

# Oracle's JD Edwards EnterpriseOne with Oracle Virtual Machine on the Cisco Unified Computing System

## What You Will Learn

This document provides an overview of the deployment and performance validation testing of Oracle's JD Edwards EnterpriseOne (JDE E1) enterprise resource planning (ERP) application on the Cisco Unified Computing System™ (Cisco UCS™). The deployment and testing was conducted in a Cisco test and development environment using the Cisco UCS B250 M2 Extended Memory Blade Server with Oracle Virtual Machine (VM) templates and Oracle's JDE Day in the Life (DIL) kit. The Oracle JDE DIL kit is a suite of scripts that exercises most common transactions of Oracle's JDE E1 applications, including business processes such as payroll, sales order, purchase order, work order, and other manufacturing processes such as shipment confirmation. The Cisco UCS B250 M2 blade server is a full-width, 2-socket blade server that uses Cisco® Extended Memory Technology and is equipped with the 3.33-GHz Intel Xeon processor X5680 and 384 GB of total memory.

The deployment was validated using the JD Edwards default Oracle VM 2.2 template as well as a split configuration. In the default Oracle VM template, all three JD Edwards Oracle VM instances (Oracle HTML, JDE E1, and database servers) were deployed on a single Cisco UCS B250 M2 blade server. In the JDE E1 split configuration, Oracle HTML and JDE E1 servers were deployed as Oracle VM instances on the Cisco UCS B250 M2 blade server, and a second Cisco UCS B250 M2 blade server was deployed for the Oracle database.

The default Oracle VM template configuration easily scaled to 1500 concurrent users, with response times for each Oracle JDE DIL kit transaction of less than one second. The split configuration deployment scaled to 2000 concurrent users, with plenty of room to scale.

## Overview

Cisco UCS is a next-generation data center platform that unites computing, networking, storage access, and virtualization resources into a cohesive system designed to reduce total cost of ownership (TCO) and increase business agility. The Cisco UCS server portfolio consists of Cisco UCS B-Series Blade Servers and Cisco UCS C-Series Rack-Mount Servers. Cisco UCS B-Series Blade Servers integrate a low-latency, lossless 10 Gigabit Ethernet unified network fabric with enterprise-class x86-architecture servers. The system is an integrated, scalable, multichassis platform in which all resources participate in a unified management domain.

As the flagship of Oracle's JD Edwards ERP offerings, JDE E1 has been the solution of choice for many small to medium-sized businesses (SMBs) in manufacturing and large multinational organizations. JDE E1 offers an attractive combination of a large, easy-to-deploy and easy-to-use set of ERP applications across multiple industries. These applications include Supply Chain Management (SCM), Human Capital Management (HCM), Supplier Relationship Management (SRM), Financials, and Customer Relationship Management (CRM). They offer a high degree of customizability and very low TCO.

This deployment of JDE E1 on Cisco UCS uses the Cisco UCS B250 M2 blade server, which provides high performance and capacity for demanding virtualization and large-data-set workloads along with high memory

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capacity and throughput. The Cisco UCS B250 M2 is a 2-socket, full-width blade server that uses Cisco Extended Memory Technology. The system supports two Intel Xeon processors 5600 series, up to 384 GB of double-data-rate-type-3 (DDR3) memory, two optional Small-Form-Factor (SFF) serial-attached Small Computer Systems Interface over IP (SCSI) or solid-state (SAS and SSD) disk drives, and two converged network adapter (CNA) mezzanine slots for up to 40 Gbps of I/O throughput.

Oracle has customized the open source Xen hypervisor and packaged it as a free server virtualization solution: Oracle VM 2.2. Oracle VM provides an easy platform for deploying, managing, and supporting enterprise applications. JDE E1 uses Oracle VM to provide customers with a preconfigured template for Oracle JDE E1 Release 9.0.2, which allows customers to rapidly deploy JDE E1 on a virtual machine with the Oracle VM 64-bit hypervisor and the 64-bit paravirtualized Linux guest operating system. The JDE E1 database is hosted on Oracle Database 11g, and the JD Edwards HTML server is run on Oracle WebLogic Server Release 10.3.2.

The Oracle JDE DIL kit's suite of 17 test scripts is used extensively by the JDE E1 customer base. The scripts exercise various applications from among the Oracle SCM, SRM, HCM, CRM, and Financials management applications. This complex mixture of applications simulates workloads that closely reflect customer environments.

The remainder of this document elaborates on the deployment environment and includes detailed results of the tests run on both the JDE E1 default Oracle VM template and the split configuration deployment with the database on a Cisco UCS B250 M2 blade server that does not use Oracle VM.

## Test Environment

Oracle VM templates provide a fast and effective way to deploy preconfigured JDE E1 solutions on Oracle VM. In this performance validation, Oracle VM templates were used to deploy the JDE E1 solution on a single Cisco UCS B250 M2 blade server.

