)) !=
NO_MORE_RESULTS) && (rc != FAIL))
				{
					if (DBROWS(dbproc))
					{
						while (((rc = dbnextrow(dbproc))
!= NO_MORE_ROWS) && (rc != FAIL))
						{

	if(pData=dbdata(dbproc, 1))

	pStockLevel->low_stock = *((long *) pData);
						}
					}
				}
			}
			if (SQLDetectDeadlock(dbproc))
			{
				pStockLevel->num_deadlocks++;
				sprintf(printbuf,"deadlock: retry: %d",pStockLevel-
>num_deadlocks);
				Sleep(10 * tryit);
			}
			else
			{
				strcpy(pStockLevel->execution_status, "Transaction commited.");
				return TRUE;
			}
	}

	// If we reached here, it means we quit after MAX_RETRY deadlocks
	strcpy(pStockLevel->execution_status, "Hit deadlock max. ");
	pStockLevel->error=ERR_TYPE_DEADLOCK;
	return -1;
}

/*
 *	Common Code for all Servers
 */

 /* FUNCTION: BOOL SQLInit()
 *
 * PURPOSE:	This function initializes SQL Server for later use.
 *
 *
 * RETURNS:		BOOL	FALSE	if successfull
 *					TRUE	if an error occurs an
connection cannot be established.
 *
 * COMMENTS:	None
 *
 */
BOOL SQLInit ()
{

	dbinit();

	if ( dbgetmaxprocs() < iMaxConnections )
	{
		if ( dbsetmaxprocs(iMaxConnections) == FAIL )
		{
			//set for fail error message when HttpExtensionProc() is called
because
			//at this point we don't have a pECB so no way to show error
message.
			iMaxConnections = -1;
		}
	}

	// install error and message handlers
	dbmsghandle((DBMSGHANDLE_PROC)msg_handler);
	dberrhandle((DBERRHANDLE_PROC)err_handler);

	return TRUE;
}


/* FUNCTION: BOOL SQLOpenConnection(EXTENSION_CONTROL_BLOCK	*pECB, int
iTermId, int iSyncId, DBPROCESS **dbproc, char *server, char *database, char *user, char
*password, char *app, int *spid, long *pack_size)
 *
 * PURPOSE:	This function opens the sql connection for use.
```

```
 *
 * ARGUMENTS:    EXTENSION_CONTROL_BLOCK      *pECB    passed in structure
pointer from inetsrv.
 *                                    int                                 iTermId
        terminal id of browser
 *                                    int                                 iSyncId
        sync id of browser
 *                                    DBPROCESS                 **dbproc  pointer to
returned DBPROCESS
 *                                    char                        *server
        SQL server name
 *                                    char                        *databaseSQL server
database
 *                                    char                        *user
        user name
 *                                    char                        *password
        user password
 *                                    char                        *app
        pointer to returned application array
 *                                    int                                 *spid
        pointer to returned spid
 *                                    long                        *pack_size
        pointer to returned default pack size
 *
 * RETURNS:                BOOL    FALSE    if successfull
 *                                                TRUE    if an error occurs
 *
 * COMMENTS:       None
 *
 */


#ifdef USE_ODBC
        static BOOL SQLOpenConnection(EXTENSION_CONTROL_BLOCK *pECB, int
iTermId, int iSyncId, DBPROCESS **dbproc, char *server, char *database, char *user, char
*password, char *app, int *spid, long *pack_size)
        {

                RETCODE         rc;
                char    buffer[30];

                *dbproc = (DBPROCESS *)malloc(sizeof(DBPROCESS));
                if ( !*dbproc )
                        return TRUE;

                //set pECB data into dbproc
                (*dbproc)->bDeadlock = FALSE;
                (*dbproc)->bFailed = FALSE;
                (*dbproc)->pECB = pECB;
                (*dbproc)->iTermId = iTermId;
                (*dbproc)->iSyncId = iSyncId;


                if ( SQLAllocConnect(henv, &(*dbproc)->hdbc) == SQL_ERROR )
                        return TRUE;

                if ( SQLSetConnectOption((*dbproc)->hdbc, SQL_PACKET_SIZE,
pack_size) == SQL_ERROR )
                        return TRUE;

                rc = SQLConnect((*dbproc)->hdbc, server, SQL_NTS, user, SQL_NTS,
password, SQL_NTS);
                if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
                        return TRUE;
                rc = SQLAllocStmt((*dbproc)->hdbc, &(*dbproc)->hstmt);
                if (rc == SQL_ERROR)
                        return TRUE;

                sprintf(buffer,"use %s", Client->database);

                rc = SQLExecDirect((*dbproc)->hstmt, buffer, SQL_NTS);
                if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
                        return TRUE;

                SQLFreeStmt((*dbproc)->hstmt, SQL_CLOSE);
                sprintf(buffer,"set nocount on");
                rc = SQLExecDirect((*dbproc)->hstmt, buffer, SQL_NTS);
                if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
                        return TRUE;
                SQLFreeStmt((*dbproc)->hstmt, SQL_CLOSE);

                sprintf(buffer,"select @@spid");

                rc = SQLExecDirect((*dbproc)->hstmt, buffer, SQL_NTS);
                if (rc != SQL_SUCCESS && rc != SQL_SUCCESS_WITH_INFO)
                        return TRUE;

                if ( SQLBindCol((*dbproc)->hstmt, 1, SQL_C_SSHORT, &(*dbproc)->sp
0, NULL) == SQL_ERROR )
                        return TRUE;

                if ( SQLFetch((*dbproc)->hstmt) == SQL_ERROR )
                        return TRUE;

                SQLFreeStmt((*dbproc)->hstmt, SQL_CLOSE);
```

```
                return FALSE;
        }

#else

        static BOOL SQLOpenConnection(EXTENSION_CONTROL_BLOCK *pECB, int
iTermId, int iSyncId, DBPROCESS **dbproc, char *server, char *database, char *user, char
*password, char *app, int *spid)
        {
                LOGINREC        *login;
                PECBINFO        pEcbInfo;

                //set local msg proc for login record
                //attach pECB record

                //this is necessary as dblib provides no way to pass user data in a login
structure. So until
                //there is an allocated dbproc we need to use a static which means that the
login attempt must
                //be serialized.

                gpECB = pECB;

                login = dblogin();
                if ( !*user )
                        DBSETLUSER(login, "sa");
                else
                        DBSETLUSER(login, user);

                DBSETLPWD(login,  password);
                DBSETLHOST(login, app);

//              Do not set the packet size.  Use the size set up in SQL Server.
//              DBSETLPACKET(login, (unsigned short)DEFCLPACKSIZE);

//              This can potentially cut down on data conversion
                DBSETLVERSION(login, DBVER60);

                if ((*dbproc = dbopen(login, server )) == NULL)
                        return TRUE;


                //set pECB data into dbproc
                pEcbInfo = (PECBINFO)malloc(sizeof(ECBINFO));
                pEcbInfo->bDeadlock = FALSE;
                pEcbInfo->pECB = pECB;
                pEcbInfo->iTermId = iTermId;
                pEcbInfo->iSyncId = iSyncId;
                dbsetuserdata(*dbproc, pEcbInfo);


                // Use the the right database
                dbuse(*dbproc, database);


                dbcmd(*dbproc, "select @@spid");

                dbsqlexec(*dbproc);
                while (dbresults(*dbproc) != NO_MORE_RESULTS)
                {
                        dbbind(*dbproc, 1, SMALLBIND, (DBINT) 0, (BYTE *) spid);
                        while (dbnextrow(*dbproc) != NO_MORE_ROWS)
                        ;
                }
                dbcmd(*dbproc, "set nocount on");

                dbsqlexec(*dbproc);
                while (dbresults(*dbproc) != NO_MORE_RESULTS)
                {
                        while (dbnextrow(*dbproc) != NO_MORE_ROWS)
                        ;
                }

                //rollback transaction on abort
                dbcmd(*dbproc, "set XACT_ABORT ON");

                dbsqlexec(*dbproc);
                while (dbresults(*dbproc) != NO_MORE_RESULTS)
                {
                        while (dbnextrow(*dbproc) != NO_MORE_ROWS)
                        ;
                }

                return FALSE;
        }

#endif

/* FUNCTION: BOOL SQLCloseConnection(EXTENSION_CONTROL_BLOCK *pECB,
DBPROCESS *dbproc)
 *
 * PURPOSE:     This function closes the sql connection.
 *
 * ARGUMENTS:   EXTENSION_CONTROL_BLOCK     *pECB   passed in structure
pointer from inetsrv.
```

```
 *                                      DBPROCESS                       *dbproc    pointer to
DBPROCESS
 *
 * RETURNS:                    BOOL      FALSE     if successfull
 *                                                         TRUE      if an error occurs
 *
 * COMMENTS:       None
 *
 */

#ifdef USE_ODBC
        static BOOL SQLCloseConnection(EXTENSION_CONTROL_BLOCK *pECB,
DBPROCESS *dbproc)
        {
                if ( dbproc )
                {
                        SQLFreeStmt(dbproc->hstmt, SQL_DROP);
                        SQLDisconnect(dbproc->hdbc);
                        SQLFreeConnect(dbproc->hdbc);
                        free(dbproc);
                        dbproc = NULL;
                }
                return FALSE;
        }
#else
        static BOOL SQLCloseConnection(EXTENSION_CONTROL_BLOCK *pECB,
DBPROCESS *dbproc)
        {
                if (dbclose(dbproc) == FAIL)
                        return TRUE;
                return FALSE;
        }
#endif

/* FUNCTION: BOOL SQLDetectDeadlock(DBPROCESS *dbproc)
 *
 * PURPOSE:        This function checks to see if a sql server deadlock condition exists.
 *
 * ARGUMENTS:      DBPROCESS                       *dbproc
        connection db process id to check
 *
 * RETURNS:                    BOOL      FALSE               no deadlock detected
 *                                                         TRUE                deadlock
condition exists
 *
 * COMMENTS:       None
 *
 */
```

```
BOOL SQLDetectDeadlock(DBPROCESS *dbproc)
{
        PECBINFO        pEcbInfo;

        if ( (pEcbInfo = (PECBINFO)dbgetuserdata(dbproc)) )
        {
                if ( pEcbInfo->bDeadlock )
                {
                        pEcbInfo->bDeadlock = FALSE;
                        return TRUE;
                }
        }
        return FALSE;
}

// Lifted from HP FDR since they did such a nice job
void TMLog( char *format, ... )
{
        va_list args;
        char buf[4096];
        int len;
        va_start( args, format );
        _strtime( buf );
        strcat( buf," ");
        len = strlen( buf );
        (void)_vsnprintf( buf+ len, sizeof( buf) - len - 1, format, args);
        buf[sizeof( buf )- 1]= '\0';
        va_end( args );
        userlog( buf );
}

/* FUNCTION: void UtilStrCpy(char *pDest, char *pSrc, int n)
 *
 * PURPOSE:        This function copies n characters from string pSrc to pDst and places a
 *                      null character at the end of the destination string.
 *
 * ARGUMENTS:      char                            *pDest      destination string pointer
 *                                      char                            *pSrc       source
string pointer
 *                                      int                                     n
        number of characters to copy
 *
 * RETURNS:                    None
 *
 * COMMENTS:       Unlike strncpy this function ensures that the result string is
 *                                      always null terminated.
 *
```

```
 */

static void UtilStrCpy(char *pDest, char *pSrc, int n)
{
   strncpy(pDest, pSrc, n);
   pDest[n] = '\0';

        return;
}

/* FUNCTION: int err_handler(DBPROCESS *dbproc, int severity, int dberr, int oserr, char
*dberrstr, char *oserrstr)
 *
 * PURPOSE:      This function handles DB-Library errors
 *
 * ARGUMENTS:    DBPROCESS               *dbproc
        DBPROCESS id pointer
 *                                      int                             severity
        severity of error
 *                                      int                             dberr
                error id
 *                                      int                             oserr
                operating system specific error code
 *                                      char                    *dberrstr
        printable error description of dberr
 *                                      char                    *oserrstr
        printable error description of oserr
 *
 * RETURNS:              int                                     INT_CONTINUE
        continue if error is SQLETIME else INT_CANCEL action
 *
 * COMMENTS:     None
 *
 */


int err_handler(DBPROCESS *dbproc, int severity, int dberr, int oserr, char *dberrstr, char
*oserrstr)
{
        PECBINFO                                pEcbInfo;
        EXTENSION_CONTROL_BLOCK         *pECB;
        FILE                                    *fp;
        SYSTEMTIME                              systemTime;
        char                                    szTmp[256];
        int                                             iTermId;
        int                                             iSyncId;

        pEcbInfo = NULL;

        if ((dbproc == NULL) || (DBDEAD(dbproc)))
        {
                TMLog("DBPROC is invalid");
                return INT_CANCEL;
        }

        if ( !(pEcbInfo = (PECBINFO)dbgetuserdata(dbproc)) )
        {
                pECB = gpECB;
                iTermId = 0;
                iSyncId = 0;
        }
        else
        {
                pECB = pEcbInfo->pECB;
                iTermId = pEcbInfo->iTermId;
                iSyncId = pEcbInfo->iSyncId;
        }

        if ( pEcbInfo && pEcbInfo->bFailed )
        {
                bError == FALSE;
                return INT_CANCEL;
        }

        if ( oserr != DBNOERR )
        {
                TMLog("DBLIB Error %s", oserrstr);
                if ( pEcbInfo )
                {
                        pEcbInfo->bFailed = TRUE;
                        bError = TRUE;
                }

                GetLocalTime(&systemTime);
                fp = fopen(szErrorLogPath, "ab");

                sprintf(szTmp, "ErrorHandler: DBLIB(%d): %s", oserr, oserrstr);

                TMLog("%2.2d/%2.2d/%2.2d %2.2d:%2.2d:%2.2d\r\n\r\n%s\r\n\r\n",
                        systemTime.wYear, systemTime.wMonth, systemTime.wDay,
                        systemTime.wHour, systemTime.wMinute,
systemTime.wSecond,
                        szTmp);

                fclose(fp);
        }
```

```
	return INT_CANCEL;
}


/* FUNCTION: int msg_handler(DBPROCESS *dbproc, DBINT msgno, int msgstate, int
severity, char *msgtext)
 *
 * PURPOSE:	This function handles DB-Library SQL Server error messages
 *
 * ARGUMENTS:	DBPROCESS		*dbproc
	DBPROCESS id pointer
 *			DBINT			msgno
	message number
 *			int				msgstate
	message state
 *			int				severity
	message severity
 *			char			*msgtext
	printable message description
 *
 * RETURNS:		int			INT_CONTINUE
	continue if error is SQLETIME else INT_CANCEL action
 *
	INT_CANCEL		cancel operation
 *
 * COMMENTS:	This function also sets the dead lock dbproc variable if necessary.
 *
 */

int msg_handler(DBPROCESS *dbproc, DBINT msgno, int msgstate, int severity, char
*msgtext)
{
	PECBINFO				pEcbInfo;
	EXTENSION_CONTROL_BLOCK	*pECB;
	FILE					*fp;
	SYSTEMTIME				systemTime;
	char					szTmp[256];
	int						iTermId;
	int						iSyncId;

	if ( !(pEcbInfo = (PECBINFO)dbgetuserdata(dbproc)) )
	{
		pECB = gpECB;
		iTermId = 0;
		iSyncId = 0;
	}
	else
	{
		pECB = pEcbInfo->pECB;
		iTermId = pEcbInfo->iTermId;
		iSyncId = pEcbInfo->iSyncId;
	}


	if ( (msgno == 5701) || (msgno == 2528) || (msgno == 5703) ||(msgno == 6006) )
		return INT_CONTINUE;

	// deadlock message
	if (msgno == 1205)
	{
		// set the deadlock indicator
		if ( pEcbInfo )
			pEcbInfo->bDeadlock = TRUE;
		else
			TMLog("Error, dbgetuserdata returned NULL.");
		return INT_CONTINUE;
	}
	if ( pEcbInfo && pEcbInfo->bFailed )
	{
		TMLog("SQL Error ");
		return INT_CANCEL;
	}

	if (msgno == 0)
		return INT_CONTINUE;
	else
	{
		TMLog("MsgHandler: SQL Error %s", msgtext);

		if ( pEcbInfo )
			pEcbInfo->bFailed = TRUE;

		bError = TRUE;

		sprintf(szTmp, "Error: SQLSVR(%d): %s", msgno, msgtext);

		TMLog("%2.2d/%2.2d/%2.2d %2.2d:%2.2d:%2.2d\r\n\r\n%s\r\n\r\n",
			systemTime.wYear, systemTime.wMonth, systemTime.wDay
			systemTime.wHour, systemTime.wMinute,
systemTime.wSecond,
			szTmp);
	}
	return INT_CANCEL;
}
```

```
/* FUNCTION: BOOL GetParameters(int argc, char *argv[])
 *
 * PURPOSE:        This function parses the command line passed in to the delivery executable,
initializing
 *                              and filling in global variable parameters.
 *
 * ARGUMENTS:    int                     argc        number of command line arguments passed
to delivery
 *                              char        *argv[]     array of command line argument
pointers
 *
 * RETURNS:                BOOL    FALSE   parameter read successfull
 *                                                      TRUE    user has requested
parameter information screen be displayed.
 *
 * COMMENTS:      None
 *
 */

static BOOL GetParameters(int argc, char *argv[])
{
        int i;

        szServer[0]                     = 0;
        szPassword[0]       = 0;
        bFlush                          = FALSE;
        strcpy(szDatabase, "tpcc");
        strcpy(szUser, "sa");

        for(i=0; i<argc; i++)
        {
                if ( argv[i][0] == '-' II argv[i][0] == '/' )
                {
                        switch(argv[i][1])
                        {
                                case 'S':
                                case 's':
                                        strcpy(szServer, argv[i]+2);
                                        break;
                                case 'V':
                                case 'v':
                                        verbose = TRUE;
                                        break;
                                case '?':
                                        return TRUE;
                        }
                }
        }
        return FALSE;
}

/* FUNCTION: void PrintParameters(void)
 *
 * PURPOSE:        This function displays the supported command line flags.
 *
 * ARGUMENTS:    None
 *
 * RETURNS:                None
 *
 * COMMENTS:      None
 *
 */

static void PrintParameters(void)
{
        TMLog("Performance Tuning Corporation Tuxedo Kit");
        TMLog("   www.perftuning.com   (281) 251-3495  ");
        TMLog("StockLevel: -S Server [-v (verbose)]" );
        TMLog("StockLevel: Server %s", szServer);

}
```

A.13 tpcc.c

```
/*      FILE:           TPCC.C
 *
 *      Based on:Microsoft TPC-C Kit Ver. 3.00.000
 *
 *                              Copyright Microsoft, 1996
 *                              Copyright Performance Tuning Corporation, 1997
 *
 *      PURPOSE:        TPC-C main program.
 *      Author:         Philip Durr
 *                              philipdu@Microsoft.com
 *
 *  MODIFIED    Changed for modularity and to allow for the Tuxedo TM
 *
 *  Author:         Edward Whalen
 *                              Performance Tuning Corporation
 *                              ewhalen@perftuning.com
 *
*/


#include <windows.h>
#include <process.h>
```

```
#include <stdio.h>
#include <stdarg.h>
#include <malloc.h>
#include <stdlib.h>
#include <string.h>
#include <time.h>
#include <sys\timeb.h>
#include <io.h>

#define DBNTWIN32
#include <sqlfront.h>
#include <sqldb.h>

#include "trans.h"                                          //tpckit transaction
header contains definations of structures specific to TPC-C
#include "httpext.h"                                        //ISAPI DLL information header

#include "tpcc.h"                                           //this dlls specific
structure, value e.t. header.

#include <tmenv.h>
#include <xa.h>
#include <atmi.h>

static TPINIT       *tpinf;
static DWORD        TLSIsTpInitedKey;
static int          ThrTpInit();

char    szServer[32]        = "EDW";        //global variables used with this DLL
char    szUser[32]          = "sa";
char    szPassword[32]      = "";
char    szDatabase[32]      = "tpcc";

BOOL    bLog                = FALSE;
BOOL    dLog                = FALSE;

int             iThreads            = 5;
int             iMaxWareHouses      = 500;
int             iQSlotts            = 3000;
int             iDelayMs            = 100;
int             iConnectDelay       = 500;
short   iDeadlockRetry      = (short)3;
short   iMaxConnections = (short)25;
int             iErrVal             = 0;

//char buffer[256];

//allowable client command strings i.e. CMD=command

char *szCmds[] =
{
        "..NewOrder..", "..Payment..", "..Delivery..", "..Order-Status..", "..Stock-Level..",
"..Exit..",
        "Submit", "Begin", "Process", "Menu", "Clear", "Users", ""
};

//defined command string functions, called via CMD=command http string from html client.

void (*DoCmd[])(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int iSync
=
{
        NewOrderForm,
        PaymentForm,
        DeliveryForm,
        OrderStatusForm,
        StockLevelForm,
        Exitcmd,
        SubmitCmd,
        BeginCmd,
        ProcessCmd,
        MenuCmd,
        ClearCmd,
        NumberOfConnectionsCmd
};


//Terminal client id structure and interface defination
TERM    Term = { 0, 0, 0, FALSE, NULL, TermInit,TermAllocate, TermRestore, TermAdd,
TermDelete };

//welcome to tpc-c html form buffer, this is first form client sees.
static char*szWelcomeForm = "<HTML>"

        "<HEAD><TITLE>Welcome To TPC-C</TITLE></HEAD><BODY>"
                                                                        "Please
Identify your Warehouse and District for this session.<BR>"
                                                                        "<FORM
ACTION=\"tpcc.dll\" METHOD=\"GET\">"
                                                                        "<INPUT
TYPE=\"hidden\" NAME=\"STATUSID\" VALUE=\"0\">"
                                                                        "<INPUT
TYPE=\"hidden\" NAME=\"ERROR\" VALUE=\"0\">"
                                                                        "<INPUT
TYPE=\"hidden\" NAME=\"FORMID\" VALUE=\"1\">"
                                                                        "<INPUT
TYPE=\"hidden\" NAME=\"TERMID\" VALUE=\"-2\">"
                                                                        "<INPUT
```

```
TYPE=\"hidden\" NAME=\"SYNCID\" VALUE=\"0\">"
                                                                    "Warehouse
ID <INPUT NAME=\"w_id\" SIZE=4><BR>"
                                                                    "District ID
<INPUT NAME=\"d_id\" SIZE=2><BR>"
                                                                    "<HR>"
                                                                    "<INPUT
TYPE=\"submit\" NAME=\"CMD\" VALUE=\"Submit\">"

        "</FORM><BODY>"
                                                                    "</HTML>";


static charszTpccLogPath[256];          //path to html log file if logging turned on in registry.
static char szErrorLogPath[256];        //path to error log file.

static  CRITICAL_SECTION                CriticalSection;
static  CRITICAL_SECTION                ErrorLogCriticalSection;

static  EXTENSION_CONTROL_BLOCK         *gpECB;
static  int                                                 bTpccExit;
        //exit delivery disconnect loop as dll exiting.

/* FUNCTION: BOOL APIENTRY DllMain(HANDLE hModule, DWORD ul_reason_for_call,
LPVOID lpReserved)
 *
 * PURPOSE:     This function is the entry point for the DLL this implementation is baised on
the
 *                      fact that DLL_PROCESS_ATTACH is only called from the inet
service once. Connections
 *                      are sent to this function as thread attachments.
 *
 * ARGUMENTS:   HANDLE  hModule                                 module handle
 *                      DWORD   ul_reason_for_call  reason for call
 *                      LPVOID  lpReserved
        reserved for future use
 *
 * RETURNS:             BOOL    FALSE                                   errors
occured in initialization
 *                                              TRUE
        DLL successfully initialized
 *
 * COMMENTS:    None
 *
 */

BOOL APIENTRY DllMain(HANDLE hModule, DWORD ul_reason_for_call, LPVOID
lpReserved)
{
        int                                                 i;
        static SECURITY_ATTRIBUTES          sa;
        static PSECURITY_DESCRIPTOR pSD;

        switch( ul_reason_for_call )
        {
                case DLL_PROCESS_ATTACH:
                        if ( ReadRegistrySettings() )
                        {
                                MessageBox(NULL, "Cannot Find TPCC Key in
registry (run install.exe).", "Init", MB_OK | MB_ICONSTOP);
                                return FALSE;
                        }

                        InitializeCriticalSection(&CriticalSection);
                        InitializeCriticalSection(&ErrorLogCriticalSection);

                        (*Term.Init)();
                        if ( !(*Term.Allocate)() )
                        {
                                MessageBox(NULL, "Error Trm.Allocate().", "Init",
MB_OK | MB_ICONSTOP);
                                return FALSE;
                        }
                        for(i=Term.iNext; i<Term.iAvailable; i++)
                                Term.pClientData[i].inUse = 0;
                        Term.pClientData[0].inUse = 1;

                        TLSIsTpInitedKey = TlsAlloc(); // check for failure later
                        // assumption:value inited to 0
                        break;
                case DLL_THREAD_ATTACH:
                        break;
                case DLL_THREAD_DETACH:
                        if ( dLog )
                        {
                                SYSTEMTIME      systemTime;
                                FILE *fp;

                                GetLocalTime(&systemTime);
                                fp = fopen(szErrorLogPath, "ab");
                                fprintf(fp, "\r\nError: %2.2d/%2.2d/%2.2d
%2.2d:%2.2d:%2.2d\r\n",
                                        systemTime.wYear, systemTime.wMonth,
systemTime.wDay,
                                        systemTime.wHour, systemTime.wMinute,
systemTime.wSecond);
```

```
                                fprintf(fp, "DLL_THREAD_DETACH \r\n");
                                fclose(fp);
                        }
                        break;
                case DLL_PROCESS_DETACH:
                        if ( pSD )
                                free( pSD );

                        bTpccExit = TRUE;

                        (*Term.Restore)();

                        DeleteCriticalSection(&CriticalSection);
                        DeleteCriticalSection(&ErrorLogCriticalSection);

                        TlsFree(TLSIsTpInitedKey);
                        break;
        }
        return TRUE;
}


/* FUNCTION: BOOL WINAPI GetExtensionVersion(HSE_VERSION_INFO *pVer)
 *
 * PURPOSE:      This function is called by the inet service when the DLL is first loaded.
 *
 * ARGUMENTS:    HSE_VERSION_INFO        *pVer      passed in structure in which to
place expected version number.
 *
 * RETURNS:              TRUE     inet service expected return value.
 *
 * COMMENTS:     None
 *
 */

BOOL WINAPI GetExtensionVersion(HSE_VERSION_INFO *pVer)
{

        pVer->dwExtensionVersion = MAKELONG(HSE_VERSION_MINOR,
HSE_VERSION_MAJOR);
        lstrcpyn(pVer->lpszExtensionDesc, "TPC-C Server.",
HSE_MAX_EXT_DLL_NAME_LEN);

        return TRUE;
}

/* FUNCTION: DWORD WINAPI HttpExtensionProc(EXTENSION_CONTROL_BLOCK
*pECB)
 *
 * PURPOSE:      This function is the main entry point for the TPCC DLL. The internet ser
 *                      calls this function passing in the http string.
 *
 * ARGUMENTS:    EXTENSION_CONTROL_BLOCK         *pECB     structure pointer to
passed in internet
 *
                        service information.
 *
 * RETURNS:              DWORD  HSE_STATUS_SUCCESS
                connection can be dropped if error
 *
        HSE_STATUS_SUCCESS_AND_KEEP_CONN     keep connect valid comment s
 *
 * COMMENTS:     None
 *
 */

DWORD WINAPI HttpExtensionProc(EXTENSION_CONTROL_BLOCK *pECB)
{
        int iCmd, FormId, TermId, iSyncId;
        FILE *fp;

//      static BOOL bReadRegistry = FALSE;

        if ( iMaxConnections == -1 )
        {
                ErrorMessage(pECB, ERR_CAN_NOT_SET_MAX_CONNECTIONS,
ERR_TYPE_WEBDLL, NULL, -1, -1);
                return HSE_STATUS_SUCCESS;
        }

        //if registry setting is for html logging then show http string passed in.
        if ( bLog )
        {
                SYSTEMTIME      systemTime;

                fp = fopen(szTpccLogPath, "ab");

                GetLocalTime(&systemTime);

                fprintf(fp, "* QUERY * %2.2d/%2.2d/%2.2d
%2.2d:%2.2d:%2.2d\r\n\r\n%s\r\n\r\n",
                        systemTime.wYear, systemTime.wMonth, systemTime.wDay
                        systemTime.wHour, systemTime.wMinute,
systemTime.wSecond,
                        pECB->lpszQueryString);
                fclose(fp);
```

```
	}


	//process http query
	if ( !ProcessQueryString(pECB, &iCmd, &FormId, &TermId, &iSyncId) )
	{
		if ( TermId < 0 )
			ErrorMessage(pECB, ERR_INVALID_TERMID,
ERR_TYPE_WEBDLL, NULL, TermId, iSyncId);
		else
			ErrorMessage(pECB, ERR_COMMAND_UNDEFINED,
ERR_TYPE_WEBDLL, NULL, TermId, iSyncId);
		return HSE_STATUS_SUCCESS_AND_KEEP_CONN;
	}

	if ( TermId != 0 )
	{
		if ( !IsValidTermId(TermId) )
		{
			ErrorMessage(pECB, ERR_INVALID_TERMID,
ERR_TYPE_WEBDLL, NULL, TermId, iSyncId);
			return HSE_STATUS_SUCCESS_AND_KEEP_CONN;
		}

		//must have a valid syncid here since termid is valid
		if ( iSyncId < 1 || iSyncId != Term.pClientData[TermId].iSyncId )
		{
			ErrorMessage(pECB, ERR_INVALID_SYNC_CONNECTION,
ERR_TYPE_WEBDLL, NULL, TermId, iSyncId);
			return HSE_STATUS_SUCCESS_AND_KEEP_CONN;
		}

	}

	//set use time
	Term.pClientData[TermId]iTickCount = GetTickCount();

	//go execute http: command
	(*DoCmd[iCmd])(pECB, FormId, TermId, iSyncId);

	//finish up and keep connection
	return HSE_STATUS_SUCCESS_AND_KEEP_CONN;
}

/* FUNCTION: static BOOL IsValidTermId(int TermId)
 *
 * PURPOSE:	This function checks to see of the passed in terminal id is valid.
 *
 * ARGUMENTS:	int		TermId
 *		client terminal id
 *
 * RETURNS:		BOOL	FALSE
 *		Terminal ID Invalid
 *			TRUE
 *			Terminal ID valid
 *
 * COMMENTS:	None
 *
 */

static BOOL IsValidTermId(int TermId)
{
	return (BOOL) ( TermId > 0 && TermId <= Term.iAvailable &&
Term.pClientData[TermId].inUse );
}

/* FUNCTION: BOOL ProcessQueryString(EXTENSION_CONTROL_BLOCK *pECB, int
*pCmd, int *pFormId, int *pTermId, int *pSyncId)
 *
 * PURPOSE:	This function extracts the relevent information out of the http command
passed in from
 *			the browser.
 *
 * ARGUMENTS:	EXTENSION_CONTROL_BLOCK	*pECB		structure
pointer to passed in internet
 *
 *				service information.
 *				int		*pCmd
 *			returned command id
 *				int		*pFormId
 *			returned active form client browser is on
 *				int		*pTermId
 *			returned client terminal id
 *
 * RETURNS:		BOOL	FALSE
 *		success
 *				TRUE
 *			command passed in is invalid
 *
 * COMMENTS:	If this is the initial connection i.e. client is at welcome screen then
 *				there will not be a terminal id or current form id if th
the case
 *				then the pTermid and pFormid return values are
undefined.
 */
```

```
BOOL ProcessQueryString(EXTENSION_CONTROL_BLOCK *pECB, int *pCmd, int *pFormId,
int *pTermId, int *pSyncId)
{
	char *ptr;
	char szBuffer[25];
	char szTmp[25];
	char *dest = szBuffer;
	int i;

	if ( (ptr = strstr(pECB->lpszQueryString, "FORMID=")) )
		*pFormId = *(ptr+7) & 0x0F;

	if ( (ptr = strstr(pECB->lpszQueryString, "TERMID=")) )
	{
		*pTermId = atoi((ptr+7));
		if ( *pTermId == 0 )  //terminal id 0 used internally
			*pTermId = -1;
		if ( *pTermId == -2 ) //login screen
			*pTermId = 0;
	}
	else
		*pTermId = 0;


	if ( (ptr = strstr(pECB->lpszQueryString, "SYNCID=")) )
		*pSyncId = atoi((ptr+7));
	else
		*pSyncId = 0;

	if ( !(ptr = strstr(pECB->lpszQueryString, "CMD=")) )
	{

		ptr = szBuffer;
		if ( !stricmp(szBuffer, "Default") )
			strcpy(szBuffer, "CMD=Begin");
		switch( *pFormId )
		{
			case WELCOME_FORM:
				strcpy(szBuffer, "CMD=Submit");
				break;
			case MAIN_MENU_FORM:
				strcpy(szBuffer, "CMD=NewOrder");
				break;
			case NEW_ORDER_FORM:
			case PAYMENT_FORM:
			case DELIVERY_FORM:
			case ORDER_STATUS_FORM:
			case STOCK_LEVEL_FORM:
				if ( !(*pTermId) )
					return FALSE;
				if ( GetKeyValue(pECB->lpszQueryString, "PI*",
szTmp, sizeof(szTmp)) )
					strcpy(szBuffer, "CMD=Process");
				else
				{
					strcpy(szBuffer, "CMD=");
					strcat(szBuffer, szCmds[*pFormId -
NEW_ORDER_FORM]);
				}
				break;
			default:
				return FALSE;
		}
	}

	ptr += 4;

	while( *ptr && *ptr != '&' )
		*dest++ = *ptr++;
	*dest = 0;

	for(i=0; szCmds[i][0]; i++)
	{
		if ( !strcmp(szCmds[i], szBuffer) )
		{
			*pCmd = i;
			return TRUE;
		}
	}
	return FALSE;
}

/* FUNCTION: void NewOrderForm(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, i
iTermId, int iSyncId)
 *
 * PURPOSE:	This function wraps the functionality needed for the TPC-C New Order
Form.
 *
 * ARGUMENTS:	int 	iFormId
	unused
 *		int
	iTermId		id of calling browser, i.e. TERMID= from http command line
 *		EXTENSION_CONTROL_BLOCK	*pECB
	structure pointer to passed in internet
 *
		service information.
```

```
 *
 * RETURNS:              None
 *
 * COMMENTS:     None
 *
 */

void NewOrderForm(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int
iSyncId)
{
        WriteZString(pECB, MakeNewOrderForm(iTermId, iSyncId, FALSE, TRUE, FALSE));

        UNUSEDPARAM(iFormId);

        return;
}

/* FUNCTION: void PaymentForm(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int
iTermId, int iSyncId)
 *
 * PURPOSE:      This function wraps the functionality needed for the TPC-C Payment Form.
 *
 * ARGUMENTS:    int                                                     iFormId
        unused
 *                      int
        iTermId         id of calling browser, i.e. TERMID= from http command line
 *                      int
        iSyncId         sync id of calling browser
 *                      EXTENSION_CONTROL_BLOCK         *pECB
        structure pointer to passed in internet
 *
                        service information.
 * RETURNS:              None
 *
 * COMMENTS:     None
 *
 */

void PaymentForm(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int
iSyncId)
{
        WriteZString(pECB, MakePaymentForm(iTermId, iSyncId, TRUE) );

        UNUSEDPARAM(iFormId);

}
```

```
/* FUNCTION: void DeliveryForm(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int
iTermId, int iSyncId)
 *
 * PURPOSE:      This function wraps the functionality needed for the TPC-C Delivery Form
 *
 * ARGUMENTS:    int                                                     iFormId
        unused
 *                      int
        iTermId         id of calling browser, i.e. TERMID= from http command line
 *                      int
        iSyncId         sync id of calling browser
 *                      EXTENSION_CONTROL_BLOCK         *pECB
        structure pointer to passed in internet
 *
                        service information.
 * RETURNS:              None
 *
 * COMMENTS:     None
 *
 */

void DeliveryForm(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int
iSyncId)
{
//      WriteZString(pECB, MakeDeliveryForm(iTermId, iSyncId,TRUE) );
        WriteZString(pECB, MakeDeliveryForm(iTermId, iSyncId, TRUE, TRUE) );

        UNUSEDPARAM(iFormId);
}

/* FUNCTION: void OrderStatusForm(EXTENSION_CONTROL_BLOCK *pECB, int iFormId
int iTermId, int iSyncId)
 *
 * PURPOSE:      This function wraps the functionality needed for the TPC-C Order Status
Form.
 *
 * ARGUMENTS:    int                                                     iFormId
        unused
 *                      int
        iTermId         id of calling browser, i.e. TERMID= from http command line
 *                      int
        iSyncId         sync id of calling borwser
 *                      EXTENSION_CONTROL_BLOCK         *pECB
        structure pointer to passed in internet
 *
                        service information.
 * RETURNS:              None
 *
```

```
 * COMMENTS:      None
 *
 */

void OrderStatusForm(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int
iSyncId)
{
        WriteZString(pECB, MakeOrderStatusForm(iTermId, iSyncId, TRUE) );

        UNUSEDPARAM(iFormId);

}

/* FUNCTION: void StockLevelForm(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int
iTermId, int iSyncId)
 *
 * PURPOSE:       This function wraps the functionality needed for the TPC-C Stock Level
Form.
 *
 * ARGUMENTS:    int                                                    iFormId
        unused
 *                              int
        iTermId         id of calling browser, i.e. TERMID= from http command line
 *                              int
        iSyncId         sync id of calling browser
 *                              EXTENSION_CONTROL_BLOCK         *pECB
        structure pointer to passed in internet
 *
                                service information.
 * RETURNS:               None
 *
 * COMMENTS:      None
 *
 */

void StockLevelForm(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int
iSyncId)
{
        WriteZString(pECB, MakeStockLevelForm(iTermId, iSyncId, TRUE) );

        return;
}

/* FUNCTION: void Exitcmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId,
int iSyncId)
 *
 * PURPOSE:       This function removes a terminal id from use, the allocated structure
however remains
 *                              valid so the next request for a new client will not require a new
memory allocation.
 *
 * ARGUMENTS:    int                                                    iFormId
        unused
 *                              int
        iTermId         id of calling browser, i.e. TERMID= from http command line
 *                              int
        iSyncId         sync id of calling browser
 *                              EXTENSION_CONTROL_BLOCK         *pECB
        structure pointer to passed in internet
 *
                                service information.
 * RETURNS:               None
 *
 * COMMENTS:      None
 *
 */

void Exitcmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int iSyncId)
{
        (*Term.Delete)(pECB, iTermId);

        WriteZString(pECB, MakeWelcomeForm() );

        UNUSEDPARAM(iFormId);
        UNUSEDPARAM(iSyncId);

        return;
}

/* FUNCTION: void SubmitCmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int
iTermId, int iSyncId)
 *
 * PURPOSE:       This function allocated a new terminal id in the Term structure array.
 *
 * ARGUMENTS:    int                                                    iFormId
        unused
 *                              int
        iTermId         id of calling browser, i.e. TERMID= from http command line
 *                              int
        iSyncId         sync id of calling browser
 *                              EXTENSION_CONTROL_BLOCK         *pECB
        structure pointer to passed in internet
 *
                                service information.
 * RETURNS:               None
 *
```

```
 * COMMENTS:      A terminal id can be allocated but still be invalid if the requested warehouse
number
 *                                      is outside the range specified in the registry. This then
will force the client id
 *                                      to be invald and an error message sent to the users
browser.
 */

void SubmitCmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int iSyncId)
{
        int             iCurrent;

        if ( (iCurrent = (*Term.Add)(pECB, pECB->lpszQueryString)) < 0 )
        {
                ErrorMessage(pECB, ERR_CANNOT_INIT_TERMINAL,
ERR_TYPE_WEBDLL, NULL, iCurrent, iSyncId);
                return;
        }

        if ( Term.pClientData[iCurrent].w_id > iMaxWareHouses ||
Term.pClientData[iCurrent].w_id < 1 )
        {
                ErrorMessage(pECB, ERR_W_ID_INVALID, ERR_TYPE_WEBDLL,
NULL, iCurrent, iSyncId);
                (*Term.Delete)(pECB, iCurrent);
                return;
        }
        if ( Term.pClientData[iCurrent].d_id < 1 || Term.pClientData[iCurrent].d_id > 10 )
        {
                ErrorMessage(pECB, ERR_D_ID_INVALID, ERR_TYPE_WEBDLL,
NULL, iCurrent, iSyncId);
                (*Term.Delete)(pECB, iCurrent);
                return;
        }

        WriteZString(pECB, MakeMainMenuForm(iCurrent,
Term.pClientData[iCurrent].iSyncId) );

        return;
}

/* FUNCTION: void BeginCmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int
iTermId, int iSyncId)
 *
 * PURPOSE:       This function is the first command executed. It is executed with the
command
 *                              CMD=Begin?Server=xxx from the http command line.
 *
 * ARGUMENTS:     int                                                     iFormId
        unused
 *                                      int
        iTermId         id of calling browser, i.e. TERMID= from http command line
 *                                      int
        iSyncId         sync id of calling browser
 *                                      EXTENSION_CONTROL_BLOCK         *pECB
        structure pointer to passed in internet
 *
                                        service information.
 * RETURNS:               None
 *
 * COMMENTS:      SQL server must be specified, however the user and password parame
are optional.
 *                                      The complete command line is
CMD=Begin&Server=server&User=sa&Psw=&. The & are used
 *                                      to separate parameters which is internet browser
standard.
 */

void BeginCmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int iSyncI
{
        LPSTR pQueryString;

        pQueryString = pECB->lpszQueryString;

        WriteZString(pECB, MakeWelcomeForm() );

        UNUSEDPARAM(iFormId);

        return;
}

/* FUNCTION: void ProcessCmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int
iTermId, int iSyncId)
 *
 * PURPOSE:       This function process the passed in http command
 *
 * ARGUMENTS:     int                                                     iFormId
        unused
 *                                      int
        iTermId         id of calling browser, i.e. TERMID= from http command line
 *                                      int
        iSyncId         sync id of calling browser
 *                                      EXTENSION_CONTROL_BLOCK         *pECB
        structure pointer to passed in internet
 *
                                        service information.
```

```
 * RETURNS:                None
 *
 * COMMENTS:       None
 *
 */

void ProcessCmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int
iSyncId)
{
        switch( iFormId )
        {
                case WELCOME_FORM:
                        return;
                case MAIN_MENU_FORM:
                        return;
                case NEW_ORDER_FORM:
                        ProcessNewOrderForm(pECB, iTermId, iSyncId);
                        return;
                case PAYMENT_FORM:
                        ProcessPaymentForm(pECB, iTermId, iSyncId);
                        return;
                case DELIVERY_FORM:
                        ProcessDeliveryForm(pECB, iTermId, iSyncId);
                        return;
                case ORDER_STATUS_FORM:
                        ProcessOrderStatusForm(pECB, iTermId, iSyncId);
                        return;
                case STOCK_LEVEL_FORM:
                        ProcessStockLevelForm(pECB, iTermId, iSyncId);
                        return;
        }
}

/* FUNCTION: void ClearCmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int
iTermId, int iSyncId)
 *
 * PURPOSE:        This function frees all currently logged in terminal ids.
 *
 * ARGUMENTS:      int                                             iFormId
        unused
 *                              int
        iTermId         id of calling browser, i.e. TERMID= from http command line
 *                              int
        iSyncId         sync id of calling browser
 *                              EXTENSION_CONTROL_BLOCK         *pECB
        structure pointer to passed in internet
 *
                                service information.
 * RETURNS:                None
 *
 * COMMENTS:       Use this function with caution, it may cause unpredictable results
 *                              if existing browsers attempt to use the web client w
out
 *                              beginning at the login screen for each client.
 */

void ClearCmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int iSyncI
{
        int i;

        EnterCriticalSection(&CriticalSection);

        for(i=0; i<Term.iAvailable; i++)
        {
                if ( Term.pClientData[i].inUse )
                        (*Term.Delete)(pECB, i);
        }

        Term.iNext                      = 0;
        Term.iAvailable         = 0;
        Term.iMasterSyncId = 1;

        if ( Term.pClientData )
                free(Term.pClientData);
        Term.pClientData    = NULL;
        Term.bInit                      = FALSE;

        (*Term.Init)();
        if ( !(*Term.Allocate)() )
        {
                ErrorMessage(pECB, ERR_MAX_CONNECT_PARAM,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
                return;
        }
        for(i=Term.iNext; i<Term.iAvailable; i++)
                Term.pClientData[i].inUse = 0;
        Term.pClientData[0].inUse = 1;

        LeaveCriticalSection(&CriticalSection);

        WriteZString(pECB, MakeWelcomeForm() );

        return;
}

/* FUNCTION: void MenuCmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int
```

```
iTermId, int iSyncId)
 *
 * PURPOSE:        This function causes an exit to the main menu
 *
 * ARGUMENTS:    int                                                     iFormId
        unused
 *                                      int
        iTermId                 id of calling browser, i.e. TERMID= from http command line
 *                                      int
        iSyncId                 sync id of calling browser
 *                                      EXTENSION_CONTROL_BLOCK         *pECB
        structure pointer to passed in internet
 *
                                        service information.
 * RETURNS:                     None
 *
 * COMMENTS:      None
 *
 */

void MenuCmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int iSyncId)
{
        WriteZString(pECB, MakeMainMenuForm(iTermId, iSyncId) );

        return;
}

/* FUNCTION: void NumberOfConnectionsCmd(EXTENSION_CONTROL_BLOCK *pECB, int
iFormId, int iTermId, int iSyncId)
 *
 * PURPOSE:        This function returns to the browser the total number of active terminal ids
 *
 * ARGUMENTS:    int                                                     iFormId
        unused
 *                                      int
        iTermId                 id of calling browser, i.e. TERMID= from http command line
 *                                      int
        iSyncId                 sync id of calling browser
 *                                      EXTENSION_CONTROL_BLOCK         *pECB
        structure pointer to passed in internet
 *
                                        service information.
 * RETURNS:                     None
 *
 * COMMENTS:      None
 */
```

```
void NumberOfConnectionsCmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int
iTermId, int iSyncId)
{
        int i;
        int         iTotal;

        // EnterCriticalSection(&CriticalSection);

        iTotal = 0;

        for(i=0; i<Term.iAvailable; i++)
        {
                if ( Term.pClientData[i].inUse )
                        iTotal++;
        }

        // LeaveCriticalSection(&CriticalSection);

        h_printf(pECB, "Total Active Connections: %d", iTotal);

        return;
}

/* FUNCTION: void WriteZString(EXTENSION_CONTROL_BLOCK *pECB, char *szStr)
 *
 * PURPOSE:        This function is the low level output function. It writes a string of text bacl
the
 *                              client browser.
 *
 * ARGUMENTS:    EXTENSION_CONTROL_BLOCK         *pECB     passed in structure
pointer from inetsrv.
 *                                      char                            *szStr
        string to display in the client browser.
 *
 * RETURNS:                     None
 *
 * COMMENTS:      This function assumes that the string to written to the client browser has
 *                                      been formatted in an HTML manner.
 */

static void WriteZString(EXTENSION_CONTROL_BLOCK *pECB, char *szStr)
{
        FILE        *fp;
        int         lpbSize;
        int         iSize;
        char        szHeader[128];
        char        szHeader1[128];
```

```
	lpbSize = strlen(szStr)+1;

	if ( bLog )
	{
		SYSTEMTIME	systemTime;

		fp = fopen(szTpccLogPath, "ab");

		GetLocalTime(&systemTime);

		fprintf(fp, "* HTML PAGE * %2.2d/%2.2d/%2.2d
%2.2d:%2.2d:%2.2d\r\n\r\n%s\r\n\r\n",
				systemTime.wYear, systemTime.wMonth, systemTime.wDay,
				systemTime.wHour, systemTime.wMinute,
systemTime.wSecond,
				szStr);

		fclose(fp);
	}

	iSize = sprintf(szHeader, "200 Ok");
	sprintf(szHeader1, "Connection: keep-alive\r\nContent-type: text/html\r\nContent-
length: %d\r\n\r\n", lpbSize);


#ifdef PURE_PERFORMIX
	(*pECB->ServerSupportFunction)(pECB->ConnID,
HSE_REQ_DONE_WITH_SESSION, NULL, 0, 0);
#else
	(*pECB->ServerSupportFunction)(pECB->ConnID,
HSE_REQ_SEND_RESPONSE_HEADER, szHeader, &iSize, (LPDWORD)szHeader1);
#endif

	(*pECB->WriteClient)(pECB->ConnID, szStr, &lpbSize, 0);

	return;
}

/* FUNCTION: void h_printf(EXTENSION_CONTROL_BLOCK *pECB, char *format, ...)
 *
 * PURPOSE:	This function forms a high level printf for an HTML browser
 *
 * ARGUMENTS:	EXTENSION_CONTROL_BLOCK	*pECB	passed in structure
pointer from inetsrv.
 *				char				*format
	printf style format string
 *				...
				other arguments as required by printf style format string.
 *
 * RETURNS:			None
 *
 * COMMENTS:	This function is mainly used for developmental support.
 */

static void h_printf(EXTENSION_CONTROL_BLOCK *pECB, char *format, ...)
{
//	int lpbSize;
	char szBuff[512];
	char szTmp[512];

	va_list marker;
	va_start( marker, format );
	vsprintf(szTmp, format, marker);
	va_end( marker );

//	lpbSize = wsprintf(szBuff, "<html>%s</html>", szTmp) + 1;
//
//	(*pECB->WriteClient)(pECB->ConnID, szBuff, &lpbSize, 0);

	wsprintf(szBuff, "<html>%s</html>", szTmp) + 1;

	WriteZString(pECB, szBuff);

	return;
}

void LogTuxError( int TpErrno, char *ErrMessage )
{
	FILE *fp;
	SYSTEMTIME	systemTime;

	GetLocalTime(&systemTime);

	fp = fopen(szErrorLogPath, "ab");
	fprintf(fp, "\r\nError: %2.2d/%2.2d/%2.2d %2.2d:%2.2d:%2.2d\r\n",
		systemTime.wYear, systemTime.wMonth, systemTime.wDay,
		systemTime.wHour, systemTime.wMinute, systemTime.wSecond);
	fprintf(fp, "Thread %d: TPCCWEB(%d): %s: %s",
		GetCurrentThreadId(), TpErrno, tpstrerror(TpErrno), ErrMessage);
	fclose(fp);
}

