

# E-BUSINESS SUITE APPLICATIONS 11i (11.5.10) BENCHMARK - USING ORACLE10g RAC ON SGI ALTIX 450 AND ALTIX XE240 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)	90 <sup>th</sup> Percentile Response Time (Sec)
3,000 Concurrent Users	0.478	0.907
Batch Workload		
Order-to-Cash Batch	Time (Min)	Hourly Order Line Throughput
50,000 Order/Inv. Lines	38.88	77,160 Lines/Hour
Payroll Batch	Time (Min)	Hourly Employee Throughput
10,000 Employees	7.50	80,000 Empl./Hour

- 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.
- Both batch programs were running on DB node1 simultaneously along with the 16% of online users and the rest of the online users were running on DB node2.

## BENCHMARK PROFILE

In January 2008, Oracle and SGI conducted a benchmark in Mountain View, CA to measure the online and batch performance of the Oracle Applications Standard Benchmark processes in an environment running Oracle E-Business Suite 11i (11.5.10) with Oracle10g™ RAC (10.2.0.3) for the Linux® operating system on a pair of 8  
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Dual-Core processor (32 cores total for the RAC cluster) SGI® Altix™ 450 database servers running Red Hat® Enterprise Linux® AS 4.4 (64-bit) OS. Five 4-core and one 4-core SGI Altix XE240 servers were respectively used as Application/Web servers and Concurrent Manager server. An SGI IS4500 storage system was used for application data and log files.

The benchmark measured the online user response times and the Order Management and Payroll batch business process hourly throughputs for a medium 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 11i Benchmark on 2 SGI Altix servers running Oracle RAC (Real Application Clusters) on Linux.**

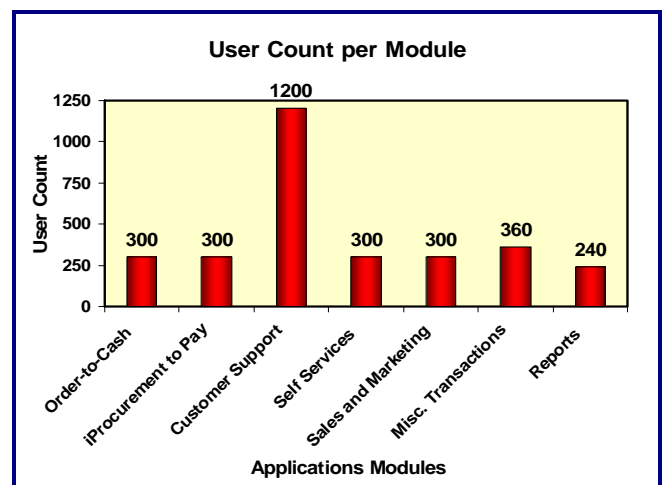


Figure 1: Oracle E-Business Suite Benchmark Concurrent User Distribution

## BENCHMARK METHODOLOGY

E-Business Suite 11i 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 on-line 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® LoadRunner® was used as the load driver, simulating concurrent users. It submitted transactions at an average rate of one every 2.5 – 15 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.

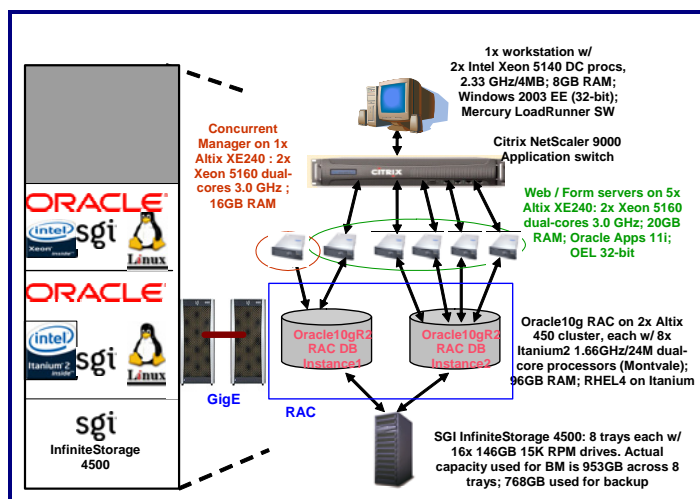


Figure 2: 3-Tier Configuration

This benchmark was run as a “Physical” 3-Tier configuration with discrete machines hosting all of the Database and Application server instances. The load across the multiple mid-tiers was balanced using a Citrix® NetScaler™ Application Switch 9000 platform device.

## BENCHMARK BUSINESS PROCESSES

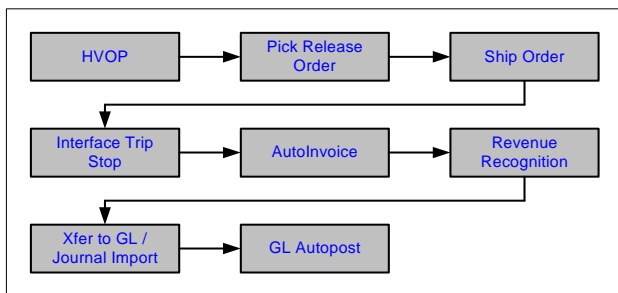
The eBS benchmark consists of a mix of on-line transactions and batch processes running in parallel. The following table describes the on-line transactions included in the benchmark run.

