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ORACLE ENTERPRISE BENCHMARK REV. 1.1

ORACLE'S PEOPLESOFT HRMS 9.1 SELF-SERVICE USING ORACLE RAC DB FOR ORACLE SOLARIS (UNICODE) ON AN ORACLE'S SPARC T4-4 AND T4-2 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

Benchmark	PeopleSoft HRMS 9.1 Self-Service	
	Standard Data Model	
(English)	Average Response	Search 1.06 sec, Save 0.74 sec
	Concurrent Users	18,000
Référence d'exécution	PeopleSoft Ressources Humaines 9.1	
	Norme modèle de données	
	temps de réponse	Search 1,06 sec, Save 0,74 sec
(Français)	Concourants Utilisateurs	18.000
Benchmark-Test	PeopleSoft Personalmanagementsystem 9.1	
	Datenbankmodell "Standard"	
(Deutsch)	Antwortzeit	Search 1,06 sec, Save 0,74 sec
	Gleichzeitige Benutzer	18.000
Patrón de rendimiento	PeopleSoft Recursos Humanos 9.1	
	Volumen Estándar de datos	
	tiempo de reacción	Search 1,06 sec, Save 0,74 sec
(Español)	Simultáneos Utilizadores	18.000
Benchmark	Gerenciamento de Recursos Humanos, PeopleSoft 9.1	
	Volume Padrão dos dados	
	tempo de resposta	Search 1,06 sec, Save 0,74 sec
(Português)	Simultâneos Usuários	18.000

BENCHMARK PROFILE

In March 2012, Oracle (PeopleSoft) conducted a benchmark in Burlington, MA to measure the online performance of Oracle's PeopleSoft Enterprise Human Resources Management System (HRMS) 9.1. The database server used Oracle RAC Database 11*g*R2 running on Oracle's SPARC T4-2 servers ((2 cpus, 16 cores, 128 vcpus) × 2) with Oracle Solaris 11 11/11. The application server used a SPARC T4-4 server and ran Oracle Solaris 10 (8/11). The web server was run on Oracle's SPARC T4-2 server. Approximately 385 GB of storage from one Oracle's Sun Server X2-4 Storage Server and attached Oracle's Sun Storage F5100 Flash Array storage system was allocated to the database instance.

The benchmark measured client response times for 6,000, 12,000 and 18,000 concurrent users. The standard database composition model represents a 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 self-service transactions with Oracle Database for Solaris on Oracle SPARC T4 Servers.**

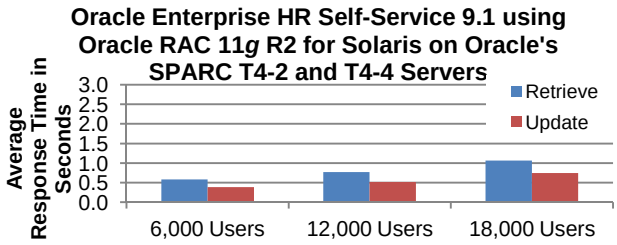

Figure 1: Average Response Times

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

METHODOLOGY

Oracle® ATS™ 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 2 shows a typical 4-tier benchmark configuration.

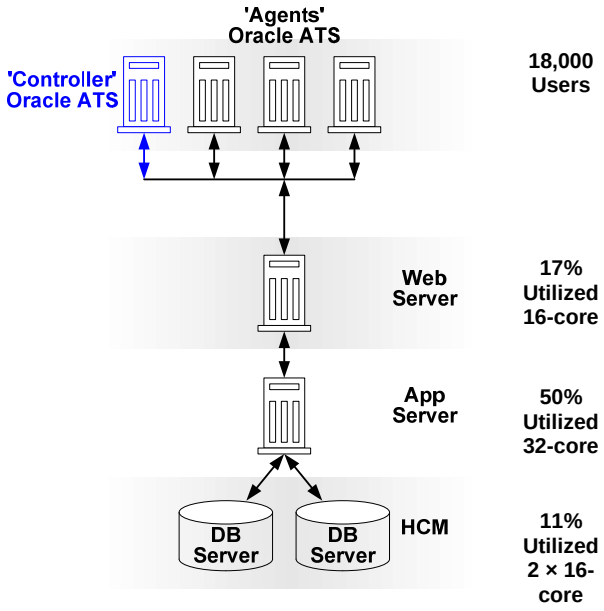

Figure 2: 4-Tier Configuration

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.