/* FUNCTION: void ErrorMessage(EXTENSION_CONTROL_BLOCK *pECB, int iError, int
iErrorType, char *szMsg)
 *
 * PURPOSE:	This function displays an error message in the client browser.
```

```
 *
 * ARGUMENTS:    EXTENSION_CONTROL_BLOCK      *pECB     passed in structure
pointer from inetsrv.
 *                                    int                                   iError
                id of error message
 *                                    int                                   iErrorType
                error type, ERR_TYPE_SQL, ERR_TYPE_DBLIB, or
ERR_TYPE_WEBDLL
 *                                    int                                   iTermId
                terminal id from browser
 *                                    int                                   iSyncid
                sync id from browser
 *                                    char *                          szMsg
        optional error message string used with ERR_TYPE_SQL and
 *
                        ERR_TYPE_DBLIB
 *
 * RETURNS:              None
 *
 * COMMENTS:     If the error type is ERR_TYPE_WEBDLL the szmsg parameter may be
NULL because it
 *                                    is ignored. If the error type is ERR_TYPE_SQL or
ERR_TYPE_DBLIB then the szMsg
 *                                    parameter contains the text of the error message, so
the szMsg parameter cannot
 *                                    be NULL.
 *
 */


void ErrorMessage(EXTENSION_CONTROL_BLOCK *pECB, int iError, int iErrorType, char
*szMsg, int iTermId, int iSyncId)
{
        int i;
        SYSTEMTIME      systemTime;

        static SERRORMSG errorMsgs[] =
        {
                {       ERR_SUCCESS,
                "Success, no error."
                                                        },
                {       ERR_COMMAND_UNDEFINED,
                "Command undefined."
                                                                },
                {       ERR_NOT_IMPLEMENTED_YET,
        "Not Implemented Yet."
                                                        },
                {       ERR_CANNOT_INIT_TERMINAL,
"Cannot initialize clientconnection."
                },
                {       ERR_OUT_OF_MEMORY,
                "insufficient memory."
                                                                },
                {       ERR_NEW_ORDER_NOT_PROCESSED,
"Cannot process new Order form."
                                },
                {       ERR_PAYMENT_NOT_PROCESSED,
"Cannot process payment form."
                                        },
                {       ERR_NO_SERVER_SPECIFIED,
"No Server name specified."
                                        },
                {       ERR_ORDER_STATUS_NOT_PROCESSED,
"Cannot process order status form."
                                },
                {       ERR_W_ID_INVALID,
                "Invalid Warehouse ID."
                                                                },
                {       ERR_CAN_NOT_SET_MAX_CONNECTIONS,
"Insufficient memory to allocate # connections."
},
                {       ERR_NOSUCH_CUSTOMER,
                "No such customer."
                                                                },
                {       ERR_D_ID_INVALID,
                "Invalid District ID Must be 1 to 10."
                                },
                {       ERR_MAX_CONNECT_PARAM,
                "Max client connections exceeded, run install to increase."
},
                {       ERR_INVALID_SYNC_CONNECTION,
"Invalid Terminal Sync ID."
                                        },
                {       ERR_INVALID_TERMID,
                "Invalid Terminal ID."
                                                                },
                {       ERR_PAYMENT_INVALID_CUSTOMER,
"Payment Form, No such Customer."
                                },
                {       ERR_SQL_OPEN_CONNECTION,
"SQLOpenConnection API Failed."
                                        },
                {       ERR_STOCKLEVEL_MISSING_THRESHOLD_KEY,
"Stock Level missing Threshold key \"TT*\"."
                },
```

```
        {       ERR_STOCKLEVEL_THRESHOLD_INVALID,
"Stock Level Threshold invalid data type range = 1 99."                 },
        {       ERR_STOCKLEVEL_THRESHOLD_RANGE,
"Stock Level Threshold out of range, range must be 1 - 99."             },
        {       ERR_STOCKLEVEL_NOT_PROCESSED,
"Stock Level not processed."
                        },
        {       ERR_NEWORDER_FORM_MISSING_DID,
"New Order missing District key \"DID*\"."
        },
        {       ERR_NEWORDER_DISTRICT_INVALID,
"New Order District ID Invalid range 1 - 10."
        },
        {       ERR_NEWORDER_DISTRICT_RANGE,
"New Order District ID out of Range. Range = 1 - 10."
},
        {       ERR_NEWORDER_CUSTOMER_KEY,
"New Order missing Customer key \"CID*\"."
                        },
        {       ERR_NEWORDER_CUSTOMER_INVALID,
"New Order customer id invalid data type, range = 1 to 3000."           },
        {       ERR_NEWORDER_CUSTOMER_RANGE,
"New Order customer id out of range, range = 1 to 3000."                },
        {       ERR_NEWORDER_MISSING_IID_KEY,
"New Order missing Item Id key \"IID*\"."
        },
        {       ERR_NEWORDER_ITEM_BLANK_LINES,
"New Order blank order lines all orders must be continuous."            },
        {       ERR_NEWORDER_ITEMID_INVALID,
"New Order Item Id is wrong data type, must be numeric."                },
        {       ERR_NEWORDER_MISSING_SUPPW_KEY,
"New Order missing Supp_W key \"SP##*\"."
                        },
        {       ERR_NEWORDER_SUPPW_INVALID,
"New Order Supp_W invalid data type must be numeric."
},
        {       ERR_NEWORDER_MISSING_QTY_KEY,
"New Order Missing Qty key \"Qty##*\"."
                        },
        {       ERR_NEWORDER_QTY_INVALID,
"New Order Qty invalid must be numeric range 1 - 99."
},
        {       ERR_NEWORDER_SUPPW_RANGE,
"New Order Supp_W value out of range range = 1 - Max Warehouses." },
        {       ERR_NEWORDER_ITEMID_RANGE,
"New Order Item Id is out of range. Range = 1 to 999999."               },
```

```
        {       ERR_NEWORDER_QTY_RANGE,
        "New Order Qty is out of range. Range = 1 to 99."
        },
        {       ERR_PAYMENT_DISTRICT_INVALID,
"Payment District ID is invalid must be 1 - 10."
},
        {       ERR_NEWORDER_SUPPW_WITHOUT_ITEMID,
"New Order Supp_W field entered without a corrisponding Item_Id."       },
        {       ERR_NEWORDER_QTY_WITHOUT_ITEMID,
"New Order Qty entered without a corrisponding Item_Id."
        {       ERR_NEWORDER_NOITEMS_ENTERED,
"New Order Blank Items between items, items must be continuous."        },
        {       ERR_PAYMENT_MISSING_DID_KEY,
"Payment missing District Key \"DID*\"."
        },
        {       ERR_PAYMENT_DISTRICT_RANGE,
"Payment District Out of range, range = 1 - 10."
},
        {       ERR_PAYMENT_MISSING_CID_KEY,
"Payment missing Customer Key \"CID*\"."
                        },
        {       ERR_PAYMENT_CUSTOMER_INVALID,
"Payment Customer data type invalid, must be numeric."
},
        {       ERR_PAYMENT_MISSING_CLT,
"Payment missing Customer Last Name Key \"CLT*\"."
        },
        {       ERR_PAYMENT_LAST_NAME_TO_LONG,
"Payment Customer last name longer than 16 characters."
},
        {       ERR_PAYMENT_CUSTOMER_RANGE,
        "Payment Customer ID out of range, must be 1 to 3000."
        },
        {       ERR_PAYMENT_CID_AND_CLT,
"Payment Customer ID and Last Name entered must be one or other."       },
        {       ERR_PAYMENT_MISSING_CDI_KEY,
"Payment missing Customer district key \"CDI*\"."
},
        {       ERR_PAYMENT_CDI_INVALID,
"Payment Customer district invalid must be numeric."
},
        {       ERR_PAYMENT_CDI_RANGE,
        "Payment Customerdistrict out of range must be 1 - 10."
},
        {       ERR_PAYMENT_MISSING_CWI_KEY,
"Payment missing Customer Warehouse key \"CWI*\"."
        },
        {       ERR_PAYMENT_CWI_INVALID,
```

```
"Payment Customer Warehouse invalid must be numeric."
},
        {       ERR_PAYMENT_CWI_RANGE,
        "Payment Customer Warehouse out of range, 1 to Max Warehouses."
},
        {       ERR_PAYMENT_MISSING_HAM_KEY,
"Payment missing Amount key \"HAM*\"."
                },
        {       ERR_PAYMENT_HAM_INVALID,
"Payment Amount invalid data type must be numeric."
        },
        {       ERR_PAYMENT_HAM_RANGE,
        "Payment Amount out of range, 0 - 9999.99."
                        },
        {       ERR_ORDERSTATUS_MISSING_DID_KEY,
"Order Status missing District key \"DID*\"."
        },
        {       ERR_ORDERSTATUS_DID_INVALID,
"Order Status District invalid, value must be numerid - 10."            },
        {       ERR_ORDERSTATUS_DID_RANGE,
"Order Status District out of range must be 1 - 10."                            },
        {       ERR_ORDERSTATUS_MISSING_CID_KEY,
"Order Status missing Customer key \"CID*\"."
        },
        {       ERR_ORDERSTATUS_MISSING_CLT_KEY,
"Order Status missing Customer Last Name key \"CLT*\"."
},
        {       ERR_ORDERSTATUS_CLT_RANGE,
"Order Status Customer last name longer than 16 characters."            },
        {       ERR_ORDERSTATUS_CID_INVALID,
"Order Status Customer ID invalid, range must be numeric 1 - 3000."     },
        {       ERR_ORDERSTATUS_CID_RANGE,
"Order Status Customer ID out of range must be 1 - 3000."                       },
        {       ERR_ORDERSTATUS_CID_AND_CLT,
"Order Status Customer ID and LastName entered must be only one."       },
        {       ERR_DELIVERY_MISSING_OCD_KEY,
"Delivery missing Carrier IDkey \"OCD*\"."
                },
        {       ERR_DELIVERY_CARRIER_INVALID,
"Delivery Carrier ID invalid must be numeric 1 - 10."                           },
        {       ERR_DELIVERY_CARRIER_ID_RANGE,
"Delivery Carrier ID out of range must be 1 - 10."
},
        {       ERR_PAYMENT_MISSING_CLT_KEY,
"Payment missing Customer Last Name key \"CLT*\"."
        },
        {       0,
                        ""
                                }
        };

        static char szNoMsg[] = "";
        char            *szForm;

        GetLocalTime(&systemTime);

        if ( !szMsg  )
                szMsg = szNoMsg;

        if ( iTermId > 0 && IsValidTermId(iTermId) )
                szForm = Term.pClientData[iTermId].szBuffer; //if termid valid use comr
terminal static buffer.
        else
                szForm = Term.pClientData[0].szBuffer;  //else term id invalid so use
common terminal static buffer.
        switch(iErrorType)
        {
                case ERR_TYPE_WEBDLL:
                        for(i=0; errorMsgs[i].szMsg[0]; i++)
                        {
                                if ( iError == errorMsgs[i].iError )
                                        break;
                        }
                        if ( !errorMsgs[i].szMsg[0] )
                                i = 1;
                        strcpy(szForm,          "<HTML><HEAD><TITLE>Welcome To
TPC-C</TITLE></HEAD><BODY><FORM ACTION=\"tpcc.dll\" METHOD=\"GET\">");
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"STATUSID\" VALUE=\"%d\">", iError);
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"ERROR\" VALUE=\"%d\">", iErrorType);
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"TERMID\" VALUE=\"%d\">", iTermId);
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"SYNCID\" VALUE=\"%d\">", iSyncId);
                        wsprintf(szForm+strlen(szForm), "Error: TPCCWEB(%d): %s'
iError, errorMsgs[i].szMsg);
                        strcat(szForm, "</FORM><BODY></HTML>");
                        WriteZString(pECB, szForm);
                        break;
                case ERR_TYPE_SQL:
                        strcpy(szForm,          "<HTML><HEAD><TITLE>Welcome To
TPC-C</TITLE></HEAD><BODY><FORM ACTION=\"tpcc.dll\" METHOD=\"GET\">");
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"STATUSID\" VALUE=\"%d\">", iError);
```

```
                                wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"ERROR\" VALUE=\"%d\">", iErrorType);
                                wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"TERMID\" VALUE=\"%d\">", iTermId);
                                wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"SYNCID\" VALUE=\"%d\">", iSyncId);
                                wsprintf(szForm+strlen(szForm), "Error: SQLSVR(%d): %s",
iError, szMsg);
                                strcat(szForm, "</FORM><BODY></HTML>");
                                WriteZString(pECB, szForm);
                                break;
                        case ERR_TYPE_DBLIB:
                                strcpy(szForm,        "<HTML><HEAD><TITLE>Welcome To
TPC-C</TITLE></HEAD><BODY><FORM ACTION=\"tpcc.dll\" METHOD=\"GET\">");
                                wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"STATUSID\" VALUE=\"%d\">", iError);
                                wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"ERROR\" VALUE=\"%d\">", iErrorType);
                                wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"TERMID\" VALUE=\"%d\">", iTermId);
                                wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"SYNCID\" VALUE=\"%d\">", iSyncId);
                                wsprintf(szForm+strlen(szForm), "Error: DBLIB(%d): %s", iError,
szMsg);
                                strcat(szForm, "</FORM><BODY></HTML>");
                                WriteZString(pECB, szForm);
                                break;
                        case ERR_TYPE_ODBC:
                                strcpy(szForm,        "<HTML><HEAD><TITLE>Welcome To
TPC-C</TITLE></HEAD><BODY><FORM ACTION=\"tpcc.dll\" METHOD=\"GET\">");
                                wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"STATUSID\" VALUE=\"%d\">", iError);
                                wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"ERROR\" VALUE=\"%d\">", iErrorType);
                                wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"TERMID\" VALUE=\"%d\">", iTermId);
                                wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"SYNCID\" VALUE=\"%d\">", iSyncId);
                                wsprintf(szForm+strlen(szForm), "Error: ODBC");
                                strcat(szForm, "</FORM><BODY></HTML>");
                                WriteZString(pECB, szForm);
                                break;
                        case ERR_TYPE_SOCKET:
                                strcpy(szForm,        "<HTML><HEAD><TITLE>Welcome To
TPC-C</TITLE></HEAD><BODY><FORM ACTION=\"tpcc.dll\" METHOD=\"GET\">");
                                wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"STATUSID\" VALUE=\"%d\">", iError);
                                wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"ERROR\" VALUE=\"%d\">", iErrorType);
                                wsprintf(szForm+strlen(szForm),"<INPUT TYPE=\"hidden\"
NAME=\"TERMID\" VALUE=\"%d\">", iTermId);
                                wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"SYNCID\" VALUE=\"%d\">", iSyncId);
                                wsprintf(szForm+strlen(szForm), "Error: SOCKET");
                                strcat(szForm, "</FORM><BODY></HTML>");
                                WriteZString(pECB, szForm);
                                break;
                        case ERR_TYPE_DEADLOCK:
                                strcpy(szForm,        "<HTML><HEAD><TITLE>Welcome To
TPC-C</TITLE></HEAD><BODY><FORM ACTION=\"tpcc.dll\" METHOD=\"GET\">");
                                wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"STATUSID\" VALUE=\"%d\">", iError);
                                wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"ERROR\" VALUE=\"%d\">", iErrorType);
                                wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"TERMID\" VALUE=\"%d\">", iTermId);
                                wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"SYNCID\" VALUE=\"%d\">", iSyncId);
                                wsprintf(szForm+strlen(szForm), "Error: Deadlock");
                                strcat(szForm, "</FORM><BODY></HTML>");
                                WriteZString(pECB, szForm);
                                break;
        }
        return;
}

#ifdef OLD_ERROR

void ErrorMessage(EXTENSION_CONTROL_BLOCK *pECB, int iError, int iErrorType, char
*szMsg, int iTermId, int iSyncId)
{
        int i;

        static SERRORMSG errorMsgs[] =
        {
                {       ERR_SUCCESS,
                "Success, no error."
                                                        },
                {       ERR_COMMAND_UNDEFINED,
                "Command undefined."
                                                                        },
                {       ERR_NOT_IMPLEMENTED_YET,
        "Not Implemented Yet."
                                                        },
                {       ERR_CANNOT_INIT_TERMINAL,
```

```
"Cannot initialize client connection."
                },
        {       ERR_OUT_OF_MEMORY,
        "insufficient memory."
                                                        },
        {       ERR_NEW_ORDER_NOT_PROCESSED,
"Cannot process new Order form."
                        },
        {       ERR_PAYMENT_NOT_PROCESSED,
"Cannot process payment form."
                        },
        {       ERR_NO_SERVER_SPECIFIED,
"No Server name specified."
                        },
        {       ERR_ORDER_STATUS_NOT_PROCESSED,
"Cannot process order status form."
                        },
        {       ERR_W_ID_INVALID,
        "Invalid Warehouse ID."
                                                        },
        {       ERR_CAN_NOT_SET_MAX_CONNECTIONS,
"Insufficient memory to allocate # connections."
},
        {       ERR_NOSUCH_CUSTOMER,
        "No such customer."
                                                        },
        {       ERR_D_ID_INVALID,
        "Invalid District ID Must be 1 to 10."
                        },
        {       ERR_MAX_CONNECT_PARAM,
        "Max client connections exceeded, run install to increase."
},
        {       ERR_INVALID_SYNC_CONNECTION,
"Invalid Terminal Sync ID."
                        },
        {       ERR_INVALID_TERMID,
        "Invalid Terminal ID."
                                                        },
        {       ERR_PAYMENT_INVALID_CUSTOMER,
"Payment Form, No such Customer."
                        },
        {       ERR_SQL_OPEN_CONNECTION,
"SQLOpenConnection API Failed."
                        },
        {       ERR_STOCKLEVEL_MISSING_THRESHOLD_KEY,
"Stock Level missing Threshold key \"TT*\"."
        },
        {       ERR_STOCKLEVEL_THRESHOLD_INVALID,
"Stock Level Threshold invalid data type range = 1 - 99."
        {       ERR_STOCKLEVEL_THRESHOLD_RANGE,
"Stock Level Threshold out of range, range must be 1 - 99."
        {       ERR_STOCKLEVEL_NOT_PROCESSED,
"Stock Level not processed."
                        },
        {       ERR_NEWORDER_FORM_MISSING_DID,
"New Order missing District key \"DID*\"."
        },
        {       ERR_NEWORDER_DISTRICT_INVALID,
"New Order District ID Invalidrange 1 - 10."
        },
        {       ERR_NEWORDER_DISTRICT_RANGE,
"New Order District ID out of Range. Range = 1 - 10."
},
        {       ERR_NEWORDER_CUSTOMER_KEY,
"New Order missing Customer key \"CID*\"."
                },
        {       ERR_NEWORDER_CUSTOMER_INVALID,
"New Order customer id invalid data type, range = 1 to 3000."           },
        {       ERR_NEWORDER_CUSTOMER_RANGE,
"New Order customer id out of range, range = 1 to 3000."
        {       ERR_NEWORDER_MISSING_IID_KEY,
"New Order missing Item Id key \"IID*\"."
        },
        {       ERR_NEWORDER_ITEM_BLANK_LINES,
"New Order blank order lines all orders must be continuous."            },
        {       ERR_NEWORDER_ITEMID_INVALID,
"New Order Item Id is wrong data type, must be numeric."
        {       ERR_NEWORDER_MISSING_SUPPW_KEY,
"New Order missing Supp_W key \"SP##*\"."
                },
        {       ERR_NEWORDER_SUPPW_INVALID,
"New Order Supp_W invalid data type must be numeric."
},
        {       ERR_NEWORDER_MISSING_QTY_KEY,
"New Order Missing Qty key \"Qty##*\"."
                },
        {       ERR_NEWORDER_QTY_INVALID,
"New Order Qty invalid must benumeric range 1 - 99."
},
        {       ERR_NEWORDER_SUPPW_RANGE,
"New Order Supp_W value out of range range = 1 - Max Warehouses." },
        {       ERR_NEWORDER_ITEMID_RANGE,
"New Order Item Id is out of range. Range = 1 to 999999."
```

```
        {       ERR_NEWORDER_QTY_RANGE,
        "New Order Qty is out of range. Range = 1 to 99."
        },
        {       ERR_PAYMENT_DISTRICT_INVALID,
"Payment District ID is invalid must be 1 - 10."
},
        {       ERR_NEWORDER_SUPPW_WITHOUT_ITEMID,
"New Order Supp_W field entered without a corrisponding Item_Id."       },
        {       ERR_NEWORDER_QTY_WITHOUT_ITEMID,
"New Order Qty entered without a corrisponding Item_Id."                },
        {       ERR_NEWORDER_NOITEMS_ENTERED,
"New Order Blank Items between items, items must be continuous."        },
        {       ERR_PAYMENT_MISSING_DID_KEY,
"Payment missing District Key \"DID*\"."
        },
        {       ERR_PAYMENT_DISTRICT_RANGE,
"Payment District Out of range, range = 1 - 10."
},
        {       ERR_PAYMENT_MISSING_CID_KEY,
"Payment missing Customer Key \"CID*\"."
                },
        {       ERR_PAYMENT_CUSTOMER_INVALID,
"Payment Customer data type invalid, must be numeric."
},
        {       ERR_PAYMENT_MISSING_CLT,
"Payment missing Customer Last Name Key \"CLT*\"."
        },
        {       ERR_PAYMENT_LAST_NAME_TO_LONG,
"Payment Customer last name longer than 16 characters."
},
        {       ERR_PAYMENT_CUSTOMER_RANGE,
        "Payment Customer ID out of range, must be 1 to 3000."
        },
        {       ERR_PAYMENT_CID_AND_CLT,
"Payment Customer ID and Last Name entered must be one or other."       },
        {       ERR_PAYMENT_MISSING_CDI_KEY,
"Payment missing Customer districtkey \"CDI*\"."
},
        {       ERR_PAYMENT_CDI_INVALID,
"Payment Customer district invalid must be numeric."
},
        {       ERR_PAYMENT_CDI_RANGE,
        "Payment Customer district out of range must be 1 - 10."
},
        {       ERR_PAYMENT_MISSING_CWI_KEY,
"Payment missing Customer Warehouse key \"CWI*\"."
        },
        {       ERR_PAYMENT_CWI_INVALID,
"Payment Customer Warehouse invalid must be numeric."
},
        {       ERR_PAYMENT_CWI_RANGE,
        "Payment Customer Warehouse out of range, 1 to Max Warehouses."
},
        {       ERR_PAYMENT_MISSING_HAM_KEY,
"Payment missing Amount key \"HAM*\"."
        },
        {       ERR_PAYMENT_HAM_INVALID,
"Payment Amount invalid data type must be numeric."
        },
        {       ERR_PAYMENT_HAM_RANGE,
        "Payment Amount out of range, 0 - 9999.99."
                        },
        {       ERR_ORDERSTATUS_MISSING_DID_KEY,
"Order Status missing District key \"DID*\"."
        },
        {       ERR_ORDERSTATUS_DID_INVALID,
"Order Status District invalid, value must be numeric 1 - 10."          },
        {       ERR_ORDERSTATUS_DID_RANGE,
"Order Status District out of range must be 1- 10."
        {       ERR_ORDERSTATUS_MISSING_CID_KEY,
"Order Status missing Customer key \"CID*\"."
        },
        {       ERR_ORDERSTATUS_MISSING_CLT_KEY,
"Order Status missing Customer Last Name key \"CLT*\"."
},
        {       ERR_ORDERSTATUS_CLT_RANGE,
"Order Status Customer last name longer than 16 characters."            },
        {       ERR_ORDERSTATUS_CID_INVALID,
"Order Status Customer ID invalid, range must be numeric 1 - 3000."     },
        {       ERR_ORDERSTATUS_CID_RANGE,
"Order Status Customer ID out of range must be 1 - 3000."
        {       ERR_ORDERSTATUS_CID_AND_CLT,
"Order Status Customer ID and LastName entered must be only one."       },
        {       ERR_DELIVERY_MISSING_OCD_KEY,
"Delivery missing Carrier ID key \"OCD*\"."
                },
        {       ERR_DELIVERY_CARRIER_INVALID,
"Delivery Carrier ID invalid must be numeric 1 - 10."
        {       ERR_DELIVERY_CARRIER_ID_RANGE,
"Delivery Carrier ID out of range must be 1 - 10."
},
        {       ERR_PAYMENT_MISSING_CLT_KEY,
"Payment missing Customer Last Name key \"CLT*\"."
        },
        {       0,
```

```
                                        ""

                                }
        };

        static char szNoMsg[] = "";
        char            *szForm;

        if ( !szMsg  )
                szMsg = szNoMsg;

        if ( iTermId > 0 && IsValidTermId(iTermId) )
                szForm = Term.pClientData[iTermId].szBuffer; //if termid valid use common
terminal static buffer.
        else
                szForm = Term.pClientData[0].szBuffer;  //else term id invalid so use
common terminal static buffer.
        switch(iErrorType)
        {
                case ERR_TYPE_WEBDLL:
                        for(i=0; errorMsgs[i].szMsg[0]; i++)
                        {
                                if ( iError == errorMsgs[i].iError )
                                        break;
                        }
                        if ( !errorMsgs[i].szMsg[0] )
                                i = 1;
                        strcpy(szForm,          "<HTML><HEAD><TITLE>Welcome To
TPC-C</TITLE></HEAD><BODY><FORM ACTION=\"tpcc.dll\" METHOD=\"GET\">");
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"STATUSID\" VALUE=\"%d\">", iError);
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"ERROR\" VALUE=\"%d\">", iErrorType);
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"TERMID\" VALUE=\"%d\">", iTermId);
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"SYNCID\" VALUE=\"%d\">", iSyncId);
                        wsprintf(szForm+strlen(szForm), "Error: TPCCWEB(%d): %s",
iError, errorMsgs[i].szMsg);
                        strcat(szForm, "</FORM><BODY></HTML>");
                        WriteZString(pECB, szForm);
                        break;
                case ERR_TYPE_SQL:
                        strcpy(szForm,          "<HTML><HEAD><TITLE>Welcome To
TPC-C</TITLE></HEAD><BODY><FORM ACTION=\"tpcc.dll\" METHOD=\"GET\">");
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"STATUSID\" VALUE=\"%d\">", iError);
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"ERROR\" VALUE=\"%d\">", iErrorType);
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"TERMID\" VALUE=\"%d\">", iTermId);
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"SYNCID\" VALUE=\"%d\">", iSyncId);
                        wsprintf(szForm+strlen(szForm), "Error: SQLSVR(%d): %s",
iError, szMsg);
                        strcat(szForm, "</FORM><BODY></HTML>");
                        WriteZString(pECB, szForm);
                        break;
                case ERR_TYPE_DBLIB:
                        strcpy(szForm,          "<HTML><HEAD><TITLE>Welcome To
TPC-C</TITLE></HEAD><BODY><FORM ACTION=\"tpcc.dll\" METHOD=\"GET\">");
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"STATUSID\" VALUE=\"%d\">", iError);
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"ERROR\" VALUE=\"%d\">", iErrorType);
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"TERMID\" VALUE=\"%d\">", iTermId);
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"SYNCID\" VALUE=\"%d\">", iSyncId);
                        wsprintf(szForm+strlen(szForm), "Error: DBLIB(%d): %s", iEr
szMsg);
                        strcat(szForm, "</FORM><BODY></HTML>");
                        WriteZString(pECB, szForm);
                        break;
                case ERR_TYPE_ODBC:
                        strcpy(szForm,          "<HTML><HEAD><TITLE>Welcome To
TPC-C</TITLE></HEAD><BODY><FORM ACTION=\"tpcc.dll\" METHOD=\"GET\">");
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"STATUSID\" VALUE=\"%d\">", iError);
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"ERROR\" VALUE=\"%d\">", iErrorType);
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"TERMID\" VALUE=\"%d\">", iTermId);
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"SYNCID\" VALUE=\"%d\">", iSyncId);
                        wsprintf(szForm+strlen(szForm), "Error: ODBC(%d): %s", iEr
szMsg);
                        strcat(szForm, "</FORM><BODY></HTML>");
                        WriteZString(pECB, szForm);
                        break;
        }
        return;
}
#endif
```

```
/* FUNCTION: BOOL GetKeyValue(char *pQueryString, char *pKey, char *pValue, int iMax)
 *
 * PURPOSE:        This function parses a http formatted string for specific key values.
 *
 * ARGUMENTS:    char                    *pQueryString       http string from client
browser
 *                                       char                    *pKey
        key value to look for
 *                                       char                    *pValue
        character array into which to place key's value
 *                                       int                             iMax
                maximum length of key value array.
 *
 * RETURNS:                BOOL    FALSE   key value not found
 *                                                 TRUE    key valud found
 *
 *
 * COMMENTS:      http keys are formatted either KEY=value& or KEY=value\0. This DLL
formats
 *                                       TPC-C input fields in such a manner that the keys can
be extracted in the
 *                                       above manner.
 */

static BOOL GetKeyValue(char *pQueryString, char *pKey, char *pValue, int iMax)
{
        char *ptr;


        if ( !(ptr=strstr(pQueryString, pKey)) )
                return FALSE;
        if ( !(ptr=strchr(ptr, '=')) )
                return FALSE;
        ptr++;
        iMax--;
        while( *ptr && *ptr != '&' && iMax)
        {
                *pValue++ = *ptr++;
                iMax–;
        }
        *pValue = 0;
        return TRUE;
}

/* FUNCTION: void TermInit(void)
 *
 * PURPOSE:        This function initializes the client ternimal structure it is called when the
TPCC.DLL
 *                                       is first loaded by the inet service.
 *
 * ARGUMENTS:    none
 *
 * RETURNS:                None
 *
 * COMMENTS:      None
 *
 */

static void TermInit(void)
{
        if ( Term.bInit )
                return;
        Term.iNext                              = 0;
        Term.iMasterSyncId = 1;

        Term.iAvailable                 = 0;
        Term.pClientData    = NULL;
        Term.bInit                              = TRUE;

        return;
}

/* FUNCTION: void TermRestore(void)
 *
 * PURPOSE:        This function frees allocated resources associated with the terminal
structure.
 *
 * ARGUMENTS:    none
 *
 * RETURNS:                None
 *
 * COMMENTS:      This function is called only with the inet service unloads the TPCC.DLL
 *
 */

static void TermRestore(void)
{
        Term.iNext                              = 0;
        Term.iAvailable                 = 0;
        Term.iMasterSyncId = 0;
        if ( Term.pClientData )
                free(Term.pClientData);
        Term.pClientData    = NULL;
        Term.bInit                              = FALSE;
```

```
	return;
}

/* FUNCTION: int TermAllocate(void)
 *
 * PURPOSE:		This function allocates more terminal array entries in the Term structure.
 *
 * ARGUMENTS:	None
 *
 * RETURNS:			int		TRUE or 1 if sucessfull
 *					int		FALSE or 0 if terminal id cannot be
allocated.
 *
 * COMMENTS:		None
 *
 */

static int TermAllocate(void)
{
	Term.iAvailable += 32;
	if ( !Term.pClientData )
		Term.pClientData = (PCLIENTDATA)malloc(Term.iAvailable *
sizeof(CLIENTDATA));
	else
		Term.pClientData = (PCLIENTDATA)realloc(Term.pClientData,
Term.iAvailable * sizeof(CLIENTDATA));
	return ( Term.pClientData ) ? 1: 0;
}

/* FUNCTION: int TermAdd(EXTENSION_CONTROL_BLOCK *pECB, char *pQueryString)
 *
 * PURPOSE:		This function assigns a terminal id which is used to identify a client browser.
 *
 * ARGUMENTS:	EXTENSION_CONTROL_BLOCK		*pECB
	passed in structure pointerfrom inetsrv.
 *				char
	*pQueryString	http query string passed to this DLL.
 *
 * RETURNS:			int			assigned terminal id
 *					-1		cannot assign id error occured.
 *
 *
 * COMMENTS:		if the terminal id cannot be assigned it is because of insufficient memory or
the
 *					SQL connection cannot be allocated.
 *
 */
```

```
static int TermAdd(EXTENSION_CONTROL_BLOCK *pECB, char *pQueryString)
{
	char	szTmp[32];
	int			i, iCurrent, iTotalConnections, iTickCount;

	EnterCriticalSection(&CriticalSection);

	for(i=0, iTotalConnections = 0; i<Term.iAvailable; i++)
	{
		if ( Term.pClientData[i].inUse )
			iTotalConnections++;
	}

	if ( iTotalConnections >= iMaxConnections )
	{
		for(iCurrent = 1, i=1, iTickCount = 0x7FFFFFFF; i<iMaxConnections; i+-
		{
			if ( iTickCount > Term.pClientData[i].iTickCount )
			{
				iTickCount = Term.pClientData[i].iTickCount;
				iCurrent = i;
			}
		}
	}
	else
	{
		for(i=0; i<Term.iAvailable; i++)
		{
			if ( !Term.pClientData[i].inUse )
				break;
		}
		iCurrent = i;
	}

	if ( i == Term.iAvailable )
	{
		Term.iNext = Term.iAvailable;
		if ( !(*Term.Allocate)() )
			goto TermAddErr1;
		for(i=Term.iNext; i<Term.iAvailable; i++)
			Term.pClientData[i].inUse = 0;
		iCurrent = Term.iNext;
	}

	Term.pClientData[iCurrent].inUse = 1;

	if ( !GetKeyValue(pQueryString, "w_id", szTmp, sizeof(szTmp)) )
		goto TermAddErr1;
```

```
	Term.pClientData[iCurrent].w_id = (short)atoi(szTmp);

	if ( !GetKeyValue(pQueryString, "d_id", szTmp, sizeof(szTmp)) )
		goto TermAddErr1;

	Term.pClientData[iCurrent].d_id = atoi(szTmp);

	Term.pClientData[iCurrent].iTickCount = GetTickCount();
	Term.pClientData[iCurrent].iSyncId = Term.iMasterSyncId++;

	if ( Init(pECB, iCurrent, Term.pClientData[iCurrent].iSyncId, szServer, szUser,
szPassword, szDatabase) )
	{
		(*Term.Delete)(pECB, iCurrent);
		goto TermAddErr1;
	}

	LeaveCriticalSection(&CriticalSection);
	return iCurrent;

TermAddErr1:
	LeaveCriticalSection(&CriticalSection);
	return -1;  //terminal unsuccessfully added
}

/* FUNCTION: void TermDelete(EXTENSION_CONTROL_BLOCK *pECB, int id)
 *
 * PURPOSE:	This function makes a terminal entry in the Term array available for reuse.
 *
 * ARGUMENTS:	EXTENSION_CONTROL_BLOCK	*pECB	passed in structure
pointer from inetsrv.
 *					int
	id			Terminal id of client exiting
 *
 * RETURNS:			None
 *
 * COMMENTS:	None
 *
 */

static void TermDelete(EXTENSION_CONTROL_BLOCK *pECB, int id)
{
	if ( id >= 0 && id < Term.iAvailable )
	{
		Close(pECB, id, -1);
		Term.pClientData[id].inUse = 0;
#ifndef LOCAL_ALLOC
			tpfree((char *)Term.pClientData[id].TuxDataPtr);
#endif  // Not LOCAL_ALLOC

	}

	return;
}

/* FUNCTION: BOOL Init(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int iSyncId,
char *szServer, char *szUser, char *szPassword, char *szDatabase)
 *
 * PURPOSE:	This function initializes the sql connection for use.
 *
 * ARGUMENTS:	EXTENSION_CONTROL_BLOCK	*pECB		passed in
structure pointer from inetsrv.
 *					int
	iTermId		id of browser client that this connection is for.
 *					int
	iSyncId		sync id for this client session
 *					char
	*szServer sql server name
 *					char
	*szUser		user name
 *					char
	*szPassword	user password
 *					char
	*szDatabase	database to use
 *
 * RETURNS:			BOOL	FALSE	if successfull
 *							TRUE	if an error occurs an
connection cannot be established.
 *
 * COMMENTS:	None
 *
 */

BOOL Init(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int iSyncId, char *szServer
char *szUser, char *szPassword, char *szDatabase)
{
	char	szApp[32];
#ifndef LOCAL_ALLOC
	char	buf[64];
	int			TpRc;
#endif // Not LOCAL_ALLOC

	sprintf(szApp, "TPCC:%ld", (int)iTermId);
```

```
		Term.pClientData[iTermId].dbproc = NULL;

#ifndef LOCAL_ALLOC // Globally allocate tuxedo structures

			if ( dLog )
			{
				FILE *fp;
				fp = fopen(szTpccLogPath, "ab");
				fprintf(fp, "Sizeof(TUX_DATA) %d \r\n", sizeof(TUX_DATA));
				fprintf(fp, "Sizeof(NEW_ORDER_DATA) %d \r\n",
sizeof(NEW_ORDER_DATA));
				fprintf(fp, "Sizeof(PAYMENT_DATA) %d \r\n",
sizeof(PAYMENT_DATA));
				fprintf(fp, "Sizeof(ORDER_STATUS_DATA) %d \r\n",
sizeof(ORDER_STATUS_DATA));
				fprintf(fp, "Sizeof(DELIVERY_DATA) %d \r\n",
sizeof(DELIVERY_DATA));
				fprintf(fp, "Sizeof(STOCK_LEVEL_DATA) %d \r\n",
sizeof(STOCK_LEVEL_DATA));
				fclose(fp);
			}

//		Add initialization of Tuxedo Structures

			if ((Term.pClientData[iTermId].TuxDataPtr = (TUX_DATA
*)tpalloc("CARRAY", NULL, sizeof(TUX_DATA))) == NULL)
			{
				TpRc = tperrno;
				sprintf(buf, "Tuxedo tpalloc failed:");
				LogTuxError(TpRc, buf);
				ErrorMessage(pECB, ERR_CANNOT_INIT_TERMINAL,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
				return TRUE;
			}

			if ( dLog )
			{
				FILE *fp;

				fp = fopen(szTpccLogPath, "ab");

				fprintf(fp, "Thread %d iTermId %d *  TuxDataPtr: %x \r\n",
					GetCurrentThreadId(), iTermId,
&Term.pClientData[iTermId].TuxDataPtr);
				fclose(fp);
			}

#endif // LOCAL_ALLOC

		return FALSE;
}

/* FUNCTION: BOOL Close(EXTENSION_CONTROL_BLOCK		*pECB, int iTermId,
iSyncId)
 *
 * PURPOSE:		This function closes the sql connection for use.
 *
 * ARGUMENTS:	EXTENSION_CONTROL_BLOCK		*pECB	passed in structure
pointer from inetsrv.
 *					int
		iTermId	id of browser client that this connection is for.
 *					int
		iSyncId	sync id of client browser
 *
 * RETURNS:			BOOL	FALSE	if successfull
 *								TRUE	if an error occurs an
connection cannot be terminated.
 *
 * COMMENTS:	None
 *
 */

static BOOL Close(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int iSyncId)
{
		PECBINFO		pEcbInfo;

		if (Term.pClientData[iTermId].dbproc != NULL)
		{
			if ( (pEcbInfo =
(PECBINFO)dbgetuserdata(Term.pClientData[iTermId].dbproc)) )
			{
				pEcbInfo->iTermId = -1;
				pEcbInfo->iSyncId = -1;
				free(pEcbInfo);		//free up user info
			}
//			return SQLCloseConnection(pECB, Term.pClientData[iTermId].dbproc)
			return 1;
		}

		UNUSEDPARAM(iSyncId);
}


/* FUNCTION: void FormatString(char *szDest, char *szPic, char *szSrc)
 *
 * PURPOSE:		This function formats a character string for inclusion in the
```

```
 *                                HTML formatted page being constructed.
 *
 * ARGUMENTS:    char             *szDest    Destination buffer where formatted string is
to be placed
 *                                char             *szPic     picture string which
describes how character value is to be
 *
        formatted.
 *                                char             *szSrc     character string value.
 *
 * RETURNS:                       None
 *
 * COMMENTS:     This functions is used to format TPC-C phone and zip value strings.
 *
 */

static void FormatString(char *szDest, char *szPic, char *szSrc)
{
        while( *szPic )
        {
                if ( *szPic == 'X' )
                {
                        if ( *szSrc )
                                *szDest++ = *szSrc++;
                        else
                                *szDest++ = ' ';
                }
                else
                        *szDest++ = *szPic;
                szPic++;
        }
        *szDest = 0;

        return;
}

/* FUNCTION: char *MakeStockLevelForm(int iTermId, int iSyncId, BOOL bInput)
 *
 * PURPOSE:      This function constructs the Stock Level HTML page.
 *
 * ARGUMENTS:    int                                iTermId    client browser terminal
id
 *                                int                                iSyncId
        client browser sync id
 *                                BOOL                       bInput     TRUE if
form is being constructed for input else FALSE
 *
 * RETURNS:                       char *                     A pointer to buffer inside client
structure where HTML form is built.
 *
 * COMMENTS:     The internal client buffer is created when the terminal id is assigned and
should not
 *                                       be freed except when the client terminal id is no long
needed.
 */

static char *MakeStockLevelForm(int iTermId, int iSyncId, BOOL bInput)
{
        char    *szForm;

        szForm = (char *)Term.pClientData[iTermId].szBuffer;

        Term.pClientData[iTermId].StockLevelData.w_id                   =
(short)Term.pClientData[iTermId].w_id;
        Term.pClientData[iTermId].StockLevelData.d_id                   =
(short)Term.pClientData[iTermId].d_id;
        Term.pClientData[iTermId].StockLevelData.num_deadlocks  = 0;

        strcpy(szForm, "<HTML><HEAD><TITLE>TPC-C Stock Level</TITLE></HEAD>"
        strcat(szForm, "<FORM ACTION=\"tpcc.dll\" METHOD=\"GET\">");
        if ( bInput )
                strcat(szForm, "<INPUT TYPE=\"hidden\" NAME=\"PI*\" VALUE=\"\">");
        strcat(szForm, "<INPUT TYPE=\"hidden\" NAME=\"STATUSID\" VALUE=\"0\">");
        strcat(szForm, "<INPUT TYPE=\"hidden\" NAME=\ERROR\" VALUE=\"0\">");
        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\" NAME=\"FORMID\"
VALUE=\"%d\">", STOCK_LEVEL_FORM);
        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\" NAME=\"TERMID\"
VALUE=\"%d\">", iTermId);
        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\" NAME=\"SYNCID\"
VALUE=\"%d\">", iSyncId);
        strcat(szForm, "<PRE>                          Stock-Level<BR>");
        wsprintf(szForm+strlen(szForm), "Warehouse: %4.4d   District: %2.2d<BR><BR>"
Term.pClientData[iTermId].StockLevelData.w_id,
Term.pClientData[iTermId].StockLevelData.d_id);
        if ( bInput )
        {
                strcat(szForm,        "Stock Level Threshold: <INPUT NAME=\"TT*\"
SIZE=2><BR><BR>"
                                                                "low stock:    <BR><HR>"
                                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"Process\">"
                                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"Menu\">" );
        }
        else
```

```
        {
                wsprintf(szForm+strlen(szForm), "Stock Level Threshold:
%2.2d<BR><BR>", Term.pClientData[iTermId].StockLevelData.thresh_hold);

                wsprintf(szForm+strlen(szForm), "low stock: %3.3d<PRE><BR><HR>",
Term.pClientData[iTermId].StockLevelData.low_stock);
                strcat(szForm,      "<INPUT TYPE=\"submit\" NAME=\"CMD\"
VALUE=\"..NewOrder..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Payment..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Delivery..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Order-Status..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Stock-Level..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Exit..\">" );
        }

        strcat(szForm, "</FORM></HTML>");

        return szForm;
}

/* FUNCTION: char *MakeMainMenuForm(int iTermId, int iSyncId)
 *
 * PURPOSE:     This function
 *
 * ARGUMENTS:   int                                 iTermId    client browser terminal
id
 *                                      int                                     iSyncId
        client browser sync id
 *
 * RETURNS:             char *                      A pointer to buffer inside client
structure where HTML form is built.
 *
 * COMMENTS:    The internal client buffer is created when the terminal id is assigned and
should not
 *                                      be freed except when the client terminal id is no longer
needed.
 */

static char *MakeMainMenuForm(int iTermId, int iSyncId)
{
        char    *szForm;

        szForm = (char *)Term.pClientData[iTermId].szBuffer;

        strcpy(szForm,      "<HTML><HEAD><TITLE>TPC-C Main
Menu</TITLE></HEAD><BODY>"
                                                "Select Desired Transaction.<BR><HR>"
                                                "<FORM ACTION=\"tpcc.dll\"
METHOD=\"GET\">");
        strcat(szForm, "<INPUT TYPE=\"hidden\" NAME=\"STATUSID\" VALUE=\"0\">");
        strcat(szForm, "<INPUT TYPE=\"hidden\" NAME=\"ERROR\" VALUE=\"0\">");
        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\" NAME=\"TERMID\"
VALUE=\"%d\">", iTermId);
        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\" NAME=\"SYNCID\"
VALUE=\"%d\">", iSyncId);
        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\" NAME=\"FORMID\"
VALUE=\"%d\">", MAIN_MENU_FORM);
        strcat(szForm,      "<INPUT TYPE=\"submit\" NAME=\"CMD\"
VALUE=\"..NewOrder..\">"
                                                "<INPUT TYPE=\"submit\" NAME=\"CMD
VALUE=\"..Payment..\">"
                                                "<INPUT TYPE=\"submit\" NAME=\"CMD
VALUE=\"..Delivery..\">"
                                                "<INPUT TYPE=\"submit\" NAME=\"CMD
VALUE=\"..Order-Status..\">"
                                                "<INPUT TYPE=\"submit\" NAME=\"CMD
VALUE=\"..Stock-Level..\">"
                                                "<INPUT TYPE=\"submit\" NAME=\"CMD
VALUE=\"..Exit..\">"
                                                "</FORM>"
                                                "</HTML>" );

        return szForm;
}

/* FUNCTION: char *MakeWelcomeForm(void)
 *
 * PURPOSE:     This function
 *
 * ARGUMENTS:   None
 *
 * RETURNS:             char *                      A pointer to the static HTML
welcome form.
 *
 * COMMENTS:    The welcome form is static.
 */

static char *MakeWelcomeForm(void)
{
        return szWelcomeForm;
}
```

```
/* FUNCTION: char *MakeNewOrderForm(int iTermId, int SyncId, BOOL Rollback, BOOL
bInput, BOOL bValid)
 *
 * PURPOSE:        This function
 *
 * ARGUMENTS:    int                                     iTermId    client browser terminal
id
 *                                      int                                     iSyncId
        client browser sync id
 *                                      BOOL                    bInput      TRUE if
form is being constructed for input else FALSE
 *                                      BOOL                    bValid      TRUE if
NewOrderData valid, ELSE FALSE effects output only
 *
 * RETURNS:                char *                  A pointer to buffer inside client
structure where HTML form is built.
 *
 * COMMENTS:      The internal client buffer is created when the terminal id is assigned and
should not
 *                                      be freed except when the client terminal id is no longer
needed.
 */

static char *MakeNewOrderForm(int iTermId, int iSyncId, BOOL Rollback, BOOL bInput, BOOL
bValid)
{
        char    *szForm;
        char    szName[146];
        char    szCredit[14];
        int             i;

        szForm = (char *)Term.pClientData[iTermId].szBuffer;

        Term.pClientData[iTermId].NewOrderData.w_id = Term.pClientData[iTermId].w_id;

        strcpy(szForm,  "<HTML>"
                                                "<HEAD><TITLE>TPC-C New
Order</TITLE></HEAD><BODY>"
                                                "<FORM ACTION=\"tpcc.dll\"
METHOD=\"GET\">" );

        if ( bInput )
        {
                strcat(szForm, "<INPUT TYPE=\"hidden\" NAME=\"PI*\" VALUE=\"\">");
                strcat(szForm, "<INPUT TYPE=\"hidden\" NAME=\"STATUSID\"
VALUE=\"0\">");
        }
        else
        {
                if ( bValid )
                        strcat(szForm, "<INPUT TYPE=\"hidden\"
NAME=\"STATUSID\" VALUE=\"0\">");
                else
                        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"STATUSID\" VALUE=\"%d\">", ERR_BAD_ITEM_ID);
        }

        if (Rollback == FALSE)
                strcat(szForm, "<INPUT TYPE=\"hidden\" NAME=\"ERROR\"
VALUE=\"0\">");
        else
                strcat(szForm, "<INPUT TYPE=\"hidden\" NAME=\"ERROR\"
VALUE=\"1\">");

        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\" NAME=\"FORMID\"
VALUE=\"%d\">", NEW_ORDER_FORM);
        wsprintf(szForm+strlen(szForm),         "<INPUT TYPE=\"hidden\"
NAME=\"TERMID\" VALUE=\"%d\">", iTermId);
        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\" NAME=\"SYNCID\"
VALUE=\"%d\">", iSyncId);
        strcat(szForm, "<PRE>                   New Order<BR>");

        if ( bInput )
        {
                wsprintf(szForm+strlen(szForm), "Warehouse:%4.4d   District: <INPUT
NAME=\"DID*\" SIZE=1>           Date:<BR>",
Term.pClientData[iTermId].NewOrderData.w_id);
                strcat(szForm,  "Customer:  <INPUT NAME=\"CID*\" SIZE=4>
Name:           Credit:     %Disc:<BR>"
                                                                "Order Number:          Number
Lines:          W_tax:          D_tax:<BR><BR>"
                                                                " Supp_W  Item_Id  Item Name
Qty  Stock  B/G  Price    Amount<BR>"
                                                                " <INPUT NAME=\"SP00*\"
SIZE=4>  <INPUT NAME=\"IID00*\" SIZE=6>                 <INPUT NAME=\"Qty00*\"
SIZE=1><BR>"
                                                                " <INPUT NAME=\"SP01*\"
SIZE=4>  <INPUT NAME=\"IID01*\" SIZE=6>                 <INPUT NAME=\"Qty01*\"
SIZE=1><BR>"
                                                                " <INPUT NAME=\"SP02*\"
SIZE=4>  <INPUT NAME=\"IID02*\" SIZE=6>                 <INPUT NAME=\"Qty02*\"
SIZE=1><BR>"
                                                                " <INPUT NAME=\"SP03*\"
SIZE=4>  <INPUT NAME=\"IID03*\" SIZE=6>                 <INPUT NAME=\"Qty03*\"
SIZE=1><BR>"
```

```
SIZE=4> <INPUT NAME=\"IID04*\" SIZE=6>
SIZE=1><BR>"

SIZE=4> <INPUT NAME=\"IID05*\" SIZE=6>
SIZE=1><BR>"

