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PeopleSoft HCM 9.1 FP2 HR Self Service Using Oracle DB on an Oracle Database Appliance

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Introduction

This white paper describes the online sizing test results for an Oracle PeopleSoft application running on Oracle Database Appliance (ODA) virtualized platform. The OLTP test was performed with Oracle's PeopleSoft Human Capital Management (HCM) 9.1 FP2 HR self-service products using Oracle 11gR2 database on an Oracle Database Appliance.

Disclaimer

There is no guarantee that the tuning that was performed for this test is relevant to your environment. Much depends on the volume and distribution of data values in the tables.

OLTP Performance Test Workload

In order to document sizing estimates of online performance of PeopleSoft HCM 9.1 FP2 on Oracle Database Appliance virtualized platform, a series of load tests were performed. The tests measured the client response times for 1000, 2000, and 3000 concurrent users on large, medium, and small database templates that are shipped with Oracle Database Appliance.

Test Environment

Figure 1 shows the system architecture for a PeopleSoft application used for load testing on ODA. This illustrates an ODA machine that is enabled as a virtualized platform running two nodes, and which is configured with an Oracle RAC database.

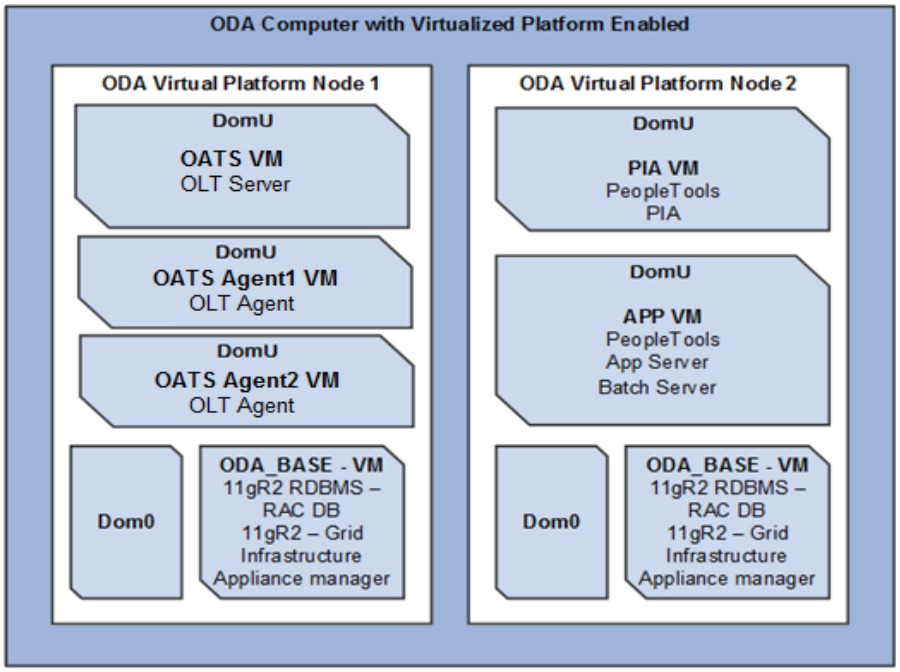

Figure 1: System Architecture of a PeopleSoft Application Used for Load Testing on ODA

The system architecture includes these components:

- DOM0: In ODA the dom0 kernel is actually a complete Linux kernel with support for a broad array of devices, file systems, software RAID, and volume management.
- ODA_BASE: A "privileged VM domain" within the ODA virtualized image. Database workload is tied to user-determined physical cores within the ODA hardware to ensure reliable performance and isolation from other application workloads.
- APP VM: The guest VM hosts the PeopleSoft PeopleTools Application Server and PeopleSoft Batch Server. In this online test only the Application Server was used.
- PIA VM: The guest VM hosts the PeopleSoft Pure Internet Architecture (PIA) domain which handles online user page requests and web services.
- OATS VM: The guest VM has Microsoft Windows operating system (OS) and Oracle Application Testing Suite (ATS).
- OATS Agent 1 VM: The guest VM has Microsoft Windows OS and Oracle Load Testing (OLT) Agent.
- OATS Agent 2 VM: The guest VM has Microsoft Windows OS and OLT Agent.

