

ORACLE'S PEOPLESOFT HRMS 9.1 FP2 SELF-SERVICE AND PAYROLL USING ORACLE DB FOR ORACLE SOLARIS (UNICODE) ON AN ORACLE'S SPARC M7-8 Server

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

Extra-Large Data Model Concurrent Benchmark	PeopleSoft HRMS 9.1 FP2 Self-Service		
		LDom1	LDom2
	Average Response	Search 0.67 sec, Save 0.42 sec	Search 0.85 sec, Save 0.49 sec
Concurrent Users	35,000	35,000	

500,480 Employees / Payments 128 Job Streams	PeopleSoft HRMS 9.1 FP2 Payroll Batch		
		LDom1	LDom2
	Minutes	22.71	22.96
Payments / Hour	1,322,272	1,307,875	

Figure 1: Average Response Times (Two Workloads x 2)

BENCHMARK PROFILE

In September 2015, Oracle (PeopleSoft) conducted a benchmark in Burlington, MA to measure the online and batch performance of Oracle's PeopleSoft Enterprise Human Resources Management System (HRMS) 9.1 on Oracle's SPARC M7-8 Server configured with two Oracle VM Server for SPARC (logical domains) LDom of 2 chips. Each logical domain was configured with (23 cores) for database Oracle Solaris zone (referred to simply as zone hereafter), (16 cores + 16 cores) for Application zones and (7 cores) for the Web zone. The remaining 2 cores were dedicated to network and disk interrupt handling. The database domain was configured with Oracle11g™ R2 database running Solaris 11.3. The application and web tiers were configured with 2 zones for PeopleSoft Application Server and one zone for Weblogic server respectively running Oracle Solaris 11.3. Approximately 600 GB of storage (12 TB DB data on 2 x Oracle ZFS Storage ZS3-2 Appliances) and 200 GB of storage (6.4 TB redo logs on 1 x Oracle Server X5-2L) was allocated to the database instance.

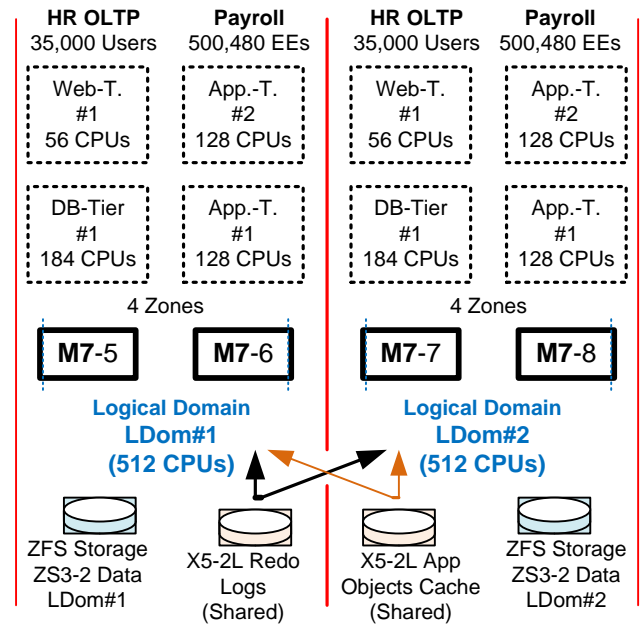


Figure 1: Virtualization Resource Apportionment

The benchmark measured client response times for a total of 70,000 concurrent users with concurrent Payroll batch executions for a total of 1,000,960 employees. The standard database composition model represents an extra-large-sized company profile. The testing was conducted in a controlled environment with no other applications running. **The goal of this Benchmark was to obtain baseline results for PeopleSoft HRMS 9.1 FP2 self-service and batch transactions with Oracle Database for Solaris on Oracle's SPARC M7 Servers.**

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

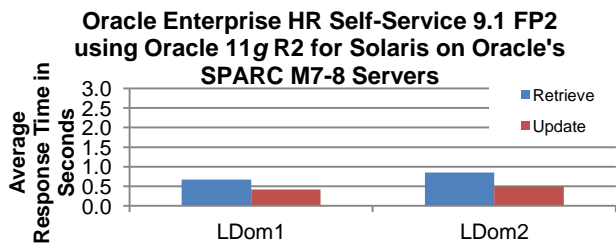


Figure 2: Average Response Times

* This average is weighted based on the business mix as reflected in Table 1: Business Process Mix.