SIZE=4> <INPUT NAME=\"IID06*\" SIZE=6>
SIZE=1><BR>"

SIZE=4> <INPUT NAME=\"IID07*\" SIZE=6>
SIZE=1><BR>"

SIZE=4> <INPUT NAME=\"IID08*\" SIZE=6>
SIZE=1><BR>"

SIZE=4> <INPUT NAME=\"IID09*\" SIZE=6>
SIZE=1><BR>"

SIZE=4> <INPUT NAME=\"IID10*\" SIZE=6>
SIZE=1><BR>"

SIZE=4> <INPUT NAME=\"IID11*\" SIZE=6>
SIZE=1><BR>"

SIZE=4> <INPUT NAME=\"IID12*\" SIZE=6>
SIZE=1><BR>"

SIZE=4> <INPUT NAME=\"IID13*\" SIZE=6>
SIZE=1><BR>"

SIZE=4> <INPUT NAME=\"IID14*\" SIZE=6>
SIZE=1><BR>"

Total:<BR><HR>"

NAME=\"CMD\" VALUE=\"Process\">"

NAME=\"CMD\" VALUE=\"Menu\">"



        }
        else
        {
                if ( bValid )
                {
" <INPUT NAME=\"SP04*\"
  <INPUT NAME=\"Qty04*\"

" <INPUT NAME=\"SP05*\"
  <INPUT NAME=\"Qty05*\"

" <INPUT NAME=\"SP06*\"
  <INPUT NAME=\"Qty06*\"

" <INPUT NAME=\"SP07*\"
  <INPUT NAME=\"Qty07*\"

" <INPUT NAME=\"SP08*\"
  <INPUT NAME=\"Qty08*\"

" <INPUT NAME=\"SP09*\"
  <INPUT NAME=\"Qty09*\"

" <INPUT NAME=\"SP10*\"
  <INPUT NAME=\"Qty10*\"

" <INPUT NAME=\"SP11*\"
  <INPUT NAME=\"Qty11*\"

" <INPUT NAME=\"SP12*\"
  <INPUT NAME=\"Qty12*\"

" <INPUT NAME=\"SP13*\"
  <INPUT NAME=\"Qty13*\"

" <INPUT NAME=\"SP14*\"
  <INPUT NAME=\"Qty14*\"

"Execution Status:

"<INPUT TYPE=\"submit\"

"<INPUT TYPE=\"submit\"

"</FORM>"
"</HTML>" );
                        wsprintf(szForm+strlen(szForm), "Warehouse: %4.4d   Distric
%2.2d                   Date: %2.2d-%2.2d-%4.4d %2.2d:%2.2d:%2.2d <BR>",
                                Term.pClientData[iTermId].NewOrderData.w_id,
                                Term.pClientData[iTermId].NewOrderData.d_id,

        Term.pClientData[iTermId].NewOrderData.o_entry_d.day,

        Term.pClientData[iTermId].NewOrderData.o_entry_d.month,

        Term.pClientData[iTermId].NewOrderData.o_entry_d.year,

        Term.pClientData[iTermId].NewOrderData.o_entry_d.hour,

        Term.pClientData[iTermId].NewOrderData.o_entry_d.minute,

        Term.pClientData[iTermId].NewOrderData.o_entry_d.second);
                }
                else
                {
                        wsprintf(szForm+strlen(szForm), "Warehouse: %4.4d   Distric
%2.2d                    Date:<BR>",
                                Term.pClientData[iTermId].NewOrderData.w_id,
                                Term.pClientData[iTermId].NewOrderData.d_id);
                }

                FormatHTMLString(szName,
Term.pClientData[iTermId].NewOrderData.c_last, 16),
                FormatHTMLString(szCredit,
Term.pClientData[iTermId].NewOrderData.c_credit, 2);

                wsprintf(szForm+strlen(szForm), "Customer:  %4.4d   Name: %s   Cred
%s   ",
                        Term.pClientData[iTermId].NewOrderData.c_id, szName,
szCredit);


                if ( bValid )
                {
                        sprintf(szForm+strlen(szForm), "%%Disc: %5.2f          <BR>
Term.pClientData[iTermId].NewOrderData.c_discount);
                        sprintf(szForm+strlen(szForm), "Order Number: %8.8d  Numt
of Lines: %2.2d       W_tax: %5.2f   D_tax: %5.2f  <BR><BR>",
                                Term.pClientData[iTermId].NewOrderData.o_id,
                                Term.pClientData[iTermId].NewOrderData.o_ol_cn
                                Term.pClientData[iTermId].NewOrderData.w_tax,
                                Term.pClientData[iTermId].NewOrderData.d_tax);
```

```
                        strcat(szForm, " Supp_W  Item_Id  Item Name              Qty
Stock  B/G  Price    Amount<BR>");
                        for(i=0; i<Term.pClientData[iTermId].NewOrderData.o_ol_cnt;
i++)
                        {
                                FormatHTMLString(szName,
Term.pClientData[iTermId].NewOrderData.Ol[i].ol_i_name, 24);

                                sprintf(szForm+strlen(szForm), "  %4.4d    %66d    %s
%2.2d    %3.3d    %1.1s   $%6.2f  $%7.2f  <BR>",

        Term.pClientData[iTermId].NewOrderData.Ol[i].ol_supply_w_id,

        Term.pClientData[iTermId].NewOrderData.Ol[i].ol_i_id,
                                        szName,

        Term.pClientData[iTermId].NewOrderData.Ol[i].ol_quantity,

        Term.pClientData[iTermId].NewOrderData.Ol[i].ol_stock,

        Term.pClientData[iTermId].NewOrderData.Ol[i].ol_brand_generic,

        Term.pClientData[iTermId].NewOrderData.Ol[i].ol_i_price,

        Term.pClientData[iTermId].NewOrderData.Ol[i].ol_amount );
                        }
                }
                else
                {
                        strcat(szForm, "%Disc:<BR>");
                        sprintf(szForm+strlen(szForm), "Order Number: %8.8d  Number
of Lines:          W_tax:       D_tax:<BR><BR>",
                                Term.pClientData[iTermId].NewOrderData.o_id);

                        strcat(szForm, " Supp_W  Item_Id  Item Name              Qty
Stock  B/G  Price    Amount<BR>");

                        i = 0;
                }
                for(; i<15; i++)
                        strcat(szForm, "<BR>");

                if ( bValid )
                {
                        sprintf(szForm+strlen(szForm), "Execution Status: %24.24s
Total:  $%8.2f  ",

        Term.pClientData[iTermId].NewOrderData.execution_status,
        Term.pClientData[iTermId].NewOrderData.total_amount);
                }
                else
                {
                        sprintf(szForm+strlen(szForm), "Execution Status: %24.24s
Total:",

        Term.pClientData[iTermId].NewOrderData.execution_status);
                }

                strcat(szForm,          "</PRE><HR><BR>"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..NewOrder..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Payment..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Delivery..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Order-Status..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Stock-Level..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Exit..\">" );
                strcat(szForm, "</FORM></HTML>");
        }

        return szForm;

}

/* FUNCTION: char *MakePaymentForm(int iTermId, int iSyncId, BOOL bInput)
 *
 * PURPOSE:         This function
 *
 * ARGUMENTS:     int                                     iTermId    client browser termi
id
 *                                      int                                     iSyncId
        client browser sync id
 *                                      BOOL                    bInput      TRUE if
form is being constructed for input else FALSE
 *
 * RETURNS:                 char *                  A pointer to buffer inside client
structure where HTML form is built.
 *
 * COMMENTS:       The internal client buffer is created when the terminal id is assigned and
should not
 *                                      be freed except when the client terminal id is no lor
```

```
needed.
 */

static char *MakePaymentForm(int iTermId, int iSyncId, BOOL bInput)
{
        char    *szForm;
        char    *ptr;
        char    szTmp[64];
        char    szW_Zip[26];
        char    szD_Zip[26];
        char    szC_Zip[26];
        char    szC_Phone[26];
        char    szTmpStr1[122];
        char    szTmpStr2[122];
        char    szTmpStr3[122];
        char    szTmpStr4[122];
        int             i;
        int             l;
        char    *szZipPic = "XXXXX-XXXX";

        szForm = (char *)Term.pClientData[iTermId].szBuffer;

        Term.pClientData[iTermId].PaymentData.w_id = Term.pClientData[iTermId].w_id;

        strcpy(szForm,  "<HTML><HEAD><TITLE>TPC-C
Payment</TITLE></HEAD><BODY>"
                                        "<FORM ACTION=\"tpcc.dll\"
METHOD=\"GET\">");
        if ( bInput )
                strcat(szForm, "<INPUT TYPE=\"hidden\" NAME=\"PI*\" VALUE=\"\">");

        strcat(szForm, "<INPUT TYPE=\"hidden\" NAME=\"STATUSID\" VALUE=\"0\">");
        strcat(szForm, "<INPUT TYPE=\"hidden\" NAME=\"ERROR\" VALUE=\"0\">");
        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\" NAME=\"FORMID\"
VALUE=\"%d\">", PAYMENT_FORM);
        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\" NAME=\"TERMID\"
VALUE=\"%d\">", iTermId);
        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\" NAME=\"SYNCID\"
VALUE=\"%d\">", iSyncId);

        strcat(szForm,  "<PRE>                          Payment<BR>");

        if ( bInput )
                strcat(szForm,  "Date:<BR><BR>" );
        else
        {
                wsprintf(szForm+strlen(szForm), "Date: %2.2d-%2.2d-%4.4d
%2.2d:%2.2d:%2.2d <BR><BR>",
                                Term.pClientData[iTermId].PaymentData.h_date.day,
                                Term.pClientData[iTermId].PaymentData.h_date.month,
                                Term.pClientData[iTermId].PaymentData.h_date.year,
                                Term.pClientData[iTermId].PaymentData.h_date.hour,
                                Term.pClientData[iTermId].PaymentData.h_date.minute,
                                Term.pClientData[iTermId].PaymentData.h_date.second);
        }
        wsprintf(szForm+strlen(szForm), "Warehouse: %4.4d",
Term.pClientData[iTermId].PaymentData.w_id);

        if ( bInput )
        {
                strcat(szForm,  "                District: <INPUT NAME=\"DID*\"
SIZE=1><BR><BR><BR><BR><BR>"
                                        "Customer: <INPUT
NAME=\"CID*\" SIZE=4>"
                                        "Cust-Warehouse: <INPUT
NAME=\"CWI*\" SIZE=4>  "
                                        "Cust-District: <INPUT
NAME=\"CDI*\" SIZE=1><BR>"
                                        "Name:                  <INPUT
NAME=\"CLT*\" SIZE=16>          Since:<BR>"
                                        "
Credit:<BR>"
                                        "
Disc:<BR>"
                                        "
Phone:<BR><BR>"
                                        "Amount Paid:       $<INPUT
NAME=\"HAM*\" SIZE=7>     New Cust Balance:<BR>"
                                        "Credit Limit:<BR><BR>Cust-
Data: <BR><BR><BR><BR></PRE><HR>"
                                        "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"Process\"><INPUT TYPE=\"submit\" NAME=\"CMD\"
VALUE=\"Menu\">"
                                        "</BODY></FORM></HTML>'
        }
        else
        {
                sprintf(szForm+strlen(szForm)," District: %2.2d<BR>",
                        Term.pClientData[iTermId].PaymentData.d_id);

                FormatHTMLString(szTmpStr1,
Term.pClientData[iTermId].PaymentData.w_street_1, 20);
                FormatHTMLString(szTmpStr2,
Term.pClientData[iTermId].PaymentData.d_street_1, 20);
```

```
                sprintf(szForm+strlen(szForm),"%s                %s<BR>", szTmpStr1,
szTmpStr2);

                FormatHTMLString(szTmpStr1,
Term.pClientData[iTermId].PaymentData.w_street_2, 20);
                FormatHTMLString(szTmpStr2,
Term.pClientData[iTermId].PaymentData.d_street_2, 20);

                sprintf(szForm+strlen(szForm),"%s                %s<BR>", szTmpStr1,
szTmpStr2);

                FormatString(szW_Zip, szZipPic,
Term.pClientData[iTermId].PaymentData.w_zip);
                FormatString(szD_Zip, szZipPic,
Term.pClientData[iTermId].PaymentData.d_zip);

                FormatHTMLString(szTmpStr1,
Term.pClientData[iTermId].PaymentData.w_city, 20);
                FormatHTMLString(szTmpStr2,
Term.pClientData[iTermId].PaymentData.w_state, 2);
                FormatHTMLString(szTmpStr3,
Term.pClientData[iTermId].PaymentData.d_city, 20);
                FormatHTMLString(szTmpStr4,
Term.pClientData[iTermId].PaymentData.d_state, 2);

                wsprintf(szForm+strlen(szForm), "%s %s %10.10s       %s %s
%10.10s<BR><BR>",
                        szTmpStr1, szTmpStr2, szW_Zip, szTmpStr3, szTmpStr4,
szD_Zip );

                wsprintf(szForm+strlen(szForm), "Customer: %4.4d  Cust-Warehouse:
%4.4d  Cust-District: %2.2d<BR>",
                        Term.pClientData[iTermId].PaymentData.c_id,
                        Term.pClientData[iTermId].PaymentData.c_w_id,
                        Term.pClientData[iTermId].PaymentData.c_d_id);

                FormatHTMLString(szTmpStr1,
Term.pClientData[iTermId].PaymentData.c_first, 16);
                FormatHTMLString(szTmpStr2,
Term.pClientData[iTermId].PaymentData.c_middle, 2);
                FormatHTMLString(szTmpStr3,
Term.pClientData[iTermId].PaymentData.c_last, 16);

                wsprintf(szForm+strlen(szForm), "Name:   %s %s %s     Since:  %2.2d-
%2.2d-%4.4d<BR>",
                        szTmpStr1, szTmpStr2, szTmpStr3,
                        Term.pClientData[iTermId].PaymentData.c_since.day,
                        Term.pClientData[iTermId].PaymentData.c_since.month,
                        Term.pClientData[iTermId].PaymentData.c_since.year);

                FormatHTMLString(szTmpStr1,
Term.pClientData[iTermId].PaymentData.c_street_1, 20);
                FormatHTMLString(szTmpStr2,
Term.pClientData[iTermId].PaymentData.c_credit, 2);

        wsprintf(szForm+strlen(szForm), "       %s                Credit: %s<BR>", szTmpStr1,
szTmpStr2);

                FormatHTMLString(szTmpStr1,
Term.pClientData[iTermId].PaymentData.d_street_2, 20);
        sprintf(szForm+strlen(szForm), "       %s                %%Disc:  %5.2f<BR>",
                        szTmpStr1,
Term.pClientData[iTermId].PaymentData.c_discount);

                FormatString(szC_Zip, szZipPic,
Term.pClientData[iTermId].PaymentData.c_zip);
                FormatString(szC_Phone, "XXXXXX-XXX-XXX-XXXX",
Term.pClientData[iTermId].PaymentData.c_phone);

                FormatHTMLString(szTmpStr1,
Term.pClientData[iTermId].PaymentData.c_city, 20);
                FormatHTMLString(szTmpStr2,
Term.pClientData[iTermId].PaymentData.c_state, 2);

                wsprintf(szForm+strlen(szForm), "       %s %s %10.10s       Phone:  %-
19.19s<BR><BR>",
                        szTmpStr1, szTmpStr2, szC_Zip, szC_Phone );

                sprintf(szForm+strlen(szForm), "Amount Paid:          $%7.2f      New Cus
Balance: $%14.2f<BR>",
                        Term.pClientData[iTermId].PaymentData.h_amount,
                        Term.pClientData[iTermId].PaymentData.c_balance);

                sprintf(szForm+strlen(szForm), "Credit Limit:   $%13.2f<BR><BR>",
                        Term.pClientData[iTermId].PaymentData.c_credit_lim);

                ptr = Term.pClientData[iTermId].PaymentData.c_credit;
                if ( *ptr == 'B' && *(ptr+1) == 'C' )
                {
                        ptr = Term.pClientData[iTermId].PaymentData.c_data;
                        l = strlen( ptr ) / 50;
                        for(i=0; i<4; i++, ptr += 50)
                        {
                                if ( i <= l )
                                        UtilStrCpy(szTmp, ptr, 50);
                                else
```

```
                                        szTmp[0] = 0;
                                if ( !i )
                                {
                                        FormatHTMLString(szTmpStr1, szTmp,
50);
                                        wsprintf(szForm+strlen(szForm), "Cust-
Data: %s<BR>", szTmpStr1);
                                }
                                else
                                {
                                        FormatHTMLString(szTmpStr1, szTmp,
50);
                                        wsprintf(szForm+strlen(szForm), "
%s<BR>", szTmpStr1);
                                }
                        }
                }
                else
                        strcat(szForm, "Cust-Data: <BR><BR><BR><BR>");

                strcat(szForm,          "</PRE><HR><BR>"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..NewOrder..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Payment..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Delivery..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Order-Status..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Stock-Level..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Exit..\">"
                                                "</BODY></FORM></HTML>");
        }

        return szForm;
}

/* FUNCTION: char *MakeOrderStatusForm(int iTermId, int iSyncId, BOOL bInput)
 *
 * PURPOSE:         This function
 *
 * ARGUMENTS:    int                                     iTermId    client browser terminal
id
 *                                      int                                     iSyncId
        client browser sync id
 *                                                      BOOL                    bInput     TRUE if
form is being constructed for input else FALSE
 *
 * RETURNS:                     char *                  A pointer to buffer inside client
structure where HTML form is built.
 *
 * COMMENTS:      The internal client buffer is created when the terminal id is assigned anc
should not
 *                                                      be freed except when the client terminal id is no lor
needed.
 */

static char *MakeOrderStatusForm(int iTermId, int iSyncId, BOOL bInput)
{
        char        *szForm;
        char        c_first[98];
        char        c_middle[14];
        char        c_last[98];
        int                 i;

        szForm = (char *)Term.pClientData[iTermId].szBuffer;

        Term.pClientData[iTermId].OrderStatusData.w_id = Term.pClientData[iTermId].w_

        strcpy(szForm,          "<HTML><HEAD><TITLE>TPC-C Order-
Status</TITLE></HEAD><BODY>"
                                                "<FORM ACTION=\"tpcc.dll\"
METHOD=\"GET\">");

        if ( bInput )
                strcat(szForm, "<INPUT TYPE=\"hidden\" NAME=\"PI*\" VALUE=\"\">");

        strcat(szForm, "<INPUT TYPE=\"hidden\" NAME=\"STATUSID\" VALUE=\"0\">");
        strcat(szForm, "<INPUT TYPE=\"hidden\" NAME=\"ERROR\" VALUE=\"0\">");
        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\" NAME=\"FORMID\"
VALUE=\"%d\">", ORDER_STATUS_FORM);
        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\" NAME=\"TERMID\"
VALUE=\"%d\">", iTermId);
        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\" NAME=\"SYNCID\"
VALUE=\"%d\">", iSyncId);

        strcat(szForm,          "<PRE>                          Order-Status<BR>" );
        wsprintf(szForm+strlen(szForm), "Warehouse: %4.4d   ",
Term.pClientData[iTermId].OrderStatusData.w_id);

        if ( bInput )
        {
                strcat(szForm,          "District: <INPUT NAME=\"DID*\" SIZE=1><BR>"
```

```
                                                "Customer: <INPUT
NAME=\"CID*\" SIZE=4>   Name:                   <INPUT NAME=\"CLT*\" SIZE=23><BR>"
                                                "Cust-Balance:<BR><BR>"
                                                "Order-Number:          Entry-
Date:                   Carrier-Number:<BR>"
                                                "Supply-W     Item-Id    Qty
Amount      Delivery-Date<BR></PRE>"
                                                "<HR><INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"Process\"><INPUT TYPE=\"submit\" NAME=\"CMD\"
VALUE=\"Menu\">"
                                                "</BODY></FORM></HTML>" );
            }
            else
            {
                        wsprintf(szForm+strlen(szForm), "District: %2.2d<BR>",
Term.pClientData[iTermId].OrderStatusData.d_id);

                        FormatHTMLString(c_first,
Term.pClientData[iTermId].OrderStatusData.c_first, 16);
                        FormatHTMLString(c_middle,
Term.pClientData[iTermId].OrderStatusData.c_middle, 2);
                        FormatHTMLString(c_last,
Term.pClientData[iTermId].OrderStatusData.c_last, 16);

                        wsprintf(szForm+strlen(szForm), "Customer: %4.4d   Name: %s %s
%s<BR>",
                                    Term.pClientData[iTermId].OrderStatusData.c_id, c_first,
c_middle, c_last);

                        sprintf(szForm+strlen(szForm), "Cust-Balance: $%9.2f<BR><BR>",
                                    Term.pClientData[iTermId].OrderStatusData.c_balance);

                        wsprintf(szForm+strlen(szForm), "Order-Number: %8.8d   Entry-Date:
%2.2d-%2.2d-%4.4d %2.2d:%2.2d:%2.2d   Carrier-Number: %2.2d<BR>",
                                    Term.pClientData[iTermId].OrderStatusData.o_id,
                                    Term.pClientData[iTermId].OrderStatusData.o_entry_d.day,
                                    Term.pClientData[iTermId].OrderStatusData.o_entry_d.month,
                                    Term.pClientData[iTermId].OrderStatusData.o_entry_d.year,
                                    Term.pClientData[iTermId].OrderStatusData.o_entry_d.hour,
                                    Term.pClientData[iTermId].OrderStatusData.o_entry_d.minute,
                                    Term.pClientData[iTermId].OrderStatusData.o_entry_d.second,
                                    Term.pClientData[iTermId].OrderStatusData.o_carrier_id);
                        strcat(szForm+strlen(szForm), "Supply-W     Item-Id    Qty     Amount
Delivery-Date<BR>");

                        for(i=0; i<Term.pClientData[iTermId].OrderStatusData.o_ol_cnt; i++)
                        {
                                    sprintf(szForm+strlen(szForm), "  %4.4d       %6.6d    %2.2d
$%8.2f      %2.2d-%2.2d-%4.4d<BR>",

                                    Term.pClientData[iTermId].OrderStatusData.OlOrderStatusData[i].ol_supply_w_id

                                    Term.pClientData[iTermId].OrderStatusData.OlOrderStatusData[i].ol_i_id,

                                    Term.pClientData[iTermId].OrderStatusData.OlOrderStatusData[i].ol_quantity,

                                    Term.pClientData[iTermId].OrderStatusData.OlOrderStatusData[i].ol_amount,

                                    Term.pClientData[iTermId].OrderStatusData.OlOrderStatusData[i].ol_delivery_d.d

                                    Term.pClientData[iTermId].OrderStatusData.OlOrderStatusData[i].ol_delivery_d.mo
h,

                                    Term.pClientData[iTermId].OrderStatusData.OlOrderStatusData[i].ol_delivery_d.y
                        }

                        strcat(szForm,          "<BR></PRE><HR><INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..NewOrder..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Payment..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Delivery..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Order-Status..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Stock-Level..\">"
                                                "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Exit..\">"
                                                "</BODY></FORM></HTML>"
            }

            return szForm;
}

/* FUNCTION: char *MakeDeliveryForm(int iTermId, int iSyncId, BOOL bInput, BOOL
bSuccess)
 *
 * PURPOSE:          This function
 *
 * ARGUMENTS:     int                                iTermId    client browser termi
id
 *                                    int                                iSyncId
            client browser sync id
 *                                    BOOL                     bInput     TRUE if
form is being constructed for input else FALSE
```

```
 *                                      BOOL                    bSuccess TRUE if
Delivery succeeded else FALSE
 *
 * RETURNS:              char *                  A pointer to buffer inside client
structure where HTML form is built.
 *
 * COMMENTS:     The internal client buffer is created when the terminal id is assigned and
should not
 *                                      be freed except when the client terminal id is no longer
needed.
 */

static char *MakeDeliveryForm(int iTermId, int iSyncId, BOOL bInput, BOOL bSuccess)
{
        char    *szForm;

        szForm = (char *)Term.pClientData[iTermId].szBuffer;

        Term.pClientData[iTermId].DeliveryData.w_id = Term.pClientData[iTermId].w_id;

        strcpy( szForm,     "<HTML><HEAD><TITLE>TPC-C
Delivery</TITLE></HEAD><BODY>"
                                        "<FORM ACTION=\"tpcc.dll\"
METHOD=\"GET\">");

        if ( bInput )
        {
                strcat(szForm, "<INPUT TYPE=\"hidden\" NAME=\"PI*\" VALUE=\"\">");
                strcat(szForm, "<INPUT TYPE=\"hidden\" NAME=\"STATUSID\"
VALUE=\"0\">");
        }
        else
        {
                if ( !bSuccess )
                {
                        sprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\"
NAME=\"STATUSID\" VALUE=\"%d\">", ERR_TYPE_DELIVERY_POST);
                        strcat(szForm, "<INPUT TYPE=\"hidden\" NAME=\"ERROR\"
VALUE=\"2\">");
                }
                else
                {
                        strcat(szForm, "<INPUT TYPE=\"hidden\"
NAME=\"STATUSID\" VALUE=\"0\">");
                        strcat(szForm, "<INPUT TYPE=\"hidden\" NAME=\"ERROR\"
VALUE=\"0\">");
                }
        }

        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\" NAME=\"FORMID\"
VALUE=\"%d\">", DELIVERY_FORM);
        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\" NAME=\"TERMID\"
VALUE=\"%d\">", iTermId);
        wsprintf(szForm+strlen(szForm), "<INPUT TYPE=\"hidden\" NAME=\"SYNCID\"
VALUE=\"%d\">", iSyncId);

        strcat(szForm,      "<PRE>                          Delivery<BR>" );

        wsprintf(szForm+strlen(szForm), "Warehouse: %4.4d<BR><BR>",
Term.pClientData[iTermId].DeliveryData.w_id);

        if ( bInput )
                strcat( szForm, "Carrier Number: <INPUT NAME=\"OCD*\"
SIZE=1><BR><BR>");
        else
        {
                wsprintf(szForm+strlen(szForm), "Carrier Number: %2.2d<BR><BR>",
                        Term.pClientData[iTermId].DeliveryData.o_carrier_id);
        }
        if ( bInput )
        {
                strcat( szForm, "Execution Status:<BR></PRE>"
                                                        "<HR><INPUT TYPE=\"submi
NAME=\"CMD\" VALUE=\"Process\">"
                                                        "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"Menu\">" );
        }
        else
        {
                wsprintf(szForm+strlen(szForm), "Execution Status:
%25.25s<BR></PRE>",
                        Term.pClientData[iTermId].DeliveryData.execution_status);

                strcat(szForm,      "<HR><INPUT TYPE=\"submit\" NAME=\"CMD\"
VALUE=\"..NewOrder..\">"
                                                        "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Payment..\">"
                                                        "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Delivery..\">"
                                                        "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Order-Status..\">"
                                                        "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Stock-Level..\">"
                                                        "<INPUT TYPE=\"submit\"
NAME=\"CMD\" VALUE=\"..Exit..\">" );
        }
```

```
        strcat( szForm,     "</BODY></FORM></HTML>" );

        return szForm;
}

/* FUNCTION: void UtilStrCpy(char * pDest, char * pSrc, int n)
 *
 * PURPOSE:     This function copies n characters from string pSrc to pDst and places a
 *                      null character at the end of the destination string.
 *
 * ARGUMENTS:   char                    *pDest  destination string pointer
 *                      char                    *pSrc   source
string pointer
 *                      int                     n
 *      number of characters to copy
 *
 * RETURNS:             None
 *
 * COMMENTS:    Unlike strncpy this function ensures that the result string is
 *                      always null terminated.
 *
 */

static void UtilStrCpy(char * pDest, char * pSrc, int n)
{
   strncpy(pDest, pSrc, n);
   pDest[n] = '\0';

        return;
}

/* FUNCTION: void ProcessNewOrderForm(EXTENSION_CONTROL_BLOCK      *pECB, int
iTermId, int iSyncId)
 *
 * PURPOSE:     This function gets and validates the input data from the new order form
 *                      filling in the required input variables. it then calls the
SQLNewOrder
 *                      transaction, constructs the output form and writes it back to client
 *                      browser.
 *
 * ARGUMENTS:   EXTENSION_CONTROL_BLOCK         *pECB   passed in structure
pointer from inetsrv.
 *                      int
 *      iTermId client browser terminal id
 *                      int
 *      iSyncId client browser sync id
 *
 * RETURNS:             None
 *
 * COMMENTS:    None
 *
 */

#ifdef LOCAL_ALLOC // Allocate the tpalloc structure for each transaction
//            This saves on some memory at the expense of some CPU cycles.
static void ProcessNewOrderForm(EXTENSION_CONTROL_BLOCK    *pECB, int iTermId, i
iSyncId)
{
        int     TpRc, iRc, iError;
        long    ilen, *olen;
        char    buf[128];

        NEW_ORDER_DATA                  *NewOrderDataPtr;  //New Order Tuxedo
Buffer

        if((iRc = ThrTpInit()) <0)
        {
                 // This is bad
                sprintf(buf, "ProcessNewOrder Failed ThrTpInit: iRc = %d", iRc);
                LogTuxError(0, buf);
                ErrorMessage(pECB, ERR_NEW_ORDER_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
                return;
         }

        memset(&Term.pClientData[iTermId].NewOrderData, 0,
sizeof(NEW_ORDER_DATA));

        Term.pClientData[iTermId].NewOrderData.w_id = Term.pClientData[iTermId].w_id;

        if ( (iError=GetNewOrderData(pECB->lpszQueryString,
&Term.pClientData[iTermId].NewOrderData)) != ERR_SUCCESS )
        {
                ErrorMessage(pECB, iError, ERR_TYPE_WEBDLL, NULL, iTermId,
iSyncId);
                return;
        }

        if ((NewOrderDataPtr = (NEW_ORDER_DATA *)tpalloc("CARRAY", NULL,
sizeof(NEW_ORDER_DATA))) == NULL)
        {
                TpRc = tperrno;
                sprintf(buf, "ProcessNewOrder Tpcalloc Failed");
                LogTuxError(TpRc, buf);
                ErrorMessage(pECB, ERR_NEW_ORDER_NOT_PROCESSED,
```

```
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
                        return;
                }

                *NewOrderDataPtr = Term.pClientData[iTermId].NewOrderData;

        ilen = sizeof(NEW_ORDER_DATA);
        olen = &ilen;

                if ( dLog )
                {
                        FILE *fp;

                        fp = fopen(szTpccLogPath, "ab");
                        fprintf(fp, "* ProcessNewOrderL Thread %d iTermId %d NewOrderDataPtr:
%x size %d \r\n",
                                GetCurrentThreadId(), iTermId, &NewOrderDataPtr,
sizeof(*NewOrderDataPtr));
                        fclose(fp);
                }

        if ((iRc = tpcall("NEWORDER", (char *)NewOrderDataPtr, ilen,
                        (char **)&NewOrderDataPtr, (long*)olen, TPSIGRSTRT)) == -1)
                {
           TpRc = tperrno;
                        sprintf(buf, "Neworder tpcall failed");
                        LogTuxError(TpRc, buf);
                        ErrorMessage(pECB, ERR_NEW_ORDER_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
           return;
        }

                if ( dLog )
                {
                        FILE *fp;

                        fp = fopen(szTpccLogPath, "ab");
                        fprintf(fp, "** ProcessNewOrderL Thread %d iTermId %d
NewOrderDataPtr: %x size %d\r\n",
                                GetCurrentThreadId(), iTermId, &NewOrderDataPtr,
sizeof(*NewOrderDataPtr));
                        fclose(fp);
                }

                Term.pClientData[iTermId].NewOrderData = *NewOrderDataPtr;

        iRc = NewOrderDataPtr->retval;
                iError = NewOrderDataPtr->error;

                tpfree((char *)NewOrderDataPtr);

                if ( iRc < 0 )
                {
                        if (iError == ERR_TYPE_DEADLOCK)
                                ErrorMessage(pECB,
ERR_NEW_ORDER_NOT_PROCESSED, ERR_TYPE_DEADLOCK, NULL, iTermId,
iSyncId);
                        else
                                ErrorMessage(pECB,
ERR_NEW_ORDER_NOT_PROCESSED, ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
                }
                else
                        if ( iError == ERR_BAD_ITEM_ID)
                                WriteZString(pECB, MakeNewOrderForm(iTermId, iSyncId,
TRUE, FALSE, (BOOL)iRc) );
                        else
                                WriteZString(pECB, MakeNewOrderForm(iTermId, iSyncId,
FALSE, FALSE, (BOOL)iRc) );

                return;
}
#else // Not LOCAL_ALLOC
static void ProcessNewOrderForm(EXTENSION_CONTROL_BLOCK    *pECB, int iTermId,
iSyncId)
{
                int                     TpRc, iRc, iError;
                long        ilen, *olen;
                char        buf[128];

        if((iRc = ThrTpInit()) <0)
                {
                        // This is bad
                        sprintf(buf, "ProcessNewOrder Failed ThrTpInit: iRc = %d", iRc);
                        LogTuxError(0, buf);
                        ErrorMessage(pECB, ERR_NEW_ORDER_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
                        return;
                }

                memset(&Term.pClientData[iTermId].NewOrderData, 0,
sizeof(NEW_ORDER_DATA));

                Term.pClientData[iTermId].NewOrderData.w_id = Term.pClientData[iTermId].w_id

                if ( (iError=GetNewOrderData(pECB->lpszQueryString,
&Term.pClientData[iTermId].NewOrderData)) != ERR_SUCCESS )
```

```
        {
                ErrorMessage(pECB, iError, ERR_TYPE_WEBDLL, NULL, iTermId,
iSyncId);
                return;
        }

        Term.pClientData[iTermId].TuxDataPtr->NewOrderData =
Term.pClientData[iTermId].NewOrderData;

    ilen = sizeof(TUX_DATA);
    olen = &ilen;

        if ( dLog )
        {
                FILE *fp;

                fp = fopen(szTpccLogPath, "ab");
                fprintf(fp, "* ProcessNewOrder Thread %d iTermId %d TuxDataPtr: %x
size %d \r\n",
                        GetCurrentThreadId(), iTermId,
&Term.pClientData[iTermId].TuxDataPtr,
                                sizeof(*Term.pClientData[iTermId].TuxDataPtr));
                fclose(fp);
        }

    if ((iRc = tpcall("NEWORDER", (char *)Term.pClientData[iTermId].TuxDataPtr, ilen,
                (char **)&Term.pClientData[iTermId].TuxDataPtr, (long *)olen,
TPSIGRSTRT)) == -1)
        {
      TpRc = tperrno;
                sprintf(buf, "Neworder tpcall failed");
                LogTuxError(TpRc, buf);
                ErrorMessage(pECB, ERR_NEW_ORDER_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
      return;
    }

        if ( dLog )
        {
                FILE *fp;

                fp = fopen(szTpccLogPath, "ab");
                fprintf(fp, "** ProcessNewOrder Thread %d iTermId %d TuxDataPtr: %x
size %d\r\n",
                        GetCurrentThreadId(), iTermId,
&Term.pClientData[iTermId].TuxDataPtr,
                                sizeof(*Term.pClientData[iTermId].TuxDataPtr));
                fclose(fp);
        }

    Term.pClientData[iTermId].NewOrderData = Term.pClientData[iTermId].TuxDataPtr-
>NewOrderData;

    iRc = Term.pClientData[iTermId].TuxDataPtr->NewOrderData.retval;
        iError = Term.pClientData[iTermId].TuxDataPtr->NewOrderData.error;

        if ( iRc < 0 )
        {
                if (iError == ERR_TYPE_DEADLOCK)
                        ErrorMessage(pECB,
ERR_NEW_ORDER_NOT_PROCESSED, ERR_TYPE_DEADLOCK, NULL, iTermId,
iSyncId);
                else
                        ErrorMessage(pECB,
ERR_NEW_ORDER_NOT_PROCESSED, ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
        }
        else
                if ( iError == ERR_BAD_ITEM_ID)
                        WriteZString(pECB, MakeNewOrderForm(iTermId, iSyncId,
TRUE, FALSE, (BOOL)iRc) );
                else
                        WriteZString(pECB, MakeNewOrderForm(iTermId, iSyncId,
FALSE, FALSE, (BOOL)iRc) );

        return;
}
#endif // LOCAL_ALLOC

/* FUNCTION: void ProcessPaymentForm(EXTENSION_CONTROL_BLOCK *pECB, int
iTermId, int iSyncId)
 *
 * PURPOSE:     This function gets and validates the input data from the payment form
 *                      filling in the required input variables. It then calls the
SQLPayment
 *                      transaction, constructs theoutput form and writes it back to cli
 *                      browser.
 *
 * ARGUMENTS:   EXTENSION_CONTROL_BLOCK     *pECB   passed in structure
pointer from inetsrv.
 *                                              int
        iTermId  client browser terminal id
 *                                              int
        iSyncId client browser sync id
 *
 * RETURNS:             None
 *
```

```
 * COMMENTS:       None
 *
 */

#ifdef LOCAL_ALLOC // Allocate the tpalloc structure for each transaction
//              This saves on some memory at the expense of some CPU cycles.
static void ProcessPaymentForm(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int
iSyncId)
{
        int                     TpRc, iRc, iError;
        long    ilen, *olen;
        char    buf[128];

        PAYMENT_DATA            *PaymentDataPtr;    //Payment Tuxedo Buffer

    if((iRc = ThrTpInit()) <0)
        {
             // This is bad
            sprintf(buf, "ProcessPayment Failed ThrTpInit: iRc = %d", iRc);
            LogTuxError(0, buf);
            ErrorMessage(pECB, ERR_PAYMENT_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
            return;
        }

        memset(&Term.pClientData[iTermId].PaymentData, 0, sizeof(PAYMENT_DATA));

    Term.pClientData[iTermId].PaymentData.w_id = Term.pClientData[iTermId].w_id;

    if ( (iError=GetPaymentData(pECB->lpszQueryString,
&Term.pClientData[iTermId].PaymentData)) != ERR_SUCCESS )
    {
        ErrorMessage(pECB, iError, ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
        return;
    }

        if ((PaymentDataPtr = (PAYMENT_DATA *)tpalloc("CARRAY", NULL,
sizeof(PAYMENT_DATA))) == NULL)
        {
            TpRc = tperrno;
            sprintf(buf, "ProcessPayment Tpcalloc Failed");
            LogTuxError(TpRc, buf);
            ErrorMessage(pECB, ERR_PAYMENT_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
            return;
        }

    *PaymentDataPtr = Term.pClientData[iTermId].PaymentData;

        ilen = sizeof(PAYMENT_DATA);
    olen = &ilen;

        if ( dLog )
        {
            FILE *fp;

            fp = fopen(szTpccLogPath, "ab");
            fprintf(fp, "* ProcessPayment Thread %d iTermId %d PaymentDataPtr: %
\r\n",
                GetCurrentThreadId(), iTermId, &PaymentDataPtr);
            fclose(fp);
        }

    if (( iRc = tpcall("PAYMENT", (char *)PaymentDataPtr, ilen,
            (char **)&PaymentDataPtr, (long *)olen, TPSIGRSTRT)) == -1)
        {
       TpRc = tperrno;
            sprintf(buf, "ProcessPayment tpcall failed");
            LogTuxError(TpRc, buf);
            ErrorMessage(pECB, ERR_PAYMENT_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
       return;
    }

        if ( dLog )
        {
            FILE *fp;

            fp = fopen(szTpccLogPath, "ab");
            fprintf(fp, "** ProcessPayment Thread %d iTermId %d PaymentDataPtr:
\r\n",
                GetCurrentThreadId(), iTermId, &PaymentDataPtr);
            fclose(fp);
        }

    Term.pClientData[iTermId].PaymentData = *PaymentDataPtr;

    iRc = PaymentDataPtr->retval;
        iError = PaymentDataPtr->error;

        tpfree((char *)PaymentDataPtr);

    if ( iRc < 0 )
        {
            if (iError == ERR_TYPE_DEADLOCK )
```

```
                                ErrorMessage(pECB, ERR_PAYMENT_NOT_PROCESSED,
ERR_TYPE_DEADLOCK, NULL, iTermId, iSyncId);
                        else if (iError == ERR_NOSUCH_CUSTOMER)
                                ErrorMessage(pECB, ERR_PAYMENT_INVALID_CUSTOMER,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
                        else
                                ErrorMessage(pECB, ERR_PAYMENT_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
    }
    else
        WriteZString(pECB, MakePaymentForm(iTermId, iSyncId, FALSE) );

    return;

}
#else // Not LOCAL_ALLOC
static void ProcessPaymentForm(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int
iSyncId)
{
        int             TpRc, iRc, iError;
        long    ilen, *olen;
        char    buf[128];

    if((iRc = ThrTpInit()) <0)
        {
                 // This is bad
                sprintf(buf, "ProcessPayment Failed ThrTpInit: iRc = %d", iRc);
                LogTuxError(0, buf);
                ErrorMessage(pECB, ERR_PAYMENT_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
                return;
        }

        memset(&Term.pClientData[iTermId].PaymentData, 0, sizeof(PAYMENT_DATA));

    Term.pClientData[iTermId].PaymentData.w_id = Term.pClientData[iTermId].w_id;

    if ( (iError=GetPaymentData(pECB->lpszQueryString,
&Term.pClientData[iTermId].PaymentData)) != ERR_SUCCESS )
    {
        ErrorMessage(pECB, iError, ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
        return;
    }

    Term.pClientData[iTermId].TuxDataPtr->PaymentData =
Term.pClientData[iTermId].PaymentData;

        ilen = sizeof(TUX_DATA);
    olen = &ilen;

        if ( dLog )
        {
                FILE *fp;

                fp = fopen(szTpccLogPath, "ab");
                fprintf(fp, "* ProcessPayment Thread %d iTermId %d PaymentDataPtr:
\r\n",
                        GetCurrentThreadId(), iTermId,
&Term.pClientData[iTermId].TuxDataPtr);
                fclose(fp);
        }

    if (( iRc = tpcall("PAYMENT", (char *)Term.pClientData[iTermId].TuxDataPtr, ilen,
                (char **)&Term.pClientData[iTermId].TuxDataPtr, (long *)olen,
TPSIGRSTRT)) == -1)
        {
       TpRc = tperrno;
                sprintf(buf, "ProcessPayment tpcall failed");
                LogTuxError(TpRc, buf);
                ErrorMessage(pECB, ERR_PAYMENT_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
       return;
    }

        if ( dLog )
        {
                FILE *fp;

                fp = fopen(szTpccLogPath, "ab");
                fprintf(fp, "** ProcessPayment Thread %d iTermId %d TuxDataPtr: %x
\r\n",
                        GetCurrentThreadId(), iTermId,
&Term.pClientData[iTermId].TuxDataPtr);
                fclose(fp);
        }

    Term.pClientData[iTermId].PaymentData = Term.pClientData[iTermId].TuxDataPtr-
>PaymentData;

    iRc = Term.pClientData[iTermId].TuxDataPtr->PaymentData.retval;
        iError = Term.pClientData[iTermId].TuxDataPtr->PaymentData.error;

    if ( iRc < 0 )
        {
                if (iError == ERR_TYPE_DEADLOCK )
                        ErrorMessage(pECB, ERR_PAYMENT_NOT_PROCESSED,
```

```
ERR_TYPE_DEADLOCK, NULL, iTermId, iSyncId);
                        else if (iError == ERR_NOSUCH_CUSTOMER)
                                ErrorMessage(pECB, ERR_PAYMENT_INVALID_CUSTOMER,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
                        else
                                ErrorMessage(pECB, ERR_PAYMENT_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
    }
    else
        WriteZString(pECB, MakePaymentForm(iTermId, iSyncId, FALSE) );

    return;
}
#endif // LOCAL_ALLOC

/* FUNCTION: void ProcessOrderStatusForm(EXTENSION_CONTROL_BLOCK *pECB, int
iTermId, int iSyncId)
 *
 * PURPOSE:         This function gets and validates the input data from the Order Status
 *                          form filling in the required input variables. It then calls the
 *                          SQLOrderStatus transaction, constructs the output form and
writes it
 *                          back to client browser.
 *
 * ARGUMENTS:    EXTENSION_CONTROL_BLOCK         *pECB     passed in structure
pointer from inetsrv.
 *                                      int
            iTermId    client browser terminal id
 *                                      int
            iSyncId client browser sync id
 *
 * RETURNS:                 None
 *
 * COMMENTS:        None
 *
 */

#ifdef LOCAL_ALLOC // Allocate the tpalloc structure for each transaction
//            This saves on some memory at the expense of some CPU cycles.
static void ProcessOrderStatusForm(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int
iSyncId)
{
            int                 TpRc, iRc, iError;
            long        ilen, *olen;
            char        buf[128];

            ORDER_STATUS_DATA       *OrderStatusDataPtr;            //Order Status Tuxedo
Buffer

    if((iRc = ThrTpInit()) <0)
            {
                        // This is bad
                        sprintf(buf, "ProcessOrderStatus Failed ThrTpInit: iRc = %d", iRc);
                        LogTuxError(0, buf);
                        ErrorMessage(pECB, ERR_ORDER_STATUS_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
                        return;
            }

    memset(&Term.pClientData[iTermId].OrderStatusData, 0,
sizeof(ORDER_STATUS_DATA));

    Term.pClientData[iTermId].OrderStatusData.w_id = Term.pClientData[iTermId].w_id;

    if ( (iError=GetOrderStatusData(pECB->lpszQueryString,
&Term.pClientData[iTermId].OrderStatusData)) != ERR_SUCCESS )
    {
        ErrorMessage(pECB, iError, ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
        return;
    }

            if ((OrderStatusDataPtr = (ORDER_STATUS_DATA *)tpalloc("CARRAY", NULL,
sizeof(ORDER_STATUS_DATA))) == NULL)
            {
                        TpRc = tperrno;
                        sprintf(buf, "ProcessOrderStatus Tpcalloc Failed");
                        LogTuxError(TpRc, buf);
                        ErrorMessage(pECB, ERR_ORDER_STATUS_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
                        return;
            }

    *OrderStatusDataPtr = Term.pClientData[iTermId].OrderStatusData;

            ilen = sizeof(ORDER_STATUS_DATA);
    olen = &ilen;

            if ( dLog )
            {
                        FILE *fp;

                        fp = fopen(szTpccLogPath, "ab");
                        fprintf(fp, "* ProcessOrderStatus Thread %d iTermId %d
OrderStatusDataPtr: %x \r\n",
                                    GetCurrentThreadId(), iTermId, &OrderStatusDataPtr);
                        fclose(fp);
```

```
            }

    if (( iRc = tpcall("ORDERSTATUS", (char *)OrderStatusDataPtr, ilen,
                        (char **)&OrderStatusDataPtr, (long *)olen, TPSIGRSTRT)) == -1)
            {
        TpRc = tperrno;
                        sprintf(buf, "ProcessOrderStatus tpcall failed");
                        LogTuxError(TpRc, buf);
                        ErrorMessage(pECB, ERR_ORDER_STATUS_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
        return;
    }

            if ( dLog )
            {
                        FILE *fp;

                        fp = fopen(szTpccLogPath, "ab");
                        fprintf(fp, "** ProcessOrderStatus Thread %d iTermId %d
OrderStatusDataPtr: %x \r\n",
                                    GetCurrentThreadId(), iTermId, &OrderStatusDataPtr);
                        fclose(fp);
            }

    Term.pClientData[iTermId].OrderStatusData = *OrderStatusDataPtr;

    iRc = OrderStatusDataPtr->retval;
            iError = OrderStatusDataPtr->error;

            tpfree((char *)OrderStatusDataPtr);

    if ( iRc < 0 )
            {
                        if ( iError == ERR_TYPE_DEADLOCK )
                                    ErrorMessage(pECB,
ERR_ORDER_STATUS_NOT_PROCESSED, ERR_TYPE_DEADLOCK, NULL, iTermId,
iSyncId);
                        else if (iError == ERR_NOSUCH_CUSTOMER)
                                    ErrorMessage(pECB, ERR_NOSUCH_CUSTOMER,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
                        else
                                    ErrorMessage(pECB,
ERR_ORDER_STATUS_NOT_PROCESSED, ERR_TYPE_WEBDLL, NULL, iTermId,
iSyncId);
    }
    else
        WriteZString(pECB, MakeOrderStatusForm(iTermId, iSyncId, FALSE) );
    return;
}
#else // Not LOCAL_ALLOC
static void ProcessOrderStatusForm(EXTENSION_CONTROL_BLOCK *pECB, int iTermId,
iSyncId)
{
            int                     TpRc, iRc, iError;
            long        ilen, *olen;
            char        buf[128];

    if((iRc = ThrTpInit()) <0)
            {
                        // This is bad
                        sprintf(buf, "ProcessOrderStatus Failed ThrTpInit: iRc = %d", iRc);
                        LogTuxError(0, buf);
                        ErrorMessage(pECB, ERR_ORDER_STATUS_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
                        return;
            }

    memset(&Term.pClientData[iTermId].OrderStatusData, 0,
sizeof(ORDER_STATUS_DATA));

    Term.pClientData[iTermId].OrderStatusData.w_id = Term.pClientData[iTermId].w_id;

    if ( (iError=GetOrderStatusData(pECB->lpszQueryString,
&Term.pClientData[iTermId].OrderStatusData)) != ERR_SUCCESS )
    {
        ErrorMessage(pECB, iError, ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
        return;
    }

    Term.pClientData[iTermId].TuxDataPtr->OrderStatusData =
Term.pClientData[iTermId].OrderStatusData;

            ilen = sizeof(TUX_DATA);
    olen = &ilen;

            if ( dLog )
            {
                        FILE *fp;

                        fp = fopen(szTpccLogPath, "ab");
                        fprintf(fp, "* ProcessOrderStatus Thread %d iTermId %d TuxDataPtr: %
\r\n",
                                    GetCurrentThreadId(), iTermId,
&Term.pClientData[iTermId].TuxDataPtr);
                        fclose(fp);
```

```
        }

    if (( iRc = tpcall("ORDERSTATUS", (char *)Term.pClientData[iTermId].TuxDataPtr, ilen,
                (char **)&Term.pClientData[iTermId].TuxDataPtr, (long *)olen,
TPSIGRSTRT)) == -1)
        {
       TpRc = tperrno;
                sprintf(buf, "ProcessOrderStatus tpcall failed");
                LogTuxError(TpRc, buf);
                ErrorMessage(pECB, ERR_ORDER_STATUS_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
       return;
    }

        if ( dLog )
        {
                FILE *fp;

                fp = fopen(szTpccLogPath, "ab");
                fprintf(fp, "** ProcessOrderStatus Thread %d iTermId %d TuxDataPtr: %x
\r\n",
                        GetCurrentThreadId(), iTermId,
&Term.pClientData[iTermId].TuxDataPtr);
                fclose(fp);
        }

