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Reducing Costs Through Better Server Utilization

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Executive Overview

As IT organizations support dynamically changing business priorities and cope with economic pressures, maintaining datacenter agility is critical. By consolidating systems onto the latest server technology and taking advantage of virtualization techniques, enterprises can optimize datacenter efficiency, gain flexibility, and reduce operating costs—without sacrificing performance or impacting service levels.

Virtually every aspect of a business depends on the services provided by corporate datacenters to stay ahead of changing business conditions. Although the tremendous resources and capabilities afforded by a large infrastructure prove invaluable, these systems are often inflexible, hampering agility as companies look to react to evolving world markets. Indeed, today's hypercompetitive environment is forcing businesses to find ways to adapt and innovate to survive and be profitable. Yet, IT organizations are faced with service-level pressures that necessitate cost reductions and greater operational efficiency. The key to success is finding the right balance.

This white paper highlights how customers can use innovative virtualization and consolidation technologies from Oracle to create substantial savings on their investments in Sun servers from Oracle.

Optimize Datacenter Efficiency with Consolidation

As businesses grow, IT organizations add systems to support datacenter loads. If not carefully planned, such additions can result in a sprawling, complex network of systems that consume valuable datacenter floor space, create excessive power and cooling demands, and are costly and difficult to manage. Today, many of these platforms are reaching the edge of their capacity, making it difficult for datacenters to depend on systems and scale solutions to meet service-level agreements. The answer: consolidation. Server consolidation—bringing together applications, databases, and services onto fewer, highly reliable servers—is not just a trend, but a necessity. By moving to the latest technologies and implementing virtualization techniques, companies can consolidate onto fewer systems that get more work done and cost less to run.

Proof That Consolidation Works

Consolidation strategies are important allies for IT organizations looking to deliver more-innovative services at less cost—and no company understands that better than Oracle. An example from its history makes the point best. Prior to being acquired by Oracle, Sun consolidated facilities supporting its storage engineering and corporate and customer support groups into a next-generation datacenter. By replacing older servers and storage systems with the latest Sun technology now available from Oracle, Sun compressed datacenter rooms from nine buildings occupying 496,000 square feet of space into a new, next-generation datacenter occupying 126,000 square feet at its Colorado campus. Using a unique pod architecture with innovative techniques for connectivity, power, and cooling, the datacenter virtually eliminated the need for raised floor space.

Using Oracle Solaris Container technology and VMware ESX Server software Sun was able to consolidate 63 servers and 30 direct-attached storage devices onto two of Oracle's Sun Fire X4600 servers. In addition, the virtual tape library group replaced 19 legacy enterprise-class servers with two of Oracle's Sun SPARC Enterprise M5000 servers, using Dynamic Domains and Containers to partition the hardware and replicate the application environments that were running on the old systems. In the end, 88 percent square footage was compressed and the development of 5,000 square feet of datacenter space avoided—saving US\$2.3 million.

By consolidating datacenter operations and refreshing the hardware infrastructure with high-performance, energy-efficient Sun systems, Sun was able to avoid US\$4 million in building costs for raised floors, decrease power consumption by more than 1 million kilowatt hours per month, increase chiller efficiency by 32 percent, remove lead and chemical waste, and reduce costs with free cooling for more than one-third of the year. Such savings enabled Sun to create a greener environment, implementing a water treatment system that saves 675,000 gallons of water per year. Results of this magnitude might seem extraordinary, but they can be replicated by Oracle customers worldwide.

Refresh the Datacenter with the Latest Server Technology

Technology refresh cycles are a necessity and can help enterprises consolidate and operate at peak performance. Oracle's comprehensive line of powerful SPARC and x86 systems ranges from blades and rackmount servers to large-scale systems with up to 256 processor cores and 4 TB of main memory that run Oracle Solaris, Linux, and Microsoft Windows environments (see Figure 1).



Figure 1. Oracle offers a comprehensive product family that ranges from blades and rackmount systems to large-scale enterprise servers.