Oracle Application Product Flow	% within App.	% Overall	Pacing in Min
<b>Order to Cash (10%)</b>			
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
<b>Procurement to Pay (10%)</b>			
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
<b>Customer Service (40%)</b>			
Create Service Request	40	16	4
Update Service Request	40	16	4
Close Service Request	20	8	4
<b>Self Service (10%)</b>			
Create & Query Cash Exp.	20	2	6
Create & Query C. Card Exp.	20	2	6
Create Project Timecard	30	3	6
View Employee Payslip	30	3	6
<b>Sales &amp; Marketing (10%)</b>			
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
<b>Miscellaneous Trans. (12%)</b>			
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
<b>Reports (8%)</b>			
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.	12
Pick Release	8
Shipping Confirmation	8
ITS	8
Auto Invoice	8
Revenue Recognition	8
GL	8



**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.

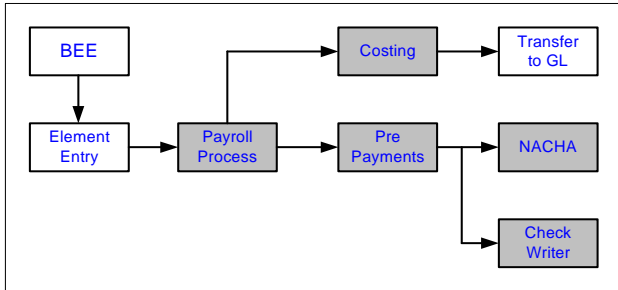
**Revenue Recognition:** Revenue Recognition program generates the revenue distribution records for the invoices and credit memos that use Invoicing and Accounting Rules. Accounting rules were assigned to recognize revenue over a 12-month accounting period. The Revenue Recognition program will create 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	8
PrePayments	8
NACHA	8
Check Writer	8
Costing	8



**Figure 4: Payroll Process Flow**

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

**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.

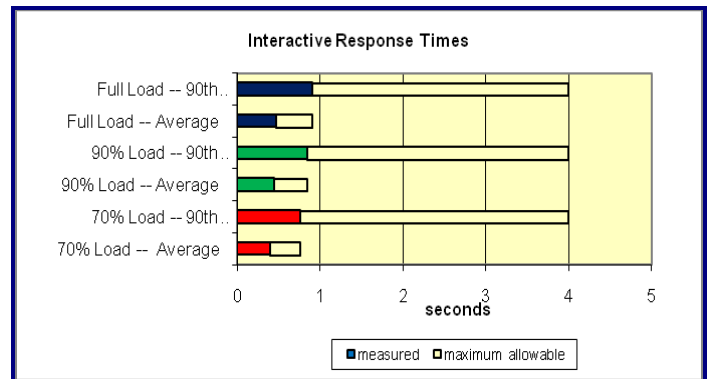
**Check Writer:** (Oracle Report Writer) This process allocates check numbers and creates/prints the payroll check and associated paper payslip.

**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**

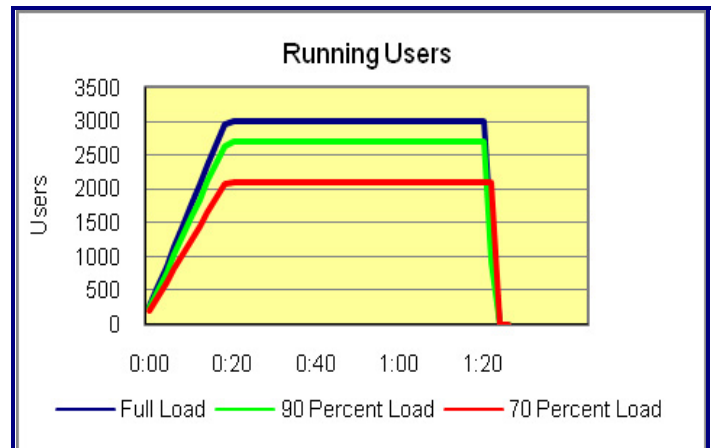
Online Workload	Avg. Resp. (Sec)	90 <sup>th</sup> Percentile Response Time in Seconds
3,000 Concurrent Users	0.478	0.907
2,700 Concurrent Users	0.447	0.854
2,100 Concurrent Users	0.406	0.763

**Table 2: Online Overall Response Times**



**Figure 5: Average Response Perspective**

Two checkpoints were completed during the measurement interval.