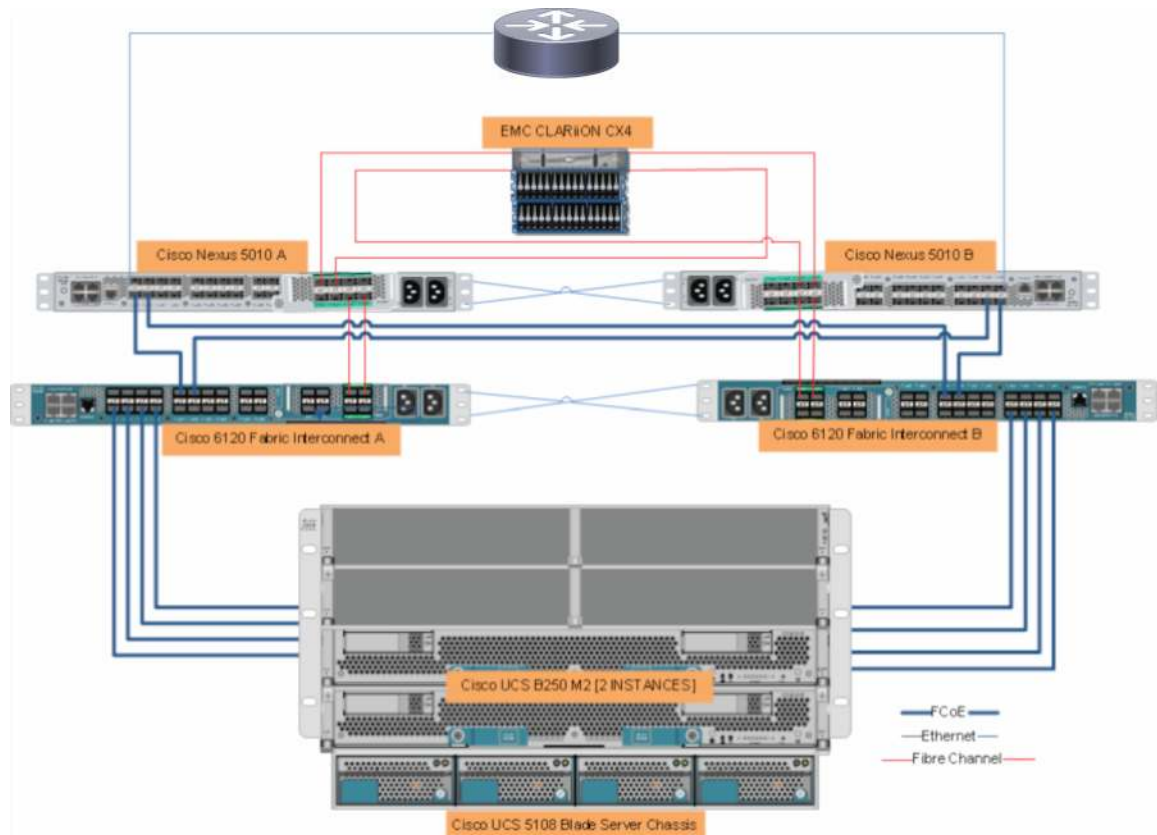
The JDE E1 split configuration included:

- Cisco UCS B250 M2 blade server for HTML and enterprise server guest Oracle VM instances using Oracle VM templates
- A second Cisco UCS B250 M2 blade server without the use of Oracle VM for the Oracle database

The deployment architecture for the test run is shown in Figure 1. The deployment infrastructure included the following components:

- Cisco UCS 5100 Series Blade Server Chassis delivers a scalable and flexible blade server chassis.
- Cisco UCS 6120XP 20-Port Fabric Interconnect provides both network connectivity and management capabilities for the system. The Cisco UCS 6100 Series Fabric Interconnects offer line-rate, low-latency, lossless 10 Gigabit Ethernet and Fibre Channel over Ethernet (FCoE) functions.
- Cisco Nexus<sup>®</sup> 5010 Switch is a one-rack-unit (1RU), 10 Gigabit Ethernet and FCoE access-layer switch built to provide more than 500-Gbps throughput with very low latency. It has 20 fixed 10 Gigabit Ethernet and FCoE ports and one expansion module slot that can be configured to support up to six additional 10 Gigabit Ethernet and FCoE ports, up to eight Fibre Channel ports, or a combination of both.
- EMC CLARiiON CX4 Model 240 is a powerful networked storage system that transparently scales to up to 240 drives. The EMC CLARiiON CX4 architecture delivers industry-leading performance, including a high level of resiliency and availability and powerful, easy-to-use interfaces.

