

## WHITE PAPER

---

# Datacenter Efficiency with Oracle x86 Blade System Solutions

---

Sponsored by: Oracle

---

Jed Scaramella  
December 2010

## EXECUTIVE SUMMARY

In today's competitive environment, IT organizations are under constant pressure to adapt IT resources and to improve levels of service in order to keep pace with the demands of the business. Yet, IDC finds many IT organizations burdened with an overly complex infrastructure that is driving up operating expenses and taxing IT staffing resources. It has been common for IT organizations to deploy, integrate, and support technologies from multiple sources. Over many years, this practice has resulted in a complex series of hardware and software solutions designed and tuned to meet the specific requirements of each application. IT staff are currently overburdened by maintenance tasks and challenged with the complicated integration between software, servers, the network, and storage systems. It is not uncommon for an IT organization to spend the majority of its resources on maintenance rather than on value-add innovations. To remain competitive, organizations must adopt a different approach to keep IT infrastructure running efficiently.

Oracle has integrated Sun hardware with Oracle's software applications and management tools to deliver a complete end-to-end solution that reduces IT complexity. Oracle's Sun Blade portfolio, which includes server, storage, networking, and management components, is combined with Oracle middleware, database software, and applications to provide infrastructure optimized for enterprise applications and scalable databases. The result is a converged system, preengineered and precertified, that can be efficiently deployed, supported, and upgraded as a single entity. IT customers are able to speed deployment times, optimize workload performance, and improve IT efficiency.

Oracle removes the burden of integrating the disparate hardware components and deploying the operating system (OS) software and applications from the IT staff. Companies are able to maximize the return on the capital expenditure (capex) as well as increase the utilization of the IT assets by reducing overprovisioning. Additionally, to help customers gain a better understanding of their environment, Oracle's Single System Management provides a centralized and comprehensive view of IT operations across the IT stack.

Within enterprise customers, converged systems are the key building blocks of the future private clouds that are shifting environments away from disparate resource silos to virtual resource pools. The integration of Oracle's x86 blade systems, Oracle VM, and Oracle Unified Storage appliances, connected with either Ethernet or InfiniBand fabric services, forms a dynamic and elastic infrastructure-as-a-service (IaaS) solution for

private cloud deployments. The results are optimized solutions that IT organizations will be able to efficiently deploy, scale, and manage in order to meet the growing demands of their business. This in turn will position IT as a valuable asset to the business as opposed to a liability.

## **SITUATION OVERVIEW**

More than ever before, enterprises are relying on their IT infrastructure as a critical element in their ability to compete in the marketplace. IT organizations are under constant pressure to adapt IT resources and to improve levels of service in order to keep pace with the demands of the business. Ongoing innovation and IT expansion have become essential to grow and evolve business models. The norm for the majority of enterprises has been for the IT organization to deploy, integrate, and support disparate technologies from multiple sources. The result over many years is a complex series of hardware and software solutions designed and tuned to meet the specific performance and availability objectives of each application. Yet, as IT environments have grown in size, the infrastructure's complexity and management costs have grown too, which places significant pressure on IT budgets and staffing resources.

IDC observes that IT managers are challenged by rising operational expenses, power and cooling limitations to IT capacity, IT staff overburdened by maintenance tasks, and the complicated integration between software, servers, the network, and storage systems. Commonly, IT organizations spend the majority of their resources on maintenance rather than on business-aligned value-add innovations. Going forward, customers are seeking IT solutions that simplify IT, reduce complexity, increase resource utilization, and shorten the time to provision and deploy new services.