**Figure 6: User Load Over Time: 70% Load = 2,100 Users, 90% Load = 2,700 Users and 100% Load = 3,000 Users**

## BENCHMARK RESULTS CONTINUED

Batch Business Metrics	Achieved Output
<b>Order to Cash</b>	
Number of Order Lines Created/Booked	50,000
Number of Order Lines Picked	50,000
Number of Order Lines Ship Confirmed	50,000
Number of Order lines Interface Trip Stopped	50,000
Number of Invoice Headers Created	50,000
Number of Invoice Lines Created	100,000

**Table 3a: Batch Transactions Completed (3,000 Users)**

Online Business Metrics	Achieved Output
<b>Order to Cash</b>	
Number of Orders Created/Booked	7,335
Number of Orders Picked	7,195
Number of Orders Ship Confirmed	7,195
Number of Orders Interface Trip Stopped	7,125
Number of Invoice Headers Created	7,180
Number of Invoice Lines Created	14,360
<b>Procurement to Pay</b>	
Number of Requisitions Created	1,188
Number of Purchase Orders Created	5,957
Number of Purchase Orders Approved	5,957
Number of PO Invoices Created	1,200
<b>Customer Support</b>	
Number of Service Requests Created	7,197
Number of Service Requests Updated	7,682
Number of Service Requests Closed	3,597
<b>Self-Service</b>	
Number of Cash Expenses Created	1,193
Number of Credit Card Expenses Created	1,193
Number of Timecards Created	900
<b>Sales &amp; Marketing</b>	
Number of Leads Converted to Proposal	2,389
Number of Leads Converted to Opportunities	2,391
Number of Opportunities Converted to Quotes	720
Number of Opportunities Converted to Orders	360
<b>Miscellaneous Transactions</b>	
Number of Fixed Assets Created	480
Number of GL Entries Created	4,790
Number of INV Miscellaneous Transactions Completed	2,395
<b>Reports</b>	
Number of AR Reports	240
Number of INV Reports	241
Number of OM Reports	240
Number of PO Reports	242

**Table 3b: Online Transactions Completed (3,000 Users)**

	2,100 Users		2,700 Users		3,000 Users	
	Avg.	90 <sup>th</sup> %	Avg.	90 <sup>th</sup> %	Avg.	90 <sup>th</sup> %
<b>Order to Cash</b>						
Cr./Book Order	1.47	1.54	1.49	1.70	1.54	1.80
Pick Release	0.76	0.80	0.72	0.83	0.74	0.87
Ship Confirm	0.24	0.32	0.25	0.32	0.25	0.32
AR Insert Inv.	0.54	0.60	0.53	0.64	0.86	0.73
<b>Procurement to Pay</b>						
Checkout req.	0.38	0.49	0.43	0.59	0.54	0.82
Submit Rq Data	0.36	0.43	0.39	0.49	0.46	0.62
Query Req.	0.15	0.20	0.17	0.24	0.22	0.30
Auto-create PO	0.21	0.22	0.21	0.22	0.22	0.22
Approve PO	0.27	0.39	0.28	0.39	0.34	0.49
View Purchase Order Find	0.29	0.36	0.33	0.42	0.30	0.37
Lines	0.46	0.54	0.49	0.54	0.49	0.58
Shipments	0.43	0.43	0.45	0.51	0.44	0.52
Distributions	0.66	0.76	0.68	0.76	0.66	0.76
Create AP Inv.	0.34	0.43	0.36	0.43	0.39	0.43
Inv. Distribution	0.33	0.40	0.36	0.46	0.40	0.49
View AP Invoice Find	0.22	0.22	0.26	0.32	0.31	0.32
Overview	1.02	1.09	1.12	1.31	1.25	1.42
Distributions	0.20	0.23	0.22	0.26	0.25	0.31
<b>Customer Service</b>						
Create Service Request	0.38	0.45	0.45	0.53	0.43	0.54
Update Service Request	0.35	0.42	0.42	0.49	0.40	0.48
Close Service Request	1.01	1.22	1.24	1.63	1.24	1.59
<b>Self Service</b>						
Create Cash Exp. Login	0.43	0.54	0.43	0.54	0.53	0.69
Submit Cash Exp.	0.60	0.74	0.68	0.84	0.74	0.94
Credit Card Expense Entry	0.17	0.20	0.19	0.23	0.19	0.24
Submit	0.63	0.76	0.71	0.90	0.78	1.04
Query Credit Card Expense	0.36	0.44	0.41	0.51	0.44	0.58
Create Project Timecard	0.21	0.23	0.21	0.26	0.24	0.29
View Employee Payslip	0.43	0.51	0.46	0.55	0.50	0.61