**Figure 1.** Deployment Architecture for Oracle's JDE E1 on Cisco UCS



## Deployment Architecture for Oracle's JDE E1 on Cisco UCS

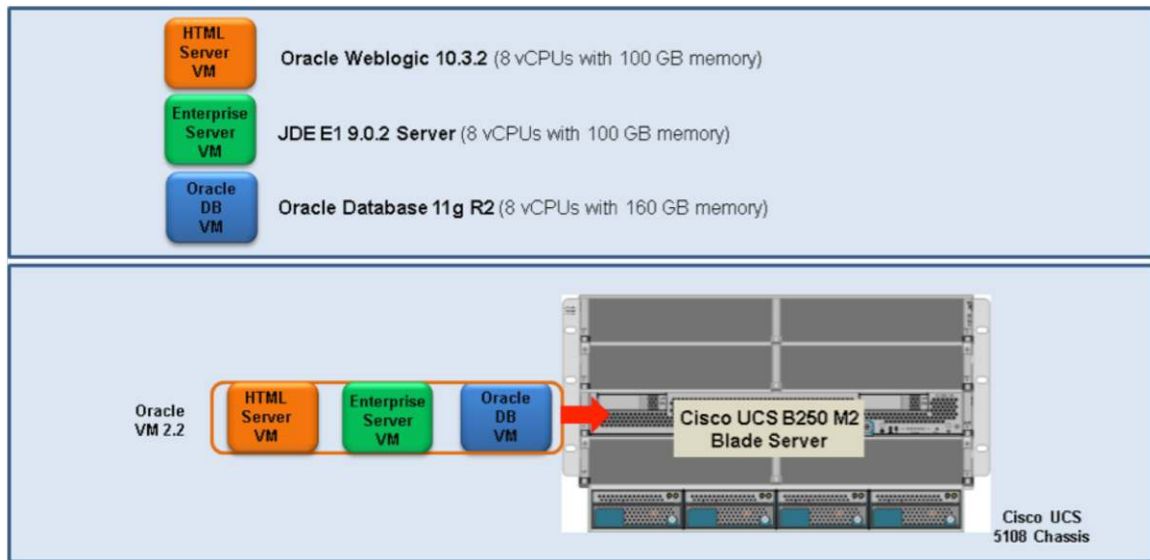
JDE E1 software components included:

- JDE E1 Release 9.0 Update 2 with Release 8.98.4 tools
- Oracle WebLogic Server Release 10.3.2
- Oracle Database Server 11gR2

## Oracle VM Template Configuration for JDE E1

Oracle VM 2.2 templates for JDE E1 were deployed on the Cisco UCS B250 M2 blade server, which was configured with a 2-socket X5680 Intel Xeon processor and 384 GB of physical memory. Figure 2 shows the deployment details for this configuration.

**Figure 2.** JDE E1 Deployment for Default Oracle VM Configuration

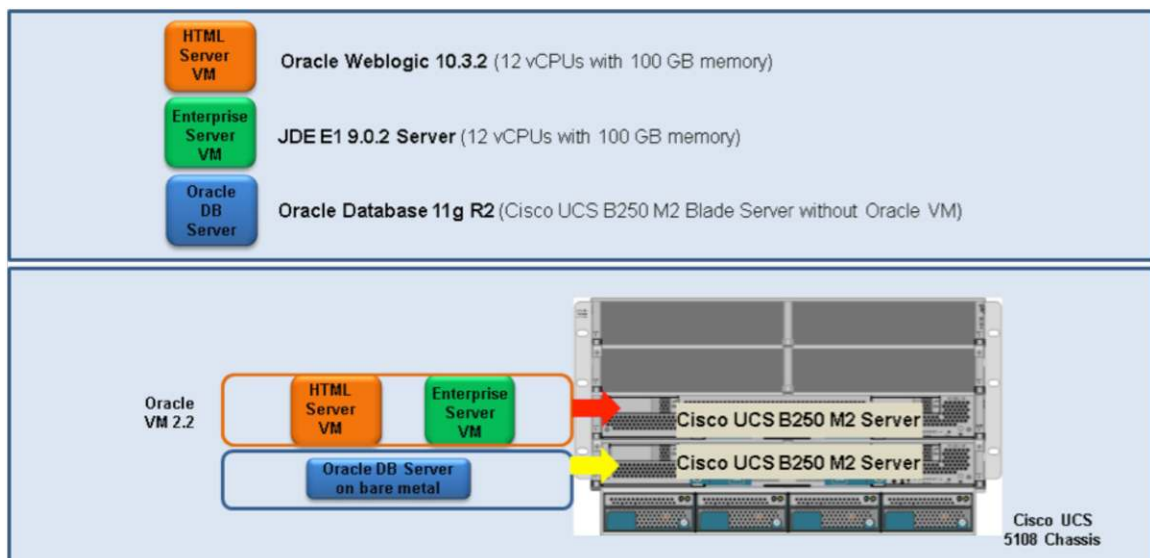


### JDE E1 Split Configuration

The JDE E1 split configuration was deployed to analyze performance results using a database server on a separate Cisco UCS B250 M2 blade server without Oracle VM. The Oracle HTML server and JDE E1 server used the Oracle VM 2.2 templates. Each of the two Oracle VM instances was configured with 12 virtual CPUs (vCPUs) and 100 GB of physical memory.

Both Cisco B250 M2 blade servers were equipped with two six-core Intel Xeon processors 5680 running at 3.33 GHz and configured with 384 GB of physical memory. Figure 3 shows the deployment details of the split configuration.

