

An Oracle White Paper
December 2010

Accelerating Deployment of Virtualized Infrastructures with the Oracle VM Blade Cluster Reference Configuration

Introduction.....	1
Overview of the Oracle VM Blade Cluster Reference Configuration ...	2
Reference Configuration Components	3
Key Benefits	3
Oracle VM.....	4
Oracle VM Manager	4
Oracle VM Server	5
Oracle VM Templates.....	5
Sun Blade 6000 Modular Systems	5
Sun Blade X6270 M2 and X6275 M2 10GbE Server Modules.....	5
Oracle Sun Blade 6000 Ethernet Switched NEM 24p 10GbE	6
Sun ZFS Storage Appliances	7
Fast I/O Throughput for Virtualized Environments	7
Flexibility Through Configuration Choices	7
Faster and Easier Deployment	8
Single-vendor Support.....	9
Conclusion.....	9
For More Information	10

Introduction

Virtualization has already been widely accepted as a means to increase IT flexibility and help IT services align better with changing business needs. The flexibility of a virtualized IT infrastructure enables new applications to be rapidly deployed, capacity to be easily scaled, and IT resources to be quickly redirected. The net result is that IT can bring greater value to the business, making virtualization an obvious win from a business perspective.

However, building a virtualized infrastructure typically requires assembling and integrating multiple components (e.g. servers, storage, network, virtualization, and operating systems). This infrastructure must be deployed and tested before applications can even be installed. It can take weeks or months to plan, architect, configure, troubleshoot, and deploy a virtualized infrastructure. The process is not only time-consuming, but also error-prone, making it hard to achieve a timely and profitable return on investment.

Oracle is the only vendor that can offer a fully integrated virtualization infrastructure with all of the necessary hardware and software components. The Oracle VM blade cluster reference configuration described in this paper provides a complete and fully tested virtualized stack that can reduce deployment time by weeks or months while also reducing risk and improving application performance.

Overview of the Oracle VM Blade Cluster Reference Configuration

Oracle's virtualization strategy is to simplify the deployment, management, and support of the enterprise stack from application to disk. The Oracle VM blade cluster reference configuration is a single-vendor solution that addresses every layer of the virtualization stack with Oracle hardware and software components (Figure 1). It enables quick and easy deployment of the virtualized infrastructure using components that have been tested together and are all supported together by one vendor — Oracle.

The solution makes use of pre-configured virtual machines that contain optimized configurations for running applications on Sun Blade 6000 Modular Systems from Oracle with Oracle's Sun ZFS Storage Appliances. Tests were conducted by Oracle to validate the reference configuration using the Oracle Validated Configuration test suite. In addition, the components have also been tested with Oracle VM by the respective product teams.

Oracle VM Templates are used with this solution to simplify and accelerate deployment of the reference configuration software stack. The Templates include pre-installed versions of Oracle Linux and Oracle Solaris as well as Oracle VM Server and Oracle VM Manager. Best practices for optimizing the environment are built into the Templates, which define configurations for all components of the software stack. To deploy the Oracle VM blade cluster reference configuration, customers simply order the recommended hardware components and then download the Oracle VM Templates for the reference configuration. The Oracle VM Templates contain ready-to-run software stacks, so the entire virtualized infrastructure can be up and running in hours as opposed to weeks.

