

E-BUSINESS SUITE APPLICATIONS R12 (R12.1.3) ORDER-TO-CASH (BATCH) BENCHMARK - USING ORACLE DATABASE 11g ON ORACLE'S SPARC T7-1 SERVER

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 benchmark test was run on a 32-core server.

Batch Workload				
100,000 Order/Inv. Lines	Threads	Time (Min)	Hourly Order Line Throughput	
HVOP	64	0.77	7,792,208	
Pick Release	64	7.90	759,494	
Ship Confirm	1	0.32	18,750,000	
Interface Trip Stop	64	1.23	4,878,049	
Inventory	500	1.20	5,000,000	
Auto Invoice	64	4.00	1,500,000	
Revenue Recognition	10	2.70	2,222,222	
Accounting Submit	1	1.02	5,882,353	
Accounting Create	1	2.27	2,643,172	
Sel. Process Total:		21.41	280,243	
Parent Proc Total:		21.90	273,973	
Wall Clock Duration*		27.28	219,941	

More processes are included in this summary than were reported in either 12.0.4 or 11i. Consequently, these results cannot be compared to earlier releases. Note that the hourly throughput numbers mentioned above are linear extrapolations. Many factors can influence performance and your results may differ.

* The "Wall Clock Duration" includes all of the job scheduling and management activity (parent process) as well as some idle intervals due to polling or waiting for all workers in a particular process to complete prior to kicking off the subsequent process. These intervals would not increase substantially, if at all, as the workload size is increased. Consequently, the throughput for larger workloads would converge towards the "Parent Process Total:" value.

BENCHMARK PROFILE

In August 2015, Oracle conducted a benchmark in Burlington, MA to measure the batch performance of the Oracle E-Business Standard Benchmark processes in an environment running Oracle E-Business Suite R12 (12.1.3) with Oracle11g™ database (11.2.0.3.0) for the Solaris® operating system on an Oracle's SPARC T7-1 server configured with one thirty-two core processor (32-cores total), running Oracle® Solaris® 11 (64-bit) OS. A single Oracle ZFS Storage ZS3-2 Appliance was used for data and one Oracle Flash Accelerator F160 PCIe Card 1.6 TB NVMe was used for logging.

The benchmark measured the Order Management batch business process hourly throughputs for a large database model. Testing was conducted in a controlled environment with no other applications running. **The goal of this Benchmark was to obtain reference batch throughputs for Oracle E-Business Suite R12 Benchmark on an Oracle's SPARC T7-1 server running Solaris 11.**

BENCHMARK METHODOLOGY

E-Business Suite R12 Benchmark batch processes are initiated from a benchmark-provided SQL script.

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

Figure 2 shows the configuration used for this benchmark run.

	<p>SPARC T7-1</p> <p>DB Server/ App Server</p> <p>32-core</p> <p>256 GB Memory</p> <p>7.5% Utilized</p>
 	<p>Oracle ZFS Storage ZS3-2 Appliance</p> <p>40 x 900 GB SAS-2 HDD + 8 Write Flash Accelerator SSD + 2 Read Flash Accelerator SSD 1.6 TB SAS (Data, Log, Cache)</p> <p>[Not Shown] Oracle Flash Accelerator F160 PCIe Card 1.6 TB NVMe (Logs)</p>

Figure 2: 2-Tier Configuration

This benchmark was run as a “Physical” 2-Tier configuration with a single machine hosting both the Database and Application server instances on a single OS image.

BENCHMARK BUSINESS PROCESSES

This E-Business Suite benchmark consists of a batch flow with seven metered processes.

Batch Order-to-Cash Processes

Business Process	Number of Threads Used
HVOP	64 (64)
Pick Release	64 (64)
Interface Trip Stop	64 (64)
Inventory	64 (500)
Auto Invoice	64 (64)
Revenue Recognition	64 (10)
Accounting Processes	1 (1)

Note that while 64 threads (workers) were entered at setup, the actual number of child processes spawned may have been larger (Inventory) or smaller (Revenue Recognition and Accounting).

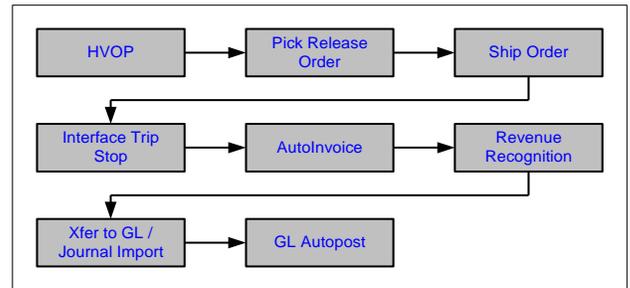


Figure 3: Order-to-Cash Process Flow

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 (and Ship Confirm): Pick Release finds and releases 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 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.

