ORACLE E-BUSINESS SUITE 12

ORACLE CLOUD MACHINE

ORACLE E-BUSINESS BENCHMARK REV. 1.0

E-BUSINESS SUITE APPLICATIONS R12 (R12.1.3) ORDER-TO-CASH (BATCH) BENCHMARK - USING ORACLE11*g* ON ORACLE'S DATABASE CLOUD SERVICE

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 an 8-core server.

Batch Workload			
100,000 Order/Inv. Lines	**Threads**	**Time (Min)**	**Hourly Order Line Throughput**
HVOP	16	1.5	4,000,000
Pick Release	16	9.53	629,591
Ship Confirm	1	0.23	26,086,957
Interface Trip Stop	16	0.88	6,818,182
Inventory	200	3.75	1,600,000
Auto Invoice	11	6.22	964,630
Revenue Recognition	5	2.67	2,247,191
Accounting Submit	1	1.0	6,000,000
Accounting Create	1	2.47	2,429,150
Sel. Process Total:		28.25	212,389
Parent Proc Total:		30.92	194,049
Wall Clock Duration*		31.02	193,424

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.

No other workloads were active during this benchmark's execution.

* 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 September 2016, Oracle conducted a benchmark in Pleasanton, CA 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). The database server used Oracle11*g*™ (11.2.0.4.0) running on Oracle's Public Cloud 16.2.2 Database Service with Oracle® Linux® 6.6 (64-bit) OS. Moreover, the instance of 8 O*CPU*, 16 threads, 120 GB used two of Oracle's Public Cloud Storage Latency Volumes for data storage and redo log storage.

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 Database Cloud Service.**

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 1 shows the configuration used for this benchmark run.

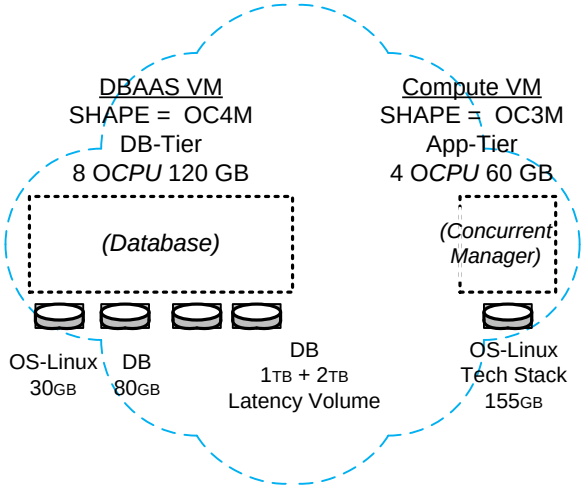

Figure 1: Virtualization Resource Apportionment

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	16 (16)
Pick Release	16 (16)
Interface Trip Stop	16 (16)
Inventory	8 (200)
Auto Invoice	11 (11)
Revenue Recognition	5 (5)
Accounting Processes	1 (1)

Note that while 16 threads (workers) were entered at setup, the actual number of child processes spawned may have been larger (Inventory) or smaller (Revenue Recognition and Accounting).

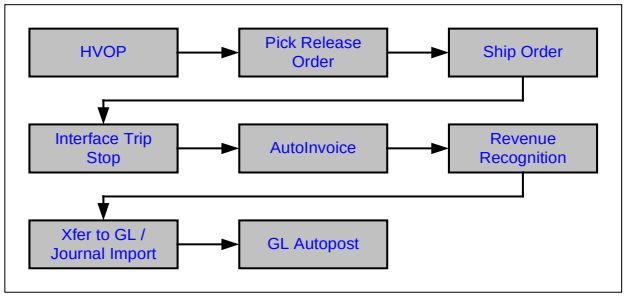

Figure 3: Order-to-Cash Process Flow

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		400,000

Table 1: Batch Transactions Completed

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

Batch Workload			
100,000 Order/Inv. Lines	**Threads**	**Time (Min)**	**Hourly Order Line Throughput**
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Table 2: Order-to-Cash (16 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 (8 cores total, 16 vCPUs). Note that the sampling rate yielded few data points to average for the briefest processes. Also note that the large number of sub-process workers (200) during the 'Inventory process' execution saturated the processors.