    Term.pClientData[iTermId].OrderStatusData = Term.pClientData[iTermId].TuxDataPtr-
>OrderStatusData;

    iRc = Term.pClientData[iTermId].TuxDataPtr->OrderStatusData.retval;
        iError = Term.pClientData[iTermId].TuxDataPtr->OrderStatusData.error;

    if ( iRc < 0 )
        {
                if ( iError == ERR_TYPE_DEADLOCK )
                        ErrorMessage(pECB,
ERR_ORDER_STATUS_NOT_PROCESSED, ERR_TYPE_DEADLOCK, NULL, iTermId,
iSyncId);
                else if (iError == ERR_NOSUCH_CUSTOMER)
                        ErrorMessage(pECB, ERR_NOSUCH_CUSTOMER,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
                else
                        ErrorMessage(pECB,
ERR_ORDER_STATUS_NOT_PROCESSED, ERR_TYPE_WEBDLL, NULL, iTermId,
iSyncId);
    }
    else
        WriteZString(pECB, MakeOrderStatusForm(iTermId, iSyncId, FALSE) );

    return;

}
#endif // LOCAL_ALLOC

/* FUNCTION: void ProcessDeliveryForm(EXTENSION_CONTROL_BLOCK *pECB, int
iTermId, int iSyncId)
 *
 * PURPOSE:      This function gets and validates the input data from the delivery form
 *                      filling in the required input variables. It then calls the
PostDeliveryInfo
 *                      Api, The client is then informed that the transaction has been
posted.
 *
 * ARGUMENTS:    EXTENSION_CONTROL_BLOCK      *pECB     passed in structure
pointer from inetsrv.
 *                                              int
 *            iTermId   client browser terminal id
 *                                              int
 *            iSyncId   clinet browser sync id
 *
 * RETURNS:                     None
 *
 * COMMENTS:     None
 *
 */

#ifdef LOCAL_ALLOC // Allocate the tpalloc structure for each transaction
//            This saves on some memory at the expense of some CPU cycles.
static void ProcessDeliveryForm(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int
iSyncId)
{
        int                     TpRc, iRc;
        char        szTmp[26];
        BOOL        bSuccess;
        long        ilen, *olen;
        char        buf[128];

        DELIVERY_DATA               *DeliveryDataPtr;     //Delivery Tuxedo Buffer

    if((iRc = ThrTpInit()) <0)
        {
                // This is bad
                sprintf(buf, "ProcessDelivery Failed ThrTpInit: iRc = %d", iRc);
                LogTuxError(0, buf);
                ErrorMessage(pECB, ERR_DELIVERY_MISSING_OCD_KEY,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
```

```
                return;
        }

        memset(&Term.pClientData[iTermId].DeliveryData, 0, sizeof(DELIVERY_DATA));

        if ( !GetKeyValue(pECB->lpszQueryString, "OCD*", szTmp, sizeof(szTmp)) )
        {
                ErrorMessage(pECB, ERR_DELIVERY_MISSING_OCD_KEY,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
                return;
        }

        if ( !IsNumeric(szTmp) )
        {
                ErrorMessage(pECB, ERR_DELIVERY_CARRIER_INVALID,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
                return;
        }

        Term.pClientData[iTermId].DeliveryData.o_carrier_id = atoi(szTmp);

        if ( Term.pClientData[iTermId].DeliveryData.o_carrier_id > 10 ||
Term.pClientData[iTermId].DeliveryData.o_carrier_id < 1 )
        {
                ErrorMessage(pECB, ERR_DELIVERY_CARRIER_ID_RANGE,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
                return;
        }

    Term.pClientData[iTermId].DeliveryData.w_id = Term.pClientData[iTermId].w_id;

        GetLocalTime(&Term.pClientData[iTermId].DeliveryData.queue_time);

        if ((DeliveryDataPtr = (DELIVERY_DATA *)tpalloc("CARRAY", NULL,
sizeof(DELIVERY_DATA))) == NULL)
        {
                TpRc = tperrno;
                sprintf(buf, "ProcessDelivery Tpcalloc Failed");
                LogTuxError(TpRc, buf);
                strcpy(Term.pClientData[iTermId].DeliveryData.execution_status, "Delivery
Post Failed");
                bSuccess = FALSE;
                WriteZString(pECB, MakeDeliveryForm(iTermId, iSyncId, FALSE,
bSuccess) );
                return;
        }

    *DeliveryDataPtr = Term.pClientData[iTermId].DeliveryData;

    ilen = sizeof(DELIVERY_DATA);
    olen = &ilen;

        if ( dLog )
        {
                FILE *fp;

                fp = fopen(szTpccLogPath, "ab");
                fprintf(fp, "* ProcessDelivery Thread %d iTermId %d DeliveryDataPtr: %
\r\n",
                        GetCurrentThreadId(), iTermId, &DeliveryDataPtr);
                fclose(fp);
        }

    if (( iRc = tpacall("DELIVERY", (char *)DeliveryDataPtr, ilen, TPNOREPLY)) == -1)
        {
                TpRc = tperrno;
                sprintf(buf, "ProcessDelivery Tpcalloc Failed");
                LogTuxError(TpRc, buf);
                strcpy(Term.pClientData[iTermId].DeliveryData.execution_status, "Deliv
Post Failed");
                bSuccess = FALSE;
                WriteZString(pECB, MakeDeliveryForm(iTermId, iSyncId, FALSE,
bSuccess) );
                return;
    }

        if ( dLog )
        {
                FILE *fp;

                fp = fopen(szTpccLogPath, "ab");
                fprintf(fp, "** ProcessDelivery Thread %d iTermId %d DeliveryDataPtr: %
TpRc = %d \r\n",
                        GetCurrentThreadId(), iTermId, &DeliveryDataPtr, TpRc);
                fclose(fp);
        }

        tpfree((char *)DeliveryDataPtr);

        strcpy(Term.pClientData[iTermId].DeliveryData.execution_status, "Delivery has be
queued.");
        bSuccess = TRUE;

        WriteZString(pECB, MakeDeliveryForm(iTermId, iSyncId, FALSE, bSuccess) );

    return;
```

```
}
#else // Not LOCAL_ALLOC
static void ProcessDeliveryForm(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int
iSyncId)
{
        int             TpRc, iRc;
        char    szTmp[26];
        BOOL    bSuccess;
        long    ilen, *olen;
        char    buf[128];

    if((iRc = ThrTpInit()) <0)
        {
            // This is bad
            sprintf(buf, "ProcessDelivery Failed ThrTpInit: iRc = %d", iRc);
            LogTuxError(0, buf);
            ErrorMessage(pECB, ERR_DELIVERY_MISSING_OCD_KEY,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
            return;
        }

        memset(&Term.pClientData[iTermId].DeliveryData, 0, sizeof(DELIVERY_DATA));

        if ( !GetKeyValue(pECB->lpszQueryString, "OCD*", szTmp, sizeof(szTmp)) )
        {
            ErrorMessage(pECB, ERR_DELIVERY_MISSING_OCD_KEY,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
            return;
        }

        if ( !IsNumeric(szTmp) )
        {
            ErrorMessage(pECB, ERR_DELIVERY_CARRIER_INVALID,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
            return;
        }

        Term.pClientData[iTermId].DeliveryData.o_carrier_id = atoi(szTmp);

        if ( Term.pClientData[iTermId].DeliveryData.o_carrier_id > 10 ||
Term.pClientData[iTermId].DeliveryData.o_carrier_id < 1 )
        {
            ErrorMessage(pECB, ERR_DELIVERY_CARRIER_ID_RANGE,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
            return;
        }

    Term.pClientData[iTermId].DeliveryData.w_id = Term.pClientData[iTermId].w_id;

        GetLocalTime(&Term.pClientData[iTermId].DeliveryData.queue_time);

    Term.pClientData[iTermId].TuxDataPtr->DeliveryData =
Term.pClientData[iTermId].DeliveryData;

    ilen = sizeof(TUX_DATA);
    olen = &ilen;

        if ( dLog )
        {
            FILE *fp;

            fp = fopen(szTpccLogPath, "ab");
            fprintf(fp, "* ProcessDelivery Thread %d iTermId %d TuxDataPtr: %x \r\
                GetCurrentThreadId(), iTermId,
&Term.pClientData[iTermId].TuxDataPtr);
            fclose(fp);
        }

    if (( iRc = tpacall("DELIVERY", (char *)Term.pClientData[iTermId].TuxDataPtr, ilen,
TPNOREPLY)) == -1)
        {
            TpRc = tperrno;
            sprintf(buf, "ProcessDelivery Tpcalloc Failed");
            LogTuxError(TpRc, buf);
            strcpy(Term.pClientData[iTermId].DeliveryData.execution_status, "Deliv
Post Failed");
            bSuccess = FALSE;
            WriteZString(pECB, MakeDeliveryForm(iTermId, iSyncId, FALSE,
bSuccess) );
            return;
    }

        if ( dLog )
        {
            FILE *fp;

            fp = fopen(szTpccLogPath, "ab");
            fprintf(fp, "** ProcessDelivery Thread %d iTermId %d TuxDataPtr: %x
TpRc = %d \r\n",
                GetCurrentThreadId(), iTermId,
&Term.pClientData[iTermId].TuxDataPtr, TpRc);
            fclose(fp);
        }
```

```
        strcpy(Term.pClientData[iTermId].DeliveryData.execution_status, "Delivery has been
queued.");
        bSuccess = TRUE;

        WriteZString(pECB, MakeDeliveryForm(iTermId, iSyncId, FALSE, bSuccess) );
   return;

}
#endif // LOCAL_ALLOC

/* FUNCTION: void ProcessStockLevelForm(EXTENSION_CONTROL_BLOCK *pECB, int
iTermId, int iSyncId)
 *
 * PURPOSE:      This function gets and validates the input data from the Stock Level
 *                      form filling in the required input variables. It then calls the
 *                      SQLStockLevel transaction, constructs the output form and
writes it
 *                      back to client browser.
 *
 * ARGUMENTS:    EXTENSION_CONTROL_BLOCK      *pECB    passed in structure
pointer from inetsrv.
 *                                    int
        iTermId   client browser terminal id
 *                                    int
        iSyncId   client browser sync id
 *
 * RETURNS:              None
 *
 * COMMENTS:     None
 *
 */

#ifdef LOCAL_ALLOC // Allocate the tpalloc structure for each transaction
//      This saves on some memory at the expense of some CPU cycles.
static void ProcessStockLevelForm(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int
iSyncId)
{
        int             TpRc, iRc, iError;
        char    szTmp[26];
        long    ilen, *olen;
        char    buf[128];

        STOCK_LEVEL_DATA        *StockLevelDataPtr; //Stock Level Tuxedo Buffer

        if((iRc = ThrTpInit()) <0)
        {
                // This is bad
                sprintf(buf, "ProcessStockLevel Failed ThrTpInit: iRc = %d", iRc);
                LogTuxError(0, buf);
                ErrorMessage(pECB, ERR_STOCKLEVEL_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
                return;
        }

   memset(&Term.pClientData[iTermId].StockLevelData, 0, sizeof(STOCK_LEVEL_DATA))

   Term.pClientData[iTermId].StockLevelData.w_id = Term.pClientData[iTermId].w_id;
   Term.pClientData[iTermId].StockLevelData.d_id = Term.pClientData[iTermId].d_id;


   if ( !GetKeyValue(pECB->lpszQueryString, "TT*", szTmp, sizeof(szTmp)) )
   {
      ErrorMessage(pECB, ERR_STOCKLEVEL_MISSING_THRESHOLD_KEY,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
      return;
   }

   if ( !IsNumeric(szTmp) )
   {
      ErrorMessage(pECB, ERR_STOCKLEVEL_THRESHOLD_INVALID,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
      return;
   }

   Term.pClientData[iTermId].StockLevelData.thresh_hold = atoi(szTmp);

   if ( Term.pClientData[iTermId].StockLevelData.thresh_hold >= 100 ||
Term.pClientData[iTermId].StockLevelData.thresh_hold < 0 )
   {
      ErrorMessage(pECB, ERR_STOCKLEVEL_THRESHOLD_RANGE,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
      return;
   }

        if ((StockLevelDataPtr = (STOCK_LEVEL_DATA *)tpalloc("CARRAY", NULL,
sizeof(STOCK_LEVEL_DATA))) == NULL)
        {
                TpRc = tperrno;
                sprintf(buf, "ProcessStockLevel Tpcalloc Failed");
                LogTuxError(TpRc, buf);
                ErrorMessage(pECB, ERR_STOCKLEVEL_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
                return;
        }

   *StockLevelDataPtr = Term.pClientData[iTermId].StockLevelData;
```

```
    ilen = sizeof(STOCK_LEVEL_DATA);
    olen = &ilen;

            if ( dLog )
            {
                    FILE *fp;

                    fp = fopen(szTpccLogPath, "ab");
                    fprintf(fp, "* ProcessStockLevel Thread %d iTermId %d StockLevelDataPtr:
%x \r\n",
                            GetCurrentThreadId(), iTermId, &StockLevelDataPtr);
                    fclose(fp);
            }

    if (( iRc = tpcall("STOCKLEVEL", (char *)StockLevelDataPtr, ilen,
                     (char **)&StockLevelDataPtr, (long *) olen, TPSIGRSTRT)) == -1)
            {
        TpRc = tperrno;
                     sprintf(buf, "ProcessStockLevel tpcall failed");
                     LogTuxError(TpRc, buf);
                     ErrorMessage(pECB, ERR_STOCKLEVEL_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
        return;
    }

            if ( dLog )
            {
                    FILE *fp;

                    fp = fopen(szTpccLogPath, "ab");
                    fprintf(fp, "** ProcessStockLevel Thread %d iTermId %d
StockLevelDataPtr: %x \r\n",
                            GetCurrentThreadId(), iTermId, &StockLevelDataPtr);
                    fclose(fp);
            }

    Term.pClientData[iTermId].StockLevelData = *StockLevelDataPtr;

    iRc = StockLevelDataPtr->retval;
            iError = StockLevelDataPtr->error;

            tpfree((char *)StockLevelDataPtr);

            if ( iRc == 0 )
            {
                     if ( iError == ERR_TYPE_DEADLOCK )
                             ErrorMessage(pECB,
ERR_STOCKLEVEL_NOT_PROCESSED, ERR_TYPE_DEADLOCK, NULL, iTermId,
iSyncId);
                     else
                             ErrorMessage(pECB,
ERR_STOCKLEVEL_NOT_PROCESSED, ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
    }
    else
        WriteZString(pECB, MakeStockLevelForm(iTermId, iSyncId, FALSE) );

    return;
}
#else // Not LOCAL_ALLOC
static void ProcessStockLevelForm(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, ir
iSyncId)
{
            int             TpRc, iRc, iError;
            char    szTmp[26];
            long    ilen, *olen;
            char    buf[128];

    if((iRc = ThrTpInit()) <0)
             {
                      // This is bad
                     sprintf(buf, "ProcessStockLevel Failed ThrTpInit: iRc = %d", iRc);
                     LogTuxError(0, buf);
                     ErrorMessage(pECB, ERR_STOCKLEVEL_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
                     return;
             }

    memset(&Term.pClientData[iTermId].StockLevelData, 0, sizeof(STOCK_LEVEL_DATA))

    Term.pClientData[iTermId].StockLevelData.w_id = Term.pClientData[iTermId].w_id;
    Term.pClientData[iTermId].StockLevelData.d_id = Term.pClientData[iTermId].d_id;


    if ( !GetKeyValue(pECB->lpszQueryString, "TT*", szTmp, sizeof(szTmp)) )
    {
        ErrorMessage(pECB, ERR_STOCKLEVEL_MISSING_THRESHOLD_KEY,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
        return;
    }

    if ( !IsNumeric(szTmp) )
    {
        ErrorMessage(pECB, ERR_STOCKLEVEL_THRESHOLD_INVALID,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
```

```
        return;
    }

    Term.pClientData[iTermId].StockLevelData.thresh_hold = atoi(szTmp);

    if ( Term.pClientData[iTermId].StockLevelData.thresh_hold >= 100 ||
Term.pClientData[iTermId].StockLevelData.thresh_hold < 0 )
    {
        ErrorMessage(pECB, ERR_STOCKLEVEL_THRESHOLD_RANGE,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
        return;
    }

    Term.pClientData[iTermId].TuxDataPtr->StockLevelData =
Term.pClientData[iTermId].StockLevelData;

    ilen = sizeof(TUX_DATA);
    olen = &ilen;

            if ( dLog )
            {
                    FILE *fp;

                    fp = fopen(szTpccLogPath, "ab");
                    fprintf(fp, "* ProcessStockLevel Thread %d iTermId %d TuxDataPtr: %x
\r\n",
                                    GetCurrentThreadId(), iTermId,
&Term.pClientData[iTermId].TuxDataPtr);
                    fclose(fp);
            }

    if (( iRc = tpcall("STOCKLEVEL", (char *)Term.pClientData[iTermId].TuxDataPtr, ilen,
                    (char **)&Term.pClientData[iTermId].TuxDataPtr, (long *) olen,
TPSIGRSTRT)) == -1)
            {
        TpRc = tperrno;
                    sprintf(buf, "ProcessStockLevel tpcall failed");
                    LogTuxError(TpRc, buf);
                    ErrorMessage(pECB, ERR_STOCKLEVEL_NOT_PROCESSED,
ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
        return;
    }

            if ( dLog )
            {
                    FILE *fp;

                    fp = fopen(szTpccLogPath, "ab");
                    fprintf(fp, "** ProcessStockLevel Thread %d iTermId %d TuxDataPtr: %x
\r\n",
                                    GetCurrentThreadId(), iTermId,
&Term.pClientData[iTermId].TuxDataPtr);
                    fclose(fp);
            }

    Term.pClientData[iTermId].StockLevelData = Term.pClientData[iTermId].TuxDataPtr-
>StockLevelData;

    iRc = Term.pClientData[iTermId].TuxDataPtr->StockLevelData.retval;
            iError = Term.pClientData[iTermId].TuxDataPtr->StockLevelData.error;

            if ( iRc == 0 )
            {
                    if ( iError == ERR_TYPE_DEADLOCK )
                            ErrorMessage(pECB,
ERR_STOCKLEVEL_NOT_PROCESSED, ERR_TYPE_DEADLOCK, NULL, iTermId,
iSyncId);
                    else
                            ErrorMessage(pECB,
ERR_STOCKLEVEL_NOT_PROCESSED, ERR_TYPE_WEBDLL, NULL, iTermId, iSyncId);
    }
    else
        WriteZString(pECB, MakeStockLevelForm(iTermId, iSyncId, FALSE) );

            return;

}
#endif // LOCAL_ALLOC

/* FUNCTION: int GetNewOrderData(LPSTR lpszQueryString, NEW_ORDER_DATA
*pNewOrderData)
 *
 * PURPOSE:         This function extracts and validates the new order form data from an htt
command string.
 *
 * ARGUMENTS:    LPSTR                           lpszQueryString                 client
browser http command string
 *                                                      NEW_ORDER_DATA          *pNewOrderData
            pointer to new order data structure
 *
 * RETURNS:                     int
                                error code indicating reason for failure
 *                                      ERR_SUCCESS
                                new order input data successfully parsed
 *
 *
```

```
 * COMMENTS:      None
 *
 */

static int GetNewOrderData(LPSTR lpszQueryString, NEW_ORDER_DATA *pNewOrderData)
{
        char    szTmp[26];
        char    szKey[26];
        int             i;
        short   items;
        BOOL    bCheck;

        if ( !GetKeyValue(lpszQueryString, "DID*", szTmp, sizeof(szTmp)) )
                return ERR_NEWORDER_FORM_MISSING_DID;

        if ( !IsNumeric(szTmp) )
                return ERR_NEWORDER_DISTRICT_INVALID;

        pNewOrderData->d_id = atoi(szTmp);

        if ( !GetKeyValue(lpszQueryString, "CID*", szTmp, sizeof(szTmp)) )
                return ERR_NEWORDER_CUSTOMER_KEY;

        if ( !IsNumeric(szTmp) )
                return ERR_NEWORDER_CUSTOMER_INVALID;
        pNewOrderData->c_id = atoi(szTmp);

        bCheck = FALSE;
        for(i=0, items=0; i<15; i++)
        {
                wsprintf(szKey, "IID%2.2d*", i);
                if ( !GetKeyValue(lpszQueryString, szKey, szTmp, sizeof(szTmp)) )
                        return ERR_NEWORDER_MISSING_IID_KEY;
                if ( szTmp[0] )
                {
                        //if blank lines between item ids
                        if ( bCheck )
                                return ERR_NEWORDER_ITEM_BLANK_LINES;
                        if ( !IsNumeric(szTmp) )
                                return ERR_NEWORDER_ITEMID_INVALID;
                        pNewOrderData->Ol[i].ol_i_id = atoi(szTmp);

                        wsprintf(szKey, "SP%2.2d*", i);
                        if ( !GetKeyValue(lpszQueryString, szKey, szTmp,
sizeof(szTmp)) )
                                return ERR_NEWORDER_MISSING_SUPPW_KEY;
                        if ( !IsNumeric(szTmp) )
                                return ERR_NEWORDER_SUPPW_INVALID;
                        pNewOrderData->Ol[i].ol_supply_w_id = (short)atoi(szTmp);

                        wsprintf(szKey, "Qty%2.2d*", i);
                        if ( !GetKeyValue(lpszQueryString, szKey, szTmp,
sizeof(szTmp)) )
                                return ERR_NEWORDER_MISSING_QTY_KEY;

                        if ( !IsNumeric(szTmp) )
                                return ERR_NEWORDER_QTY_INVALID;

                        pNewOrderData->Ol[i].ol_quantity = atoi(szTmp);
                        items++;

                        if ( pNewOrderData->Ol[i].ol_i_id >= 1000000 || pNewOrderD
>Ol[i].ol_i_id < 1 )
                                return ERR_NEWORDER_ITEMID_RANGE;
                        if ( pNewOrderData->Ol[i].ol_quantity >= 100|| pNewOrderDat
>Ol[i].ol_quantity < 1 )
                                return ERR_NEWORDER_QTY_RANGE;
                }
                else
                {
                        wsprintf(szKey, "SP%2.2d*", i);
                        if ( !GetKeyValue(lpszQueryString, szKey, szTmp,
sizeof(szTmp)) )
                                return ERR_NEWORDER_MISSING_QTY_KEY;

                        if ( szTmp[0] )
                                return
ERR_NEWORDER_SUPPW_WITHOUT_ITEMID;

                        wsprintf(szKey, "Qty%2.2d*", i);
                        if ( !GetKeyValue(lpszQueryString, szKey, szTmp,
sizeof(szTmp)) )
                                return ERR_NEWORDER_MISSING_QTY_KEY;

                        if ( szTmp[0] )
                                return
ERR_NEWORDER_QTY_WITHOUT_ITEMID;

                        bCheck = TRUE;
                }
        }
        if ( items == 0 )
                return ERR_NEWORDER_NOITEMS_ENTERED;

        pNewOrderData->o_ol_cnt = items;
```

```
	return ERR_SUCCESS;
}

/* FUNCTION: int GetPaymentData(LPSTR lpszQueryString, PAYMENT_DATA
*pPaymentData)
 *
 * PURPOSE:	This function extracts and validates the payment form data from an http
command string.
 *
 * ARGUMENTS:	LPSTR		lpszQueryString		client
browser http command string
 *			PAYMENT_DATA	*pPaymentData
	pointer to payment data structure
 *
 * RETURNS:		int
			error code indicating reason for failure
 *				ERR_SUCCESS
			all input data successfully parsed
 *
 * COMMENTS:	None
 *
 */

static int GetPaymentData(LPSTR lpszQueryString, PAYMENT_DATA *pPaymentData)
{
	char	szTmp[26];
	char	*ptr;

	if ( !GetKeyValue(lpszQueryString, "DID*", szTmp, sizeof(szTmp)) )
		return ERR_PAYMENT_MISSING_DID_KEY;
	if ( !IsNumeric(szTmp) )
		return ERR_PAYMENT_DISTRICT_INVALID;
	pPaymentData->d_id = atoi(szTmp);

	if ( !GetKeyValue(lpszQueryString, "CID*", szTmp, sizeof(szTmp)) )
		return ERR_PAYMENT_MISSING_CID_KEY;

	if ( szTmp[0] && !IsNumeric(szTmp) )
		return ERR_PAYMENT_CUSTOMER_INVALID;


	pPaymentData->c_id = atoi(szTmp);

	if ( szTmp[0] == 0 )
	{
		if ( !GetKeyValue(lpszQueryString, "CLT*", szTmp, sizeof(szTmp)) )
			return ERR_PAYMENT_MISSING_CLT;
		_strupr( szTmp );
		strcpy(pPaymentData->c_last, szTmp);
		if ( strlen(pPaymentData->c_last) > 16 )
			return ERR_PAYMENT_LAST_NAME_TO_LONG;
	}
	else
	{
		if ( !GetKeyValue(lpszQueryString, "CLT*", szTmp, sizeof(szTmp)) )
			return ERR_PAYMENT_MISSING_CLT_KEY;
		if ( szTmp[0] )
			return ERR_PAYMENT_CID_AND_CLT;
	}

	if ( !GetKeyValue(lpszQueryString, "CDI*", szTmp, sizeof(szTmp)) )
		return ERR_PAYMENT_MISSING_CDI_KEY;
	if ( !IsNumeric(szTmp) )
		return ERR_PAYMENT_CDI_INVALID;
	pPaymentData->c_d_id = atoi(szTmp);

	if ( !GetKeyValue(lpszQueryString, "CWI*", szTmp, sizeof(szTmp)) )
		return ERR_PAYMENT_MISSING_CWI_KEY;

	if ( !IsNumeric(szTmp) )
		return ERR_PAYMENT_CWI_INVALID;

	pPaymentData->c_w_id = atoi(szTmp);


	if ( !GetKeyValue(lpszQueryString, "HAM*", szTmp, sizeof(szTmp)) )
		return ERR_PAYMENT_MISSING_HAM_KEY;

	ptr = szTmp;

	while( *ptr )
	{
		if ( *ptr == '.' )
		{
			ptr++;
			if ( !*ptr )
				break;
			if ( *ptr < '0' || *ptr > '9' )
				return ERR_PAYMENT_HAM_INVALID;
			ptr++;
			if ( !*ptr )
				break;
			if ( *ptr < '0' || *ptr > '9' )
				return ERR_PAYMENT_HAM_INVALID;
			if ( !*ptr )
```

```
                                        return ERR_PAYMENT_HAM_INVALID;
                }
                else if ( *ptr < '0' || *ptr > '9' )
                                        return ERR_PAYMENT_HAM_INVALID;
                ptr++;
        }

        pPaymentData->h_amount = atof(szTmp);
        if ( pPaymentData->h_amount >= 10000.00 || pPaymentData->h_amount < 0 )
                return ERR_PAYMENT_HAM_RANGE;

        return ERR_SUCCESS;
}

/* FUNCTION: int GetOrderStatusData(LPSTR lpszQueryString, ORDER_STATUS_DATA
*pOrderStatusData)
 *
 * PURPOSE:     This function extracts and validates the payment form data from an http
command string.
 *
 * ARGUMENTS:   LPSTR                                   lpszQueryString
        client browser http command string
 *                                      ORDER_STATUS_DATA       *pOrderStatusData
        pointer to order statusdata structure
 *
 * RETURNS:                 int
                            error code indicating reason for failure
 *                                  ERR_SUCCESS
                            successfully parsed all required input data
 *
 * COMMENTS:    None
 *
 */
static int GetOrderStatusData(LPSTR lpszQueryString, ORDER_STATUS_DATA
*pOrderStatusData)
{
        char    szTmp[26];

        if ( !GetKeyValue(lpszQueryString, "DID*", szTmp, sizeof(szTmp)) )
                return ERR_ORDERSTATUS_MISSING_DID_KEY;
        if ( !IsNumeric(szTmp) )
                return ERR_ORDERSTATUS_DID_INVALID;
        pOrderStatusData->d_id = atoi(szTmp);

        if ( !GetKeyValue(lpszQueryString, "CID*", szTmp, sizeof(szTmp)) )
                return ERR_ORDERSTATUS_MISSING_CID_KEY;

        if ( szTmp[0] == 0 )
        {
                pOrderStatusData->c_id = 0;
                if ( !GetKeyValue(lpszQueryString, "CLT*", szTmp, sizeof(szTmp)) )
                        return ERR_ORDERSTATUS_MISSING_CLT_KEY;
                _strupr( szTmp );
                strcpy(pOrderStatusData->c_last, szTmp);
                if ( strlen(pOrderStatusData->c_last) > 16 )
                        return ERR_ORDERSTATUS_CLT_RANGE;
        }
        else
        {
                if ( !IsNumeric(szTmp) )
                        return ERR_ORDERSTATUS_CID_INVALID;
                pOrderStatusData->c_id = atoi(szTmp);
                if ( !GetKeyValue(lpszQueryString, "CLT*", szTmp, sizeof(szTmp)) )
                        return ERR_ORDERSTATUS_MISSING_CLT_KEY;
                if ( szTmp[0] )
                        return ERR_ORDERSTATUS_CID_AND_CLT;
        }

        return ERR_SUCCESS;
}

/* FUNCTION: BOOL ReadRegistrySettings(void)
 *
 * PURPOSE:     This function reads the NT registry for startup parameters. There
parameters are
 *                      under the TPCC key.
 *
 * ARGUMENTS:   None
 *
 * RETURNS:                 None
 *
 * COMMENTS:    This function also sets up required operation variables to the default valu
 *                                  so if registry is not setup the default values will be
used.
 *
 */

static BOOL ReadRegistrySettings(void)
{
        HKEY    hKey;
        DWORD   size;
        DWORD   type;
        char    szTmp[256];

        bLog                            = FALSE;
        dLog                            = FALSE;
```

```
	iMaxWareHouses	= 500;
	iThreads		= 5;
	iQSlotts		= 3000;
	iDelayMs		= 100;
	iDeadlockRetry	= (short)3;
	strcpy(szTpccLogPath, "tpcclog.");
	strcpy(szErrorLogPath, "tpccerr.");


	if ( RegOpenKeyEx(HKEY_LOCAL_MACHINE, "SOFTWARE\\Microsoft\\TPCC", 0,
KEY_READ, &hKey) != ERROR_SUCCESS )
		return TRUE;
	size = sizeof(szTmp);

	if ( RegQueryValueEx(hKey, "PATH", 0, &type, szTmp, &size) ==
ERROR_SUCCESS )
	{
		strcpy(szTpccLogPath, szTmp);
		strcat(szTpccLogPath, "tpcclog.");
		strcpy(szErrorLogPath, szTmp);
		strcat(szErrorLogPath, "tpccerr.");
	}

	size = sizeof(szTmp);
	if ( RegQueryValueEx(hKey, "LOG", 0, &type, szTmp, &size) == ERROR_SUCCESS
)
	{
		if ( !stricmp(szTmp, "ON") )
			bLog = TRUE;
	}

	size = sizeof(szTmp);
	if ( RegQueryValueEx(hKey, "DEBUG", 0, &type, szTmp, &size) ==
ERROR_SUCCESS )
	{
		if ( !stricmp(szTmp, "ON") )
			dLog = TRUE;
	}

	size = sizeof(szTmp);
	if ( RegQueryValueEx(hKey, "MaximumWarehouses", 0, &type, szTmp, &size) ==
ERROR_SUCCESS )
	{
		iMaxWareHouses = atoi(szTmp);
		if ( iMaxWareHouses == 0 )
			iMaxWareHouses = 500;
	}

	size = sizeof(szTmp);
	if ( RegQueryValueEx(hKey, "NumberOfDeliveryThreads", 0, &type, szTmp, &size
ERROR_SUCCESS )
		iThreads = atoi(szTmp);
	if ( !iThreads )
		iThreads = 5;

	size = sizeof(szTmp);
	if ( RegQueryValueEx(hKey, "QueueSlotts", 0, &type, szTmp, &size) ==
ERROR_SUCCESS )
		iQSlotts = atoi(szTmp);
		if ( !iQSlotts )
			iQSlotts = 3000;

		size = sizeof(szTmp);
	if ( RegQueryValueEx(hKey, "BackoffDelay", 0, &type, szTmp, &size) ==
ERROR_SUCCESS )
		iDelayMs = atoi(szTmp);
		if ( !iDelayMs )
			iDelayMs = 100;

	size = sizeof(szTmp);
	if ( RegQueryValueEx(hKey, "DeadlockRetry", 0, &type, szTmp, &size) ==
ERROR_SUCCESS )
		iDeadlockRetry = (short)atoi(szTmp);
		if ( !iDeadlockRetry )
			iDeadlockRetry = (short)3;

	size = sizeof(szTmp);
	if ( RegQueryValueEx(hKey, "MaxConnections", 0, &type, szTmp, &size) ==
ERROR_SUCCESS )
		iMaxConnections = (short)atoi(szTmp);
		if ( !iMaxConnections )
			iMaxConnections = (short)25;

	RegCloseKey(hKey);

	return FALSE;

}



/* FUNCTION: BOOL IsNumeric(char *ptr)
 *
 * PURPOSE:	This function determines if a string is numeric. It fails if any characters
other
 *			than numeric and null terminator are present.
```

```
 *
 * ARGUMENTS:    char                    *ptr        pointer to string to check.
 *
 * RETURNS:                BOOL    FALSE   if string is not all numeric
 *                                         TRUE    if string contains only
numeric characters i.e. '0' - '9'
 *
 * COMMENTS:     None
 *
 */

static BOOL IsNumeric(char *ptr)
{
        if ( *ptr == 0 )
                return FALSE;

        while( *ptr && isdigit(*ptr) )
                ptr++;
        return ( !*ptr );
}


/* FUNCTION: void FormatHTMLString(char *szBuff, int iLen, char *szStr)
 *
 * PURPOSE:      This function Handles translation of HTML specific character field data
 *                       when an HTML output form is generated.
 *
 * ARGUMENTS:    char    *szBuff   Returned string information
 *                               char    *szStr    input string to be formatted.
 *                               int             iLen      Length of returned
string
 *
 * RETURNS:              none
 *
 * COMMENTS:     The length paramter is the absolute length of the returned string in
 *                               HTML characters. For example the input string>
would be returned as
 *                               &gt; which would be counted as 1 character.If the
number of input
 *                               characters is less than the iLen parameter spaces are
appended to
 *                               the end of the string to ensure that at least iLen
characters are
 *                               returned in the szBuff parameter.
 *
 */

static void FormatHTMLString(char *szBuff, char *szStr, int iLen)
{
        while( iLen && *szStr )
        {
                switch( *szStr )
                {
                        case '>':
                                *szBuff++ = '&';
                                *szBuff++ = 'g';
                                *szBuff++ = 't';
                                *szBuff++ = ';';
                                szStr++;
                                break;
                        case '<':
                                *szBuff++ = '&';
                                *szBuff++ = 'l';
                                *szBuff++ = 't';
                                *szBuff++ = ';';
                                szStr++;
                                break;
                        case '&':
                                *szBuff++ = '&';
                                *szBuff++ = 'a';
                                *szBuff++ = 'm';
                                *szBuff++ = 'p';
                                *szBuff++ = ';';
                                szStr++;
                                break;
                        case '\"':
                                *szBuff++ = '&';
                                *szBuff++ = 'q';
                                *szBuff++ = 'u';
                                *szBuff++ = 'o';
                                *szBuff++ = 't';
                                *szBuff++ = ';';
                                szStr++;
                                break;
                        default:
                                *szBuff++ = *szStr++;
                                break;
                }
                iLen--;
        }
        while( iLen-- )
                *szBuff++ = ' ';

        *szBuff = 0;

        return;
```

```
}


static int ThrTpInit()
{

    static int num_tpinits=0;
    static int x=1;
    static int once=0;
    static CRITICAL_SECTION     TpCriticalSection;
            int lasterr, iRc, TpRc;
            int retry = 0;
            BOOL Success = FALSE;

    if(!TlsGetValue(TLSIsTpInitedKey))
    {
                        if (!once)
                        {
                                InitializeCriticalSection(&TpCriticalSection);
                                once=1;
                        }

                        if ( dLog )
                        {
                                FILE *fp;

                                fp = fopen(szTpccLogPath, "ab");
                                fprintf(fp, "* In ThrTpInit Thread %d * \r\n",
GetCurrentThreadId());
                                fclose(fp);
                        }

                        while ( retry < TP_MAX_RETRIES )
                        {
                                EnterCriticalSection(&TpCriticalSection);
                                if(tpinf == NULL)
                                {
                                        if ((tpinf = ( TPINIT *)tpalloc("TPINIT", NULL,
sizeof(TPINIT))) == NULL)
                                          {
                                                LeaveCriticalSection(&TpCriticalSection);
                                                TpRc = tperrno;
                                                {
                                                        FILE *fp;

                                                        fp = fopen(szErrorLogPath, "ab");
                                                        fprintf(fp, ">>>> ThrTpInit:%d :
tpalloc of tpinit failed: %d : %s\r\n",
                                                                                GetCurrentThreadId
TpRc, tpstrerror(TpRc));
                                                        fclose(fp);
                                                }
                                                retry++;
                                                continue;
                                        }
                                tpinf->flagsl=TPMULTICONTEXTS;
                                }

                                if (retry == 0)
                                        itoa(++num_tpinits, tpinf->cltname, 10);

// Do the TPINIT
                                iRc = tpinit(tpinf);
                                TpRc = tperrno;

                                // check tpalloc() ?
                                if (iRc < 0)
                                {
                                        LeaveCriticalSection(&TpCriticalSection);
                                        retry++;
                                        lasterr = GetLastError();
/*                                      TpRc = tperrno;
                                        {
                                                FILE *fp;

                                                fp = fopen(szErrorLogPath, "ab");
                                                fprintf(fp, ">>>> ThrTpInit:%d : tpinit faile
%d %s :try # %d\r\n",
                                                                GetCurrentThreadId(), iRc,
tpstrerror(TpRc), retry);
                                                fclose(fp);
                                        }
*/
                                }
                                else
                                {
                                        Success = TRUE;
                                        LeaveCriticalSection(&TpCriticalSection);
                                        break;
                                }

                                Sleep(50); // Relinquish thread timeslice
                        } // retry the tpinit if it failed the first time

                        if ( Success == FALSE )
                        {
```

```
                        {
                                char ebuf[128];

                                sprintf(ebuf, ">>>> ThrTpInit %d : Cannot tpinit after
%d tries iRc = %d LastErr = %d \r\n",
                                GetCurrentThreadId(), TP_MAX_RETRIES, iRc,
lasterr);
                                LogTuxError(TpRc, ebuf);
                        }
                        return -1;
                }
                if ( Success == TRUE )
                {
                        if ( retry > 0 )
                        {
                                char ebuf[128];

                                sprintf(ebuf, ">>>> ThrTpInit %d : Cannot tpinit after
%d tries iRc = %d LastErr = %d \r\n",
                                GetCurrentThreadId(), TP_MAX_RETRIES, iRc,
lasterr);

                                sprintf(ebuf, "* ThrTpInit Thread %d Success retry
count %d with LastErr = %d * \r\n",
                                        GetCurrentThreadId(), retry, lasterr);
                                LogTuxError(TpRc, ebuf);
                        }

                        if ( ( iRc=TlsSetValue(TLSIsTpInitedKey,&x)) ==0)
                        {
                                {
                                        FILE *fp;

                                        fp = fopen(szErrorLogPath, "ab");
                                        fprintf(fp, ">>>> ThrTpInit %d : TlsSetValue
Failed iRc: %d \r\n",
                                        GetCurrentThreadId(), iRc);
                                        fclose(fp);
                                }
                        }
                }
        }
        else
        {
                if ( dLog )
                {
                        FILE *fp;

                        fp = fopen(szTpccLogPath, "ab");
                        fprintf(fp, "* ThrTpInit Thread %d already tpinited * \r\n",
GetCurrentThreadId());
                        fclose(fp);
                }
        }
    return 0;
}
```

A.14 tpcc.def

```
LIBRARY TPCC.DLL

EXPORTS

        GetExtensionVersion     @1
        HttpExtensionProc   @2
```

A.15 tpcc.h

```
/*      FILE:           TPCC.H
 *                              Microsoft TPC-C Kit Ver. 3.00.001
 *                              Audited 08/23/96, By Francois Raab
 *
 *                              Copyright Microsoft, 1996
 *
 *      PURPOSE:        Header file for ISAPI TPCC.DLL, defines structures and
functions used in the isapi tpcc.dll.
 *      Author:         Philip Durr
 *                              philipdu@Microsoft.com
 */

//#define LOCAL_ALLOC 1

//VERSION RESOURCE DEFINES
#define _APS_NEXT_RESOURCE_VALUE                                        101
#define _APS_NEXT_COMMAND_VALUE
        40001
#define _APS_NEXT_CONTROL_VALUE
        1000
#define _APS_NEXT_SYMED_VALUE                                           101

#define TP_MAX_RETRIES
        50
```

```
#define ERR_BAD_ITEM_ID                                 1
                //expected abort record in txnRecord
#define ERR_TYPE_DELIVERY_POST                          2
        //expected delivery post failed
#define   ERR_TYPE_WEBDLL
        3               //tpcc web generated error
#define   ERR_TYPE_SQL                                  4
                //sql server generated error
#define   ERR_TYPE_DBLIB                                5
                //dblib generated error
#define   ERR_TYPE_ODBC                                 6
                //odbc generated error
#define ERR_TYPE_SOCKET                                 7
                //error on communication socket client rte only
#define ERR_TYPE_DEADLOCK                               8
                //dblib and odbc only deadlock condition
#define ERR_TYPE_TUXEDO                                 9
                //tuxedo error

#define   ERR_SUCCESS
        1000    //"Success, no error.
#define   ERR_COMMAND_UNDEFINED
        1001    //"Command undefined.
#define   ERR_NOT_IMPLEMENTED_YET
        1002    //"Not Implemented Yet.
#define   ERR_CANNOT_INIT_TERMINAL                      1003
        //"Cannot initialize client connection.
#define   ERR_OUT_OF_MEMORY
        1004    //"insufficient memory.
#define   ERR_NEW_ORDER_NOT_PROCESSED
        1005    //"Cannot process new Order form.
#define   ERR_PAYMENT_NOT_PROCESSED                     1006
        //"Cannot process payment form.
#define   ERR_NO_SERVER_SPECIFIED
        1007    //"No Server name specified.
#define   ERR_ORDER_STATUS_NOT_PROCESSED                1008
        //"Cannot process order status form.
#define   ERR_W_ID_INVALID
        1009    //"Invalid Warehouse ID.
#define   ERR_CAN_NOT_SET_MAX_CONNECTIONS               1010
        //"Insufficient memory to allocate # connections.
#define   ERR_NOSUCH_CUSTOMER
        1011    //"No such customer.
#define   ERR_D_ID_INVALID
        1012    //"Invalid District ID Must be 1 to 10.
#define   ERR_MAX_CONNECT_PARAM
        1013    //"Max client connections exceeded, run install to increase.