Sun Servers with CoolThreads Technology

Sun servers with CoolThreads technology deliver the next wave in innovative system design with world-record performance and a great price-to-performance ratio. They also deliver groundbreaking energy and space efficiency, as well as the industry's best performance per watt. Blending the performance and scalability of midrange servers with the economies of energy-efficient chip multithreading designs, these servers support up to 64 simultaneous execution threads on a single processor, large memory, cryptographic acceleration, and integrated on-chip I/O technology, to deliver dramatic improvements over traditional system architectures. Scalable systems are available—from space- and power-efficient blade and rackmount designs to expandable systems with I/O and internal disk options to Network Equipment Building Specification certified servers that handle the demands of carrier-grade environments. Hot-pluggable cooling fans, drives, and power supplies help eliminate disruption and deliver best-in-class reliability for mean time between service interruptions, service intervals, and fault robustness.

The space, watts, and performance (SWaP) metric shows that Sun servers can surpass systems from other vendors that use even the latest IBM POWER6 or Intel Xeon processors, using up to 30 percent less energy and occupying one-half the datacenter space—all while meeting or exceeding performance levels. Indeed, Java technology-based applications can run on Sun servers faster, in less space, and with less power than on systems from IBM and HP. For example, the Sun SPARC Enterprise T5440 server with four processors provides up to 4.4 times better performance and more than 3.5 times better performance per watt than IBM Power 570 and HP Integrity rx6600 servers, and it saves up to half the space they require, according to the Standard Performance Evaluation Corporation's SPECjbb2005

(Java Server Benchmark) (see Figure 2).¹ In addition, the Sun SPARC Enterprise T5240 server provides up to five times the performance in half the space and 2.5 times better performance per watt than many x86 systems—and it costs up to 30 percent less.

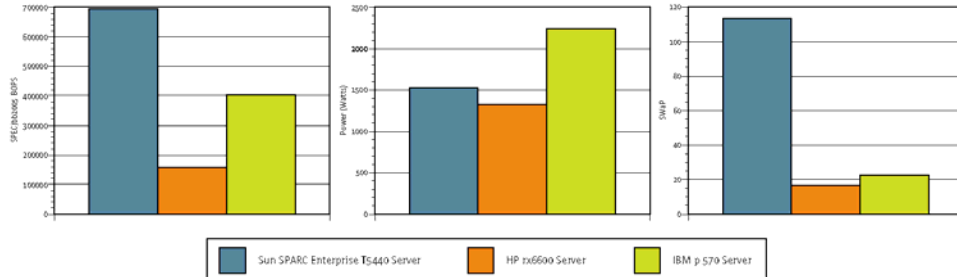


Figure 2. Sun servers with CoolThreads technology use less energy and occupy less datacenter space than systems from other vendors, without sacrificing performance.

Sun SPARC Enterprise M-Series Servers

The Sun SPARC Enterprise M-series servers are highly reliable; easy to manage; and vertically, horizontally, and diagonally scalable systems, with all the benefits of mainframes and none of the associated cost, complexity, or vendor lock-in. In fact, these servers deliver a mainframe-class system architecture at open source prices. With symmetric multiprocessing scalability from 1 to 64 processors, memory subsystems as large as 4 TB, and high-throughput I/O architectures, Sun SPARC Enterprise M-Series servers easily perform the heavy lifting required of consolidated workloads.

The entire product family—the Sun SPARC Enterprise M3000, Sun SPARC Enterprise M4000, Sun SPARC Enterprise M5000, Sun SPARC Enterprise M8000, and Sun SPARC Enterprise M9000 servers—features a balanced and highly scalable design. The design uses the latest generation of SPARC64 processors connected to memory and I/O by a new high-speed, low-latency system interconnect, delivering exceptional throughput to software applications. For example, the Sun SPARC Enterprise M9000 server, which was running Oracle Solaris 10, SAP ERP 6.0, and Oracle Database

¹Results are from spec.org as of 10/10/08. Sun SPARC Enterprise T5440 server (4 chips, 32 cores): 692,736 SPECjbb2005 business operations per second (BOPS), 21,648 SPECjbb2005 BOPS / Java Virtual Machine (JVM). Results submitted to SPEC. IBM Power 570 (4 chips, 8 cores) 402,642 SPECjbb2005 BOPS, 100,731 SPECjbb2005 BOPS/JVM. HP Integrity rx6600 (4 x1.6 GHz Intel Itanium 2 chips, 8 cores) 158,174 SPECjbb2005 BOPS, 39,544 SPECjbb2005 BOPS/JVM. IBM Power 570 (8 x 4.2 GHz IBM POWER6 chips, 16 cores, 128 GB RAM) 798,752 SPECjbb2005 BOPS, SPECjbb2005 BOPS/JVM = 99,844 IBM Power 570 (2 building blocks) power specifications calculated as 80 percent of maximum input power reported 10/5/08. HP Integrity rx6660 power calculated as 80 percent of maximum input power dissipation reported 10/5/08. Sun SPARC Enterprise T5440 server power consumption taken from measurements made during the benchmark run. Estimated heating, ventilating, and air-conditioning costs calculated as 100 percent premium over power usage per year (based on global average of US\$0.13/kilowatt-hour) gathered from the World Energy Organization.

