

Sun Fire™ X4140

&

Sun Fire™ X4240

1-RU & 2-RU 2-Socket (8-way) x64 Rackmount Servers

Industry Leading Performance, Expandability & Power Efficiency

Just the Facts

SunWIN Token # 509869

Sun Fire X4140 & X4240 Server
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Sun Fire X4140 & X4240 Server
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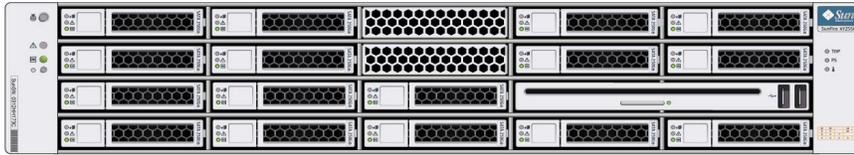
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Sun Fire X4140 and X4240 Server Positioning



Sun Fire X4140 – Maximum Performance, Density, and Energy Efficiency



Sun Fire X4240 – Maximum Performance, Flexibility, and Expandability

What's new

07/21/09: Announce AMD Istanbul processors – Six-Core AMD Opteron 2400 series processors

Introduction

The Sun Fire X4140 and X4240 servers incorporate advanced breakthrough new, innovative design principles in a universal shared chassis design for world-class performance, unmatched density, leading storage capacity, embedded system management, built-in virtualization support and investment protection. The new chassis design, optimized for cooling and power efficiency, offers industry-leading energy efficiency and performance in a small form factor. Both servers also give customers a choice of operating systems, running the Solaris (TM) Operating System (OS), Windows, Linux or VMware, with the flexibility to deploy a broad range of applications.

The Sun Fire X4140 server with AMD Opteron processors with Direct Connect Architecture, DDR2 memory and AMD Virtualization (AMD-V) technology are designed for seamless operability from dual-core to quad-core to six-core within the same power and thermal infrastructure, is a two-socket 1U system with up to twice the memory capacity, internal storage and networking connectivity as competitive two-socket 1U servers. With more than 2.4 terabyte of high-performance internal disk storage, the Sun Fire X4140 server is an ideal solution for horizontal database and other disk-intensive applications.

Also, the Sun Fire X4240 server with AMD Opteron processors are designed for seamless upgradeability from dual-core to quad-core within the same power and thermal infrastructure, is the first and only two-socket quad-core system with sixteen hard drive slots in a 2U form factor on the market from a tier-one vendor. It is the best two-socket 2U x64 system in terms of storage density and expandability. It offers up to twice the storage power up to 4.8 terabytes and memory capacity than competitive servers, resulting in lower energy and cooling costs.

The Six-Core AMD Opteron processors utilize the advantages of AMD HyperTransport (HT) Assist, which can result in faster queries that can increase performance for cache sensitive applications such as database, virtualization and compute intensive applications. The other big enhancement is the implementation of coherent HyperTransport 3 links, which supports data transfers up to 17.6 GB/second of bandwidth per inter-processor

communication.

The Third-Generation AMD Opteron processors offers a built-in memory controller and similar power requirements to the current AMD Opteron processor, coupled with DDR2 memory are anticipated to result in lower system power requirements and operational costs than competitive products using Intel Woodcrest and Clovertown processors. Also, the Third-Generation AMD Opteron processors provide Dual Dynamic Power Management, CoolCore and Independent Dynamic Core Technology to set a new standard in performance and energy efficiency. Our designed servers are easily upgradeable from dual-core to quad-core with just processor changes, thus reducing data center churn and acquisition costs.

Running Solaris(TM), Linux, Windows and VMware Operating systems, the Sun Fire X4140 and X4240 servers allow customers to run existing 32-bit applications on the same hardware as they migrate to their choice of next generation 64-bit applications. The Sun Fire X4140 and X4240 servers can help minimize required staff training and support as well as help reduce data center real estate and cooling needs.

The Sun Fire X4140 and X4240 are general-purpose servers designed for deployment in a wide range of architectures:

- Scale-out architectures: With large memory capacity, internal storage, quad Gigabit Ethernet ports and high speed PCIe expansion slots that enable high speed system interconnects such as fibre channel and InfiniBand, these servers are able to solve complex computing problems that require intense compute resources.
- Scale-up architectures: With up to 12 cores available, these servers are well-suited for web, databases and infrastructure services.
- Scale-within: With their ability to run Solaris 10 Containers and VMware, Sun Fire X4140 and X4240 servers are ideal platforms for consolidating multiple applications on a single platform.

Designed by Sun Microsystems from the ground up to facilitate system management, these servers help customers scale their computing resources without additional complexity by offering standardized solutions featuring state-of-the-art remote management capabilities. Fault identification and management features provided by Sun Integrated Lights Out Manager (ILOM), which is IMPI 2.0 compliant increase availability by reducing errors and speeding repair time. By utilizing ILOM features and the optional Sun System Manager software, customers can take advantage of state-of-the-art remote automation that integrates at the data center level. Zero-touch capabilities managed through a variety of interface options combined with full binary compatibility with other family members simplifies the installation, deployment, and maintenance of x64 systems.

