



# E-BUSINESS SUITE PAYROLL 11i (11.5.10) USING ORACLE10g FOR NOVELL® SUSE™ LINUX ON IBM® eSERVER™ xSERIES® 366 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

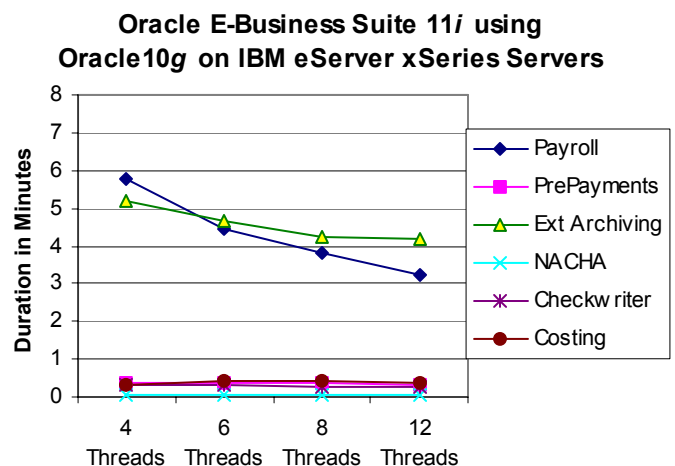
5,000 Employees (12 Threads)	Time	Hourly Throughput
<b>Payroll Process</b>	3.22 min	93,264
<b>PrePayments</b>	0.30 min	1,000,000
<b>Ext. Proc. Archive</b>	4.20 min	71,429
<b>NACHA</b>	0.03 min	9,000,000
<b>Check Writer</b>	0.28 min	1,058,824
<b>Costing</b>	0.38 min	782,609
<b>Total</b>	8.42 min	35,644

Note that the hourly throughput numbers above are linear extrapolations. Many factors can influence performance and your results may differ. It should be noted that the results described in this paper are for a database supporting 5,000 employees. Comparison with results measured against different database sizes are misleading and strongly discouraged.

## BENCHMARK PROFILE

In August 2005, Oracle and IBM conducted a benchmark at the IBM xSeries Performance Lab in Research Triangle Park, NC to measure the batch performance of the Payroll processes in Oracle's E-Business Suite Payroll 11i (11.5.10) with Oracle10g™ 10.1.0.4 for Linux on a 4-way IBM eServer™ xSeries® 366 database server, running Novell® SUSE™ Linux Enterprise Server 9 for x86 with SP1. A second xSeries 366 was used as the application server. A Storage Area Network (SAN), consisting of multiple IBM TotalStorage® DS4500s, provided disk storage for the database, Oracle binaries and backups.

The benchmark measured 'Payroll' application business process runtimes for a small database model. Testing was conducted in a controlled environment with no other applications running. The tuning changes, if any, were approved by Oracle Applications Development and will be generally available in a future update. **The goal of this Benchmark was to obtain reference performance results for Oracle's E-Business Suite 11i Payroll on IBM eServer xSeries servers running SLES9 Linux.**



**Figure 1: Oracle Payroll 11i Processing Rates**

The benefits from running increasing numbers of threads are more pronounced on the two longer processes, Payroll and External Archiving. Note that the gains decline at higher numbers of parallel threads for External Archiving.

## METHODOLOGY

E-Business Suite 11i Payroll 11.5.10 batch processes can be initiated from a browser. For this benchmark, all runs used a browser to initiate Pro-C, PL/SQL and Oracle Report Writer jobs.

The batch processes were run as a single concurrent process which automatically and dynamically divides the employee population across the number of sub-processes configured by the user (AKA threads). The Payroll multithreading engine is fully load balanced ensuring that each of the threads has a roughly equal amount of work to do. For this benchmark 4, 6, 8 or 12 threads were used.

