



SUN FIRE™ X64 SERVERS HELPING ORGANIZATIONS GET AHEAD, AND STAY AHEAD

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IT Today — More Than Simple Computing

In recent years, the nature of computing has changed in fundamental ways. The explosive growth of corporate intranets and the Internet has created new and challenging demands. As the number of users and devices accessing services over the network grows, IT organizations are being forced to rethink how they create, manage, extend, and ultimately deliver information technology (IT) services with greater functionality and reduced cost. At the same time, these advancements create massive opportunities for operational efficiency, cost reductions, and innovations in service and functionality.

There is no doubt that IT organizations are focused on obtaining additional availability or scalability in the most efficient way possible, with users taking for granted that IT services will deliver the performance and predictability they need. Recent economic trends forced many IT organizations to turn toward x86 servers running the Linux operating system for business-critical applications. With low acquisition costs, x86 servers make it possible to scale environments by deploying pools of redundant servers in a distributed architecture that supports rapid growth. However, as these systems are replicated throughout IT infrastructures to give them greater resiliency and throughput, the result is often a sprawling, complex network of systems that consume valuable data center floor space, create excessive power and cooling demands, and are costly and difficult to manage.

While cost and complexity are in the forefront of people's minds, IT managers are also concerned about the ability of the infrastructure to adapt and meet ever-changing business demands.

- *Avoiding data center meltdown*

Technology continues to change, with IT organizations replacing systems every three to four years with more servers that provide greater functionality. These advancements, however, are pushing data centers to the limit—large numbers of servers that each consume increasing amounts of power are wreaking havoc on operational facilities, and HVAC systems are failing to keep pace. These environmental factors take on greater importance as IT organizations look to increase system availability and ensure service level agreements are met.

- *Reducing the cost of IT operations*

IT executives continue to look for ways to drive down the cost of delivering and managing services, even when adding IT service capacity. Unfortunately, the cost associated with managing a large number of servers, and providing needed cooling and power for these vital resources, is a greater burden than first anticipated. Adding cooling capacity to a building is often expensive, making IT service capacity an issue even when the data center still has room for more servers. These issues point out it is no longer sufficient to evaluate IT infrastructure components based on ease of management and maintenance alone — the ability to consolidate and virtualize systems to affect better resource utilization and conserve energy are now significant factors.

- *Creating an agile, efficient environment*

Because IT services are at the heart of business functions, such as customer service and new product development, IT service agility can impact customer satisfaction, time to market, and other business metrics. The sheer number of components involved in a typical infrastructure creates complexity that can slow deployment and inflate the cost of daily operations. Businesses must be able to rapidly deploy new services and add capacity to IT services without disruption, delay, or added complexity.

- *Realizing a greater return on IT assets*

Return on assets (ROA) is impacted by system performance and utilization. Higher performance servers enable businesses to generate greater transaction or compute throughput per dollar. Faster response times for users can then translate to increased productivity and improved business results. System utilization can also impact ROA — fewer systems are needed when each system is used more efficiently and thus handles a bigger workload. For businesses that deploy hundreds or thousands of servers, small increases in performance, throughput, and system utilization can easily translate into many thousands of dollars in savings.

- *Ensuring enterprise reliability and security*

In today's global economy, business-critical applications must consistently exceed user expectations and enterprise data must be protected from security threats. As a result, the systems on which these crucial applications run must be secure, reliable, and easy to maintain and service — and system designs must reflect these priorities. Indeed, security must be integrated into the overall system design instead of being tacked on after the fact. Redundancy and remote management features that can reduce the risk of unexpected service errors should be inherent, ensuring failed components do not create service interruptions or take too much time to replace.

The Need for Modular Computing

Providing new and innovative services while reducing data center cost and complexity and ensuring security and regulatory compliance is not a small task. Addressing these concerns requires a modular, flexible computing infrastructure that innovates at all levels — from the processor, to the system and applications it runs, to the data center itself. To be effective, such an approach must take into account the business and its applications, and the technology and infrastructure that support them (Figure 1). This transition from a traditional rackmount server-based approach to a modular computing model enables data centers to be managed as a flexible fabric of interconnected computing resources that provide services rather than as a room filled with individual systems. Data centers gain a flexible infrastructure that can accommodate new technology easily, pack more computing power into a smaller footprint, scale to meet growing business demands, and reap the benefits of investment protection. However, infrastructure, hardware, and software components must be designed with this technology shift in mind.