The Sun Fire X4140 and X4240 servers, when combined with Sun's rich portfolio of software, storage, service offerings, help reduce cost and complexity while accelerating time-to-revenue for data centers that run a broad range of applications including web, app, database and grid applications.

For more information see: <http://www.sun.com/X4140>.

For more information see: <http://www.sun.com/X4240>.

Features, Functions, and Benefits

Sun Fire X4140 Server Key Features, Functions, and Benefits

Feature	Function	Benefit
Performance		
Highest Performance in Class	<ul style="list-style-type: none"> • Sufficient power-envelope to support the fastest dual, quad and six-core AMD Opteron processors • Native dual, quad and six-core design • Delivers both 32- and 64-bit enterprise-class computing 	<ul style="list-style-type: none"> • Provides fastest performance in this class of servers • Nearly doubles computing resources without power and cooling increases • Increases performance while providing investment protection for existing 32-bit

Feature	Function	Benefit
	<ul style="list-style-type: none"> • Common socket design for Next-Generation, Quad Core and Six Core AMD Opteron processors • AMD Direct Connect Architecture • AMD Virtualization™ Technology 	<ul style="list-style-type: none"> • application • Reduces data center churn as upgrade for increased performance • Integrated Memory Controller improves performance by more effectively handling the memory • AMD's Direct Connect Architecture helps guests run at near-native speed
HyperTransport Technology and integrated 128-bit wide DDR2 memory controller	<ul style="list-style-type: none"> • Provides a high-speed connection between processor and core logic. • Reduces memory bandwidth latency by pooling memory resources onto a single coherent space. 	<ul style="list-style-type: none"> • Increases performance by eliminating performance bottlenecks found in traditional x86 Front Side Bus (FSB) architecture.
Industry Leading Reliability and Expandability		
Hot-swappable HDDs	<ul style="list-style-type: none"> • Performance for I/O-bound applications and redundancy for mission-critical data 	<ul style="list-style-type: none"> • Increase performance and availability
Up to 64GB of memory with ECC and ChipKill	<ul style="list-style-type: none"> • Support memory-intensive applications • ECC provides automatic single-bit error correction • ChipKill allows a single DRAM chip to fail and the system will continue to run 	<ul style="list-style-type: none"> • Improve application performance • ECC helps to ensure data integrity • improving availability • ChipKill improves system availability
Integrated Quad Gigabit Ethernet	<ul style="list-style-type: none"> • Outstanding network I/O performance • Increased network availability when installed in failover configurations 	<ul style="list-style-type: none"> • Increases network efficiency, flexibility, and availability
64-bit PCIe Slots	<ul style="list-style-type: none"> • Allows connectivity to additional network or storage while supporting full CPU path bandwidth. 	<ul style="list-style-type: none"> • Enables flexibility to meet evolving business and application requirements.
Energy Efficiency		
AMD Opteron Processors	<ul style="list-style-type: none"> • Supports the latest Six-Core AMD Opteron processors, placing up to 12 CPU cores in a compact form factor • Supports the 55W Six-Core AMD Opteron processor for energy conscious customers • Consistent processor thermal/power window requirements across all generations • Integrated Memory Controller • PowerNow! Technology: dynamic processor voltage and frequency throttling technology which works with server BIOS and operating system 	<ul style="list-style-type: none"> • Nearly doubles computing resources with minimal power and cooling increase • Data centers using Next-Generation AMD Opteron-based servers should experience less churn during performance upgrades as processor power requirements are planned not to increase • AMD Opteron processors do not require an additional memory controller chip • When running OS's supported by this product for PowerNow! technology, power consumption is minimized
DDR2 Memory	<ul style="list-style-type: none"> • Proven, cost-effective technology 	<ul style="list-style-type: none"> • DDR2 memory has been in the marketplace for years and requires less power than FBDIMM memory
Operating System and Management Environment		
Integrated Lights Out Manager for Remote	<ul style="list-style-type: none"> • Integrated Lights Out Manager (ILOM): • Remote management with full 	<ul style="list-style-type: none"> • All management which does not require physically touching the system can be



Feature	Function	Benefit
Management	Keyboard, Mouse, Video, Storage (KVMs) <ul style="list-style-type: none"> Remote media capability (floppy, CD etc.) Full DMTF CLI Browser UI for control of the system through a graphical interface. IPMI 2.0 compliant for management and control SNMP v1, V2c, V3 for system monitoring Monitor and report system and component status on all FRUs 	performed remotely <ul style="list-style-type: none"> Easily integrates into customer's existing management environment by supporting industry standards Integrated LOM is a core part of system, there is no additional charge for this functionality as with some of the competition
Runs applications on: <ul style="list-style-type: none"> Solaris 10 Linux (RHEL 4, RHEL 5 & SLES 10) Windows Server 2003 & 2008 VMware ESX 3.0.2 & 3.5 	<ul style="list-style-type: none"> Run applications on industry standard platform running OS of choice 	<ul style="list-style-type: none"> Maximize application performance with best OS Ease transition to 64-bit computing Maximize IT investment by standardizing hardware to reduce required training and spares

Product Family Placement

The Sun Fire X4140 and X4240 servers are the newest members in Sun's x64 server based on the AMD Opteron processor. The Sun Fire X4150 server still remains in the product lineup for customers who prefer 1-RU 2-socket servers based on the Intel Xeon processor.