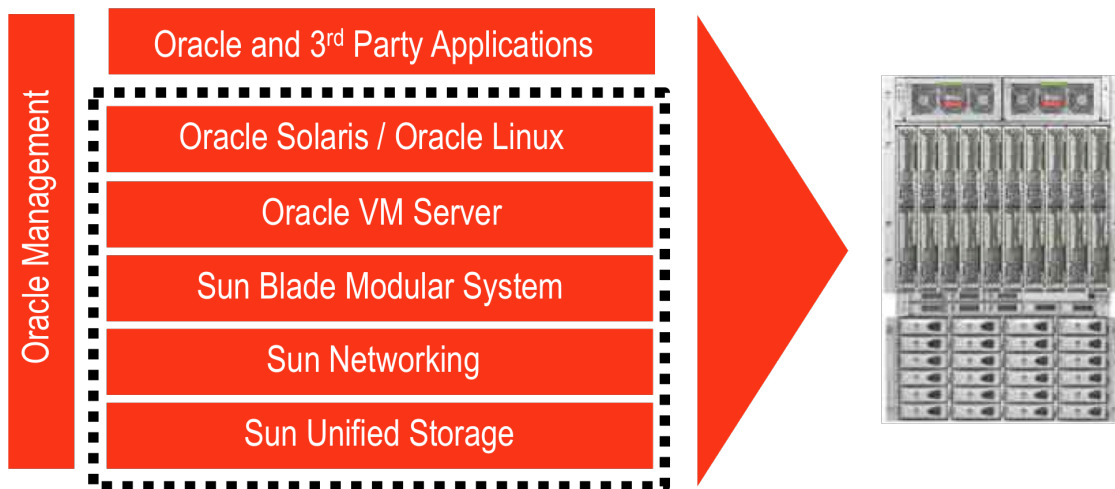


Figure 1. The Oracle VM blade cluster reference configuration provides a complete hardware and software stack that can accelerate deployment and reduce the risk of errors.

Reference Configuration Components

Table 1 includes a list of the supported components in the reference configuration along with relevant configuration details.

TABLE 1. COMPONENTS OF THE ORACLE VM BLADE CLUSTER REFERENCE CONFIGURATION		
STACK LAYER	RECOMMENDED ORACLE PRODUCT	CONFIGURATION DESCRIPTION
Operating System	Oracle Solaris and Oracle Linux	<ul style="list-style-type: none"> • Oracle Solaris 10 • Oracle Linux 5
Virtualization	Oracle VM Server for x86	<ul style="list-style-type: none"> • Oracle VM Server 2.2.1 runs on each compute blade • Oracle VM Manager 2.2 running as a VM, HA enabled • Oracle VM Templates offer pre-installed and pre-configured software images
Server hardware	Sun Blade 6000 Chassis Sun Blade X6275 M2 10 GbE server module Sun Blade X6270 M2 server module	<ul style="list-style-type: none"> • 10 single- or dual-node server modules per chassis • Start with 2 nodes and scale up to 32 nodes in one Oracle VM server pool • Scale to multiple server pools
Networking	Sun Blade 6000 Ethernet Switched NEM 24p 10GbE	<ul style="list-style-type: none"> • 10 10GbE downlinks: 1 link to each blade server via Fabric Expansion Module (FEM)¹ • 14 10GbE uplinks: 2 SFP+, 3 QSFP (Quad Small Factor Ports) (equiv to 12 10GbE ports)
Storage	Oracle's Sun ZFS Storage Appliances <ul style="list-style-type: none"> • Sun ZFS Storage 7120 • Sun ZFS Storage 7320 • Sun ZFS Storage 7420 • Sun ZFS Storage 7720 	<ul style="list-style-type: none"> • Available in different configurations to meet a variety of needs for capacity, price, and performance • Use NFS over high-speed 10Gb Ethernet interfaces for Oracle VM Servers to access shared storage

Key Benefits

Key benefits of the Oracle VM blade cluster reference configuration include:

- **Faster time to value** – Begin deploying applications immediately because the optimized software stack is pre-configured for best practices and is ready-to-run on the recommended hardware platforms.
- **Reduced deployment cost and risk** – The entire hardware and software stack has been tested and is supported together by Oracle.
- **Elastic scalability** – As capacity needs grow, the system can be easily scaled in multiple dimensions with the ability to add compute, storage, and networking resources independently.

¹ The Sun Blade X6270 M2 server module requires a FEM. The X6275 M2 10GbE server module utilizes its integrated 10GbE controller and therefore does not require a FEM.

Oracle VM

Oracle VM server virtualization is designed to efficiently virtualize business-critical database and application workloads and fully supports both Oracle and non-Oracle applications. It delivers more efficient performance and makes enterprise applications easier to deploy, manage, and support. Oracle VM is available for free download and use without a licensing fee.

As shown in Figure 2, Oracle VM enables a physical hardware server to be logically divided into multiple virtual machines (VMs). Each virtual machine has its own virtual CPUs, network interfaces, storage, and operating system. These resources are managed using Oracle VM Manager, the management interface for the virtual environment.

Oracle VM Templates offer a means to accelerate deployment of enterprise software and eliminate installation and configuration costs by providing pre-installed and pre-configured software images.