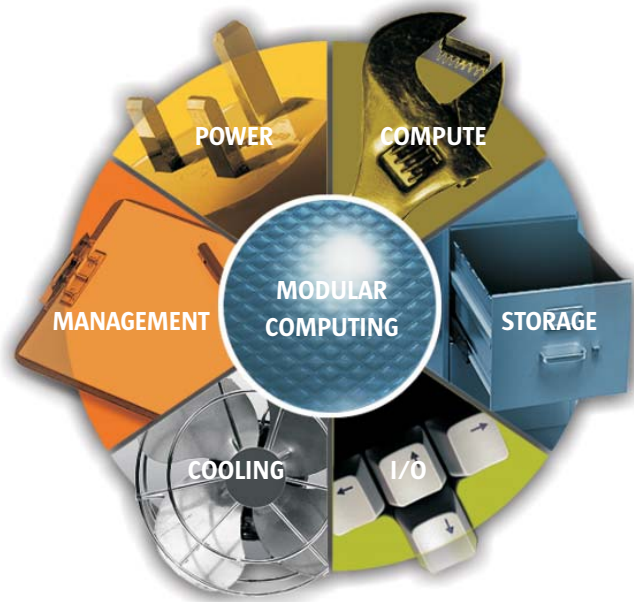


Figure 1. Modular computing looks at all aspects of the IT infrastructure.

The Sun Fire™ x64 Servers — Modularity Redefined

With more than two decades of focus on network computing and a history of solving complex enterprise computing challenges, Sun has developed deep expertise in data center best practices and system architectures. This strong combination of skills and technologies is now being brought to the x86 server market to help organizations build modular, high quality solutions based on innovative, enterprise architectures that are cost-effective to architect, implement, and manage.

A complete, modular approach with industry-leading price/performance that ranges from very low cost single rackmount servers to integrated solutions, the Sun Fire™ x64 server family gives IT organizations the flexibility to put computing resources where they are needed most. The result of combining Sun's network computing expertise with the performance per watt advantages of the AMD Opteron™ processor, the Sun Fire x64 server family brings blazing performance and a new level of energy efficiency to the x86 server market. These performance throughput advancements, in conjunction with strong reliability features, make the Sun Fire x64 server family ideal for application, database, and data servers. With high energy efficiency and a small footprint, Sun Fire x64 servers are also a great fit for consolidation projects.

- *Rackmount servers — Sun Fire™ X2100, Sun Fire™ X2200, Sun Fire™ X4100, Sun Fire™ X4200, Sun Fire™ X4600 servers*
The Sun Fire x64 server family begins with a broad range of entry-level and enterprise-class rackmount servers. The Sun Fire™ X2100 and Sun Fire™ X2200 servers are designed to help enterprises realize the positive aspects of a scale-out architecture while reducing the hidden costs and complexities. Featuring Next-Generation AMD Opteron processors, AMD's Direct Connect Architecture, an embedded service processor, and Sun software tools to enable the management of many servers as one, Sun's compact Sun Fire X2100 and Sun Fire X2200 servers deliver speed, energy efficiency, and simplified management without impacting budget constraints. Indeed, the Sun Fire X2100 server is the only two-way x64 rackmount server that offers industry-leading price/performance for under \$1000 U.S. The Sun Fire X2200 server has achieved multiple world record performance claims, and is the highest performing and most energy efficient four-way x64 server in its class. With twice the memory capacity and networking connectivity, the Sun Fire X2200 server offers reduced power consumption, increased space efficiency, and lower price than comparable systems.

The Sun Fire™ X4100 and Sun Fire™ X4200 servers are the fastest, most energy-efficient, and most reliable one-way to four-way x64 servers in their class. Designed to deliver increased service levels while also offering lower operational costs and better asset utilization, these 2-socket, 4-way servers include built-in redundancy and remote management capabilities. The Sun Fire™ X4600 server is not only the fastest, most scalable, and energy efficient four-way x64 server available — it is also the only one to scale to 16-way in a compact 4RU form factor. Designed to improve the economics of x64 systems while setting new standards for performance, reliability, and energy efficiency, this powerful rackmount server scales quickly from four to eight sockets, simply by adding modular processor boards. This innovative design enables Sun Fire X4600 systems to be upgraded and scaled to next generation processors and memory without disrupting the existing software and network environment, reducing costs while scaling applications. With extensive ISV application offerings, time-saving manageability, and availability features, the Sun Fire X4600 server is the top midrange solution for server consolidation and virtualization, database environments, and high performance computing (HPC).