X64 Server Family Comparison

The following table compares some features of the Sun Fire X4100, Sun Fire X4140 and Sun Fire X4150 servers.

Features	Sun Fire X4140 Server	Sun Fire X4100 Server	Sun Fire X4150 Server
Form Factor	1U	1U	1U
Processor Architecture	AMD Opteron	AMD Opteron	Intel Xeon
Processor Type	Dual-Core, Quad-Core, enhanced Quad-Core and Six-Core	Dual-Core, Quad-Core or enhanced Quad-Core	Dual-Core or Quad-Core
Processor Speed	1.8 GHz to 3.0 GHz	1.8 GHz to 3.2 GHz	1.6 GHz to 3.0 GHz
Level 2 Cache	2x 1MB for Dual-Core 4x 512KB for Quad-Core, enhanced Quad-Core & Six-Core	2x 1MB for Dual-Core 4x 512KB for Quad-Core & enhanced Quad-Core	4MB for Dual-Core 2x 4MB for Quad-Core

Features	Sun Fire X4140 Server	Sun Fire X4100 Server	Sun Fire X4150 Server
CPU Interconnect	HyperTransport	HyperTransport	Front Side Bus
Memory Controller	Embedded in processor	Embedded in processor	Separate chip
Memory Type	667 MHz registered DDR2	667 MHz registered DDR2	667 MHz registered FB-DIMM
DIMM Slots	16	8	16
DIMMs per CPU	8	4	8
Max Memory	128 GB	32 GB	64 GB
Internal Disk	8x 2.5" SAS 4x 2.5" SATA SSD	4x 2.5" SAS	8x 2.5" SAS
Onboard RAID	SW RAID 0, 1 for SATA	RAID 0, 1 for SAS	SW RAID 0, 1 for SATA
Add-on RAID	RAID 0, 1, 5, 6 with SAS RAID HBA	none	RAID 0, 1, 5, 6 with SAS RAID HBA
Removable Media	DVD±RW	DVD-ROM, CD-RW/DVD	DVD±RW
Network connections	Integrated 4x Gigabit Ethernet	Integrated 4x Gigabit Ethernet	Integrated 4x Gigabit Ethernet
Expansion Slots	3x PCIe	2x PCIe	3x PCIe
Service Processor	Integrated LOM	Integrated LOM	Embedded LOM
Redundant, Hot-Swap PSU	Yes	Yes	Yes
In-band management	IPMI v2.0 via KCS driver SNMP OS-resident agent	IPMI v2.0 via KCS driver SNMP OS-resident agent	IPMI v2.0 via KCS driver SNMP OS-resident agent
Out-of-band management	IPMI v2.0;DMTF CLI; SNMP- v1, v2, v3; Web GUI	IPMI v2.0;DMTF CLI; SNMP- v1, v2, v3; Web GUI	IPMI v2.0;DMTF CLI; SNMP- v1, v2, v3; Web GUI
Remote management features Remote Keyboard, Video, Mouse (KVM), and remote media capability Video redirection, Remote power control, remote access to BIOS, remote FRU status	Remote Keyboard, Video, Mouse (KVM), and remote media capability Video redirection, Remote power control, remote access to BIOS, remote FRU status	Remote Keyboard, Video, Mouse (KVM), and remote media capability Video redirection, Remote power control, remote access to BIOS, remote FRU status	Remote Keyboard, Video, Mouse (KVM), and remote media capability Video redirection, Remote power control, remote access to BIOS, remote FRU status
System management paths	A single dedicated management 100BaseT port, system serial port and	A single dedicated management 100BaseT port, system serial port and four	A single dedicated management 100BaseT port, system serial port and



Features	Sun Fire X4140 Server	Sun Fire X4100 Server	Sun Fire X4150 Server
	four system Ethernet ports	system Ethernet ports	four system Ethernet ports
Redundant, Hot-Swap Fans	Yes	Yes	Yes
Depth	28 in. 711.2 mm	24.8 in. 632 mm	28 in. 711.2 mm
Power supply	Redundant, Hot-swappable, 658W each	Redundant, Hot-swappable, 550W each	Redundant, Hot-swappable, 658W each
O/S	See http://www.sun.com for latest operating system support for each product		
I/O	See http://www.sun.com for latest I/O support for each product		

The following table compares some features of the Sun Fire X4240 and Sun Fire X4200.