Batch Order-to-Cash Processes Continued

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 E-Business Suite 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 and by direct submission of multiple transaction managers via the benchmark SQL script. The execution interval is set to 5 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.

BENCHMARK RESULTS

Batch Business Metrics	Achieved Output
Order to Cash	
Number of Order Lines Created/Booked	100,000
Number of Order Lines Picked	100,000
Number of Order Lines Ship Confirmed	100,000
Number of Order lines Interface Trip Stopped	100,000
Number of Invoice Headers Created	100,000
Number of Invoice Lines Created	200,000

Table 1: Batch Transactions Completed

100,000 order lines were processed in this test. Table 2 shows the processing time in minutes.

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Table 2: Order-to-Cash (64 Worker) Batch Performance

R12.1.3 Application changes, data model additions and test methodology improvements render direct comparison to previous Oracle E-Business release 12.0.4, 11.5.10 and 11.5.9 results invalid.

SERVER PERFORMANCE

Figure 4 shows the average CPU utilization on the server. The value shown is the average across the processors (32 cores total, 256 vcpus, 64 vcpus active). Note that the sampling rate yielded few data points to average for the briefest processes.

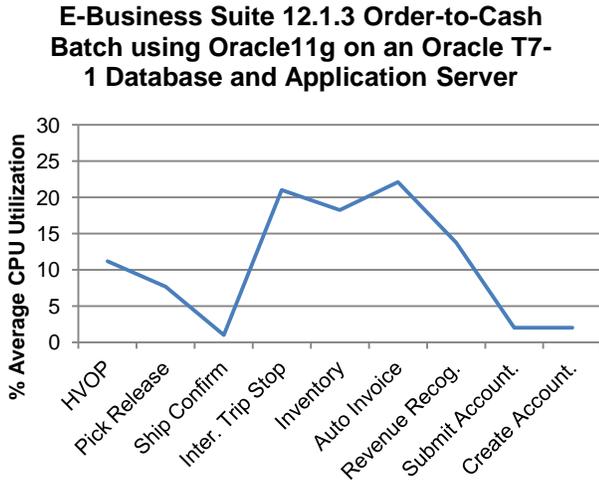


Figure 4: Average DB/App CPU Utilization

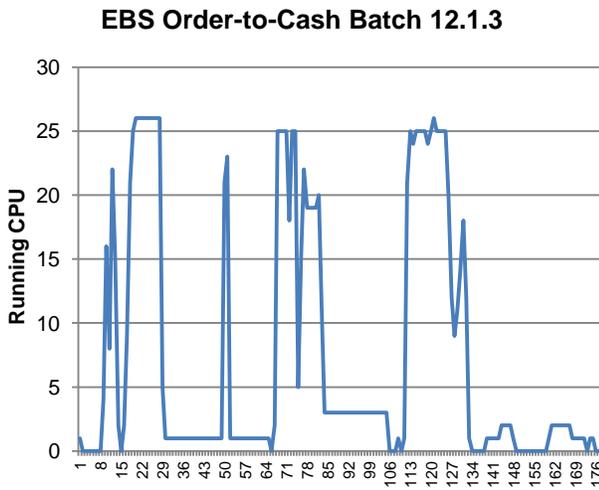


Figure 5: Running CPU Utilization

Workload	% User	% System	% Idle
HVOP	11.00	0.17	88.83
Pick Release	7.65	0.02	92.25
Ship Confirm	1	0	99
Interface Trip Stop	20.13	0.88	78.75
Inventory	17.38	0.88	82.00
Auto Invoice	22.06	0.06	77.76
Rev. Recognition	13.25	0.5	86.25
Submit Accounting	2	0	98
Create Accounting	2	0	98
Wall Clock Avg.	7.46	0.11	92.36

Table 3: Average CPU Utilization Breakout (64 Workers)

Average GB Used	O-to-C
DB/App Server	128 GB

Table 4: Average Memory Utilization

I/O PERFORMANCE

An Oracle ZFS Storage ZS3-2 Appliance equipped with 2 Storage Drive Enclosures (40 HDD + 8 Log SSD + 2 Cache SSD) was used for storage. The batch workload requires optimal I/O performance.