- *Data server — Sun Fire™ X4500 server*

The Sun Fire™ X4500 server is the world's first Data Server. Integrating powerful AMD Opteron processors with massive data storage and throughput, the Sun Fire X4500 server delivers extremely high storage density and throughput rates at nearly half the cost of traditional solutions. By integrating state-of-the-art server and storage technologies, the Sun Fire X4500 delivers the remarkable performance of a four-way x64 server, and the highest storage density available with up to 24 TB in a 4U form factor. Providing up to five times the storage density of traditional solutions, and the highest throughput rates (1 GB/second from disks to network, and 2 GB/second to memory), the Sun Fire X4500 server is ideal for applications driven by both storage density and high bandwidth requirements, such as data warehousing, video-on-demand, high performance computing, Web analytics, and video surveillance applications.

“The Sun Fire X4500 server is proof that careful, clever engineering will result in a solution that has never before been achieved. We consider the Sun Fire X4500 server to be the result of genius-level ingenuity on the part of Sun.”

*— Professor Satoshi Matsuoka
Head of Research Infrastructure,
Global Scientific Information and
Computing Center
Tokyo Institute of Technology*

- *Modular server — Sun Blade™ 8000 Modular System*

The Sun Blade™ 8000 Modular System provides a fundamentally new approach that combines the best aspects of modular architecture with a design focused on the needs of the data center. Delivering serious computational performance, flexible networking, integrated open standard management, and industry standard high bandwidth I/O capabilities, this innovative platform provides up to three times the throughput of today's blades, while using 20 percent less power and 30 to 50 percent less space than modern rack mount servers. The result is an effective modular architecture that is available to high performance databases, enterprise business applications, and even high performance computing (HPC) environments without arbitrary limitations and compromises. The system accommodates up to 10 server modules with four-socket Next-Generation AMD Opteron processors, and provides industry standard I/O designed to support 1.6 TB/second throughput, high performance SAS and SATA hard drives, and extremely large and fast memory. Redundant hot-pluggable, hot-swappable components make the Sun Blade 8000 Modular System easy to service.

- *Grid solutions — Sun™ Grid Rack System*

The Sun™ Grid Rack System is an integrated, factory-configured cluster tailored to a specific solution area. The first two Sun Grid Rack System offerings address high performance computing (HPC) and Web services environments. Derived from Sun's enterprise-class engineering disciplines and real world experience with thousands of Grid deployments, these factory-assembled and pre-tested solutions integrate Sun Fire x64 servers with networking, storage, and software to create a complete system that is fully supported by Sun. Systems are offered in a range of flexible configurations with an open architecture supporting industry standards to simplify deployment into unique environments.

A Choice of Operating Systems

More than ever before, businesses are looking to standardize on operating system and server hardware architectures to help reduce management costs. While all Sun Fire x64 servers come pre-loaded with the industry-leading Solaris™ 10 Operating System at no cost, they also can run virtually any operating system — with full support from Sun for Red Hat and SuSE versions of Linux, as well as Microsoft Windows Server and VMware. Sun

Fire X4000 and Sun Fire X2000 servers are also Windows Catalog Certified for Microsoft Windows Server 2003. As a result, organizations can take advantage of the excellent price performance and manageability of Sun's x64 servers while maintaining a consistent operating environment across the IT infrastructure and fostering IT operational efficiency.



Figure 2. The modular Sun Fire x64 server product family brings enterprise computing to x86 environments.