Features	Sun Fire X4240 Server	Sun Fire X4200 Server
Form Factor	2U	2U
Processor Architecture	AMD Opteron	AMD Opteron
Processor Type	Dual-Core, Quad-Core, enhanced Quad-Core and Six-Core	Dual-Core, Quad-Core or enhanced Quad-Core
Processor Speed	1.8 GHz to 3.0 GHz	1.8 GHz to 3.2 GHz
Level 2 Cache	2x 1MB for Dual-Core 4x 512KB for Quad-Core, enhanced Quad-Core & Six-Core	2x 1MB for Dual-Core 4x 512KB for Quad-Core & enhanced Quad-Core
CPU Interconnect	HyperTransport	HyperTransport
Memory Controller	Embedded in processor	Embedded in processor
Memory Type	667 MHz registered DDR2	667 MHz registered DDR2
DIMM Slots	16	8
DIMMs per CPU	8	4
Max Memory	128 GB	32 GB
Internal Disk	16x 2.5" SAS 8x 2.5" SATA SSD	4x 2.5" SAS
Onboard RAID	SW RAID 0, 1 for SATA	RAID 0, 1 for SAS
Add-on RAID	RAID 0, 1, 5, 6 with SAS RAID HBA	none
Removable Media	DVD±RW	DVD-ROM, CD-RW/DVD
Network connections	Integrated 4x Gigabit Ethernet	Integrated 4x Gigabit Ethernet
Expansion Slots	6x PCIe	2x PCIe

Features	Sun Fire X4240 Server	Sun Fire X4200 Server
Service Processor	Integrated LOM	Integrated LOM
Redundant, Hot-Swap PSU	Yes	Yes
In-band management	IPMI v2.0 via KCS driver SNMP OS-resident agent	IPMI v2.0 via KCS driver SNMP OS-resident agent
Out-of-band management	IPMI v2.0;DMTF CLI; SNMP- v1, v2, v3; Web GUI	IPMI v2.0;DMTF CLI; SNMP- v1, v2, v3; Web GUI
Remote management features Remote Keyboard, Video, Mouse (KVM), and remote media capability Video redirection, Remote power control, remote access to BIOS, remote FRU status	Remote Keyboard, Video, Mouse (KVM), and remote media capability Video redirection, Remote power control, remote access to BIOS, remote FRU status	Remote Keyboard, Video, Mouse (KVM), and remote media capability Video redirection, Remote power control, remote access to BIOS, remote FRU status
System management paths	A single dedicated management 100BaseT port, system serial port and four system Ethernet ports	A single dedicated management 100BaseT port, system serial port and four system Ethernet ports
Redundant, Hot-Swap Fans	Yes	Yes
Depth	28 in. 711.2 mm	24.8 in. 632 mm
Power supply	Redundant, Hot-swappable, 1050W each	Redundant, Hot-swappable, 550W each
O/S	See http://www.sun.com for latest operating system support for each product	
I/O	See http://www.sun.com for latest I/O support for each product	

Key Messages

- **Performance...do more with less**
 - Design and deliver the industry's most innovative, high performance, energy-efficient systems in the market
 - Run a broad range of applications more efficiently and quickly
- **Expandability.... headroom to grow your business**
 - Up to twice the memory, storage and networking connectivity of similar systems in its class
- **Energy-efficient.....save power and cooling costs**
 - Customers can save on energy consumption, cooling cost and the environment
- **Manage and Monitor the System.....locally or remotely**
 - Delivering benefits of common manageability, serviceability and maximum performance
 - Integrated Lights Out Manager (ILOM) allows full remote KVMS functionality with video and media

redirection

- **Maximize Uptime**
 - Enterprise-class reliability through redundant and hot-swappable power supplies and fans
 - Hot-swappable disk drives make drive replacement fast and easy
 - SAS host bus adapters offer RAID choices to meet the customer's requirements
- **Multi-platform.....less complexity**
 - Runs Solaris, Linux, Windows and VMware operating systems
 - Standardize on one hardware platform for all major operating systems in the data center
 - Integrate the very best features in system design, virtualization and systems management

Target Customers

The Sun Fire X4140 and X4240 servers are targeted at customers that want enterprise class x64 servers that are fast, expandable and energy efficient.

Target Markets

- Web 2.0
- Service Providers
- Database
- Government
- Education
- Telco, SP, Media & Broadband
- Manufacturing (EDA, Oil & Gas)
- Financial Services

Target Applications

- Web Server
- IT Infrastructure (security, DNS, proxy, caching, firewall, gateway)
- Virtualization and Consolidation
- Clustered HPC Grid Computing
- File/Print
- Messaging/Collaboration
- Video Streaming
- OLTP
- Video Streaming

Market Value Proposition

Sun Fire X4140 and X4240 servers are fast, expandable and energy-efficient enterprise class x64 servers that

run Solaris™, Linux, Windows and VMware operating systems.

- Do More With Less: High performing server helps to maximize Return On Investment.
- More Headroom to Grow: More expandable in memory, storage and networking connectivity.
- Cut IT operating expenses: More power efficient that results in power consumption and cooling cost.
- Improve Service Levels: High availability features such as hot swappable and redundant power supplies, fans and disks lead to higher uptime.

Availability

Sun Fire X4140 Standard configurations in US will RR on April 02, 2008, and GA on May 22, 2008.

Sun Fire X4140 Standard configurations outside of US will RR on April 02, 2008, and GA on May 22, 2008.

Sun Fire X4140 XATO configurations worldwide will RR and GA on May 22, 2008.

Sun Fire X4240 Standard configurations in US will RR on April 24, 2008, and GA on May 22, 2008.