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

- Load (search/retrieval) times were measured from the time the user clicked the <OK> button until all the data for the entire business transaction had been retrieved.
- Update (save) times were measured from the time the user clicked the <SAVE> button until the system had released the page.

Business Processes

The fourteen PeopleSoft HCM 9.1 FP2 business processes tested in this online sizing test are listed in the following table with the HCM products:

TABLE 1: PEOPLESOFT HCM 9.1 FP2 BUSINESS PROCESSES USED IN TESTING

EMPLOYEE SELF SERVICE	eProfile	• Update Home Address • Update Home Phone
	eBenefits	• View Benefits Summary • Benefits Change life
	ePay	• View Paycheck • Update Direct Deposit Info • Employee Adds Profile Items
MANAGER SELF SERVICE	eDevelopment	• View Employee Info
	eProfile	• Initiate Termination • Initiate Promotion
	eCompensation	• Initiate Employee Salary Change
HR ADMINISTRATION	Admin	• Add a Person • Hire a Person

		• Add a Job

Hardware Configuration

This test used Oracle Database Appliance X4-2 configured with Virtualized Platform. For details, please refer to the Oracle Database Appliance X4-2 white paper.

Software Versions

- Operating System: Oracle Enterprise Linux version 5.9 (2.6.39-400.126.1.el5) and Microsoft Windows 2008 (For OATS Server and OATS agent).
- RDBMS: Oracle11gR2 11.2.0.3 (64-bit) RAC DB
- PeopleSoft People Tools: 8.52.03
- PeopleSoft Application: PeopleSoft HCM 9.1 FP2
- Tuxedo: Oracle Tuxedo, Version 10.3
- Oracle WebLogic: 10.3.5
- Load Testing: Oracle Application Testing Suite 12.3.0

Database Templates

Oracle Database Appliance provides pre-built configuration templates that are used to create databases of different sizes and capacities. The database templates that were used to create the databases for testing are described in the following table. Refer to the Oracle Database Appliance Getting Started Guide for more information.

See Oracle® Database Appliance Getting Started Guide, "C Database Sizing for Oracle Database Appliance," http://docs.oracle.com/cd/E22693_01/doc.21/e22692/sizing.htm#autoId0

TABLE 2: DATABASE TEMPLATE FEATURES

FEATURE	SMALL	MEDIUM	LARGE
CPU count (each instance)	4	8	12
SGA (GB)	8	16	24
PGA (GB)	4	8	12
Processes	400	800	1200

Note: These templates do not include a PeopleSoft application database. You must create or migrate a PeopleSoft application database to RAC database created on ODA_BASE based on small, medium, and large template.

Results

This section summarizes the test results. For every test run, average CPU utilization, Memory usage, and weighted average response time of search and save are captured.

Note: *One vCPU is equivalent to half a CPU core. Therefore, 16 vCPUs correspond to 8 CPU cores or a 4 Processor license.*

Workload execution

The workload was executed under the following conditions.

- The PIA VM and the APP VM were running on ODA server node 2.

- The database was created as a RAC database using the "Large/Medium/Small" templates.
- The heap size was set to 1024M for PIA domains.
- The users were distributed among the applications in similar proportions to real-world usage by customers.

The workload scripts were run for one hour with the desired number of users, with ramp-up and wind-down periods before and after. In the ramp-up phase virtual users gradually log into the system until it reaches the set number of users (for example, 1000, 2000, and 3000) and each set of online users completes the 10 iterations.

ATS – Setup Environment

We had following configuration for OATS server and OATS agents during load test:

- OATS VM
  - 20 GB RAM
  - 6vCPUs
- OATS Agent1 VM
  - 5 GB RAM
  - 4 vCPUs
- OATS Agent2 VM
  - 5 GB RAM
  - 4 vCPUs

Test 1 – Large Database Template

Purpose

The goal of this test is to collect and compare the response time and CPU utilization of PIA, APP, and Database servers with the following configuration:

- RAC and single instance databases are created using a large template
- APP VM is configured with 6, 8, and 10 vCPUs
- PIA has 2 vCPUs for 1k, 2k, and 3k virtual users

Test Environment

There were 6 tests executed to test the OLTP load with the following configuration:

- PIA VM
  - 2 PIA Oracle WebLogic domains
  - Heap Size 1024M
  - 20 GB of RAM
  - 2 vCPUs
- APP VM
  - 40GB of RAM
  - Single APP domain

