

# ORACLE'S PEOPLESOFT HRMS 9.1 FP2 PAYROLL USING ORACLE DB FOR ORACLE SOLARIS (UNICODE) ON AN ORACLE'S SPARC T4-4

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

PeopleSoft Enterprise Payroll (North American) 9.1 FP2			
Extra-Large Data Model			
500,480 Employees 500,480 Payments	32 Job Streams	64 Job Streams	128 Job Streams
Minutes	46.28	33.42	26.83
Payments/Hour	648,850	898,527	1,119,224

The benchmark measured five Payroll application business process runtimes for one database model representing an extra-large organization. A single execution strategy was executed to model the preferred customer option. Testing was conducted in a controlled environment with no other applications running. The tuning changes, (if any) were approved by PeopleSoft Development and will be generally available in a future release or update. **The goal of this benchmark was to obtain baseline Extra-Large-model results for Oracle (PeopleSoft) Enterprise Payroll 9.1 FP2 using Oracle on a SPARC T4-4 server.**

This report summarizing batch processing in HCM 9.1 FP2 on this particular hardware and software environment is one of three. Two complementary reports cover stand-alone OLTP and concurrent batch/OLTP results on this same environment for further performance analysis.

## BENCHMARK PROFILE

In October 2012, Oracle Sun conducted a benchmark in Burlington, MA in collaboration with Oracle (PeopleSoft) to measure the batch performance of the Paysheet Creation, Payroll Calculation and Payroll Confirmation processes in PeopleSoft Enterprise Payroll 9.1 FP2 (North American) using Oracle11g™ R2 on a 4-way Eight-Core (32 cores in all – 256 vcpus) Oracle's SPARC T4-4 database server, running Solaris 11 11/11. Approximately 568 GB of storage (296 GB on Comstar/F5100 + 182 GB on F5100 + 90 GB redo logs on X4275) was allocated to the database instance.

Oracle Enterprise Payroll 9.1 FP2 Using Oracle11g for Solaris on a SPARC T4-4

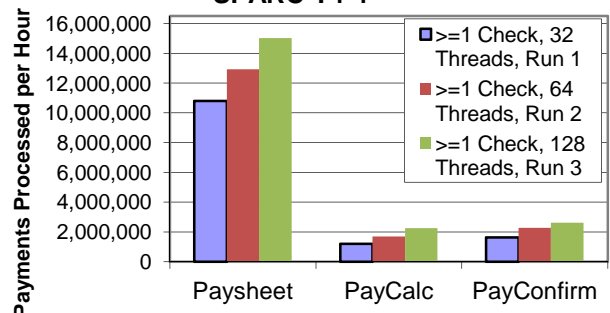


Figure 1: Enterprise Payroll 9.1 FP2 Payments/Hour

## METHODOLOGY

For this benchmark, all jobs were initiated on the server from a browser.

This application was run as thirty-two, sixty-four, and one hundred twenty-eight concurrent processes.

Batch processes are background processes, requiring no operator intervention or interactivity. Results of these processes are automatically logged in the database.

## BUSINESS PROCESSES

The five Payroll processes tested are as follows:

**Paysheet Creation:** Generates payroll data worksheets for employees, consisting of standard payroll information for each employee for the given pay cycle. The Paysheet process can be run separately from the other two tasks, usually before the end of the pay period.

**Payroll Calculation:** Looks at Paysheets and calculates checks for those employees. Payroll Calculation can be run any number of times throughout the pay period. The first run will do most of the processing, while each successive run updates only the calculated totals of changed items. This iterative design minimizes the time required to calculate a payroll, as well as the processing resources required. In this benchmark, Payroll Calculation was run only once, as though at the end of a pay period.

**Payroll Confirmation:** Takes the information generated by Payroll Calculation and updates the employees' balances with the calculated amounts. The system assigns check numbers at this time and creates direct deposit records. Confirm can only be run once, and therefore, must be run at the end of the pay period.

**Print Advice Forms:** This process takes the information generated by Payroll Calculation and Confirmation and produces an Advice for each employee to report Earnings, Taxes, Deductions, net pay and bank accounts where Net Pay were sent.

**Create Direct Deposit File:** This process takes the information generated by Payroll Calculation and Confirmation and produces an electronic transmittal file used to transfer payroll funds directly into an employee's bank account.

## BATCH PROCESS STRATEGIES

The figure below summarizes the execution strategy that was undertaken for this benchmark. The runs did not use the 'Single-Check' option but did use multiple job streams.

