

E-BUSINESS SUITE APPLICATIONS R12 (FAMILY PACK C) PRODUCT INFORMATION MANAGEMENT (PIM) (120 MILLION ITEM RECORDS) BENCHMARK - USING ORACLE10g ON IBM System x3755 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

This batch/OLTP benchmark test was run on a 12-core server.

120 M Row DB	100 Users	200 Users
Weighted Response	1.32	1.41
Weighted Transactions/Second	83.51	80.71
Transactions/Hour	300,622	290,551

The benchmark measured the PIM business process response times and throughputs per second for a Small/Medium database model. Testing was conducted in a controlled environment with no other applications running. **The goal of this Benchmark was to obtain reference performance results for Oracle E-Business Suite R12 PIM on IBM System x servers running Linux.**

Note that the hourly throughput numbers mentioned above are linear extrapolations. Many factors can influence performance and your results may differ.

BENCHMARK PROFILE

In June 2009, Oracle conducted a benchmark in Pleasanton, CA to measure the performance of selected Oracle E-Business Product Information Management (PIM) processes in an environment running Oracle E-Business Suite R12 (Family Pack C) with Oracle10g™ database (10.2.0.3) for the Linux® operating system on an IBM® System x3755 server configured with three quad-core AMD® Opteron™ 8384 processors (12-cores total), running Red Hat® Enterprise Linux® 4 (32-bit) OS. A second System x3755 was used for the middle tier. A single IBM Storage System™ DS5300 disk array was used for storage.

BENCHMARK METHODOLOGY

E-Business Suite R12 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.

Hewlett-Packard® LoadRunner® was used as the load driver, simulating concurrent users. It submitted transactions at an average rate of one every 1.75 – 2.5 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.

	<p>200 Users</p> <p>System x3755 Apps Server 8-core 32 GB</p> <p>31% Utilized</p>
	<p>System x3755 DB Server 12-core 32 GB</p>
	<p>DS5300 System Storage 5 Drawers – Data 1 Drawer – Logs</p>

Figure 2: 2-Tier Configuration

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

BENCHMARK BUSINESS PROCESSES

The E-Business Suite PIM 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
Search (30%)			
Keyword Search	33	11	1.75
Advanced Search	33	11	1.75
Catalog Browse	33	11	1.75
Item Creation (U.I.) (30%)			
Style-SKU Generation	33	11	1.75
Single Item Creation	16.5	5.4	1.75
Multiple Item Creation (non Style-SKU)	16.5	5.4	1.75
BOM/Pack Creation	16.5	5.4	2.25
Multiple BOM/Pack Creation (Style-SKU Pack Creation)	16.5	5.4	1.75
Item Maintenance (U.I.) (25%)			
Assign Multiple Items to Multiple Organizations (SKU Ranging)	40	7.4	1.75
Update Attributes for a Single Item	60	11	1.75
Import (15%)			
Match Items	33	5.4	2.5
Import New Items	33	5.4	1.75
Import Item Updates	33	5.4	1.75
		100%	

Table 1: Online Transaction Mix

PROCESS FLOW DESCRIPTIONS

Search:

Keyword Search: Perform searches using keywords that may be part of an item number, item catalog category, manufacturer, manufacturer part number, short description or long description. Keyword search flows were based on a number of simple keywords.

Advanced Search: Search for items within a category based on search criteria templates, which are specific to the category. Advanced search flows included search criteria based on item attributes and item relationships, such as suppliers.

Catalog Browse: Provides navigation through a hierarchical catalog to find items based on their classification. Catalog browse flows were conducted based on selected nodes in the hierarchy, online response time to refresh hierarchy and display relevant items was measured.

Item Creation:

Style/SKU Generation: SKUs items were mass created for a Style Item through the Style-SKU Generation User Interface. Process was initiated from User Interface, performance was measured on the batch process creating the new SKU items.

Single Item Creation: Single item was created through the user interface using the standard item creation process. Online response time was measured.