---

### **Datacenter Complexity**

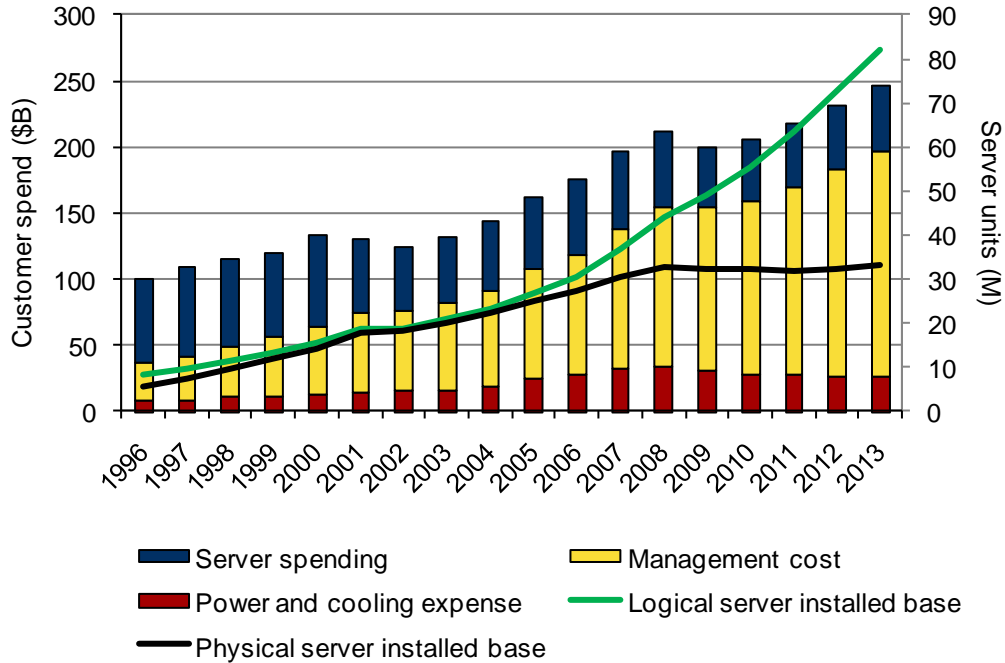
Figure 1 illustrates the changing economic landscape within the datacenter over nearly two decades, driven by shifts in both the types and the numbers of technologies installed. As the industry increasingly migrated workloads to x86 servers as a method to control capex, it was common practice to deploy one physical server for each installed application. The consequence has been a very disjointed physical server sprawl leading to a point where the operational expense (opex) associated with servers outweighs the capex.

Additionally, the installed base of systems itself has become complex, especially considering the proliferation of server virtualization, as illustrated in Figure 1. Technology is always evolving, bringing new features and requirements to IT equipment. As IT departments are continually starting new projects (most often driven by the latest technology update), applications are running on disparate generations of technologies that are difficult and expensive to couple together and manage.

Going forward, a different approach is required to keep IT infrastructure running efficiently. IDC believes there is an emerging opportunity to deliver to customers a new type of solution that minimizes legacy challenges yet deploys easily into existing datacenters.

**FIGURE 1**

Worldwide Spending on Servers, Power and Cooling, and Management/Administration



Source: IDC, 2010

### Management Challenges

As a consequence of the large numbers of servers deployed within a customer's datacenter, the systems maintenance costs and tasks have drastically increased as well. IDC estimates that staff cost related to server management has risen 600% to over \$120 billion annually, significantly taxing budgets as well as IT staff time. To manage the disparate systems within the environment, many IT administrators must utilize multiple management platforms to be able to complete the wide variety of functions, including system deployment, provision of workloads, ongoing maintenance, software updates, and security patches. A centralized approach to system management would improve IT's ability to monitor and control the IT infrastructure while increasing staff efficiencies.

Historically, ensuring application performance and availability required the overprovisioning of server resources. Most applications consume only a fraction of an average server's total capacity, typically 10–15% of an x86 server. The introduction of server virtualization to the x86 environment, enabling multiple virtual machines and applications to run on one physical server, has benefited customers twofold: improving the utilization rates of server hardware and lowering the capex requirements for new server hardware. IDC's forecast shows that the physical server installed base will plateau over the next five years, yet there will be rapid growth in the number of virtual machines deployed. IDC expects virtual machine density to rise from five virtual machines per physical server on average in 2008 to more than eight virtual machines per physical server by 2013.

While IT organizations have widely adopted virtualization in their environment, IDC still finds that investment in system management and automation has not kept pace. As a result, it is common to find that many datacenters still employ manually intensive processes that place greater burdens on IT staffing. A problem also exists with the lack of integration across application, OS, hypervisor, compute, networking, and storage resources. The management tools — like the hardware, server, storage, and networking components — are disparate; they have to be piecemealed without solid integration across all the elements. This manual intervention often means that systems are disconnected from business processes and the ability to adapt to change in response to the business is hampered.

## CONVERGENCE EVOLVES IT ENVIRONMENTS

Over the past two decades, it was common for IT customers to source multiple products from a variety of suppliers as they constructed their IT solutions, often acting as their own systems integrator in mixing and matching servers, storage, networking, and systems software to optimize the performance of their applications.