#define   ERR_INVALID_SYNC_CONNECTION                   1014
        //"Invalid Terminal Sync ID.
#define   ERR_INVALID_TERMID
        1015    //"Invalid Terminal ID.
#define   ERR_PAYMENT_INVALID_CUSTOMER                  1016
        //"Payment Form, No such Customer.
#define   ERR_SQL_OPEN_CONNECTION
        1017    //"SQLOpenConnection API Failed.
#define   ERR_STOCKLEVEL_MISSING_THRESHOLD_KEY  1018    //"Stock
Level missing Threshold key "TT*".
#define   ERR_STOCKLEVEL_THRESHOLD_INVALID      1019    //"Stock
Level Threshold invalid data type range = 1 - 99.
#define   ERR_STOCKLEVEL_THRESHOLD_RANGE                1020
        //"Stock Level Threshold out of range, range must be 1 - 99.
#define   ERR_STOCKLEVEL_NOT_PROCESSED                  1021
        //"Stock Level not processed.
#define   ERR_NEWORDER_FORM_MISSING_DID                 1022
        //"New Order missing District key "DID*".
#define   ERR_NEWORDER_DISTRICT_INVALID                 1023
        //"New Order District ID Invalid range 1 - 10.
#define   ERR_NEWORDER_DISTRICT_RANGE                   1024
        //"New Order District ID out of Range. Range = 1 - 10.
#define   ERR_NEWORDER_CUSTOMER_KEY                     1025
        //"New Order missing Customer key "CID*".
#define   ERR_NEWORDER_CUSTOMER_INVALID                 1026
        //"New Order customer id invalid data type, range = 1 to 3000.
#define   ERR_NEWORDER_CUSTOMER_RANGE
        1027    //"New Order customer id out of range, range = 1 to 3000.
#define   ERR_NEWORDER_MISSING_IID_KEY          1028    //"New
Order missing Item Id key "IID*".
#define   ERR_NEWORDER_ITEM_BLANK_LINES                 1029
        //"New Order blank order lines all orders must be continuous.
#define   ERR_NEWORDER_ITEMID_INVALID                   1030
        //"New Order Item Id is wrong data type, must be numeric.
#define   ERR_NEWORDER_MISSING_SUPPW_KEY                1031
        //"New Order missing Supp_W key "SP##*".
#define   ERR_NEWORDER_SUPPW_INVALID                    1032
        //"New Order Supp_W invalid data type must be numeric.
#define   ERR_NEWORDER_MISSING_QTY_KEY                  1033
        //"New Order Missing Qty key "Qty##*".
#define   ERR_NEWORDER_QTY_INVALID                      1034
        //"New Order Qty invalid must be numeric range 1 - 99.
#define   ERR_NEWORDER_SUPPW_RANGE                      1035
        //"New Order Supp_W value out of range range = 1 - Max Warehouses.
#define   ERR_NEWORDER_ITEMID_RANGE                     1036
        //"New Order Item Id is out of range. Range = 1 to 999999.
#define   ERR_NEWORDER_QTY_RANGE
        1037    //"New Order Qty is out of range. Range = 1 to 99.
```

```
#define    ERR_PAYMENT_DISTRICT_INVALID                    1038    //"Payment
District ID is invalid must be 1 - 10.
#define    ERR_NEWORDER_SUPPW_WITHOUT_ITEMID               1039    //"New
Order Supp_W field entered without a corrisponding Item_Id.
#define    ERR_NEWORDER_QTY_WITHOUT_ITEMID                 1040
           //"New Order Qty entered without a corrisponding Item_Id.
#define    ERR_NEWORDER_NOITEMS_ENTERED                    1041
           //"New Order Blank Items between items, items must be continuous.
#define    ERR_PAYMENT_MISSING_DID_KEY                     1042
           //"Payment missing District Key "DID*".
#define    ERR_PAYMENT_DISTRICT_RANGE                      1043
           //"Payment District Out of range, range = 1 - 10.
#define    ERR_PAYMENT_MISSING_CID_KEY                     1044
           //"Payment missing Customer Key "CID*".
#define    ERR_PAYMENT_CUSTOMER_INVALID                    1045
           //"Payment Customer data type invalid, must be numeric.
#define    ERR_PAYMENT_MISSING_CLT
           1046    //"Payment missing Customer Last Name Key "CLT*".
#define    ERR_PAYMENT_LAST_NAME_TO_LONG                   1047
           //"Payment Customer last name longer than 16 characters.
#define    ERR_PAYMENT_CUSTOMER_RANGE                      1048
           //"Payment Customer ID out of range, must be 1 to 3000.
#define    ERR_PAYMENT_CID_AND_CLT
           1049    //"Payment Customer ID and Last Name entered must be one or other.
#define    ERR_PAYMENT_MISSING_CDI_KEY                     1050
           //"Payment missing Customer district key "CDI*".
#define    ERR_PAYMENT_CDI_INVALID
           1051    //"Payment Customer district invalid must be numeric.
#define    ERR_PAYMENT_CDI_RANGE
           1052    //"Payment Customer district out of range must be 1 - 10.
#define    ERR_PAYMENT_MISSING_CWI_KEY                     1053
           //"Payment missing Customer Warehouse key "CWI*".
#define    ERR_PAYMENT_CWI_INVALID
           1054    //"Payment Customer Warehouse invalid must be numeric.
#define    ERR_PAYMENT_CWI_RANGE
           1055    //"Payment Customer Warehouse out of range, 1 to Max Warehouses.
#define    ERR_PAYMENT_MISSING_HAM_KEY                     1056
           //"Payment missing Amount key "HAM*".
#define    ERR_PAYMENT_HAM_INVALID
           1057    //"Payment Amount invalid data type must be numeric.
#define    ERR_PAYMENT_HAM_RANGE
           1058    //"Payment Amount out of range, 0 - 9999.99.
#define    ERR_ORDERSTATUS_MISSING_DID_KEY                 1059
           //"Order Status missing District key "DID*".
#define    ERR_ORDERSTATUS_DID_INVALID                     1060
           //"Order Status District invalid, value must be numeric 1 - 10.
#define    ERR_ORDERSTATUS_DID_RANGE                       1061
           //"Order Status District out of range must be 1 - 10.
#define    ERR_ORDERSTATUS_MISSING_CID_KEY                 1062
           //"Order Status missing Customer key "CID*".
#define    ERR_ORDERSTATUS_MISSING_CLT_KEY                 1063
           //"Order Status missing Customer Last Name key "CLT*".
#define    ERR_ORDERSTATUS_CLT_RANGE                       1064
           //"Order Status Customer last name longer than 16 characters.
#define    ERR_ORDERSTATUS_CID_INVALID                     1065
           //"Order Status Customer ID invalid, range must be numeric 1 - 3000.
#define    ERR_ORDERSTATUS_CID_RANGE                       1066
           //"Order Status Customer ID out of range must be 1 - 3000.
#define    ERR_ORDERSTATUS_CID_AND_CLT                     1067
           //"Order Status Customer ID and LastName entered must be only one."
#define    ERR_DELIVERY_MISSING_OCD_KEY                    1068    //"Delivery
missing Carrier ID key \"OCD*\".
#define    ERR_DELIVERY_CARRIER_INVALID                    1069    //"Delivery
Carrier ID invalid must be numeric 1 - 10.
#define    ERR_DELIVERY_CARRIER_ID_RANGE                   1070
           //"Delivery Carrier ID out of range must be 1 - 10.
#define ERR_PAYMENT_MISSING_CLT_KEY                        1071
           //"Payment missing Customer Last Name key "CLT*".
#define ERR_TPINIT_BAD
           5001    //"Bad TPINIT"
#define ERR_TPALLOC_BAD
           5002    //"Bad TPALLOC"
#define ERR_TPCALL_BAD
           5003    //"Bad TPCALL"

//note that the welcome form must be processed first as terminal ids assigned here, once the
//terminal id is assigned then the forms can be processed in any order.
#define WELCOME_FORM                                       1
           //beginning form no term id assigned, form id
#define MAIN_MENU_FORM                                     2
           //term id assigned main menu form id
#define NEW_ORDER_FORM                                     3
           //new order form id
#define PAYMENT_FORM                                       4
           //payment form id
#define DELIVERY_FORM                                      5
           //delivery form id
#define ORDER_STATUS_FORM                                  6
           //order status id
#define STOCK_LEVEL_FORM                                   7
           //stock level form id

//This macro is used to prevent the compiler error unused formal parameter
#define UNUSEDPARAM(x) (x = x)

//error message structure used in ErrorMessage API
```

```
typedef struct _SERRORMSG
{
        int             iError;                         //error id of message
        char    szMsg[80];                      //message to sent to browser
} SERRORMSG;

//This structure is used for posting delivery transactions
typedef struct _DELIVERY_TRANSACTION
{
        SYSTEMTIME      queue;                  //time delivery transaction queued
        short           w_id;                   //delivery warehouse
        short           o_carrier_id;           //carrier id
} DELIVERY_TRANSACTION;

#ifdef USE_ODBC
        typedef struct _DBPROCESS
        {
                HDBC    hdbc;
                HSTMT   hstmt;
                int             spid;
                void    *uPtr;
        } DBPROCESS, *PDBPROCESS;

        //dblib error message return values
        #define INT_EXIT        0
        #define INT_CONTINUE    1
        #define INT_CANCEL      2
#endif

//This structure defines the data necessary to keep distinct for each terminal or client connection.
typedef struct _CLIENTDATA
{
        int                             inUse;
        //in use flag allows client entries to be reused
        int                             w_id;
        //warehouse id assigned at welcome form
        int                             d_id;
        //district id assigned at welcome form

        PDBPROCESS      dbproc;                                         //dblib
connection pointer
        int                             spid;
        //spid assigned from dblib
        int                             iSyncId;
        //syncronization id
        int                             iTickCount;
        //time of last access;
        int                             iTermId;                                //terminal
of http stream connection

        char                            szBuffer[4096];         //form buffer each
HTML form is built for a client in here

        NEW_ORDER_DATA          NewOrderData;                   //new orde
form data
        PAYMENT_DATA            PaymentData;                    //payment form data
        ORDER_STATUS_DATA       OrderStatusData;        //order status form data
        DELIVERY_DATA           DeliveryData;                   //delivery form data
        STOCK_LEVEL_DATA        StockLevelData;                 //stock level form da

#ifndef LOCAL_ALLOC
        TUX_DATA                        *TuxDataPtr;                    //Tuxedo
Data Structure for all transactions
#endif // LOCAL_ALLOC

} CLIENTDATA;

typedef CLIENTDATA *PCLIENTDATA;                        //pointer to client structure

//This structure is used to define the operational interface for terminal id support
typedef struct _TERM
{
        int                             iAvailable;
        //total allocated terminal array entries
        int                             iNext;
                //next available terminal array element
        int                             iMasterSyncId;
        //syncronization id
        BOOL                    bInit;
        //structure has been initialized flag
        CLIENTDATA              *pClientData;
        //pointer to allocated client data
        void                    (*Init)(void);
        //API to initialize this structure
        int                             (*Allocate)(void);
        //API to allocate a new terminal entry array id returned
        void                    (*Restore)(void);                       //API to fr
terminal data
        int                             (*Add)(EXTENSION_CONTROL_BLOCK *pECB,
char *pQueryString);//API to add a terminal id to array, this context will

                                //be passed from the browser to the tpcc.dll in the

                                //TERMID= key in the HTTP string.
        void                    (*Delete)(EXTENSION_CONTROL_BLOCK *pECB, int id);
```

```
        //API to free resources used by a terminal array entry
} TERM;

typedef TERM *PTERM;
        //pointer to terminal structure type

//this structure allows the EXTENSION CONTROL BLOCK to be passed to the msg and error
handlers.
typedef struct _ECBINFO
{
        int                                             iTermId;   //terminal id
        int                                             iSyncId;   //browser
sync id
        BOOL                                    bDeadlock;         //deadlock
condition flag
        BOOL                                    bFailed;   //cleared before sql
transaction, set in err handlers if an error occurs
        EXTENSION_CONTROL_BLOCK *pECB;                  //inetsrv current
connection structure information
} ECBINFO, *PECBINFO;


//function prototypes

BOOL APIENTRY DllMain(HANDLE hModule, DWORD ul_reason_for_call, LPVOID
lpReserved);
static void DeliveryDisconnect(void *ptr);
static BOOL IsValidTermId(int TermId);
BOOL ProcessQueryString(EXTENSION_CONTROL_BLOCK *pECB, int *pCmd, int *pFormId,
int *pTermId, int *pSyncId);
void NewOrderForm(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int
iSyncId);
void PaymentForm(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int
iSyncId);
void DeliveryForm(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int
iSyncId);
void OrderStatusForm(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int
iSyncId);
void StockLevelForm(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int
iSyncId);
void Exitcmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int iSyncId);
void SubmitCmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int
iSyncId);
void BeginCmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int iSyncId);
void ProcessCmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int
iSyncId);
void ClearCmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int iSyncId);
void MenuCmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int iTermId, int iSyncId);
void NumberOfConnectionsCmd(EXTENSION_CONTROL_BLOCK *pECB, int iFormId, int
iTermId, int iSyncId);
static void WriteZString(EXTENSION_CONTROL_BLOCK *pECB, char *szStr);
static void h_printf(EXTENSION_CONTROL_BLOCK *pECB, char *format, ...);
void LogTuxError(int TpRc, char *ErrMessage);
void ErrorMessage(EXTENSION_CONTROL_BLOCK *pECB, int iError, int iErrorType, char
*szMsg, int iTermId, int iSyncId);
static BOOL GetKeyValue(char *pQueryString, char *pKey, char *pValue, int iMax);
static void TermInit(void);
int err_handler(DBPROCESS *dbproc, int severity, int dberr, int oserr, char *dberrstr, char
*oserrstr);
int msg_handler(DBPROCESS *dbproc, DBINT msgno, int msgstate, int severity, char
*msgtext);
static void TermRestore(void);
static int TermAllocate(void);
static int TermAdd(EXTENSION_CONTROL_BLOCK *pECB, char *pQueryString);
static void TermDelete(EXTENSION_CONTROL_BLOCK *pECB, int id);
BOOL Init(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int iSyncId, char *szServer
char *szUser, char *szPassword, char *szDatabase);
static BOOL Close(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int iSyncId);
static BOOL SQLOpenConnection(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, in
iSyncId, DBPROCESS **dbproc, char *server, char *database, char *user, char *password,
*app, int *spid);
static BOOL SQLCloseConnection(EXTENSION_CONTROL_BLOCK *pECB, DBPROCESS
*dbproc);
static BOOL SQLStockLevel(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int iSyn
DBPROCESS *dbproc, STOCK_LEVEL_DATA *pStockLevel, short deadlock_retry);
static int SQLNewOrder(EXTENSION_CONTROL_BLOCK    *pECB, int iTermId, int iSyncId
DBPROCESS *dbproc, NEW_ORDER_DATA  *pNewOrder, short deadlock_retry);
static int SQLPayment(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int iSyncId,
DBPROCESS *dbproc, PAYMENT_DATA *pPayment, short deadlock_retry);
static int SQLOrderStatus(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int iSyncId
DBPROCESS *dbproc, ORDER_STATUS_DATA *pOrderStatus, short deadlock_retry);
static int SQLDelivery(DBPROCESS *dbproc, DELIVERY_DATA *pDelivery, short
deadlock_retry);
static void WriteLog(DELIVERY_DATA *pDelivery, SYSTEMTIME *trans_end );
static void CalculateElapsedTime(int *pElapsed, LPSYSTEMTIME lpBegin, LPSYSTEMTIM
lpEnd);
BOOL SQLDetectDeadlock(DBPROCESS *dbproc);
static void FormatString(char *szDest, char *szPic, char *szSrc);
static char *MakeStockLevelForm(int iTermId, int iSyncId, BOOL bInput);
static char *MakeMainMenuForm(int iTermId, int iSyncId);
static char *MakeWelcomeForm(void);
static char *MakeNewOrderForm(int iTermId, int iSyncId, BOOL Rollback, BOOL bInput, BO
bValid);
static char *MakePaymentForm(int iTermId, int iSyncId, BOOL bInput);
static char *MakeOrderStatusForm(int iTermId, int iSyncId, BOOL bInput);
static char *MakeDeliveryForm(int iTermId, int iSyncId, BOOL bInput, BOOL bSuccess);
```

```
static void UtilStrCpy(char * pDest, char * pSrc, int n);
static void ProcessNewOrderForm(EXTENSION_CONTROL_BLOCK    *pECB, int iTermId, int
iSyncId);
static void ProcessPaymentForm(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int
iSyncId);
static void ProcessOrderStatusForm(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int
iSyncId);
static void ProcessDeliveryForm(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int
iSyncId);
static void ProcessStockLevelForm(EXTENSION_CONTROL_BLOCK *pECB, int iTermId, int
iSyncId);
static int GetNewOrderData(LPSTR lpszQueryString, NEW_ORDER_DATA *pNewOrderData);
static int GetPaymentData(LPSTR lpszQueryString, PAYMENT_DATA *pPaymentData);
static int GetOrderStatusData(LPSTR lpszQueryString, ORDER_STATUS_DATA
*pOrderStatusData);
static BOOL ReadRegistrySettings(void);
static BOOL PostDeliveryInfo(short w_id, short o_carrier_id);
static BOOL IsNumeric(char *ptr);
static void FormatHTMLString(char *szBuff, char *szStr, int iLen);
static void PrintParameters(void);

#ifdef USE_ODBC
        void dbsetuserdata(PDBPROCESS dbproc, void *uPtr);
        void *dbgetuserdata(PDBPROCESS dbproc);
        void BindParameter(PDBPROCESS dbproc, UWORD ipar, SWORD fCType,
SWORD fSqlType, UDWORD cbColDef, SWORD ibScale, PTR rgbValue, SDWORD
cbValueMax);
        void ODBCError(PDBPROCESS dbproc);
        BOOL ExecuteStatement(PDBPROCESS dbproc, char *szStatement);
        BOOL BindColumn(PDBPROCESS dbproc, SQLUSMALLINT icol, SQLSMALLINT
fCType, SQLPOINTER rgbValue, SQLINTEGER cbValueMax);
        BOOL GetResults(PDBPROCESS dbproc);
        BOOL MoreResults(PDBPROCESS  dbproc);
        BOOL ReopenConnection(PDBPROCESS dbproc);
#endif
```

A.16 tpcc.rc

```
//Microsoft Developer Studio generated resource script.
//
#include "resource.h"

#define APSTUDIO_READONLY_SYMBOLS
////////////////////////////////////////////////////////////////////////////
//
// Generated from the TEXTINCLUDE 2 resource.
//
#include "afxres.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

#ifndef _MAC
////////////////////////////////////////////////////////////////////////////
//
// Version
//

VS_VERSION_INFO VERSIONINFO
 FILEVERSION 0,3,0,2
 PRODUCTVERSION 0,3,0,2
 FILEFLAGSMASK 0x3fL
#ifdef _DEBUG
 FILEFLAGS 0x1L
#else
 FILEFLAGS 0x0L
#endif
 FILEOS 0x40004L
 FILETYPE 0x2L
 FILESUBTYPE 0x0L
BEGIN
    BLOCK "StringFileInfo"
    BEGIN
        BLOCK "040904b0"
        BEGIN
            VALUE "Comments", "TPC-C HTML DLL Server\0"
            VALUE "CompanyName", "Microsoft\0"
            VALUE "FileDescription", "tpcc\0"
            VALUE "FileVersion", "0, 3, 0, 2\0"
            VALUE "InternalName", "tpcc\0"
            VALUE "LegalCopyright", "Copyright © 1996\0"
            VALUE "OriginalFilename", "tpcc.dll\0"
            VALUE "ProductName", "Microsoft tpcc\0"
            VALUE "ProductVersion", "0, 3, 0, 2\0"
        END
    END
```

```
    BLOCK "VarFileInfo"
    BEGIN
        VALUE "Translation", 0x409, 1200
    END
END

#endif    // !_MAC


#ifdef APSTUDIO_INVOKED
//////////////////////////////////////////////////////////////////////////////
//
// TEXTINCLUDE
//

1 TEXTINCLUDE DISCARDABLE
BEGIN
    "resource.h\0"
END

2 TEXTINCLUDE DISCARDABLE
BEGIN
    "#include ""afxres.h""\r\n"
    "\0"
END

3 TEXTINCLUDE DISCARDABLE
BEGIN
    "\r\n"
    "\0"
END

#endif    // APSTUDIO_INVOKED

#endif    // English (U.S.) resources
//////////////////////////////////////////////////////////////////////////////



#ifndef APSTUDIO_INVOKED
//////////////////////////////////////////////////////////////////////////////
//
// Generated from the TEXTINCLUDE 3 resource.
//


//////////////////////////////////////////////////////////////////////////////
#endif    // not APSTUDIO_INVOKED
```

A.17 trans.h

```
/*          FILE:               TRANS.H
 *                                      Microsoft TPC-C Kit Ver. 3.00.000
 *                                      Audited 08/23/96    By Francois Raab
 *          PURPOSE:            Header file for ISAPI TPCC.DLL, defines structures and
functions used in the isapi tpcc.dll.
 *
 *                                      Copyright Microsoft inc. 1996, All Rights Reserved
 *
 *          Author:             PhilipDu, from tpcc.h by DamienL
 *                                      DamienL@Microsoft.com
 *                                      philipdu@Microsoft.com
 */

#ifndef _INC_TRANS

        #define _INC_TRANS

        #ifdef USE_ODBC
                #ifndef TIMESTAMP_STRUCT
                        #include <sqltypes.h>
                #endif
        #else
                #ifndef _INC_SQLFRONT
                        #include <sqlfront.h>
                #endif
        #endif

        #ifndef DBINT
                typedef long DBINT;
        #endif

        #define   DEFCLPACKSIZE                         4096
        #define   DEADLOCKWAIT                          10

        // String length constants
        #define SERVER_NAME_LEN         20
        #define DATABASE_NAME_LEN       20
        #define USER_NAME_LEN           20
        #define PASSWORD_LEN            20
        #define TABLE_NAME_LEN          20
        #define I_DATA_LEN              50
        #define I_NAME_LEN              24
        #define BRAND_LEN               1
        #define LAST_NAME_LEN           16
```

```
#define W_NAME_LEN              10
#define ADDRESS_LEN             20
#define STATE_LEN               2
#define ZIP_LEN                 9
#define S_DIST_LEN              24
#define S_DATA_LEN              50
#define D_NAME_LEN              10
#define FIRST_NAME_LEN          16
#define MIDDLE_NAME_LEN         2
#define PHONE_LEN               16
#define DATETIME_LEN            30
#define CREDIT_LEN              2
#define C_DATA_LEN              250
#define H_DATA_LEN              24
#define DIST_INFO_LEN           24
#define MAX_OL_NEW_ORDER_ITEMS  15
#define MAX_OL_ORDER_STATUS_ITEMS 15
#define STATUS_LEN              25
#define OL_DIST_INFO_LEN        24

// transaction structures

typedef struct
{
        short                   ol_supply_w_id;
        long                    ol_i_id;
        char                    ol_i_name[I_NAME_LEN+1];
        short                   ol_quantity;
        char
ol_brand_generic[BRAND_LEN+1];
        double                  ol_i_price;
        double                  ol_amount;
        short                   ol_stock;
        short                   num_warehouses;
} OL_NEW_ORDER_DATA;

typedef struct
{
        short           w_id;
        short           d_id;
        long            c_id;
        short           o_ol_cnt;
        char            c_last[LAST_NAME_LEN+1];
        char            c_credit[CREDIT_LEN+1];
        double          c_discount;
        double          w_tax;
        double          d_tax;
        long                    o_id;
        short                   o_commit_flag;
#ifdef USE_ODBC
        TIMESTAMP_STRUCT        o_entry_d;
#else
        DBDATEREC       o_entry_d;
#endif
        short           o_all_local;
        double          total_amount;
        long            num_deadlocks;
        int                             retval;
        int                             error;
        char
execution_status[STATUS_LEN];
        OL_NEW_ORDER_DATA       Ol[MAX_OL_NEW_ORDER_ITEMS];
} NEW_ORDER_DATA;

typedef struct
{
        short                   w_id;
        short                   d_id;
        long                    c_id;
        short                   c_d_id;
        short                   c_w_id;
        double                  h_amount;
#ifdef USE_ODBC
        TIMESTAMP_STRUCT        h_date;
#else
        DBDATEREC               h_date;
#endif
        char                    w_street_1[ADDRESS_LEN+1];
        char                    w_street_2[ADDRESS_LEN+1];
        char                    w_city[ADDRESS_LEN+1];
        char                    w_state[STATE_LEN+1];
        char                    w_zip[ZIP_LEN+1];
        char                    d_street_1[ADDRESS_LEN+1];
        char                    d_street_2[ADDRESS_LEN+1];
        char                    d_city[ADDRESS_LEN+1];
        char                    d_state[STATE_LEN+1];
        char                  d_zip[ZIP_LEN+1];
        char                    c_first[FIRST_NAME_LEN+1];
        char                    c_middle[MIDDLE_NAME_LEN + 1];
        char                 c_last[LAST_NAME_LEN+1];
        char                    c_street_1[ADDRESS_LEN+1];
        char                    c_street_2[ADDRESS_LEN+1];
        char                    c_city[ADDRESS_LEN+1];
        char                    c_state[STATE_LEN+1];
        char                    c_zip[ZIP_LEN+1];
        char                    c_phone[PHONE_LEN+1];
```

```
        #ifdef USE_ODBC
                TIMESTAMP_STRUCT        c_since;
        #else
                DBDATEREC               c_since;
        #endif
                char                    c_credit[CREDIT_LEN+1];
                double                  c_credit_lim;
                double                  c_discount;
                double                  c_balance;
                char                    c_data[200+1];
                long                    num_deadlocks;
                int                                     retval;
                int                                     error;
                char
execution_status[STATUS_LEN];
        } PAYMENT_DATA;

        typedef struct
        {
                long                    ol_i_id;
                short                   ol_supply_w_id;
                short                   ol_quantity;
                double                  ol_amount;
        #ifdef USE_ODBC
                TIMESTAMP_STRUCT        ol_delivery_d;
        #else
                DBDATEREC                       ol_delivery_d;
        #endif
        } OL_ORDER_STATUS_DATA;

        typedef struct
        {
                short           w_id;
                short           d_id;
                long            c_id;
                char            c_first[FIRST_NAME_LEN+1];
                char            c_middle[MIDDLE_NAME_LEN+1];
                char            c_last[LAST_NAME_LEN+1];
                double           c_balance;
                long            o_id;
        #ifdef USE_ODBC
                TIMESTAMP_STRUCT        o_entry_d;
        #else
                DBDATEREC       o_entry_d;
        #endif
                short           o_carrier_id;
                OL_ORDER_STATUS_DATA
OlOrderStatusData[MAX_OL_ORDER_STATUS_ITEMS];
                short           o_ol_cnt;
                long            num_deadlocks;
                int                                     retval;
                int                                     error;
                char                            execution_status[STATUS_LEN];
        } ORDER_STATUS_DATA;

        typedef struct
        {
                long                                    o_id;
        } DEL_ITEM;

        typedef struct
        {
                short           w_id;
                short           o_carrier_id;
                SYSTEMTIME              queue_time;
                long            num_deadlocks;
                long                                    o_id[10];
                int                                     retval;
                int                                     error;
                char            execution_status[STATUS_LEN];
        } DELIVERY_DATA;

        typedef struct
        {
                short                                   w_id;
                short                                   d_id;
                short                                   thresh_hold;
                long                                    low_stock;
                long                                    num_deadlocks;
                int                                     retval;
                int                                     error;
                char
        execution_status[STATUS_LEN];
        } STOCK_LEVEL_DATA;

        typedef struct
        {
                NEW_ORDER_DATA                  NewOrderData;
        //new order form data
                PAYMENT_DATA            PaymentData;            //payment
form data
                ORDER_STATUS_DATA       OrderStatusData;    //order status form
data
                DELIVERY_DATA           DeliveryData;           //delivery
form data
```

```
                STOCK_LEVEL_DATA        StockLevelData;                 //stock level
form data
        } TUX_DATA;

#endif
```

Appendix B Server Source Code

The TPC-C database was created using the following Tranact-SQL scripts

B.1 createdb.sql

```
/*  TPC-C Benchmark Kit                         */
/*                                              */
/*  CREATEDB.SQL                                */
/*                                              */
/*  This script is used to create the database    */


use master
go

if exists ( select name from sysdatabases where name = "tpcc" )
        drop database tpcc
go

create database tpcc
        on tpc_misc1    =    655,
           tpc_misc2    =    655,
           tpc_misc3    =    655,
           tpc_misc4    =    655,
           tpc_misc5    =    880,
           tpc_cs1      =   9952,
           tpc_cs2      =   9952,
           tpc_cs3      =   9952,
           tpc_cs4      =   9952,
           tpc_cs5      =   9952,
           tpc_cs6      =  13240,
           tpc_ol1      =   4549,
           tpc_ol2      =   4549,
           tpc_ol3      =   4549,
           tpc_ol4      =   4549,
           tpc_ol5      =   7000
        log on v_log_dev =  8699
go

alter database tpcc on q_log_dev=8699
go

alter database tpcc on y_log_dev=8699
go

alter database tpcc on x_log_dev=8699
go

alter database tpcc on w_log_dev=8699
go



sp_logdevice tpcc, q_log_dev
go

sp_logdevice tpcc, y_log_dev
go

sp_logdevice tpcc, x_log_dev
go

sp_logdevice tpcc, w_log_dev
go
```

B.2 dbopt1.sql

```
/* TPC-C Benchmark Kit                          */
/*                                              */
/*                                              */
/* Set database options for database load       */


use master
go

sp_dboption tpcc,'select into/bulkcopy',true
go

sp_dboption tpcc,'trunc. log on chkpt.',true
go

use tpcc
go

checkpoint
go
```

```
use tpcc_admin
go

sp_dboption tpcc,'trunc. log on chkpt.',true
go
```

B.3 dbopt2.sql

```
/* TPC-C Benchmark Kit                                  */
/*                                                      */
/*                                                      */
/* Reset database options after database load   */


use master
go

sp_dboption tpcc,'select ',false
go

sp_dboption tpcc,'trunc. ',false
go

use tpcc
go

checkpoint
go
```

B.4 diskinit.sql

```
/*  TPC-C Benchmark Kit                          */
/*                                          */
/*  DISKINIT.SQL                                */
/*                                          */
/*  This script is used create the database devices  */


use master
go

disk init name = "v_log_dev",
            physname = "V:",
            vdevno   = 10,
            size     = 4453888
go

disk init name = "q_log_dev",
            physname = "Q:",
            vdevno   = 11,
            size     = 4453888
go

disk init name = "y_log_dev",
            physname = "Y:",
            vdevno   = 12,
            size     = 4453888
go

disk init name = "x_log_dev",
     physname = "X:",
     vdevno   = 14,
     size     = 4453888
go

disk init name = "w_log_dev",
     physname = "W:",
     vdevno   = 31,
     size     = 4453888
go

disk init name = "tpc_misc1",
            physname = "G:",
            vdevno   = 15,
            size     = 335360
 go

disk init name = "tpc_misc2",
            physname = "H:",
            vdevno   = 16,
            size     = 335360
go

disk init name = "tpc_misc3",
            physname = "I:",
            vdevno   = 17,
            size     = 335360
go

disk init name = "tpc_misc4",
```

```
        physname = "F:",
        vdevno   = 18,
        size     = 335360
go

disk init name = "tpc_misc5",
        physname = "E:",
        vdevno   = 19,
        size     = 450560
go

disk init name = "tpc_cs1",
        physname = "L:",
        vdevno   = 20,
        size     = 5095424
go

disk init name = "tpc_cs2",
        physname = "M:",
        vdevno   = 21,
        size     = 5095424
go

disk init name = "tpc_cs3",
        physname = "N:",
        vdevno   = 22,
        size     = 5095424
go

disk init name = "tpc_cs4",
        physname = "O:",
        vdevno   =23,
        size     = 5095424
go

disk init name = "tpc_cs5",
        physname = "J:",
        vdevno   = 24,
        size     = 5095424
go

disk init name = "tpc_cs6",
        physname = "K:",
        vdevno   = 25,
        size     = 6778880
go

disk init name = "tpc_ol1",
        physname = "T:",
        vdevno   = 26,
        size     = 2329088
go

disk init name = "tpc_ol2",
        physname = "U:",
        vdevno   = 27,
        size     = 2329088
go

disk init name = "tpc_ol3",
        physname = "R:",
        vdevno   = 28,
        size     = 2329088
go

disk init name = "tpc_ol4",
        physname = "S:",
        vdevno   = 29,
        size     = 2329088
go

disk init name = "tpc_ol5",
        physname = "P:",
        vdevno   = 30,
        size     = 3584000
go
```

B.5 idxcuscl.sql

```
/*  TPC-C Benchmark Kit                                          */
/*                                                               */
/*  IDXCUSCL.SQL                                                 */
/*                                                               */
/*  Creates clustered index on customer (seg)                    */


use tpcc
go


if exists ( select name from sysindexes where name = 'customer_c1' )
        drop index customer.customer_c1
go
```

```
select getdate()
go
create unique clustered index customer_c1 on customer(c_w_id, c_d_id, c_id)
        with sorted_data on big_seg
go
select getdate()
go
```

B.6 idxcusnc.sql

```
/*  TPC-C Benchmark Kit                                     */
/*                                                          */
/*  IDXCUSNC.SQL                                            */
/*                                                          */
/*  Creates non-clustered index on customer (seg)           */


use tpcc
go


if exists ( select name from sysindexes where  name = 'customer_nc1' )
        drop index customer.customer_nc1
go

select getdate()
go
create unique nonclustered index customer_nc1 on customer(c_w_id, c_d_id, c_last, c_first,
c_id)
        on big_seg
go
select getdate()
go
```

B.7 idxdiscl.sql

```
/*  TPC-C Benchmark Kit                                     */
/*                                                          */
/*  IDXDISCL.SQL                                            */
/*                                                          */
/*  Creates clustered index on district (seg)               */


use tpcc
go


if exists ( select name from sysindexes where name = 'district_c1' )
        drop index district.district_c1
go

select getdate()
go
create unique clustered index  district_c1 on district(d_w_id, d_id)
        with fillfactor=1 on misc_seg
go
select getdate()
go
```

B.8 idxitmcl.sql

```
/*  TPC-C Benchmark Kit                                     */
/*                                                          */
/*  IDXITMCL.SQL                                            */
/*                                                          */
/*  Creates clustered index on item (seg)                   */


use tpcc
go


if exists ( select name from sysindexes where  name = 'item_c1' )
        drop index item.item_c1
go

select getdate()
go
create unique clustered index item_c1 on item(i_id)
        with sorted_data on misc_seg
go
select getdate()
go
```

B.9 idxnodcl.sql

```
/*  TPC-C Benchmark Kit                                     */
/*                                                          */
/*  IDXNODCL.SQL                                            */
                /*                                                  */
```

```
/*  Creates clustered index on new-order (seg)                  */


use tpcc
go


if exists ( select name from sysindexes where  name = 'new_order_c1' )
        drop index new_order.new_order_c1
go

select getdate()
go
create unique clustered index new_order_c1 on new_order(no_w_id, no_d_id, no_o_id)
        with sorted_data on misc_seg
go
select getdate()
go
```

B.10 idxodlcl.sql

```
/*  TPC-C Benchmark Kit                                         */
/*                                                              */
/*  IDXODLCL.SQL                                                */
/*                                                              */
/*  Creates clustered index on order-line (seg)                 */


use tpcc
go


if exists ( select name from sysindexes where  name = 'order_line_c1' )
        drop index order_line.order_line_c1
go

select getdate()
go
create unique clustered index order_line_c1 on order_line(ol_w_id, ol_d_id, ol_o_id, ol_number)
        with sorted_data on ordln_seg
go
select getdate()
go
```

B.11 idxordcl.sql

```
/*  TPC-C Benchmark Kit                                         */
/*                                                              */
/*  IDXORDCL.SQL                                                */
/*                                                              */
/*  Creates clustered index on orders (seg)                     */


use tpcc
go


if exists ( select name from sysindexes where  name = 'orders_c1' )
        drop index orders.orders_c1
go

select getdate()
go
create unique clustered index orders_c1 on orders(o_w_id, o_d_id, o_id)
        with sorted_data on misc_seg
go
select getdate()
go
```

B.12 idxstkcl.sql

```
/*  TPC-C Benchmark Kit                                         */
/*                                                              */
/*  IDXSTKCL.SQL                                                */
/*                                                              */
/*  Creates clustered index on stock (seg)                      */


use tpcc
go


if exists ( select name from sysindexes where  name = 'stock_c1' )
        drop index stock.stock_c1
go

select getdate()
go
create unique clustered index stock_c1 on stock(s_i_id, s_w_id)
        with sorted_data on big_seg
go
```

```
select getdate()
go
```

B.13 idxwarcl.sql

```
/*  TPC-C Benchmark Kit                                         */
/*                                                              */
/*  IDXWARCL.SQL                                                */
/*                                                              */
/*  Creates clustered index on warehouse (seg)                  */


use tpcc
go


if exists ( select name from sysindexes where name = 'warehouse_c1' )
        drop index warehouse.warehouse_c1
go

select getdate()
go
create unique clustered index warehouse_c1 on warehouse(w_id)
        with fillfactor=1 on misc_seg
go
select getdate()
go
```

B.14 pintable.sql

```
/* TPC-C Benchmark Kit                                          */
/*                                                              */
/* This script file is used to 'pin' certain tables in the data cache       */

use tpcc
go

exec sp_tableoption "district","pintable",true
exec sp_tableoption "warehouse","pintable",true
exec sp_tableoption "new_order","pintable",true
exec sp_tableoption "item","pintable",true
go
```

B.15 segment.sql

```
/*  TPC-C Benchmark Kit                                         */
/*                                                              */
/*  SEGMENT.SQL                                                 */
/*                                                              */
/*  This script is used to create the database segments  */


use tpcc
go

exec sp_dropsegment misc_seg
go
exec sp_dropsegment ol_seg
go
exec sp_dropsegment cs_seg
go

sp_addsegment misc_seg, tpc_misc1
go
sp_extendsegment misc_seg, tpc_misc2
go
sp_extendsegment misc_seg, tpc_misc3
go
sp_extendsegment misc_seg, tpc_misc4
go
sp_extendsegment misc_seg, tpc_misc5
go

sp_addsegment cs_seg, tpc_cs1
go
sp_extendsegment cs_seg, tpc_cs2
go
sp_extendsegment cs_seg, tpc_cs3
go
sp_extendsegment cs_seg, tpc_cs4
go
sp_extendsegment cs_seg, tpc_cs5
go
sp_extendsegment cs_seg, tpc_cs6
go

sp_addsegment ol_seg, tpc_ol1
go
sp_extendsegment ol_seg, tpc_ol2
go
sp_extendsegment ol_seg, tpc_ol3
go
sp_extendsegment ol_seg, tpc_ol4
```

```
go
sp_extendsegment ol_seg, tpc_ol5
go
```

B.16 tables.sql

```
/*  TPC-C Benchmark Kit                                 */
/*                                                      */
/*  TABLES.SQL                                          */
/*                                                      */
/*  Creates TPC-C tables (seg)                          */


use tpcc
go

checkpoint
go


if exists ( select name from sysobjects where name = 'warehouse' )
        drop table warehouse
go

create table warehouse
(
        w_id                    smallint,
        w_name                  char(10),
        w_street_1              char(20),
        w_street_2              char(20),
        w_city                  char(20),
        w_state                 char(2),
        w_zip                   char(9),
        w_tax                   numeric(4,4),
        w_ytd                   numeric(12,2)
) on misc_seg
go


if exists ( select name from sysobjects where name = 'district' )
        drop table district
go

create table district
(
        d_id                    tinyint,
        d_w_id                  smallint,
        d_name                  char(10),
        d_street_1              char(20),
        d_street_2              char(20),
        d_city                  char(20),
        d_state                 char(2),
        d_zip                   char(9),
        d_tax                   numeric(4,4),
        d_ytd                   numeric(12,2),
        d_next_o_id             int
) on misc_seg
go


if exists ( select name from sysobjects where name = 'customer' )
        drop table customer
go

create table customer
(
        c_id                    int,
        c_d_id                  tinyint,
        c_w_id                  smallint,
        c_first                 char(16),
        c_middle                char(2),
        c_last                  char(16),
        c_street_1              char(20),
        c_street_2              char(20),
        c_city                  char(20),
        c_state                 char(2),
        c_zip                   char(9),
        c_phone                 char(16),
        c_since                 datetime,
        c_credit                char(2),
        c_credit_lim            numeric(12,2),
        c_discount              numeric(4,4),
        c_balance               numeric(12,2),
        c_ytd_payment           numeric(12,2),
        c_payment_cnt           smallint,
        c_delivery_cnt          smallint,
        c_data_1                char(250),
        c_data_2                char(250)
) on cs_seg
go


if exists ( select name from sysobjects where name = 'history' )
        drop table history
```

```
go

create table history
(
        h_c_id                  int,
        h_c_d_id                tinyint,
        h_c_w_id                smallint,
        h_d_id                  tinyint,
        h_w_id                  smallint,
        h_date                  datetime,
        h_amount                numeric(6,2),
        h_data                  char(24)
) on misc_seg
go


if exists ( select name from sysobjects where name = 'new_order' )
        drop table new_order
go

create table new_order
(
        no_o_id                 int,
        no_d_id                 tinyint,
        no_w_id                 smallint
) on misc_seg
go


if exists ( select name from sysobjects where name = 'orders' )
        drop table orders
go

create table orders
(
        o_id                    int,
        o_d_id                  tinyint,
        o_w_id                  smallint,
        o_c_id                  int,
        o_entry_d               datetime,
        o_carrier_id            tinyint,
        o_ol_cnt                tinyint,
        o_all_local             tinyint
) on misc_seg
go


if exists ( select name from sysobjects where name = 'order_line' )
        drop table order_line
go

create table order_line
(
        ol_o_id                 int,
        ol_d_id                 tinyint,
        ol_w_id                 smallint,
        ol_number               tinyint,
        ol_i_id                 int,
        ol_supply_w_id          smallint,
        ol_delivery_d           datetime,
        ol_quantity             smallint,
        ol_amount               numeric(6,2),
        ol_dist_info            char(24)
) on ol_seg
go


if exists ( select name from sysobjects where name = 'item' )
        drop table item
go

create table item
(
        i_id                    int,
        i_im_id                 int,
        i_name                  char(24),
        i_price                 numeric(5,2),
        i_data                  char(50)
) on misc_seg
go


if exists ( select name from sysobjects where name = 'stock' )
        drop table stock
go

create table stock
(
        s_i_id                  int,
        s_w_id                  smallint,
        s_quantity              smallint,
        s_dist_01               char(24),
        s_dist_02               char(24),
        s_dist_03               char(24),
        s_dist_04               char(24),
        s_dist_05               char(24),
```

```
        s_dist_06           char(24),
        s_dist_07           char(24),
        s_dist_08           char(24),
        s_dist_09           char(24),
        s_dist_10           char(24),
        s_ytd               int,
        s_order_cnt         smallint,
        s_remote_cnt        smallint,
        s_data              char(50)
) on cs_seg
go
```

B.17 tpccbcp.sql

```
/* TPC-C Benchmark Kit                                          */
/*                                                              */
/*                                                              */
/* This script file sets the table lock option for bulk load    */


use tpcc
go

exec sp_tableoption "warehouse","table lock on bulk load",true
exec sp_tableoption "district","table lock on bulk load",true
exec sp_tableoption "stock","table lock on bulk load",true
exec sp_tableoption "item","table lock on bulk load",true
exec sp_tableoption "customer","table lock on bulk load",true
exec sp_tableoption "history","table lock on bulk load",true
exec sp_tableoption "orders","table lock on bulk load",true
exec sp_tableoption "order_line","table lock on bulk load",true
exec sp_tableoption "new_order","table lock on bulk load",true
go
```

B.18 tpccirl.sql

```
/* TPC-C Benchmark Kit                                          */
/*                                                              */
/*  This script file sets the insert row lock option on selected tables     */


use tpcc
go

exec sp_tableoption "history","insert row lock",true
exec sp_tableoption "new_order","insert row lock",true
exec sp_tableoption "orders","insert row lock",true
exec sp_tableoption "order_line","insert row lock",true
go
```

Stored Procedures

B.19 neword.sql

```
/*  File:      NEWORD.SQL                                        */
/*             Microsoft TPC-C Kit Ver. 3.00.000                    */
/*             Audited 08/23/96, By Francois Raab                   */
/*                                                          */
/*             Copyright Microsoft, 1996                         */
/*                                                          */
/*  Purpose:    New-Order transaction for Microsoft TPC-C Benchmark Kit    */
/*  Author:     Damien Lindauer                                   */
/*             damienl@Microsoft.com                             */


use tpcc
go

/* new-order transaction stored procedure */

if exists ( select name from sysobjects where name = "tpcc_neworder" )
        drop procedure tpcc_neworder
go

/*  Modified by rick vicik, 2/4/97  */
/*  Combined initialization of local variables into district update statement  */
/*  Combined 3 huge case select statements into a single one  */

create proc tpcc_neworder
                                                        @w_id       smalli
                                                        @d_id       tinyint,
                                                        @c_id       int,
                                                        @o_ol_cnt     tinyir
                                                        @o_all_local  tinyin
                                                        @i_id1  int = 0,
@s_w_id1 smallint = 0, @ol_qty1 smallint = 0,
                                                        @i_id2  int = 0,
@s_w_id2 smallint = 0, @ol_qty2 smallint = 0,
                                                        @i_id3  int = 0,
@s_w_id3 smallint = 0, @ol_qty3 smallint = 0,
                                                        @i_id4  int = 0,
@s_w_id4 smallint = 0, @ol_qty4 smallint = 0,
```

```
@s_w_id5 smallint = 0, @ol_qty5 smallint = 0,

@s_w_id6 smallint = 0, @ol_qty6 smallint = 0,

@s_w_id7 smallint = 0, @ol_qty7 smallint = 0,

@s_w_id8 smallint = 0, @ol_qty8 smallint = 0,

@s_w_id9 smallint = 0, @ol_qty9 smallint = 0,

@s_w_id10 smallint = 0, @ol_qty10 smallint = 0,

@s_w_id11 smallint = 0, @ol_qty11 smallint = 0,

@s_w_id12 smallint = 0, @ol_qty12 smallint = 0,

@s_w_id13 smallint = 0, @ol_qty13 smallint = 0,

@s_w_id14 smallint = 0, @ol_qty14 smallint = 0,

@s_w_id15 smallint = 0, @ol_qty15 smallint = 0


as
declare @w_tax          numeric(4,4),
        @d_tax          numeric(4,4),
        @c_last         char(16),
        @c_credit       char(2),
        @c_discount     numeric(4,4),
        @i_price        numeric(5,2),
        @i_name         char(24),
        @i_data         char(50),
        @o_entry_d      datetime,
        @remote_flag    int,
        @s_quantity     smallint,
        @s_data         char(50),
        @s_dist         char(24),
                        @li_no          int,
                        @o_id                           int,
                        @commit_flag    int,
        @li_id          int,
        @li_s_w_id      smallint,
        @li_qty         smallint,
                        @ol_number                      int,
                        @c_id_local                     int

begin
```

```
@i_id5  int = 0,

@i_id6  int = 0,

@i_id7  int = 0,

@i_id8  int = 0,

@i_id9  int = 0,

@i_id10 int = 0,

@i_id11 int = 0,

@i_id12 int = 0,

@i_id13 int = 0,

@i_id14 int = 0,

@i_id15 int = 0,


begin transaction n

/*  get district tax and next availible order id and update */
/*  plus initialize local variables  */

    update district
            set @d_tax      = d_tax,
               @o_id        = d_next_o_id,
                        d_next_o_id = d_next_o_id + 1,
       @o_entry_d = getdate(),
       @li_no=0,
       @commit_flag = 1
               where d_w_id = @w_id and
                    d_id   = @d_id

            /*  process orderlines */
    while (@li_no < @o_ol_cnt)
            begin

       select @li_no = @li_no + 1

               /*  Set i_id, s_w_id, and qty for this lineitem */

               select @li_id = case @li_no
                     when 1 then @i_id1
                                 when 2 then @i_id2
                                 when 3 then @i_id3
                                 when 4 then @i_id4
                                 when 5 then @i_id5
                                 when 6 then @i_id6
                                 when 7 then @i_id7
                                 when 8 then @i_id8
                                 when 9 then @i_id9
                                 when 10 then @i_id10
                                 when 11 then @i_id11
                                 when 12 then @i_id12
                                 when 13 then @i_id13
                                 when 14 then @i_id14
                                 when 15 then @i_id15
                                 end,

                                 @li_s_w_id = case @li_no
                                 when 1 then @s_w_id1
                                 when 2 then @s_w_id2
                                 when 3 then @s_w_id3
                                 when 4 then @s_w_id4
                                 when 5 then @s_w_id5
```

```
                        when 6 then @s_w_id6
                        when 7 then @s_w_id7
                        when 8 then @s_w_id8
                        when 9 then @s_w_id9
                        when 10 then @s_w_id10
                        when 11 then @s_w_id11
                        when 12 then @s_w_id12
                        when 13 then @s_w_id13
                        when 14 then @s_w_id14
                        when 15 then @s_w_id15
                        end,

                        @li_qty = case  @li_no
                        when 1 then @ol_qty1
                        when 2 then @ol_qty2
                        when 3 then @ol_qty3
                        when 4 then @ol_qty4
                        when 5 then @ol_qty5
                        when 6 then @ol_qty6
                        when 7 then @ol_qty7
                        when 8 then @ol_qty8
                        when 9 then @ol_qty9
                        when 10 then @ol_qty10
                        when 11 then @ol_qty11
                        when 12 then @ol_qty12
                        when 13 then @ol_qty13
                        when 14 then @ol_qty14
                        when 15 then @ol_qty15
                        end

/* get item data (no one updates item) */

select @i_price = i_price,
       @i_name  = i_name,
       @i_data  = i_data
from item (tablock holdlock)
          where i_id = @li_id

         /* if there actually is an item with this id, go to work */

                    if (@@rowcount > 0)
                    begin
   update stock set s_ytd        = s_ytd + @li_qty,
                @s_quantity  = s_quantity,
                s_quantity   = s_quantity - @li_qty +
                   case when (s_quantity - @li_qty < 10) then 91 else 0 end,
                s_order_cnt  = s_order_cnt + 1,
                s_remote_cnt = s_remote_cnt + case
                   when (@li_s_w_id = @w_id) then 0 else 1 end,
                @s_data      = s_data,
                @s_dist      = case @d_id
                                        when 1  then s_dist_01
                                           when 2  then s_dist_02
                                           when 3  then s_dist_03
                                           when 4  then s_dist_04
                                           when 5  then s_dist_05
                                           when 6  then s_dist_06
                                           when 7  then s_dist_07
                                           when 8  then s_dist_08
                                           when 9  then s_dist_09
                                           when 10 then s_dist_10
                            end
   where s_i_id = @li_id and
                                  s_w_id = @li_s_w_id

                            /* insert order_line data (using data from item and stock) */

   insert into order_line values(@o_id,            /* from district update */
                            @d_id,                        /* input param        */
                            @w_id,          /* input param        */
                            @li_no,         /* orderline number   */
                            @li_id,         /* lineitem id        */
                            @li_s_w_id,     /* lineitem warehouse */
                            "jan 1, 1900",  /* constant           */
                            @li_qty,        /* lineitem qty       */
                            @i_price * @li_qty, /* ol_amount          */
                            @s_dist)        /* from stock         */

   /* send line-item data to client */

                     select @i_name,
        @s_quantity,
        b_g = case when ( (patindex("%ORIGINAL%",@i_data) > 0) and
                          (patindex("%ORIGINAL%",@s_data) > 0) )
             then "B" else "G" end,
        @i_price,
        @i_price * @li_qty

end
else
                begin

                   /*  no item found - triggers rollback condition */

                            select "",0,"",0,0
                            select @commit_flag = 0
```

```
                end
        end

/* get customer last name, discount, and credit rating */

select @c_last     = c_last,
       @c_discount = c_discount,
       @c_credit   = c_credit,
                     @c_id_local = c_id
from customer holdlock
where c_id   = @c_id and
      c_w_id = @w_id and
      c_d_id = @d_id

/* insert fresh row into orders table */

insert into orders values (@o_id,
                           @d_id,
                              @w_id,
                                                    @c_id_local,
                                                    @o_entry_d,
                                                       0,
                                                       @o_ol_cnt,
                                                       @o_all_local)

        /* insert corresponding row into new-order table */

        insert into new_order values (@o_id,
                                                                    @d_id,
                                                                    @w_id)


        /*  select warehouse tax */

        select @w_tax = w_tax
        from warehouse holdlock
        where w_id = @w_id

        if (@commit_flag = 1)
                commit transaction n
        else
                /* all that work for nuthin!!! */
                rollback transaction n

        /* return order data to client */
        select @w_tax,
               @d_tax,
                  @o_id,
                  @c_last,
                  @c_discount,
                  @c_credit,
                  @o_entry_d,
                  @commit_flag

end

go
```

B.20 ordstat.sql

```
/*  File:      ORDSTAT.SQL                                  */
/*             Microsoft TPC-C Kit Ver. 3.00.000              */
/*             Audited 08/23/96, By Francois Raab               */
/*                                                  */
/*             Copyright Microsoft, 1996                    */
/*                                                  */
/*  Purpose:    Order-Status transaction for Microsoft TPC-C Benchmark Kit  */
/*  Author:     Damien Lindauer                               */
/*             damienl@Microsoft.com                          */


use tpcc
go

if exists ( select name from sysobjects where name = "tpcc_orderstatus" )
        drop procedure   tpcc_orderstatus
go

/*  Modified by rick vicik, 2/4/97  */
/*  Eliminated @val local variable  */

create proc tpcc_orderstatus @w_id                  smallint,
                                                                @d_id
        tinyint,
                                                                @c_id
        int,
                                                                @c_last  char(16) =
""

as

declare @c_balance          numeric(12,2),
        @c_first            char(16),
        @c_middle           char(2),
                    @o_id                           int,
```

```
        @o_entry_d              datetime,
        @o_carrier_id  smallint,
        @cnt                            smallint

begin tran o

        if (@c_id = 0)
                begin
                /* get customer id and info using last name */

                select @cnt = (count(*)+1)/2
                from customer holdlock
                where c_last= @c_last and
                  c_w_id = @w_id and
           c_d_id = @d_id
                set rowcount @cnt

                select @c_id = c_id,
                        @c_balance = c_balance,
                        @c_first   = c_first,
                        @c_last    = c_last,
                        @c_middle  = c_middle
                from customer holdlock
                where c_last = @c_last and
                  c_w_id = @w_id and
           c_d_id = @d_id
                order by c_w_id, c_d_id, c_last, c_first

                set rowcount 0
                end

        else
                begin

                /*  get customer info if by id*/

                select @c_balance = c_balance,
                      @c_first   = c_first,
                      @c_middle  = c_middle,
                      @c_last    = c_last
                from customer holdlock
                where c_id   = @c_id and
                     c_d_id = @d_id and
                     c_w_id = @w_id

                select @cnt = @@rowcount

                end

                /* if no such customer */
                if (@cnt = 0)
                begin
                        raiserror("Customer not found",18,1)
                        goto custnotfound
                end

                /*  get order info */

                select @o_id = o_id,
                        @o_entry_d    = o_entry_d,
                  @o_carrier_id = o_carrier_id
                from orders holdlock
        where o_w_id = @w_id and
              o_d_id = @d_id and
               o_c_id = @c_id

                /*  select order lines for the current order */

                select ol_supply_w_id,
                  ol_i_id,
                     ol_quantity,
                     ol_amount,
                     ol_delivery_d
                from order_line holdlock
                where ol_o_id = @o_id and
                     ol_d_id = @d_id and
                     ol_w_id = @w_id

custnotfound:

commit tran o

/*  return data to client  */

select @c_id,
                @c_last,
                @c_first,
                @c_middle,
                @o_entry_d,
                @o_carrier_id,
                @c_balance,
                @o_id

go
```

B.21 payment.sql

```
/*  File:       PAYMENT.SQL                                         */

/*              Microsoft TPC-C Kit Ver. 3.00.000                   */
/*              Audited 08/23/96, By Francois Raab                  */
/*                                                          */
/*              Copyright Microsoft, 1996                           */
/*                                                          */
/*  Purpose:    Payment transaction for Microsoft TPC-C Benchmark Kit      */
/*  Author:     Damien Lindauer                                     */
/*              damienl@Microsoft.com                               */


use tpcc
go

if exists (select name from sysobjects where name = "tpcc_payment" )
        drop procedure tpcc_payment
go

create proc tpcc_payment @w_id          smallint,
                                                        @c_w_id         smallint,
                                                        @h_amount       numeric(6,2),
                                                        @d_id           tinyint,
                                                        @c_d_id         tinyint,
                                                        @c_id           int,
                                                        @c_last         char(16) = ""


as
declare  @w_street_1     char(20),
         @w_street_2     char(20),
         @w_city         char(20),
         @w_state        char(2),
         @w_zip          char(9),
         @w_name         char(10),
         @d_street_1     char(20),
         @d_street_2     char(20),
         @d_city         char(20),
         @d_state        char(2),
         @d_zip          char(9),
         @d_name         char(10),
         @c_first        char(16),
         @c_middle       char(2),
         @c_street_1     char(20),
         @c_street_2     char(20),
         @c_city         char(20),
         @c_state        char(2),
         @c_zip          char(9),
         @c_phone        char(16),
         @c_since        datetime,
         @c_credit       char(2),
         @c_credit_lim   numeric(12,2),
         @c_balance      numeric(12,2),
         @c_discount     numeric(4,4),
         @data1          char(250),
         @data2          char(250),
         @c_data_1       char(250),
         @c_data_2       char(250),
         @datetime       datetime,
         @w_ytd          numeric(12,2),
         @d_ytd          numeric(12,2),
         @cnt            smallint,
         @val            smallint,
         @screen_data    char(200),
                 @d_id_local     tinyint,
                 @w_id_local     smallint,
                 @c_id_local     int

select @screen_data = ""

begin tran p

        /* get payment date */

        select @datetime = getdate()

        if (@c_id = 0)
        begin
                /* get customer id and info using last name */

                select @cnt = count(*)
                from customer holdlock
                where c_last = @c_last and
                     c_w_id = @c_w_id and
                     c_d_id = @c_d_id

                select @val = (@cnt + 1) / 2
                set rowcount @val

                select @c_id = c_id
                from customer holdlock
                where c_last = @c_last and
                     c_w_id = @c_w_id and
                     c_d_id = @c_d_id
                order by c_w_id, c_d_id, c_last, c_first
```

