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ORACLE ENTERPRISE BENCHMARK REV. 1.1

PEOPLESOFT ENTERPRISE PAYROLL 9.0 USING ORACLE FOR SOLARIS ON A SUN® SPARC Enterprise™ M5000

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	
Extra-Large Volume Model	
Payroll	500,480 Employees 750,720 Payments 50.11 minutes
Payments/Hour	898,886 per hour

The benchmark measured five Payroll application business process runtimes for one database model representing an extra-large organization. Three different execution strategies were executed to model different customer options. 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 using Oracle on a Sun SPARC Enterprise M5000 server.**

BENCHMARK PROFILE

In May 2010, Oracle Sun conducted a benchmark in Menlo Park, CA in collaboration with Oracle (PeopleSoft) to measure the batch performance of the Paysheet Creation, Payroll Calculation and Payroll Confirmation processes in PeopleSoft Enterprise Payroll 9.0 (North American) using Oracle11*g*™ on an 8-way Quad-Core (32 cores in all – 64 vcpus) Oracle's Sun SPARC Enterprise M5000 database server, running Solaris 10 10/09. Approximately 530 GB of storage from one 960 GB Oracle's Sun Storage F5100 Flash Array storage system and one 272 gigabyte Oracle's StorageTek 2510 Array (RAID 0) was allocated to the database instance (~240 GB used for DB).

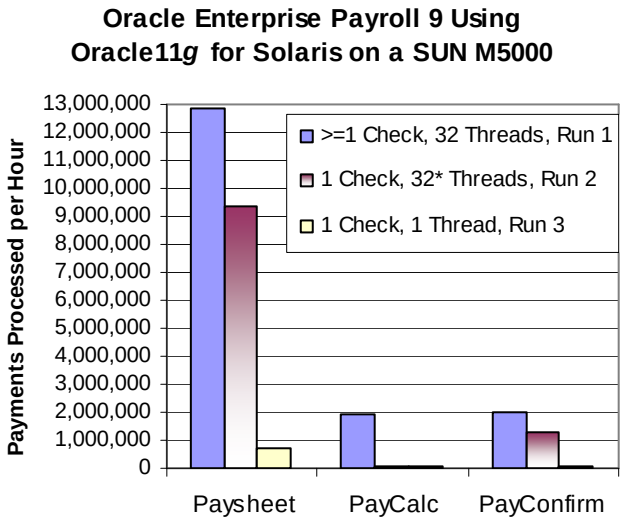

Figure 1: Enterprise Payroll 9.0 Payments/Hour

METHODOLOGY

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

This application was run as thirty-two concurrent processes, or as single-streamed 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 three different execution strategies that were undertaken for this benchmark. The first run did not use the 'Single-Check' option but did use multiple job streams. The second run did use the 'Single-Check' option, but with the 'PayCalc' process being sequential serial jobs, rather than concurrent parallel jobs. The third run was executed as a single job stream with the 'Single-Check' option.

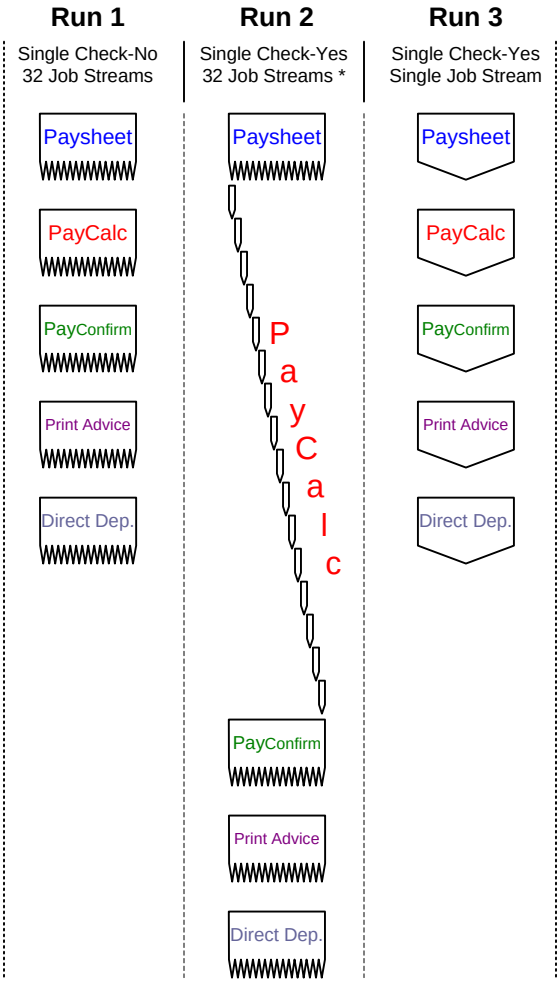

Figure 2: Batch Job Stream Execution Variations

* For Paycalc only, this is effectively 32 jobs run sequentially.