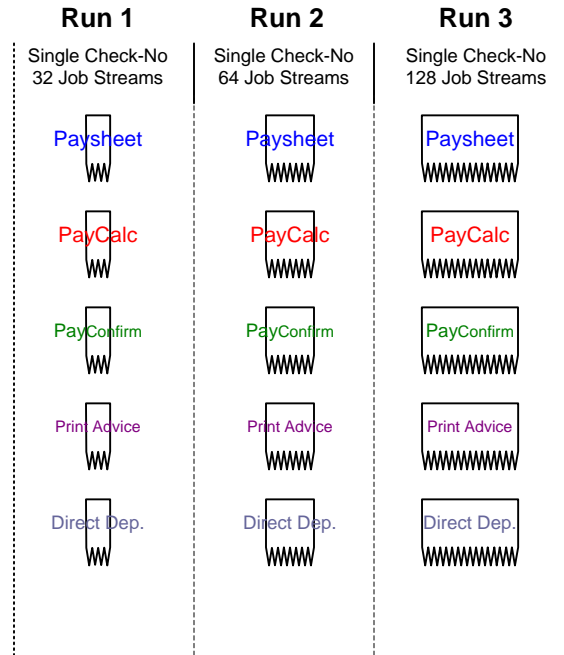


Figure 2: Batch Job Stream Execution Variations

## BATCH RESULTS

The table below contains the actual runtimes, in minutes, for the Payroll processes. It also shows how many employees were processed and the number of checks and advices produced.

	Shortest		
	Run 1	Run 2	Run 3
<b>Job Streams</b>	<b>32</b>	<b>64</b>	<b>128</b>
<b>Single Check</b>	<b>No</b>	<b>No</b>	<b>No</b>
<b>Employees</b>	500,480	500,480	500,480
<b>Jobs</b>	500,480	500,480	500,480
<b>PayCheck</b>	0	0	0
<b>PayAdvice</b>	500,480	500,480	500,480
<b>Payments</b>	500,480	500,480	500,480
<b>Paysheet</b>	2.78	2.32	2.0
<b>PayCalc</b>	25.05	17.85	13.33
<b>PayConfirm</b>	18.45	13.25	11.5
<b>Total Minutes</b>	46.28	33.42	26.83
<b>Total Hours</b>	0.78	0.58	0.41
<b>Print Advice</b>	12.02	8.3	7.63
<b>Direct Deposit</b>	0.5	0.53	0.35
<b>Total Minutes</b>	12.52	8.83	7.98

**Table 1: PeopleSoft 9.1 FP2 Payroll Process Runtimes**

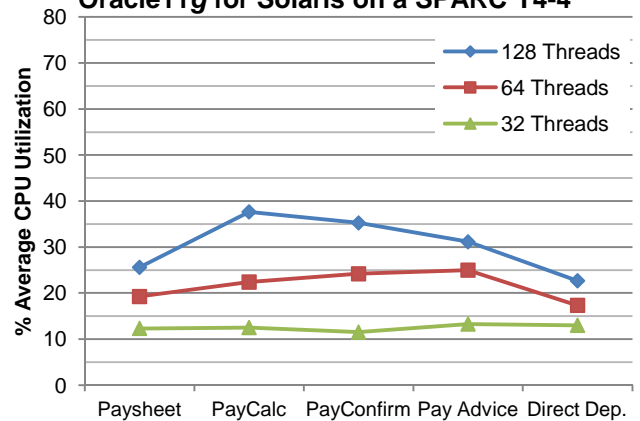
	Highest		
	Run 1	Run 2	Run 3
<b>Job Streams</b>	<b>32</b>	<b>64</b>	<b>128</b>
<b>Single Check</b>	<b>No</b>	<b>No</b>	<b>No</b>
<b>Paysheet</b>	10,801,726	12,943,448	15,014,400
<b>PayCalc</b>	1,198,754	1,682,285	2,252,723
<b>PayConfirm</b>	1,627,577	2,266,324	2,611,200
<b>Net per Hour</b>	648,850	898,527	1,119,224
<b>Print Advice</b>	2,498,236	3,617,927	3,935,622
<b>Direct Deposit</b>	60,057,600	56,658,113	85,796,571

**Table 2: PeopleSoft 9.1 FP2 Payroll Process Throughputs**

The throughputs above are linear extrapolations only. For Paysheet, PayCalc and PayConfirm the throughputs are payments per hour. For Print Advice and Direct Deposit, throughputs are PayAdvice per hour. Performance may vary on other hardware and software platforms and with other data composition models.