I/O Performance		Data	Redo Log
Transfers/Sec	Avg	277	
	Peak	1,874	
Writes/Sec	Avg	224	4,160
	Peak	1,858	31,326
Reads/Sec	Avg	53	
	Peak	796	
MB/Sec	Avg	16	
	Peak	117	
Write MB/Sec	Avg	15	37
	Peak	117	222
Read MB/Sec	Avg	0.7	
	Peak	13.0	
Service Time (ms)	Avg	2.0	0.02
	Peak	5.5	0.40

Table 5: Average I/O Utilization Breakout

DATA COMPOSITION DESCRIPTION

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

Application	Business Objects	Large/Extra-Large Model
TCA	Organizations	1,100,000
	Contacts	4,900,000
	Contact Points	3,700,000
	Accounts	1,100,000
	Account Sites	1,090,000
	Account Site Uses	2,180,000
	Contracts	Contracts
Install Base	Instances	1,300,000
	Trackable Items	5
	Items	1,100,000
HR	Managers	800
	Employees	250,000
	Payroll Users	250,000
	Users	20,000
	Credit Card Entries	4,000,000
	Supplier(s)	10,000
Assets	Asset Categories	984
General Ledger	GL Code Combinations	93,417

Table 7: Data Composition

PATCHES

The following patches were applied to the benchmark environment on top of Oracle E-Business Suite R12 (12.1.3).

Patch 13366268:
 Unique Patch ID: 14394336
 Bugs fixed: 13366268

Patch 13258936:
 Unique Patch ID: 14465000
 Bugs fixed: 13258936

Patch 13004894:
 Unique Patch ID: 14182829
 Bugs fixed: 13004894

Patch 13001379:
 Unique Patch ID: 14706905.1
 Bugs fixed: 13001379

Patch 12985184:
 Unique Patch ID: 14321186
 Bugs fixed: 12985184

Patch 12960302:
 Unique Patch ID: 14254252
 Bugs fixed: 12960302

Patch 12942119:
 Unique Patch ID: 14210496
 Bugs fixed: 12942119

Patch 9858539:
 Unique Patch ID: 14308099
 Bugs fixed: 9858539

Patch 4247037:
 Unique Patch ID: 14211388
 Bugs fixed: 4247037

OPERATING SYSTEM TUNING

DATABASE OPERATING SYSTEM TUNING

1. Set thread_transience_kernel=0
2. Set thread_transience_user=0

APPLICATION TUNING

Database:

```
exec fnd_stats.gather_table_stats
('AR','RA_CUSTOMER_TRX_ALL', 100,
cascade=>TRUE); exec fnd_stats.gather_table_stats
('AR','RA_CUSTOMER_TRX_LINES_ALL',
100,cascade=>TRUE);
exec fnd_stats.gather_table_stats
('AR','RA_INTERFACE_LINES_ALL', 100,
cascade=>TRUE); exec fnd_stats.gather_table_stats
('AR','RA_INTERFACE_DISTRIBUTIONS_ALL',
100,cascade=>TRUE); exec fnd_stats.gather_table_stats
('AR','RA_INTERFACE_SALESCREDITS_ALL',
100,cascade=>TRUE);
exec fnd_stats.gather_table_stats
('ZX','ZX_PROCESS_RESULTS', 100, cascade=>TRUE);
exec fnd_stats.gather_table_stats ('ZX', 'ZX_RATES_B',100,
cascade=>TRUE); exec fnd_stats.gather_table_stats
('ZX','ZX_SUBSCRIPTION_DETAILS', 100,
cascade=>TRUE); exec fnd_stats.gather_table_stats ('ZX',
'ZX_TAXES_B',100, cascade=>TRUE);
```

APPLICATION PATCHES CONTINUED:

1) Patch 8300196 applied on Thu Mar 26 06:05:24 GMT-05:00 2009

[Base Bug(s): 8300196]

2) Patch 5651245 applied on Thu Mar 26 06:04:56 GMT-05:00 2009

[Base Bug(s): 5651245]

3) Patch 7329300 applied on Thu Mar 26 06:04:22 GMT-05:00 2009

[Base Bug(s): 7329300]

4) Patch 7580744 applied on Thu Mar 26 06:03:15 GMT-05:00 2009

[Base Bug(s): 7580744]