**Figure 3.** JDE E1 Deployment for Split Configuration

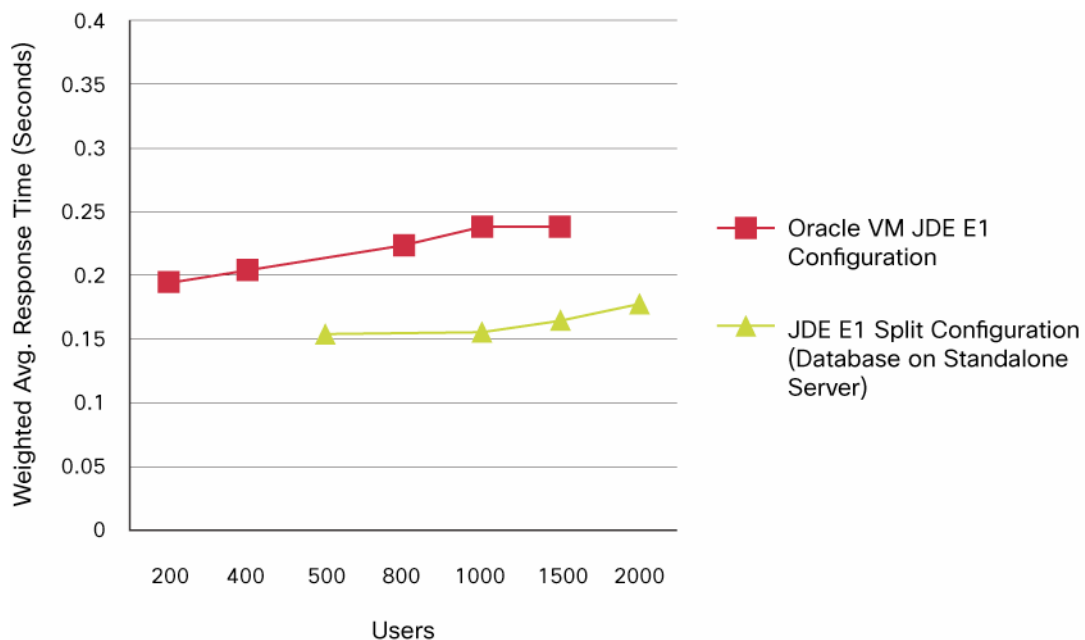


## Summary of Results

The interactive version of the Oracle JDE DIL kit was run with 200 to 1500 users using the default Oracle VM template configuration, and with 500 to 2000 users using the split configuration.

As shown in Figure 4, the weighted average response time for the Oracle VM template default configuration for JDE E1 was approximately 0.238 second for 1500 concurrent users compared to 0.165 second for the same 1500 concurrent users on the split configuration. The addition of a second Cisco UCS B250 M2 blade server for the split configuration allows more room on the computation-intensive JDE E1 server to achieve better performance, with the additional benefit of enhanced database server scalability.

**Figure 4.** Oracle JDE DIL Kit Illustrating Weighted Average Response Time with Oracle VM Templates and Split Configuration



## Test Results

The interactive version of the Oracle JDE DIL kit was run to capture the end-user response time with important system characteristics such as CPU, memory, and I/O statistics across the test system.

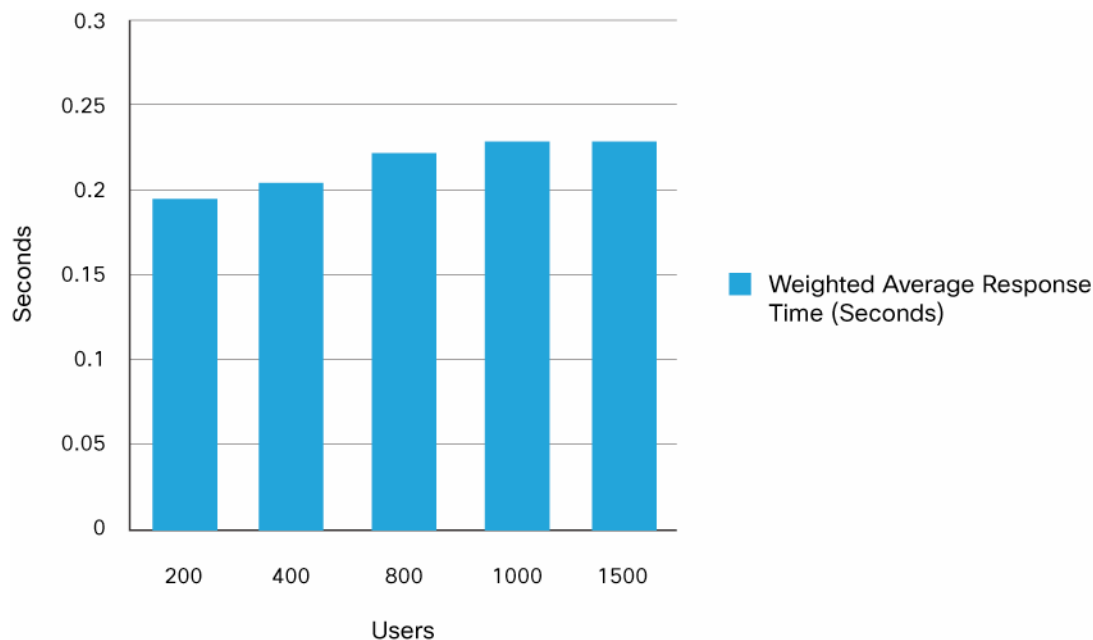
### Oracle VM Template for JDE E1

The test with the Oracle VM template was run for a varying load of 400 to 1500 users, and system resource utilization was measured across all three Oracle VM instances (Oracle HTML server, JDE E1 server, and database server). The number of Oracle WebLogic clustered instances on the HTML server guest Oracle VM instance were increased in proportion to the increase in the number of concurrent users and load balanced through a single Oracle HTTP server.