**Table 4a: Detailed Online Transaction Response Times**

	2,100 Users		2,700 Users		3,000 Users	
	Avg.	90 <sup>th</sup> %	Avg.	90 <sup>th</sup> %	Avg.	90 <sup>th</sup> %
<b>Sales &amp; Marketing</b>						
Create Proposal	0.38	0.49	0.43	0.57	0.49	0.67
Create Quote	0.51	0.58	0.54	0.65	0.60	0.73
Update quote	0.22	0.26	0.25	0.31	0.27	0.34
Place Order	0.92	1.06	0.95	1.12	1.02	1.21
Query Forecast	0.20	0.26	0.23	0.31	0.27	0.37
Query Forecast Details	0.09	0.11	0.10	0.15	0.11	0.15
Submit Forecast	0.32	0.41	0.34	0.44	0.41	0.56
Update Forecast	0.08	0.09	0.08	0.11	0.09	0.13
Update Forecast Details	0.32	0.41	0.35	0.48	0.40	0.53
<b>Miscellaneous Trans.</b>						
AR Bill to Open	0.21	0.22	0.22	0.22	0.22	0.22
AR View Cust. Transact. Find	0.42	0.54	0.45	0.54	0.48	0.62
Aging	0.19	0.22	0.20	0.29	0.21	0.29
Acct. Summary	0.18	0.21	0.19	0.21	0.19	0.22
Acct. Details 1	0.19	0.22	0.20	0.22	0.20	0.24
Acct. Details 2	0.64	0.80	0.74	0.98	0.87	1.13
Line Items	0.48	0.60	0.56	0.70	0.68	0.83
Tax	0.19	0.22	0.22	0.30	0.24	0.32
Tr. Accounting	0.19	0.22	0.20	0.25	0.21	0.28
AR Cust. Sum. Open Address	0.21	0.22	0.22	0.22	0.22	0.21
Open 'Ship To'	0.22	0.22	0.22	0.22	0.22	0.22
FA Create	0.22	0.22	0.23	0.22	0.23	0.22
FA Query Asset	0.20	0.25	0.22	0.27	0.22	0.27
GL Create Journal Entry	0.23	0.34	0.24	0.35	0.26	0.37
GL Query J. E.	0.17	0.21	0.18	0.21	0.18	0.22
INV Insert	1.22	1.74	1.07	1.39	1.15	1.48
INV View Item Attributes	0.25	0.29	0.25	0.30	0.26	0.31
INV View Quant	0.23	0.24	0.22	0.22	0.22	0.21
Overall Avg.	0.41	0.76	0.45	0.85	0.48	0.91

**Table 4b: Detailed Online Transaction Response Times**

50,000 order lines were processed in this test. Tables 5-7 show the processing time in minutes.

50,000 Order Lines	Order	Time (Min)	Order Lines per Hour
HVOP		2.37	1,265,822.8
Pick Release		8.33	360,144.1
Ship Confirm		1.15	2,608,695.7
ITS		3.9	769,230.8
Auto Invoice		5.03	596,421.5
Revenue Recognition		6.73	445,765.2
General Ledger		5.5	545,454.5
Journal Import		2.2	1,363,636.4
Posting		3.67	817,438.7
<b>Totals:</b>		<b>38.88</b>	<b>77,160.5</b>

**Table 5: Order-to-Cash Batch Performance (3,000 Users)**

50,000 Order Lines	Order	Time (Min)	Order Lines per Hour
HVOP		2.35	1,276,595.7
Pick Release		8.3	361,445.8
Ship Confirm		1.17	2,564,102.6
ITS		4.03	744,416.9
Auto Invoice		4.93	608,519.3
Revenue Recognition		6.95	431,654.7
General Ledger		5.18	579,150.6
Journal Import		2.25	1,333,333.3
Posting		3.5	857,142.9
<b>Totals:</b>		<b>38.66</b>	<b>77,599.6</b>

**Table 6: Order-to-Cash Batch Performance (2,700 Users)**

50,000 Order Lines	Order	Time (Min)	Order Lines per Hour
HVOP		2.17	1,382,488.5
Pick Release		8.13	369,003.7
Ship Confirm		1.15	2,608,695.7
ITS		4.1	731,707.3
Auto Invoice		4.07	737,100.7
Revenue Recognition		6.77	443,131.5
General Ledger		5.07	591,716.0
Journal Import		2.15	1,395,348.8
Posting		3.12	961,538.5
<b>Totals:</b>		<b>36.73</b>	<b>81,677.1</b>

**Table 7: Order-to-Cash Batch Performance (2,100 Users)**

10,000 employees were processed for the semi-monthly payroll in this test. Tables 8-10 show the processing time in minutes.

10,000 Employees	Time (Min)	Employees per Hour
Payroll Process	5.70	105,263.2
PrePayments	0.50	1,200,000.0
NACHA	0.08	7,500,000.0
Check Writer	0.42	1,428,571.4
Costing	0.80	750,000.0
<b>Totals:</b>	<b>7.50</b>	<b>80,000.0</b>

**Table 8: Payroll Batch Performance (3,000 Users)**

10,000 Employees	Time (Min)	Employees per Hour
Payroll Process	5.52	108,695.7
PrePayments	0.50	1,200,000.0
NACHA	0.08	7,500,000.0
Check Writer	0.40	1,500,000.0
Costing	0.78	769,230.8
<b>Totals:</b>	<b>7.28</b>	<b>82,417.6</b>

**Table 9: Payroll Batch Performance (2,700 Users)**

10,000 Employees	Time (Min)	Employees per Hour
Payroll Process	5.45	110,091.7
PrePayments	0.50	1,200,000.0
NACHA	0.08	7,500,000.0
Check Writer	0.42	1,428,571.4
Costing	0.75	800,000.0
<b>Totals:</b>	<b>7.20</b>	<b>83,333.3</b>

**Table 10: Payroll Batch Performance (2,100 Users)**

## SERVER PERFORMANCE

Figure 7 shows the average CPU utilization on the Altix servers for 3,000 users. The value shown is the average across the sixteen processors (32 cores) in the two database server instances and the two processors (4 cores) in each of the five application servers and the Concurrent Manager server.