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 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.

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 3,600 business processes per minute at the peak load of 18,000 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.

ONLINE PROCESS RESULTS

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

Process		6,000 Users	12,000 Users	18,000 Users
Update Home Address	Search	0.38	0.50	0.73
	Save	0.68	0.92	1.36
Update Home Phone	Search	0.31	0.41	0.59
	Save	0.33	0.44	0.62
View Benefits Summary	View	0.46	0.63	0.90
Update Beneficiary	Search	0.49	0.68	0.93
	Save 1	0.08	0.10	0.14
	Save 2	0.10	0.15	0.21
	Edit/ Calc	0.04	0.05	0.07
View Paycheck	Search	0.75	1.00	1.38
	View	0.36	0.51	0.71
Update Direct Deposit Info	Search	0.29	0.38	0.56
	Save	0.07	0.09	0.13
Employee Adds Profile Items	Search	0.27	0.33	0.47
	Save	0.92	1.28	1.81
	Submit	1.49	2.02	2.81
	Confirm	1.04	1.40	1.93
View Employee Info	Search	0.16	0.22	0.32
Initiate Termination	Search	0.40	0.51	0.71
	Save	0.10	0.14	0.19
	Confirm	0.10	0.13	0.18
Initiate Promotion	Search	0.43	0.54	0.75
	Save	0.41	0.52	0.71
Initiate Salary Change	Search	0.49	0.64	0.89
	Save	0.40	0.55	0.77
	Calc	0.07	0.09	0.13
Add a Person	Save	0.18	0.23	0.34
Hire a Person	Save 1	0.19	0.23	0.34
	Save 2	0.62	0.81	1.17
Add a Job	Search	0.51	0.62	0.83
	Save	0.57	0.81	1.18
* Average Search		0.58	0.77	1.06
* Average Save		0.38	0.51	0.74
Trans/min Est.		1,200	2,400	3,600

Table 2: Employee/Manager Process Runtimes

SERVER PERFORMANCE

Figure 3 shows the average CPU utilization for each of the servers in this test. The CPU utilization is the average across all of the CPUs in each server.

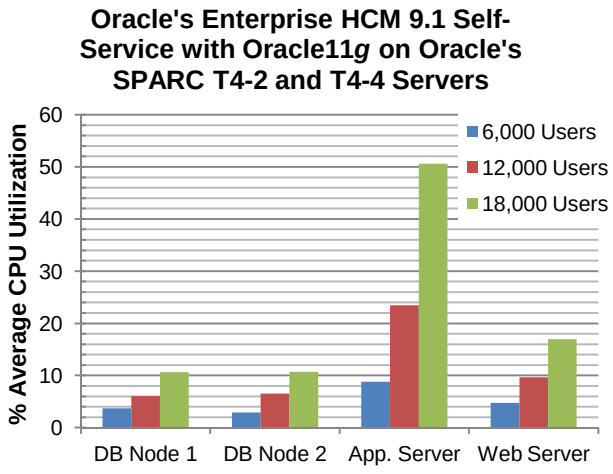

Figure 3: Average Server CPU Utilization

% CPU		User	System	Idle
DB Server 1				
18,000 Users		8	3	89
12,000 Users		4	2	94
6,000 Users		2	2	96
DB Server 2				
18,000 Users		8	3	89
12,000 Users		5	1	94
6,000 Users		2	1	97
App Server				
18,000 Users		45	6	49
12,000 Users		21	3	76
6,000 Users		8	1	91
Web Server				
18,000 Users		13	4	83
12,000 Users		8	2	90
6,000 Users		4	1	95