## User Response Time

User response time was captured at the LoadRunner Controller for all 17 interactive Oracle JDE DIL test scripts. The weighted average user response time varied from 0.195 to 0.238 second for 200 to 1500 users, respectively. Figure 5 illustrates the average response time for Oracle VM template deployment.

**Figure 5.** Oracle JDE DIL Kit Response Time with Oracle VM Templates

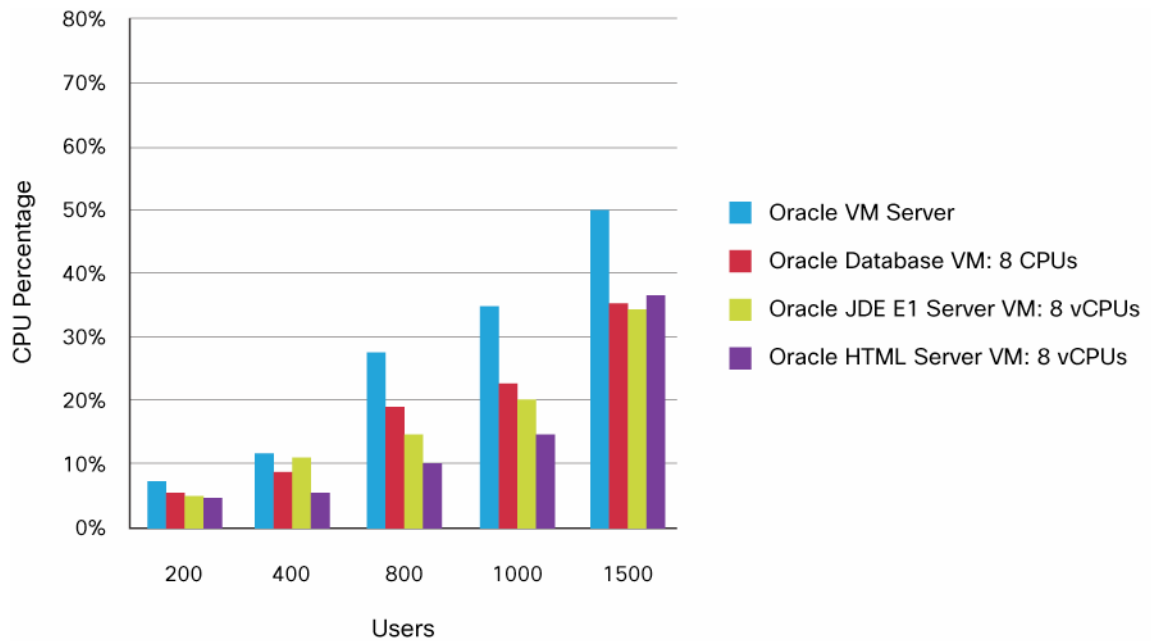


## CPU Utilization

All three Oracle VM instances were monitored with the Nigel's Monitor (nmon) performance tool. XenTop was used to monitor the Oracle VM 2.2 server. Figure 6 illustrates CPU utilization on each of the three tiers of the Oracle VM deployment for JDE E1.

Each of the three Oracle VM instances was assigned eight vCPUs. As shown, the total CPU utilization of the Cisco UCS B250 M2 blade server ranged from 6 to 50 percent with 200 to 1500 users, respectively. CPU utilization on each of the three Oracle VM instances of the JDE E1 deployment scaled linearly with 200 to 1500 users. Oracle VM for the Oracle database and for the HTML server had similar CPU utilization rates of 35 to 36 percent, and the rate for Oracle VM for the JDE E1 server was approximately 33 percent for 1500 users.

