

E-BUSINESS SUITE APPLICATIONS R12 (12.1.3) EXTRA-LARGE PAYROLL (BATCH) BENCHMARK - USING ORACLE11g 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 a 4-core server.

Batch Workload			
250,000 Employees	Threads	Time (Min)	Hourly Employee Throughput
Payroll Processing	24	4.62	3,243,834
PrePayments	24	1.72	8,711,140
External Archive	24	29.42	509,885
NACHA	4	4.21	3,561,368
Checkwriter	2	0.77	19,531,294
Costing	24	1.49	10,029,583
Totals:		42.24	355,114
Parent Proc. Total		87.08	172,248
Wall Clock Duration*		87.08	172,248

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 toward the "Totals:" value.

BENCHMARK PROFILE

In July 2016, Oracle conducted a benchmark in Pleasanton, CA to measure the batch performance of Oracle's E-Business Standard Benchmark processes in an environment running Oracle E-Business Suite Payroll R12 (12.1.3). The database server used Oracle11g™ (11.2.0.4.5) running on Oracle's Public Cloud 16.2.2 Database Service with Oracle® Linux® 6.6 (64-bit) OS. Moreover, the instance of 4 OCPU, 8 threads, 60 GB used two of Oracle's Public Cloud Storage Latency Volumes for data storage and redo log storage.

The benchmark measured the Payroll batch business process hourly throughputs for an extra-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.**

Instantaneous Hourly Throughputs

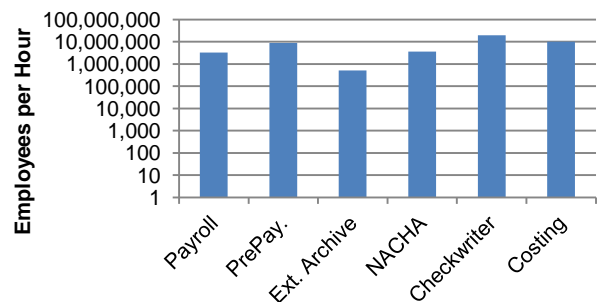


Figure 1: Oracle E-Business Payroll Batch Throughputs

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.

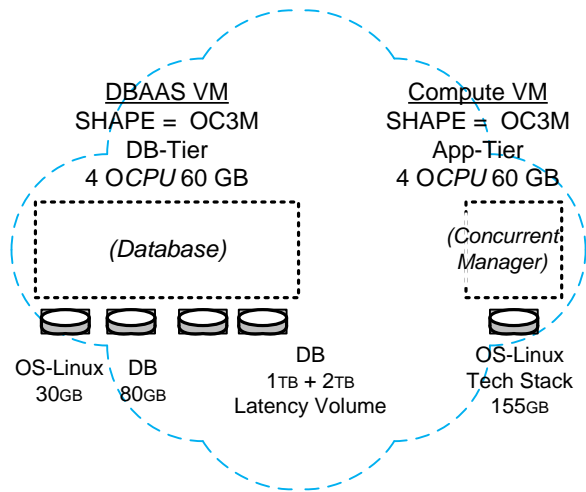


Figure 1: Virtualization Resource Apportionment

BENCHMARK BUSINESS PROCESSES

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

Batch Payroll Processes

Business Process	Number of Threads Used	Process Type
Payroll Process	24	Pro-C
PrePayments	24	Pro-C
External Archive Process	24	Pro-C & PL/SQL
NACHA	4	Pro-C
Check Writer	2	Pro-C & Oracle Report Writer
Costing	24	Pro-C

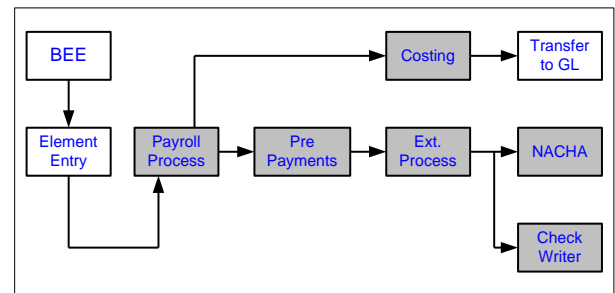


Figure 3: Payroll Process Flow

The Oracle E-Business Suite R12 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.

External Archiving Process: (Pro-C, PL/SQL) Replicates the results of the Payroll run into a separate archive for audit purposes. This data is primarily used for Payslips (Both printed and on line), as a source for check and direct deposit printing, third party interfaces, and tax remittance reporting.