Sun Fire X4240 Standard configurations outside of US will RR on April 24, 2008, and GA on May 22, 2008.

Sun Fire X4240 XATO configurations worldwide will RR and GA on May 22, 2008.

Enabling Technology

Technology Overview

The Sun Fire X4140 and X4240 Servers are symmetric, multiprocessor, x64-based, rack-optimized servers which has the following system architectural features:

- AMD Opteron processors
- Fast and low power memory
- HyperTransport technology
- Non-volatile boot media
- Integrated Lights Out Management (ILOM) with a dedicated Service Processor

AMD Opteron Processor

The AMD Opteron processor is part of a new computing platform that extends the ubiquitous x86 architecture to accommodate x64 64-bit processing. Formerly known as x86-64, AMD's enhancements to the x86 architecture allow seamless migration to the superior performance of x64 64-bit technology. AMD's Opteron processor was designed as CMP (Chip-level Multi-processing) from the start with Crossbar Switch and System Request Interface. This approach defines a new class of computing by combining full x86 compatibility, a high-performance 64-bit architecture, and the economics of an industry-standard processor.

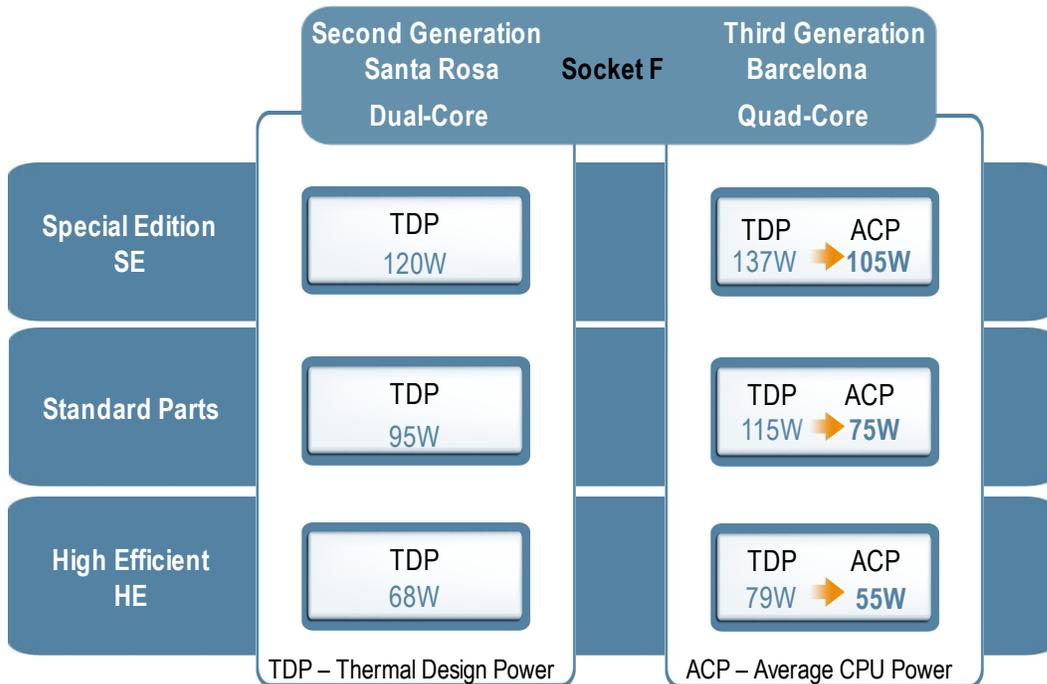


Figure 1. Power Consumption for Socket F Dual- and Quad-Core AMD Processors

Socket F is not a traditional socket but a Land Grid Array (LGA). This means that there are no pins on the

processor, but only small pits. These pits make contact with the slightly spring landing-points on the system board. This approach gives multiple advantages, such as a higher contact point density and better electrical properties. Socket F has 1207 lands that are used for either dual- or quad-core processors in the Sun fire X4140 and X4240 server. As shown in figure 1, Dual-Core socket F processors are based on the second-generation AMD Opteron processors. Quad-core uses the same socket and can be upgraded from socket F dual-core processors. It is important to note that older "Rev E" processors are not compatible because they are 940 pin processors.

Third-generation AMD Opteron processors are quad-core Barcelona processors only. All the features associated with third-generation processors as described below and only apply to quad-core processors.

Second-Generation (Dual-Core) AMD Opteron Processor

The Second-Generation AMD Opteron processors are native Dual-Core AMD Opteron processors with Direct Connect Architecture. AMD Opteron processors feature a common core architecture that is consistent across 1-, 2-, 4-, and 8-socket systems and is also consistent with previous AMD Opteron processors. This strategy helps Sun customers to minimize the cost of transition and maximize past investments in software and hardware optimization.

AMD Opteron processors are offered in three series: the 1000 Series (single socket), 2000 Series (up to 2 sockets), and the 8000 Series (4 to 8 sockets). The 1000 Series is built on AMD's new Socket AM2. The 2000 and 8000 Series are built on AMD's new Socket F (1207). The 2000 Series will be used exclusively in the Sun Fire X4140 and X4240 servers.

