ORACLE ENTERPRISE BENCHMARK   REV. 1.1

ORACLE'S PEOPLESOFT HRMS 9.1 FP2 SELF-SERVICE USING ORACLE DB 11g FOR LINUX ON CISCO UCS B460 M4 AND B200 M3 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 FP2 Self-Service	
	Extra-Large Data Model	
Average Response	Search 0.35 sec, Save 0.17 sec	
Concurrent Users	20,000	

BENCHMARK PROFILE

In October 2014, Cisco and Oracle (PeopleSoft) conducted a benchmark in Bangalore, India to measure the online performance of Oracle's PeopleSoft Enterprise Human Resources Management System (HRMS) 9.1 using Oracle Database 11g 11.2.0.3 on a Cisco® UCS™ B460 M4 database server configured with four fifteen-core processors (60-cores total), running Oracle® Linux® 6.3 (64-bit) OS. A single EMC® VNX5500 Storage System was used for storage. Two Cisco® UCS™ B200 M3 (two twelve-core processors apiece) application servers and one UCS™ B200 M3 web server were likewise utilized.

The benchmark measured client response times for 12,000, 16,000 and 20,000 concurrent users. 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 transactions with Oracle Database for Linux on Cisco UCS B460 M4 and UCS B200 M3 Servers.**

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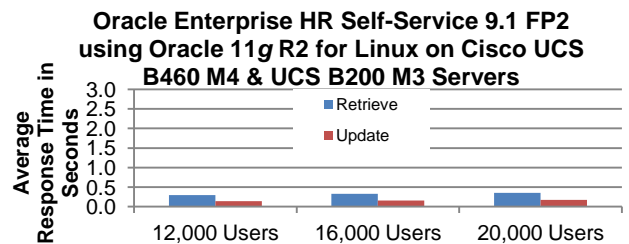

Figure 1: Average Response Times

* 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.

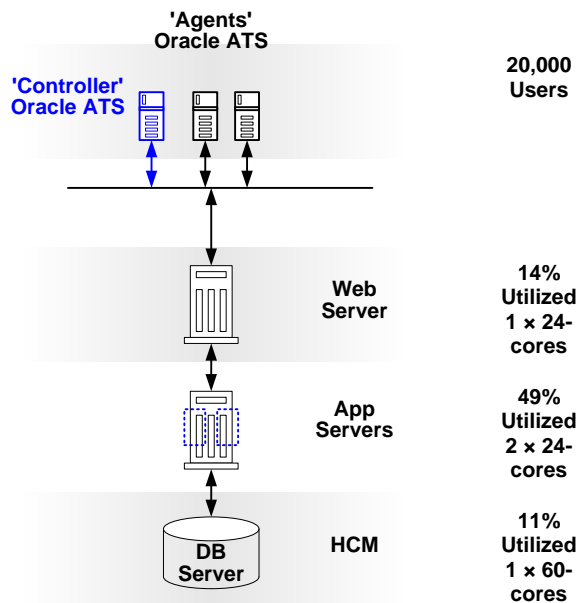Figure 2 shows a typical 4-tier benchmark configuration.

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 4,000 business processes per minute at the peak load of 20,000 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		12,000 Users	16,000 Users	20,000 Users
Update Home Address	Search	0.295	0.324	0.352
	Save	0.329	0.363	0.385
Update Home Phone	Search	0.23	0.255	0.279
	Save	0.183	0.202	0.215
View Benefits Summary	View	0.229	0.254	0.277
Update Beneficiary	Search	0.28	0.308	0.338
	Save 1	0.029	0.032	0.035
	Save 2	0.045	0.051	0.056
	Edit/ Calc	0.019	0.022	0.026
View Paycheck	Search	0.32	0.352	0.382
	View	0.256	0.292	0.31
Update Direct Deposit Info	Search	0.228	0.251	0.275
	Save	0.038	0.042	0.045
Employee Adds Profile Items	Search	0.191	0.214	0.237
	Save	0.382	0.413	0.432
	Submit	2.684	3.049	3.28
	Confirm	0.234	0.265	0.279
View Employee Info	Search	0.276	0.31	0.341
Initiate Termination	Search	0.275	0.304	0.333
	Save	0.055	0.057	0.044
	Confirm	0.047	0.046	0.029
Initiate Promotion	Search	0.286	0.322	0.353
	Save	0.275	0.313	0.349
Initiate Salary Change	Search	0.306	0.342	0.377
	Save	0.771	0.83	0.885
	Calc	0.111	0.124	0.132
Add a Person	Save	0.028	0.033	0.035
	Confirm	0.083	0.091	0.097
Hire a Person	Save 1	0.026	0.031	0.034
	Save 2	0.019	0.021	0.014
	Confirm	0.177	0.174	0.107
Add a Job	Search	0.209	0.228	0.244
	Save	0.077	0.101	0.13
	Confirm	0.038	0.045	0.048
* Average Search		0.294	0.324	0.353
* Average Save		0.139	0.155	0.167
Trans/min Est.		2,400	3,200	4,000

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.
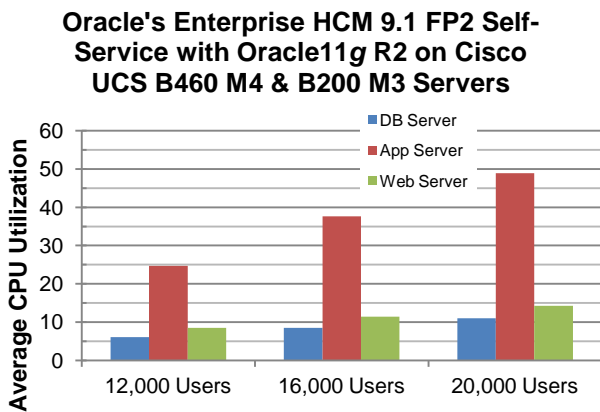
Oracle's Enterprise HCM 9.1 FP2 Self-Service with Oracle11*g* R2 on Cisco UCS B460 M4 & B200 M3 Servers