Business Process	Threads	Process Type
Payroll Process	4, 6, 8 or 12	Pro-C
PrePayments	4, 6, 8 or 12	Pro-C
Ext. Process Archive	4, 6, 8 or 12	Pro-C & PL/SQL
NACHA	4, 6, 8 or 12	Pro-C
Check Writer	4, 6, 8 or 12	Pro-C & Oracle Report Writer
Costing	4, 6, 8 or 12	Pro-C

Batch processes are background processes, requiring no operator intervention or interactivity. Results of these processes are automatically logged in the database. The runtimes are posted to the Concurrent Manager database table where they are stored for subsequent analysis.

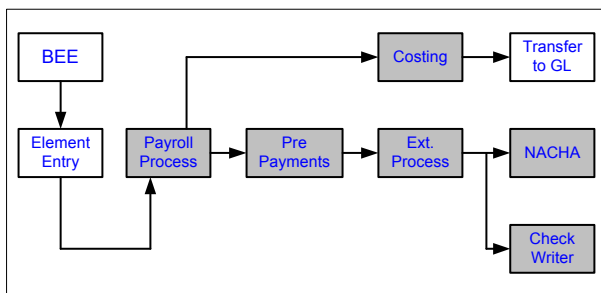


Figure 2: Process Flow

## BUSINESS PROCESSES

The Oracle E-Business Suite 11i Payroll processes tested are as follows:

**Payroll Process:** (Pro-C) 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:** (Pro-C) Distributes the net pay for each employee across the various payment methods (Direct Deposit, Check, or Cash). This a single payroll process or can be run across multiple payroll processes.

**External Process Archive:** (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:** (Pro-C) 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:** (Pro-C and Oracle Report Writer) This process allocates check numbers and creates/prints the payroll check and associated paper payslip.

**Costing:** (Pro-C) 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.

## BATCH RESULTS

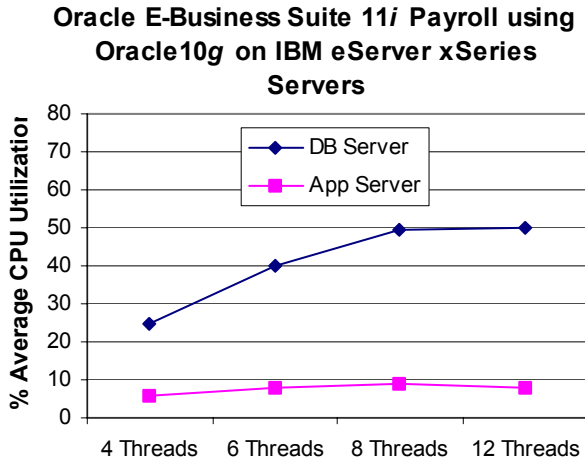
5,000 employees were processed for the semi-monthly payroll in this test. Table 1 shows the processing time in minutes for increasing numbers of parallel threads.

5,000 Employees	4 Threads	6 Threads	8 Threads	12 Threads
Payroll Process	5.78	4.45	3.80	3.22
PrePayments	0.38	0.37	0.38	0.30
Ext. Proc. Archive	5.22	4.68	4.23	4.20
NACHA	0.05	0.05	0.03	0.03
Check Writer	0.32	0.30	0.28	0.28
Costing	0.32	0.43	0.43	0.38
<b>Totals:</b>	<b>12.07</b>	<b>10.28</b>	<b>9.17</b>	<b>8.42</b>

Table 1: Batch Performance

## SERVER PERFORMANCE

Figure 3 shows the average CPU utilization for each process. The value shown is the average across all 4 processors in each server.



**Figure 3: Average CPU Utilization**

No processes were I/O bound in these tests.

## I/O PERFORMANCE

The database was stored on 160GB, spread across five RAID 0 LUNs, residing on the three DS4500s. The remaining drives were configured as RAID 5 LUNs, used to store Oracle binaries, backups and system administration related files.

No I/O bottlenecks were observed.