As the number of systems and devices continues to proliferate, IT organizations are faced with the challenge of determining the most appropriate technologies and then making them work within their existing environment. For many customers, this process has become too complex and now requires sophisticated staffing expertise as well as significant lead time for provisioning, testing, and deployment. Traditionally, server, storage, and network systems are installed in their own "silos," which has made interoperability, efficiency, and problem resolution a challenge. This also calls into question the IT department's main job function — to construct and deploy infrastructure or to deliver IT services to the business units.

IDC believes the new converged systems that are coming to market offer the value of ease of installation and simplicity of management. Convergence not only lowers complexity for customers but also acts as an enabling vehicle for an IaaS shared service model of computing, one that maximizes hardware utilization, improves availability, contains management costs, and reduces time to deployment.

IT organizations want to create a dynamic environment where infrastructure can automatically grow, shrink, and redeploy at an optimized price point based on changes in business demands. While this has long been a vision, the realities of building in this type of flexibility have been difficult to achieve.

Converged infrastructure also brings the benefits of faster deployment time (relative to standalone hardware), improved availability with preset service-level agreements (SLAs), and lower opex costs through the use of integrated management tools. IDC research with customers who have deployed converged infrastructure environments shows that the true benefits are not so much in the hardware itself but in the agility of the environment that reduces both capex costs and opex costs, simplifies management, and improves availability with a more predictable operating environment (see Figure 2).

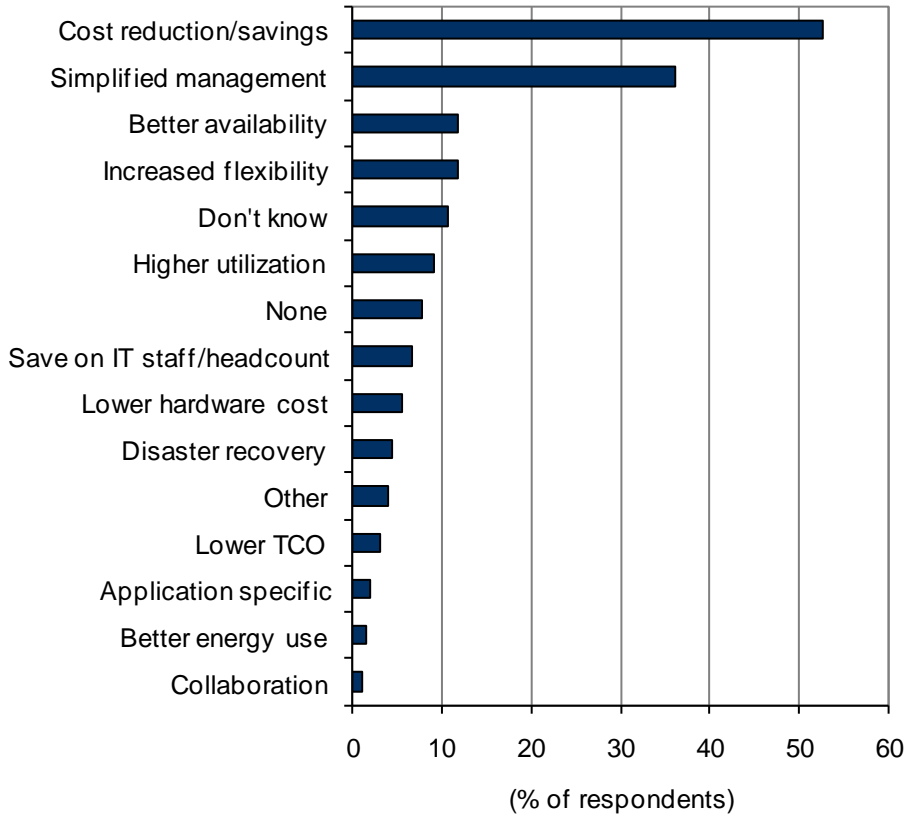
"Converged systems" refers to a new set of enterprise products that package server, storage, and networking architectures together as a single unit and utilize built-in service-oriented management tools for the purpose of driving efficiencies in time to deployment and simplifying ongoing operations.

Within a converged system, the compute, storage, and network devices are aware of each other and are tuned for higher performance than if constructed in a purely siloed process.