Oracle VM is backed by the Oracle worldwide technical support organization and is fully certified with all Oracle software and hardware.

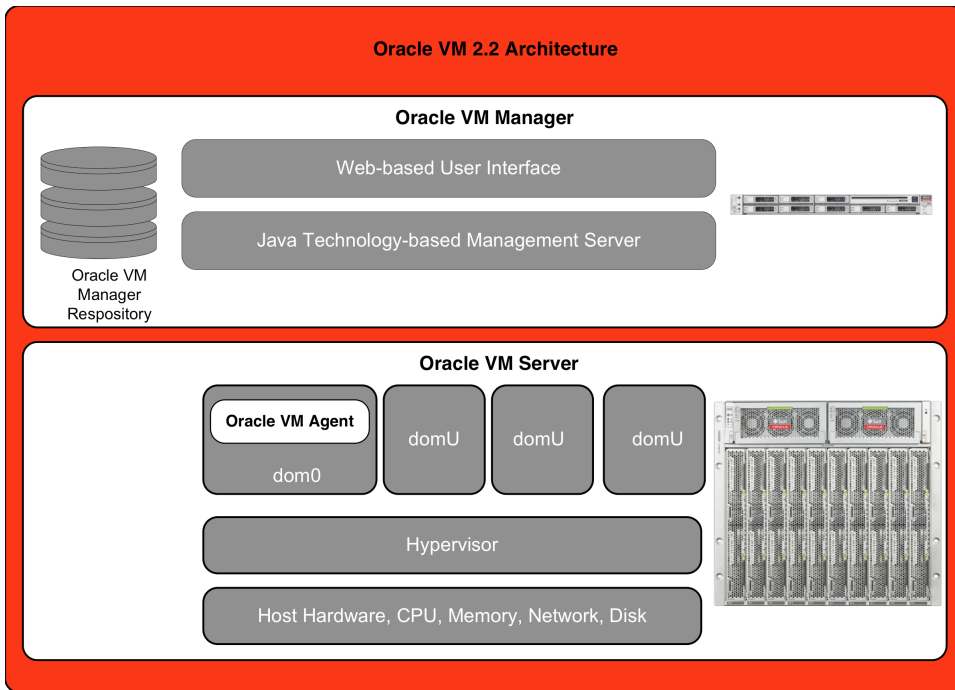


Figure 2. The Oracle VM architecture enables hardware resources to be managed as flexible resource pools.

Oracle VM Manager

Oracle VM Manager lets administrators create, clone, share, configure, boot and migrate virtual machines using an easy-to-use graphical interface. It enables administrators to streamline tasks that would otherwise be time-intensive and highly manual. Oracle VM Manager can help reduce data center complexity by making it easier to manage the virtualized infrastructure. For example, administrators

can quickly create new virtual machines and then deploy operating systems and applications using Oracle VM Templates. Oracle VM Manager also helps reduce the cost and complexity of virtual machine failover through automatic failover and restart capabilities.

Oracle VM Server

Based on open technology, Oracle VM Server includes a VM agent, which enables the communication channel with the Oracle VM Manager for management purposes. It provides a self-contained virtualization environment designed to provide an agile, secure, server-based platform for running guest virtual machines.

Oracle VM Templates

Oracle VM Templates provide an innovative approach to deploying a fully configured software stack by offering pre-installed and pre-configured software images. The Templates not only save valuable time in deployment, but also provide the benefit of delivering gold images of stacks that are well tested, configured, and popular.

To begin using the encapsulated software in an Oracle VM Template, simply download the Template from Oracle E-Delivery and import it to an Oracle VM instance. (Third-party developed Templates are made available via their corresponding channels.) Users can immediately begin using the software right away. No further installation is required.

Sun Blade 6000 Modular Systems

Sun Blade 6000 Modular Systems from Oracle provide an open modular architecture that is optimized for performance, efficiency, and density. With a choice of server modules based on the latest Oracle SPARC® and Intel® Xeon® processors, organizations can select the platforms that best match their applications or existing infrastructure, without worrying about vendor lock-in. The blade servers also support a choice of operating systems as well as industry-standard PCIe I/O modules, expandable storage, transparent networking, and consolidated management.

