ORACLE'S PEOPLESOFT HRMS 9.1 FP2 PAYROLL USING ORACLE DB FOR ORACLE SOLARIS (UNICODE) ON AN ORACLE'S SPARC M6-32

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	36.23	23.82	18.27
Payments/Hour	828,838	1,260,654	1,643,612

BENCHMARK PROFILE

In January 2014, 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 Oracle11*g*™ R2. The database server used Oracle11*g*™ R2 on a 2-way Twelve-Core (24 cores in all) Oracle's SPARC M6-32 database server, running Solaris 11.1 11.1.10.5.2 (SRU10.5). Approximately 600 GB of storage (5.67 TB DB data on 2×2540-M2 $+ 2 \times 2501$) and 200 GB of storage (1.26 TB redo logs on X3-2L) was allocated to the database instance.

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 M6-32 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.
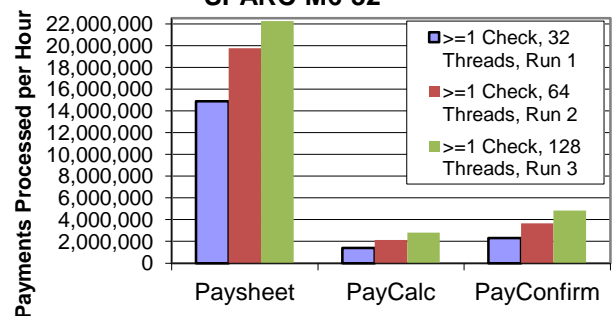

Figure 1: Enterprise Payroll 9.1 FP2 Payments/Hour

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.
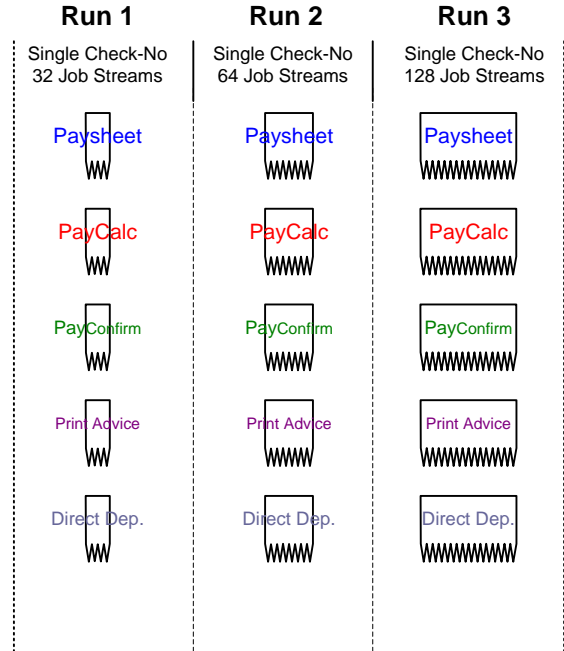

Figure 2: Batch Job Stream Execution Variations

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
Job Streams	32	64	128
Single Check	No	No	No
Employees	500,480	500,480	500,480
Jobs	500,480	500,480	500,480
PayCheck	0	0	0
PayAdvice	500,480	500,480	500,480
Payments	500,480	500,480	500,480
Paysheet	2.02	1.52	1.35
PayCalc	21.28	14.07	10.72
PayConfirm	12.93	8.23	6.2
Total Minutes	36.23	23.82	18.27
Total Hours	0.6	0.4	0.3
Print Advice	10.25	6.75	5.32
Direct Deposit	0.5	0.27	0.35
Total Minutes	10.75	7.02	5.67

Table 1: PeopleSoft 9.1 FP2 Payroll Process Runtimes

			Highest
	Run 1	Run 2	Run 3
Job Streams	32	64	128
Single Check	No	No	No
Paysheet	14,865,742	19,755,789	22,243,555
PayCalc	1,411,127	2,134,243	2,801,194
PayConfirm	2,322,413	3,648,699	4,843,354
Net per Hour	828,838	1,260,654	1,643,612
Print Advice	2,929,639	4,448,711	5,644,511
Direct Deposit	60,057,600	111,217,777	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