METHODOLOGY

Oracle® ATST™ was used as the load driver, simulating concurrent users. It submitted a business process at an average rate of one every five minutes for each concurrent user.

Measurements were recorded when the user load was attained and the environment reached a steady state.

Figure 3 shows a typical 4-tier benchmark configuration.

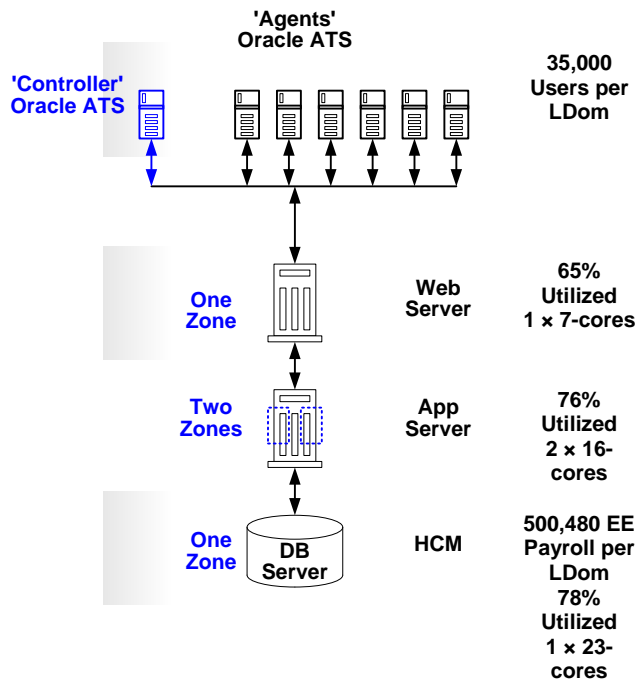


Figure 3: 4-Tier Configuration (Each LDom)

Load (search/retrieval) times were measured from the time the user clicks the <OK> button until all the data for the entire business transaction has been retrieved.

Update (save) times were measured from the time the user clicks the <SAVE> button until the system has released the page.

ONLINE BUSINESS PROCESSES

Oracle (PeopleSoft) defines a business transaction as a series of HTML pages that guide a user through a particular scenario, such as promoting an employee.

The fourteen PeopleSoft Enterprise 9.1 FP2 HRMS business processes tested in this benchmark are as follows:

EMPLOYEE SELF-SERVICE

eProfile

Update Home Address: Update address in Personal Data section.

Update Home Phone: Update phone number in Personal Data section.

eBenefits

View Benefits Summary: View overall benefits enrollment data.

Benefits Change Life: View benefits and alter the beneficiaries' allocations in the Basic Life Plan.

ePay

View Paycheck: View current paycheck information.

Update Direct Deposit Info: Add a direct deposit directive.

Employee Adds Profile Items: Add competencies to personnel profile.

MANAGER SELF-SERVICE

eDevelopment

View Employee Info: View job and personal information.

eProfile

Initiate Termination: Initiate a termination by recording an effective date and reason for termination.

Initiate Promotion: Initiate a promotion by entering a new job title and salary.

eCompensation

Initiate Employee Salary Change: Process a salary change for a single employee.

HR ADMINISTRATION

Add a Person: Add a person and their biographical details.

Hire a Person: Enter the specified job data and work location, followed by the payroll and compensation details.

Add a Job: Add job details to an existing employee.

ONLINE PROCESS RESULTS

The table below shows average retrieval (search) and update (save) times, in seconds, for each business process.

