E-BUSINESS APPLICATIONS 11*i* (11.5.10) BENCHMARK -USING ORACLE10*g* ON IBM SYSTEM X3850 SERVERS

As a global leader in e-business applications, Oracle is committed to delivering high performance solutions that meet our customers' expectations. Business software must deliver rich functionality with robust performance. This performance must be maintained at volumes that are representative of customer environments.

Oracle benchmarks demonstrate our software's performance characteristics for a range of processing volumes in a specific configuration. Customers and prospects can use this information to determine the software, hardware, and network configurations necessary to support their processing volumes.

The primary objective of our benchmarking effort is to provide as many data points as possible to support this important decision.

SUMMARY OF RESULTS

Online Workload		
Number of Users	**Avg. Resp. (Sec)**	**90th Percentile Response Time (Sec)**
1000 Concurrent Users	0.582	1.217
Batch Workload		
Order-to-Cash Batch	**Time (Min)**	**Hourly Order Line Throughput**
10,000 Order/Inv. Lines	34.60	17,341 Lines/Hour
Payroll Batch	**Time (Min)**	**Hourly Employee Throughput**
5,000 Employees	11.93	25,146 Checks/Hour

Note that the online users and the two batch workloads were running simultaneously and the hourly throughput numbers mentioned above are linear extrapolations. Many factors can influence performance and your results may differ.

BENCHMARK PROFILE

In May and June 2006, Oracle and IBM conducted a benchmark at the IBM System x Performance Lab in Research Triangle Park, NC to measure the online and batch performance of the Oracle Applications Standard Benchmark processes in an environment running Oracle E-Business Suite 11*i* (11.5.10) with Oracle10*g*™ (10.1.0.4) for Linux on an IBM System x database server running four dual-core, hyper-threaded processors and Red Hat® Enterprise Linux® Advanced Server release 3.0 Update 6. A second IBM System x3850 4-processor, dual-core server was used as an application/web

server. Two IBM TotalStorage® DS4500s were used for data storage.

The benchmark measured the online user response times and the Order Management and Payroll batch business process hourly throughputs for a small database model. Testing was conducted in a controlled environment with online users and the two batch processes running concurrently. **The goal of this Benchmark was to obtain reference response times and throughputs for Oracle E-Business Suite 11***i*** Benchmark on 4-processor[1] IBM System x servers.**
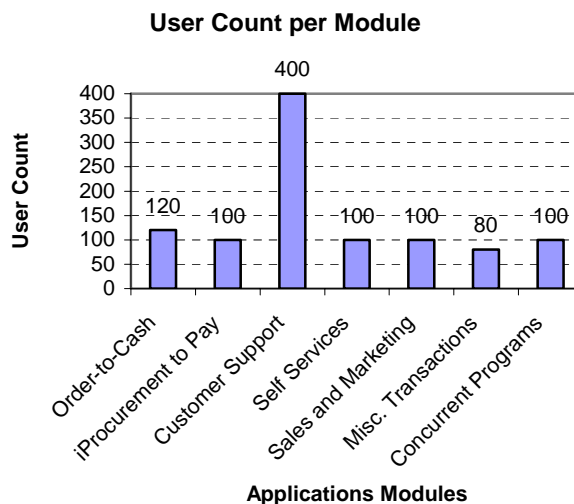
User Count per Module

Figure 1: Oracle eBS Benchmark Concurrent User Distribution
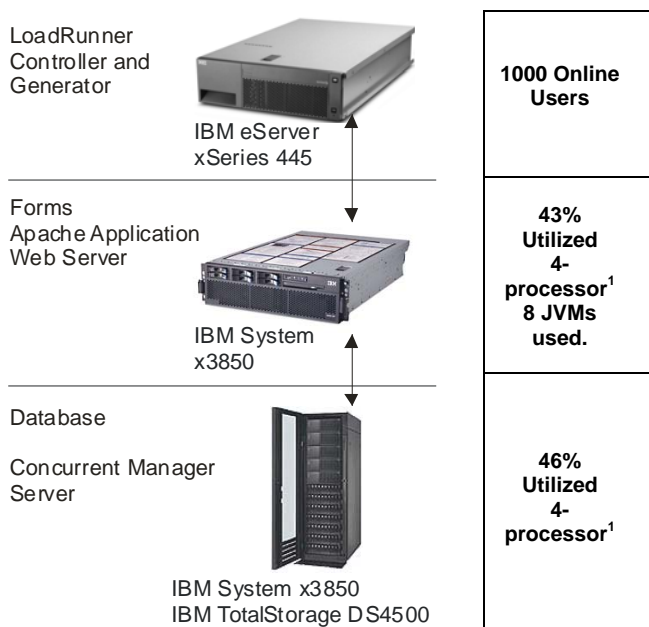
Benchmark Methodology