## SERVER PERFORMANCE

**Oracle Enterprise Payroll 9.1 FP2 using Oracle11g for Solaris on a SPARC T4-4**



**Figure 3: Average CPU Utilization**

Note that even the 128-Thread run only used half of the 256 vCPUs available on this server. Other processing could have been carried out concurrently.

	Job Streams	User	System	Idle
<b>Paysheet</b>	32	9.63	2.50	87.69
	64	15.46	3.46	80.77
	128	20.75	4.75	74.42
<b>PayCalc</b>	32	10.63	1.92	87.50
	64	19.26	3.07	77.61
	128	32.47	5.20	62.35
<b>PayConfirm</b>	32	9.41	2.62	88.49
	64	19.69	4.74	75.81
	128	28.95	6.44	64.75
<b>Print Advice</b>	32	10.31	2.94	86.73
	64	19.58	5.67	75.02
	128	24.42	6.84	68.87
<b>Direct Dep.</b>	32	8.33	4.67	87.00
	64	11.67	5.67	82.67
	128	15.33	7.67	77.33

**Table 3: Average CPU Utilization**

## I/O PERFORMANCE

The Oracle's Sun Storage F5100 Flash Arrays were used for storage of tables, indexes and for undo and redo logs. I/O performance is crucial to batch performance. Reads and Writes per second are summarized in the following table.

Job Streams	128			
	Reads/S	Writes/S	KB R./S	KB W./S
Paysheet	326	666	8,894	35,402
PayCalc	2,406	903	51,777	65,552
PayConfirm	2,798	1,612	22,385	81,291
Print Advice	9	11	81	93
Direct Deposit	2,839	46	22,712	691
Job Streams	64			
	Reads/S	Writes/S	KB R./S	KB W./S
Paysheet	327	456	9,044	30,173
PayCalc	323	105	6,160	9,159
PayConfirm	1,931	1,124	15,454	53,223
Print Advice	8	10	73	134
Direct Deposit	423	42	3,389	679
Job Streams	32			
	Reads/S	Writes/S	KB R./S	KB W./S
Paysheet	206	268	5,789	25,482
PayCalc	1,283	352	25,707	32,540
PayConfirm	2,766	1,111	22,133	57,781
Print Advice	6	153	57	3,191
Direct Deposit	890	41	7,119	674

**Table 4: I/O Performance**

### Employee Profiles

- Part-time, hourly paid weekly with one additional pay, with Federal and California State tax, two general deductions and eight per pay period benefit deductions, one garnishment (KU0200).
- One Part-time salaried and paid monthly with one additional pay, with Federal and California State tax, one general deduction, three garnishments and seven per pay period benefit deductions with Absence Management (KU0202 ER0).
- One Part-time exception hourly paid bi-weekly with one additional pay, with Federal and California State tax, one general deduction, three garnishments and seven per pay period benefit deductions with Absence Management (KU0202 ER1).
- Full-time salaried paid monthly with Federal, New Jersey and New York State tax and New Jersey local tax, with five benefit deductions and no general deductions with Absence Management (KU0203).

## DATA COMPOSITION DESCRIPTION

There are 500,480 active employees and each employee has eleven months of payroll history. Within the active employee population, there are a total of 500,480 Jobs from which the active employees receive compensation. In this benchmark there are a total of 500,480 payments.

The employees were distributed over four monthly, semi-monthly, bi-weekly and weekly pay groups. Each of these pay groups was assigned to 32 pay groups for a total of 128 pay groups. With further sub-divisions, the benchmark was set up for 32, 64, or 128 concurrent processes for the Paysheet, PayCalc and PayConfirm processes for this test. The employee profiles are as follows:

Employee ID	Pay Group	Pay Freq.	Employee Type	Employee Status
KU0200	PB1	Weekly	Hourly	PT 20 Hrs
KU0202, ER0	PB4	Monthly	Salaried	PT 30 Hrs
KU0202, ER1	PB2	Bi-Weekly	Exc Hourly	PT 10 Hrs
KU0203	PB4	Monthly	Salaried	FT
KU0204	PB2	Bi-Weekly	Salaried	FT
KU0205	PB3	Semi-Mon.	Salaried	FT
KU0208, ER0	PB1	Weekly	Salaried	PT 20 Hrs
KU0209	PB3	Semi-Mon.	Hourly	FT