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

Batch Business Metrics	Achieved Output
Payroll	
Payroll Process	500,000
PrePayment	250,000
NACHA + Check	250,000
Costing	250,000

Table 1: Batch Transactions Completed

In this test, 250,000 employees were processed. One checkpoint was completed during the measurement interval. Table 2 shows the processing time in minutes.

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Table 2: Payroll Batch Performance

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. The value shown is the average across the processors (4 cores total).

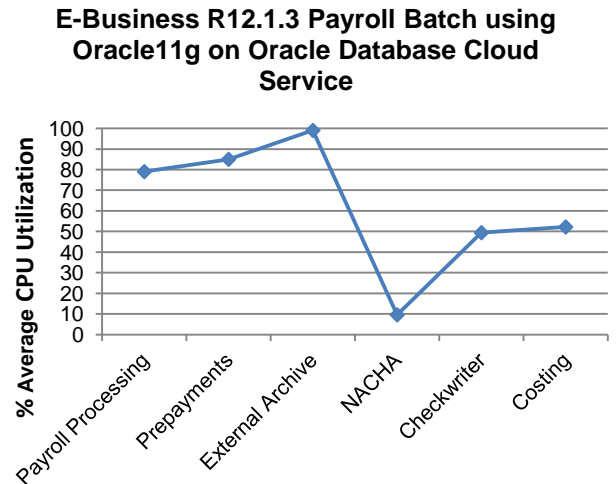


Figure 4: Average DB/App/Web CPU Utilization

Note that the high processing power applied to the briefest business processes resulted in sparse CPU data sampling.

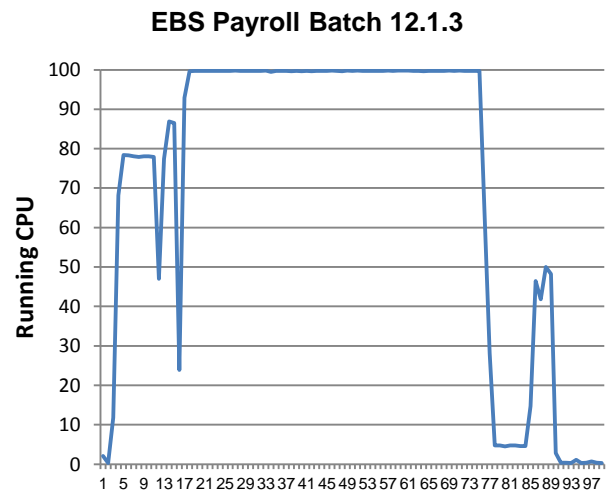


Figure 5: Running CPU Utilization

Figure 5 shows the CPU activity for the entire sequence of processes.

SERVER PERFORMANCE CONTINUED

Online Workload	% User	% Sys	% Wait	% Idle
Payroll Processing	66.33	10.55	2.14	20.98
PrePayments	73.63	9.97	1.43	15.00
External Archive	92.19	6.80	0.03	0.98
NACHA	6.75	0.88	1.91	90.48
Checkwriter	40.2	6.2	3	50.6
Costing	38.47	8.20	5.43	47.83
Wall Clock Avg.	66.48	5.84	0.89	26.80

Table 3: Average Server CPU Utilization

Average GB Used	DB Server
24-Threads	58 GB

Table 5: 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		24-Thread
Transfers/Sec	Avg	1,374
	Peak	8,199
Writes KB/Sec	Avg	22,529
	Peak	77,841
Reads KB/Sec	Avg	3,028
	Peak	33,403

Table 6: 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
HR	Employees	250,000

Table 7: Data Composition

PERFORMANCE INITIALIZATION

The init.ora file has to have this added.

```
filesystemio_options =setall
```

BENCHMARK ENVIRONMENT

HARDWARE CONFIGURATION

A single DBaaS instance version 16.2.2 on Oracle Database Cloud Service with Shape OC3M (4 OCPU as 8 vCPU) was used. It was equipped with the following:

- 4 OCPU (8vcpu) running on 3.00 GHz Intel® Xeon™ E5-2690 v2
- 60 Gigabytes of Memory (~58 peak)
- Two Oracle Public Storage Volumes for a total of 110 GB were used to host Linux and Oracle 11g 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 OCPU (8vcpu) running on 3.00 GHz Intel® Xeon™ E5-2690 v2
- 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)

Oracle 11g™ 11.2.0.4.5 (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

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

RAC Real Applications Clusters



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E-Business R12 Payroll Batch
July 2016

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