A Better Design for a Better Data Center

The Sun Fire x64 server family is based on a smarter building-block approach that aims to provide better economics through a flexible architecture that fosters agile deployment, higher quality, lower risk, higher utilization, and easier management. To help this effort, this powerful x64 server family was designed with three primary goals:

- *Performance to enable doing more with less*

Sun Fire x64 servers combine the high performance of the 64-bit AMD Opteron processor with large memory capacity and high bandwidth, low latency interconnects for compute clusters. The result is an x86 compatible system that can stand alone as a high performance compute server, or can be easily integrated into a network of high performance processors to share application workloads and process extremely large jobs.

- *Reliability to gain stability*

By employing a consistent architecture based on redundant, hot-swappable, common components, and adhering to industry standards, the Sun Fire x64 server line is not only highly reliable, but also easy to maintain and service. The extremely reliable Solaris 10 OS has been proven to scale well on 64-bit multi-core systems, and offers binary compatibility so that applications can run unchanged across all Sun Fire x64 servers. As a result, businesses can add compute capacity without changing the software environment, helping to maintain application stability.

“Real innovation for the enterprise requires real engineering talent, and few companies understand this better than Sun.”

— Hector Ruiz
Chairman, President, and CEO
Advanced Micro Devices

- *Operational efficiency to reduce costs*

The Sun Fire x64 server line can help improve operational efficiency in three primary ways. First, power efficient AMD Opteron processors and power supply units, combined with optimized enclosure airflow, enables Sun Fire x64 servers to deliver greater performance while consuming up to 56 percent less power and generating less heat than comparable Intel Xeon multiprocessor systems. The result — it is less expensive to provide power and cooling for Sun Fire x64 servers. Second, the Sun Fire x64 server family is designed for ease of service. Combined with a highly efficient management environment that includes an intuitive user interface for managing and monitoring groups of server resources, these servers take ease of maintenance to a new level. Finally, the modular, systems approach taken with the Sun Fire X4000 servers, the Sun Blade 8000 Modular System, and the Sun Grid Rack System further support operational efficiency. With more networking ports and remote management features standard, Sun Fire x64 servers are designed for aggregation into a distributed architecture, and can provide even greater efficiencies when deployed within the Sun Grid Rack System. An entire Sun Grid Rack system can be deployed and managed as a single component, leveraging the network computing and solution expertise of Sun and its partners, and enabling IT staff to provision and manage IT applications in less time.

Save Power, Save on Cooling, Save Space

The Sun Fire x64 server family is designed to tackle the environmental factors affecting data centers. The power efficiency of AMD Opteron processors results in more transactions per watt of power used. These advancements, combined with system architectures engineered to increase air flow and efficient cooling, leads to reduced cooling costs. Indeed, Sun Fire X4100 servers offer up to 56 percent savings in power and cooling¹. As a result, deploying a compute farm of 1,000 CPUs consisting of Sun Fire X4100 servers with AMD Opteron processors can lead to a savings of more than \$0.5M in power and HVAC costs compared to other servers based on the Intel Xeon processor. Furthermore, the higher density offered in Sun Fire x64 servers translates into space savings and yields more computing power at lower cost than other platforms in a similar footprint. For example, organizations can consolidate twice as many servers onto a single Sun Fire X4600 server with a reduction of IT complexity compared to a HP DL 585 server. The result — twice the performance at half the physical rack space per server.

Build Efficient, Agile Environments

In today's competitive business climate businesses must find ways to get computing environments up fast and keep them operating at peak efficiency. Organizations can experience up to 90 percent faster deployment, and up to 80 percent less installation issues when deploying Sun Grid Rack systems instead of individual servers. Thorough testing and integration is done at the factory, not on the data center floor. The SunSM Customer Ready Systems program (CRS) is used to stage each system, perform system testing to check all hardware components, and optionally pre-load software to provide a full functioning solution that is ready to power on when it arrives at the dock.

In addition to the time saving features of Sun Grid Rack Systems, Sun Fire x64 servers offer features that can help accelerate deployment and simplify operation. Uniformity in the Sun Fire x64 server product line allows for

1. One rack of Sun Fire X4100 Servers populated with dual-core AMD Opteron processors can take as much as 56 percent less power on average than the Intel Xeon MP processor based solution required to provide a similar amount of CPU cores.

simplification of administration procedures and faster implementation of system updates or upgrades. In addition, the management environment for Sun Fire x64 servers enables system administrators to easily provision new servers using Solaris™ Flash technology. Solaris Flash software allows administrators to archive a copy of a complete software stack and later replicate the archived image onto other servers, enabling existing or new servers to be up and running in just minutes. Sun also provides proven and tested infrastructure solutions as well as technical best practices that are documented in Sun BluePrints™ articles and books. These proven approaches to well-defined problems can provide further support for rapid deployment and flexibility in IT services.