Oracle blades are optimized to run Oracle Linux, Oracle Solaris and Oracle VM. The result is a modular IT infrastructure architecture that serves the needs of the datacenter and the goals of the business while protecting existing investments into the future.

Sun Blade X6270 M2 and X6275 M2 10GbE Server Modules

Within the Sun Blade 6000 Modular System Chassis, the recommended blade server modules for the Oracle VM blade cluster reference configuration are the Sun Blade X6270 M2 and the dual-node X6275 M2 10GbE server modules.

Oracle's Sun Blade X6270 M2 server module is the best fit for mid-range virtualization workloads that require a balanced blade. It supports up to 144GB of main memory and up to 12 CPU cores with the high-speed six-core Intel Xeon Processor 5600 series. The Sun Blade X6270 M2 server module offers

balanced performance and superior energy efficiency while reducing the cost and complexity of a virtualized infrastructure.

Sun Blade X6275 M2 10GbE server modules are ideal for large virtualization infrastructures that require the high density of a dual-node blade and support for 10 Gigabit Ethernet to reduce I/O bottlenecks. The Sun Blade X6275 M2 10GbE server module is Oracle's highest compute density blade server with support for a total of 24 CPU cores and up to 192 GB of main memory in a single blade. Combining the Sun Blade X6275 M2 10GbE with the high performance, low latency Sun Blade 6000 Ethernet Switched Network Express Module 24p 10GbE delivers the required bandwidth to eliminate potential network bottlenecks that can be experienced in virtualized environments.

Key features of the Sun Blade X6270 M2 and X6275 M2 10GbE server modules are compared in Table 2.

SPECIFICATION CATEGORY	SUN BLADE X6270 M2 SERVER MODULES	SUN BLADE X6275 M2 10GBE SERVER MODULES ²
CPU Power	<ul style="list-style-type: none"> Up to 12 cores Up to two six-core high-speed Intel Xeon Processor 5600 series CPUs 	<ul style="list-style-type: none"> Up to 24 cores Two compute nodes per blade Two six-core high-speed Intel Xeon Processor 5600 series CPUs per compute node
Main Memory	<ul style="list-style-type: none"> 18 DIMM slots Up to 144GB total memory 	<ul style="list-style-type: none"> 12 DIMM slots per compute node Up to 96GB memory per compute node or a total of 192GB per blade
I/O	<ul style="list-style-type: none"> Two 10/100/1000-T Ethernet ports for up to 1 GbE 282GB/sec I/O bandwidth 	<ul style="list-style-type: none"> Two models: Integrated 10GbE or 1GbE networking Support for high IOPS Sun Flash Modules

Oracle Sun Blade 6000 Ethernet Switched NEM 24p 10GbE

The Oracle Sun Blade 6000 Ethernet Switched NEM 24p 10GbE³ simplifies data center deployments while simultaneously delivering the highest attainable throughput with 10GbE switching technology. With its combination of advanced cut-through switching, novel use of QSFP for uplinks, and line rate quality of service, the switched NEM 24p provides the ideal solution for virtualization and network storage. The solution scales to 4 chassis, offering 75% fewer cables and eliminating the need for expensive external switching.

In the Oracle VM blade cluster reference configuration, the Sun Blade 6000 Modular System is equipped with a redundant pair of switched NEM 24p interconnects. Each is dedicated to one head of the Sun ZFS Storage Appliance cluster. This solution leverages the bandwidth of 10GbE while

² The Sun Blade X6275 M2 10GbE server module was tested with the Oracle VM blade cluster reference configuration.

³ In the product name, NEM represents network express module.

ensuring no single points of failure. It also offers 12 unused 10GbE uplinks per NEM for seamless integration into the datacenter.

The high performance and reduced cabling offered by the Sun Blade 6000 Ethernet Switched NEM 24p 10GbE make it ideal for the virtualized architecture of the Oracle VM blade cluster reference configuration.