## DATA COMPOSITION DESCRIPTION

History data was created prior to the timed benchmark runs. This yielded data for 6 semi-monthly pay periods.

	Small Model
# of employees	Configurable (5,000)
# of assignments	Equal to number of employees (5,000)
# of elements	11
# of payroll	1
# of consolidation sets	1
# of Location	2

**Table 2: Payroll Data**

	Criteria & Deductions
Elements	Regular Salary
	Federal Income Tax (FIT)
	FUTA
	SS_EE
	SS_ER
	Medicare_EE
	Medicare_ER
	Vertex
	Workers Compensation
	Union Dues
	After-Tax Life
Payroll	Semi-Monthly
Locations	Texas
	Orlando (FL)

**Table 3: Workload Factors**

## TUNING RECOMMENDATIONS

The database was created on raw devices, with async I/O enabled for optimum performance. The database initialization parameters (init.ora) were in accordance with MetaLink Doc ID 216205.1, "Database Initialization Parameters and Configuration for Oracle Applications 11i".

Hugepages were configured as described in MetaLink Doc ID 317139.1, "How to Configure SuSE SLES 9 for Very large Memory with ramfs and hugepages".

## BENCHMARK ENVIRONMENT

### HARDWARE CONFIGURATION

#### **Database Server:**

The IBM eServer xSeries 366 4-way was used as the database server. It was equipped with the following:

- 4 × 3.66 GHz Intel® Xeon™ MP Processors (EM64T), each with 1 Megabyte of Level-2 Cache with HyperThreading™ enabled
- 32 Gigabytes of Memory
- Integrated Serial Attached SCSI (SAS) controller to support SAS disk drives
- One internal 73.4GB SAS disk drive
- Integrated dual Gigabit Ethernet
- Four Fibre Channel Host Bus Adapters

#### **Application Server:**

The IBM eServer xSeries 366 4-way server was used as the application server. It was equipped with the following:

- 4 × 3.66 GHz Intel® Xeon™ MP Processors (EM64T), each with 1 Megabyte of Level-2 Cache with HyperThreading™ enabled
- 32 Gigabytes of Memory
- Integrated Serial Attached SCSI (SAS) controller to support SAS disk drives
- One internal 36.4GB SAS disk drive
- Integrated dual Gigabit Ethernet
- Four Fibre Channel Host Bus Adapters

#### **Storage Area Network:**

The SAN consisted of three IBM TotalStorage DS4500s with dual RAID controllers, with 1GB Cache on each controller.

## SOFTWARE VERSIONS

Oracle's E-Business Suite (eBS Kit) 11.5.10

Oracle10g™ 10.1.0.4 (32-bit)

Novell® SUSE™ Linux Enterprise Server 9 for x86 with SP1 (on the database server and application server) kernel 2.6.5-7.139-bigsm



### **IBM**

#### **IBM xSeries Performance Lab**

Research Triangle Park, NC

#### **Solutions Enablement**

Redwood Shores, CA

#### **IBM / Oracle International Competency Center**

San Mateo, CA

World Wide Web <http://www.ibm.com>



### **Oracle**

#### **Applications Performance & Benchmarks**

500 Oracle Parkway

Redwood Shores, California 94065

Tel 650/506-0658

Fax 650/506-0658

Email [info@oracle.com](mailto:info@oracle.com)

World Wide Web <http://www.oracle.com>

E-Business Suite, AppsNet, Collaboration Suite, Oracle Direct and RAC are trademarks of Oracle, Inc. Oracle, JD Edwards and PeopleSoft are registered trademarks of Oracle Corporation and/or its affiliates. Other names may be trademarks of their respective owners. The information contained herein is subject to change without notice. Copyright © 2005 Oracle, Inc. All rights reserved. C/N 0XXX-0905

IBM, the IBM logo, the eServer logo, eServer, xSeries, and TotalStorage are trademarks or registered trademarks of International Business Machines, Inc. in the United States, other countries, or both.