E-Business Suite 11*i* Benchmark 11.5.10 online and batch processes can be initiated from a browser. For this benchmark, all runs used a browser to initiate the online user transactions and the batch processes were initiated as concurrent programs running simultaneously with the online users.

The batch workloads were run as standard concurrent processes via the concurrent manager.

Mercury Interactive's LoadRunner® was used as the load driver, simulating concurrent users. It submitted transactions at an average rate of one every 2.5 – 10 minutes for each concurrent user.

Measurements were recorded on all of the servers when the user load was attained and the environment reached a steady state.

Figure 2 shows the configuration used for this benchmark run.

LoadRunner Controller and Generator	**1000 Online Users**
IBM eServer xSeries 445	
Forms Apache Application Web Server	**43% Utilized 4-processor[1] 8 JVMs used.**
IBM System x3850	
Database Concurrent Manager Server	**46% Utilized 4-processor[1]**
IBM System x3850 IBM TotalStorage DS4500	

Figure 2: 3-Tier Configuration

This benchmark was run as a "Physical" 3-Tier configuration with discrete machines hosting the Database and Application server instances.

BENCHMARK BUSINESS PROCESSES

The eBS benchmark consists of a mix of online transactions and batch processes running in parallel.

The following table describes the online transactions included in the benchmark run.

Oracle Application Product Flow	% within App.	% Overall	Pacing in Min
Order to Cash (10%)			
Create & Book Order	40	4	5
Pick Release	20	2	2.5
Ship Confirm / ITS	20	2	2.5
Receivables - Invoice	20	2	2.5
Procurement to Pay (10%)			
Create & Query Requisition	20	2	3
Auto-create & Approve PO	20	2	3
View Purchase Order	20	2	3
Create Invoice	20	2	3
Invoice Inquiry	20	2	3
Customer Service (40%)			
Create Service Request	40	16	4
Update Service Request	40	16	4
Close Service Request	20	8	4
Self Service (10%)			
Create & Query Cash Exp.	20	2	6
Create & Query Credit Card Expense	20	2	6
Create Project Timecard	30	3	6
View Employee Payslip	30	3	6
Sales & Marketing (10%)			
Sales Lead to Proposal	40	4	3
Opportunity to Quote	20	2	10
Sales Opportunity to Order	20	2	10
Opportunity to Sales Forecast	20	2	7.5
Miscellaneous Trans. (12%)			
AR View Customer Transact.	16.7	2	7.5
AR Customer Summary	16.7	2	7.5
FA Create & Query Asset	16.7	2	7.5
GL Create Journal Entry	16.7	2	7.5
INV View Item Attributes	16.7	2	7.5
INV Insert Misc. Transactions	16.7	2	7.5

Reports (8%)			
AR – Aging Report	25	2	15
INV – Min/Max Inventory Rep.	25	2	15
OM – Order Summary Report	25	2	15
PO – Printed PO Report	25	2	15
		100%	

Table 1: Online Transaction Mix

Batch Order-to-Cash Processes

Business Process	Number of Threads Used
High Vol. Order Proc.	2
Pick Release	2
Shipping Confirmation	2
ITS	2
Auto Invoice	1
Revenue Recognition	2
GL	1
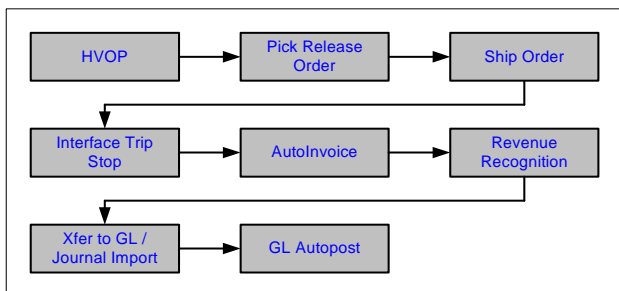
Figure 3: Order-to-Cash Process Flow

High Volume Order Processing (HVOP): The HVOP program processes orders by reading the rows from the Order Management Interface tables and converting the interface records into permanent order headers and their respective order lines. The orders are then booked and advanced to the shipping state.