5) Patch 7379122 applied on Thu Mar 26 06:02:36 GMT-05:00 2009

[Base Bug(s): 5179574 5637094 5239126 5095815 5055442 4554284 5029950 4587572 4903532 4439469 4197970 4601861 7044603 4900129 5960451 6607951 5225797 5401921 5049074 6826532 5354517 4905112 4873311 5406923 5631915 5114396 5644862 7300525 5861360 5095648 4610820 5092688 6455161 6705965 4335559 4671216 4492467 6397568 5029952 5029954 3962946 4329444 4542188 4899479 4458415 4712638 5276400 7022400 5222032 6009358 7334756 5258410 5065930 4555795 5094098 5490935 6737308 6055387 5233111 4359124 6350565 4175906 4871035 4587431 4486132 4348230 4661844 5584790 6639839 4152843 4597251 5242647 5650178 4402808 4768040 4561867 5738539 5933477 5091108 4691191 5376215 5015557 7379122 7135493 4605877 5605370 5689908 5675556 4969005 4745776 5243019 5227879 5408664 4969029 7120513 7137797 5049077 4146291 4679094 4166537 3743912 4047969 4925103 6999528 5490845 4593539 5648102 5151518 5464895 4754900 5751672 5458543 5071931 4751932 5998987 5222931 5648727 5057964 6270140 4519477 4939157 6404447 5226235 5884075 4680009 6130365 7135488 5910829 3345756 5896963 6016022 5382595 4966417 6753516 4226736 5347751 5014128 5501362]

6) Patch 7121788 applied on Thu Mar 26 06:01:42 GMT-05:00 2009

[Base Bug(s): 7121788]

7) Patch 6400501 applied on Thu Mar 26 06:01:02 GMT-05:00 2009

[Base Bug(s): 6400501]

8) Patch 5394728 applied on Thu Mar 26 06:00:02 GMT-05:00 2009

[Base Bug(s): 5394728]

9) Patch 3559326 applied on Thu Mar 26 05:59:29 GMT-05:00 2009

[Base Bug(s): 3559326]

10) Patch 7140405 applied on Thu Mar 26 05:59:00 GMT-05:00 2009

[Base Bug(s): 6116405 6764875]

11) Patch 7281456 applied on Thu Mar 26 05:58:23 GMT-05:00 2009

[Base Bug(s): 6371228]

12) Patch 7195389 applied on Thu Mar 26 05:57:53 GMT-05:00 2009

[Base Bug(s): 5917053]

13) Patch 7016961 applied on Thu Mar 26 05:57:19 GMT-05:00 2009

[Base Bug(s): 7016961]

14) Patch 4526825 applied on Thu Mar 26 05:56:38 GMT-05:00 2009

[Base Bug(s): 4526825]

15) Patch 4407272 applied on Thu Mar 26 05:55:56 GMT-05:00 2009

[Base Bug(s): 4407272]

16) Patch 6857221 applied on Thu Mar 26 05:55:15 GMT-05:00 2009

[Base Bug(s): 6857221]

17) Patch 7229760 applied on Thu Mar 26 05:54:29 GMT-05:00 2009

[Base Bug(s): 6823259 6790720 6251633 6999812 7150529 7000696 7114153 6770810 6446152 7229760 7242694 5465339 6724714 6821297 6395358 7046878 6704955 7021759]

BENCHMARK ENVIRONMENT

HARDWARE CONFIGURATION

A single Oracle's SPARC T7-1 server was used for the database server and middle-tier server. It was equipped with the following:

- 1 × SPARC M7 processor (4.13 GHz, 1-chip, 32-cores, 256-threads total), each with 64 MB of Level 3 cache (8 MB per 4-core cluster)
- 256 Gigabytes of Memory (~128 peak)
- 1 × Oracle ZFS Storage ZS3-2 Appliance (40 × 900 GB SAS-2 HDD and 8 × Write Flash Accelerator SSD [Log] and 2 × Read Flash Accelerator SSD 1.6 TB SAS [Cache]) for DB data
- 1 × Oracle Flash Accelerator F160 PCIe Card 1.6 TB NVMe for DB Redo Logs

SOFTWARE VERSIONS

Oracle E-Business Suite R12 (12.1.3)

Oracle 11g™ 11.2.0.3.0 (64-bit)

Oracle Solaris 11 (64-bit) on the database/application server.

The following Java versions have all been used in the Oracle Apps environment:

- Java 1.4.1_04-b05
- Java 1.4.2_08-b03
- Java 1.4.2_10-b03
- Java 1.5.0_07-b03
- Java 1.5.0_08-b03
- Java 1.5.0_18-b02
- Java 1.5.0_30-b03
- Java 1.6.0_17-b04

Glossary and Acronyms:

HVOP High Volume Order Processing

OASB Oracle Applications Standard Benchmark

ORACLE®

Oracle

Applications Performance & Benchmarks

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The results published in this report have been independently reviewed and audited by:

INFO SIZING

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