```
            set rowcount 0
end

/* get customer info and update balances */

update customer set
            @c_balance     = c_balance = c_balance - @h_amount,
            c_payment_cnt  = c_payment_cnt + 1,
            c_ytd_payment  = c_ytd_payment + @h_amount,
            @c_first       = c_first,
            @c_middle      = c_middle,
   @c_last        = c_last,
   @c_street_1    = c_street_1,
            @c_street_2    = c_street_2,
            @c_city        = c_city,
            @c_state       = c_state,
            @c_zip         = c_zip,
            @c_phone       = c_phone,
            @c_credit      = c_credit,
            @c_credit_lim  = c_credit_lim,
            @c_discount    = c_discount,
            @c_since       = c_since,
            @data1         = c_data_1,
            @data2         = c_data_2,
            @c_id_local    = c_id
where c_id   = @c_id and
     c_w_id = @c_w_id and
     c_d_id = @c_d_id

/* if customer has bad credit get some more info */

if (@c_credit = "BC")
begin

            /* compute new info */

            select @c_data_2 = substring(@data1,209,42) +
                                                substring(@data2, 1, 208)
            select @c_data_1 = convert(char(5),@c_id) +
                                                convert(char(4),@c_d_id) +
                                          convert(char(5),@c_w_id) +
                                          convert(char(4),@d_id) +
                                          convert(char(5),@w_id) +
                                          convert(char(19),@h_amount) +
                                          substring(@data1, 1, 208)

            /* update customer info */

                        update customer set
                              c_data_1 = @c_data_1,
                                    c_data_2 = @c_data_2
                        where c_id   = @c_id and
                                    c_w_id = @c_w_id and
                              c_d_id = @c_d_id

                        select @screen_data = substring (@c_data_1,1,200)
            end



            /* get district data and update year-to-date */

            update district
                        set d_ytd       = d_ytd + @h_amount,
                                    @d_street_1 = d_street_1,
                                    @d_street_2 = d_street_2,
                                    @d_city     = d_city,
                                    @d_state    = d_state,
                                    @d_zip      = d_zip,
                                    @d_name     = d_name,
                                    @d_id_local = d_id
                        where d_w_id = @w_id and
                              d_id   = @d_id

            /* get warehouse data and update year-to-date */

            update warehouse
            set w_ytd       = w_ytd + @h_amount,
                        @w_street_1 = w_street_1,
               @w_street_2 = w_street_2,
               @w_city     = w_city,
               @w_state    = w_state,
               @w_zip      = w_zip,
               @w_name     = w_name,
                        @w_id_local = w_id
            where w_id = @w_id

            /* create history record */

            insert into history values  (@c_id_local,
                                                                                    @c_d_id,
                                                                                          @c_w_id

@d_id_local,
```

```
@w_id_local,
                                                                @datetime,

@h_amount,
                                                                @w_name
+ "    " + @d_name)

commit tran p

/* return data to client */

select  @c_id,
                        @c_last,
                        @datetime,
                        @w_street_1,
                        @w_street_2,
                        @w_city,
                        @w_state,
                        @w_zip,
                        @d_street_1,
                        @d_street_2,
                        @d_city,
                        @d_state,
                        @d_zip,
                        @c_first,
                        @c_middle,
                        @c_street_1,
                        @c_street_2,
                        @c_city,
                        @c_state,
                        @c_zip,
                        @c_phone,
                        @c_since,
                        @c_credit,
                        @c_credit_lim,
                        @c_discount,
                        @c_balance,
                        @screen_data

go
```

B.22 delivery.sql

```
/*  File:      DELIVERY.SQL                                */
/*             Microsoft TPC-C Kit Ver. 3.00.000           */
/*             Audited 08/23/96, By Francois Raab          */
/*                                                         */
/*             Copyright Microsoft, 1996                   */
/*                                                         */
/*  Purpose:    Delivery transaction for Microsoft TPC-C Benchmark Kit     */
/*  Author:     Damien Lindauer                            */
/*             damienl@Microsoft.com                       */


use tpcc
go

/* delivery transaction */

if exists (select name from sysobjects where name = "tpcc_delivery" )
        drop procedure tpcc_delivery
go

create proc tpcc_delivery                   @w_id           smallint,

        @o_carrier_id   smallint
as

declare @d_id tinyint,
        @o_id int,
        @c_id int,
        @total numeric(12,2),
        @oid1 int,
        @oid2 int,
        @oid3 int,
        @oid4 int,
        @oid5 int,
        @oid6 int,
        @oid7 int,
        @oid8 int,
        @oid9 int,
        @oid10 int

select @d_id = 0

begin tran d

   while (@d_id < 10)
   begin

        select @d_id  = @d_id + 1,
              @total = 0,
              @o_id  = 0

        select @o_id = min(no_o_id)
```

```
from new_order holdlock
where no_w_id = @w_id and
                no_d_id = @d_id

if (@@rowcount <> 0)
begin

   /* claim the order for this district */

   delete new_order
   where no_w_id = @w_id and
                   no_d_id = @d_id and
                      no_o_id = @o_id

   /* set carrier_id on this order (and get customer id) */

   update orders
            set o_carrier_id = @o_carrier_id,
         @c_id       = o_c_id
   where o_w_id = @w_id and
                   o_d_id = @d_id and
                      o_id   = @o_id

   /* set date in all lineitems for this order (and sum amounts) */

   update order_line
            set ol_delivery_d = getdate(),
            @total       = @total + ol_amount
   where ol_w_id = @w_id and
           ol_d_id = @d_id and
                      ol_o_id = @o_id

   /* accummulate lineitem amounts for this order into customer */

            update customer
                   set c_balance      = c_balance + @total,
                      c_delivery_cnt = c_delivery_cnt + 1
   where c_w_id = @w_id and
                   c_d_id = @d_id and
                      c_id   = @c_id

end

select @oid1 = case @d_id when  1  then @o_id else @oid1 end,
     @oid2 = case @d_id when  2  then @o_id else @oid2 end,
     @oid3 = case @d_id when  3  then @o_id else @oid3 end,
     @oid4 = case @d_id when  4  then @o_id else @oid4 end,
     @oid5 = case @d_id when  5  then @o_id else @oid5 end,
     @oid6 = case @d_id when  6  then @o_id else @oid6 end,
     @oid7 = case @d_id when  7  then @o_id else @oid7 end,
     @oid8 = case @d_id when  8  then @o_id else @oid8 end,
     @oid9 = case @d_id when  9  then @o_id else @oid9 end,
     @oid10 = case @d_id when 10 then @o_id else @oid10 end

   end

commit tran d

select @oid1,
     @oid2,
     @oid3,
     @oid4,
     @oid5,
     @oid6,
     @oid7,
     @oid8,
     @oid9,
     @oid10

go
```

B.23 stocklev.sql

```
/*  File:      STOCKLEV.SQL                                    */
/*             Microsoft TPC-C Kit Ver. 3.00.000                  */
/*             Audited 08/23/96, By Francois Raab                 */
/*                                                    */
/*             Copyright Microsoft, 1996                      */
/*                                                    */
/*  Purpose:    Stock-Level transaction for Microsoft TPC-C Benchmark Kit  */
/*  Author:     Damien Lindauer                                 */
/*             damienl@Microsoft.com                           */


use tpcc
go

/* stock-level transaction stored procedure */

if exists (select name from sysobjects where name = "tpcc_stocklevel" )
           drop procedure tpcc_stocklevel
go

/* Modified by rick vicik, 2/4/97 */
```

```
/* Eliminate 1 local variable, use derived table to eliminate duplicate item#'s */

create proc tpcc_stocklevel     @w_id                   smallint,
                                                        @d_id                   tinyint,
                                                        @threshhold             smallint
as
declare @o_id int

select @o_id = d_next_o_id
from district
where d_w_id = @w_id and
              d_id   = @d_id

select count(*) from stock,
   (select distinct(ol_i_id) from order_line
    where ol_w_id    =  @w_id and
                  ol_d_id    =  @d_id and
                  ol_o_id between (@o_id-20) and (@oid-1)) OL

where s_w_id     =  @w_id and
     s_i_id     =  OL.ol_i_id and
     s_quantity <  @threshhold
go
```

The TPC-C database was loaded using the LOAD.EXE executable, the source code is listed below.

B.24 makefile

```
!include $(TPC_DIR)\build\ntintel\tpc.inc

CUR_DIR = $(TPC_DIR)\src

CLIENT_EXE     = $(EXE_DIR)\client.exe
MASTER_EXE     = $(EXE_DIR)\master.exe
TPCCLDR_EXE    = $(EXE_DIR)\tpccldr.exe
DELIVERY_EXE   = $(EXE_DIR)\delivery.exe
sqlstat_EXE    = $(EXE_DIR)\sqlstat.exe

all : $(CLIENT_EXE) $(MASTER_EXE) $(TPCCLDR_EXE) $(DELIVERY_EXE) $(sqlstat_EXE)

$(OBJ_DIR)\client.obj : $(CUR_DIR)\client.c $(INC_DIR)\tpcc.h
   $(CC) $(CFLAGS) /Fo$(OBJ_DIR)\client.obj $(CUR_DIR)\client.c

$(OBJ_DIR)\master.obj : $(CUR_DIR)\master.c $(INC_DIR)\tpcc.h
   $(CC) $(CFLAGS) /Fo$(OBJ_DIR)\master.obj $(CUR_DIR)\master.c

$(OBJ_DIR)\tpccldr.obj : $(CUR_DIR)\tpccldr.c $(INC_DIR)\tpcc.h
   $(CC) $(CFLAGS) /Fo$(OBJ_DIR)\tpccldr.obj $(CUR_DIR)\tpccldr.c

$(OBJ_DIR)\stats.obj : $(CUR_DIR)\stats.c $(INC_DIR)\tpcc.h
   $(CC) $(CFLAGS) /Fo$(OBJ_DIR)\stats.obj $(CUR_DIR)\stats.c

$(OBJ_DIR)\getargs.obj : $(CUR_DIR)\getargs.c   $(INC_DIR)\tpcc.h
   $(CC) $(CFLAGS) /Fo$(OBJ_DIR)\getargs.obj $(CUR_DIR)\getargs.c

$(OBJ_DIR)\util.obj : $(CUR_DIR)\util.c  $(INC_DIR)\tpcc.h
   $(CC) $(CFLAGS) /Fo$(OBJ_DIR)\util.obj $(CUR_DIR)\util.c

$(OBJ_DIR)\time.obj : $(CUR_DIR)\time.c $(INC_DIR)\tpcc.h
   $(CC) $(CFLAGS) /Fo$(OBJ_DIR)\time.obj $(CUR_DIR)\time.c

$(OBJ_DIR)\random.obj : $(CUR_DIR)\random.c $(INC_DIR)\tpcc.h
   $(CC) $(CFLAGS) /Fo$(OBJ_DIR)\random.obj $(CUR_DIR)\random.c

$(OBJ_DIR)\strings.obj : $(CUR_DIR)\strings.c $(INC_DIR)\tpcc.h
   $(CC) $(CFLAGS) /Fo$(OBJ_DIR)\strings.obj $(CUR_DIR)\strings.c

$(OBJ_DIR)\sqlfuncs.obj : $(CUR_DIR)\sqlfuncs.c  $(INC_DIR)\tpcc.h
   $(CC) $(CFLAGS) /Fo$(OBJ_DIR)\sqlfuncs.obj $(CUR_DIR)\sqlfuncs.c

$(OBJ_DIR)\tran.obj : $(CUR_DIR)\tran.c  $(INC_DIR)\tpcc.h
   $(CC) $(CFLAGS) /Fo$(OBJ_DIR)\tran.obj $(CUR_DIR)\tran.c

$(OBJ_DIR)\data.obj : $(CUR_DIR)\data.c  $(INC_DIR)\tpcc.h
   $(CC) $(CFLAGS) /Fo$(OBJ_DIR)\data.obj $(CUR_DIR)\data.c

$(OBJ_DIR)\delivery.obj : $(CUR_DIR)\delivery.c  $(INC_DIR)\tpcc.h
   $(CC) $(CFLAGS) /Fo$(OBJ_DIR)\delivery.obj $(CUR_DIR)\delivery.c

$(OBJ_DIR)\sqlstat.obj : $(CUR_DIR)\sqlstat.c  $(INC_DIR)\tpcc.h
   $(CC) $(CFLAGS) /Fo$(OBJ_DIR)\sqlstat.obj $(CUR_DIR)\sqlstat.c

$(EXE_DIR)\client.exe : $(OBJ_DIR)\client.obj $(OBJ_DIR)\tran.obj $(OBJ_DIR)\sqlfuncs.ob
$(OBJ_DIR)\random.obj $(OBJ_DIR)\util.obj $(OBJ_DIR)\data.obj $(OBJ_DIR)\getargs.obj
$(OBJ_DIR)\time.obj $(OBJ_DIR)\stats.obj $(OBJ_DIR)\strings.obj
   $(LL) -entry:mainCRTStartup -out:$(EXE_DIR)\client.exe              \
   $(OBJ_DIR)\client.obj $(OBJ_DIR)\tran.obj   $(OBJ_DIR)\sqlfuncs.obj   \
   $(OBJ_DIR)\random.obj $(OBJ_DIR)\util.obj   $(OBJ_DIR)\data.obj      \
   $(OBJ_DIR)\getargs.obj $(OBJ_DIR)\time.obj  $(OBJ_DIR)\stats.obj     \
   $(OBJ_DIR)\strings.obj                                               \
```

```
    $(DB_LIB)\ntwdblib.lib $(NTLIBS)

$(EXE_DIR)\master.exe : $(OBJ_DIR)\master.obj $(OBJ_DIR)\sqlfuncs.obj $(OBJ_DIR)\util.obj
$(OBJ_DIR)\getargs.obj $(OBJ_DIR)\time.obj $(OBJ_DIR)\stats.obj
    $(LL) -entry:mainCRTStartup -out:$(EXE_DIR)\master.exe          \
    $(OBJ_DIR)\master.obj $(OBJ_DIR)\sqlfuncs.obj $(OBJ_DIR)\util.obj   \
    $(OBJ_DIR)\getargs.obj $(OBJ_DIR)\time.obj   $(OBJ_DIR)\stats.obj   \
    $(DB_LIB)\ntwdblib.lib $(NTLIBS)

$(EXE_DIR)\tpccldr.exe : $(OBJ_DIR)\tpccldr.obj $(OBJ_DIR)\getargs.obj $(OBJ_DIR)\util.obj
$(OBJ_DIR)\time.obj $(OBJ_DIR)\random.obj $(OBJ_DIR)\strings.obj
    $(LL) -entry:mainCRTStartup -out:$(EXE_DIR)\tpccldr.exe          \
    $(OBJ_DIR)\tpccldr.obj $(OBJ_DIR)\getargs.obj $(OBJ_DIR)\strings.obj \
    $(OBJ_DIR)\util.obj $(OBJ_DIR)\time.obj $(OBJ_DIR)\random.obj       \
    $(DB_LIB)\ntwdblib.lib $(NTLIBS)

$(EXE_DIR)\delivery.exe : $(OBJ_DIR)\delivery.obj $(OBJ_DIR)\sqlfuncs.obj
$(OBJ_DIR)\util.obj $(OBJ_DIR)\getargs.obj $(OBJ_DIR)\time.obj $(OBJ_DIR)\stats.obj
    $(LL) -entry:mainCRTStartup -out:$(EXE_DIR)\delivery.exe          \
    $(OBJ_DIR)\delivery.obj $(OBJ_DIR)\sqlfuncs.obj $(OBJ_DIR)\util.obj     \
    $(OBJ_DIR)\getargs.obj $(OBJ_DIR)\time.obj  $(OBJ_DIR)\stats.obj     \
    $(DB_LIB)\ntwdblib.lib $(NTLIBS)

$(EXE_DIR)\sqlstat.exe : $(OBJ_DIR)\sqlstat.obj $(OBJ_DIR)\sqlfuncs.obj $(OBJ_DIR)\util.obj
$(OBJ_DIR)\getargs.obj $(OBJ_DIR)\time.obj $(OBJ_DIR)\stats.obj
    $(LL) -entry:mainCRTStartup -out:$(EXE_DIR)\sqlstat.exe          \
    $(OBJ_DIR)\sqlstat.obj $(OBJ_DIR)\sqlfuncs.obj $(OBJ_DIR)\util.obj     \
    $(OBJ_DIR)\getargs.obj $(OBJ_DIR)\time.obj  $(OBJ_DIR)\stats.obj     \
    $(DB_LIB)\ntwdblib.lib $(NTLIBS)
```

Loader Source

B.25 tpccldr.c

```
/*                      FILE:       TPCCLDR.C
*                       Microsoft TPC-C Kit Ver. 3.00.000
*                       Audited 08/23/96, By Francois Raab
*
*                       Copyright Microsoft, 1996
*
* PURPOSE:              Database loader for Microsoft TPC-C Benchmark Kit
* Author:               Damien Lindauer
*                               damienl@Microsoft.com
*/

// Includes
#include "tpcc.h"
#include "search.h"

// Defines
#define MAXITEMS                100000
#define CUSTOMERS_PER_DISTRICT  3000
#define DISTRICT_PER_WAREHOUSE  10
#define ORDERS_PER_DISTRICT     3000
#define MAX_CUSTOMER_THREADS    2
#define MAX_ORDER_THREADS       3
#define MAX_MAIN_THREADS        4

// Functions declarations
long NURand();
void LoadItem();
void LoadWarehouse();

void Stock();
void District();

void LoadCustomer();
void CustomerBufInit();
void CustomerBufLoad();
void LoadCustomerTable();
void LoadHistoryTable();

void LoadOrders();
void OrdersBufInit();
void OrdersBufLoad();
void LoadOrdersTable();
void LoadNewOrderTable();
void LoadOrderLineTable();
void GetPermutation();
void CheckForCommit();
void OpenConnections();

void BuildIndex();

void CurrentDate();

// Shared memory structures

typedef struct
{
    long            ol;
    long            ol_i_id;
    short           ol_supply_w_id;
```

```
   short          ol_quantity;
   double          ol_amount;
   char           ol_dist_info[DIST_INFO_LEN+1];
          // Added to insure ol_delivery_d set properly during load
          char                                    ol_delivery_d[30];
} ORDER_LINE_STRUCT;

typedef struct
{
   long           o_id;
   short          o_d_id;
   short          o_w_id;
   long           o_c_id;
   short          o_carrier_id;
   short          o_ol_cnt;
   short          o_all_local;
          ORDER_LINE_STRUCT   o_ol[15];
} ORDERS_STRUCT;

typedef struct
{
   long                                    c_id;
   short                                   c_d_id;
   short                                   c_w_id;
          char                                    c_first[FIRST_NAME_LEN+1];
   char                                    c_middle[MIDDLE_NAME_LEN+1];
   char                                    c_last[LAST_NAME_LEN+1];
   char                                    c_street_1[ADDRESS_LEN+1];
   char                                    c_street_2[ADDRESS_LEN+1];
   char                                    c_city[ADDRESS_LEN+1];
   char                                    c_state[STATE_LEN+1];
   char                                    c_zip[ZIP_LEN+1];
   char                                    c_phone[PHONE_LEN+1];
   char                                    c_credit[CREDIT_LEN+1];
   double                                  c_credit_lim;
   double                                  c_discount;
   double                                  c_balance;
   double                                  c_ytd_payment;
          short                                   c_payment_cnt;
          short                                   c_delivery_cnt;
          char                                    c_data_1[C_DATA_LEN+1];
   char                                    c_data_2[C_DATA_LEN+1];
          double                                  h_amount;
   char                                    h_data[H_DATA_LEN+1];
} CUSTOMER_STRUCT;

typedef struct
{
          char                                    c_last[LAST_NAME_LEN+1];
          char                                    c_first[FIRST_NAME_LEN+1];
   long                                    c_id;
} CUSTOMER_SORT_STRUCT;

typedef struct
{
   long           time_start;
} LOADER_TIME_STRUCT;


// Global variables
char           errfile[20];
DBPROCESS      *i_dbproc1;
DBPROCESS      *w_dbproc1, *w_dbproc2;
DBPROCESS      *c_dbproc1, *c_dbproc2;
DBPROCESS      *o_dbproc1, *o_dbproc2, *o_dbproc3;
ORDERS_STRUCT   orders_buf[ORDERS_PER_DISTRICT];
CUSTOMER_STRUCT customer_buf[CUSTOMERS_PER_DISTRICT];
long           main_threads_completed;
long           customer_threads_completed;
long           order_threads_completed;
long           orders_rows_loaded;
long           new_order_rows_loaded;
long           order_line_rows_loaded;
long           history_rows_loaded;
long           customer_rows_loaded;
long           stock_rows_loaded;
long           district_rows_loaded;
long           item_rows_loaded;
long           warehouse_rows_loaded;
long           main_time_start;
long           main_time_end;
TPCCLDR_ARGS    *aptr, args;


//==============================================================================
//
// Function name: main
//
//==============================================================================

int main(int  argc, char **argv)
{

          DWORD          dwThreadID[MAX_MAIN_THREADS];
          HANDLE         hThread[MAX_MAIN_THREADS];
          FILE           *fLoader;
```

```
        char            buffer[255];
        int             main_threads_started;
        RETCODE         retcode;
        LOGINREC *login;

printf("\n*****************************************************");
        printf("\n*                                                   *");
        printf("\n*  Microsoft SQL Server 6.5                         *");
        printf("\n*                                                   *");
        printf("\n*  TPC-C BENCHMARK KIT:  Database loader            *");
        printf("\n*  Version %s                                 *", TPCKIT_VER);
        printf("\n*                                                   *");
        printf("\n*****************************************************\n\n");

// process command line arguments

aptr = &args;
GetArgsLoader(argc, argv, aptr);

        if (aptr->build_index = 0)
                printf("data load only\n");
        if (aptr->build_index = 1)
                printf("data load and index creation\n");

        // install dblib error handlers

        dbmsghandle((DBMSGHANDLE_PROC)SQLMsgHander);
        dberrhandle((DBERRHANDLE_PROC)SQLErrHandler);

        // open connections to SQL Server

        OpenConnections();

        // open file for loader results
fLoader = fopen(aptr->loader_res_file, "a");

if (fLoader == NULL)
        {
                printf("Error, loader result fle open failed.");
                exit(-1);
        }

// start loading data

sprintf(buffer,"TPC-C load started for %ld warehouses:  ", aptr->num_warehouses);
        if(aptr->build_index = 0)
                strcat(buffer, "data load only\n");
        if (aptr->build_index = 1)
                strcat(buffer, "data load and index creation\n");

        printf("%s",buffer);
        fprintf(fLoader,"%s",buffer);

        main_time_start = (TimeNow() / MILLI);

        // start parallel load threads

        main_threads_completed = 0;
        main_threads_started = 0;

        if ((aptr->table == NULL) || !(strcmp(aptr->table,"item")))
        {
                fprintf(fLoader, "\nStarting loader threads for: item\n");

                hThread[0] = CreateThread(NULL,
                                                                        0,
(LPTHREAD_START_ROUTINE) LoadItem,
                                                                        NULL,
                                                                        0,
&dwThreadID[0]);

                if (hThread[0] == NULL)
                {
                        printf("Error, failed in creating creating thread = 0.\n");
                        exit(-1);
                }

                main_threads_started++;

        }

        if ((aptr->table == NULL) || !(strcmp(aptr->table,"warehouse")))
        {
                fprintf(fLoader, "Starting loader threads for: warehouse\n");

                hThread[1] = CreateThread(NULL,
                                                                        0,
(LPTHREAD_START_ROUTINE) LoadWarehouse,
                                                                        NULL,
                                                                        0,
&dwThreadID[1]);
```

```
                        if (hThread[1] == NULL)
                        {
                                printf("Error, failed in creating creating thread = 1.\n");
                                exit(-1);
                        }

                        main_threads_started++;
                }

        if ((aptr->table == NULL) || !(strcmp(aptr->table,"customer")))
                {
                        fprintf(fLoader, "Starting bader threads for: customer\n");

                        hThread[2] = CreateThread(NULL,
                                                                                0,
(LPTHREAD_START_ROUTINE) LoadCustomer,
                                                                                NULL,
                                                                                0,
&dwThreadID[2]);

                        if (hThread[2] == NULL)
                        {
                                printf("Error, failed in creating creating main thread = 2.\n");
                                exit(-1);
                        }

                        main_threads_started++;
                }

        if ((aptr->table == NULL) || !(strcmp(aptr->table,"orders")))
                {
                        fprintf(fLoader, "Starting loader threads for: orders\n");

                        hThread[3] = CreateThread(NULL,
                                                                                0,
(LPTHREAD_START_ROUTINE) LoadOrders,
                                                                                NULL,
                                                                                0,
&dwThreadID[3]);

                        if (hThread[3] == NULL)
                        {
                                printf("Error, failed in creating creating main thread = 3.\n");
                                exit(-1);
                        }

                main_threads_started++;

                }

                while (main_threads_completed != main_threads_started)
                        Sleep(1000L);

        main_time_end = (TimeNow() / MILLI);

        sprintf(buffer,"\nTPC-C load completed successfully in %ld minutes.\n",
                                        (main_time_end - main_time_start)/60);

                printf("%s",buffer);
                fprintf(fLoader, "%s", buffer);

                fclose(fLoader);

                dbexit();

        exit(0);
}


//==============================================================================
//
// Function name: LoadItem
//
//==============================================================================

void LoadItem()
{
        long   i_id;
                long   i_im_id;
        char   i_name[I_NAME_LEN+1];
        double i_price;
        char   i_data[I_DATA_LEN+1];
                char   name[20];
                long   time_start;

                printf("\nLoading item table...\n");

                // Seed with unique number
                seed(1);

                InitString(i_name, I_NAME_LEN+1);
                InitString(i_data, I_DATA_LEN+1);
```

```
	sprintf(name, "%s..%s", aptr->database, "item");
	bcp_init(i_dbproc1, name, NULL, "logs\\item.err", DB_IN);

	bcp_bind(i_dbproc1, (BYTE *) &i_id,      0, -1,         NULL, 0, 0, 1);
	bcp_bind(i_dbproc1, (BYTE *) &i_im_id,   0, -1,         NULL, 0, 0, 2);
	bcp_bind(i_dbproc1, (BYTE *) i_name,     0, I_NAME_LEN, NULL, 0, 0, 3);
	bcp_bind(i_dbproc1, (BYTE *) &i_price,   0, -1,         NULL, 0, SQLFLT8, 4);
	bcp_bind(i_dbproc1, (BYTE *) i_data,     0, I_DATA_LEN, NULL, 0, 0, 5);

	time_start = (TimeNow() / MILLI);

	item_rows_loaded = 0;

	for (i_id = 1; i_id <= MAXITEMS; i_id++)
	{
		i_im_id = RandomNumber(1L, 10000L);

		MakeAlphaString(14, 24, I_NAME_LEN, i_name);

		i_price = ((float) RandomNumber(100L, 10000L))/100.0;

		MakeOriginalAlphaString(26, 50, I_DATA_LEN, i_data, 10);

		if (!bcp_sendrow(i_dbproc1))
			printf("Error, LoadItem() failed calling bcp_sendrow().  Check
error file.\n");
		item_rows_loaded++;
		CheckForCommit(i_dbproc1, item_rows_loaded, "item", &time_start);
	}

	bcp_done(i_dbproc1);
	dbclose(i_dbproc1);

	printf("Finished loading item table.\n");

	if (aptr->build_index == 1)
		BuildIndex("idxitmcl");

	InterlockedIncrement(&main_threads_completed);
}


//============================================================================
//
// Function   : LoadWarehouse
//
// Loads WAREHOUSE table and loads Stock and District as Warehouses are created
//
//============================================================================

void LoadWarehouse()
{
   short  w_id;
   char   w_name[W_NAME_LEN+1];
   char   w_street_1[ADDRESS_LEN+1];
   char   w_street_2[ADDRESS_LEN+1];
   char   w_city[ADDRESS_LEN+1];
   char   w_state[STATE_LEN+1];
   char   w_zip[ZIP_LEN+1];
   double w_tax;
   double w_ytd;
	char   name[20];
	long   time_start;


	printf("\nLoading warehouse table...\n");

	// Seed with unique number
	seed(2);

	InitString(w_name, W_NAME_LEN+1);
	InitAddress(w_street_1, w_street_2, w_city, w_state, w_zip);

	sprintf(name, "%s..%s", aptr->database, "warehouse");
	bcp_init(w_dbproc1, name, NULL, "logs\\whouse.err", DB_IN);

	bcp_bind(w_dbproc1, (BYTE *) &w_id,        0, -1,          NULL, 0, 0, 1);
	bcp_bind(w_dbproc1, (BYTE *) w_name,       0, W_NAME_LEN,  NULL, 0, 0, 2);
	bcp_bind(w_dbproc1, (BYTE *) w_street_1,   0, ADDRESS_LEN, NULL, 0, 0, 3);
	bcp_bind(w_dbproc1, (BYTE *) w_street_2,   0, ADDRESS_LEN, NULL, 0, 0, 4);
	bcp_bind(w_dbproc1, (BYTE *) w_city,       0, ADDRESS_LEN, NULL, 0, 0, 5);
	bcp_bind(w_dbproc1, (BYTE *) w_state,      0, STATE_LEN,   NULL, 0, 0, 6);
	bcp_bind(w_dbproc1, (BYTE *) w_zip,        0, ZIP_LEN,     NULL, 0, 0, 7);
	bcp_bind(w_dbproc1, (BYTE *) &w_tax,       0, -1,          NULL, 0, SQLFLT8, 8);
	bcp_bind(w_dbproc1, (BYTE *) &w_ytd,       0, -1,          NULL, 0, SQLFLT8, 9);

	time_start = (TimeNow() / MILLI);

	warehouse_rows_loaded = 0;

	for (w_id = aptr->starting_warehouse; w_id < aptr->num_warehouses+1; w_id++)
	{

		MakeAlphaString(6,10, W_NAME_LEN, w_name);
```

```
                MakeAddress(w_street_1, w_street_2, w_city, w_state, w_zip);

                w_tax = ((float) RandomNumber(1L,2000L))/10000.00;

                w_ytd = 300000.00;

                if (!bcp_sendrow(w_dbproc1))
                printf("Error, LoadWarehouse() failed calling bcp_sendrow().  Check error
file.\n");
                warehouse_rows_loaded++;
                CheckForCommit(i_dbproc1, warehouse_rows_loaded,"warehouse",
&time_start);
        }

        bcp_done(w_dbproc1);
        dbclose(w_dbproc1);

        printf("Finished loading warehouse table.\n");

        if (aptr->build_index == 1)
                BuildIndex("idxwarcl");

        stock_rows_loaded = 0;
        district_rows_loaded = 0;

        District(w_id);
        Stock(w_id);

        InterlockedIncrement(&main_threads_completed);
}


//==============================================================================
//
// Function   : District
//
//==============================================================================

void District()
{
   short  d_id;
   short  d_w_id;
   char   d_name[D_NAME_LEN+1];
   char   d_street_1[ADDRESS_LEN+1];
   char   d_street_2[ADDRESS_LEN+1];
   char   d_city[ADDRESS_LEN+1];
   char   d_state[STATE_LEN+1];
   char   d_zip[ZIP_LEN+1];
   double d_tax;
   double d_ytd;
        char   name[20];
   long   d_next_o_id;
   int    rc;
        long   time_start;
        int             w_id;

        for (w_id = aptr->starting_warehouse; w_id < aptr->num_warehouses+1; w_id++)
        {

                printf("...Loading district table: w_id = %d\n", w_id);

                // Seed with unique number
                seed(4);

                InitString(d_name, D_NAME_LEN+1);

                InitAddress(d_street_1, d_street_2, d_city, d_state, d_zip);

                sprintf(name, "%s..%s", aptr->database, "district");
                rc = bcp_init(w_dbproc2, name, NULL, "logs\\district.err", DB_IN);

                bcp_bind(w_dbproc2, (BYTE *) &d_id,          0, -1,          NULL, 0, 0, 1)
                bcp_bind(w_dbproc2, (BYTE *) &d_w_id,        0, -1,          NULL, 0, 0, 2
                bcp_bind(w_dbproc2, (BYTE *) d_name,         0, D_NAME_LEN,  NULL
0, 0, 3);
                bcp_bind(w_dbproc2, (BYTE *) d_street_1,     0, ADDRESS_LEN,  NU
0, 0, 4);
                bcp_bind(w_dbproc2, (BYTE *) d_street_2,     0, ADDRESS_LEN,  NU
0, 0, 5);
                bcp_bind(w_dbproc2, (BYTE *) d_city,         0, ADDRESS_LEN,  NULL
0, 6);
                bcp_bind(w_dbproc2, (BYTE *) d_state,        0, STATE_LEN,    NULL,
0, 7);
                bcp_bind(w_dbproc2, (BYTE *) d_zip,          0, ZIP_LEN,      NULL, 0, 0
8);
                bcp_bind(w_dbproc2, (BYTE *) &d_tax,         0, -1,          NULL, 0,
SQLFLT8, 9);
                bcp_bind(w_dbproc2, (BYTE *) &d_ytd,         0, -1,          NULL, 0,
SQLFLT8, 10);
                bcp_bind(w_dbproc2, (BYTE *) &d_next_o_id,   0, -1,          NULL, 0, 0
11);

                d_w_id = w_id;

                d_ytd  = 30000.0;
```

```
                d_next_o_id = 3001L;

                time_start = (TimeNow() / MILLI);

                for (d_id = 1; d_id <= DISTRICT_PER_WAREHOUSE; d_id++)
                {
                        MakeAlphaString(6,10,D_NAME_LEN, d_name);

                        MakeAddress(d_street_1, d_street_2, d_city, d_state, d_zip);

                        d_tax = ((float) RandomNumber(0L,2000L))/10000.00;

                        if (!bcp_sendrow(w_dbproc2))
                                printf("Error, District() failed calling bcp_sendrow().
Check error file.\n");
                        district_rows_loaded++;
                        CheckForCommit(w_dbproc2, district_rows_loaded, "district",
&time_start);
                }

                rc = bcp_done(w_dbproc2);
        }

        printf("Finished loading district table.\n");

        if (aptr->build_index == 1)
                BuildIndex("idxdiscl");

   return;
}


//==============================================================================
//
// Function   : Stock
//
//==============================================================================

void Stock()
{
   long  s_i_id;
   short s_w_id;
   short s_quantity;
   char  s_dist_01[S_DIST_LEN+1];
   char  s_dist_02[S_DIST_LEN+1];
   char  s_dist_03[S_DIST_LEN+1];
   char  s_dist_04[S_DIST_LEN+1];
   char  s_dist_05[S_DIST_LEN+1];
   char  s_dist_06[S_DIST_LEN+1];
   char  s_dist_07[S_DIST_LEN+1];
   char  s_dist_08[S_DIST_LEN+1];
   char  s_dist_09[S_DIST_LEN+1];
   char  s_dist_10[S_DIST_LEN+1];
   long  s_ytd;
   short s_order_cnt;
   short s_remote_cnt;
   char  s_data[S_DATA_LEN+1];
   short i;
   short len;
   int   rc;
        char  name[20];
        long  time_start;

        // Seed with unique number
        seed(3);

        sprintf(name, "%s..%s", aptr->database, "stock");
        rc = bcp_init(w_dbproc2, name, NULL,"logs\\stock.err", DB_IN);

        bcp_bind(w_dbproc2, (BYTE *) &s_i_id,       0, -1,         NULL, 0, 0, 1);
        bcp_bind(w_dbproc2, (BYTE *) &s_w_id,       0, -1,         NULL, 0, 0, 2);
        bcp_bind(w_dbproc2, (BYTE *) &s_quantity,   0, -1,         NULL, 0, 0, 3);
        bcp_bind(w_dbproc2, (BYTE *) s_dist_01,     0, S_DIST_LEN, NULL, 0, 0, 4);
        bcp_bind(w_dbproc2, (BYTE *) s_dist_02,     0, S_DIST_LEN, NULL, 0, 0, 5);
        bcp_bind(w_dbproc2, (BYTE *) s_dist_03,     0, S_DIST_LEN, NULL, 0, 0, 6);
        bcp_bind(w_dbproc2, (BYTE *) s_dist_04,     0, S_DIST_LEN, NULL, 0, 0, 7);
        bcp_bind(w_dbproc2, (BYTE *) s_dist_05,     0, S_DIST_LEN, NULL, 0, 0, 8);
        bcp_bind(w_dbproc2, (BYTE *) s_dist_06,     0, S_DIST_LEN, NULL, 0, 0, 9);
        bcp_bind(w_dbproc2, (BYTE *) s_dist_07,     0,S_DIST_LEN, NULL, 0, 0, 10);
        bcp_bind(w_dbproc2, (BYTE *) s_dist_08,     0, S_DIST_LEN, NULL, 0, 0, 11);
        bcp_bind(w_dbproc2, (BYTE *) s_dist_09,     0, S_DIST_LEN, NULL, 0, 0, 12);
        bcp_bind(w_dbproc2, (BYTE *) s_dist_10,     0, S_DIST_LEN, NULL, 0, 0, 13);
        bcp_bind(w_dbproc2, (BYTE *) &s_ytd,        0, -1,         NULL, 0, 0, 14);
        bcp_bind(w_dbproc2, (BYTE *) &s_order_cnt,  0, -1,         NULL, 0, 0, 15);
        bcp_bind(w_dbproc2, (BYTE *) &s_remote_cnt, 0, -1,         NULL, 0, 0, 16);
        bcp_bind(w_dbproc2, (BYTE *) s_data,        0, S_DATA_LEN,   NULL, 0, 0, 17);

        s_ytd = s_order_cnt = s_remote_cnt = 0;

        time_start = (TimeNow() / MILLI);

        printf("...Loading stock table\n");

        for (s_i_id=1; s_i_id <= MAXITEMS; s_i_id++)
        {
```

```
                        for (s_w_id = aptr->starting_warehouse; s_w_id < aptr-
>num_warehouses+1; s_w_id++)
                        {

                                s_quantity = RandomNumber(10L,100L);
                                len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_01);
                                len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_02);
                                len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_03);
                                len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_04);
                                len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_05);
                                len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_06);
                                len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_07);
                                len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_08);
                                len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_09);
                                len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_10);

                                len = MakeOriginalAlphaString(26,50, S_DATA_LEN,
s_data,10);

                                if (!bcp_sendrow(w_dbproc2))
                                printf("Error, Stock() failed calling bcp_sendrow().  Check error
file.\n");
                                stock_rows_loaded++;
                                CheckForCommit(w_dbproc2, stock_rows_loaded, "stock",
&time_start);

                        }
                }

                bcp_done(w_dbproc2);
                dbclose(w_dbproc2);

                printf("Finished loading stock table.\n");

                if (aptr->build_index == 1)
                        BuildIndex("idxstkcl");

                return;
}


//============================================================================
//
// Function    : LoadCustomer
//
//============================================================================

void LoadCustomer()
{
        LOADER_TIME_STRUCT      customer_time_start;
        LOADER_TIME_STRUCT      history_time_start;
        short                   w_id;
    short               d_id;
        DWORD                   dwThreadID[MAX_CUSTOMER_THREADS];
        HANDLE                  hThread[MAX_CUSTOMER_THREADS];
        char                    name[20];
        char                                    buf[250];

        printf("\nLoading customer and history tables...\n");

        // Seed with unique number
        seed(5);

        // Initialize bulk copy
        sprintf(name, "%s..%s", aptr->database, "customer");
        bcp_init(c_dbproc1, name, NULL, "logs\\customer.err", DB_IN);

        sprintf(name, "%s..%s", aptr->database, "history");
        bcp_init(c_dbproc2, name, NULL, "logs\\history.err", DB_IN);

        customer_rows_loaded    = 0;
        history_rows_loaded     = 0;

        CustomerBufInit();

        customer_time_start.time_start = (TimeNow() / MILLI);
        history_time_start.time_start = (TimeNow() / MILLI);

        for (w_id = aptr->starting_warehouse; w_id <= aptr->num_warehouses; w_id++)
        {
                for (d_id = 1L; d_id <= DISTRICT_PER_WAREHOUSE; d_id++)
                {

                        CustomerBufLoad(d_id, w_id);

                        // Start parallel loading threads here...

                        customer_threads_completed=0;

                        // Start customer table thread

                        printf("...Loading customer table for: d_id = %d, w_id = %d\n",
d_id, w_id);

                        hThread[0] = CreateThread(NULL,
```

```
0,

(LPTHREAD_START_ROUTINE) LoadCustomerTable,

&customer_time_start,

0,

&dwThreadID[0]);

                                if (hThread[0] == NULL)
                                {
                                        printf("Error, failed in creating creating thread = 0.\n");
                                        exit(-1);
                                }

                                // Start History table thread

                                printf("...Loading history table for: d_id = %d, w_id = %d\n", d_id,
w_id);

                                hThread[1] = CreateThread(NULL,

0,

(LPTHREAD_START_ROUTINE) LoadHistoryTable,

&history_time_start,

0,

&dwThreadID[1]);

                                if (hThread[1] == NULL)
                                {
                                        printf("Error, failed in creating creating thread = 1.\n");
                                        exit(-1);
                                }

                                while (customer_threads_completed != 2)
                                        Sleep(1000L);
                        }
                }

                // flush the bulk connection
                bcp_done(c_dbproc1);
                bcp_done(c_dbproc2);

        sprintf(buf,"update customer set c_first = 'C_LOAD = %d' where c_id = 1 and c_w_id = 1 a
c_d_id = 1",LOADER_NURAND_C);
                dbcmd(c_dbproc1, buf);
                dbsqlexec(c_dbproc1);
                while (dbresults(c_dbproc1) != NO_MORE_RESULTS);

                dbclose(c_dbproc1);
                dbclose(c_dbproc2);

                printf("Finished loading customer table.\n");

                if (aptr->build_index == 1)
                        BuildIndex("idxcuscl");

                if (aptr->build_index == 1)
                        BuildIndex("idxcusnc");

                InterlockedIncrement(&main_threads_completed);

        return;

}


//=============================================================================
//
// Function   : CustomerBufInit
//
//=============================================================================

void CustomerBufInit()
{
        int     i;

        for (i=0;i<CUSTOMERS_PER_DISTRICT;i++)
        {
                customer_buf[i].c_id = 0;
                customer_buf[i].c_d_id = 0;
                customer_buf[i].c_w_id = 0;

                strcpy(customer_buf[i].c_first,"");
                strcpy(customer_buf[i].c_middle,"");
                strcpy(customer_buf[i].c_last,"");
                strcpy(customer_buf[i].c_street_1,"");
                strcpy(customer_buf[i].c_street_2,"");
                strcpy(customer_buf[i].c_city,"");
                strcpy(customer_buf[i].c_state,"");
                strcpy(customer_buf[i].c_zip,"");
```

```
                strcpy(customer_buf[i].c_phone,"");
                strcpy(customer_buf[i].c_credit,"");

                customer_buf[i].c_credit_lim = 0;
                customer_buf[i].c_discount = (float) 0;
                customer_buf[i].c_balance = 0;
                customer_buf[i].c_ytd_payment = 0;
                customer_buf[i].c_payment_cnt = 0;
                customer_buf[i].c_delivery_cnt = 0;

                strcpy(customer_buf[i].c_data_1,"");
                strcpy(customer_buf[i].c_data_2,"");

                customer_buf[i].h_amount = 0;

                strcpy(customer_buf[i].h_data,"");

        }


}


//============================================================================
//
// Function    : CustomerBufLoad
//
// Fills shared buffer for HISTORY and CUSTOMER
//============================================================================

void CustomerBufLoad(int d_id, int w_id)
{
        long                                    i;
   CUSTOMER_SORT_STRUCT    c[CUSTOMERS_PER_DISTRICT];


        for (i=0;i<CUSTOMERS_PER_DISTRICT;i++)
        {
                if (i < 1000)
                        LastName(i, c[i].c_last);
                else
                        LastName(NURand(255,0,999,LOADER_NURAND_C),
c[i].c_last);

                MakeAlphaString(8,16,FIRST_NAME_LEN, c[i].c_first);

                c[i].c_id = i+1;
        }

        printf("...Loading customer buffer for: d_id = %d, w_id = %d\n",
                        d_id, w_id);

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

                customer_buf[i].c_d_id = d_id;
                customer_buf[i].c_w_id = w_id;
                customer_buf[i].h_amount = 10.0;
                customer_buf[i].c_ytd_payment = 10.0;
                customer_buf[i].c_payment_cnt = 1;
                customer_buf[i].c_delivery_cnt = 0;

                // Generate CUSTOMER and HISTORY data

                customer_buf[i].c_id = c[i].c_id;

                strcpy(customer_buf[i].c_first, c[i].c_first);
                strcpy(customer_buf[i].c_last,c[i].c_last);

                customer_buf[i].c_middle[0] = 'O';
                customer_buf[i].c_middle[1] = 'E';

                MakeAddress(customer_buf[i].c_street_1,
                                customer_buf[i].c_street_2,
                                customer_buf[i].c_city,
                                customer_buf[i].c_state,
                                customer_buf[i].c_zip);

                MakeNumberString(16, 16, PHONE_LEN, customer_buf[i].c_phone);

                if (RandomNumber(1L, 100L) > 10)
                        customer_buf[i].c_credit[0] = 'G';
                else
                        customer_buf[i].c_credit[0] = 'B';
                customer_buf[i].c_credit[1] = 'C';

                customer_buf[i].c_credit_lim = 50000.0;
                customer_buf[i].c_discount = ((float) RandomNumber(0L, 5000L)) /
10000.0;
                customer_buf[i].c_balance = -10.0;

                MakeAlphaString(250, 250, C_DATA_LEN, customer_buf[i].c_data_1);
                MakeAlphaString(50, 250, C_DATA_LEN, customer_buf[i].c_data_2);

                // Generate HISTORY data
```

```
                    MakeAlphaString(12, 24, H_DATA_LEN, customer_buf[i].h_data);

            }
}

//=============================================================================
//
// Function   : LoadCustomerTable
//
//=============================================================================

void LoadCustomerTable(LOADER_TIME_STRUCT *customer_time_start)
{
            int       i;
   long       c_id;
   short      c_d_id;
   short      c_w_id;
   char       c_first[FIRST_NAME_LEN+1];
   char       c_middle[MIDDLE_NAME_LEN+1];
   char       c_last[LAST_NAME_LEN+1];
   char       c_street_1[ADDRESS_LEN+1];
   char       c_street_2[ADDRESS_LEN+1];
   char       c_city[ADDRESS_LEN+1];
   char       c_state[STATE_LEN+1];
   char       c_zip[ZIP_LEN+1];
   char       c_phone[PHONE_LEN+1];
   char       c_credit[CREDIT_LEN+1];
   double     c_credit_lim;
   double     c_discount;
   double     c_balance;
   double     c_ytd_payment;
   short      c_payment_cnt;
   short      c_delivery_cnt;
   char       c_data_1[C_DATA_LEN+1];
   char       c_data_2[C_DATA_LEN+1];
char       name[20];
            char                    c_since[50];

   bcp_bind(c_dbproc1, (BYTE *) &c_id,         0, -1,            NULL,0,0, 1);
   bcp_bind(c_dbproc1, (BYTE *) &c_d_id,       0, -1,            NULL,0,0, 2);
   bcp_bind(c_dbproc1, (BYTE *) &c_w_id,       0, -1,            NULL,0,0, 3);
   bcp_bind(c_dbproc1, (BYTE *) c_first,       0, FIRST_NAME_LEN, NULL,0,0, 4);
   bcp_bind(c_dbproc1, (BYTE *) c_middle,      0, MIDDLE_NAME_LEN,NULL,0,0, 5);
   bcp_bind(c_dbproc1, (BYTE *) c_last,        0, LAST_NAME_LEN,  NULL,0,0, 6);
   bcp_bind(c_dbproc1, (BYTE *) c_street_1,    0, ADDRESS_LEN,    NULL,0,0, 7);
   bcp_bind(c_dbproc1, (BYTE *) c_street_2,    0, ADDRESS_LEN,    NULL,0,0, 8);
   bcp_bind(c_dbproc1, (BYTE *) c_city,        0, ADDRESS_LEN,    NULL,0,0, 9);
   bcp_bind(c_dbproc1, (BYTE *) c_state,       0, STATE_LEN,      NULL,0,0,10);
   bcp_bind(c_dbproc1, (BYTE *) c_zip,         0, ZIP_LEN,        NULL,0,0,11);
   bcp_bind(c_dbproc1, (BYTE *) c_phone,       0, PHONE_LEN,      NULL,0,0,12);
            bcp_bind(c_dbproc1, (BYTE *) c_since,       0, 50,            NULL,0,SQLCHAR,13)
   bcp_bind(c_dbproc1, (BYTE *) c_credit,      0, CREDIT_LEN,     NULL,0,0,14);
   bcp_bind(c_dbproc1, (BYTE *) &c_credit_lim, 0, -1,            NULL,0,SQLFLT8,15);
   bcp_bind(c_dbproc1, (BYTE *) &c_discount,   0, -1,            NULL,0,SQLFLT8,16);
   bcp_bind(c_dbproc1, (BYTE *) &c_balance,    0, -1,            NULL,0,SQLFLT8,17);
   bcp_bind(c_dbproc1, (BYTE *) &c_ytd_payment, 0, -1,           NULL,0,SQLFLT8,18);
   bcp_bind(c_dbproc1, (BYTE *) &c_payment_cnt, 0, -1,           NULL,0,0,19);
   bcp_bind(c_dbproc1, (BYTE *) &c_delivery_cnt,0, -1,           NULL,0,0,20);
   bcp_bind(c_dbproc1, (BYTE *) c_data_1,      0, C_DATA_LEN,     NULL,0,0,21);
   bcp_bind(c_dbproc1, (BYTE *) c_data_2,      0, C_DATA_LEN,     NULL,0,0,22);

   for (i = 0; i < CUSTOMERS_PER_DISTRICT; i++)
   {
                        c_id = customer_buf[i].c_id;
                        c_d_id = customer_buf[i].c_d_id;
                        c_w_id = customer_buf[i].c_w_id;

