

# E-BUSINESS SUITE APPLICATIONS R12 (12.2.5) LARGE PAYROLL (BATCH) BENCHMARK - USING ORACLE11g ON ORACLE’S CLOUD INFRASTRUCTURE

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, representing roughly one fourth of the available computing power of the system under test.

Batch Workload			
250,000 Employees	Threads	Time (Min)	Hourly Employee Throughput
Payroll Processing	16	7.58	1,978,021
PrePayments	16	2.63	5,696,202
External Archive	16	34.55	434,153
NACHA	16	0.55	27,272,727
Checkwriter	16	1.2	12,500,000
Costing	16	2.75	5,454,545
<b>Totals:</b>		49.27	304,465
<b>Wall Clock Duration*</b>		63.05	237,906

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 March 2018, 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 (12.2.5). The database server used Oracle11g™ (11.2.0.4.0) running on Oracle’s Cloud Infrastructure (OCI) Bare-Metal Cloud 16.2.2 Database Service with Oracle® Linux® 6.8 (64-bit) OS. Moreover, the instance of 8 OCPU, 16 threads, 512 GB used the attached 12.8 TB NVMe SSD 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.**

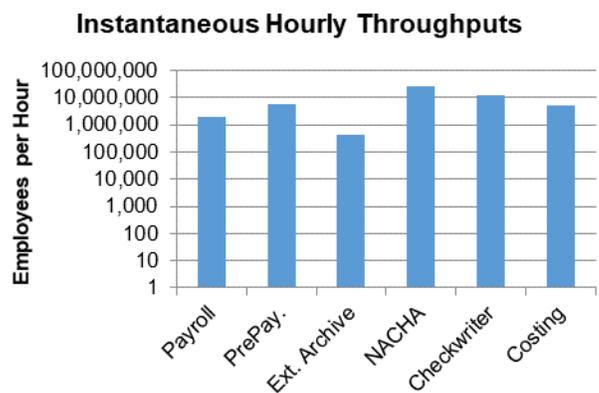


Figure 1: Oracle E-Business Payroll Batch Throughputs

## 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.

Phoenix Region with Availability Domains

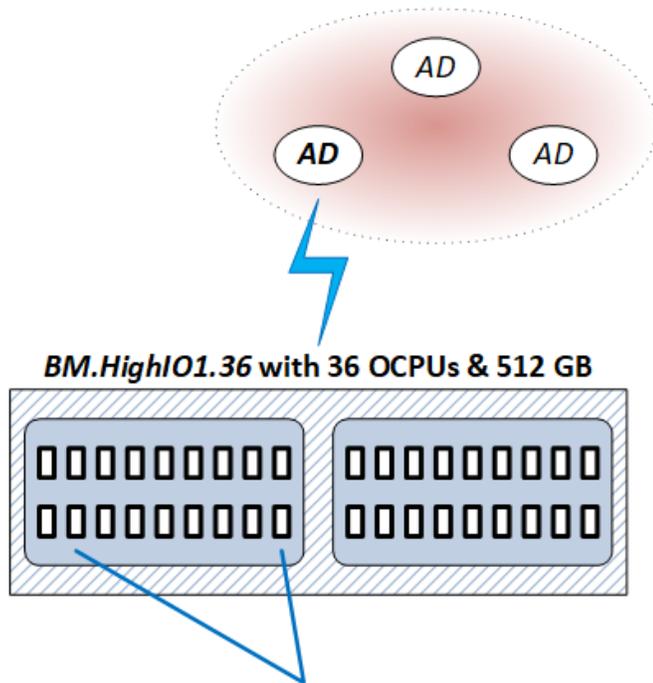


Figure 1: DB Server Resource Provisioning

## 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	16	Pro-C
PrePayments	16	Pro-C
External Archive Process	16	Pro-C & PL/SQL
NACHA	16	Pro-C
Check Writer	16	Pro-C & Oracle Report Writer
Costing	16	Pro-C

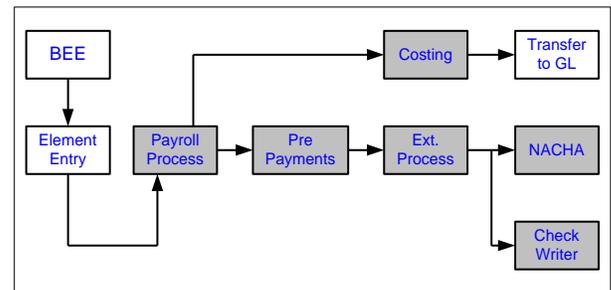


Figure 3: Payroll Process Flow

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
<b>Payroll</b>	
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.