Accelerate Deployment with Sun Services

Sun offers a comprehensive portfolio of consulting services and workshops that leverage Sun's vast experience with network computing to help design, implement, and manage optimal solutions, helping organizations to realize the full value of IT investments. Sun Services gets solutions up and running quickly and efficiently, and provides the operational support and management capabilities that help maximize service levels while minimizing costs. Sun also offers SunSM Managed Services, where management of the IT infrastructure or applications is performed by Sun and its partners. Sun Managed Services are designed to work together with enterprise IT resources and with third-party service organizations, enabling organizations to focus on their core business while maintaining control of the IT environment.

Drive Greater System Utilization

A server that can be fully utilized can generate more results, such as more transactions per hour, and thus bring more value to the business. Sun management tools provide the means to drive greater system utilization through virtualization of server resources and scheduling software that distributes workloads across a pool of server resources. Solaris™ Containers technology, included in the Solaris OS, provides flexible, software-defined boundaries for isolating software applications or services. Applications can then be managed independently of each other, even while running in the same instance of the Solaris OS.

Organizations wishing to further increase server utilization and streamline IT operations by virtualizing server resources can take advantage of Solaris Containers technology, the VMware line of products, and other virtualization technologies. VMware ESX Server is virtual infrastructure software for partitioning, consolidating, and managing systems in mission-critical environments. With VMware ESX Server on Sun Fire x64 servers, IT organizations can easily provision new services running on the Solaris 10 OS, Microsoft Windows, and standard Linux distribution operating systems on the same piece of hardware. Partitioning servers to run multiple operating systems enables a greater variety of applications to be run on the same server and helps organizations more fully utilize IT assets. Other virtualization technologies, such as Microsoft Virtual Server, are also available on Sun Fire x64 systems.

Sun also offers a resource scheduling solution called Sun N1™ Grid Engine software. Enabling the pooling of server and storage resources into larger enterprise grids, the Sun N1 Grid Engine software helps multiple users, teams, and departments share common resources while working on different projects. Computing tasks or jobs are distributed across the grid in accordance with resource requirements for the job, user requests, and managerial policies. Accounting data is also stored to make it easy to monitor and manage resource usage by specific jobs, users, or departments. The low overhead of Sun N1 Grid Engine software and its focus on scheduling workloads to optimize resources has enabled some companies to reach an overall resource utilization of up to 90 percent.

Ease the Management Burden and Reduce the Cost of IT Operations

The high cost of operating and managing a large number of servers is one of the most painful issues facing IT managers today. Sun Fire x64 servers offer good news in this area by providing significant cost savings in power consumption and cooling, as well as more efficient management and serviceability. A broad range of time-saving management tools complement these systems and help IT managers monitor and manage all system elements within the Sun environment.

Simplify System Management

Experience has shown that the management environment is a critical factor in the total cost of ownership of servers. Sun believes it is so important that Sun designed the management architecture for its Sun Fire X4000 servers first, and then built the server around the management environment. Indeed, most Sun Fire x64 servers include a sophisticated service processor at no extra charge. Designed with inherent security, this Sun Integrated Lights Out Manager (ILOM) monitors the server hardware and software for faults and interacts with remote management software to enable zero touch remote management.

Lights out management enables out-of-band communication with the server even if the operating system is not running. By connecting to the ILOM board using the ILOM Remote Console, a Java™ WebStart application, administrators can choose to redirect the local keyboard, mouse, floppy and CD-ROM or DVD-ROM as if connected to the remote server. The remote devices are emulated by the ILOM Service Processor and seen by the BIOS and operating system as if they were locally connected to the Sun Fire server. Remote Video also allows administrators to see anything that comes out of the server graphic chip in the remote ILOM Remote Console window. These tools enable administrators to install an operating system, patches, or applications, configure or manage services, and enter data as if he or she were working locally at the server. In short, any service operation that does not require physical insertion or removal of parts can be done from another city or continent.