Pick Release: Pick Release finds and release the eligible delivery lines that meet the release criteria, and creates move orders. The process of transacting move orders creates a reservation and determines the inventory source sub-inventory.

Ship Confirm: Ship Confirm is the process of confirming that items have shipped. When a delivery is ship-confirmed, Shipping Execution confirms that the delivery lines associated with the delivery have shipped.

Interface Trip Stop: The deliveries created in the previous step are then assigned to trips, which may involve multiple stops depending upon the shipping addresses of the

deliveries. SRS has been modified to accept Organization code as a parameter and process the trip stops for the specified organization. Interface Trip Stop - SRS has also been enhanced to spawn multiple child processes to process trip stops in parallel. The parameter Stops per Batch is used to specify the number of stops to be processed by each thread of the Interface Trip Stop - SRS. Interface Trip Stop - SRS has also been enhanced to defer the Inventory Interface processes. In the eBS kit, this profile is set to Yes so that the Inventory Interface transactions are processed in the background by the Inventory transaction manager.

INV Material: The material transaction manager is configured to execute material transaction by periodic concurrent request submissions. The execution interval is set to 20 minutes.

Auto-Invoice: The Auto-Invoice process is used to import invoices, credit memos, debit memos, and on–account credits. 'Receivables' ensures that the data imported is accurate and valid.

Revenue Recognition: Revenue Recognition program generates the revenue distribution records for the invoices and credit memos that use Invoicing and Accounting Rules. Accounting rules were assigned to recognize revenue over a 12-months accounting period. The Revenue Recognition program will create distribution records for the invoices and credit memos that are created in Receivables and imported using Auto-Invoice.

Transfer to General Ledger & Journal Import: The General Ledger Interface program transfers Receivables transaction accounting distributions to the general ledger interface table (GL_INTERFACE) and creates either detailed or summarized journal batches. "Receivables" creates un-posted journal entries in general ledger and executes Journal Import from Oracle General Ledger. It posts journal batches in Oracle General Ledger to update account balances.

General Ledger Auto-post: This posts journal batches to update the account balances of the detail and summary accounts. It can post actual budget or encumbrance journal batches.

Batch Payroll Processes

Business Process	Number of Threads Used
Payroll Process	4
PrePayments	4
NACHA	4
Check Writer	4
Costing	4
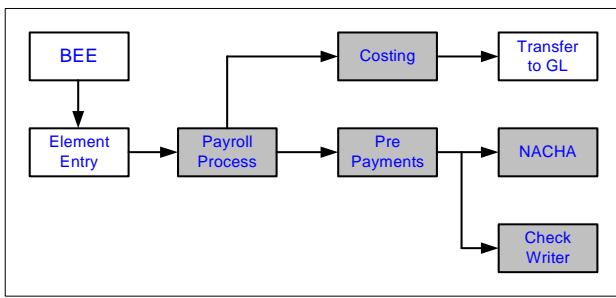
Figure 4: Payroll Process Flow

The Oracle E-Business Suite 11*i* Payroll processes tested are as follow:

Payroll Process: Identifies all employees to be processed and performs calculations required to complete the gross to net calculation including earnings, deductions, and taxes. The specific groups of employees processed can be controlled by multiple parameters to the payroll process including the ability for a user to define a rules based set of employees.

PrePayments: Distributes the net pay for each employee across the various payment methods (Direct Deposit, Check, or Cash). This can be run for a single payroll process or across multiple payroll processes.

NACHA: This is the US version of the Global Direct Deposit process which creates the bank interface file as per NACHA rules based on the rules in the Pre Payment process.

Check Writer: (Oracle Report Writer) This process allocates check numbers and creates/prints the payroll check and associated paper payslip.