Multiple Item Creation: Multiple items were created simultaneously through the user interface using the standard item creation process. Process was initiated from user interface, performance was measured on the batch process creating the new items.

BOM/Pack Creation: Single pack hierarchy was created through the user interface. Online response time was measured.

Multiple BOM/Pack Creation: Multiple pack hierarchies were created simultaneously through the standard create pack for style item/s flow. Process was initiated from user interface, performance was measured on the batch process creating the new items and structures.

PROCESS FLOW DESCRIPTIONS CONTINUED

Item Maintenance:

Assign Multiple Item to Multiple Organizations: Multiple items were assigned to multiple organizations through the mass maintenance flow, assign items to organizations. The item - organization assignments were selected through the item and organization search user interface, and then updates submitted as a batch program. Performance was measured on the batch process creating the items - organization assignments.

Update Item Attributes: Item attributes were updated through the Item Workbench. Online response time was measured.

Import:

Match Items: Matching process was executed from the Import Workbench, performance was measured on the batch process matching the items.

Import New Items: New items were imported from the staging / open interface tables. Performance was measured on the batch import process.

Import Item Updates: Item Updates were imported from the staging / open interface tables. Performance was measured on the batch import process.

BENCHMARK RESULTS

120 Million Row Data Model	Seconds		Actions Per Second	
	100	200	100	200
OLTP Users				
1a. Keyword search	1.518	1.603		
1b. Advance search	1.943	2.04		
1c. Browse catalog	1.66	1.874		
2a. Style/SKU generation			40.825	39.979
2b. Single item creation	0.218	0.266		
2c. Multiple item creation			53.333	49.661
2d. Bom/Pack creation	1.854	1.886		
2e. Multiple bom/pack creation			27.73	25.3
3a. Assign multi items to multi orgs			92.579	95.309
3c. Update item attributes	0.43	0.466		
5a. Match items			71.174	63.871
5b. Import new items			167.36	157.71
5c. Import item updates			168.78	165.10
Weighted Averages	1.32	1.41	83.506	80.708
Approx. Trans./Min.	51.6	103.3		

Table 2: PIM Transaction Results

The weighted averages are based on the business mix as reflected in Table 1: Online Process Mix.

R12 Application changes, data model additions and test methodology improvements render direct comparison to previous Oracle E-Business release 11.5.10 and 11.5.9 results invalid.

SERVER PERFORMANCE

Figure 4 shows the average CPU utilization on the Database server and mid-tier server. The value shown is the average across the processors (12 cores total for DB server and 8 cores total for the middle-tier).

Oracle E-Business Suite R12 PIM using Oracle10g on IBM System x 3755 Servers

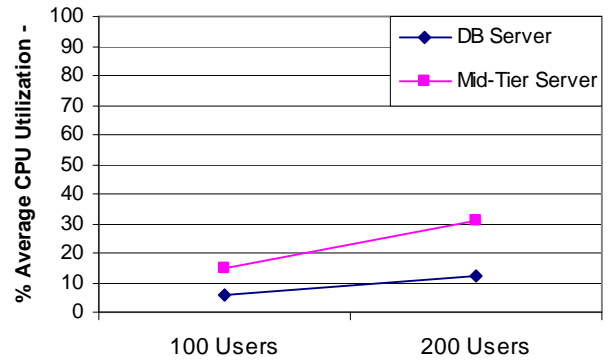


Figure 3: Average DB Server CPU Utilization

Online Workload	% User	% System	% I/O Wait	% Idle
DB Server - 200	9.99	2.26	0.00	87.76
DB Server - 100	4.95	1.05	0.00	93.98
Mid-Tier - 200	26.33	4.81	0.00	68.85
Mid-Tier - 100	12.86	2.24	0.00	84.89

Table 3: Average Server CPU Utilization Breakout

Average GB Used	100 Users	200 Users
DB Server	5.38 GB	7.67 GB
Mid-Tier server	4.70 GB	6.38 GB

Table 4: Average Memory Utilization

I/O PERFORMANCE

A DS5300 storage system equipped with six disk drawers was used for storage. The batch workload requires optimal I/O performance.