HRMS Process	% within Group	% Overall	Pacing in Min
Employee Self-Service (60%)			
Update Home Address	3%	1.8%	5
Update Phone Numbers	3%	1.8%	5
View Benefits Summary	10%	6%	5
Update Beneficiary	2%	1.2%	5
View Paycheck	78%	46.8%	5
Update Direct Deposit	2%	1.2%	5
Employee Adds Profile Items	2%	1.2%	5
Manager Self-Service (20%)			
View Employee Info	50%	10%	5
Initiate Termination	20%	4%	5
Initiate Promotion	10%	2%	5
Initiate Employee Salary Change	20%	4%	5
HR Administrator (20%)			
Add a Person	20%	4%	5
Hire a Person	40%	8%	5
Add a Job Row	40%	8%	5
Total		100%	5

Table 1: Business Process Mix

The table above shows the proportions of the business processes used in the measurements of this benchmark. The proportions are intended to simulate a typical user scenario.

The database and application servers were processing a total of 14,000 (7,000 + 7,000) business processes per minute at the peak load of 70,000 (35,000 + 35,000) concurrent users. The estimated transaction rate is calculated by dividing the total number of concurrent users by the average pacing rate.

Performance may vary on other hardware and software platforms and with other data composition models.

Process		35,000 Users LDom1	35,000 Users LDom2
Update Home Address	Search	0.64	0.84
	Save	0.92	1.0
Update Home Phone	Search	0.52	0.66
	Save	0.44	0.5
View Benefits Summary	View	0.63	0.78
Update Beneficiary	Search	0.63	0.78
	Save 1	0.11	0.18
	Save 2	0.15	0.21
	Edit/Calc	0.1	0.15
View Paycheck	Search	0.67	0.87
	View	0.61	0.75
Update Direct Deposit Info	Search	0.49	0.62
	Save	0.12	0.2
Employee Adds Profile Items	Search	0.44	0.54
	Save	0.99	1.12
	Submit	3.52	3.65
	Confirm	0.83	0.94
View Employee Info	Search	0.74	0.9
Initiate Termination	Search	0.7	0.86
	Save	0.14	0.25
	Confirm	0.07	0.15
Initiate Promotion	Search	0.77	0.91
	Save	0.82	0.91
Initiate Salary Change	Search	0.81	0.99
	Save	1.63	1.77
	Calc	0.33	0.41
Add a Person	Save	0.12	0.18
	Confirm	0.23	0.29
Hire a Person	Save 1	0.12	0.19
	Save 2	0.11	0.16
	Confirm	0.46	0.52
Add a Job	Search	0.57	0.7
	Save	0.53	0.6
	Confirm	0.18	0.24
* Average Search		0.67	0.85
* Average Save		0.42	0.49
Trans/min Est.		7,000	7,000

Table 2: Employee/Manager Process Runtimes

BATCH 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 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.

	LDom1	LDom2
Job Streams	128	128
Single Check	No	No
Employees	500,480	500,480
Jobs	500,480	500,480
PayCheck	0	0
PayAdvice	500,480	500,480
Payments	500,480	500,480
Paysheet	1.13	1.43
PayCalc	12.98	13
PayConfirm	8.6	8.53
Total Minutes	22.71	22.96
Total Hours	0.38	0.38
Print Advice	6.4	6.35
Direct Deposit	0.48	0.4
Total Minutes	6.88	6.75

Table 3: PeopleSoft 9.1 FP2 Payroll Process Runtimes

	LDom1	LDom2
Job Streams	128	128
Single Check	No	No
Paysheet	26,574,159	20,999,161
PayCalc	2,313,467	2,309,908
PayConfirm	3,491,721	3,520,375
Net per Hour	1,322,272	1,307,875
Print Advice	4,692,000	4,728,945
Direct Deposit	62,560,000	75,072,000

Table 4: 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

Figure 4 shows the average CPU utilization for the database server. The CPU utilization is the average across all of the CPUs. Notice that the OLTP ramp-up and ramp-down phases clearly book-end the batch execution. The three ‘Payroll’ batch processes are in the dark color, followed by the ‘Print Advice’ and brief ‘Direct Deposit’ processes in the light color.