Costing: This process associates the payroll transaction data with the General Ledger (GL) accounts in preparation for transfer of the data to GL. This process uses a sophisticated hierarchical rules based engine to determine the mapping of the HRMS data and payroll results to the GL accounts.

BENCHMARK RESULTS

Online Workload	Avg. Resp. (Sec)	90th Percentile Response Time in Seconds
1000 Concurrent Users	0.582	1.217
900 Concurrent Users	0.536	1.109
700 Concurrent Users	0.504	1.038

Table 1: Online Overall Response Times

Two checkpoints were completed during the measurement interval.
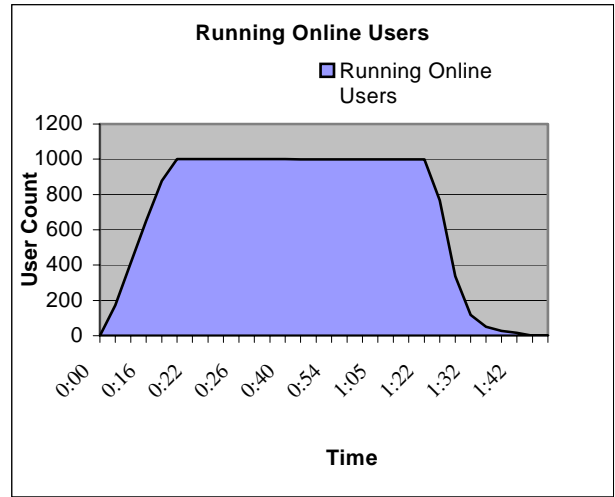
Business Metrics		Expected Output
Order to Cash		
Number of Orders Created/Booked		2,400
Number of Orders Picked		2,400
Number of Orders Ship Confirmed		2,400
Number of Orders Interface Trip Stopped		2,400
Number of Invoice Headers Created		2,400
Number of Invoice Lines Created		4,800
Procurement to Pay		
Number of Requisitions Created		400
Number of Purchase Orders Lines Created		2,000
Number of Purchase Orders Approved		400
Number of PO Invoices Created		382
Customer Support		
Number of Service Requests Created		2,399
Number of Service Requests Updated		2,400
Number of Service Requests Closed		1,199
Self-Service		
Number of Cash Expenses Created		392
Number of Credit Card Expenses Created		392
Number of Timecards Created		300
Sales & Marketing		

Number of Leads Converted to Proposal		800
Number of Leads Converted to Opportunities		800
Number of Opportunities Converted to Quotes		240
Number of Opportunities Converted to Orders		118
Miscellaneous Transactions		
Number of Fixed Assets Created		160
Number of GL Entries Created		1,600
Number of INV Miscellaneous Transactions Completed		800
Reports		
Number of GL Autoposts		59
Number of AR Reports		80
Number of INV Reports		80
Number of OM Reports		80
Number of PO Reports		80

Table 2a: Online Transactions Achieved Minimum Output

Customer Service						
Create Service Request	0.37	0.40	0.37	0.41	0.39	0.43
Update Service Request	0.29	0.38	0.31	0.40	0.34	0.41
Close Service Request	2.03	2.35	2.14	2.49	2.32	2.73
Self Service						
Create Cash Exp. Login	0.25	0.29	0.28	0.34	0.33	0.43
Submit Cash Exp.	0.64	0.72	0.66	0.76	0.79	0.99
Query Cash Exp.	0.34	0.40	0.42	0.46	0.47	0.59
Credit Card Expense Entry	0.27	0.26	0.30	0.29	0.31	0.32
Submit	0.75	0.84	0.81	0.95	0.90	1.07
Query Credit Card Expense	0.35	0.38	0.41	0.48	0.44	0.51
Create Project Timecard	0.23	0.29	0.24	0.29	0.27	0.34
View Employee Payslip	0.51	0.64	0.56	0.66	0.59	0.76