Figure 3: Average Server CPU Utilization

% CPU	User	System	I/O Wait	Idle
DB Server				
20,000 Users	8.8	2.1	0.1	89.0
16,000 Users	6.7	1.7	0.1	91.5
12,000 Users	4.7	1.3	0.1	93.9
App Server				
20,000 Users	46.3	2.3	0.4	51.1
16,000 Users	35.6	1.8	0.2	62.4
12,000 Users	23.2	1.3	0.2	75.3
Web Server				
20,000 Users	13.1	1.2	0.0	85.7
16,000 Users	10.5	0.9	0.0	88.6
12,000 Users	7.8	0.7	0.0	91.5

Table 3: Summary of CPU Utilization

	12,000 Users	16,000 Users	20,000 Users
DB Server	370 GB	364 GB	350 GB
App Server	191 GB	204 GB	220 GB
Web Server	44 GB	45 GB	45 GB

Table 4: Average Memory Utilization

I/O PERFORMANCE

An EMC VNX5500 Storage System equipped with 5 Disk Array Enclosures (75 disk drives total) was used for storage. The batch workload requires optimal I/O performance.

vUsers →	12,000	16,000	20,000
DB	Average	Average	Average
IO/s	1,412	1,735	1,996
KB r/s	1,209	1,547	2,173
KB w/s	7,419	9,000	10,203
App Server			
IO/s	3,036	3,409	3,956
KB r/s	1	1	31
KB w/s	22,390	25,151	28,764

Table 5: I/O Metrics

DATA COMPOSITION DESCRIPTION

The standard database was comprised of:

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

BENCHMARK ENVIRONMENT

HARDWARE CONFIGURATION

Database Server:

A Cisco® UCS™ B460 M4 server was used for the database server. It was equipped with the following:

- 4 × 2.8 GHz Intel® Xeon™ Fifteen-Core E7-4890 v2 processors with Hyper-Threading enabled (4-processors, 60-cores, 120-threads total), each with 37.5 MB of Level 3 cache with Two modular LAN on Motherboard (mLOM) slots for Cisco UCS Virtual Interface Card (VIC)

- 1 Terabyte of Memory (~370 GB used at peak load)

- 1 × EMC VNX5500 Storage System attached to a Cisco UCSB-MLOM-40G-01 Virtual Interface Card for data and logs

- ~39 TB raw disk space available for allocation (75 × 536 GB)

- Database storage configured with 14 x 600 GB 15K SAS Drives + 5 x 200 GB EFD Drives (~9400 GB) storage on RAID 5 for data and 4 x 200 GB EFD Drives RAID 1/0 storage for Redo logs (6 Groups)

Application Server(s):

2 × Cisco® UCS™ B200 M3 servers were used as the application servers. They were equipped with the following:

- 2 × 2.7 GHz Intel® Xeon™ Twelve Core E5-2697 V2 processors with Hyper - Threading enabled (2 – Processors , 24 Cores 48 Threads Total), each with 30 MB of Level 3 Cache

- 256 Gigabytes of Memory (~224 GB used at peak load)

In the application tier, 6 PeopleSoft domains with 240 application servers (40 per each domain) were hosted for a total of 12 domains and 480 PSAPPSRV processes.

The following storage was used:
- EMC VNX5500 Storage System attached to a Cisco Virtual Interface Card

- Application and Linux Binaries were hosted on the EMC VNX5500 Storage

Web Server(s):

1 × Cisco® UCS™ B200 M3 server was used as the web server. It was equipped with the following:

   (27 PIA Domains were configured.)

- 2 × 2.7 GHz Intel® Xeon™ Twelve Core E5-2697 V2 processors with Hyper - Threading enabled (2 – Processors , 24 Cores 48 Threads Total), each with 30 MB of Level 3 Cache

- 256 Gigabytes of Memory (~45 GB used at peak load)

- EMC VNX5500 Storage System attached to a Cisco Virtual Interface Card

- Web and Linux Binaries were hosted on the EMC VNX5500 Storage

Load Simulation Driver(s):

1 × commodity server was used as the load driver controller and driver. It was equipped with the following:

- 2 × 2.70 Gigahertz Intel® Xeon™ E5-2697 v2 Twelve-Core Processors, each with 256 Kilobytes of Level-2 Cache per core (24 cores total)

- 256 Gigabytes of Memory

2 × commodity servers were used as the load drivers. They were equipped with the following:

- 2 × 3.33 Gigahertz Intel® Xeon™ X5680 Six-Core Processors, each with 256 Kilobytes of Level-2 Cache per core (12 cores total)

- 96 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 11*g* 11.2.0.3.0 (64-bit)

Oracle Linux 6.3 (2.6.39-200.24.1.el6uek.x86_64) (on the Database Server)

Oracle Linux 5.8 (OEL 2.6.18-300.el5) (on the App Servers and Web Server)

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

Oracle JRockit® 1.6.0_45-b06

Oracle ATS Load Test software 9.20.0370

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

Oracle WebLogic Server™ 11*g* (10.3.5)

Micro Focus COBOL Server Express V5.1 revision 000

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