10g, achieved 39,100 SAP sales and distribution users on an industry-standard measure of enterprise resource planning (ERP) performance, according to the SAP 2-tier Sales and Distribution benchmark (see Figure 3). In addition, the Sun SPARC Enterprise M9000 server has achieved a new single system performance world record on the TPC-H data warehousing benchmark at the 1 TB scale factor, demonstrating the effectiveness of Oracle Solaris 10 running Oracle Database 11g on the SPARC processor-based platform. Using the same number of cores, the Sun SPARC Enterprise M9000 server outperformed the best competing single system result, posted by the HP Integrity Superdome, by 69 percent, with an 18 percent advantage on price-to-performance ratio.

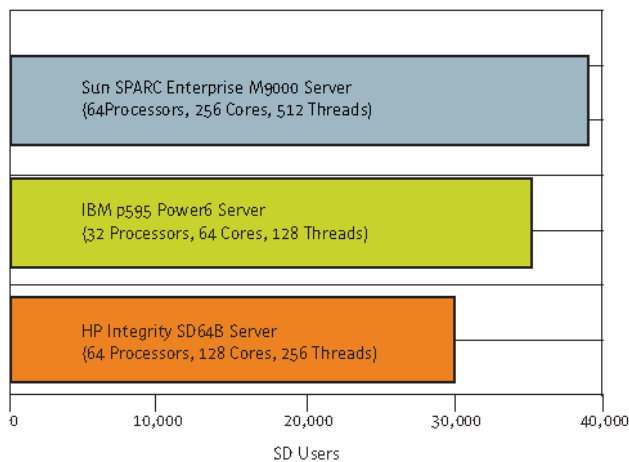


Figure 3. Sun SPARC Enterprise M9000 servers deliver exceptional ERP performance on the SAP 2-tier Sales and Distribution benchmark.

Also architected to reduce planned and unplanned downtime, these servers include stellar RAS capabilities to avoid outages and reduce recovery time. Design features, such as advanced CPU integration and data path integrity, and memory mirroring, end-to-end data protection, hot-swappable components, fault-resilient power options, and hardware redundancy, boost the reliability of these servers. In addition, dynamic reconfiguration features allow companies to consolidate onto Sun SPARC Enterprise M-Series servers and retain complete control over system resources—for unprecedented online reconfiguration for processors, memory, and I/O.

Virtualize for Even Greater Savings

Virtualization is emerging as an important tool as organizations look to consolidate redundant and aging infrastructure and create a more-agile and more-cost-effective datacenter. Indeed, server virtualization technologies can help organizations quickly recover from disasters; reduce time to market for new services; and better use existing infrastructure to reduce space, power, and cooling requirements. Oracle offers choice and flexibility when it comes to server virtualization technology—from support for one or more operating system (OS) instances to little or complete isolation to solutions that range in flexibility and performance characteristics (see Figure 4).