ILOM implements the latest in management standards, including the HyperText Transfer Protocol Secure (HTTPS), Intelligent Platform Management Interface 2.0 (IPMI 2.0), Simple Network Management Protocol (SNMP), and the Distributed Management Taskforce Systems Management Architecture for Server Hardware (DMTF SMASH) CLI initiative. Support for these industry standards and initiatives makes it easier for enterprises to deploy and manage Sun Fire X4000 and Sun Blade 8000 servers within existing IT infrastructures. Because the ILOM operates independently of the operating system, all ILOM features are available regardless of the choice of operating system. Furthermore, all communications with ILOM are protected using security standards such as Secure Socket Shell (SSH). ILOM also helps prevent unauthorized access through Role-Based Access Control (RBAC) and single sign-on that is supported through the Lightweight Directory Access Protocol (LDAP).

Sun Fire X4000 and Sun Blade 8000 servers come pre-installed with ILOM at *no extra cost*, whereas similar features on competitive servers can cost more than U.S. \$300 per system¹.

Manage More Systems with the Sun N1™ System Manager Software

As the number of systems grows, the complexity of managing such a large and often diverse environment becomes increasingly apparent. Designed specifically to address the challenges associated with managing the system

¹List prices for similar functionality on other platforms include HP Advanced iLO at US \$349, IBM RSA II at £399, and Dell Remote Access Card at US \$299 per system.

infrastructure throughout its lifecycle, the Sun N1™ System Manager software enables administrators to discover, provision, monitor, update, and manage hundreds of Sun Fire x64 servers from a single management console anywhere on the Web. Combined with ILOM technology, the Sun N1 System Manager software enables hundreds of servers to be managed as if they were a single system, helping to reduce IT support costs and improve service levels.

Included at no extra charge with Sun Fire x64 servers, the Sun N1 System Manager software provides remote server management through a Web-based graphical user interface (GUI) or from a command line interface (CLI). The GUI includes guided forms and templates for complex commands, as well as drag-and-drop features for managing operating system profiles, patches, and firmware updates to systems or groups of systems. Remote management capabilities include bare metal provisioning, system-level configuration, and management and monitoring functionality.

Sun's experience shows that on average 20 percent of a system administrator's time is spent on initial deployment of new servers. With the Sun N1 System Manager software, organizations can significantly reduce initial deployment time through automated discovery. This powerful tool automatically captures hardware environment information, allowing administrators to deploy and begin monitoring new systems within minutes. Updates and maintenance tasks are also more efficient. By using the grouping features in the Sun N1 System Manager, administrators can perform operations such as patch updates on entire groups of like servers simultaneously. This feature also helps administrators to rapidly provision new OS payloads (Solaris OS or Red Hat Linux) or complete software stacks from a central console. Industry standard interfaces also make it easy to blend Sun N1 System Manager with an existing enterprise management solution.

Fix Problems Faster

Getting problems resolved and systems back online quickly is essential if the IT infrastructure is to operate at peak efficiency. Sun Fire x64 servers incorporate several innovative features that make servicing systems easy.

- *Easy access to hot-swappable components*

Sun Fire x64 servers are designed for easy serviceability with hot-pluggable cooling fans, power supplies, disk drives, and even blade servers and I/O cards (Sun Blade 8000 Modular System), and easy access to common service areas. For example, system fans are easy to reach and can be replaced without having to pull the entire server out of its rack.

- *Service lights*

When working on a full rack of servers, it can be difficult to identify which server needs attention, even if the fault was already identified on a remote management console. Sun Fire X4000 and Sun Blade 8000 servers are equipped with service lights that integrate with the ILOM environment to help system administrators and service engineers work together to quickly identify faulty components in need of service. The ILOM environment on Sun Fire X4000 and Sun Blade 8000 servers enables administrators to manipulate front panel lights, so that a blinking light can make it easier to find the server that corresponds to a fault identified using system management tools. Once inside the server chassis, additional lights help pinpoint the faulty component quickly for faster service. Every field replaceable component incorporates a light that identifies errors. For example, each memory DIMM includes an error light located on the holder that identifies the specific memory DIMM to be serviced in the event of a failure.