- 40 PSAPPSRV processes
- Recycle count=0
- Log Fence=2
- TraceSql=0
- EnableDBCache=Y
- 6 vCPUs for 1k VUs, 8 vCPUs for 2k VUs and 10 vCPUs for 3k VUs

- ODA_BASE VM
  - ODA base at 12 vCPUs and 96 GB of RAM
- RAC and Single Instance Database created using "Large" database template
  - Processes=1200
  - Cpu_count=12
  - Sga_target=24G
  - Pga_aggregate_size=12G

TABLE 3: AVERAGE SERVER UTILIZATION (%) FOR THE LARGE DATABASE TEMPLATE TEST:

DB Template	Large					
Database	RAC			Single Instance		
ODA_BASE	12 vCPUs			12 vCPUs		
PIA VM	2 vCPUs			2 vCPUs		
Tests	Test1.1	Test1.2	Test1.3	Test1.4	Test1.5	Test1.6
APP VM	4 vCPUs	8 vCPUs	10 vCPUs	4 vCPUs	8 vCPUs	10 vCPUs
Users / Server Utilization (%)	**1k**	**2k**	**3k**	**1k**	**2k**	**3k**
DB1 - CPU	1.53	2.81	3.42	2.40	4.09	6.61
DB2 - CPU	1.65	2.77	4.18	NA	NA	NA
APP - CPU	14.54	24.86	34.83	13.76	22.72	33.77
APP - RAM	22.04	26.13	29.08	21.62	27.88	29.05
PIA - CPU	8.62	19.27	34.33	8.10	17.17	33.14
PIA- RAM	17.52	17.76	17.94	17.78	17.85	17.98
Avg Response Time (sec)						
Search	.32	.35	.40	.32	.35	.39
Save	.16	.17	.18	.16	.17	.18

Test 2 – Medium Database Template

Purpose

The goal of this test is to collect and compare the response time and CPU utilization of PIA, APP, and Database servers with the following configuration:

- RAC and single instance databases are created using a medium template

- APP VM is configured with 6, 8, and 10 vCPUs
- PIA has 2 vCPUs for 1k, 2k, and 3k virtual users

Note. The difference between Test1 and Test2 is that Test1 was executed with a large database template while Test2 was executed on medium database template.

Test Environment

There were 6 tests executed to test the OLTP load with the following configuration:

- PIA VM
  - 2 PIA Oracle WebLogic domains
  - Heap Size 1024M
  - 20 GB of RAM
  - 2 vCPUs
- APP VM
  - 40GB of RAM
  - Single APP domain
  - 40 PSAPPSRV processes
  - Recycle count=0
  - Log Fence=2
  - TraceSql=0
  - EnableDBCache=Y
  - 6 vCPUs for 1k VUs, 8 vCPUs for 2k VUs and 10 vCPUs for 3k VUs
- ODA_BASE VM
  - ODA base at 8 vCPUs and 64 GB of RAM
- RAC and Single Instance Database created using "Medium" database template
  - Processes=800
  - Cpu_count=8
  - Sga_target=16G
  - Pga_aggregate_size=8G

TABLE 4: AVERAGE SERVER UTILIZATION (%) FOR THE MEDIUM DATABASE TEMPLATE TEST:

DB Template	Medium					
Database	RAC			Single Instance		
ODA_BASE	4 vCPUs			4 vCPUs		
PIA VM	2 vCPUs			2 vCPUs		
Tests	Test2.1	Test2.2	Test2.3	Test2.4	Test2.5	Test2.6

APP VM	4 vCPUs	8 vCPUs	10 vCPUs	4 vCPUs	8 vCPUs	10 vCPUs
Users / Server Utilization (%)	**1k**	**2k**	**3k**	**1k**	**2k**	**3k**
DB1 - CPU	8.92	10.59	12.16	11.30	13.96	19.58
DB2 - CPU	2.72	4.94	6.76	NA	NA	NA
APP - CPU	21.97	24.67	33.76	13.49	24.46	34.06
APP - RAM	22.09	25.64	28.84	21.85	25.50	29.38
PIA - CPU	8.18	19.17	35.06	8.05	18.91	33.30
PIA- RAM	17.69	18.27	18.42	18.10	18.31	18.46
Avg Response Time (sec)						
Search	.32	.36	.41	.33	.37	.41
Save	.16	.17	.18	.16	.18	.19

Test 3 – Small Database Template

Purpose

The goal of this test is to collect and compare the response time and CPU utilization of PIA, APP, and Database servers with the following configuration:

- RAC and single instance databases are created using "Small" template
- APP VM is configured with 6, 8, and 10 vCPUs
- PIA has 2 vCPUs for 1k, 2k, and 3k virtual users

The difference between Test 3 and Test 2 is that Test 3 was executed with a small database template.