                        strcpy(c_first, customer_buf[i].c_first);
                        strcpy(c_middle, customer_buf[i].c_middle);
                        strcpy(c_last, customer_buf[i].c_last);
                        strcpy(c_street_1, customer_buf[i].c_street_1);
                        strcpy(c_street_2, customer_buf[i].c_street_2);
                        strcpy(c_city, customer_buf[i].c_city);
                        strcpy(c_state, customer_buf[i].c_state);
                        strcpy(c_zip, customer_buf[i].c_zip);
                        strcpy(c_phone, customer_buf[].c_phone);
                        strcpy(c_credit, customer_buf[i].c_credit);

                        CurrentDate(&c_since);

                        c_credit_lim = customer_buf[i].c_credit_lim;
                        c_discount = customer_buf[i].c_discount;
                        c_balance = customer_buf[i].c_balance;
                        c_ytd_payment = customer_buf[i].c_ytd_payment;
                        c_payment_cnt = customer_buf[i].c_payment_cnt;
                        c_delivery_cnt = customer_buf[i].c_delivery_cnt;

                        strcpy(c_data_1, customer_buf[i].c_data_1);
                        strcpy(c_data_2, customer_buf[i].c_data_2);

                        // Send data to server
                        if (!bcp_sendrow(c_dbproc1))
                        printf("Error, LoadCustomerTable() failed calling bcp_sendrow().  Check
error file.\n");
                        customer_rows_loaded++;
```

```
                        CheckForCommit(c_dbproc1, customer_rows_loaded, "customer",
&customer_time_start->time_start);
    }

            InterlockedIncrement(&customer_threads_completed);

}


//============================================================================
//
// Function   : LoadHistoryTable
//
//============================================================================

void LoadHistoryTable(LOADER_TIME_STRUCT *history_time_start)
{
            int         i;
    long        c_id;
    short       c_d_id;
    short       c_w_id;
            double      h_amount;
    char        h_data[H_DATA_LEN+1];
            char                    h_date[50];

    bcp_bind(c_dbproc2, (BYTE *) &c_id,         0, -1,          NULL, 0, 0, 1);
    bcp_bind(c_dbproc2, (BYTE *) &c_d_id,       0, -1,          NULL, 0, 0, 2);
    bcp_bind(c_dbproc2, (BYTE *) &c_w_id,       0, -1,          NULL, 0, 0, 3);
    bcp_bind(c_dbproc2, (BYTE *) &c_d_id,       0, -1,          NULL, 0, 0, 4);
    bcp_bind(c_dbproc2, (BYTE *) &c_w_id,       0, -1,          NULL, 0, 0, 5);
    bcp_bind(c_dbproc2, (BYTE *) h_date,        0, 50,          NULL, 0, SQLCHAR, 6);
    bcp_bind(c_dbproc2, (BYTE *) &h_amount,     0, -1,          NULL, 0, SQLFLT8, 7);
    bcp_bind(c_dbproc2, (BYTE *) h_data,        0, H_DATA_LEN,   NULL, 0, 0, 8);

    for (i = 0; i < CUSTOMERS_PER_DISTRICT; i++)
    {
                        c_id = customer_buf[i].c_id;
                        c_d_id = customer_buf[i].c_d_id;
                        c_w_id = customer_buf[i].c_w_id;
                        h_amount = customer_buf[i].h_amount;
                        strcpy(h_data, customer_buf[i].h_data);
                        CurrentDate(&h_date);

                        // send to server
                        if (!bcp_sendrow(c_dbproc2))
                        printf("Error, LoadHistoryTable() failed calling bcp_sendrow().  Check error
file.\n");
                        history_rows_loaded++;
                        CheckForCommit(c_dbproc2, history_rows_loaded, "history",
&history_time_start->time_start);
    }

            InterlockedIncrement(&customer_threads_completed);

}


//============================================================-
===============
//
// Function   : LoadOrders
//
//============================================================================
=====

void LoadOrders()
{
            LOADER_TIME_STRUCT      orders_time_start;
            LOADER_TIME_STRUCT      new_order_time_start;
            LOADER_TIME_STRUCT      order_line_time_start;
            short                   w_id;
    short           d_id;
            DWORD                   dwThreadID[MAX_ORDER_THREADS];
            HANDLE                  hThread[MAX_ORDER_THREADS];
            char                    name[20];


            printf("\nLoading orders...\n");

            // seed with unique number
            seed(6);

            // initialize bulk copy
            sprintf(name, "%s..%s", aptr->database, "orders");
            bcp_init(o_dbproc1, name, NULL, "logs\\orders.err", DB_IN);

            sprintf(name, "%s..%s", aptr->database, "new_order");
            bcp_init(o_dbproc2, name, NULL, "logs\\neword.err", DB_IN);

            sprintf(name, "%s..%s", aptr->database, "order_line");
            bcp_init(o_dbproc3, name, NULL, "logs\\ordline.err", DB_IN);

            orders_rows_loaded      = 0;
            new_order_rows_loaded   = 0;
            order_line_rows_loaded  = 0;
```

```
	OrdersBufInit();

	orders_time_start.time_start = (TimeNow() / MILLI);
	new_order_time_start.time_start = (TimeNow() / MILLI);
	order_line_time_start.time_start = (TimeNow() / MILLI);

	for (w_id = aptr->starting_warehouse; w_id <= aptr->num_warehouses; w_id++)
	{
		for (d_id = 1L; d_id <= DISTRICT_PER_WAREHOUSE; d_id++)
		{
			OrdersBufLoad(d_id, w_id);

			// start parallel loading threads here...

			order_threads_completed=0;

			// start Orders table thread

			printf("...Loading Order Table for: d_id = %d, w_id = %d\n", d_id,
w_id);

			hThread[0] = CreateThread(NULL,

0,

(LPTHREAD_START_ROUTINE) LoadOrdersTable,

&orders_time_start,

0,

&dwThreadID[0]);

			if (hThread[0] == NULL)
			{
				printf("Error, failed in creating creating thread = 0.\n");
				exit(-1);
			}

			// start NewOrder table thread

			printf("...Loading New-Order Table for: d_id = %d, w_id = %d\n",
d_id, w_id);

			hThread[1] = CreateThread(NULL,

0,

(LPTHREAD_START_ROUTINE) LoadNewOrderTable,

&new_order_time_start,

0,

&dwThreadID[1]);

			if (hThread[1] == NULL)
			{
				printf("Error, failed in creating creating thread = 1.\r
				exit(-1);
			}

			// start Order-Line table thread

			printf("...Loading Order-Line Table for: d_id = %d, w_id = %d\
d_id, w_id);

			hThread[2] = CreateThread(NULL,

0,

(LPTHREAD_START_ROUTINE) LoadOrderLineTable,

&order_line_time_start,

0,

&dwThreadID[2]);

			if (hThread[2] == NULL)
			{
				printf("Error, failed in creating creating thread = 2.\r
				exit(-1);
			}

			while (order_threads_completed != 3)
				Sleep(1000L);

		}
	}

	printf("Finished loading orders.\n");

	InterlockedIncrement(&main_threads_completed);
```

```
    return;
}


//================================================================================
//
// Function    : OrdersBufInit
//
// Clears shared buffer for ORDERS, NEWORDER, and ORDERLINE
//
//================================================================================

void OrdersBufInit()
{
        int     i;
        int                     j;

        for (i=0;i<ORDERS_PER_DISTRICT;i++)
        {
                orders_buf[i].o_id = 0;
                orders_buf[i].o_d_id = 0;
                orders_buf[i].o_w_id = 0;
                orders_buf[i].o_c_id = 0;
                orders_buf[i].o_carrier_id = 0;
                orders_buf[i].o_ol_cnt = 0;
                orders_buf[i].o_all_local = 0;

                for (j=0;j<=14;j++)
                {
                        orders_buf[i].o_ol[j].ol = 0;
                        orders_buf[i].o_ol[j].ol_i_id = 0;
                        orders_buf[i].o_ol[j].ol_supply_w_id = 0;
                        orders_buf[i].o_ol[j].ol_quantity = 0;
                        orders_buf[i].o_ol[j].ol_amount = 0;
                        strcpy(orders_buf[i].o_ol[j].ol_dist_info,"");
                }
        }


}


//================================================================================
//
// Function    : OrdersBufLoad
//
// Fills shared buffer for ORDERS, NEWORDER, and ORDERLINE
//
//================================================================================

void OrdersBufLoad(int d_id, int w_id)
{

        int     cust[ORDERS_PER_DIST+1];
        long    o_id;
        short   ol;

        printf("...Loading Order Buffer for: d_id = %d, w_id = %d\n",
                        d_id, w_id);

        GetPermutation(cust, ORDERS_PER_DIST);

        for (o_id=0;o_id<ORDERS_PER_DISTRICT;o_id++)
        {

                // Generate ORDER and NEW-ORDER data

                orders_buf[o_id].o_d_id = d_id;
                orders_buf[o_id].o_w_id = w_id;
                orders_buf[o_id].o_id = o_id+1;
                orders_buf[o_id].o_c_id = cust[o_id+1];
                orders_buf[o_id].o_ol_cnt = RandomNumber(5L, 15L);

                if (o_id < 2100)
                {
                        orders_buf[o_id].o_carrier_id = RandomNumber(1L, 10L);
                        orders_buf[o_id].o_all_local  = 1;
                }
                else
                {
                        orders_buf[o_id].o_carrier_id = 0;
                        orders_buf[o_id].o_all_local  = 1;
                }

                for (ol=0;ol<orders_buf[o_id].o_ol_cnt;ol++)
                {

                        orders_buf[o_id].o_ol[ol].ol = ol+1;
                        orders_buf[o_id].o_ol[ol].ol_i_id = RandomNumber(1L,
MAXITEMS);
                        orders_buf[o_id].o_ol[ol].ol_supply_w_id = w_id;
                        orders_buf[o_id].o_ol[ol].ol_quantity = 5;
                        MakeAlphaString(24, 24, OL_DIST_INFO_LEN,
&orders_buf[o_id].o_ol[ol].ol_dist_info);

                        // Generate ORDER-LINE data
```

```
                                if (o_id < 2100)
                                {
                                        orders_buf[o_id].o_ol[ol].ol_amount = 0;
                                        // Added to insure ol_delivery_d set properly during
load
                                        CurrentDate(&orders_buf[o_id].o_ol[ol].ol_delivery_d);
                                }
                                else
                                {
                                        orders_buf[o_id].o_ol[ol].ol_amount =
RandomNumber(1,999999)/100.0;
                                        // Added to insure ol_delivery_d set properly during
load
                                        strcpy(orders_buf[o_id].o_ol[ol].ol_delivery_d,"Dec 31,
1889");
                                }
                        }
                }
}


//==============================================================================
//
// Function   : LoadOrdersTable
//
//==============================================================================

void LoadOrdersTable(LOADER_TIME_STRUCT *orders_time_start)
{
        int     i;
    long    o_id;
        short   o_d_id;
        short   o_w_id;
    long    o_c_id;
    short   o_carrier_id;
    short   o_ol_cnt;
    short   o_all_local;
        char            o_entry_d[50];

        // bind ORDER data
    bcp_bind(o_dbproc1, (BYTE *) &o_id,         0, -1,      NULL, 0, 0, 1);
    bcp_bind(o_dbproc1, (BYTE *) &o_d_id,       0, -1,      NULL, 0, 0, 2);
    bcp_bind(o_dbproc1, (BYTE *) &o_w_id,       0, -1,      NULL, 0, 0, 3);
    bcp_bind(o_dbproc1, (BYTE *) &o_c_id,       0, -1,      NULL, 0, 0, 4);
    bcp_bind(o_dbproc1, (BYTE *) o_entry_d,     0, 50,      NULL, 0, SQLCHAR, 5);
    bcp_bind(o_dbproc1, (BYTE *) &o_carrier_id, 0, -1,      NULL, 0, 0, 6);
    bcp_bind(o_dbproc1, (BYTE *) &o_ol_cnt,     0, -1,      NULL, 0, 0, 7);
    bcp_bind(o_dbproc1, (BYTE *) &o_all_local,  0, -1,      NULL, 0, 0, 8);

    for (i = 0; i < ORDERS_PER_DISTRICT; i++)
    {
                        o_id        = orders_buf[i].o_id;
                        o_d_id      = orders_buf[i].o_d_id;
                        o_w_id      = orders_buf[i].o_w_id;
                        o_c_id      = orders_buf[i].o_c_id;
                        o_carrier_id = orders_buf[i].o_carrier_id;
                        o_ol_cnt    = orders_buf[i].o_ol_cnt;
                        o_all_local = orders_buf[i].o_all_local;
                        CurrentDate(&o_entry_d);

                        // send data to server
                        if (!bcp_sendrow(o_dbproc1))
                        printf("Error, LoadOrdersTable() failed calling bcp_sendrow().  Check err
file.\n");
                        orders_rows_loaded++;
                        CheckForCommit(o_dbproc1, orders_rows_loaded, "ORDERS",
&orders_time_start->time_start);
    }

                if ((o_w_id == aptr->num_warehouses) && (o_d_id == 10))
                {
                        bcp_done(o_dbproc1);
                        dbclose(o_dbproc1);

                        if (aptr->build_index == 1)
                                BuildIndex("idxordcl");
                }

                InterlockedIncrement(&order_threads_completed);

}


//==============================================================================
//
// Function   : LoadNewOrderTable
//
//==============================================================================

void LoadNewOrderTable(LOADER_TIME_STRUCT *new_order_time_start)
{
    int     i;
    long    o_id;
    short   o_d_id;
    short   o_w_id;
```

```
        // Bind NEW-ORDER data
    bcp_bind(o_dbproc2, (BYTE *) &o_id,         0, -1, NULL, 0, 0, 1);
    bcp_bind(o_dbproc2, (BYTE *) &o_d_id,       0, -1, NULL, 0, 0, 2);
    bcp_bind(o_dbproc2, (BYTE *) &o_w_id,       0, -1, NULL, 0, 0, 3);

        for (i = 2100; i < 3000; i++)
        {
                o_id    = orders_buf[i].o_id;
                o_d_id  = orders_buf[i].o_d_id;
                o_w_id  = orders_buf[i].o_w_id;

                if (!bcp_sendrow(o_dbproc2))
                printf("Error, LoadNewOrderTable() failed calling bcp_sendrow().  Check
error file.\n");
                new_order_rows_loaded++;
                CheckForCommit(o_dbproc2, new_order_rows_loaded, "NEW_ORDER",
&new_order_time_start->time_start);

        }

        if ((o_w_id == aptr->num_warehouses) && (o_d_id == 10))
        {
                bcp_done(o_dbproc2);
                dbclose(o_dbproc2);

                if (aptr->build_index == 1)
                        BuildIndex("idxnodcl");
        }

        InterlockedIncrement(&order_threads_completed);

}


//============================================================================
//
// Function   : LoadOrderLineTable
//
//============================================================================

void LoadOrderLineTable(LOADER_TIME_STRUCT *order_line_time_start)
{
        int     i,j;
    long    o_id;
        short   o_d_id;
        short   o_w_id;
    long    ol;
        long    ol_i_id;
    short   ol_supply_w_id;
    short   ol_quantity;
    double  ol_amount;
    short   o_all_local;
    char    ol_dist_info[DIST_INFO_LEN+1];
        char            ol_delivery_d[50];

        // bind ORDER-LINE data
    bcp_bind(o_dbproc3, (BYTE *) &o_id,             0, -1, NULL, 0, 0, 1);
    bcp_bind(o_dbproc3, (BYTE *) &o_d_id,           0, -1, NULL, 0, 0, 2);
    bcp_bind(o_dbproc3, (BYTE *) &o_w_id,           0, -1, NULL, 0, 0, 3);
    bcp_bind(o_dbproc3, (BYTE *) &ol,               0, -1, NULL, 0, 0, 4);
    bcp_bind(o_dbproc3, (BYTE *) &ol_i_id,          0, -1, NULL, 0, 0, 5);
    bcp_bind(o_dbproc3, (BYTE *) &ol_supply_w_id,   0, -1, NULL, 0, 0, 6);
        bcp_bind(o_dbproc3, (BYTE *) ol_delivery_d,                             0, 50,
NULL, 0, SQLCHAR, 7);
    bcp_bind(o_dbproc3, (BYTE *) &ol_quantity,      0, -1, NULL, 0, 0, 8);
    bcp_bind(o_dbproc3, (BYTE *) &ol_amount,        0, -1, NULL, 0, SQLFLT8, 9);
    bcp_bind(o_dbproc3, (BYTE *) ol_dist_info,      0, DIST_INFO_LEN, NULL, 0, 0, 10);

        for (i = 0; i < ORDERS_PER_DISTRICT; i++)
    {
                o_id    = orders_buf[i].o_id;
                o_d_id  = orders_buf[i].o_d_id;
                o_w_id  = orders_buf[i].o_w_id;

                for (j=0; j < orders_buf[i].o_ol_cnt; j++)
                {
                        ol          = orders_buf[i].o_ol[j].ol;
                        ol_i_id     = orders_buf[i].o_ol[j].ol_i_id;
                        ol_supply_w_id = orders_buf[i].o_ol[j].ol_supply_w_id;
                        ol_quantity = orders_buf[i].o_ol[j].ol_quantity;
                        ol_amount   = orders_buf[i].o_ol[j].ol_amount;
                        //  Changed to insure ol_delivery_d set properly (now set in
OrdersBufLoad)
                        //  CurrentDate(&ol_delivery_d);
                        strcpy(ol_delivery_d,orders_buf[i].o_ol[j].ol_delivery_d);

                        strcpy(ol_dist_info,orders_buf[i].o_ol[j].ol_dist_info);

                        if (!bcp_sendrow(o_dbproc3))
                                printf("Error, LoadOrderLineTable() failed calling
bcp_sendrow().  Check error file.\n");
                        order_line_rows_loaded++;
                        CheckForCommit(o_dbproc3, order_line_rows_loaded,
"ORDER_LINE", &order_line_time_start->time_start);
                }
```

```
		}

		if ((o_w_id == aptr->num_warehouses) && (o_d_id == 10))
		{
			bcp_done(o_dbproc3);
			dbclose(o_dbproc3);

			if (aptr->build_index == 1)
				BuildIndex("idxodlcl");
		}

		InterlockedIncrement(&order_threads_completed);

}


//============================================================================
//
// Function   : GetPermutation
//
//============================================================================

void GetPermutation(int perm[], int n)
{
		int i, r, t;

		for (i=1;i<=n;i++)
			perm[i] = i;

		for (i=1;i<=n;i++)
		{
			r = RandomNumber(i,n);
			t = perm[i];
			perm[i] = perm[r];
			perm[r] = t;
		}

}


//============================================================================
//
// Function   : CheckForCommit
//
//============================================================================

void CheckForCommit(DBPROCESS *dbproc,
					int rows_loaded,
					char *table_name,
				long *time_start)
{

   long     time_end, time_diff;

   // commit every "batch" rows

   if ( !(rows_loaded % aptr->batch) )
   {
			bcp_batch(dbproc);

			time_end = (TimeNow() / MILLI);
			time_diff = time_end - *time_start;

			printf("-> Loaded %ld rows into %s in %ld sec - Total = %d (%.2f rps)\n"
				aptr->batch,
				table_name,
					time_diff,
				rows_loaded,
					(float) aptr->batch / (time_diff ? time_diff : 1L));

			*time_start = time_end;
   }

   return;
}


//============================================================================
//
// Function   : OpenConnections
//
//============================================================================

void OpenConnections()
{
		RETCODE		retcode;

		LOGINREC *login;

   login = dblogin();

   retcode = DBSETLUSER(login, aptr->user);
		if (retcode == FAIL)
		{
			printf("DBSETLUSER failed.\n");
		}
```

```
        retcode = DBSETLPWD(login, aptr->password);
        if (retcode == FAIL)
        {
                printf("DBSETLPWD failed.\n");
        }

        retcode = DBSETLPACKET(login, (USHORT) aptr->pack_size);
        if (retcode == FAIL)
        {
                printf("DBSETLPACKET failed.\n");
        }

        printf("DB-Library packet size: %ld\n",aptr->pack_size);

// turn connection into a BCP connection
retcode = BCP_SETL(login, TRUE);
        if (retcode == FAIL)
        {
                printf("BCP_SETL failed.\n");
        }

// open connections to SQL Server */

if ((i_dbproc1 = dbopen(login, aptr->server)) == NULL)
{
                printf("Error on login 1 to server %s.\n", aptr->server);
                exit(-1);
}

if ((w_dbproc1 = dbopen(login, aptr->server)) == NULL)
{
                printf("Error on login 2 to server %s.\n", aptr->server);
                exit(-1);
}

if ((w_dbproc2 = dbopen(login, aptr->server)) == NULL)
{
                printf("Error on login 3 to server %s.\n", aptr->server);
                exit(-1);
}

if ((c_dbproc1 = dbopen(login, aptr->server)) == NULL)
{
                printf("Error on login 4 to server %s.\n", aptr->server);
                exit(-1);
}

if ((c_dbproc2 = dbopen(login, aptr->server)) == NULL)
{
                printf("Error on login 5 to server %s.\n", aptr->server);
                exit(-1);
}

if ((o_dbproc1 = dbopen(login, aptr->server)) == NULL)
{
                printf("Error on login 6 to server %s.\n", aptr->server);
                exit(-1);
}

if ((o_dbproc2 = dbopen(login, aptr->server)) == NULL)
{
                printf("Error on login 7 to server %s.\n", aptr->server);
                exit(-1);
}

if ((o_dbproc3 = dbopen(login, aptr->server)) == NULL)
{
                printf("Error on login 8 to server %s.\n", aptr->server);
                exit(-1);
}

}



//=============================================================================
//
// Function name: SQLErrHandler
//
//=============================================================================

int SQLErrHandler(SQLCONN *dbproc,
                                        int     severity,
                                        int     err,
                                        int     oserr,
                                        char    *dberrstr,
                                        char    *oserrstr)
{

        char msg[256];
        FILE *fp1;
        char timebuf[128];
        char datebuf[128];

        _strtime(timebuf);
        _strdate(datebuf);
```

```
        sprintf(msg, "%s %s : DBLibrary (%ld) %s\n", datebuf, timebuf, err, dberrstr);
    printf("%s",msg);

        fp1 = fopen("logs\tpccldr.err","a");
        if (fp1 == NULL)
        {
                printf("Error in opening errorlog file.\n");
        }
        else
        {
                fprintf(fp1, msg);
                fclose(fp1);
        }

    if (oserr != DBNOERR)
    {
                sprintf(msg, "%s %s : OSError (%ld) %s\n", datebuf, timebuf, oserr,
oserrstr);
                printf("%s",msg);

                fp1 = fopen("logs\\tpccldr.err","a");
                if (fp1 == NULL)
                {
                        printf("Error in opening errorlog file.\n");
                }
                else
                {
                        fprintf(fp1, msg);
                        fclose(fp1);
                }
    }

        if ((dbproc == NULL) || (DBDEAD(dbproc)))
        {
                exit(-1);
        }

        return (INT_CANCEL);

}


//============================================================================
//
// Function name: SQLMsgHandler
//
//============================================================================
int SQLMsgHandler(SQLCONN   *dbproc,
                                        DBINT     msgno,
                                                int       msgstate,
                                                int       severity,
                                                char      *msgtext)
{
    char msg[256];
        FILE        *fp1;
        char timebuf[128];
        char datebuf[128];

    if ( (msgno == 5701) || (msgno == 2528) || (msgno == 5703) || (msgno == 6006) )
        {
                return(INT_CONTINUE);
        }

        if (msgno == 0)
        {
                return(INT_CONTINUE);
        }
        else
        {
                _strtime(timebuf);
                _strdate(datebuf);

                sprintf(msg, "%s %s : SQLServer (%ld) %s\n", datebuf, timebuf, msgno,
msgtext);

                printf("%s",msg);

                fp1 = fopen("logs\\tpccldr.err","a");
                if (fp1 == NULL)
                {
                        printf("Error in opening errorlog file.\n");
                }
                else
                {
                        fprintf(fp1, msg);
                        fclose(fp1);
                }

                exit(-1);
        }

        return (INT_CANCEL);
}
```

```
//==================================================================
//
// Function name: CurrentDate
//
//==================================================================

void CurrentDate(char           *datetime)
{

        char timebuf[128];
        char datebuf[128];

        _strtime(timebuf);
        _strdate(datebuf);

        sprintf(datetime, "%s %s", datebuf, timebuf);

}


//==================================================================
//
// Function name: BuildIndex
//
//==================================================================

void BuildIndex(char*index_script)
{
        char        cmd[256];

        printf("Starting index creation:  %s\n",index_script);

        sprintf(cmd, "isql -S%s -U%s -P%s -e -i%s\\%s.sql >> logs\\%s.out",
                                        aptr->server,
                                        aptr->user,
                                        aptr->password,
                                        aptr->index_script_path,
                                        index_script,
                                        index_script);

        system(cmd);

        printf("Finished index creation:  %s\n",index_script);
}
```

B.26 getargs.c

```
// TPC-C Benchmark Kit
//
// Module:  GETARGS.C
// Author:  DamienL


// Includes
#include "tpcc.h"


//==================================================================
//
// Function name: GetArgsLoader
//
//==================================================================

void GetArgsLoader(int argc, char **argv, TPCCLDR_ARGS *pargs)
{
   int                  i;
   char     *ptr;

#ifdef DEBUG
   printf("[%ld]DBG: Entering GetArgsLoader()\n", (int) GetCurrentThreadId());
#endif

   /* init args struct with some useful values */
   pargs->server                        = SERVER;
   pargs->user                          = USER;
   pargs->password                      = PASSWORD;
   pargs->database                      = DATABASE;
   pargs->batch                         = BATCH;
   pargs->num_warehouses                = UNDEF;
   pargs->table                         = NULL;
        pargs->loader_res_file                  = LOADER_RES_FILE;
        pargs->pack_size                        = DEFLDPACKSIZE;
        pargs->starting_warehouse       = DEF_STARTING_WAREHOUSE;
        pargs->build_index                      = BUILD_INDEX;
        pargs->index_script_path        = INDEX_SCRIPT_PATH;

   /* check for zero command line args */
   if ( argc == 1 )
                GetArgsLoaderUsage();

   for (i = 1; i < argc; ++i)
   {
                if (argv[i][0] != '-' && argv[i][0] != '/')
                {
```

```
printf("\nUnrecognized command");
GetArgsLoaderUsage();
exit(1);
}

ptr = argv[i];

switch (ptr[1])
{
case 'h':    /* Fall throught */
case 'H':
                        GetArgsLoaderUsage();
                        break;

case 'D':
                        pargs->database = ptr+2;
                        break;

case 'P':
                        pargs->password = ptr+2;
                        break;

case 'S':
                        pargs->server = ptr+2;
                        break;

case 'U':
                        pargs->user = ptr+2;
                        break;

case 'b':
                        pargs->batch = atol(ptr+2);
                        break;

case 'W':
                        pargs->num_warehouses =atol(ptr+2);
                        break;

case 's':
                        pargs->starting_warehouse = atol(ptr+2);
                        break;

case 't':
                        pargs->table = ptr+2;
                        break;

            case 'f':
                        pargs->loader_res_file = ptr+2;
                                                break;

                                        case 'p':
                                                pargs->pack_size =atol(ptr+2);
                                                break;

                                        case 'i':
                                                pargs->build_index = atol(ptr+2);


                                case 'd':
                                                pargs->index_script_path = ptr+2;
                                                break;

                                default:
                                                GetArgsLoaderUsage();
                                                exit(-1);
                                                break;
                                }
    }

    /* check for required args */
    if (pargs->num_warehouses == UNDEF )
    {
                        printf("Number of Warehouses is required\n");
                        exit(-2);
    }

    return;
}


//==============================================================================
//
// Function name: GetArgsLoaderUsage
//
//==============================================================================

void GetArgsLoaderUsage()
{

#ifdef DEBUG
    printf("[%ld]DBG: Entering GetArgsLoaderUsage()\n", (int) GetCurrentThreadId());
#endif


    printf("TPCCLDR:\n\n");
            printf("Parameter                                       Default\n");
```

```
            printf("-------------------------------------------------------------\n");
    printf("-W Number of Warehouses to Load                Required \n");
    printf("-S Server                                  %s\n", SERVER);
    printf("-U Username                                  %s\n", USER);
    printf("-P Password                                 %s\n", PASSWORD);
    printf("-D Database                                 %s\n", DATABASE);
            printf("-b Batch Size                              %ld\n", (long) BATCH);
            printf("-p TDS packet size                           %ld\n", (long) DEFLDPACKSIZE);
            printf("-f Loader Results Output Filename                  %s\n", LOADER_RES_FILE);
            printf("-s Starting Warehouse                        %ld\n", (long)
DEF_STARTING_WAREHOUSE);
            printf("-i Build Option (data = 0, data and index = 1)       %ld\n", (long)
BUILD_INDEX);
            printf("-d Index Script Path                         %s\n", INDEX_SCRIPT_PATH);
            printf("-t Table to Load                             all tables \n");
    printf("   [item|warehouse|customer|orders]\n");

            printf("\nNote:  Command line switches are case sensitive.\n");

    exit(0);
}


//==============================================================================
//
// Function name: GetArgsMaster
//
//==============================================================================

void GetArgsMaster(int argc, char **argv, MASTER_DATA *pargs)
{
    int                 i;
    char    *ptr;

#ifdef DEBUG
    printf("[%ld]DBG: Entering GetArgsMaster()\n", (int) GetCurrentThreadId());
#endif

    pargs->server               = SERVER;
    pargs->database             = DATABASE;
            pargs->admin_database       = ADMIN_DATABASE;
    pargs->user                 = USER;
    pargs->password             = PASSWORD;
    pargs->ramp_up              = RAMP_UP;
    pargs->steady_state         = STEADY_STATE;
    pargs->ramp_down            = RAMP_DOWN;
    pargs->num_users            = NUM_USERS;
    pargs->num_warehouses       = NUM_WAREHOUSES;
pargs->think_times          = THINK_TIMES;
pargs->display_data         = DISPLAY_DATA;
            pargs->deadlock_retry       = DEADLOCK_RETRY;
pargs->tran                 = TRANSACTION;
            pargs->client_mode          = CLIENT_MODE;
            pargs->comment              = NULL;
            pargs->load_multiplier      = DEF_LOAD_MULTIPLIER;
            pargs->checkpoint_interval  = DEF_CHECKPOINT_INTERVAL;
            pargs->first_checkpoint     = DEF_FIRST_CHECKPOINT;
            pargs->delivery_backoff     = DELIVERY_BACKOFF;
            pargs->num_deliveries       = NUM_DELIVERIES;
            pargs->disable_90th                         = DISABLE_90TH;
            pargs->enable_sqlstat                       = ENABLE_SQLSTAT;
            pargs->resfilename                          = RESFILENAME;
            pargs->sqlstat_filename                     = SQLSTAT_FILENAME;
            pargs->sqlstat_period                       = SQLSTAT_PERIOD;
            pargs->shutdown_server                      = SHUTDOWN_SERVER;
            pargs->auto_run                                     = AUTO_RUN;
            pargs->disable_sqlperf                      = DISABLE_SQLPERF;

/* check for zero command line args */
if ( argc == 1 )
                GetArgsMasterUsage();

for (i = 1; i < argc; ++i)
{
                if (argv[i][0] != '-' && argv[i][0] != '/')
                {
                printf("\nUnrecognized command");
                GetArgsMasterUsage();
                exit(1);
                }

                ptr = argv[i];

                switch (ptr[1])
                {
                case 'h':     /* Fall throught */
                                GetArgsMasterUsage();
                                break;

                case 'S':
                                pargs->server = ptr+2;
                                break;

                case 'D':
                        pargs->database = ptr+2;
                                break;
```

```
case 'A':
        pargs->admin_database = ptr+2;
                break;

case 'U':
                pargs->user = ptr+2;
                break;

case 'P':
                pargs->password = ptr+2;
                break;

case 'u':
                pargs->ramp_up = atol(ptr+2);
                break;

case 's':
                pargs->steady_state = atol(ptr+2);
                break;

case 'd':
                pargs->ramp_down = atol(ptr+2);
                break;

case 'c':
                pargs->num_users = atol(ptr+2);
                break;

case 'w':
                pargs->num_warehouses = atol(ptr+2);
                break;

case 'T':
                pargs->think_times = atol(ptr+2);
                break;

case 'o':
                pargs->display_data = atol(ptr+2);
                break;

        case 'm':
                pargs->load_multiplier = atof(ptr+2);
                break;

case 'f':
                pargs->first_checkpoint = atol(ptr+2);
                break;

case 'i':
                pargs->checkpoint_interval = atol(ptr+2);
                break;

case 'C':
                pargs->comment = ptr+2;
                break;

case 'B':
                pargs->client_mode = atol(ptr+2);
                break;

case 'n':
                pargs->num_deliveries = atol(ptr+2);
        break;

case 'b':
                pargs->delivery_backoff = atol(ptr+2);
                break;

        case 'r':
                pargs->deadlock_retry = (short) atol(ptr+2);
        break;

        case 't':
                pargs->tran = atol(ptr+2);
                break;

        case 'E':
                pargs->enable_sqlstat = atol(ptr+2);
                break;

case 'e':
                pargs->sqlstat_filename = ptr+2;
                break;

        case 'g':
                pargs->shutdown_server = atol(ptr+2);
                break;

case 'F':
                pargs->resfilename = ptr+2;
                break;

        case 'N':
                pargs->disable_90th = atol(ptr+2);
                break;
```

```
                        case 'a':
                                pargs->auto_run = atol(ptr+2);
                                break;

                        case 'q':
                                pargs->disable_sqlperf = atol(ptr+2);
                                break;

                        case 'W':
                                pargs->sqlstat_period = atol(ptr+2);
                                break;

                default:
                                GetArgsMasterUsage();
                                exit(-1);
                                break;
                }
    }

    return;
}


//============================================================================
//
// Function name: GetArgsMasterUsage
//
//============================================================================

void GetArgsMasterUsage()
{

#ifdef DEBUG
    printf("[%ld]DBG: Entering GetArgsMasterUsage()\n", (int) GetCurrentThreadId());
#endif

    printf("MASTER:\n\n");
            printf("Parameter                                       Default\n");
            printf("-------------------------------------------------------------------------\n");
            printf("-S Server                                       %s\n", SERVER);
    printf("-D Database                                     %s\n", DATABASE);
            printf("-A Admin Database                               %s\n", ADMIN_DATABASE);
    printf("-U Username                                     %s\n", USER);
    printf("-P Password                                     %s\n", PASSWORD);
            printf("-u Ramp Up Time (seconds)                       %ld\n", (long)
RAMP_UP);
            printf("-s Steady State Time (seconds)                  %ld\n", (long)
STEADY_STATE);
            printf("-d Ramp Down Time (seconds)                     %ld\n", (long)
RAMP_DOWN);
    printf("-c Number of Users                              %ld\n", (long) NUM_USERS);
            printf("-w Number of Warehouses                         %ld\n", (long)
NUM_WAREHOUSES);
            printf("-f First Checkpoint (seconds)                   %ld\n", (long)
DEF_FIRST_CHECKPOINT);
            printf("-i Checkpoint Interval (seconds)                %ld\n", (long)
DEF_CHECKPOINT_INTERVAL);
            printf("-B Client mode (TPC-C Scaled = 0, TPC-C Batch = 1)      %ld\n", (long)
CLIENT_MODE);
            printf("-n Number of Delivery Threads per Client Driver         %ld\n", (long)
NUM_DELIVERIES);
            printf("-b Delivery Queue Backoff Delay (seconds)       %ld\n", (long)
DELIVERY_BACKOFF);
            printf("-r Deadlock Retries                             %ld\n", (long)
DEADLOCK_RETRY);
            printf("-T Use Think Times (no = 0, yes = 1)            %ld\n", (long)
THINK_TIMES);
            printf("-m Think Time Load Multiplier                   %0.4f\n",
DEF_LOAD_MULTIPLIER);
            printf("-o Display Data to Console (no = 0, yes = 1)    %ld\n", (long)
DISPLAY_DATA);
            printf("-t Transaction (0, 1, 2, 3, 4, 5)               %ld\n", (long)
TRANSACTION);
            printf("-N Disable 90th Per. Calc. (no = 0, yes = 1)    %ld\n",(long)
DISABLE_90TH);
            printf("-E Enable Steady State Sqlstats Collection (no = 0, yes = 1)    %ld\n",(long)
ENABLE_SQLSTAT);
            printf("-W Sqlstats Collection Period (seconds)         %ld\n",(long)
SQLSTAT_PERIOD);
            printf("-e Sqlstats File Name                           %s\n",
SQLSTAT_FILENAME);
            printf("-g Shutdown SQL Server at End of Test (no = 0, yes = 1)         %ld\n",(long)
SHUTDOWN_SERVER);
            printf("-F Result File Name                             %s\n", RESFILENAME);
    printf("-a Automated Test Run (no = 0, yes = 1)         %ld\n",(long) AUTO_RUN)
            printf("-C Comment to Include in Result File            None\n");
            printf("\nNote:  Command line switches are case sensitive.\n");

    exit(0);
}


//============================================================================
//
```

```
// Function name: GetArgsClient
//
//==========================================================================

void GetArgsClient(int argc, char **argv, GLOBAL_CLIENT_DATA *pClient)
{
   int                  i;
   char     *ptr;

#ifdef DEBUG
   printf("[%ld]DBG: Entering GetArgsClient()\n", (int) GetCurrentThreadId());
#endif

            pClient->num_threads            = NUM_THREADS;
   pClient->server                  = SERVER;
   pClient->database                = DATABASE;
            pClient->admin_database         = ADMIN_DATABASE;
   pClient->user                    = USER;
   pClient->password                = PASSWORD;
            pClient->pack_size              = (long) DEFCLPACKSIZE;
            pClient->synch_servername       = SYNCH_SERVERNAME;
            pClient->disable_delivery_resfiles = DISABLE_DELIVERY_RESFILES;
            pClient->enable_qj                                      = ENABLE_QJ;

   /* check for 1 or more command line args */
   if ( argc != 1 )
   {
                        for (i = 1; i < argc; ++i)
                        {
                        if (argv[i][0] != '-' && argv[i][0] != '/')
                        {
                                        printf("\nUnrecognized command");
                                        GetArgsClientUsage();
                                        exit(1);
                           }

                           ptr = argv[i];

                        switch (ptr[1])
                        {
                                        case 'S':
                                                pClient->server = ptr+2;
                                        break;

                                        case 'D':
                                                pClient->database = ptr+2;
                                        break;
                                        case 'A':
                                                pClient->admin_database = ptr+2;
                                        break;

                                        case 'U':
                                                pClient->user = ptr+2;
                                        break;

                                        case 'P':
                                                pClient->password = ptr+2;
                                        break;

                                        case 'c':
                                                pClient->num_threads = atol(ptr+2);
                                        break;

                                        case 'p':
                                                pClient->pack_size = atol(ptr+2);
                                                break;

                                        case 'd':
                                                pClient->disable_delivery_resfiles =
atol(ptr+2);
                                                break;

                                        case 's':
                                                pClient->synch_servername = ptr+2;
                                                break;

                                        case 'q':
                                                pClient->enable_qj = atol(ptr+2);
                                                break;

                                        default:
                                                GetArgsClientUsage();
                                                exit(-1);
                                                break;
                                }
                                }
                        }

   return;
}


//==========================================================================
//
// Function name: GetArgsClientUsage
```

```
//
//====================================================================

void GetArgsClientUsage()
{

#ifdef DEBUG
   printf("[%ld]DBG: Entering GetArgsClientUsage()\n", (int) GetCurrentThreadId());
#endif

   printf("CLIENT:\n\n");
            printf("Parameter                                    Default\n");
            printf("-------------------------------------------------------------\n");
            printf("-S Server                                %s\n", SERVER);
   printf("-D Database                              %s\n", DATABASE);
            printf("-A Admin Database                        %s\n", ADMIN_DATABASE);
   printf("-U Username                               %s\n", USER);
   printf("-P Password                              %s\n", PASSWORD);
            printf("-c Number of User Connections                %ld\n",(long) NUM_THREADS);
            printf("-p TDS Packet Size                           %ld\n",(long) DEFCLPACKSIZE);
            printf("-d Disable Delivery Result Files (no = 0, yes = 1)  %ld\n",(long)
DISABLE_DELIVERY_RESFILES);
            printf("-s Master Driver Servername                  %s\n", SYNCH_SERVERNAME);


   printf("\nNote:  Command line switches are case sensitive.\n");

   exit(0);
}


//====================================================================
//
// Function name: GetArgsDelivery
//
//====================================================================
void GetArgsDelivery(int argc, char **argv, DELIVERY_ARGS *pDelivery)
{
   int                  i;
   char     *ptr;

#ifdef DEBUG
   printf("[%ld]DBG: Entering GetArgsDelivery()\n", (int) GetCurrentThreadId());
#endif

            pDelivery->pipe_num = 0;

   /* check for 1 or more command line args */
   if ( argc != 1 )
            {
                     for (i = 1; i < argc; ++i)
                     {
                     if (argv[i][0] != '-' && argv[i][0] != '/')
                     {
                                       printf("\nUnrecognized command");
                                       GetArgsClientUsage();
                                       exit(1);
                     }

                     ptr = argv[i];

                        switch (ptr[1])
                        {
                                       case 'p':
                                                pDelivery->pipe_num = (long) atol(ptr+2)
                                                break;

                                       default:
                                                printf("ERROR:  No pipe number
specified.");
                                                exit(-1);
                                                break;
                     }
                     }
   }

   return;
}


//====================================================================
//
// Function name: GetArgsSQLStat
//
//====================================================================

void GetArgsSQLStat(int argc, char **argv, SQLSTAT_ARGS *pargs)
{
   int                  i;
   char     *ptr;

   /* init args struct with some useful values */
   pargs->server                    = SERVER;
   pargs->user                 = USER;
   pargs->password                  = PASSWORD;
   pargs->admin_database       = ADMIN_DATABASE;
```

```
        pargs->sqlstat_filename    =  SQLSTAT_FILENAME;
        pargs->run_id                                       =  UNDEF;

/* check for zero command line args */
if ( argc == 1 )
                GetArgsSQLStatUsage();

for (i = 1; i < argc; ++i)
{
                if (argv[i][0] != '-' && argv[i][0] != '/')
                {
                printf("\nUnrecognized command");
                GetArgsSQLStatUsage();
                exit(1);
                }

                ptr = argv[i];

                switch (ptr[1])
                {

                case 'S':
                                pargs->server = ptr+2;
                                break;

                case 'U':
                                pargs->user = ptr+2;
                                break;

                case 'P':
                                pargs->password = ptr+2;
                                break;

                case 'A':
                                pargs->admin_database = ptr+2;
                                break;

                        case 'i':
                                pargs->run_id = atol(ptr+2);
                                break;

                        case 'f':
                                pargs->sqlstat_filename = ptr+2;
                                break;

                default:
                        GetArgsSQLStatUsage();
                        exit(-1);
                                break;
                        }
        }

        /* check for required args */
        if (pargs->run_id == UNDEF )
        {
                        printf("Error, Run ID is required.\n");
                        exit(-2);
        }

        return;
}


//============================================================================
//
// Function name: GetArgsSQLStatUsage
//
//============================================================================

void GetArgsSQLStatUsage()
{

        printf("SQLSTAT:\n\n");
                printf("Parameter                                       Default\n");
                printf("-------------------------------------------------------------\n");
        printf("-S Server                                   %s\n", SERVER);
        printf("-U Username                                   %s\n", USER);
        printf("-P Password                                  %s\n", PASSWORD);
        printf("-A Admin Database                               %s\n", ADMIN_DATABASE);
                printf("-i Run ID                                       (required)\n");
                printf("-f Statistics Result file                       %s\n", SQLSTAT_FILENAME);

                printf("\nNote:  Command line switches are case sensitive.\n");

        exit(0);
}
```

B.27 random.c

```
/*              FILE:                   RANDOM.C

 *                                              Microsoft TPC-C Kit Ver. 3.00.000
 *                                              Audited 08/23/96, By Francois Raab
 *
```

```
 *                                        Copyright Microsoft, 1996
 *
 *      PURPOSE:        Random number generation functions for Microsoft TPC-C
Benchmark Kit
 *      Author:         Damien Lindauer
 *                                        damienl@Microsoft.com
 */

// Includes
#include "tpcc.h"
#include "math.h"

// Defines
#define A          16807
#define M      2147483647
#define Q         127773     /* M div A */
#define R           2836     /* M mod A */
#define Thread       __declspec(thread)

// Globals
long       Thread Seed = 0;      /* thread local seed */

/*****************************************************************************
*                                                                            *
* random -                                                                   *
*      Implements a GOOD pseudo random number generator.  This generator     *
*      will/should? run the complete period before repeating.                *
*                                                                            *
* Copied from:                                                               *
*      Random Numbers Generators: Good Ones Are Hard to Find.                *
*      Communications of the ACM - October 1988 Volume 31 Number 10          *
*                                                                            *
* Machine Dependencies:                                                      *
*      long must be 2 ^ 31 - 1 or greater.                                   *
*                                                                            *
*****************************************************************************/

/*****************************************************************************
* seed - load the Seed value used in irand and drand.  Should be used before *
*      first call to irand or drand.                                         *
*****************************************************************************/

void seed(long val)
{

#ifdef DEBUG
   printf("[%ld]DBG: Entering seed()...\n", (int) GetCurrentThreadId());
            printf("Old Seed %ld New Seed %ld\n",Seed, val);
#endif

   if ( val < 0 )
            val = abs(val);

   Seed = val;

}


/*****************************************************************************
*                                                                            *
* irand - returns a 32 bit integer pseudo random number with a period of     *
*      1 to 2 ^ 32 - 1.                                                      *
*                                                                            *
* parameters:                                                                *
*      none.                                                                 *
*                                                                            *
* returns:                                                                   *
*      32 bit integer - defined as long ( see above ).                       *
*                                                                            *
* side effects:                                                              *
*      seed get recomputed.                                                  *
*****************************************************************************/

long irand()
{
   register long    s;      /* copy of seed */
   register long    test;   /* test flag */
   register long    hi;     /* tmp value for speed */
   register long    lo;     /* tmp value for speed */

#ifdef DEBUG
   printf("[%ld]DBG: Entering irand()...\n", (int) GetCurrentThreadId());
#endif

   s = Seed;
   hi = s / Q;
   lo = s % Q;

   test = A * lo - R * hi;
   if ( test > 0 )
                        Seed = test;
   else
                        Seed = test + M;

   return( Seed );
}
```

```
/*****************************************************************************
*                                                                            *
* drand - returns a double pseudo random number between 0.0 and 1.0.        *
*       See irand.                                                           *
*****************************************************************************/
double drand()
{

#ifdef DEBUG
   printf("[%ld]DBG: Entering drand()...\n", (int) GetCurrentThreadId());
#endif

   return( (double)irand() / 2147483647.0);
}


//===========================================================================
// Function   : RandomNumber
//
// Description:
//===========================================================================
long RandomNumber(long lower, long upper)
{
   long rand_num;

#ifdef DEBUG
   printf("[%ld]DBG: Entering RandomNumber()...\n", (int) GetCurrentThreadId());
#endif

            if ( upper == lower )  /* pgd 08-13-96 perf enhancement */
                        return lower;

            upper++;

   if ( upper <= lower )
                        rand_num = upper;
   else
                        rand_num = lower + irand() % (upper - lower); /* pgd 08-13-96 perf
enhancement */


#ifdef DEBUG
   printf("[%ld]DBG: RandomNumber between %ld & %ld ==> %ld\n",
                                          (int) GetCurrentThreadId(), lower, upper, rand_num);
#endif

   return rand_num;
}


#if 0

//Orginal code pgd 08/13/96

long RandomNumber(long lower,
                                                      long upper)
{
   long rand_num;

#ifdef DEBUG
   printf("[%ld]DBG: Entering RandomNumber()...\n", (int) GetCurrentThreadId());
#endif

            upper++;

   if ((upper <= lower))
                        rand_num = upper;
   else
                        rand_num = lower + irand() % ((upper > lower) ? upper - lower : upper);


#ifdef DEBUG
   printf("[%ld]DBG: RandomNumber between %ld & %ld ==> %ld\n",
                                          (int) GetCurrentThreadId(), lower, upper, rand_num
#endif


   return rand_num;
}
#endif

//===========================================================================
// Function   : NURand
//
// Description:
//===========================================================================
long NURand(int iConst,
            long x,
            long y,
            long C)
{
   long rand_num;
```

```
#ifdef DEBUG
   printf("[%ld]DBG: Entering NURand()...\n", (int) GetCurrentThreadId());
#endif

   rand_num = (((RandomNumber(0,iConst) | RandomNumber(x,y)) + C) % (y-x+1))+x;

#ifdef DEBUG
   printf("[%ld]DBG: NURand: num = %d\n", (int) GetCurrentThreadId(), rand_num);
#endif

   return rand_num;
}
```

B.28 util.c

```
// TPC-C Benchmark Kit
//
// Module:  UTIL.C
// Author:  DamienL


// Includes
#include "tpcc.h"


//==============================================================================
//
// Function name: UtilSleep
//
//==============================================================================

void UtilSleep(long  delay)
{

#ifdef DEBUG
   printf("[%ld]DBG: Entering UtilSleep()\n", (int) GetCurrentThreadId());
#endif

#ifdef DEBUG
   printf("[%ld]DBG: Sleeping for %ld seconds...\n", (int) GetCurrentThreadId(), delay);
#endif

   Sleep(delay * 1000);

}


//==============================================================================
//
// Function name: UtilSleep
//
//==============================================================================

void UtilSleepMs(long  delay)
{

#ifdef DEBUG
   printf("[%ld]DBG: Entering UtilSleepMs()\n", (int) GetCurrentThreadId());
#endif