- *Predictive self-healing technology*

Serviceability of Sun Fire x64 servers is also enhanced through the predictive self-healing and fault management facilities of the Solaris 10 OS. Predictive Self-Healing is designed to maximize the availability of the system and application services by automatically diagnosing, isolating, and recovering from faults. This helps to not only reduce hardware failures but also to reduce the impact of application failures, leading to increased system and application availability. With the Solaris™ Fault Manager, the system automatically diagnoses faulty components, a function that in some cases can reduce analysis time from days to seconds. Once diagnosed, the system can quickly take corrective action and automatically restore application services. This powerful technology ensures that business-critical applications and essential system services can continue uninterrupted in the event of software failures, major hardware component failures, and even software configuration problems. Furthermore, once a faulty system component is diagnosed and configured out of the system by the Solaris Fault Manager, ILOM enables administrators to remotely address the fault in a timely manner so that system performance and service levels can be maintained.

Sun Fire x64 Performance — Simply Fast

Getting more work done by doing it faster makes a server more valuable to the business. Powered by the highest performing AMD Opteron processors, the Sun Fire x64 family of servers continues to beat the competition in performance tests, setting over 70 world record benchmarks to date. Since each Sun Fire x64 server can get more work done in the same time than competitive servers, the same overall workload can be processed with fewer servers in the infrastructure. With leadership that spans multiple hardware architectures and form factors, the Sun Fire x64 server family surpasses systems from IBM, HP, and Dell on a variety of industry benchmarks for Web-based services, business processing and business intelligence applications, database transactions, and compute-intensive applications, such as those used in financial services, product development and manufacturing, animation, graphic design, software development, and pharmaceuticals.

More information on system performance, including a complete list of over 100 record breaking performance results achieved by Sun Fire x64 platforms, can be found at <http://sun.com/x64/benchmarks/>.

Gain Longevity and Protect Investments

Because IT assets depreciate, it is important they provide value — business flexibility, agility, and efficiency — for as long as possible, and be easy to replace when the time comes. Protecting valuable investments requires that assets have a long and useful life span even as business needs grow and change over time. Hardware servers that can be easily and cost-effectively scaled to meet changing business needs can offer greater value versus servers which require a major transition in order to add capacity. Likewise, servers that can be easily repurposed for other uses also provide investment protection and greater return.

Sun gives businesses the flexibility to build a server infrastructure that can scale from low to high end systems, helping protect existing investments in hardware, software, and training. Unlike other x86 servers which are often constrained to scale up to four or eight CPUs, Sun Fire x64 servers scale seamlessly up to 16 cores to achieve mid-range system performance levels with the same consistent architecture. By offering seamless migration of 32-bit applications to the 64-bit environment and source code compatibility between architectures, Sun also helps protect investments in pre-existing software applications. Furthermore, the use of industry standards and open

interfaces across the Sun Fire x64 product line also helps avoid vendor lock-in. Software applications that run on Sun Fire x64 servers and follow these industry standards can be easily integrated with other applications, and are also well poised to run on other vendors' platforms now and in the future.

Rest Assured with Enterprise Reliability and Security

Knowing the IT infrastructure will run no matter what happens is key to business confidence. Computing resources do suffer faults, and security concerns raise questions about infrastructure reliability and availability. Sun Fire x64 servers and solutions are designed to help organizations minimize the risk associated with interruptions in service.

- *Designed for reliability and serviceability*

Designed for reliability and serviceability, Sun Fire x64 servers are built from common components with fewer interconnections, and include built-in redundancy, enterprise reliability, availability, and serviceability (RAS) features. In addition to easy access to components for servicing, Sun offers best-in-class reliability for mean time between system interruptions (MTBSI), service intervals, and fault robustness on Sun Fire x64 servers.

- *Built on a secure foundation*

All Sun Fire x64 servers run the highly secure Solaris 10 OS, which provides a host of security features previously only found in Sun's military-grade Trusted Solaris™ operating system. User and Process Rights Management work in conjunction with Solaris Containers technology to enable secure hosting of thousands of applications and multiple customers on the same system. Security administrators can also minimize and harden the Solaris OS to implement a secure foundation for deploying enterprise services.