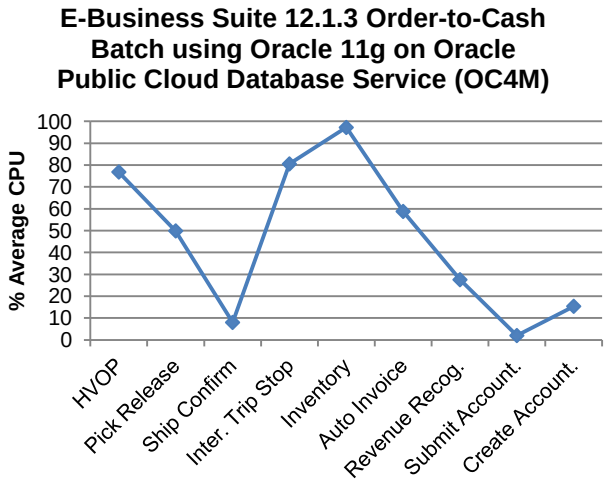

Figure 4: Average Database CPU Utilization

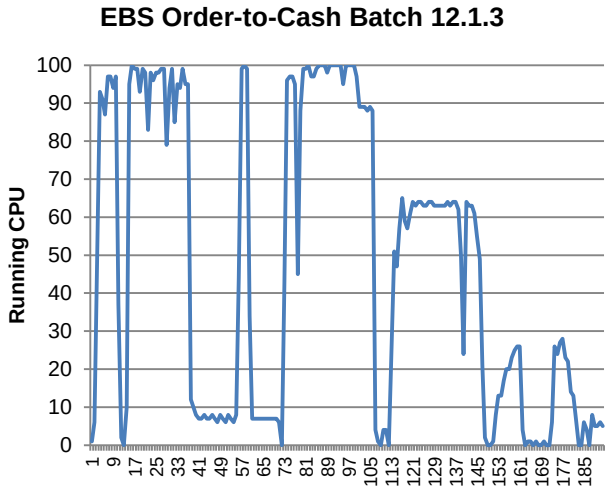

Figure 5: Running CPU Utilization

Workload		% User	% System	% Idle	% Wait
HVOP		68.30	6.30	23.20	1.90
Pick Release		45.07	3.74	50.14	1.04
Ship Confirm		5	1	92	2
Interface Trip Stop		71.00	7.83	19.50	1.33
Inventory		88.54	7.93	2.82	0.68
Auto Invoice		50.42	2.74	41.24	5.45
Rev. Recognition		16.09	1.64	72.45	10.09
Submit Accounting		1	0	98	1
Create Accounting		12.00	1.00	84.63	2.19
Wall Clock Avg.		45.24	3.66	48.43	2.56

Table 3: Average CPU Utilization Breakout (16 Workers)

Average GB Used	O-to-C
Database Server	102 GB

Table 4: Average Memory Utilization

I/O PERFORMANCE

Two Oracle Public Cloud Storage Latency Volumes were used for storage of tables and indexes. The batch workload requires optimal I/O performance.

I/O Performance		DB	Redo
Reads/Sec	Avg	425.6	0
Writes/Sec	Avg	1,730.1	546.4
Reads MB/Sec	Avg	5.7	0
Writes MB/Sec	Peak	24.8	21.6
Blocks Read/Sec	Avg	731.9	N/A
Blocks Write/Sec	Peak	3,170.9	N/A

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	222,000
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

PERFORMANCE INITIALIZATION

The init.ora file has to have this added.

filesystemio_options =setall

CONDITIONAL TUNING

See MOS Note: 2215027.1

(*This may not enhance performance for all customer situations.)*

APPLICATION TUNING

Database:

```
create index ZX.ZX_RATES_B_TEST on
ZX.ZX_RATES_B(TAX_RATE_CODE,TAX,EFFECTIVE
_FROM);
EXEC
FND_STATS.GATHER_TABLE_STATS('ZX','ZX_RATE
S_B',DBMS_STATS.AUTO_SAMPLE_SIZE);

drop index AR.RA_INTERFACE_LINES_N1;
create index AR.RA_INTERFACE_LINES_N1 on
AR.RA_INTERFACE_LINES_ALL
(REQUEST_ID,CUSTOMER_TRX_ID) ;
EXEC
FND_STATS.GATHER_TABLE_STATS('AR','RA_INTE
RFACE_LINES_ALL',DBMS_STATS.AUTO_SAMPLE_S
IZE);

EXEC
FND_STATS.GATHER_TABLE_STATS('AR','HZ_RELA
TIONSHIPS',DBMS_STATS.AUTO_SAMPLE_SIZE);

create index AR.RA_CUSTOMER_TRX_LINES_TEST on
AR.RA_CUSTOMER_TRX_LINES_ALL(REQUEST_ID);
EXEC
FND_STATS.GATHER_TABLE_STATS('AR','RA_CUST
OMER_TRX_LINES_ALL',DBMS_STATS.AUTO_SAMP
LE_SIZE);

EXEC
FND_STATS.GATHER_TABLE_STATS('WSH','WSH_D
ELIVERY_DETAILS',DBMS_STATS.AUTO_SAMPLE_S
IZE);
```

BENCHMARK ENVIRONMENT

HARDWARE CONFIGURATION

A single DBaaS instance version 16.2.2 on Oracle Database Cloud Service with Shape OC4M (8 OCPU as 16 vCPU) was used. It was equipped with the following:

- 8 O*CPU* (16vcpu) running on 2.29 GHz Intel® Xeon™ E5-2699 v3
- 120 Gigabytes of Memory (~104.6 peak)
- Two Oracle Public Storage Volumes for a total of 110 GB were used to host Linux and Oracle 11*g* Database software.

Application Server:

A single COMPUTE Instance of Oracle's Public Cloud 16.2.2 was used for this test. 1 × Oracle Linux COMPUTE Instance with Shape OC3M was used as an application server to host the Concurrent Manager.

- 4 O*CPU* (8vcpu) running on 2.29 GHz Intel® Xeon™ E5-2699 v3
- 60 Gigabytes of Memory (~14 GB used at peak load)
- One Oracle Public Storage Volume for a total of 155 GB was used to host Linux and the Application Tier software.

SOFTWARE VERSIONS

Oracle E-Business Suite R12 (12.1.3)

Oracle11*g*™ 11.2.0.4.0 (64-bit)

Oracle Linux 6.6 (64-bit) on the database server.

Xen 4.3.1 OVM

Java HotSpot™ 64-bit server VM (build 14.3-b01), mixed mode

The following Java™ Standard Edition (SE) versions have all been used in the Oracle Apps environment:

- Java 1.6.0_17-b04

Glossary and Acronyms:

DBaaS Database as a Service

OASB Oracle Applications Standard Benchmark

O*CPU* Oracle CPU (1 physical core, for 2 execution threads with Hyper threading enabled)

RAC **R**eal **A**pplications **C**lusters

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