Key benefits include:

- Simplified network topology with embedded 10GbE switching, eliminating the need for external switching
- Reduced costs and simplified management with 4:1 cable reduction and simple scalability to 4 chassis
- Seamless integration into existing datacenters with the industry's highest density uplinks

Sun ZFS Storage Appliances

Sun ZFS Storage Appliances provide all the benefits of unified storage in an easy-to-use appliance package to help organizations dramatically simplify their storage deployment and management while also reducing costs. These appliances change the economics of storage by using a high-performance Hybrid Storage Pool (HSP) architecture that combines the performance characteristics of SSDs with high-capacity hard disk drives (HDDs). The SSDs provide read and write cache, enabling higher performance than traditional storage architectures at up to 35% less cost.

Oracle's Unified Storage systems also provide unmatched simplicity and ease-of-use through an intuitive and powerful browser user interface (BUI) for simplified management. Revolutionary business analytics functionality allows administrators to quickly diagnose and resolve performance issues in production systems.

Fast I/O Throughput for Virtualized Environments

Sun ZFS Storage Appliances support many concurrent I/O threads due to an innovative architecture that leverages SSDs, multiple CPU cores, and 10 Gigabit Ethernet connectivity. This high level of I/O throughput enables Sun ZFS Storage Appliances to support more virtual machines without sacrificing service levels.

While the appliances support many different storage I/O protocols including, Common Internet File System (CIFS), Internet Small Computer System Interface (iSCSI), InfiniBand (IB), and Fibre Channel (FC), NFS over Ethernet is recommended for attaching the storage in the Oracle VM blade cluster reference configuration. This is due the extreme simplicity of NFS and the fact that it scales well on Sun ZFS Storage Appliances.

Flexibility Through Configuration Choices

To meet a variety of needs for capacity, price, and performance, Sun ZFS Storage Appliances are available in different configurations that include high availability (HA) cluster configurations for the

Sun ZFS Storage 7320, 7420, and 7720 system models. In a clustered configuration, the head node resources failover to the surviving node in the event of node crash, thus helping to ensure near continuous availability. All systems come bundled with the same software including data protocols, replication, compression, and DTrace Analytics software for system troubleshooting and performance optimization.

Key hardware component specifications of the Sun ZFS Storage Appliance are listed in Table 3.

TABLE 3: SUN ZFS STORAGE APPLIANCE MODELS						
PLATFORM	STORAGE CAPACITY	PROCESSOR	MEMORY (DRAM)	WRITE OPTIMIZED SSD	READ OPTIMIZED SSD	CLUSTER OPTION
Sun ZFS Storage 7120	Up to 60 x 2TB SAS Disks [120TB]	1 x Quad Core Intel Westmere EP E5620 @ 2.4GHz	Up to 36GB	Up to 96GB	N/A	N
Sun ZFS Storage 7320 (details are per controller)	Up to 96 x 2TB SAS Disks [192TB]	2 x Quad Core Intel Westmere EP E5620 @ 2.4GHz	Up to 72GB	Up to 16 x 18GB	Up to 4 x 512GB	Y
Sun ZFS Storage 7420 (details are per controller)	Up to 576 x 2TB SAS Disks [1.1PB]	4 x 6C Intel Nehalem EX E7530 @ 1.86GHz [or] 4 x 8C Intel Nehalem EX X7550 @ 2GHz	Up to 512GB	Up to 96 x 18GB	Up to 4 x 512GB	Y
Sun ZFS Storage 7720	Expandable racks. Each Rack 720 TB	4 x 8C Intel Nehalem EX X7550 @ 2GHz	Up to 512GB per controller	2 x 18GB per cage	Up to 4 x 512GB per controller	Y

Faster and Easier Deployment

The typical process for deploying a virtualized infrastructure involves assembling a mix of hardware and software technologies from multiple vendors and includes a number of steps that can either be eliminated or greatly simplified with the Oracle VM blade cluster reference configuration. Many IT organizations have separate teams for deploying server, network and storage systems. If any one of these teams gets busy and is delayed in completing their part of the virtualized infrastructure, it becomes a bottleneck for the entire deployment schedule. The risk of delays is minimized with the Oracle VM blade cluster reference configuration where the software is pre-installed and pre-configured, and the hardware components have already been tested together.

Table 4 shows a comparison of the estimated time to complete the deployment tasks for a typical multi-vendor scenario versus deploying the Oracle VM blade cluster reference configuration.