- *Integrated with secure and reliable components*

The security and availability of Sun Fire x64 servers can be further enhanced when deployed within Sun Grid Rack Systems, where all components are proven to work together. Sun Grid Rack Systems can take advantage of the Sun™ Secure Application Switch - N1000 Series, which integrates Gigabit wire-speed application switching, chip-level embedded security, and dynamic resource virtualization. The integrated services within the Sun™ Secure Application Switch help to greatly simplify management of distributed computing environments by eliminating and consolidating specialized components, such as legacy server load balancers, SSL accelerators, and bandwidth management appliances. The resulting simplicity reduces the risk of errors, thereby enhancing reliability and improving security.

- *Unparalleled service and support*

Another major factor that sets Sun Fire x64 servers apart from competitive offerings is service and support. Whether running the Solaris OS, Linux, or the Microsoft Windows operating system, Sun Fire x64 servers are supported by Sun's comprehensive support services. Experienced Sun engineers are available to identify and resolve technical issues around the clock. Sun also offers online self-help and monitoring tools as well as SunSM Connection, an always-available and highly secure connection that delivers service and support as a network service. Pre-emptive support offerings from Sun can help maximize service levels and deliver greater reliability for enterprise applications.

Summary

Now more than ever before, organizations are striving to align IT services with business goals and gain competitive advantage. Success depends on building a flexible infrastructure — one that can adapt to rapidly changing business demands while reducing the cost of operations. Deploying x64 servers in the data center not only gives IT organizations excellent value without comprising performance, but also the kind of reliability, security, efficiency, and agility needed to build enterprise-class environments and avoid data center meltdown.

Building on decades of enterprise network computing expertise, Sun is bringing a new class of x64 server to the market. Sun Fire x64 servers are designed from the ground up by Sun to deliver blazing performance and help IT organizations standardize x64 server technology across the entire infrastructure. Delivered within an enterprise solution context, Sun Fire x64 servers combined with Sun software and services offer the following major advantages:

- *Modularity* — Flexible servers and solutions provide the foundation for an infrastructure that can help avoid data center meltdown. Sun Fire x64 servers accommodate new technology easily, pack more computing power into a smaller footprint, save valuable data center floor space, and help organizations reap the benefits of investment protection.
- *Industry-leading performance* — The fastest x64 servers on the market help deliver greater return on IT assets.
- *Operational efficiency* — Sun Fire x64 server require lower power and cooling costs and offer more efficient management and serviceability, giving businesses a chance to redirect more of the IT budget to strategic projects.
- *Enterprise reliability and security* — Enterprise-class RAS features in Sun Fire x64 servers, built-in remote management tools, an industry-leading secure operating system, integrated offerings with Sun Grid Rack Systems, and Sun's world class service and support organization bring a new level of enterprise reliability and security to x64 computing.
- *Solution orientation* — Sun has gone beyond designing a high performance server and is providing comprehensive solutions that can help accelerate deployment and reduce risk.

Sun believes that strong network computing platforms are essential to success, and continues to provide foundation-level products that help companies optimize their computing infrastructure and meet business requirements. Through its commitment to networking, throughput computing, UNIX[®], and open systems and standards, Sun consistently delivers robust, flexible, compact, high performance servers, and state-of-the-art technologies that meet the needs of today's complex data center environments. The combination of Sun systems, the Solaris Operating System, and key technologies like extremely power efficient processors and systems, join forces with third-party solutions to help organizations transform their data centers into less complex, more manageable, higher performance infrastructures that cost less to run.

For More Information

To learn more about the Sun Fire x64 server product line and why it is a smarter choice for the enterprise, contact a Sun sales representative, take advantage of Sun's Try and Buy program, or visit the Web sites listed in Table 1 below.

Table 1. Web sites for additional information

Web Site URL	Description
sun.com/servers	Sun Server Product Line
sun.com/x64	Sun Fire x64 Product Offerings
sun.com/x64/success.jsp	Success Stories
sun.com/software/solaris	Solaris 10 Operating System
sun.com/service/about/	Sun Services Overview
sun.com/products/networking/switches	Sun Secure Application Switches
sun.com/storage/	Sun Storage Solutions
sun.com/solutions/blueprints	Sun BluePrints Program
sun.com/products/architectures-platforms/refarch/	Sun Reference Architectures
sun.com/tryandbuy	Try and Buy Program

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