**Figure 6.** JDE E1 CPU Utilization



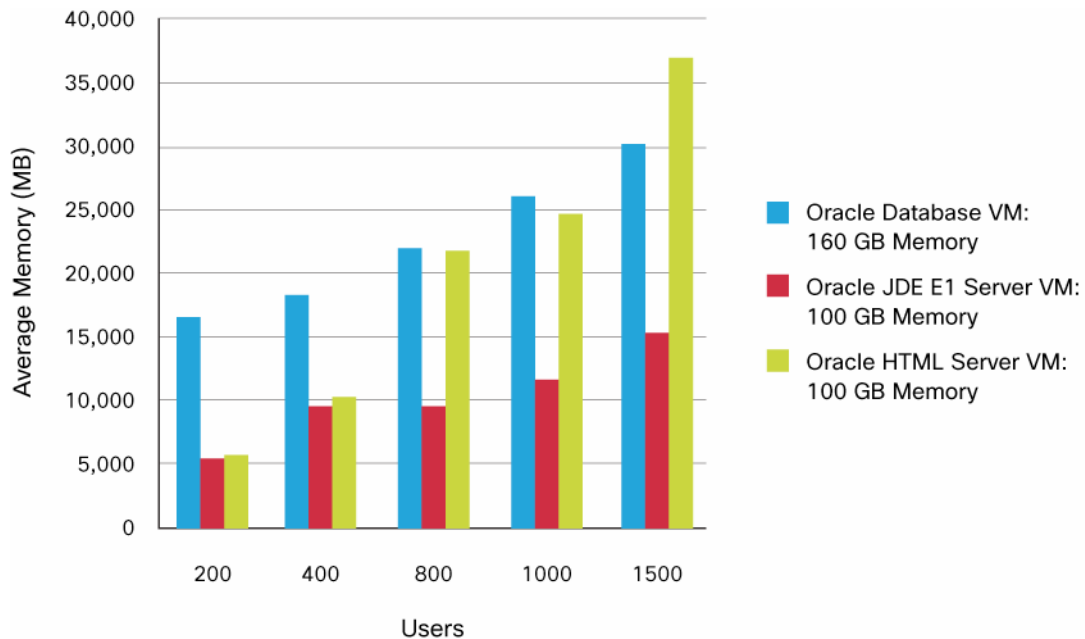
### Memory Utilization

The Cisco UCS B250 M2 blade server was deployed with 384 GB of physical memory. The nmon tool was used to record physical memory use across all three Oracle VM instances. Memory assigned to each of the three JDE Oracle VM instances was fixed across the entire test from 400 to 1500 users and was assigned as follows:

- The Oracle HTML server and JDE E1 server were each allocated 100 GB of memory.
- The Oracle database server was assigned 160 GB of memory.

The active memory utilization for the test with 400 to 1500 users is shown in Figure 7.

**Figure 7.** JDE E1 Active Memory Utilization



### JDE E1 Split Configuration

In a JDE E1 production environment, the database is commonly deployed on a standalone server. To simulate this scenario and validate the performance of the Oracle JDE DIL kit, the Oracle HTML server and JDE E1 server were deployed on Oracle VM 2.2 using Oracle VM templates, and the Oracle database was moved to another Cisco UCS B250 M2 blade server. The configuration for Oracle VM instances and the Oracle database included the following components:

- The Oracle HTML server and JDE E1 server were each assigned 12 vCPUs and 100 GB of physical memory on a Cisco UCS B250 M2 blade server (a 2-socket server with Intel Xeon processor 5680 and 384 GB of physical memory).
- Oracle database was deployed on a separate Cisco UCS B250 M2 blade server (a 2-socket server with Intel Xeon processor 5680 and 384 GB of physical memory)

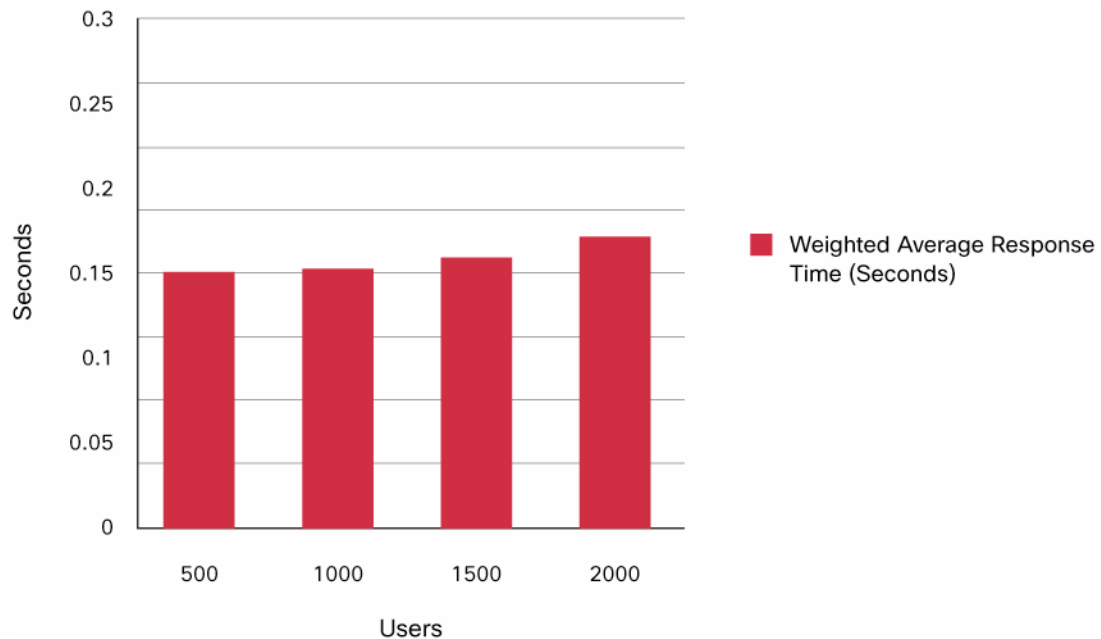
This test was run with 500 to 2000 users, and the system resource utilization was measured for each of the three tiers of the JDE E1 application.