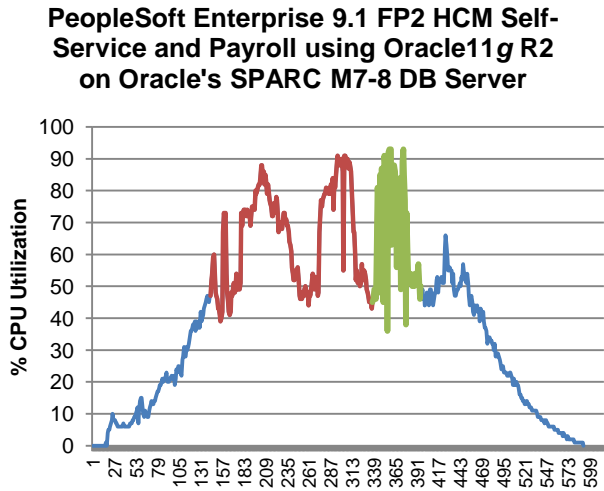


Figure 4: Average Server CPU Utilization

% CPU	LDom	User	System	Idle
DB Server	LDom1	43.33	8.22	48.44
PaySheet	LDom2	40.70	7.60	51.70
PayCalc	LDom1	59.24	8.53	32.23
	LDom2	61.70	8.40	29.98
PayConfirm	LDom1	65.45	11.96	22.57
	LDom2	66.60	11.38	22.04
Print Advice	LDom1	62.11	11.84	26.03
	LDom2	60.73	11.58	27.80
Direct Dep.	LDom1	27.50	7.25	64.75
	LDom2	23.20	5.80	70.80
App Server	LDom1	68.58	7.60	23.79
All Process.	LDom2	68.58	7.67	23.76
Web Server	LDom1	53.01	9.29	37.68
All Process.	LDom2	56.15	9.45	34.34

Table 5: Summary of CPU Utilization

	LDom1	LDom2
DB Server	426 GB	428 GB
App Server	347 GB	346 GB
Web Server	49 GB	48 GB

Table 6: Average Memory Utilization

I/O PERFORMANCE

Two Oracle ZFS Storage ZS3-2 Appliances were used for storage of tables and indexes. An Oracle Server X5-2L with NVMe was used for storage of redo logs. I/O performance is crucial to performance and is summarized as follows:

vUsers →	LDom1	LDom2
DB	Average	Average
r/s	1,641	1,615
w/s	843	827
MB r/s	17.10	16.92
MB w/s	34.10	33.56
Service Time (ms)	1.36	1.48
DB Redo		
w/s	1,919	1,888
MB w/s	23.42	23.0
Service Time (ms)	0.12	0.10
App Cache		
r/s	2,733	2,765
w/s	2,152	2,082
MB r/s	87.16	84.99
MB w/s	36.26	35.17
Service Time (ms)	0.40	0.38

Table 7: I/O Metrics

DATA COMPOSITION DESCRIPTION OF EACH DATABASE

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 four 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 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 8: Employee Profiles for Seed Data

- 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).
- 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.

OLTP DATA COMPOSITION DESCRIPTION OF EACH DATABASE

The standard database was comprised of:

- 500,480 Employees (8 per Department)
- 62,560 Managers
- 62,560 Department Table Entries

BENCHMARK ENVIRONMENT

HARDWARE CONFIGURATION (SPARC M7-8)

Database Server: (One per LDom)

1 × Oracle Solaris Zone with 23 cores on an Oracle's SPARC M7-8 server was used as a database server in each LDom. It was equipped with the following:

- 1 × 4.13 GHz SPARC™ M7 Thirty-Two 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 (32 cores total – 256 vcpus/threads)
- 1024 Gigabytes of Memory (~426 GB used at peak load) per LDOM

Two Oracle ZFS Storage ZS3-2 Appliances were used for Database data storage. The storage servers were equipped with the following:

- 40 × 300 GB 10K RPM SAS-2 HDD
- 8 × Write Flash Accelerator SSD
- 2 × Read Flash Accelerator SSD 1.6 TB SAS

One Oracle Server X5-2L was used for redo log files.