Figure 2. Opteron Dual-Core Processor Architecture

Figure 2 shows the integrated memory controller with 144 bits (128 addressable) to main memory. Also integrated on silicon are the three Hypertransport links that service inter-process and I/O communications. The two processor cores are located next to the Crossbar and System Request Interface. These two components have been in the AMD64 architecture from the first generation processors anticipating dual- and quad-core implementation. This design maintains two distinct processor cores but does not duplicate the memory controllers or HyperTransport links. The logic of how to manage inter-process communications between the cores and system resources are all managed by the Crossbar. The Crossbar runs at full core frequency to allow data to come into the processor at full speed. The Crossbar will also manage data flow to the memory controller and other Hypertransport I/O components.

The Next-Generation AMD Opteron Processor Design for Socket F (1207) (formerly known as "Rev F") is a redesign of the original AMD Opteron (formerly known as "Rev E") design and offer the following enhancements:

- New socket design, all native dual core processors
- Consistent processor power requirements
- Supports lower power DDR2 memory technology
- Consistent socket design and power requirements planned for Quad-Core AMD Opteron processors
- AMD PowerNow! Technology
- AMD Virtualization™ support (formerly known as Pacifica)

AMD Opteron processors leverage the same proven Direct Connect Architecture and CMP (Chip-level Multi-Processing) design features of the Dual-Core AMD Opteron processors, including:

AMD64 technology

- 64-bit operating systems to provide full, transparent, and simultaneous 32-bit and 64-bit platform application

multitasking

- Runs existing installed base of 32-bit applications and operating systems at peak performance, while providing a 64-bit capable migration path
- Designed to enable 64-bit computing while remaining compatible with the vast x86 software infrastructure
- Enables a single architecture across 32- and 64-bit environments

Direct Connect Architecture

- Helps to reduce the real challenges and bottlenecks of system architecture
- Memory is directly connected to the CPU, optimizing memory performance
- I/O is directly connected to the CPU, for more balanced throughput and I/O
- CPUs are connected directly to CPUs allowing for more linear symmetrical multiprocessing
- Integrated Memory Controller on-die DDR2 DRAM memory controller offers available memory bandwidth up to 10.7 GB/s (with DDR2-667) per processor

Integrated DDR2 Memory Controller

- A 128-bit wide, on-chip DDR2 memory controller that supports ECC and ChipKill technologies and provides low-latency memory bandwidth which scales as processors are added
- Dedicated 1MB L2 Cache for each core

AMD HyperTransport™ Technology

- Provides a scalable bandwidth interconnect between processors, I/O subsystems and other chipsets
- The 2000 series Opteron Processor has one coherent and two non-coherent HyperTransport technology links providing up to 24.0 GB/s peak bandwidth per processor

Quad-core upgradeability

- AMD Opteron processors with DDR2 memory are designed to offer a seamless upgrade path from dual-core to quad-core when they are available in 2008 in similar thermal envelopes to help leverage existing investments
- Maintain the same platform at similar power efficiency

AMD Virtualization™ (AMD-V™)

- Reduces overhead by selectively intercepting instructions destined for guest environments
- Direct Connect Architecture helps guests run at near native speed
- Virtualization-aware integrated memory controller provides efficient isolation of virtual machine memory

Enhanced performance-per watt

- Energy-efficient DDR2 memory uses up to 30% less power than DDR1 and up to 58% less power than FBDIMM
- AMD PowerNow!™ technology with Optimized Power Management can deliver performance on demand while minimizing power consumption
- DDR2 platforms can upgrade to quad-core AMD Opteron processors within existing thermal bands for significantly better performance-per-watt

AMD HyperTransport™ Technology

HyperTransport technology is a high-speed, low latency, point-to-point link designed to increase the communication speed between integrated circuits in computers, servers, embedded systems, and networking and telecommunications equipment. The Next-Generation AMD Opteron processor continues to use HyperTransport Technology links to provide a scalable bandwidth interconnect among processors, I/O subsystems, and other chip sets. HyperTransport Technology:

- Helps increase overall system performance by removing I/O bottlenecks typically found in Front Side Bus (FSB) architectures and efficiently integrating with legacy buses, increasing bandwidth and speed, and reducing latency of processors.
- Provides up to 8 GB/sec. bandwidth per link at 16x16 bits, 1 GHz operation, providing sufficient bandwidth for supporting new interconnects, such as PCI-Express.
- Provide significantly more bandwidth than current technologies
- Use low-latency responses and low pin counts
- Maintain compatibility with legacy PC buses while being extensible to new SNA (Systems Network Architecture) buses.
- Appear transparent to operating systems and offer little impact on peripheral drivers.
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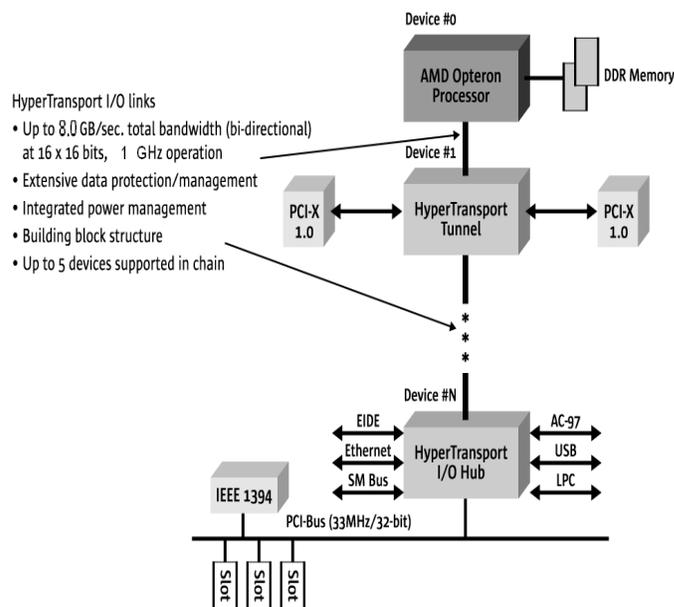