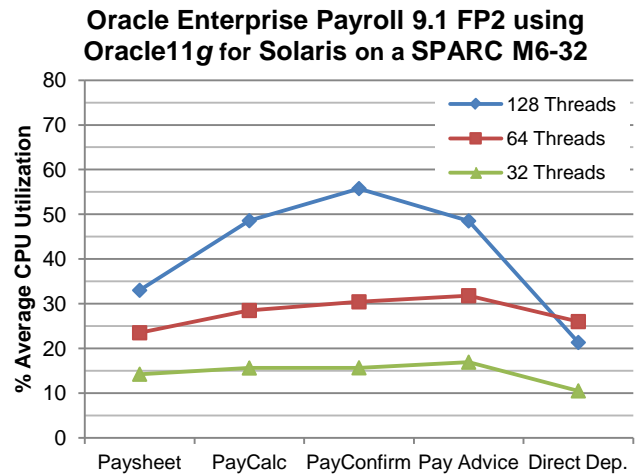**Oracle Enterprise Payroll 9.1 FP2 using Oracle11g for Solaris on a SPARC M6-32**

Figure 3: Average CPU Utilization

Note that even the 128-Thread run only used two-thirds of the 192 vCPUs available on this server. Other processing could have been carried out concurrently. Also notice that the final process, the 'Direct Deposit' action is very brief, so that there were few CPU data points to average (thus the minimal difference between the 64-thread and 128-thread averages).

	Job Streams	User	System	Idle
Paysheet	32	10.7	3.4	85.8
	64	18.9	4.9	76.5
	128	26.8	6.1	67.0
PayCalc	32	13.2	2.4	84.4
	64	24.5	3.9	71.5
	128	42.7	5.8	51.4
PayConfirm	32	12.5	3.1	84.3
	64	25.1	5.4	69.6
	128	47.1	8.5	44.2
Print Advice	32	13.1	3.8	83.1
	64	24.9	6.6	68.2
	128	39.2	9.5	51.5
Direct Dep.	32	7.0	3.7	89.5
	64	17.5	9.0	74.0
	128	14.3	7.0	78.7

Table 3: Average CPU Utilization

I/O PERFORMANCE

Oracle's Sun Storage 2540-M2 Arrays with 2501 expansion trays were used for storage of tables, indexes and for undo logs. Oracle's Sun Server X3-2L was used for storage of 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	2013.5	919.6	72116.8	127416.5
PayCalc	2489.3	1078.2	74866.7	98832.1
PayConfirm	596.3	1767.4	25234.3	180321.3
Print Advice	7.7	2074.9	114.9	56787.7
Direct Deposit	1.39	158.63	18.4	2173.3
Job Streams	64			
	Reads/S	Writes/S	KB R./S	KB W./S
Paysheet	1915.4	592.5	65276.3	114626.4
PayCalc	1900.3	775.9	57310.4	77864.5
PayConfirm	437.3	1595.9	18914.9	134115.3
Print Advice	7.8	1425.5	117.8	32150.
Direct Deposit	30.9	69.7	872.4	546.4
Job Streams	32			
	Reads/S	Writes/S	KB R./S	KB W./S
Paysheet	1458.1	385.2	49818.3	88359.6
PayCalc	1250.4	522.9	37763.2	52535.8
PayConfirm	285.0	1475.2	12052.5	97400.6
Print Advice	8.9	614.9	89.7	15623.6
Direct Deposit	20.5	12.7	551.3	46.8

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 9th (PB1 weekly), Dec 16th (PB2 bi-weekly), Dec 15th (PB3 semi-monthly), or Dec 31st (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 Solaris Zone with 24 cores on an Oracle's SPARC M6-32 server was used as a database server. It was equipped with the following:

- 2 × 3.6 GHz SPARC™ M6 Twelve-Core processors 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 48 Megabytes of Level-3 on-chip cache (24 cores total – 192 vcpus/threads)

- 1 Terabyte of Memory (~851 GB used at peak load)

- 600 GB of DB data mirrored volume created using 2 × 2540-M2 + 2 × 2501 [48 × 300 GB 15k rpm SAS drives]

- 200 GB of DB redo log volume using 1 × Sun Server X3-2L [1 × 8-Port 6Gbps SAS-2 RAID PCI Express HBA, 12 × 3 TB 7.2K rpm SAS drives] with Oracle Solaris 11.1 (COMSTAR)

SOFTWARE VERSIONS

Oracle's PeopleSoft HRMS and Campus Solutions 9.10.00.000 with FP2

Oracle's PeopleSoft Enterprise (PeopleTools) 8.52.03

Oracle11*g* 11.2.0.3.0 (64-bit)

Oracle Solaris 11.1 (11.1.10.5.2) (SRU10.5)

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

Oracle Tuxedo 10.3.0.0 (64-bit) Patch Level 043

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