**FIGURE 2**

**Major Benefits of Converged Systems**

Q. *What do you see as the top two major benefits to converged computing?*



n = 255

Source: IDC's *Datacenter and Cloud Computing Survey*, 2010

**ORACLE VM BLADE CLUSTER REFERENCE CONFIGURATION**

**Oracle VM x86 Blade Cluster Drives Convergence**

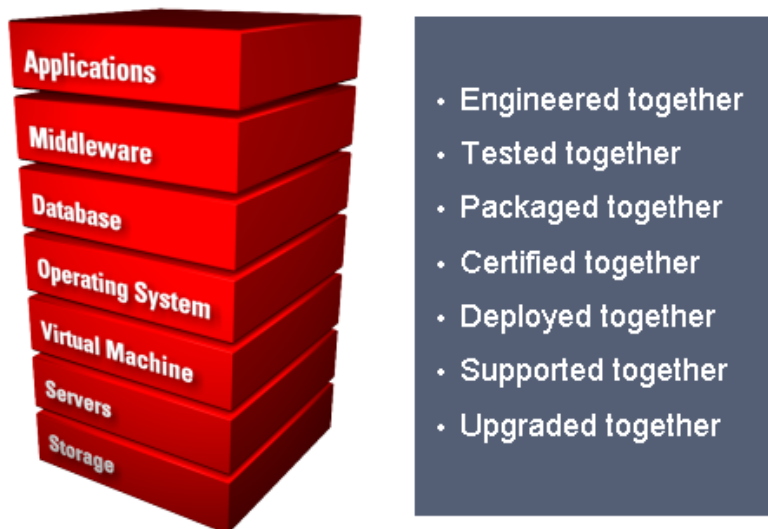
While many converged solutions that combine servers, storage, and networking have come to market recently, Oracle's strategy is differentiated in that Oracle is offering a complete reference architecture leveraging Sun hardware with Oracle software applications and management tools. Oracle is delivering a platform that integrates server, storage, networking, OS, and management components from Sun with Oracle middleware, database software, and applications. The result is a complete system that is designed to be a rapidly deployable solution and that reduces complexity in the customer's IT environment.

A critical element of the Oracle solution is the new Oracle VM Blade Cluster reference configuration, which provides documented best practices for implementing private cloud IaaS or any highly virtualized environment. According to Oracle, the reference configuration enables customers to speed deployment times, reducing certain configurations from 100 hours to 2 hours. Oracle states that IT organizations are able to achieve faster return on investment and realize up to 59% lower total cost of ownership over three years. The reference architecture leverages a standard InfiniBand or 10 Gigabit Ethernet (GbE) fabric and provides customers with the choice of deploying InfiniBand to accelerate performance of Oracle software running on x86 clusters.

Oracle is leveraging its expertise from the Exadata systems, Oracle's first integrated database machines built using the Sun systems, which combine x86 servers, Sun Flash Technology, InfiniBand fabrics, and advanced software algorithms that speed performance and throughput. In the Oracle converged system, based on Sun Blade Servers, the hardware elements are combined with a software stack that focuses on tailored enterprise solutions, most notably line-of-business applications, and scalable databases. The goal is delivering preengineered, pretested, preoptimized, precertified, and preconfigured solutions that can be deployed, supported, and upgraded together, thereby reducing complexity, ensuring workload performance, and improving IT efficiency (see Figure 3).

**FIGURE 3**

#### Oracle Complete Stack



Source: Oracle, 2010

#### ***Operational Efficiencies***

With traditional IT solutions, the IT organization typically owns the task of trying to determine the optimal IT elements for a specific workload, integrating the disparate hardware components, and deploying the OS software and application(s). In addition,

all of the lengthy configuration and testing processes must be done prior to production deployment. Oracle's solution removes these burdens from the IT staff by delivering an optimized end-to-end infrastructure solution, all from a single vendor. Companies are potentially able to reduce operating expenses associated with IT staff as well as increase the utilization of the IT assets by reducing overprovisioning. Customers may be able to achieve significant business return for their capex by getting a system that delivers maximum application throughput for their hardware investment.

### ***Rapid Deployment***

The pace at which businesses require information and IT services continues to accelerate, and competitive forces are mandating that IT be able to become increasingly flexible and deliver new or expanded applications in a rapid manner. Today's IT departments are already resource constrained, and IDC expects budgets to remain relatively flat for the foreseeable future. Compared with standalone hardware systems, Oracle's converged systems can reduce deployment times, thereby providing the valued services deployed on those systems to the business in a shorter time frame.