Figure 2. Sample HyperTransport Technology Interconnect Block Diagram

Third-Generation (Quad-Core) AMD Opteron Processor

AMD's native Quad-Core Opteron processors incorporate four processor cores on a single die of silicon. The Quad-Core AMD Opteron processors are electrical-, thermal-, and socket-compatible with the Next-Generation AMD Opteron Socket F (1207) processors.

AMD's Quad-Core AMD Opteron processors go far beyond simply adding two more cores, but rather presents a "native" multi-core design where all four cores are on one piece of silicon. Quad-Core AMD Opteron processors feature Direct Connect Architecture, which means you have processors directly connected to one another, and an I/O and Memory Controller directly connected to each processor to reduce bottlenecks for better performance. Furthermore, Quad-Core AMD Opteron processors are not only the industry's first native x86 quad-core processors, they are also the first quad-core processors designed within the same thermal and power envelopes as AMD's current generation of dual-core processors.

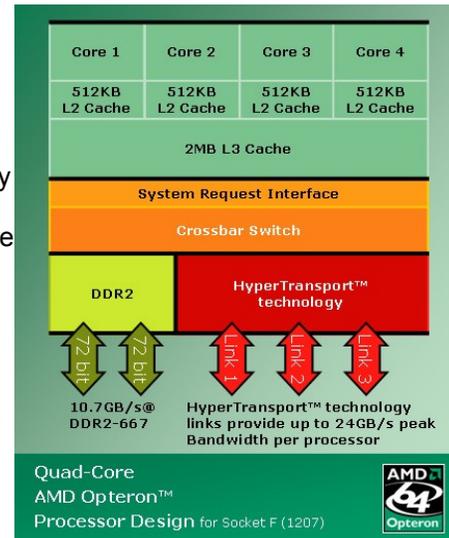


Figure 3. Third-Generation Quad-Core Processor Block Diagram

Designed from inception for the most demanding datacenters, the Quad-Core AMD Opteron processor brings significant enhancements to market in four critical areas:

Processor Design for Energy-Efficiency

- AMD CoolCore™ technology can reduce energy consumption and heat generation by turning off unused parts of the processor. Independent Dynamic Core Technology, an enhancement to AMD PowerNow! technology, allows each core to vary its clock frequency depending on the specific performance requirement of the applications it is supporting, helping to reduce power consumption.
- Dual Dynamic Power Management (formerly called "splitplane") provides an independent power supply to the cores and to the memory controller, allowing the cores and memory controller to operate on different voltages, depending on usage.

Investment Protection

- Quad-Core AMD Opteron processors maintain compatibility with the socket and thermal envelopes of Second-Generation AMD Opteron processors to enable a seamless upgrade path.

Virtualization

- Virtualization is memory intensive and the Quad-Core AMD Opteron processor provides exceptional memory throughput through its integrated memory controller.
- The Sun Fire X4140 and X4240 servers are designed for virtualization with quad-core processor and eight memory slots per processor for memory and CPU intensive workloads.
- AMD Virtualization introduces Rapid Virtualization Indexing (formerly called "Nested Paging") and Tagged TLBs. AMD's Rapid Virtualization Indexing feature is designed to reduce the overhead penalty associated with virtualization technologies by moving the process of managing virtual memory from software to hardware, reducing the complexity of existing x86 virtualization solutions and enabling increased

performance and efficiency for many virtual workloads, allowing for a higher performing, more flexible IT environment.

High-Performance Computing

- AMD Memory Optimizer Technology increases memory throughput by up to 50% compared to previous generations of the AMD Opteron processor.
- AMD Wide Floating Point Accelerator provides 128-bit SSE floating point capabilities, which enable each core to simultaneously execute up to four FLOPS per clock (four times the floating-point computations of previous AMD Opteron processors) for significantly improving performance in compute-intensive and workstation applications.
- AMD Balanced Smart Cache provides significant cache enhancements with 128KB L1 cache and 512KB L2 cache per core and 2MB shared L3 cache across all four cores.