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 ⇐		Longest
	Run 1	**Run 2**	**Run 3**
Job Streams	**32**	**32 ***	**1**
Single Check	**No**	**Yes**	**Yes**
Employees	*500,480*	*500,480*	*500,480*
Jobs	*750,720*	*750,720*	*750,720*
PayCheck	*100,096*	*0*	*0*
PayAdvice	*650,624*	*550,528*	*550,528*
Payments	*750,720*	*550,528*	*550,528*
Paysheet	3.5	3.52	48.28
PayCalc	23.78	484.1	446.13
PayConfirm	22.83	25.33	390.5
Total Minutes	50.11	512.95	884.91
Total Hours	0.83	8.55	14.75
Print Advice	21.77	19.5	374.57
Direct Deposit	2.0	1.75	7.5
Total Minutes	23.77	21.25	382.07

Table 1: PeopleSoft 9 Payroll Process Runtimes

* For Paycalc only, this is effectively 32 jobs run sequentially.

	Highest ⇔		Lowest
	Run 1	**Run 2**	**Run 3**
Job Streams	**32**	**32 ***	**1**
Single Check	**No**	**Yes**	**Yes**
Paysheet	12,869,485	9,384,000	684,169
PayCalc	1,894,163	68,233	74,040
PayConfirm	1,972,892	1,304,053	84,588
Net per Hour	898,886	64,395	17,900
Print Advice	1,793,175	1,693,932	88,185
Direct Deposit	19,518,720	18,875,245	4,404,224

Table 2: PeopleSoft 9 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

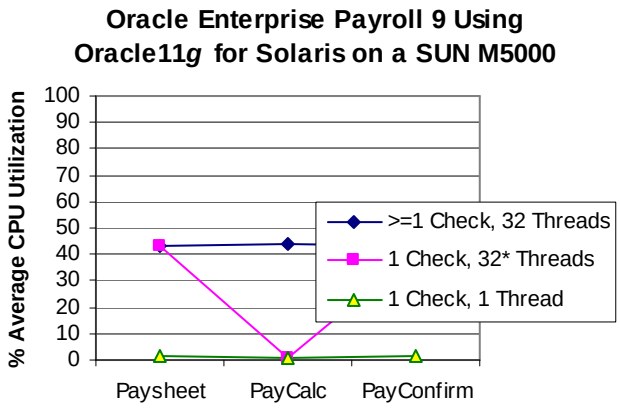

Figure 3: Average CPU Utilization

	Highest ⇔		Lowest
	Run 1	**Run 2**	**Run 3**
Job Streams	**32**	**32 ***	**1**
Single Check	**No**	**Yes**	**Yes**
Paysheet	43.48	43.39	1.61
PayCalc	43.69	1.09	1.11
PayConfirm	43.1	40.81	1.18
Print Advice	43.99	43.45	1.44
Direct Deposit	41.8	42.9	1.89

Table 3: Average CPU Utilization

I/O PERFORMANCE

The Oracle's Sun Storage F5100 Flash Array was used for storage of tables, indexes and 'undo' and that the Oracle's StorageTek 2510 Array was used for redo logs only. I/O performance is crucial to batch performance. Reads and Writes per second are summarized for each of the three runs in the following table.

	Run 1		**Run 2**		**Run 3**	
Job Streams	**32**		**32 ***		**1**	
Single Check	**No**		**Yes**		**Yes**	
	Reads	*Writes*	Reads	*Writes*	Reads	*Writes*
Paysheet	**1811**	*136*	**1874**	*139*	**130**	*71*
PayCalc	**1796**	*434*	**103**	*37*	**119**	*48*
PayConfirm	**5240**	*1746*	**4910**	*1836*	**307**	*82*
Print Advice	**2504**	*278*	**2756**	*284*	**131**	*4*
Direct Deposit	**330**	*119*	**215**	*114*	**111**	*7*

Table 4: I/O Performance

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 750,720 Jobs from which the active employees receive compensation. In the Pay Cycle benchmarked, 350,336 employees have one active Job record and will receive 1 payment each. 50,048 employees have two active Job records for a total of 100,096 Jobs allocated to these employees (Employee ID prefix KU202). Each Job is in a differently defined Paygroup and each employee will receive two payments. Lastly, 100,096 employees have three active Job records for a total of 300,288 Jobs allocated to these employees (Employee ID prefixes KU0207 and KU0208). Each Job is in a similarly defined Paygroup. These 100,096 employees will receive 1 payment each if the Single Check option is activated, or 3 payments, if it is not. Payments from multiple jobs can only be consolidated into a single payment when the Jobs are assigned to either the same Paygroup, or different Paygroups that share the same Pay_End_Dt. In this benchmark there are a total of 550,528 payments after consolidation when the Single Check option is activated and a total of 750,720 payments when the Single Check option is not active.