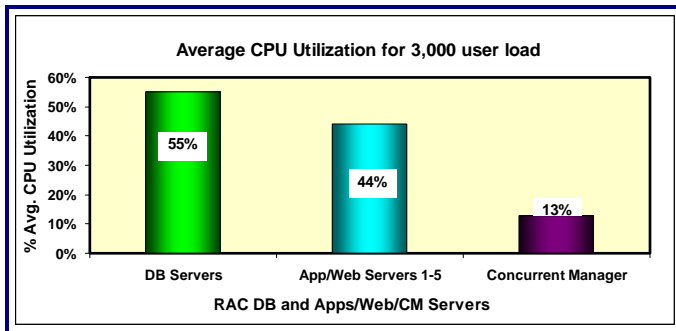


Figure 7: Average CPU Utilization

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

Online Workload	% User	% System	% I/O Wait	% Idle
DB1Server 100%	42.28	7.75	0.66	49.31
90%	41.50	7.22	0.64	50.64
70%	37.30	6.30	0.62	55.77
DB2Server 100%	47.87	8.76	1.26	42.10
90%	41.75	7.94	1.20	49.11
70%	31.96	6.35	1.14	60.56
App/Web 1 100%	37.49	4.14	0.64	57.73
90%	33.34	3.74	0.63	62.29
70%	25.94	2.94	0.68	70.44
App/Web 2 100%	38.78	4.18	0.59	56.46
90%	32.72	3.66	0.65	62.97
70%	25.86	2.89	0.69	70.56
App/Web 3 100%	37.51	4.14	0.74	57.62
90%	34.07	3.83	0.75	61.34
70%	25.84	2.93	0.83	70.41
App/Web 4 100%	37.62	4.16	0.71	57.51
90%	35.27	3.83	0.73	60.17
70%	26.33	2.93	0.83	69.91
App/Web 5 100%	42.67	4.08	0.67	52.57
90%	37.22	3.67	0.73	58.38
70%	28.64	2.88	0.80	67.68
CM Server 100%	10.57	1.07	0.94	87.42
90%	9.93	1.03	0.92	88.12
70%	8.71	0.93	0.85	89.50

Table 11: Average CPU Utilization Breakout

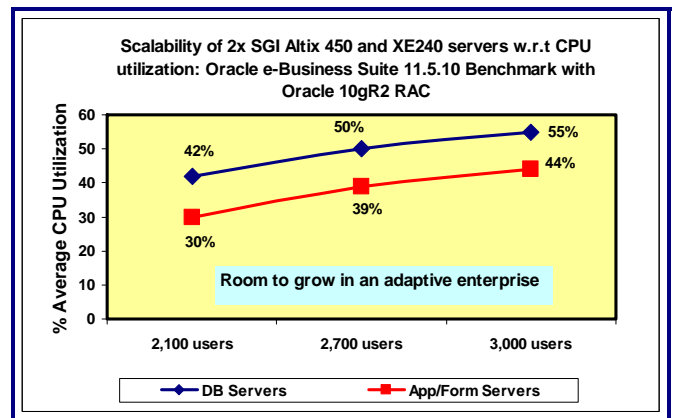


Figure 8: Server CPU Scalability

Figures 8 and 10 respectively show the CPU and memory scalability of Altix servers as the user load increases. Figure 9 shows the total memory usage on the Altix servers with varying numbers of users.

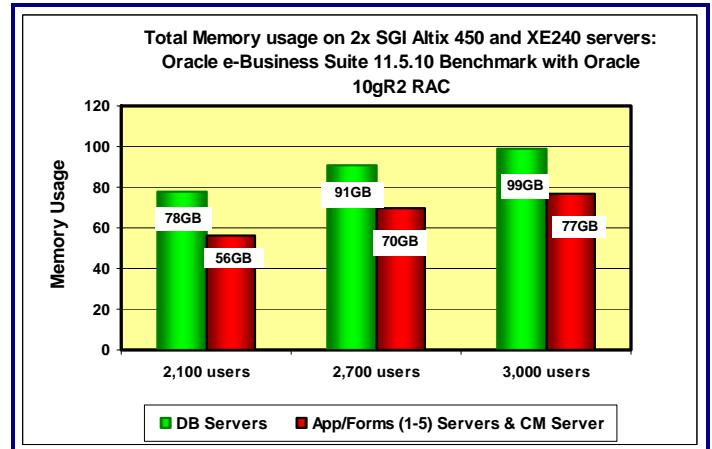


Figure 9: Total Memory Usage (Gigabytes)