Test Environment

There were 6 tests executed to test the OLTP load with the following configuration:

- PIA VM
  - 2 PIA Oracle WebLogic domains
  - Heap Size 1024M
  - 20 GB of RAM
  - 2 vCPUs
- APP VM
  - 40GB of RAM
  - Single APP domain
  - 40 PSAPPSRV processes
  - Recycle count=0
  - Log Fence=2
  - TraceSql=0

  - EnableDBCache=Y
  - 6 vCPUs for 1k VUs, 8 vCPUs for 2k VUs and 10 vCPUs for 3k VUs
- Database
  - ODA base at 4 vCPUs and 32 GB of RAM
- RAC and Single Database created using "Small" database template
  - Processes=400
  - Cpu_count=4
  - Sga_target=8G
  - Pga_aggregate_size=4G

TABLE 5: AVERAGE SERVER UTILIZATION (%) FOR THE SMALL DATABASE TEMPLATE TEST:

DB Template	Small					
Database	RAC			Single Instance		
ODA_BASE	4 vCPUs			4 vCPUs		
PIA VM	2 vCPUs			2 vCPUs		
Tests	Test3.1	Test3.2	Test3.3	Test3.4	Test3.5	Test3.6
APP VM	4 vCPUs	8 vCPUs	10 vCPUs	4 vCPUs	8 vCPUs	10 vCPUs
Users / Server Utilization (%)	**1k**	**2k**	**3k**	**1k**	**2k**	**3k**
DB1 - CPU	20.53	27.83	37.30	27.16	44.68	NA
DB2 - CPU	5.15	9.88	16.85	NA	NA	NA
APP - CPU	13.81	24.67	35.79	13.69	24.72	NA
APP - RAM	22.09	25.62	30.25	21.91	25.07	NA
PIA - CPU	8.19	19.11	34.61	8.04	18.88	NA
PIA- RAM	17.87	17.9	17.81	17.91	17.95	
Avg Response Time (sec)						
Search	.32	.37	.46	.37	.48	NA
Save	.11	.17	.21	.13	.22	NA

Conclusion

The sizing of your hardware and resources must be adequate for the requirement of your environment. In general, to avoid hardware related performance bottlenecks, each hardware component should operate at no more that 80% of capacity.

The online sizing test results for PeopleSoft Human Capital Management 9.1 FP2 based on Oracle Database Appliance shows that the response time for search and save are good even when we change the configuration at the Database, Application Server, and PIA server level. However, average server utilization changes accordingly. We can summarize the results in the following matrix:

TABLE 6: SUMMARY OF TESTING RESULTS

DB Template	Large		Medium		Small	
Database	RAC	Single Instance	RAC	Single Instance	RAC	Single Instance
ODA_BASE (vCPUs)	12	12	8	8	4	4
PIA VM (vCPUs)	2	2	2	2	2	2
APP VM (vCPUs)	10	10	8	8	6	6
Users / CPU Utilization	**3k**	**3k**	**2k**	**2k**	**1k**	**1k**
DB1	3.42	6.61	10.59	13.96	20.53	27.16
DB2	4.18	NA	4.94	NA	5.15	NA
APP	34.83	33.77	24.67	24.46	13.81	13.69
PIA	34.33	33.14	19.17	18.91	8.4	8.04
Response Time (sec)						
Search	.40	.39	.36	.37	.32	.37
Save	.18	.18	.17	.18	.11	.13

Test results show that Oracle Database Appliance provides a "solution-in-a-box," which can increase performance to new levels with simple changes to the configuration. The Oracle Database Appliance virtualized is an excellent solution for customers looking for rapid, easy PeopleSoft HCM application deployments with solid performance and availability characteristics.

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