### User Response Time

User response time was captured at the LoadRunner Controller for all 17 interactive Oracle JDE DIL kit test scripts. The average user response time varied from 0.154 to 0.178 second for 500 to 2000 users, respectively. Figure 8 shows the average response time for the split configuration.



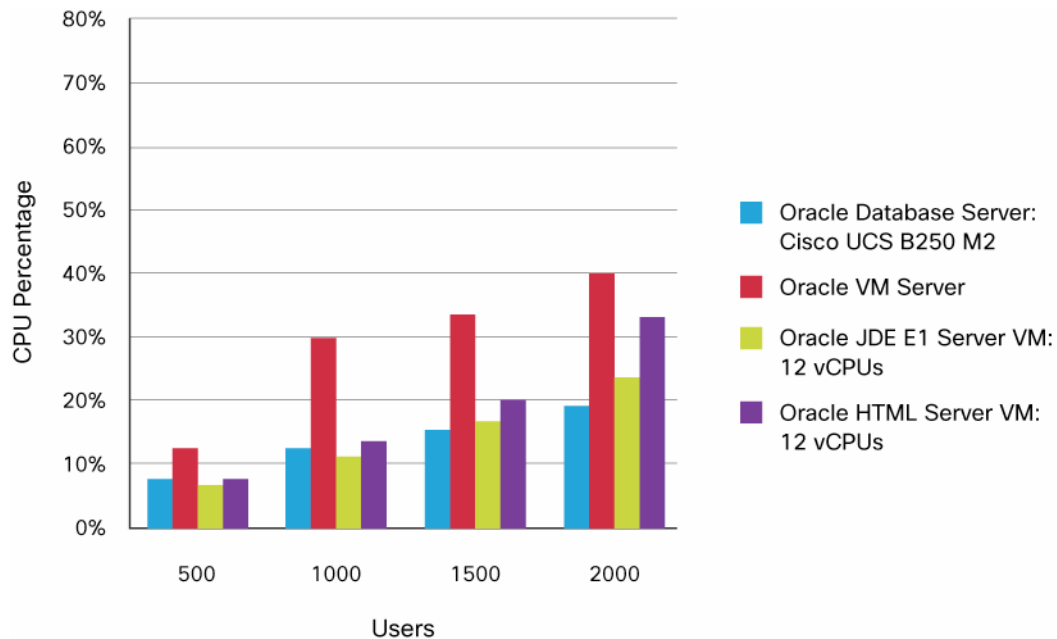
**Figure 8.** Oracle JDE DIL Kit Response Time with Split Configuration Deployment



All three tiers of the JDE E1 deployment for split configuration were monitored with the nmon tool. XenTop was used to monitor the Oracle VM 2.2 server. Figure 9 illustrates the CPU utilization on each of the three tiers of the JDE E1 deployment.

The Oracle VM instances for the Oracle HTML server and JDE E1 server were assigned 12 vCPUs each on a single Cisco UCS B250 M2 blade server. The database server was deployed on a second Cisco UCS B250 M2 blade server with a configuration without Oracle VM. As shown in Figure 9, the total CPU utilization of the Oracle VM server ranged from 12 to 40 percent, and the utilization of the database server ranged from 7 to 19 percent, with 500 to 2000 users, respectively. For 1500 users, the Oracle VM instances for the Oracle JDE E1 and HTML servers experienced 23 and 33 percent CPU utilization, respectively.