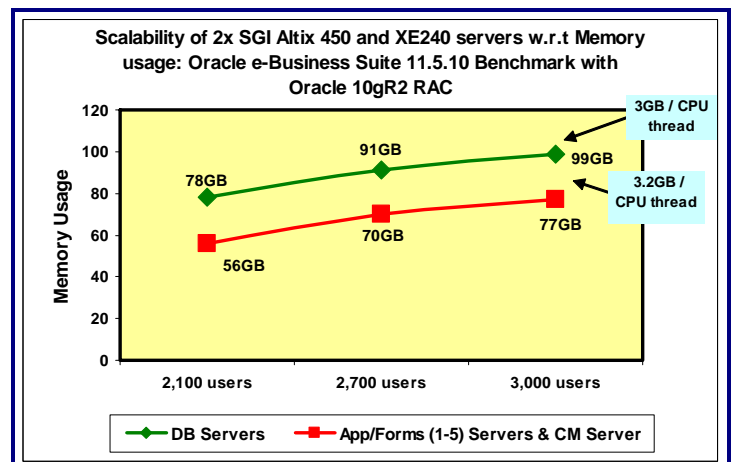


Figure 10: Server Memory Scalability

## SERVER PERFORMANCE CONTINUED

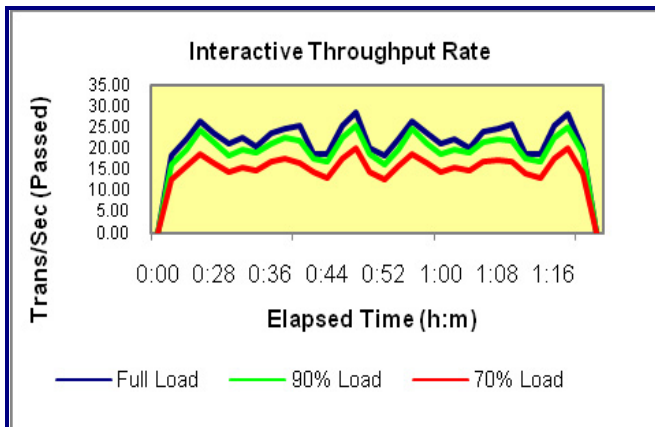


Figure 11: Server Interactive Throughput Rate

Figure 11 shows the interactive throughput rate of the Altix servers during the steady state period of the benchmark test as the user load increased from 2,100 to 2,700 and then to 3,000.

## I/O PERFORMANCE

An SGI IS4500 storage system equipped with eight disk trays was used as “shared” storage for the 2-node Altix cluster. The batch workload requires optimal I/O performance. Data and redo log files were striped across all eight trays. Efficiency of redo log management is crucial for this benchmark. A dedicated controller path was used for redo log files. The actual storage capacity, including backup, was 1.7 TB.

Figures 13, 14 and 15 respectively show the average reads and writes for data files and log files during the steady state period of the test with a 3,000-user load. Figure 12 shows the I/O scalability of an IS4500 storage system during the benchmark tests.

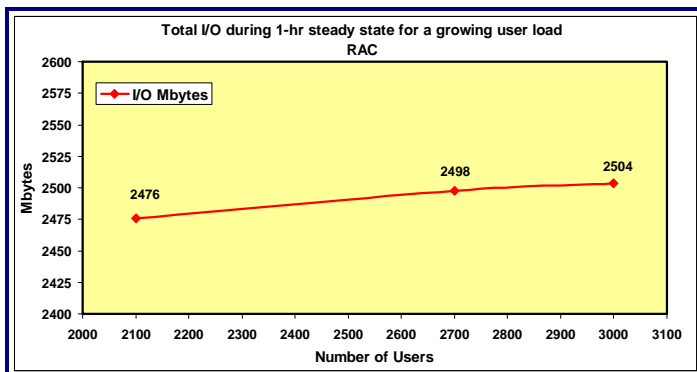


Figure 12: Storage System Scalability

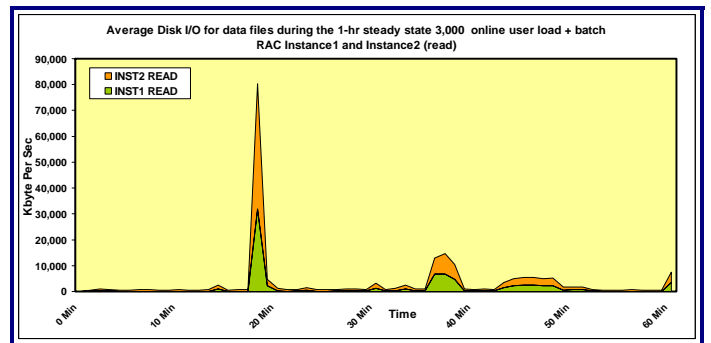


Figure 13: Average Disk I/O (reads) for Data Files during the Steady State period (3,000 Users)

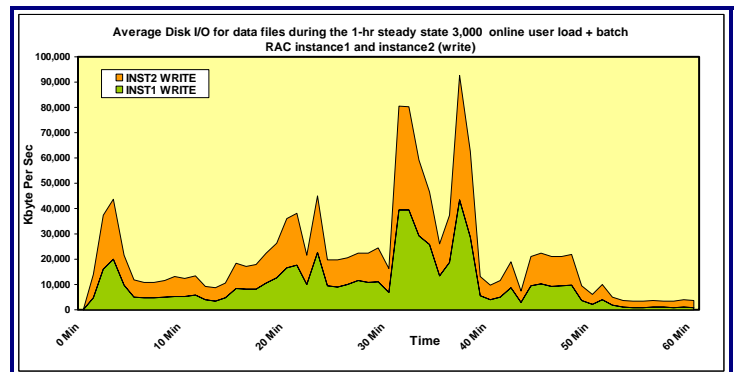


Figure 14: Average Disk I/O (writes) for Data Files during the Steady State period (3,000 Users)