TABLE 4. TASKS REQUIRED FOR MULTI-VENDOR SOLUTION VERSUS ORACLE VM BLADE CLUSTER REFERENCE CONFIGURATION			
DEPLOYMENT TASK	TYPICAL MULTI-VENDOR DEPLOYMENT	ORACLE VM BLADE CLUSTER REFERENCE CONFIGURATION	ESTIMATED TIME SAVINGS
Install applications	Set up the OS, check compatibility, install and configure the application(s), apply the patches, and install and configure related management tools.	Download the Oracle VM Templates that are pre-installed and pre-configured with the entire application stack and are ready to deploy.	Multiple days or weeks
Install OS	Approximately 1 hour to install OS and relevant patches.	Either Oracle Linux or Oracle Solaris are included in the Oracle VM Templates that are ready to deploy	1 hour
Configure and setup hardware	Verify the compatibility of all hardware components, device drivers, etc.	Provides best practices and guidelines to set up server, storage and network components.	Hours to several days
Reliability and integration testing	Testing the virtualized infrastructure before deploying applications can take hours or even days if problems are detected.	The defined configuration is pre-tested and optional components are interoperable.	Hours or days

Single-vendor Support

Support is also greatly simplified with this single-vendor solution. There is no need to negotiate multiple support contracts with different vendors, saving time during procurement. Daily operations are also simplified because one vendor can be called for support regardless of which hardware or software component has caused the problem. A single support ticket with Oracle means that customer IT teams do not have to spend their valuable time trying to isolate the right system component before calling Oracle for support.

Conclusion

Most IT organizations don't want to spend weeks building a multi-vendor virtualized infrastructure. Yet until now, they've had little choice because running IT without virtualization is too costly. The Oracle VM blade cluster reference configuration offers a better alternative that not only reduces the time and cost of deployment, but also reduces risk and makes it easy to scale the virtualized infrastructure.

The entire software stack is pre-configured, pre-optimized, and ready-to-run on the recommended hardware platforms. Because the components have already been tested together and are supported together, there is less risk of deployment delays or production downtime. With the ability to add compute, storage and networking resources independently, the system can be scaled in multiple dimensions to match evolving changes in demand for applications.

For More Information

For more information about this reference configuration, refer to the technical white paper titled, “Best Practices and Guidelines for Deploying the Oracle VM Blade Cluster Reference Configuration,” which is available on the [Oracle Technology Network](http://www.oracle.com/technetwork/) at <http://www.oracle.com/technetwork/>.

For more information about Oracle VM, Oracle Linux, Oracle Solaris, Sun Blade Modular Systems, Sun ZFS Storage Appliances, or Sun networking solutions, visit www.oracle.com or call +1.800.ORACLE1 to speak to an Oracle representative.

The Web resources listed in Table 5 provide additional product information and Table 6 provides resources for staying connected to Oracle virtualization news.

WEB RESOURCE DESCRIPTION	WEB RESOURCE URL
Oracle Solaris	http://oracle.com/solaris
Oracle Linux	http://oracle.com/linux
Oracle VM Templates	http://www.oracle.com/technetwork/server-storage/vm/templates-101937.html
Oracle Virtualization	http://oracle.com/virtualization
Sun Blade Systems	http://www.oracle.com/goto/blades
Sun ZFS Storage Appliances	http://www.oracle.com/us/products/servers-storage/storage/unified-storage/
Sun Networking	http://www.oracle.com/us/products/servers-storage/networking/
Oracle Enterprise Manager	http://www.oracle.com/us/products/enterprise-manager/
Oracle Enterprise Manager Ops Center	http://www.oracle.com/us/products/enterprise-manager/opscenter/
Oracle Premier Support for Systems	http://www.oracle.com/us/support/systems/premier/

WEB RESOURCE DESCRIPTION	WEB RESOURCE URL
Oracle Virtualization on Twitter	http://www.twitter.com/ORCL_Virtualize
Oracle Virtualization Blog	http://blogs.oracle.com/virtualization
Sample Virtualization Newsletter	http://www.oracle.com/newsletters/samples/virtualization.html
Subscribe to the Virtualization Newsletter	http://www.oracle.com/subscribe/index.html



Accelerating Deployment of Virtualized
Infrastructures with the Oracle VM Blade Cluster
Reference Configuration
December 2010

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 © 2011, 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