Table 2b: Detailed Online Transaction Response Times

	700 Users		900 Users		1000 Users	
	Avg.	90th%	Avg.	90th%	Avg.	90th%
Order to Cash						
Cr./Book Order	1.38	1.48	1.43	1.56	1.57	1.90
Pick Release	0.61	0.69	0.60	0.69	0.63	0.75
Ship Confirm	0.24	0.32	0.25	0.32	0.26	0.32
AR Insert Inv.	0.56	0.63	0.55	0.64	0.60	0.66
Procurement to Pay						
Checkout req.	0.35	0.40	0.42	0.49	0.45	0.51
Submit Rq Data	0.26	0.29	0.29	0.35	0.35	0.43
Query Req.	0.16	0.16	0.17	0.18	0.20	0.23
Auto-create PO	0.22	0.21	0.22	0.21	0.22	0.21
Approve PO	0.36	0.43	0.37	0.43	0.40	0.52
View Purchase Order Find	0.23	0.21	0.22	0.21	0.35	0.37
Lines	0.46	0.54	0.49	0.54	0.51	0.54
Shipments	0.44	0.48	0.44	0.43	0.45	0.43
Distributions	0.66	0.66	0.66	0.66	0.67	0.66
Create AP Inv.	0.36	0.34	0.34	0.43	0.41	0.43
Inv. Distribution	0.35	0.38	0.33	0.38	0.38	0.38
View AP Invoice Find	0.23	0.21	0.22	0.21	0.22	0.21
Overview	1.21	1.31	1.32	1.41	1.38	1.41
Distributions	0.27	0.29	0.31	0.34	0.32	0.35

	700 Users		900 Users		1000 Users	
	Avg.	90th%	Avg.	90th%	Avg.	90th%
Sales & Marketing						
Create Proposal	0.35	0.38	0.41	0.46	0.45	0.54
Create Quote	0.50	0.66	0.58	0.76	0.62	0.87
Place Order	1.35	1.79	1.28	1.82	1.31	1.76
Query Forecast	0.27	0.27	0.28	0.34	0.30	0.38
Query Forecast Details	0.15	0.16	0.16	0.19	0.21	0.23
Submit Forecast	0.50	0.44	0.43	0.52	0.48	0.61
Update Forecast	0.16	0.18	0.18	0.24	0.26	0.38
Update Forecast Details	0.46	0.44	0.48	0.58	0.48	0.64
Update quote	0.25	0.34	0.34	0.56	0.38	0.59
Miscellaneous Trans.						
AR View Cust. Transact. Find	0.81	0.87	0.88	0.98	0.97	1.09
Aging	0.28	0.32	0.29	0.32	0.31	0.32
Acct. Summary	0.22	0.21	0.22	0.21	0.26	0.31
Acct. Details 1	0.22	0.21	0.22	0.21	0.23	0.21
Acct. Details 2	0.88	0.98	1.01	0.98	1.02	1.20
Line Items	0.63	0.72	0.71	0.72	0.70	0.80

Tax	0.22	0.21	0.23	0.21	0.23	0.32
AR Cust. Sum. Open Address	0.22	0.21	0.22	0.21	0.22	0.21
Open 'Ship To'	0.22	0.21	0.22	0.21	0.22	0.21
FA Create	0.22	0.23	0.22	0.21	0.22	0.21
FA Query Asset	0.21	0.24	0.22	0.24	0.21	0.26
GL Create Journal Entry	0.24	0.35	0.26	0.38	0.29	0.41
GL Query J. E.	0.17	0.19	0.17	0.19	0.17	0.21
INV View Item Attributes	0.34	0.35	0.32	0.35	0.35	0.37
INV View Quant	0.22	0.21	0.22	0.21	0.23	0.21

Table 2b: Detailed Online Transaction Results

10,000 order lines were processed in this test. Tables 3-5 show the processing time in minutes.

10,000 Order Lines	Time (Min)	Order Lines per Hour
HVOP	3.72	161,290
Pick Release	5.12	117,187
Ship Confirm	0.98	612,244
ITS	4.75	126,315
Auto Invoice	3.83	156,657
Revenue Recognition	3.18	188,679
General Ledger	13.02	46.082
Totals:	34.60	17,341

Table 3: Order-to-Cash Batch Performance (1000 Users)

10,000 Order Lines	900 Users	700 Users
HVOP	3.25 Min.	2.98 Min.
Pick Release	5.08 Min.	4.77 Min.
Ship Confirm	0.93 Min.	0.82 Min.
ITS	4.30 Min.	4.00 Min.
Auto Invoice	4.55 Min.	3.88 Min.
Revenue Recognition	3.25 Min.	3.00 Min.
General Ledger	11.49 Min.	11.12 Min.
Totals:	32.85 Min.	30.57 Min.