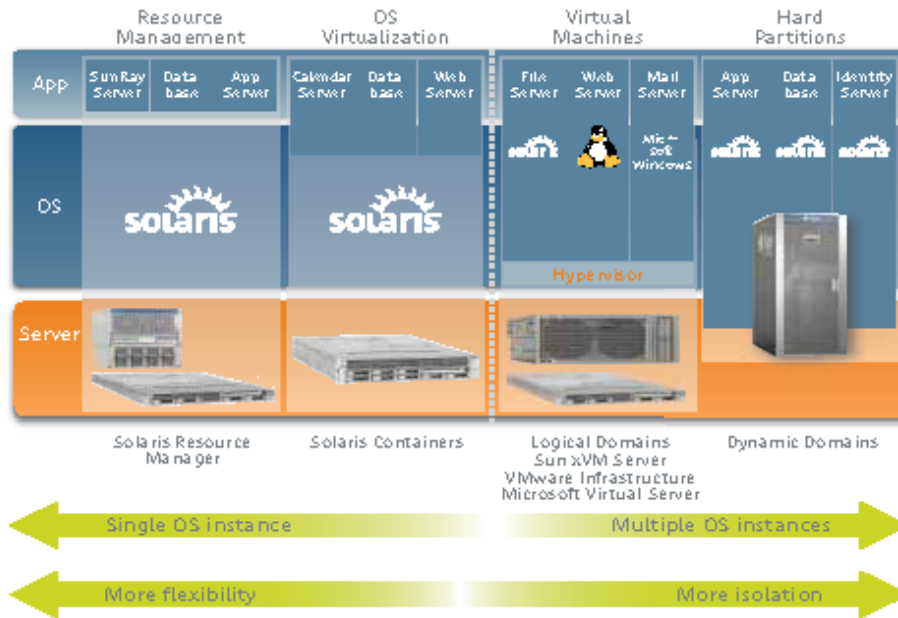


Figure 4. Oracle’s virtualization technologies range from simple resource management to full electrical isolation between multiple OS system instances.

Some of the features and benefits of Oracle’s virtualization technology include the following:

- Resource management enhances the benefits and simplicity of running multiple applications on the same server and OS instance. Controls govern the use of CPU, memory, and I/O resources, and let administrators set and enforce policies that guarantee the share of resources available to applications.
- OS-level virtualization enables multiple applications to share the same OS instance, while providing separate security domains for each application—with very low overhead. Oracle Solaris Containers combine resource management and virtualization for a solution that works on every server running Oracle Solaris OS. Up to 8,000 containers can be created on a domain—32 times that of partitioning solutions from IBM.
- Oracle VM Server for SPARC and Oracle Solaris Containers provide built-in virtualization capabilities for Sun servers with CoolThreads technology, helping companies to consolidate, virtualize, and save like never before. Run up to 128 virtual machines on a server without paying for proprietary virtualization technologies, and dramatically increase server use, efficiency, and ROI.
- Virtual machine monitors provide greater isolation by supporting multiple OS types and instances on the same machine. Each application can run in its own OS instance, and a hypervisor gives each application the illusion that it owns a complete, dedicated set of hardware.
- Hard partitions support multiple OS instances without the overhead of a hypervisor. Available on Oracle’s midrange and high-end servers, including Sun SPARC Enterprise M-Series servers, Dynamic Domains provides the ultimate in isolation with a separate electrically isolated environment for each OS. Unlike domain capabilities from other vendors, Dynamic Domains can be dynamically resized—one socket at a time.

Proven Customer Success

By switching to more-efficient, more-powerful Sun systems, organizations in a vast range of industries have realized tremendous savings in cost and resources, leaving a resource surplus with which to grow their business.

Deliver Services Faster and at Lower Cost

DigiTar, a messaging services innovator, was able to deliver highly scalable advanced messaging services and to process messages faster and at lower cost. The company replaced eight HP servers with two Sun servers. The benefits of the switch are listed below:

- Four and a half times the performance of existing systems
- Two times the processing capacity of MySQL database servers
- 10 times improvement in price-to-performance ratio
- 75 percent reduction in operating costs for MySQL database applications
- 83 percent reduction in power usage and heat dissipation
- 5 percent decrease in total power consumption

Handle Growth and Reduce Downtime

PlanetOut, a major media company, consolidated 400 older Sun servers to 70 Sun Fire T1000 servers. With this migration, the company was able to achieve the following:

- Reduced server footprint by 50 percent
- Moved to a smaller datacenter
- Realized higher customer satisfaction due to virtually no service interruptions
- Achieved payback in one and a half years

Double Capacity While Reducing Footprint and Costs

By upgrading existing database servers to Sun SPARC Enterprise M4000 and Sun SPARC Enterprise M5000 servers, Core Services was able to achieve the following:

- Reduce the runtime of manufacturing batch jobs by up to 67 percent
- Increase CPU idle time by 60 percent at load average
- Reduce the number of CPUs needed by more than 35 percent
- Reduce their footprint by two-thirds with compact, multicore servers
- Save US\$200,000 to US\$300,000 in licensing costs

Double Performance with Virtualization and Massive Consolidation

By deploying critical business applications on Sun SPARC Enterprise M5000, Sun SPARC Enterprise M9000, and Sun SPARC Enterprise T5220 servers running Oracle Solaris 10, and using Oracle's virtualization technology, Clifford Chance—one of the largest law firms in the world—was able to achieve the following:

- Double the performance of a key business application
- Consolidate server hardware by 90 percent
- Plan to consolidate 10 global datacenters down to 4
- Project that server usage rates would increase from 15–25 percent to 85 percent
- Project full ROI achievement within two years

Real, Tangible Results for Any Organization

It has been shown that organizations that migrate from HP to Oracle servers reap substantial savings. A company that consolidates 18 HP Integrity Superdome servers onto a single Sun SPARC Enterprise M9000 server will realize more than US\$15 million in savings within five years on hardware alone. The switch would reduce power and cooling by 90 percent, reduce floor space requirements by 95 percent, and achieve an ROI of more than 200 percent, with payback within 26 months.

By consolidating systems onto the latest server technology and employing virtualization techniques, enterprises can substantially reduce operating costs and increase reliability and productivity². For example, an IT organization with a variety of existing Sun systems—such as the Sun Fire 220 server, Sun Fire 280 server, Sun Fire V440 server, and Sun Fire V880 server (with a total of 115 system boards located in 618 square feet of datacenter floor space)—can consolidate and virtualize onto Sun SPARC Enterprise M8000 and Sun SPARC Enterprise T5440 servers for substantial savings.

By moving applications and services onto two Sun SPARC Enterprise M8000 servers with 14 system boards and four Sun SPARC Enterprise T5440 servers requiring only 68 square feet of datacenter floor space, a company can realize more than US\$3.5 million in savings within five years on hardware alone, and reclaim nearly 90 percent of floor space used by the servers. Combined with an 80 percent reduction in power, cooling, and carbon dioxide emissions, the organization can save more than US\$1.3 million in environmental costs.

² Data in this example is provided for informational purposes only and is not an Oracle proposal or guarantee of results. Data is calculated with a proprietary tool that illustrates the potential ROI, total cost of ownership, and other financial results that customers might achieve by implementing various IT solutions. The results shown are based on application of assumptions to the particular data input. Actual results might vary depending on factors such as the accuracy of the assumptions and the data.

With an initial investment of US\$391,000 for the systems and professional services implementation consulting, the company can save nearly US\$2.3 million in maintenance costs and more than US\$147,000 in system administrator productivity. The company can increase reliability from three 9s to four 9s to save US\$291,000 over five years by reducing unscheduled downtime. Delivering an internal rate of return of 151 percent and an ROI of 903 percent, the refresh, consolidation, and virtualization strategy pays for itself in 14 months (see Figure 5).

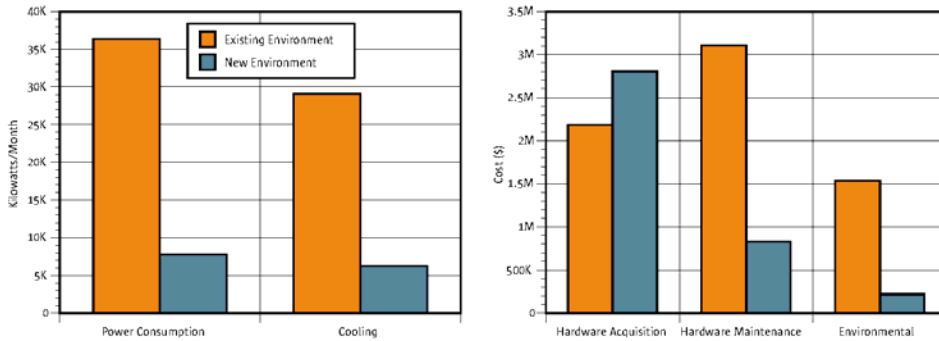


Figure 5. With an initial investment of US\$391,000, companies can reduce overall datacenter costs by more than US\$4.8 million and achieve a full ROI in 14 months.

Conclusion

Innovative technologies and supporting services are bringing economies of scale to enterprises. Opportunities exist to gain efficiencies by consolidating the datacenter infrastructure. With the latest technology and virtualization strategies, companies can streamline the datacenter and tackle business challenges head-on. Oracle and its partners can help organizations select well-justified targets for consolidation that provide a compelling ROI. Whether companies are looking to lower costs, conserve energy, improve response times, raise service levels, react faster to new demands, or optimize the balance sheet, deploying Oracle’s Sun servers running Oracle Solaris 10 can help deliver well-defined and measurable results.



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