I/O Performance	DB – 100 U.	DB – 200 U.	Mid-Tier - 100	Mid-Tier - 200
Avg tps during an interval:	95.97	183.05	88.70	120.64
Max tps during an interval:	373.80	639.60	206.40	295.50
Max tps interval time:	0.48	0.48	0.48	0.47
Total number of Mbytes read:	1,527.37	1,813.78	60.48	149.91
Total number of Mbytes written:	4,403.91	9,084.80	1,676.84	2,265.81
Read/Write Ratio:	0.35	0.20	0.04	0.07

Table 5: Average I/O Utilization Breakout

PATCHES

The following patches were applied to the benchmark environment on top of Oracle E-Business Applications R12.

Update to Family Pack C

APPLICATION TUNING

Database:

```
create index inv.mtl_system_items_f2 on
inv.mtl_system_items_b
(UPPER(SEGMENT1))
parallel nologging tablespace UPGRADE_T_01;
alter index inv.mtl_system_items_f2 noparallel
logging ;
```

DATA COMPOSITION DESCRIPTION

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

Data Description	Small/Medium Large Model
Items	1,000,000
Organizations	120
Item – Organization Combinations	120,000,000
Suppliers	250
Item – Supplier Combinations (avg. of 2 per item)	2,000,000
Item – Supplier - Organizations	120,000,000
Categories (Alternate)	2,500
Average BOM levels	3
Average items per BOM	3

Table 6: Data Composition

BENCHMARK ENVIRONMENT

HARDWARE CONFIGURATION

An IBM System x3755 (3163-AC1) server configured with three Quad-core AMD Opteron processors and IBM's exclusive CPU Pass Thru card was used for the database server. It was equipped with the following:

- 3 × 2.7 GHz AMD Opteron™ Quad-Core Processor 8384 processors (12 cores total), each with 6 MB of Level 3 cache
- Total Memory: 32 GB PC-5300 667 MHz registered 240-pin DDR2-SDRAM RDIMMs
- Network: Gigabit full duplex.
- Operating system: Red Hat Enterprise Linux 4
- For more details on the IBM System x3755, please visit <http://www-03.ibm.com/systems/x/hardware/enterprise/x3755/specs.html>
- Storage: DS5300 with a total of 48 × 145 GB 15K RPM fibre-channel disks.
- For more details on DS5300, please visit <http://www.ibm.com/servers/storage/disk/ds5000/ds5300/index.html>

An IBM System x3755 (3163-AC1) server configured with two Quad-core AMD Opteron processors and IBM's exclusive CPU Pass Thru card was used for the application/web server. It was equipped with the following:

- 2 × 2.7 GHz AMD Opteron™ Quad-Core Processor 8384 processors (8 cores total), each with 6 MB of Level 3 cache
- Total Memory: 32 GB PC-5300 667 MHz registered 240-pin DDR2-SDRAM RDIMMs
- Network: Gigabit full duplex.
- Operating system: Red Hat Enterprise Linux 4
- For more details on the IBM System x3755, please visit <http://www-03.ibm.com/systems/x/hardware/enterprise/x3755/specs.html>

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SOFTWARE VERSIONS

Oracle's E-Business Suite R12 PIM (Family Pack C [~12.1.1])

Oracle10g™ 10.2.0.3 (32-bit)

Red Hat Enterprise Linux 4 update 5 (32-bit) (on the database server)

Red Hat Enterprise Linux 4 update 4 (32-bit) (on the application/web server and Concurrent Manager server)

Note: Oracle accepts that the results obtained using Redhat Enterprise Linux 4 very closely approximates results that may be obtained if Oracle Enterprise Linux 4 update 4 were used in this test.

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

Glossary and Acronyms:

ATP Available to Promise

BEE Batch Element Entries

HVOP High Volume Order Processing

OASB Oracle Applications Standard Benchmark

PIM Product Information Management

RAC Real Applications Clusters



Oracle

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