### ***Common Management***

Reducing complexity in the datacenter requires a centralized set of management tools, one that will provide a view of IT operations and costs. Oracle's Single System Management is a unifying technology platform that manages the complete IT solution stack. The platform spans the system with Oracle Integrated Lights Out Manager (ILOM) for server and network switch management; Oracle Hardware Installation Assistant, which is designed to ease the installation of OS and firmware upgrades; and Oracle Hardware Management, which defines and captures configurations. All of these components tie up into Oracle Enterprise Manager Ops Center, which provides whole life-cycle management at the datacenter level. This holistic and comprehensive management platform can assist customers in improving IT utilization and gaining a better understanding of their environment.

---

## **Oracle Sun Blade Server Portfolio**

Oracle has demonstrated its commitment to the x86 and blade server market and continues to enhance the blade portfolio with new solutions for cloud and highly virtualized environments. Oracle's server strategy is to develop purpose-built systems that integrate with Oracle IP to maximize operational efficiency, simplify management, and reduce complexity while improving flexibility. Highlights of the blade offerings include:

- ☒ **Sun Blade 6000 Chassis.** The chassis was designed to offer all the benefits of (x86 and SPARC) blade technologies while avoiding compromises. It offers both chassiswide I/O and blade-specific I/O (via PCI ExpressModules), meaning customers can run workloads with different I/O requirements in the same chassis. The chassis design allows the server blades to flexibly support an increased number of DIMM slots and hot-swappable drives.
  
- ☒ **Sun Blade X6270 M2.** The Intel-based two-socket server blade combines high I/O bandwidth with a large memory footprint targeting enterprise collaboration and virtualized business applications. Powered by the latest six-core Intel Xeon processor 5600 series, this balanced blade leverages the unique I/O architecture of the Sun Blade 6000 chassis, making it very easy to deploy and update.

☒ **Sun Blade X6275 M2.** The Intel Xeon 5600 series (dual-node) server blade is designed for compute-intensive workloads that require a highly dense computing solution. This blade includes two independent **(two-socket) servers** inside a single server module. This diskless blade supports Sun Flash Modules for high-speed low-power storage or application acceleration.

☒ **Sun Blade Storage Module M2.** Providing rapid in-chassis storage scalability, the Sun Blade Storage Module M2 supports multiple SAS-2 zones for ease of management and provisioning. The module has eight hot-swappable (SAS-2) hard drives to provide a storage pool of over 20TB to the chassis via nine storage modules.

☒ **Blade Networking**

☐ Oracle's network fabric strategy is to tightly integrate network services into each layer of the IT stack using either Ethernet or InfiniBand fabric services. Customers can deploy Oracle's network fabric into any Oracle environment to improve performance and simplify datacenter management. These network fabrics also power the Oracle Exalogic Elastic Cloud and Oracle Exadata Database Machine and demonstrate Oracle's ability to deliver performance by integrating fabric services with the application infrastructure. Oracle's network fabric eliminates I/O bottlenecks by integrating advanced networking capabilities across Oracle Applications, Oracle Fusion Middleware, and Oracle Databases running on Oracle's SPARC and x86 servers with Oracle ZFS Storage Appliances and Oracle VM with Oracle Solaris and Oracle Linux.

☐ **Virtualized 10GbE M2 Network Express Module (NEM).** This module features virtualized 10GbE I/O connectivity between Sun Blade modules within the chassis, eliminating a full tier of switching and providing zero management overhead and 10:1 cable reduction.

☐ **Switched Network Express Module (NEM) 10GbE 24p.** This module provides an ultradense, low-latency switch option for customers. It has 14 10GbE uplink ports to serve the most I/O-demanding enterprise applications, which eliminates potential bottlenecks that can result from running large numbers of virtual servers.

☐ **Sun Network 10GbE Switch 72p.** This external ultradense 10GbE switch is a key element for deploying Oracle's Cluster fabric. Optimized for use as both a top-of-rack switch as well as an aggregation switch, it can be used in conjunction with the Switched NEM 10GbE 24p to connect up to 720 server nodes to a nonblocking fabric with low latency.

☐ **Management.** The Sun Blade 6000 chassis offers users a single point of management for server, storage, and chassis networking, thereby reducing hardware complexity, operational expense, and IT staff burden. The Sun Blade Zone Manager provides dynamic zoning to enable the grouping of multiple blade server modules with storage modules, which reduces the number of discrete devices IT staff have to manage. Additionally, Oracle ILOM, equipped on each (x86 and SPARC) server module, provides a consistent interface to server administrators for day-to-day hardware diagnostics. As noted earlier, all Sun management platforms tie up into

Oracle Enterprise Manager Ops Center for a unified management solution, reducing management complexity for cloud and highly virtualized environments. With Oracle Enterprise Manager Ops Center 11g, customers can manage applications to disk, including the new Sun Blade X6275 M2 blade module and new Sun networking products, from a single tool.