Table 3: Summary of CPU Utilization

		6,000 Users	12,000 Users	18,000 Users
DB Server 1		90 GB	87 GB	88 GB
DB Server 2		91 GB	88 GB	93 GB
App Server		106 GB	122 GB	146 GB
Web Server		85 GB	93 GB	103 GB

Table 4: Average Memory Utilization

I/O PERFORMANCE

The Oracle 's Sun Server X2-4 Storage Server with attached Sun Storage F5100 Flash Array storage was used for storage of tables and indexes. I/O performance is crucial to performance and is summarized as follows:

		18,000 Users
DB Node 1		Average
r/s		5
w/s		160
KB r/s		70
KB w/s		850
DB Node 2		
r/s		8
w/s		170
KB r/s		100
KB w/s		1,100
App Serv.		
r/s		4
w/s		510
KB r/s		30
KB w/s		8,200

Table 5: I/O Metrics

DATA COMPOSITION DESCRIPTION

The standard database was comprised of:

- 500,000 Employees (5 per Department)
- 100,000 Managers
- 100,000 Department Table Entries

BENCHMARK ENVIRONMENT

HARDWARE CONFIGURATION

Database Server:

2 × Oracle's SPARC T4-2 servers were used as the database servers. They were equipped with the following:

- 2 × 2.85 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 (16 cores total – 128 vcpus)
- 128 Gigabytes of Memory (~93 GB used at peak load)
- 3 × 300 GB SAS internal disks

The two Oracle's SPARC T4-2 RAC instances shared this storage:

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 system 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 385 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 shared storage to the two RAC instances.
- 1 × 32-port Brocade FC switch (even though only 2 ports were used) attached to the 2 RAC instances to access shared storage.
- Oracle Solaris 11 11/11 X86 configured as COMSTAR Storage Server.

Two of Oracle's Sun X4275 Storage Servers for Redo log data, each 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

Each X4275 was attached to one RAC instance providing 2 × 400 GB mirrored (hardware RAID 1) redo Logs (total space used ~1600 GB)

- Oracle Solaris 11 Express 2010.11 X86 configured as COMSTAR Storage Servers.

Application Server(s):

1 × Oracle's SPARC T4-4 server was used as the application 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)
- 512 Gigabytes of Memory (~146 GB used at peak load)
- 5 × 300 GB SAS internal disks
- 1 × 300 GB internal SSD
- 2 × 100 GB internal SSD

Web Server(s):

1 × Oracle's SPARC T4-2 server was used as the web server. It was equipped with the following:

- 2 × 2.85 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 (16 cores total – 128 vcpus)
- 256 Gigabytes of Memory (~103 GB used at peak load)
- 1 × 300 GB SAS internal disk
- 1 × 300 GB internal SSD

Load Simulation Driver(s):

4 × Sun Blade X6240 servers were used as the load driver controller and drivers. They were equipped with the following:

- 1 × 2.3 Gigahertz AMD® Opteron™ 2356 Quad-Core Processors,
  each with 2 Megabytes of Level-2 Cache (4 cores total)
- 32 Gigabytes of Memory

SOFTWARE VERSIONS

Oracle's PeopleSoft HCM (HRMS) 9.1

Oracle's PeopleSoft Enterprise (PeopleTools) 8.51.02

Oracle RAC Database 11*g* 11.2.0.3.0 (64-bit) Patch Set 2

Oracle Solaris 11 (11/11) (on the Database Server)

Oracle Solaris 10 (8/11) (on the App Server and Web Server)

Microsoft® Windows Server 2003 Enterprise Edition w/SP 2 (on the Controller and Drivers)

Oracle ATS Load Test software 9.20

Oracle (BEA) Tuxedo® 10.3.0.0 Patch Level 031 (64-bit) with Java SE 1.6.0_26 Runtime Environment and Java HotSpot ™ 64-bit Server VM 20.1

Oracle WebLogic Server™ 11*g* (10.3.3)

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