Table 4: Order-to-Cash Batch Performance (900 and 700 Users)

5,000 employees were processed for the semi-monthly payroll in this test. Tables 6-8 show the processing time in minutes.

5,000 Employees	Time (Min)	Employees per Hour
Payroll Process	10.6	28,301
PrePayments	0.6	500,000
NACHA	0.03	10,000,000
Check Writer	0.2	1,500,000
Costing	0.5	600,000
Totals:	11.93	25,146

Table 6: Payroll Batch Performance (1000 Users)

5,000 Employees	900 Users	700 Users
Payroll Process	9.68 Min	9.43 Min
PrePayments	0.60 Min	0.55 Min
NACHA	0.05 Min	0.03 Min
Check Writer	0.15 Min	0.12 Min
Costing	0.57 Min	0.48 Min
Totals:	11.05 Min	10.61 Min

Table 7: Payroll Batch Performance (900 and 700 Users)

SERVER PERFORMANCE

Figure 4 shows the average CPU utilization for each process. The value shown is the average across the 4 processors in

Oracle e-Business Suite eBS Benchmark 11.5.10 using Oracle10*g* on IBM System x3850 Servers
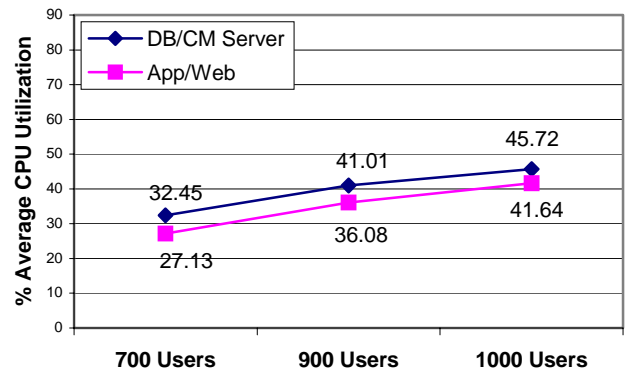
the database server and the 4 processors in the application server.

Figure 4: Average CPU Utilization

Each server scaled smoothly as users were added, keeping the batch load constant over the steady state period.

Online Workload		700 Users	900 Users	1000 Users
DB/CM Server CPU		32.5%	41.0%	45.7%
App/Web Server		27.1%	36.1%	42.6%

Table 9: Average CPU Utilization

Online Workload		700 Users	900 Users	1000 Users
DB/CM Server (32 GB)		19.6GB	20.8GB	20.9 GB
App/Web Server (32 GB)		21.5GB	25.9GB	26.7 GB

Table 10: Average Memory Utilization (Megabytes)

I/O PERFORMANCE

The fibre channel IBM TotalStorage® DS5400 disk arrays were used for storage. I/O performance is crucial to batch performance and is summarized as follows:

512 bytes blocks		700 Users	900 Users	1000 Users
Transfer Requests/Sec Avg.		217	265	282
Peak		908	884	951
Blocks Written/Sec Avg.		5,621	6,105	6,329
Peak		39,097	36,103	37,828
Blocks Read/Sec Avg.		679	789	848
Peak		3,798	3,384	4,544

Table 11: I/O Subsystem Metrics

DATA COMPOSITION DESCRIPTION

Major data components for the model under test are summarized in the following table.

Application	Business Objects	Small Model
TCA	Organizations	100,000
	Contacts	200,000
	Contact Points	200,000
	Accounts	100,000
	Account Sites	100,000
	Account Site Uses	200,000

Contracts	Contracts	20,000
Install Base	Instances	100,000
	Trackable Items	5
Items	Reserve - Items	100,000
HR	Managers	200
	Employees	5,000
	Payroll Users	5,000
	Users	5,000
	Credit Card Entries	5,000
	Supplier(s)	1,000
Assets	Asset Categories	100
General Ledger	GL Code Combinations	1,000
Sales & Marketing	Resources	3,601
	Resource Groups	400
	Resource Hierarchy Level(s)	4
	Sales Leads	100,000
	Campaigns	1
	Sales Territories	3,201

Table 12: Data Composition

PATCHES

The following patches were applied to the benchmark environment on top of Oracle Applications 11.5.10.