#ifdef DEBUG
   printf("[%ld]DBG: Sleeping for %ld milliseconds...\n", (int) GetCurrentThreadId(), delay);
#endif

   Sleep(delay);

}

//==============================================================================
//
// Function name: UtilPrintNewOrder
//
//==============================================================================
void UtilPrintNewOrder(NEW_ORDER_DATA *pNewOrder)
{
   int i;

#ifdef DEBUG
   printf("[%ld]DBG: Entering UtilPrintNewOrder()\n", (int) GetCurrentThreadId());
#endif

            EnterCriticalSection(&ConsoleCritSec);

            printf("\n[%04ld]\tNewOrder Transaction\n\n", (int) GetCurrentThreadId());

   printf("Warehouse: %ld\n"
                        "District: %ld\n"
                        "Date: %02ld/%02ld/%04ld %02ld:%02ld:%02ld\n\n"
                        "Customer Number:  %ld\n"
                        "Customer Name: %s\n"
                        "Customer Credit: %s\n"
                        "Cusotmer Discount: %02.2f%%\n\n"
                        "Order Number: %ld\n"
                        "Warehouse Tax: %02.2f%%\n"
                        "District Tax: %02.2f%%\n\n"
                        "Number of Order Lines: %ld\n\n",
```

```
                        (int)    pNewOrder->w_id,
                        (int)    pNewOrder->d_id,
                        (char *) pNewOrder->o_entry_d.month,
                        (char *) pNewOrder->o_entry_d.day,
                        (char *) pNewOrder->o_entry_d.year,
                        (char *) pNewOrder->o_entry_d.hour,
                        (char *) pNewOrder->o_entry_d.minute,
                        (char *) pNewOrder->o_entry_d.second,
                        (int)    pNewOrder->c_id,
                        (char *) pNewOrder->c_last,
                        (char *) pNewOrder->c_credit,
                        (float)  pNewOrder->c_discount,
                        (int)    pNewOrder->o_id,
                        (float)  pNewOrder->w_tax,
                        (float)  pNewOrder->d_tax,
                        (int)    pNewOrder->o_ol_cnt);

        printf("Supp_W Item_Id Item Name              Qty Stock B/G Price    Amount   \n");
        printf("------ ------- ------------------------ --- ----- --- -------- ---------\n");

   for (i=0;i < pNewOrder->o_ol_cnt;i++)
   {
                printf("%04ld   %06ld %24s   %02ld   %03ld   %1s  %8.2f %9.2f\n",
                (int)    pNewOrder->Ol[i].ol_supply_w_id,
                (int)    pNewOrder->Ol[i].ol_i_id,
                         (char *) pNewOrder->Ol[i].ol_i_name,
                (int)    pNewOrder->Ol[i].ol_quantity,
                (int)    pNewOrder->Ol[i].ol_stock,
                (char *) pNewOrder->Ol[i].ol_brand_generic,
                (float)  pNewOrder->Ol[i].ol_i_price,
                (float)  pNewOrder->Ol[i].ol_amount);
   }

        printf("\nTotal: $%05.2f\n\n",
                        (float)  pNewOrder->total_amount);

        printf("Execution Status: %s\n\n",
                        (char *) pNewOrder->execution_status);

        LeaveCriticalSection(&ConsoleCritSec);

}


//============================================================================
//
// Function name: UtilPrintPayment
//
//============================================================================

void UtilPrintPayment(PAYMENT_DATA *pPayment)
{

        char    tmp_data[201];
   char    data_line_1[51];
        char    data_line_2[51];
        char    data_line_3[51];
        char    data_line_4[51];

#ifdef DEBUG
   printf("[%ld]DBG: Entering UtilPrintPayment()\n", (int) GetCurrentThreadId());
#endif

   EnterCriticalSection(&ConsoleCritSec);

        printf("\n[%04ld]\tPayment Transaction\n\n", (int) GetCurrentThreadId());

   printf("Date: %02ld/%02ld/%04ld %02ld:%02ld:%02ld\n\n",
                (int)    pPayment->h_date.month,
                         (int)    pPayment->h_date.day,
                (int)    pPayment->h_date.year,
                         (int)    pPayment->h_date.hour,
                         (int)    pPayment->h_date.minute,
                         (int)    pPayment->h_date.second);

        printf("Warehouse: %ld\n"
                "District: %ld\n\n",
                         (int)    pPayment->w_id,
                         (int)    pPayment->d_id);

        printf("Warehouse Address Street 1: %s\n"
                "Warehouse Address Street 2: %s\n",
                         (char *) pPayment->w_street_1,
                         (char *) pPayment->w_street_2);

        printf("Warehouse Address City: %s\n"
             "Warehouse Address State: %s\n"
             "Warehouse Address Zip: %s\n\n",
                         (char *) pPayment->w_city,
                         (char *) pPayment->w_state,
                         (char *) pPayment->w_zip);

        printf("District Address Street 1: %s\n"
                "District Address Street 2: %s\n",
                         (char *) pPayment->d_street_1,
                  (char *) pPayment->d_street_2);
```

```
        printf("District Address City: %s\n"
             "District Address State: %s\n"
             "District Address Zip: %s\n\n",
                      (char *) pPayment->d_city,
                              (char *) pPayment->d_state,
                              (char *) pPayment->d_zip);

        printf("Customer Number: %ld\n"
                      "Customer Warehouse: %ld\n"
                      "Customer District: %ld\n",
                              (int)    pPayment->c_id,
                              (int)    pPayment->c_w_id,
                              (int)    pPayment->c_d_id);

        printf("Customer Name:   %s %s %s\n"
                      "Customer Since:  %02ld-%02ld-%04ld\n",
                              (char *) pPayment->c_first,
                              (char *) pPayment->c_middle,
                              (char *) pPayment->c_last,
                              (int)    pPayment->c_since.month,
                              (int)    pPayment->c_since.day,
                              (int)    pPayment->c_since.year);

        printf("Customer Address Street 1: %s\n"
             "Customer Address Street 2: %s\n"
             "Customer Address City: %s\n"
             "Customer Address State: %s\n"
             "Customer Address Zip: %s\n"
                      "Customer Phone Number: %s\n\n"
             "Customer Credit: %s\n"
             "Customer Discount: %02.2f%%\n",
                              (char *) pPayment->c_street_1,
                              (char *) pPayment->c_street_2,
                              (char *) pPayment->c_city,
                              (char *) pPayment->c_state,
                              (char *) pPayment->c_zip,
                              (char *) pPayment->c_phone,
                              (char *) pPayment->c_credit,
                              (double) pPayment->c_discount);

        printf("Amount Paid: $%04.2f\n"
             "New Customer Balance: $%10.2f\n",
                              (float)  pPayment->h_amount,
                              (double) pPayment->c_balance);

    printf("Credit Limit: $%10.2f\n\n",
                              (double) pPayment->c_credit_lim);

    if (strcmp(pPayment->c_data," ") != 0)
                {
                        strcpy(tmp_data, pPayment->c_data);
                        strncpy(data_line_1, tmp_data, 50);       data_line_1[50] = '\0';
                        strncpy(data_line_2, &tmp_data[50], 50);  data_line_2[50] = '\0';
                        strncpy(data_line_3, &tmp_data[100], 50); data_line_3[50] = '\0';
                        strncpy(data_line_4, &tmp_data[150], 50); data_line_4[50] = '\0';

                }
                else
                {
                        strcpy(data_line_1, " "); strcpy(data_line_2, " ");
                        strcpy(data_line_3, " "); strcpy(data_line_4, " ");
                }

                printf("              ---------------------------------------------------\n");
        printf("Customer Data: l%50sl\n", data_line_1);
                printf("               l%50sl\n", data_line_2);
                printf("               l%50sl\n", data_line_3);
                printf("               l%50sl\n", data_line_4);
                printf("              ---------------------------------------------------\n\n");

                printf("Execution Status: %s\n\n",
                                        (char *) pPayment->execution_status);

                LeaveCriticalSection(&ConsoleCritSec);

}


//============================================================================
//
// Function name: UtilPrintOrderStatus
//
//============================================================================

void UtilPrintOrderStatus(ORDER_STATUS_DATA *pOrderStatus)
{
    int i;

#ifdef DEBUG
    printf("[%ld]DBG: Entering UtilPrintOrderStatus()\n", (int) GetCurrentThreadId());
#endif

                EnterCriticalSection(&ConsoleCritSec);

                printf("\n[%04ld]\tOrder-Status Transaction\n\n", (int) GetCurrentThreadId());
```

```
        printf("Warehouse: %ld\n"
             "District: %ld\n\n",
                        (int) pOrderStatus->w_id,
                        (int) pOrderStatus->d_id);

        printf("Customer Number: %ld\n"
             "Customer Name: %s %s %s\n\n",
                        (int) pOrderStatus->c_id,
                        (char *) pOrderStatus->c_first,
                        (char *) pOrderStatus->c_middle,
                        (char *) pOrderStatus->c_last);

        printf("Customer Balance: $%5.2f\n\n",
                        (double) pOrderStatus->c_balance);

        printf("Order Number: %ld\n"
             "Entry Date: %02ld/%02ld/%04ld %02ld:%02ld:%02ld\n"
             "Carrier Number: %ld\n\n"
             "Number of order lines: %ld\n\n",
                        (int) pOrderStatus->o_id,
                        (int) pOrderStatus->o_entry_d.month,
                        (int) pOrderStatus->o_entry_d.day,
                        (int) pOrderStatus->o_entry_d.year,
                        (int) pOrderStatus->o_entry_d.hour,
                        (int) pOrderStatus->o_entry_d.minute,
                        (int) pOrderStatus->o_entry_d.second,
                        (int) pOrderStatus->o_carrier_id,
                        (int) pOrderStatus->o_ol_cnt);

    printf ("Supply-W    Item-Id    Delivery-Date    Qty   Amount    \n");
        printf ("--------    -------    -------------    ---   ----------\n");

    for (i=0;i < pOrderStatus->o_ol_cnt; i++)
    {
                printf("%04ld       %06ld     %02ld/%02ld/%04ld       %02ld     %9.2f\n",
                                (int) pOrderStatus-
>OlOrderStatusData[i].ol_supply_w_id,
                                (int) pOrderStatus->OlOrderStatusData[i].ol_i_id,
                                (int) pOrderStatus-
>OlOrderStatusData[i].ol_delivery_d.month,
                                (int) pOrderStatus-
>OlOrderStatusData[i].ol_delivery_d.day,
                                (int) pOrderStatus-
>OlOrderStatusData[i].ol_delivery_d.year,
                                (int) pOrderStatus->OlOrderStatusData[i].ol_quantity,
                                (double) pOrderStatus-
>OlOrderStatusData[i].ol_amount);
    }

        if (pOrderStatus->o_ol_cnt == 0)
                printf("\nNo Order-Status items.\n\n");

        printf("\nExecution Status: %s\n\n",
                        (char *) pOrderStatus->execution_status);

        LeaveCriticalSection(&ConsoleCritSec);

}


//============================================================================
//
// Function name: UtilPrintDelivery
//
//============================================================================

void UtilPrintDelivery(DELIVERY_DATA *pQueuedDelivery)
{

#ifdef DEBUG
    printf("[%ld]DBG: Entering UtilPrintDelivery()\n", (int) GetCurrentThreadId());
#endif

        EnterCriticalSection(&ConsoleCritSec);

        printf("\n[%04ld]\tDelivery Transaction\n\n", (int) GetCurrentThreadId());

    printf("Warehouse: %ld\n", (int) pQueuedDelivery->w_id);

        printf("Carrier Number: %ld\n\n", (int) pQueuedDelivery->o_carrier_id);

    printf("Execution Status: %s\n\n", (char *) pQueuedDelivery->execution_status);

        LeaveCriticalSection(&ConsoleCritSec);

}


//============================================================================
//
// Function name: UtilPrintStockLevel
//
//============================================================================

void UtilPrintStockLevel(STOCK_LEVEL_DATA *pStockLevel)
```

```
{

#ifdef DEBUG
    printf("[%ld]DBG: Entering UtilPrintStockLevel()\n", (int) GetCurrentThreadId());
#endif

            EnterCriticalSection(&ConsoleCritSec);

            printf("\n[%04ld]\tStock-Level Transaction\n\n", (int) GetCurrentThreadId());

            printf("Warehouse: %ld\nDistrict: %ld\n",
                                (int) pStockLevel->w_id,
                                (int) pStockLevel->d_id);

            printf("Stock Level Threshold: %ld\n\n", (int) pStockLevel->thresh_hold);

            printf("Low Stock Count: %ld\n\n", (int) pStockLevel->low_stock);

            printf("Execution Status: %s\n\n", (char *) pStockLevel->execution_status);

            LeaveCriticalSection(&ConsoleCritSec);
}

//============================================================================
//
// Function name: UtilError
//
//============================================================================
void UtilError(long threadid, char * header, char *msg)
{

#ifdef DEBUG
    printf("[%ld]DBG: Entering UtilError()\n", (int) GetCurrentThreadId());
#endif

    printf("[%ld] %s: %s\n", (int) threadid, header, msg);
}


//============================================================================
//
// Function name: UtilFatalError
//
//============================================================================

void UtilFatalError(long threadid, char * header, char *msg)
{

#ifdef DEBUG
    printf("[%ld]DBG: Entering UtilFatalError()\n", (int) GetCurrentThreadId());
#endif

    printf("[Thread: %ld]... %s: %s\n", (int) threadid, header, msg);
    exit(-1);
}


//============================================================================
//
// Function name: UtilStrCpy
//
//============================================================================
void UtilStrCpy(char * pDest, char * pSrc, int n)
{

#ifdef DEBUG
    printf("[%ld]DBG: Entering UtilStrCpy()\n", (int) GetCurrentThreadId());
#endif

    strncpy(pDest, pSrc, n);
    pDest[n] = '\0';
}


#ifdef USE_CONMON
//============================================================================
//
// Function name: WriteConsoleString
//
//============================================================================
void WriteConsoleString(HANDLE hConMon, char *str, short x, short y, short color, BOOL pa
{
            COORD   dwWriteCoord = {0, 0};
            DWORD   cCharsWritten;
            LPVOID  dummy;
            int     len, i;

#ifdef DEBUG
    printf("[%ld]DBG: Entering WriteConsoleString()\n", (int) GetCurrentThreadId());
#endif

            dwWriteCoord.X = x;
            dwWriteCoord.Y = y;

            if (pad)
            {
```

```
                len = strlen(str);
                if (len < CON_LINE_SIZE)
                {
                        for(i=1;i<CON_LINE_SIZE-len;i++)
                        {
                                strcat(str," ");
                        }
                }
        }

        EnterCriticalSection(&ConsoleCritSec);

        switch (color)
  {
                case YELLOW:
                        SetConsoleTextAttribute(hConMon,
                                FOREGROUND_INTENSITY |
FOREGROUND_GREEN | FOREGROUND_RED | BACKGROUND_BLUE);
                break;

                case RED:
                        SetConsoleTextAttribute(hConMon,
                                FOREGROUND_INTENSITY |
FOREGROUND_RED | BACKGROUND_BLUE);
                break;

                case GREEN:
                        SetConsoleTextAttribute(hConMon,
                                FOREGROUND_INTENSITY |
FOREGROUND_GREEN | BACKGROUND_BLUE);
                        break;
  }

        SetConsoleCursorPosition(hConMon, dwWriteCoord);
        WriteConsole(hConMon, str, strlen(str), &cCharsWritten, dummy);

        LeaveCriticalSection(&ConsoleCritSec);

}
#endif


//============================================================================
//
// Function name: AddDeliveryQueueNode
//
//============================================================================
BOOL AddDeliveryQueueNode(DELIVERY_PTR node_to_add)
{

        DELIVERY_PTR    local_node;
#ifdef DEBUG
        DELIVERY_PTR    ptrtmp;
        short           i;
#endif

        EnterCriticalSection(&QueuedDeliveryCritSec);

        if ((local_node = malloc(sizeof(struct delivery_node)) ) == NULL)
        {
                printf("ERROR:  problem allocating memory for delivery queue.\n");
                exit(-1);
        }
        else
        {
                memcpy(local_node, node_to_add, sizeof (struct delivery_node));

                if (queued_delivery_cnt == 0)
                {
                        delivery_head = local_node;
                        delivery_head->next_delivery = NULL;
                        delivery_tail = delivery_head;
                }
                else
                {
                        local_node->next_delivery = NULL;
                        delivery_tail->next_delivery = local_node;
                        delivery_tail = local_node;
                }
        }

        queued_delivery_cnt++;

#ifdef DEBUG
        i=0;
        printf("Add to delivery list: %ld\n",queued_delivery_cnt);
        ptrtmp=delivery_head;
        while (ptrtmp != NULL)
        {
                i++;
                printf("%ld - w_id %ld - o_carrier_id %ld - queue_time %d/%d/%d
%d:%d:%d:%d\n",
                                        i, ptrtmp->w_id, ptrtmp->o_carrier_id,
                                        ptrtmp->queue_time.wMonth,
                                        ptrtmp->queue_time.wDay,
```

```
                                        ptrtmp->queue_time.wYear,
                                        ptrtmp->queue_time.wHour,
                                        ptrtmp->queue_time.wMinute,
                                        ptrtmp->queue_time.wSecond,
                                        ptrtmp->queue_time.wMilliseconds);

                ptrtmp=ptrtmp->next_delivery;
        }
#endif

        LeaveCriticalSection(&QueuedDeliveryCritSec);

   return TRUE;

}


//=============================================================================
//
// Function name: GetDeliveryQueueNode
//
//=============================================================================

BOOL GetDeliveryQueueNode(DELIVERY_PTR node_to_get)
{

        DELIVERY_PTR            local_node;
        BOOL                    rc;
#ifdef DEBUG
        DELIVERY_PTR            ptrtmp;
        short                   i;
#endif

        EnterCriticalSection(&QueuedDeliveryCritSec);

        if (queued_delivery_cnt == 0)
        {

#ifdef DEBUG
                printf("No delivery nodes found.\n");
#endif
                rc = FALSE;
        }
        else
        {

                memcpy(node_to_get, delivery_head, sizeof(struct delivery_node));

                if (queued_delivery_cnt == 1)
                {
                        free(delivery_head);
                        delivery_head = NULL;
                        queued_delivery_cnt = 0;
                }
                else
                {
                        local_node = delivery_head;
                        delivery_head = delivery_head->next_delivery;
                        free(local_node);
                        queued_delivery_cnt--;
                }

#ifdef DEBUG
                i=0;
                printf("Get from delivery list: %ld\n",queued_delivery_cnt);
                ptrtmp=delivery_head;
                while (ptrtmp != NULL)
                {
                        i++;
                        printf("%ld - w_id %ld - o_carrier_id %ld - queue_time
%d/%d/%d %d:%d:%d:%d\n",
                                        i, ptrtmp->w_id, ptrtmp->o_carrier_id,
                                        ptrtmp->queue_time.wMonth,
                                        ptrtmp->queue_time.wDay,
                                        ptrtmp->queue_time.wYear,
                                        ptrtmp->queue_time.wHour,
                                        ptrtmp->queue_time.wMinute,
                                        ptrtmp->queue_time.wSecond,
                                        ptrtmp->queue_time.wMilliseconds);

                        ptrtmp=ptrtmp->next_delivery;
                }
#endif

                rc = TRUE;

        }

        LeaveCriticalSection(&QueuedDeliveryCritSec);

   return rc;

}


//=============================================================================
```

```
//
// Function name: WriteDeliveryString
//
//============================================================================

void WriteDeliveryString(char   buf[255])
{

        DWORD   bytesWritten;
        DWORD   retCode;

#ifdef DEBUG
   printf("[%ld]DBG: Entering UtilDeliveryMsg()\n", (int) GetCurrentThreadId());
#endif

        EnterCriticalSection(&WriteDeliveryCritSec);

   retCode = WriteFile (hDeliveryMonPipe, buf, PLEASE_WRITE,
                        &bytesWritten, NULL);

        LeaveCriticalSection(&WriteDeliveryCritSec);

}
```

Appendix C Benchcraft RTE Configuration

Profile: 1098

File Path: C:\bench106\1098.pro

Version: 1.0.1

Number of Engines: 9

Name: DRIVER1
Description: herbert driver engine
Directory: c:\benchcrf\logs\bench.log
Machine: HERBERT
Parameter Set: spec3.3
Index: 0
Seed: 87043
Configured Users: 1220
Pipe Name: DRIVER11562454610
Connect Rate: 200
Start Rate: 0
CLIENT_NURAND: 233
CPU: 0

Name: DRIVER2
Description: Hill driver engine
Directory: c:\benchcrf\logs\bench.log
Machine: HILL
Parameter Set: spec3.3
Index: 100000
Seed: 87043
Configured Users: 1220
Pipe Name: DRIVER21562509179
Connect Rate: 200
Start Rate: 0
CLIENT_NURAND: 233
CPU: 0

Name: DRIVER3
Description: Prost driver engine
Directory: c:\benchcrf\logs\bench.log
Machine: PROST
Parameter Set: spec3.3
Index: 200000
Seed: 87043
Configured Users: 1220
Pipe Name: DRIVER31562544880
Connect Rate: 200
Start Rate: 0
CLIENT_NURAND: 233
CPU: 0

Name: DRIVER4
Description: Dunlop driver engine
Directory: c:\benchcrf\logs\bench.log
Machine: DUNLOP
Parameter Set: spec3.3
Index: 300000
Seed: 87043
Configured Users: 1220
Pipe Name: DRIVER41562629512
Connect Rate: 200
Start Rate: 0
CLIENT_NURAND: 233
CPU: 0

Name: DRIVER5
Description: Senna driver engine
Directory: c:\benchcrf\logs\bench.log
Machine: SENNA
Parameter Set: spec3.3
Index: 400000
Seed: 87043
Configured Users: 1220
Pipe Name: DRIVER5252107451
Connect Rate: 200
Start Rate: 0
CLIENT_NURAND: 233
CPU: 0

Name: DRIVER6
Description: Senna number2
Directory: c:\benchcrf\logs\bench2.log
Machine: SENNA
Parameter Set: spec3.3
Index: 500000
Seed: 87043
Configured Users: 1220
Pipe Name: DRIVER65114684
Connect Rate: 200
Start Rate: 0
CLIENT_NURAND: 233
CPU: 0

Name: DRIVER7

Description: prost2
Directory: c:\benchcrf\logs\bench2.log
Machine: PROST
Parameter Set: spec3.3
Index: 600000
Seed: 87043
Configured Users: 1220
Pipe Name: DRIVER731455801
Connect Rate: 200
Start Rate: 0
CLIENT_NURAND: 233
CPU: 0

Name: DRIVER8
Description: Dunlop 2
Directory: c:\benchcrf\logs\bench2.log
Machine: DUNLOP
Parameter Set: spec3.3
Index: 700000
Seed: 87043
Configured Users: 1220
Pipe Name: DRIVER831518661
Connect Rate: 200
Start Rate: 0
CLIENT_NURAND: 233
CPU: 0

Name: DRIVER9
Description: Hill 2
Directory: c:\benchcrf\logs\bench2.log
Machine: HILL
Parameter Set: spec3.3
Index: 800000
Seed: 87043
Configured Users: 1220
Pipe Name: DRIVER921968018
Connect Rate: 200
Start Rate: 0
CLIENT_NURAND: 233
CPU: 0

Number of User groups: 9

Driver Engine: DRIVER1
IIS Server: FLESH
SQL Server: garbage
User: sa
Protocol: Html
w_id Range: 1 - 122
w_id Max Warehouse: 1098
Scale: Normal
User Count: 1220
District id: 1
Scale Down: No

Driver Engine: DRIVER2
IIS Server: COFFEE
SQL Server: garbage
User: sa
Protocol: Html
w_id Range: 123 - 244
w_id Max Warehouse: 1098
Scale: Normal
User Count: 1220
District id: 1
Scale Down: No

Driver Engine: DRIVER3
IIS Server: HAPPY
SQL Server: garbage
User: sa
Protocol: Html
w_id Range: 245 - 366
w_id Max Warehouse: 1098
Scale: Normal
User Count: 1220
District id: 1
Scale Down: No

Driver Engine: DRIVER4
IIS Server: TEA
SQL Server: garbage
User: sa
Protocol: Html
w_id Range: 367 - 488
w_id Max Warehouse: 1098
Scale: Normal
User Count: 1220
District id: 1
Scale Down: No

Driver Engine: DRIVER5
IIS Server: BEER
SQL Server: garbage
User: sa
Protocol: Html

w_id Range: 489 - 610
w_id Max Warehouse: 1098
Scale: Normal
User Count: 1220
District id: 1
Scale Down: No

Driver Engine: DRIVER6
IIS Server: COLA
SQL Server: garbage
User: sa
Protocol: Html
w_id Range: 611 - 732
w_id Max Warehouse:1098
Scale: Normal
User Count: 1220
District id: 1
Scale Down: No

Driver Engine: DRIVER7
IIS Server: booze
SQL Server: garbage
User: sa
Protocol: Html
w_id Range: 733 - 854
w_id Max Warehouse: 1098
Scale: Normal
User Count: 1220
District id: 1
Scale Down: No

Driver Engine: DRIVER8
IIS Server: vodka
SQL Server: garbage
User: sa
Protocol: Html
w_id Range: 855 - 976
w_id Max Warehouse: 1098
Scale: Normal
User Count: 1220
District id: 1
Scale Down: No

Driver Engine: DRIVER9
IIS Server: METHS
SQL Server: garbage
User: sa
Protocol: Html
w_id Range: 977 - 1098
w_id Max Warehouse: 1098
Scale: Normal
User Count: 1220
District id: 1
Scale Down: No

Number of Parameter Sets: 2

~Default
Default Parameter Set

	Txn Weight	Think Time	Key Time	RT Delay	RT Fence	Menu Delay	
New Order	10.00			12.05	18.01	0.10	5.00
	0.10						
Payment	10.00			12.05	3.01	0.10	5.00
	0.10						
Delivery	1.00	5.05		2.01	0.10	5.00	0.10
Stock Level	1.00			5.05	2.01	0.10	20.00
	0.10						
Order Status	1.00			10.05	2.01	0.10	5.00
	0.10						

spec3.3
tpcc spec version 33 transaction mix

	Txn Weight	Think Time	Key Time	RT Delay	RT Fence	Menu Delay	
New Order	44.50			12.10	18.01	0.10	5.00
	0.10						
Payment	43.20			12.10	3.01	0.10	5.00
	0.10						
Delivery	4.10	5.10		2.01	0.10	5.00	0.10
Stock Level	4.10			5.05	2.01	0.10	20.00
	0.10						
Order Status	4.10			10.20	2.01	0.10	5.00
	0.10						

Appendix D Tunable Parameters

D.1 Microsoft Windows NT Server 4.0

[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\MSSQLServer\MSSQLServer\Parameters]

"SQLArg0"="-dC:\\MSSQL\\DATA\\MASTER.DAT"
"SQLArg1"="-eC:\\MSSQL\\LOG\\ERRORLOG"

D.2 Microsoft Windows NT Client 4.0

[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\TPCC]
"PATH"="C:\\InetPub\\wwwroot\\"
"LOG"="OFF"
"NumberOfDeliveryThreads"="30"
"MaximumWarehouses"="1010"
"BackoffDelay"="500"
"DeadlockRetry"="3"
"MaxConnections"="2000"
"QueueSlotts"="3000"
"ConnectionPooling"="OFF"
"ConnectionPoolRetryTime"="500"
"LastInstalledVersion"="DBLIB"
"DEBUG"="OFF"

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\InetInfo]

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\InetInfo\Parameters]
"BandwidthLevel"=dword:ffffffff
"ListenBackLog"=dword:00000800
"PoolThreadsLimit"=dword:00000100
"ThreadTimeout"=dword:00015180
"PoolThreadLimit"=dword:00000100

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\InetInfo\Parameters\Filter]
"FilterType"=dword:00000000
"NumGrantSites"=dword:00000000
"NumDenySites"=dword:00000000

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\InetInfo\Parameters\Mime
]
"text/html,htm,,h"=""
"image/gif,gif,,g"=""
"image/jpeg,jpg,,:"=""
"text/plain,txt,,0"=""
"text/html,html,,h"=""
"image/jpeg,jpeg,,:"=""
"image/jpeg,jpe,,:"=""
"image/bmp,bmp,,:"=""
"application/octet-stream,*,,5"=""
"application/pdf,pdf,,5"=""
"application/octet-stream,bin,,5"=""
"application/oda,oda,,5"=""
"application/zip,zip,,9"=""
"application/rtf,rtf,,5"=""
"application/postscript,ps,,5"=""
"application/postscript,ai,,5"=""
"application/postscript,eps,,5"=""
"application/mac-binhex40,hqx,,4"=""
"application/msword,doc,,5"=""
"application/msword,dot,,5"=""
"application/winhlp,hlp,,5"=""
"video/mpeg,mpeg,,:"=""
"video/mpeg,mpg,,:"=""
"video/mpeg,mpe,,:"=""
"video/x-msvideo,avi,,<"=""
"video/quicktime,qt,,:"=""
"video/quicktime,mov,,:"=""
"video/x-sgi-movie,movie,,<"=""
"x-world/x-vrml,wrl,,5"=""
"x-world/x-vrml,xaf,,5"=""
"x-world/x-vrml,xof,,5"=""
"x-world/x-vrml,flr,,5"=""
"x-world/x-vrml,wrz,,5"=""
"application/x-director,dcr,,5"=""
"application/x-director,dir,,5"=""
"application/x-director,dxr,,5"=""
"image/cis-cod,cod,,5"=""
"image/x-cmx,cmx,,5"=""
"application/envoy,evy,,5"=""
"application/x-msaccess,mdb,,5"=""
"application/x-mscardfile,crd,,5"=""
"application/x-msclip,clp,,5"=""
"application/octet-stream,exe,,5"=""
"application/x-msexcel,xla,,5"=""
"application/x-msexcel,xlc,,5"=""
"application/x-msexcel,xlm,,5"=""

```
"application/x-msexcel,xls,,5"=""
"application/x-msexcel,xlt,,5"=""
"application/x-msexcel,xlw,,5"=""
"application/x-msmediaview,m13,,5"=""
"application/x-msmediaview,m14,,5"=""
"application/x-msmoney,mny,,5"=""
"application/x-mspowerpoint,ppt,,5"=""
"application/x-msproject,mpp,,5"=""
"application/x-mspublisher,pub,,5"=""
"application/x-msterminal,trm,,5"=""
"application/x-msworks,wks,,5"=""
"application/x-mswrite,wri,,5"=""
"application/x-msmetafile,wmf,,5"=""
"application/x-csh,csh,,5"=""
"application/x-dvi,dvi,,5"=""
"application/x-hdf,hdf,,5"=""
"application/x-latex,latex,,5"=""
"application/x-netcdf,nc,,5"=""
"application/x-netcdf,cdf,,5"=""
"application/x-sh,sh,,5"=""
"application/x-tcl,tcl,,5"=""
"application/x-tex,tex,,5"=""
"application/x-texinfo,texinfo,,5"=""
"application/x-texinfo,texi,,5"=""
"application/x-troff,t,,5"=""
"application/x-troff,tr,,5"=""
"application/x-troff,roff,,5"=""
"application/x-troff-man,man,,5"=""
"application/x-troff-me,me,,5"=""
"application/x-troff-ms,ms,,5"=""
"application/x-wais-source,src,,7"=""
"application/x-bcpio,bcpio,,5"=""
"application/x-cpio,cpio,,5"=""
"application/x-gtar,gtar,,9"=""
"application/x-shar,shar,,5"=""
"application/x-sv4cpio,sv4cpio,,5"=""
"application/x-sv4crc,sv4crc,,5"=""
"application/x-tar,tar,,5"=""
"application/x-ustar,ustar,,5"=""
"audio/basic,au,,<"=""
"audio/basic,snd,,<"=""
"audio/x-aiff,aif,,<"=""
"audio/x-aiff,aiff,,<"=""
"audio/x-aiff,aifc,,<"=""
"audio/x-wav,wav,,<"=""
"audio/x-pn-realaudio,ram,,<"=""
"image/ief,ief,,:"=""
"image/tiff,tiff,,:"=""
"image/tiff,tif,,:"=""
"image/x-cmu-raster,ras,,:"=""
"image/x-portable-anymap,pnm,,:"=""
"image/x-portable-bitmap,pbm,,:"=""
"image/x-portable-graymap,pgm,,:"=""
"image/x-portable-pixmap,ppm,,:"=""
"image/x-rgb,rgb,,:"=""
"image/x-xbitmap,xbm,,:"=""
"image/x-xpixmap,xpm,,:"=""
"image/x-xwindowdump,xwd,,:"=""
"text/html,stm,,h"=""
"text/plain,bas,,0"=""
"text/plain,c,,0"=""
"text/plain,h,,0"=""
"text/richtext,rtx,,0"=""
"text/tab-separated-values,tsv,,0"=""
"text/x-setext,etx,,0"=""
"application/x-perfmon,pmc,,5"=""
"application/x-perfmon,pma,,5"=""
"application/x-perfmon,pmr,,5"=""
"application/x-perfmon,pml,,5"=""
"application/x-perfmon,pmw,,5"=""


[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\InetInfo\Performance]
"Library"="infoctrs.DLL"
"Open"="OpenINFOPerformanceData"
"Close"="CloseINFOPerformanceData"
"Collect"="CollectINFOPerformanceData"
"Last Counter"=dword:00000756
"Last Help"=dword:00000757
"First Counter"=dword:00000738
"First Help"=dword:00000739


[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC]
"Type"=dword:00000020
"Start"=dword:00000002
"ErrorControl"=dword:00000000
"ImagePath"=hex(2):43,3a,5c,57,49,4e,4e,54,5c,53,79,73,74,65,6d,33,32,5c,69,6e,\
  65,74,73,72,76,5c,69,6e,65,74,69,6e,66,6f,2e,65,78,65,00
"DisplayName"="World Wide Web Publishing Service"
"DependOnService"=hex(7):52,50,43,53,53,00,4e,54,4c,4d,53,53,50,00,00
"DependOnGroup"=hex(7):00
"ObjectName"="LocalSystem"


[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\HTMLA]
```

```
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\Parameters]
"MajorVersion"=dword:00000002
"MinorVersion"=dword:00000000
"AdminName"="Administrator"
"AdminEmail"="Admin@corp.com"
"MaxConnections"=dword:000186a0
"LogType"=dword:00000000
"LogFileDirectory"=hex(2):25,53,79,73,74,65,6d,52,6f,6f,74,25,5c,53,79,73,74,\
  65,6d,33,32,5c,4c,6f,67,46,69,6c,65,73,00
"LogFileTruncateSize"=dword:01388000
"LogFilePeriod"=dword:00000001
"LogFileFormat"=dword:00000000
"LogSqlDataSource"="HTTPLOG"
"LogSqlTableName"="Internetlog"
"LogSqlUserName"="InternetAdmin"
"LogSqlPassword"="sqllog"
"Authorization"=dword:00000005
"AnonymousUserName"="IUSR_BEER"
"Default Load File"="Default.htm"
"Dir Browse Control"=dword:4000001e
"CheckForWAISDB"=dword:00000000
"CacheExtensions"=dword:00000001
"GlobalExpire"=dword:ffffffff
"ServerSideIncludesEnabled"=dword:00000001
"ServerSideIncludesExtension"=".stm"
"DebugFlags"=dword:00000008
"ScriptTimeout"=dword:00000384
"ConnectionTimeOut"=dword:00000a8c
"InstallPath"="C:\\WINNT\\System32\\inetsrv"
"SecurePort"=dword:000001bb
"Filter DLLs"="C:\\WINNT\\System32\\inetsrv\\sspifilt.dll"
"AccessDeniedMessage"="Error: Access is Denied."
"NTAuthenticationProviders"="NTLM"
"AcceptExOutstanding"=dword:00000800
"ServerComment"=""


[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\Parameters\Deny IP
List]

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\Parameters\Grant IP
List]

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\Parameters\Script
Map]
".idc"="C:\\WINNT\\System32\\inetsrv\\httpodbc.dll"

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\Parameters\Virtua
Roots]
"/,"="C:\\InetPub\\wwwroot,,5"
"/Scripts,"="C:\\InetPub\\scripts,,4"
"/iisadmin,"="C:\\WINNT\\System32\\inetsrv\\iisadmin,,1"


[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\Performance]
"Library"="w3ctrs.DLL"
"Open"="OpenW3PerformanceData"
"Close"="CloseW3PerformanceData"
"Collect"="CollectW3PerformanceData"
"Last Counter"=dword:00000790
"Last Help"=dword:00000791
"First Counter"=dword:00000758
"First Help"=dword:00000759

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\Security]
"Security"=hex:01,00,14,80,c0,00,00,00,cc,00,00,00,14,00,00,00,34,00,00,00,02,\
  00,20,00,01,00,00,00,02,80,18,00,ff,01,0f,00,01,01,00,00,00,00,00,01,00,00,\
  00,00,20,02,00,00,02,00,8c,00,05,00,00,00,00,00,18,00,8d,01,02,00,01,01,00,\
  00,00,00,00,01,00,00,00,00,74,00,73,00,00,00,1c,00,fd,01,02,00,01,02,00,00,\
  00,00,00,05,20,00,00,00,23,02,00,00,76,00,63,00,00,00,1c,00,ff,01,0f,00,01,\
  02,00,00,00,00,00,05,20,00,00,00,20,02,00,00,76,00,63,00,00,00,1c,00,ff,01,\
  0f,00,01,02,00,00,00,00,00,05,20,00,00,00,25,02,00,00,76,00,63,00,00,00,18,\
  00,fd,01,02,00,01,01,00,00,00,00,00,05,12,00,00,00,25,02,00,00,01,01,00,00,\
  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\W3SAMP]

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\Enum]
"0"="Root\\LEGACY_W3SVC\\0000"
"Count"=dword:00000001
"NextInstance"=dword:00000001
```

D.3 Tuxedo Configuration

```
*RESOURCES

IPCKEY 133133



MAXACCESSERS 500

MAXSERVERS 50

MAXSERVICES 50

MODEL SHM

MASTER tpcc

LDBAL Y
SCANUNIT 15
BLOCKTIME 60
BBLQUERY 60

*MACHINES
DEFAULT:

"COFFEE" LMID= tpcc
        TUXDIR="C:\tuxedo"
        APPDIR="C:\InetPub\wwwroot"
        TUXCONFIG="C:\InetPub\wwwroot\tuxconfig"
        ULOGPFX="C:\InetPub\wwwroot\ULOG"
        TYPE="WinNT"
        UID= 0
        GID= 0

*GROUPS
GROUPNO
        LMID=tpcc GRPNO=1 OPENINFO=NONE

GROUPPAY
        LMID=tpcc GRPNO=2 OPENINFO=NONE

GROUPOS
        LMID=tpcc GRPNO=3 OPENINFO=NONE

GROUPSL
        LMID=tpcc GRPNO=4 OPENINFO=NONE

GROUPDEL
        LMID=tpcc GRPNO=5 OPENINFO=NONE

*SERVERS
DEFAULT:

neworder SRVGRP=GROUPNO
        SRVID=100
        MIN=16 MAX=20
        CLOPT="-A -- -Sgarbage"
        RQADDR=newq REPLYQ=Y

payment SRVGRP=GROUPPAY
        SRVID=200
        MIN=11 MAX=15
        CLOPT="-A -- -Sgarbage"
        RQADDR=payq REPLYQ=Y

orderstatus SRVGRP=GROUPOS
        SRVID=300
        MIN=4 MAX=5
        CLOPT="-A -- -Sgarbage"
        RQADDR=ordq REPLYQ=Y

stocklevel SRVGRP=GROUPSL
        SRVID=400
        MIN=6 MAX=10
        CLOPT="-A -- -Sgarbage"
        RQADDR=stkq REPLYQ=Y

delivery SRVGRP=GROUPDEL
        SRVID=500
        MIN=3 MAX=5
        CLOPT="-A -- -Sgarbage -F"
        RQADDR=delq REPLYQ=N


*SERVICES
```

D.4 Microsoft SQL Server 6.5 Parameters

name	minimum	maximum	config_value	run_value
affinity mask	0	2147483647	63	63
allow updates	0	1	1	1
backup buffer size	1	32	1	1
backup threads	0	32	5	5
cursor threshold	-1	2147483647	-1	-1
database size	2	10000	2	2
default language	0	9999	0	0
default sortorder id	0	255	50	50
fill factor	0	100	0	0
free buffers	20	524288	4000	4000
hash buckets	4999	16777216	749011	749011
language in cache	3	100	3	3
LE threshold maximum	2	500000	301	301
LE threshold minimum	2	500000	20	20
LE threshold percent	1	100	0	0
locks	5000	2147483647	5000	5000
LogLRU buffers	0	2147483647	2100	2100
logwrite sleep (ms)	-1	500	-1	-1
max async IO	1	1024	25	25
max lazywrite IO	1	1024	100	100
max text repl size	0	2147483647	65536	65536
max worker threads	10	1024	180	180
media retention	0	365	0	0
memory	2800	1048576	900000	900000
nested triggers	0	1	1	1
network packet size	512	32767	4096	4096
open databases	5	32767	20	20
open objects	100	2147483647	500	500
priority boost	0	1	0	0
procedure cache	1	99	2	2
Protection cache size	1	8192	15	15
RA cache hit limit	1	255	4	4
RA cache miss limit	1	255	3	3
RA delay	0	500	15	15
RA pre-fetches	1	1000	3	3
RA slots per thread	1	255	5	5
RA worker threads	0	255	0	0
recovery flags	0	1	0	0
recovery interval	1	32767	32767	32767
remote access	0	1	0	0
remote conn timeout	-1	32767	10	10
remote login timeout	0	2147483647	5	5
remote proc trans	0	1	0	0
remote query timeout	0	2147483647	0	0
remote sites	0	256	0	0
resource timeout	5	2147483647	10	10
set working set size	0	1	0	0
show advanced options	0	1	1	1
SMP concurrency	-1	64	-1	-1
sort pages	64	511	64	64
spin counter	1	2147483647	10000	10000
tempdb in ram (MB)	0	2044	5	5
time slice	50	1000	100	100
user connections	5	32767	370	370
user options	0	4095	0	0

D.5 Microsoft SQL Server 6.5 Startup Parameters

Configuration Parameters

No Windows NT Server Registry parameters were changed from their default settings.

The following services were stopped on the server and clinet machines:

Computer Browser, Licence Logging Service, Messenger, Net Logon, Plug and Play, RPC locator, Server, Spooler, TCP/IP NetBIOS helper.

Microsoft SQL Server Startup Parameters

C:\mssql\binn\sqlservr –c –x –t1081 –T812 –T3502 –T1140 –Cd1440000 –Cp4500

The above parameters where:

-c Start SQL Server independently of the Service Control Manager
-x This disables the keeping of the CPU time and cache hit ratio statistics
-t1081 Allows the index pages to travel through the cache a second time
-T812 This disablesthe checkpoint buffer sorting
-T3502 Writes a message to the SQL Server Errorlog showing the beginning and ending tim each checkpoint
-T1140 Optimizes the free space allocation
-Cd1440000 Defines 2KB of database cache buffers
-Cp4500 Defines a number of buffers to be used by the procedure cache

Microsoft Server Stack Size

Microsoft SQL Server 6.5 Enterprize Edition default stack size was changed when using the EDITBIN utility.

The EDITBIN utility is available with Microsoft Visual C++ V4.0 and the command used to change the stack size is editbin /S: 65536 sqlservr.exe

The above command editbin /S: 65536 sqlservr.exe can be found as an article in the Microsoft Knowledge Base on the Microsoft Web Site at www.microsoft.com/support

The DBCC GAMINIT

After execution of the benchmark, the following script was run to proactively to populate the Global Allocation Map (GAM) rather than allowing it to be populated on a as needed basis.

```
Use tpcc
go
dbcc gaminit
go
```

The above commands are an article in the Microsoft Knowledge Base on the Microsoft Web Site www.microsoft.com/support

Cache'Column of Sysobjects Table

Before the execution of the benchmark, the following script was used and SQL Server was restarted to improve the cache performance of tables which are accessed non-uniformly. Us this feature is documented as an article in the Microsoft Knowledge Base on the Microsoft W Site at www.microsoft.com/support

```
use  tpcc
go
update sysobjects set cache=2 from sysobjects where name = 'stock'
go
update sysobjects set cache=5 from sysobjects where name = 'customer'
go
```

BOOT.INI

In the Boot.ini file "/3gb" switch was added to allow the use of 3GB of user and 1GB of kernel virtual address space to be used rather than the usual 2GB.

Appendix F Third Party Letters

11/21/97

BEA ENTERPRISE MIDDLEWARE SOLUTIONS

November 20, 1997

Mr. D. A. Howarth
FUJITSU ICL Computers Ltd.,
Lovelace Road, Bracknell, Berkshire,
England RG12 8SN

Dear Mr. Howarth;

Per your request I am enclosing the pricing information regarding TUXEDO 6.x that you requested. This pricing applies to Tuxedo 6.1, 6.2 and 6.3. Please note that Tuxedo 6.3 is our most recent version of Tuxedo but that all 6.x releases are generally available. Core functionality services pricing is appropriate for your activities. As per the table below the FUJITSU system is classified as either a Tier 1 or Tier 2 server depending on this CPU Capacity of the system. If the CPU capacity is 2 CPUs then the system is a tier 1 system. If the CPU capacity is 4 CPUs then the systems is a tier 2 system.

Tuxedo Core Functionality Services (CFS) Program Product Pricing and Description

TUX CFS is a limited function product from BEA that offers a subset of TUXEDO 6.3/6.2/6.1 capabilities. The following standard 6.x features ARE NOT AVAILABLE WITH TUX-Core AND CANNOT BE SUPPORTED BY TUX-Core:

1. /WS
2. /Q
3. /COBOL
4. /DCE
5. Transaction
6. Events
7. DOMAINS
8. Admin API
9. ACLs (Access Control List security option)
10. Link Level Encryption
11. Web Browser GUI Admin

TUX-CFS provides a basic level of middleware support for distributed computing, and is best used by organizations with substantial resources and knowledge for advanced distributed computing implementations.

TUX-CFS prices are server only and are based on the overall performance characteristics of the server and uses the same five tier computer classification as TUXEDO 6.3. Prices range from $3,000 for Tier 1 to $250,000 for Tier 5. Under this pricing option EVERY system running TUX-CFS at the user site must have a TUXEDO license installed and pay the appropriate per server license fees.

11/21/97 FRI 13:10 FAX [illegible]

10/31/97 BEA SYSTEMS, INC.

BEA Tux/CFS Unlimited User License Fees Per Server

Unlimited User License fees per server	Number of Users	Dollar Amount	Maintenance (5 x 8) per year	Maintenance (7 x 24) per year
Tier 1 -- PC Servers with 1 or 2 CPUs, entry level RISC Uni-processor workstations and servers (Class 1and Class 2)	Unlimited	$3,000.00	$450.00	$660.00
Tier 2 - PC Servers with 3 or 4 CPUs, Midrange RISC Uni-processor servers and workstations (class 3)	Unlimited	$12,000.00	$1,800.00	$2,640.00
Tier 3 - Midrange Multiprocessors, up to 8 CPUs per system capacity (Class 4 and 5)	Unlimited	$30,000.00	$4,500.00	$6,600.00
Tier 4 - Large (more than 8, less than 32 CPUs) and Mainframe Systems (Class 6)	Unlimited	$100,000.00	$15,000.00	$22,000.00
Tier 5 - Massively Parallel Systems, > 32 processors	Unlimited	$250,000.00	$37,500.00	$55,000.00

Intel based server tier classifications:

		Tier 1	Tier 1	Tier 2	Tier 3	Tier 3
Platform	**Operating System**	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**
Intel Pentium/ Pentium Pro PCs	Interactive R3.2 ESIX SVR 4.0 SCO UNIX 3.2.2 and 3.2.4 SCO ODT 2.x,3.x Solaris x86 2.X UnixWare, Windows NT 3.5/4.0	All 386/486 PCs are Class 1	ALL Pentium and Pentium Pro PCs with 1 or 2 CPUs capacity are Tier 1	ALL Pentium and Pentium Pro PCs with 3 or 4 CPUs capacity are Tier 2		ALL Pentium and Pentium Pro PCs with 5,6,7, or 8 CPUs are Tier 3

Very Truly Yours,

Lewis D. Brentano,
Director Market Planning

10100 Santa Fe Drive, Suite 203, Overland Park, KS 66212

Fax

To: Ronnie Chow **From:** Josen Ruiseco, Manager - Cyberstore Division

Fax: +44 1344 472060 **Pages:** 1 (including cover sheet)

Phone: +44 1344 472697 **Date:** February 5, 1998

Re: Price Quote **CC:** N/A

☐ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

• **Comments:**

Compex MicroHub MX1205 100TX, 5 Port Hub

Each Unit $166.77 x4 units= $747.08

Compex MicroHub /8 10 bt hub 8 RJ45 1BNC Stackable

Each Unit $34.42 x1515 units= $52,631.10

TOTAL **$53,378.18 - Cash Price** (Check, Cashier's Check, Wire Transfer)

Shipping to Customs - NO CHARGE

TOTAL **$55,513.31 - Credit Card Price**

Thank you for the opportunity to give you a quote. If you find a better price, we would like to try to beat it. It has been a pleasure serving you.

voice 913.385.3888.x114 fax 913.385.3360 www.netsales.net josen@netsales.net

Microsoft Corporation
One Microsoft Way
Redmond, WA 98052-6399

Tel 425 882 8080
Telex 160520
Fax 425 936 7329

Microsoft

February 6, 1998

Mr. David Howarth
Performance Benchmarking Manager
Servers Division
Fujitsu ICL Computers Ltd.
Lovelace Road, Bracknell, Berkshire
England RG12 8SN

via FAX 44 1344 473000

Dear Dave,

Here is the information you requested regarding US pricing of certain Microsoft products:

Microsoft SQL Server, Enterprise Edition 6.5, unlimited user license	$38999
Microsoft Windows NT Server, Enterprise Edition 4.0, incl 25 CALs	$3999
Windows NT Server 4.0, incl 5 CALs	$809
Microsoft SQL Workstation (includes programmers toolkit)	$499
Visual C++ 32-bit edition (subscription)	$499
5-yr maintenance for above software @ $2095/yr	$10475

This quote is valid for the next 60 days. Please let me know if I can be of any further assistance.

Best regards,

Sid Arora
Product Manager, Microsoft SQL Server
Personal and Business Systems Group

Microsoft Corporation is an equal opportunity employer.