### ***Building Block for Private Clouds***

IDC believes converged systems are placing customers on an evolutionary path toward the building of private clouds within their IT environments. IT infrastructures are transforming from disparate resource silos to virtual resource pools. However, these new systems must be able to be deployed into an existing datacenter alongside a customer's legacy infrastructure and also implemented on an adoption curve that is not disruptive to the enterprise's operations.

As demonstrated at the Oracle OpenWorld 2010 event, the combination of Oracle's x86 Blade Clustered systems, Oracle VM, and Oracle Unified Storage appliances using Oracle's network fabric has formed a dynamic and elastic IaaS solution for private cloud deployments. Oracle continues to leverage its broad spectrum of resources to engineer, test, optimize, certify, package, deploy, upgrade, manage, and support its range of products effectively. The results are integrated solutions that Oracle customers will be able to efficiently deploy, scale, and manage in order to meet the growing demands of their business. Oracle offers the key building blocks for building the cloud solutions, including the x86 Blade Clustered systems, storage, networking, and management; Oracle VM; Oracle Solaris; and Oracle Linux.

### **Enterprise-Ready Cloud**

Certain aspects of cloud computing make potential IT customers nervous. In an IDC survey of IT customers, over 70% noted security concerns as a challenge in moving to a public cloud. A private cloud, built on converged systems, can deliver a service-based approach to IT, but customers can still control security and compliance issues not yet fully covered in public clouds.

The same survey found that customers believe lower-end workloads were most suited for public cloud environments; specifically email, Web conferencing, workgroup, Web infrastructure, and streaming media. Furthermore, high-end business processing workloads, such as CRM, ERP, and OLTP, rank highest among customers as applications not suitable for public clouds. Oracle is able to deliver integrated hardware and software that offers customers the reliability they seek for demanding enterprise workloads.

## **CHALLENGES/OPPORTUNITIES**

Unlike many instances for IT vendors, the biggest obstacle for adoption of converged systems may be not the technology but the human element as it requires a change in thinking. In order to realize the full benefits from converged systems, IT organizations will have to shift their thinking about IT in terms of both management and asset procurement. Moving to a converged infrastructure often requires the customer to accept the trade-off to a smaller set of product options. This can run counter to traditional procurement

policies, which typically include a short list of vendors and multiple product options. Customers indicated to IDC that they are concerned that converged infrastructures will lock them into one supplier's architecture and road map for next-generation technologies. It is critical for vendors, such as Oracle, that their marketing message demonstrate that the adoption of converged systems does not require a complete rip and replace strategy and how these systems can easily integrate into their existing infrastructure.

Converged technology requires more interaction between previously siloed technology groups and IT departments. The integration of server, storage, and networking components also means coordination among the IT staff members who are responsible for managing those IT components. The advantage to an integrated technology approach is that it does help drive a consensus around application priorities and goals for datacenter metrics, improving communication between teams through a single management tool and framework.

## **CONCLUSION**

IDC believes the integration of server, storage, and networking, tightly coupled with virtualization and automation technologies in converged systems, is increasingly attractive to enterprise customers. The operational efficiencies gained, the increased flexibility in the infrastructure, and the ability to rapidly meet SLAs are key drivers for IT organizations in their journey toward creating private cloud environments and aligning with the needs of the business. IDC believes blades will play a prominent role in the early development of private clouds. The all-in-box nature of the chassis, with shared I/O and power and centralized management, makes the platform a well-suited building block.

Oracle's converged solution, offering hardware and software that have been engineered together, has already been tuned and tested on the Oracle factory floor. This benefits IT customers because less time and effort is required to deploy and run the system. Additionally, the preintegration of hardware components and centralized management minimizes the risk of manual errors, simplifies diagnosis of events, and reduces operational expenses. Because Oracle owns the enterprise and database application, it is able to offer an infrastructure that is optimized for a range of workloads, whether they be process, data, or I/O intensive.

---

## **Copyright Notice**

External Publication of IDC Information and Data — Any IDC information that is to be used in advertising, press releases, or promotional materials requires prior written approval from the appropriate IDC Vice President or Country Manager. A draft of the proposed document should accompany any such request. IDC reserves the right to deny approval of external usage for any reason.

Copyright 2010 IDC. Reproduction without written permission is completely forbidden.