1. 4529484: SUBMIT EXPENSE PERFORMANCE ISSUE
2. 4058603: OIE.I ROLLUP PATCH #2
3. 4282785: PERFORMANCE: SERVICE REQUEST CREATION IS SLOW FROM THE SRTAB FROM CC
4. 4455883: POOR PERFORMANCE SEARCHING SEVICE REQUESTS
5. 4564212: AR AGING 4 BUCKET REPORT IS DOING FULL TABLE SCAN
6. 4345584: UNABLE TO ENTER A LINE IN SALES ORDER FORM
7. 4605076: EXCESSIVE EXECUTIONS FOR SPECIFIC PACKAGE
8. 4612749: BUG FIXES FOR CS: OCT-05 PATCH
9. 4756197: TOO MANY EXECUTIONS OF SELECT A.PERZ_DATA_ID, A.PROFILE_NAME...IN UPDATE
10. 4733725: BUG FIXES FOR CS: DEC 05 PATCH
11. 5068932: INV: EXCESSIVE PROFILE AND LOGGING CALLS IN PICK RELEASE
12. 4384590: BACKPORT FOR BUG# 4287370
13. 4699535: HIGH BUFFER GET SQL IN WSHINTERFACE.
14. JAVA.LANG.ARRAYINDEXOUTOFBOUNDSEXCEPTION WHILE CREATING QUOTATION

15. The 'View Payables Invoice – Overview' Loadrunner script was modified to close the invoice header and distribution windows for each user iteration.

APPLICATION SETTINGS

Database:

1. The database initialization parameters were set according to the MetaLink document 216205.1 "Database Initialization Parameters and Configuration for Oracle Applications 11i".

Order Management:

1. The profile option 'OM: Apply Automatic Attachments' was set to 'No'.
2. Price adjustment event at booking. "Book Order" was disabled.
3. The item identifier default type was changed to 'Internal Item Number'.
4. The setup parameters "Enable Freight Ratings" and "Enable Ship Method" were set to No.
5. Re-pricing was disabled at Book Order. 'Save Order Event' was disabled in the Pricing setup.
6. The profile option ONT_BYPASS_NOTIFY_OC was created and set to "Y".

Inventory:

1. The pick release rules was set to "Autocreate Deliveries".
2. Except 'serviceable items', all other items used in the benchmark were set as 'Non Trackable' through the Item Master form.

Tech. Stack Configuration:

1. In jserv.properties file the following properties were changed:
   # XML Gateway Parameters
   wrapper.bin.parameters=-DOXTALogDebugMsg=false
   # OA Framework
   wrapper.bin.parameters=-Djbo.323.compatible=true
   # JMS & WF
   wrapper.bin.parameters=-DLONG_RUNNING_JVM=true
   # STO
   wrapper.bin.parameters=-DCACHEMODE=DISTRIBUTED

Sales & Marketing:

1. Update 'Launch On Date' to current date if 3 months passed after Campaign Schedule created.
2. The profile options ASO: Calculate Price' and 'ASO: Calculate Tax' were set to "Manual"
3. The profile option 'ASO: Use Network Container' was set to 'No'.

Service:

1. Business event subscriptions were disabled.
2. For iSupport, the type of Alert bin was changed to Java.
   Content Source Type : Java Object
   Content Source Name: oracle.apps.ibu.homepage.AlertBinRenderer

Receivables:

1. The scheduled "General Ledger Transfer" concurrent program was cancelled.

Payroll:

1. CHUNCK_SIZE was set to 20 in PAY_ACTION_PARAMETERS table.

APPLICATION TUNING

1. Two additional indexes were created on table RA_CUSTOMER_TRX_LINES_ALL on columns interface_line_attribute1 and interface_line_attribute6

2. The index INV.MTL_ITEM_CATEGORIES_N3 was modified to have the columns in the following order.
   MTL_ITEM_CATEGORIES(CATEGORY_ID,CATEGORY_SET_ID,ORGANIZATION_ID)