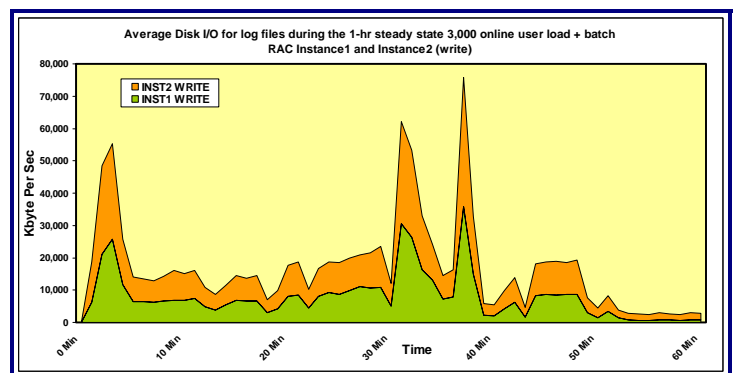


Figure 15: Average Disk I/O for Log Files during the Steady State period (3,000 Users)

## DATA COMPOSITION DESCRIPTION

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

Application	Business Objects	Medium Model
TCA	Organizations	500,000
	Contacts	1,000,000
	Contact Points	1,000,000
	Accounts	500,000
	Account Sites	500,000
	Account Site Uses	1,000,000
Contracts	Contracts	100,000
Install Base	Instances	500,000
	Trackable Items	5
Items	Reserve - Items	500,000
HR	Managers	400
	Employees	50,000
	Payroll Users	50,000
	Users	10,000
	Credit Card Entries	500,000
	Supplier(s)	5,000
Assets	Asset Categories	100
General Ledger	GL Code Combinations	1,000
Sales & Marketing	Resources	9,021
	Resource Groups	820
	Resource Hierarchy Level(s)	4
	Sales Leads	500,000
	Campaigns	1
	Sales Territories	8,201

**Table 12: Data Composition**

## PATCHES

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

Patch # 4529484	SUBMIT EXPENSE PERFORMANCE ISSUE
Patch# 4058603	TRACKING BUG FOR OIE.I RUP PATCH #2
Patch# 4016423	JSPWRITER KEEPING A REFERENCE TO SESSION OBJECT
Patch# 4282785	PERFORMANCE: SERVICE REQUEST CREATION IS SLOW FROM THE SRTAB FROM CC
Patch# 4455883	POOR PERFORMANCE SEARCHING SEVICE REQUESTS
Patch# 4564212	AR AGING 4 BUCKET REPORT IS DOING FULL TABLE SCAN
Patch# 4345584	UNABLE TO ENTER A LINE IN SALES ORDER FORM
Patch# 4605076	EXCESSIVE EXECUTIONS FOR SPECIFIC PACKAGE
Patch# 4612749	BUG FIXES FOR CS: OCT-05 PATCH
Patch# 4756197	TOO MANY EXECUTIONS OF SELECT A.PERZ_DATA_ID, A.PROFILE_NAME...IN UPDATE
Patch# 4733725	BUG FIXES FOR CS: DEC 05 PATCH
Patch# 5068932	INV: EXCESSIVE PROFILE AND LOGGING CALLS IN PICK RELEASE
Patch# 4384590	BACKPORT FOR BUG# 4287370
Patch# 4699535	BUFFER GET SQL IN WSHINTERFACE

**Table 13: Application Patches**

The following patches were applied to the benchmark environment on top of Oracle 10gR2 (10.2.03).

Patch# 5892355	ASSERT IN KOPEPIC THROWING 22635 INTERNAL ERROR NEEDS TO BE REMOVED
Patch# 5755471	ORA-00600 [22635], AT SYS.UPGRADE_SYSTEM_TYPE S_FROM_920 DURING UPGRADE
Patch# 5005469	NEED SCRIPT TO ASSIST WITH MIGRATION FROM KOREAN_LEXER TO KOREAN_MORPH_LEXER
Patch# 5390722	DB 10.2.0.1 INSTALLATION FAILS ON MONTECITO CHIP H/W (UNIVERSAL INSTALLER)
Patch# 5728380	STMAIL 2 PROCESSES SPIN ON INSERT STATEMENT
Patch# 5896963	PERF REGRESS LGWR KSLPSTEVENT
Patch# 5530583	UPDATE SLOW IF INDEXED FIELDS CHANGED AND INDEX ON ASSM

**Table 14: Database Patches**

## 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 were 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=false  
# STO  
wrapper.bin.parameters=-  
DCACHEMODE=LOCAL
2. jserv.conf  
ApJServVMTimeout set from 90 to 120
3. httpd.conf  
KeepAliveTimeout set to 45  
MaxSpareServers 25  
StartServers 10  
MaxClients 640
4. VIS\_appx.env:  
FORMS60\_TIMEOUT set from 5 to 60  
FND\_JDBC\_BUFFER\_MAX=12%