**Table 5: Employee Profiles for Seed Data**

- Full time, salaried paid biweekly with Federal and Pennsylvania State tax and seven per pay period benefit deductions (KU0204).
- Full time, salaried paid semi-monthly with one additional pay, with Federal and Michigan State tax, five per pay period benefit deductions, with Time and Labor (KU0205).
- One Part-time salaried paid weekly with one additional pay, with Federal and Georgia State tax, seven per pay period benefit deductions and one general deduction with Absence Management and Time and Labor (KU0208 ER0).
- Full time, hourly paid semi-monthly with one additional pay, with Federal and California State tax, seven per pay period benefit deductions and no general deductions (KU0209)

The benchmarking payroll Pay\_End\_Dt is Dec 9<sup>th</sup> (PB1 weekly), Dec 16<sup>th</sup> (PB2 bi-weekly), Dec 15<sup>th</sup> (PB3 semi-monthly), or Dec 31<sup>st</sup> (PB4 monthly). The database reflects ~11 months history in calendar year 2006.

Note that this 'Data Model' has been revised from that used for Release 9.1. Direct comparison between this result and results published for earlier releases is impossible.

## BENCHMARK ENVIRONMENT

### HARDWARE CONFIGURATION

#### **Database Server:**

1 × Oracle's SPARC T4-4 server was used as the database server. It was equipped with the following:

- 4 × 3.0 GHz SPARC T4 Eight-Core processors (sockets), each with 16 Kilobytes of Instruction and 16 Kilobytes of Data Level-1 on core cache, 128 Kilobytes of shared Instruction and Data Level-2 cache per core, and 4 Megabytes of Level-3 on-chip cache (32 cores total – 256 vcpus)
- 256 Gigabytes of Memory (~117 GB used at peak load)
- 1 × 600 GB SAS internal disk (Oracle 11gR2 software, UFS file system)
- 1 × 300 GB SAS internal disks (PeopleSoft tools, UFS file system)
- 1 × 300 GB SAS internal disks (OS disk installed on ZFS storage pool)

One of Oracle's Sun Server X2-4 Storage Server (4 × 2 GHz Xeon X7550, 128 GB mem) with 1 × 8 Gbit FiberChannel HBA, 4 × SAS HBA and with attached Oracle's Sun Storage F5100 Flash Array Storage systems with 80 Flash Modules (FMODs) was used. The F5100 was equipped with the following:

- 80 × 24 GB FMODs in sun Storage Flash Array F511 device (FM size is 24 GB, once formatted ~22.98 GB)
- Approximately 296 GB of database data storage out of ~900 GB (aggregate) from one ~1800 GB (mirrored) Oracle's Sun Storage F5100 Flash Array storage system was allocated as data storage to the database instance using Oracle Automatic Storage Management (ASM) for database files management.
- Oracle Solaris 11 11/11 X86 configured as COMSTAR Storage Server.

One of Oracle's Sun Storage F5100 Flash Array Storage system directly attached via 4 × SAS HBA interfaces to SPARC T4-4 was used. The F5100 was equipped with the following:

- 40 × 24 GB FMODs in sun Storage Flash Array F511 device
- Approximately 182 GB of database data storage out of ~450 GB (aggregate) from one ~900 GB (mirrored) Oracle's Sun Storage F5100 Flash Array storage system was allocated as data storage to the database instance using Oracle Automatic Storage Management (ASM) for database files management.

One of Oracle's Sun X4275 Storage Servers for Redo log data, equipped with:

- 1 × 2.53 GHz XEON E5540 and 6 GB memory
- 12 × 2 TB SAS disks with Niwot Raid controller
- 1 × 8 Gb FC HBA
- The X4275 was attached to the database instance on the SPARC T4-4 providing 3 × 30 GB mirrored (hardware RAID 1) redo Logs (total space used ~180 GB)
- Oracle Solaris 11 Express 2010.11 X86 configured as COMSTAR Storage Servers.

## SOFTWARE VERSIONS

Oracle's PeopleSoft HRMS and Campus Solutions  
9.10.00.000 with FP2

Oracle's PeopleSoft Enterprise (PeopleTools) 8.52.03

Oracle11g 11.2.0.3.0 (64-bit)

Oracle Solaris 11 11/11

Micro Focus COBOL Server Express 5.1 ws6 (64-bit)

Oracle Tuxedo 10.3.0.0 (64-bit) Patch Level 043



### Oracle (PeopleSoft) Pleasanton

5815 Owens Drive

P. O. Box 8018

Pleasanton, California 94588-8618

Tel 925/694-3000

Fax 925/694-3100

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

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



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Oracle Corporation  
World Headquarters  
500 Oracle Parkway  
Redwood Shores, CA 94065  
U.S.A.

Worldwide Inquiries:  
Phone: +1.650.506.7000  
Fax: +1.650.506.7200

[oracle.com](http://oracle.com)



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