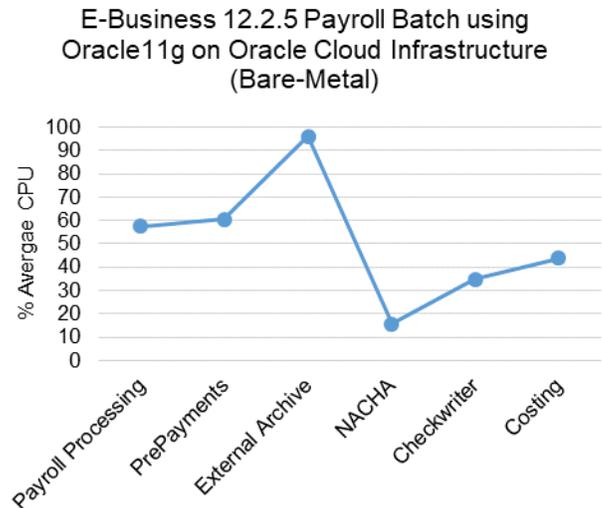
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**Table 2: Payroll Batch Performance**

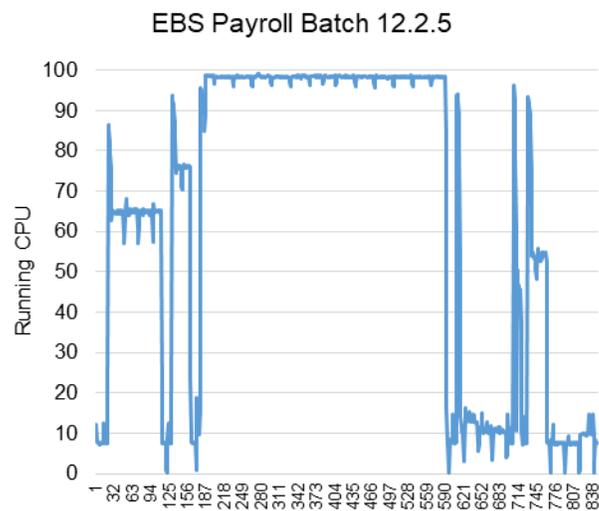
R12 Application changes, data model additions and test methodology improvements render direct comparison to previous Oracle E-Business release 11.5.10 and 11.5.9 results invalid.

## SERVER PERFORMANCE

Figure 4 shows the average CPU utilization on the Database server. The value shown is the average across the processors (8 cores total).



**Figure 4: Average DB/App/Web CPU Utilization**



**Figure 5: Running CPU Utilization**

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

## SERVER PERFORMANCE CONTINUED

Batch Workload	% User	% Sys	% Wait	% Idle
Payroll Processing	50.76	6.77	0.01	42.46
PrePayments	54.85	5.61	0.02	39.53
External Archive	90.28	5.79	0.00	3.93
NACHA	13.56	1.93	0.03	84.47
Checkwriter	31.89	2.99	0.03	65.10
Costing	37.35	6.42	0.01	56.21
Wall Clock Avg.	59.68	4.87	0.01	35.44

**Table 3: Average Server CPU Utilization**

Average GB Used	DB Server
16-Threads	321 GB

**Table 5: Average Memory Utilization**

## I/O PERFORMANCE

Four Oracle locally attached NVMe SSD drives were used for storage of tables and indexes. The batch workload requires optimal I/O performance.

I/O Performance		16-Thread
Transfers/Sec	Avg	4,954
	Peak	83,119
Writes KB/Sec	Avg	63,568
	Peak	570,408
Reads KB/Sec	Avg	668
	Peak	22,836

**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 Model
HR	Employees	250,000

**Table 7: Data Composition**

## PERFORMANCE INITIALIZATION

N/A

## BENCHMARK ENVIRONMENT

### HARDWARE CONFIGURATION (BM.DENSEIO1.36)

#### Database Server:

A single Bare Metal instance version 16.2.2 on Oracle Cloud Infrastructure with Shape BM.DenseIO1.36 (8 OCPU as 16 vCPU) was used. It was equipped with the following:

- 8 OCPU (16vcpu) running on 2.30 GHz Intel® Xeon™ E5-2699 v3
- 512 Gigabytes of Memory (~321 peak)
- 4 × 3.2 TB (12.8 TB total) locally attached NVMe SSD drives were used to host Linux and Oracle 11g Database software.

#### Application Server:

A single COMPUTE Instance of Oracle's Cloud Infrastructure 16.2.2 was used for this test. 1 × Oracle Linux COMPUTE Instance with Shape VM.Standard1.8 (8 OCPU as 8 vCPU) was used as an application server to host the Concurrent Manager.

- 8 OCPU (8vcpu) running on 2.30 GHz Intel® Xeon™ E5-2699 v3
- 56 Gigabytes of Memory
- 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 (12.2.5)

Oracle 11g™ 11.2.0.4.0 (64-bit)

Oracle Linux 6.8 (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:

NVMe Non-Volatile Memory Express

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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