**Figure 9.** JDE E1 CPU Utilization



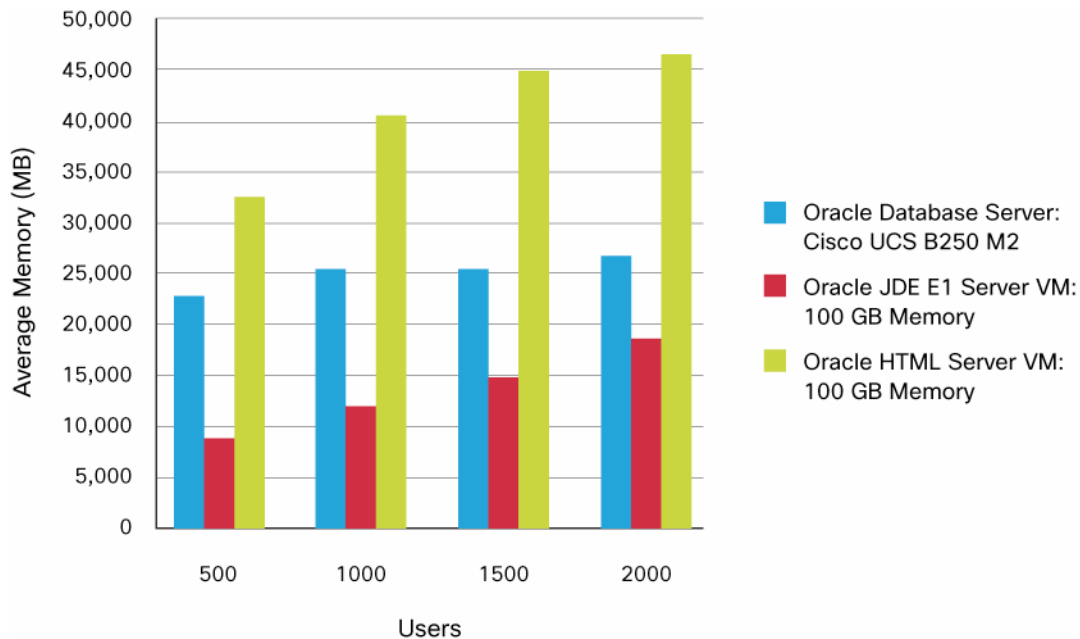
## Memory Utilization

Figure 10 illustrates the active memory use for each of the three tiers of the JDE E1 deployment. Memory assigned to each of the three JDE E1 components was fixed across the entire test at 500 to 2000 users and included the following features:

- The Oracle HTML server and JDE E1 server were each allocated 100 GB of memory.
- The Oracle database server was running on the Cisco UCS B250 M2 blade server with 384 GB of memory.

Active memory use for the database server was at a maximum of 26 GB for 2000 users, and the JDE E1 server reached a maximum of 18 GB for the same 2000 users. The Oracle HTML server was running 10 instances of Oracle WebLogic nodes clustered with an HTTP server at the front end and used a maximum of 46 GB of memory for 2000 users.

**Figure 10.** JDE E1 Split Configuration Active Memory Utilization



## Conclusion

The Cisco UCS B250 M2 Extended Memory Blade Server, deployed with Oracle VM 2.2 templates on JDE E1, successfully scaled to 1500 users with a 0.238-second response time for all Oracle JDE DIL kit transactions and with 50 percent total server CPU utilization. The split configuration, with two Cisco UCS B250 M2 blade servers, deployed to simulate common production deployments, easily scaled to 2000 users with an approximately 0.178 second weighted average response time and with 40 percent CPU utilization on the Oracle VM server and 19 percent utilization on the database server. The end-user response time and server resource utilization for both Oracle VM template and split configuration deployments scaled linearly based on the number of users.

The Cisco UCS B250 M2 blade server deployed in this performance validation provides higher memory density in x86 server systems and allows less expensive memory modules to fulfill application and database memory requirements for greater memory per core. This capability enables larger memory-resident workloads and results in lower licensing costs.

## Disclaimer

Note that the testing conducted to develop these results was performed at the end of 2011. Some of the products that make up this solution set now have new versions: for example, Oracle VM 3.0 is now available. Therefore, a similar configuration composed of new versions of software and hardware elements could yield different results.

## For More Information

- Oracle JDE Express Installation Guide for Oracle VM Templates:  
<http://www.oracle.com/us/products/applications/jd-edwards-enterpriseone/tools-and-technology/053317.html?ssSourceSitelid=otnen>

- Cisco B250 M2 Extended Memory Blade Server:  
<http://www.cisco.com/en/US/products/ps10914/index.html>

## Appendix: Test System Specifications

Tables 1 and 2 summarize the test configurations.

**Table 1.** Test Configuration for JDE E1 Default Template Deployment on Cisco UCS B250 M2 Blade Server

<b>Test server</b>	One Cisco UCS B250 M2 server equipped with two 6-core Intel Xeon processors 5680 at 3.33 GHz and configured with 384 GB of physical memory
<b>HTML server</b>	Oracle WebLogic 10.3.2 on Oracle VM 2.2 with 8 vCPUs and 100 GB of memory
<b>JDE E1 server</b>	JDE E1 Server Release 9 Update 2 with Release 8.98.4 tools deployed on Oracle VM 2.2 with 8 vCPUs and 100 GB of memory
<b>Database</b>	Oracle Database 11gR2 deployed on Oracle VM 2.2 with 8 vCPUs and 160 GB of memory
<b>Storage</b>	EMC Clariion CX4
<b>Operating system (64-bit)</b>	Oracle Linux 5.5 (Red Hat-compatible kernel)

**Table 2.** Configuration for JDE E1 Split Configuration (Database on Server Without Oracle VM)

<b>Test server</b>	Two Cisco UCS B250 M2 servers equipped with two 6-core Intel Xeon processors 5680 at 3.33 GHz and configured with 384 GB of physical memory
<b>HTML server</b>	Oracle WebLogic 10.3.2 on Oracle VM 2.2 with 12 vCPUs and 100 GB of memory
<b>JDE E1 server</b>	JDE E1 Server Release 9 Update 2 with Release 8.98.4 tools deployed on Oracle VM 2.2 with 12 vCPUs and 100 GB of memory
<b>Database</b>	Oracle Database 11gR2 deployed on a separate Cisco UCS B250 M2 blade server with Oracle Linux 5.5 (Red Hat-compatible kernel)
<b>Storage</b>	EMC Clariion CX4
<b>Operating system (64-bit)</b>	Oracle Linux 5.5 (Red Hat-compatible kernel)



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