The employees were distributed over four monthly, semi-monthly, bi-weekly and weekly pay groups with ten different employee profiles. Each of these was assigned to 32 pay groups. Hence, the benchmark was set up for 32 concurrent processes for the Paysheet and confirmation processes for this test. The profiles are as follows:

Employee ID	Pay Group	Pay Freq.	Employee Type	Employee Status
KU0200	PB1	Weekly	Hourly	PT 20 Hrs
KU0201	PB2	Bi-Weekly	Hourly	FT
KU0202	PB4	Monthly	Salaried	PT 30 Hrs
	PB2	Bi-Weekly	Exc Hourly	PT 10 Hrs
KU0203	PB4	Monthly	Salaried	FT
KU0204(a)	PB2	Bi-Weekly	Salaried	FT
KU0204(b)	PB2	Bi-Weekly	Salaried	FT
KU0205	PB3	Semi-Mon.	Salaried	FT
KU0207	PB1	Weekly	Hourly	PT 20 Hrs
	PB1	Weekly	Hourly	PT 10 Hrs
	PB1	Weekly	Hourly	PT 10 Hrs
KU0208	PB1	Weekly	Salaried	PT 20 Hrs
	PB1	Weekly	Salaried	PT 10 Hrs
	PB1	Weekly	Salaried	PT 10 Hrs
KU0209	PB3	Semi-Mon.	Hourly	FT

Table 5: Employee Profiles for Seed Data

- Part-time, hourly paid weekly with Federal and California State tax, three general deductions and nine per pay period benefit deductions, one garnishment deduction and two direct deposits (KU0200).

- Full time, hourly, paid biweekly with federal and Ohio State and local tax deductions and nine per pay period benefit and two general deductions with Time and Labor. (KU0201)

- Two Part-time jobs, one salaried paid monthly and the other exception hourly paid biweekly, with federal and California State tax, four general deductions and eight per pay period benefit deductions with Absence Management (KU0202)

- Full-time salaried paid monthly with Federal and California and New York reciprocity tax, with six benefit deductions and no general deductions with Absence Management (KU0203)

- Full time, salaried paid biweekly with federal and Pennsylvania state and four local tax deductions and eight per pay period benefit deductions (KU0204) (Used twice)

- Full time, salaried paid semi-monthly, with federal and Michigan state and local tax deductions, six per pay period benefit deductions, with Time and Labor (KU0205)

- Three Part-time jobs, all hourly paid weekly, with federal and Tennessee State tax, three general deductions and eight per pay period benefit deductions and one direct deposit with Absence Management and Time and Labor (KU0207)

- Three Part-time jobs, all salaried paid weekly, with federal and Georgia State tax, one general deduction and eight per pay period benefit deductions with Absence Management and Time and Labor (KU0208)

- Full time, hourly paid semi-monthly, with federal and California state tax deductions, eight 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.

For concurrent runs, when the 'Single-Check' option is enabled, all the jobs for an employee paid on the same Pay_End_Dt, must reside within a single pay 'runid.'

Note that this 'Data Model' is different, and more complex, than that used for benchmarking Releases 8.8 and 8.9. Direct comparison between this result and results published for those releases is impossible.

BENCHMARK ENVIRONMENT

A Oracle's Sun SPARC® Enterprise™ M5000 was used as the database server and process scheduler. It was equipped with the following:

- 8 × 2.53 GHz SPARC64 VII Quad-Core processors, each with 5.5 Megabytes of Level-2 on-chip cache (32 cores total – 64 vcpus)
- 64 Gigabytes of Memory (~47.18 GB used at peak load)
- 4 × Sun StorageTek™ Dual-Port SAS Fibre Channel Host Bus Adapters (HBA)

One of Oracle's Sun Storage F5100 Flash Array storage system with 40 Flash Modules (FMODs) and one of Oracle's StorageTek 2510 arrays were used. The storage arrays were equipped with the following:

- 40 × 24 GB FMODs in Flash Array F5100, and 2 × 136 GB (RAID 0) SAS 15K RPM disk drives in 2510 Array.
- ~1.2 Terabytes of total Flash and Disk Space available. Approximately 240 GB was used for the database from the 530 GB of storage allocated to the database instance.

SOFTWARE VERSIONS

Oracle's PeopleSoft HRMS and Campus Solutions 9.00.00.311

Oracle's PeopleSoft Enterprise (PeopleTools) 8.49.25

Oracle11*g* 11.1.0.7.0 (64-bit)

Oracle Solaris 10 10/09

Micro Focus COBOL Server Express 4.0 w/SP4 (64-bit)

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