- 2 × 2.4 GHz Intel Xeon E5-2630 v3 Eight-Core processors
- 32 Gigabytes of Memory
- 4 × 1.6 TB NVMe SSD

Application Server(s): (Two per LDom)

2 × Oracle Solaris Zones with 32 cores total on an Oracle's SPARC M7-8 server were used as the application servers in each LDom. They were equipped with the following:

- 1 × 4.13 GHz SPARC™ M7 Thirty-Two 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 (32 cores total – 256 vcpus/threads)
- 1024 Gigabytes of Memory (~347 GB used at peak load) per LDOM

In the application tier, 5 PeopleSoft domains with 350 application servers (70 per each domain) were hosted in the two separate Oracle Solaris Zones for a total of 10 domains with 700 application server processes.

One Oracle Server X5-2L was used for App. objects cache.

- 2 × 2.4 GHz Intel Xeon E5-2630 v3 Eight-Core processors
- 32 Gigabytes of Memory
- 4 × 1.6 TB NVMe SSD

Web Server(s): (One per LDom)

1 × Oracle Solaris Zone with 7 cores on an Oracle's SPARC M7-8 server was used as the web server in each LDom. It was equipped with the following:

(1 zone was configured with 32 Web Logic instances with 1 GB heap size.)

- 1 × 4.13 GHz SPARC™ M7 Thirty-Two 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 (32 cores total – 256 vcpus/threads)
- 1024 Gigabytes of Memory (~49 GB used at peak load) per LDOM

Load Simulation Driver(s):

1 × Oracle Server X3-2 server was used as the load driver controller (LDom1). It was equipped with the following:

- 2 × 2.9 GHz Intel Xeon E5-2690 Eight-Core processors, each with 2 × 6 Megabytes of Level-2 on-chip cache (16 cores total)
- 128 Gigabytes of Memory

1 × Oracle Server X4-2 server was used as the load driver controller (LDom2). It was equipped with the following:

- 2 × 3.0 GHz Intel Xeon E5-2697 v2 Eight-Core processors, each with 6 Megabytes of Level-3 cache (16 cores total)
- 256 Gigabytes of Memory

6 × Oracle Server X3-2 servers were used as the load drivers (LDom1). They were equipped with the following:

- 2 × 2.9 GHz Intel Xeon E5-2690 Eight-Core processors, each with 2 × 6 Megabytes of Level-2 on-chip cache (16 cores total)
- 128 Gigabytes of Memory

6 × Oracle Server X4-2 servers were used as the load drivers (LDom2). They were equipped with the following:

- 2 × 3.0 GHz Intel Xeon E5-2697 v2 Eight-Core processors, each with 6 Megabytes of Level-3 cache (16 cores total)
- 256 Gigabytes of Memory

SOFTWARE VERSIONS

Oracle's PeopleSoft HRMS and Campus Solutions
9.10.00.000 with FP 2

Oracle's PeopleSoft Enterprise (PeopleTools) 8.52.03

Oracle Database 11g 11.2.0.3.0 (64-bit)

Oracle Solaris 11.3 (on the Database Server)

Oracle Solaris 11.3 (on the App Server and Web Server)

Java Platform, Std. Edition Development Kit 6 with Update 32

Microsoft® Windows Server 2008 R2 Enterprise Edition (on
the Controller and Drivers)

Oracle ATS Load Test software 9.20.0370

Oracle (BEA) Tuxedo® 10.3.0.0 Patch Level 043 (64-bit)

Oracle WebLogic Server™ 11g (10.3.5)



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

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



Enterprise HRMS 9.1 on SPARC M7-8
October 2015

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



Oracle is committed to developing practices and products that help protect the environment

Copyright © 2015, Oracle and/or its affiliates. All rights reserved. This document is provided for information purposes only and the contents hereof are subject to change without notice. This document is not warranted to be error-free, nor subject to any other warranties or conditions, whether expressed orally or implied in law, including implied warranties and conditions of merchantability or fitness for a particular purpose. We specifically disclaim any liability with respect to this document and no contractual obligations are formed either directly or indirectly by this document. This document may not be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without our prior written permission.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. UNIX is a registered trademark licensed through X/Open Company, Ltd. 1010

Hardware and Software, Engineered to Work Together