## APPLICATION SETTINGS CONTINUED

### 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. CHUNK\_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

## APPLICATION TUNING CONTINUED

7. The index  
AR.RA\_CUST\_TRX\_LINE\_GL\_DIST\_N2 was  
dropped.
8. RA\_CUST\_TRX\_LINE\_GL\_DIST\_ALL,  
GL\_INTERFACE, RA\_CUSTOMER\_TRX\_ALL,  
RA\_CUSTOMER\_TRX\_LINES\_ALL,  
GL\_IMPORT\_REFERENCES,  
GL\_JE\_HEADERS, GL\_JE\_LINES,  
MTL\_MATERIAL\_TRANSACTIONS,  
MTL\_RESERVATIONS,  
MTL\_ONHAND\_QUANTITIES\_DETAIL, tables  
and their index were moved to the tablespace,  
locally managed, uniform size 10M
9. PAY\_RUN\_RESULTS,  
PAY\_RUN\_RESULT\_VALUES tables and index  
were moved to the tablespace, locally managed,  
uniform size 20M.

## OTHER TUNING

1. Order to Cash batch and Payroll Batch were launched  
from db1 (which ties to app5 and CM).
2. The following online scripts were executed on app5  
which ties to db1:
  - OM order Pick Release
  - OM Ship Confirm
  - SS Create Query Requisition
  - Create Approve Purchase Order
  - AR aging Report
  - Inv Min Max Report
  - OM order summary report
  - PO printed Report

## OPERATING SYSTEM TUNING

1. Hugesmem option was enabled for database to have  
large pages.
2. The following lines were added to the  
/etc/security/limits.conf file:
  - soft nofile 130000
  - hard nofile 130000
  - soft nproc 20000
  - hard nproc 20000
  - oracle soft memlock 16777216
  - oracle hard memlock 16777216
3. The following kernel parameters were changed in  
the /etc/sysctl.conf file:
  - kernel.sem = 3010 385280 3010 128
  - kernel.shmax= 51539607552
  - kernel.shmall = 2097152
  - vm.nr\_hugepages=48

## BENCHMARK ENVIRONMENT

### HARDWARE CONFIGURATION

Two SGI Altix 450 servers were used as the batch/database server. Each system was equipped with the following:

- 8 × Dual-Core Intel® Itanium® Processor 9150 with 1.66 GHz, 667 MHz bus and 24 MB cache per socket.
- Total Memory: 96 GB
- Network: Gigabit full duplex.
- Cluster Interconnect: GigE
- Operating system: Red Hat Linux Advanced Server for Itanium AS 4.4
- For more details on SGI Altix 450 servers, please visit: <http://www.sgi.com/products/servers/altix/450>
- Storage: IS4500 with 8 trays of 2,336 GB each (Total ~18.6 Terabytes)(~953 GB used) with dual RAID controllers. One controller path was exclusively dedicated to the redo logs. Each tray has 16 physical disks, configured as RAID 0 raw. The storage was FC-attached and shared by both Altix 450 servers.
- For more details on SGI IS4500 Storage System, please visit: <http://www.sales.corp.sgi.com/products/storage/4500/>

#### *Application Servers:*

5 × SGI Altix XE240 Servers were used as application and web servers. Each system was equipped with the following:

- 2 × 3.0 GHz Dual-Core Intel® Xeon® 5160 processors, each with 4 MB of L2 Cache per socket
- Total Memory: 20 GB.
- Network: Gigabit full duplex.
- Operating system: Oracle® Enterprise Linux for Intel x86
- For more details on SGI Altix XE240 servers, please visit: <http://www.sgi.com/products/servers/altix/x>

#### *Concurrent Manager Server(s):*

1 × SGI Altix XE240 Server was used as a Concurrent Manager server. This system was equipped with the following:

- 2 × 3.0 GHz Dual-Core Intel® Xeon® 5160 processors, each with 4 MB of L2 Cache per socket
- Total Memory: 16 GB.

#### *Application Traffic Management Device(s):*

1 × Citrix® NetScaler™ Application Switch 9000 platform was used to distribute the LoadRunner traffic across the Web and application servers.

For more details on NetScaler 9000, please refer to: <http://www.citrix.com/English/ps2/products/product.asp?contentID=21679>

#### *Load Driver(s):*

1 × Dell® Precision 490 Mini-Tower workstation was used as a load driver. This system was equipped with the following:

- 2 × 2.33 GHz Dual-Core Intel® Xeon® 5140 processors, each with 4 MB of L2 Cache per socket
- Total Memory: 8 GB.

## SOFTWARE VERSIONS

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

Oracle10g™ 10.2.0.3 (64-bit)

Red Hat® Enterprise Linux® Advanced Server for Itanium AS 4.4

Mercury® LoadRunner® 8.0

For more details on Mercury's LoadRunner, please refer to <http://www.mercury.com/us/products/performance-center/loadrunner/>

Apache WebServer 1.3.19 with JServ 1.1.2

Java™ 2 Runtime Environment, Standard Edition (build 1.4.2). Classic VM (build 1.4.2, J2RE 1.4.2 (JIT enabled: jtc))

Citrix NetScaler NS7.0: Build 50.2, Date: Jan. 31, 2007

### 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



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