3. The sequence cache size for the following indexes were set to 10000:

   INV.MTL_SALES_ORDERS_S,
   ONT.OE_MSG_ID_S,
   ONT.OE_SALES_CREDITS_S,
   MRP.MRP_AP_REFRESH_S,
   MRP.MRP_ATP_SCHEDULE_TEMP_S,
   WSH.WSH_DELIVERY_ASSIGNMENTS_S,
   WSH.WSH_DELIVERY_DETAILS_S

4. The snapshot logs were dropped on the following tables:
   INV.MTL_MATERIAL_TRANSACTIONS
   INV.MTL_RESERVATIONS
   INV.MTL_DEMAND
   OSM.AS_SALES_LEADS

5. The retention time of the following queues was set to 0:
   APPLSYS.WF_REPLAY_OUT
   APPLSYS.WF_REPLAY_IN
   APPLSYS.WF_IN
   APPLSYS.WF_OUT
   APPLSYS.WF_DEFERRED
   APPLSYS.WF_NOTIFICATION_IN
   APPLSYS.WF_NOTIFICATION_OUT
   APPLSYS.WF_JAVA_DEFERRED

6. Statistics were re-collected for index HZ_RELATIONSHIPS_N6

7. The index AR.RA_CUST_TRX_LINE_GL_DIST_N2 was dropped.

8. RA_CUST_TRX_LINE_GL_DIST_ALL table and index were moved to the tablespace, locally managed, uniform size 20M.

9. PAY_RUN_RESULTS, PAY_RUN_RESULT_VALUES tables and index were moved to the tablespace, locally managed, uniform size 20M.

BENCHMARK ENVIRONMENT

HARDWARE CONFIGURATION

Database/Batch/Concurrent Manager Server:

An IBM System x ^{TM} 3850 server was used as the batch/database/concurrent manager server. It was configured as follows:

- 4 x Dual Core Intel® Xeon® Processor 7040 (3.0GHz with 2 x 2MB L2 cache per Core). Hyperthreading was enabled in this configuration. With hyper-threading enabled, four dual-core CPUs acted like 16 logical CPUs.
- 32GB RAM
- Internal SAS drive
- 2 x QLogic QLA2312 Fibre Channel Adapters
- Approximately ~232GB of RAID-0 storage was configured in the SAN on two 20 drive LUNs for the database defined for this benchmark

Application Server:

An IBM System x ^{TM} 3850 server was used as the application/web server. It was configured as follows:

- 4 x Dual Core Intel® Xeon® Processor 7040 (3.0GHz with 2 x 2MB L2 cache per Core).

Hyperthreading was enabled in this configuration. With hyper-threading enabled, four dual-core CPUs acted like 16 logical CPUs.
- 32GB RAM
- Internal SAS drive
- 2 x QLogic QLA2312 Fibre Channel Adapters
- Approximately ~100GB of RAID-0 storage was configured in the SAN on a 20 drive LUN for the application server installation used in this benchmark.

Shared Storage:

A SAN was setup to be accessible by both database server and application server. It was configured as follows

- 2 x IBM TotalStorage ® DS4500 storage servers
- 12 x IBM TotalStorage ® DS4000 EXP710 Fibre Channel Storage Expansion Units
- 168 x 36GB FC drives
- 1 x IBM 2109-F16 SAN Fibre Channel Switch

SOFTWARE VERSIONS

Oracle's E-Business Suite (eBS Kit) 11.5.10

Oracle10g™ 10.1.0.4 (32-bit)

Red Hat Enterprise Linux® 3 (RHEL3) – Update 6 (kernel 2.4.21-37.ELsmp) for both database and application servers.

Mercury Interactive's LoadRunner® 8.0

Oracle HTTP Server Powered by Apache/1.3.19 with JServ 1.1.2

Java(TM) 2 Runtime Environment, Standard Edition (build 1.4.2_04-b05). Java HotSpot(TM) Client VM (build 1.4.2_04-b05, mixed mode)

Glossary and Acronyms:

ATP   Available to Promise

BEE   Batch Element Entries

HVOP   High Volume Order Processing

OASB   Oracle Applications Standard Benchmark

RAC   Real Applications Clusters

ORACLE