Processor Design for Energy-Efficiency

Power consumption continues to be one of the top concerns for managing today's datacenters. AMD Opteron processors address this concern by providing customers with industry-leading overall power-efficiency and can deliver significant performance gains over dual-core AMD Opteron processors while operating in the same thermal infrastructure. The Next-Generation AMD Opteron processors will further define a new standard in performance-per-watt with PowerNow!(TM) capabilities and energy-efficient DDR2 memory support, while maintaining a consistent maximum 95-watt thermal design power envelope. The memory capacity offered with AMD's Direct Connect Architecture, customers can have the memory performance they require with DDR2 and avoid the premature use of memory technologies that are not yet at an optimal price-to-performance ratio and that require more power. All AMD Opteron processor series - current Single-, Dual, Quad-Core, and future AMD Opteron processors - have all been designed to a consistent power requirement (thermal window).

Processor Longevity

The AMD Opteron processor socket design is planned to remain identical as AMD transitions the Next-Generation AMD Opteron processor to its upcoming Quad-Core AMD Opteron processor. Both generations of AMD Opteron processors are planned to maintain consistent processor power requirements, utilize DDR2 memory and feature an Integrated Memory Controller.

Sun servers compatible with Next-Generation AMD Opteron processor are planned to be upgradable to Quad-Core AMD Opteron processors with only processor and BIOS changes.

Consistent processor and system architecture design reduces total cost of system ownership. Less platform churn reduces application qualification and support costs. Consistent power requirements eliminate the need to reconfigure system racking or data center power.

Thermal Design Power (TDP) will continue to be leveraged for engineering thermal design maximum limits. TDP values are conservative engineering design limits and will be used by Sun engineering in the design of servers.

Average CPU Power (ACP)

ACP is a metric that offers a relevant estimation of the power consumption for Quad-Core AMD Opteron processors. ACP is determined by breaking down multiple components of power consumed within the processor, including the power dedicated to the cores, the integrated memory controller, and to HyperTransport™ technology links. ACP and TDP are both indicators of processor power. TDP refers to the thermal design power processors are capable of consuming that the specification system designers follow. AMD has referenced processor power consumption based off of TDP values to date. ACP represents a relevant wattage that reflects power consumption while running server-class enterprise workloads. ACP is a useful metric for data center operators to use when estimating power budgets to size their datacenters. TDP is more useful and relevant to

system designers.

AMD Opteron Processor	AMD Opteron Processor	Low Power CPU Modules HE	Standard Power Modules	Performance Optimized Power SE
Dual- Core 8200 Series	TDP	68 W	95 W	120 W
Quad-Core 8300 Series	TDP	75 W	115 W	137 W
	ACP	55 W	75 W	105 W

Figure 4. AMD Opteron Processor Power Consumption

When discussing processor power, it is very important to read footnotes on competitive information to ensure comparisons are the same. Typically, AMD conservatively uses maximum power in their marketing materials, whereas Intel often utilizes average power or the equivalent to ACP. Sun's power calculator will use Average CPU Power (ACP) rather than Thermal Design Power (TDP). TDP values are used by Sun engineering for the design of these systems.

The Quad-Core AMD Opteron™ processor architecture contains a number of key energy efficiency improvements to reduce the amount of power consumed by our processors across a wide variety of usage scenarios and workloads. A new feature called Dual Dynamic Power Management (DDPM) provides the processors with additional power rails which are dedicated to the processor cores, to the HyperTransport technology links and internal memory controller. Separating the power rails of the cores from the internal memory controller allows each of the cores to independently adjust frequency for the given workload while also allowing for voltage changes to all the cores. This technology enables considerable power savings at the processor level during non-peak workloads. The ACP values for each power band include the power for the cores, integrated memory controller and HyperTransport™ technology links.

A consistent thermal window means a customer can migrate to the Next-Generation of a product without needing to reconfigure the quantity of servers per cabinet, add cabinets to the datacenter, or increase the power grid to the datacenter.

AMD Enhanced PowerNow!™

Enhanced AMD PowerNow!™ Technology is designed to reduce power consumption of the entire quad-core processor. The native quad-core design enables enhanced power management to address each of the four cores independently.

Dual Dynamic Power Management™ (formally “splitplane”) allows each processor to maximize the power-saving benefits of AMD PowerNow! technology without compromising performance. Dual Dynamic Power Management can reduce idle power consumption and allow for per-processor power management in multi-socket systems to decrease power consumption.

Independent Dynamic Core Technology allows each core to vary its frequency, based on the specific needs of the application. This allows for more precise power management to reduce data center energy consumption and thereby reduce total cost of ownership (TCO).

Power consumption is related to the voltage level of the voltage supply to the processor as well as the frequency

of operation. General purpose systems are designed to operate at a voltage level and frequency level that meets their peak computational performance. This level of operation will consume significant amounts of power that is not useful at times when the peak processor performance is not required. Power is typically saved by reducing the supply voltage of the processor when peak performance is not needed. In this approach, the sections of the processor which are unused have the clock frequency reduced which reduces power. As shown in Figure 5, the core frequency with the dual-core CPU is locked based on the core 0 load characteristics. Core 1 will operate at the same core frequency even though it's load characteristics are low. With Independent Dynamic Core Technology, the native quad-core processor can operate each of the cores at different frequency based on the load characteristics of that particular core.

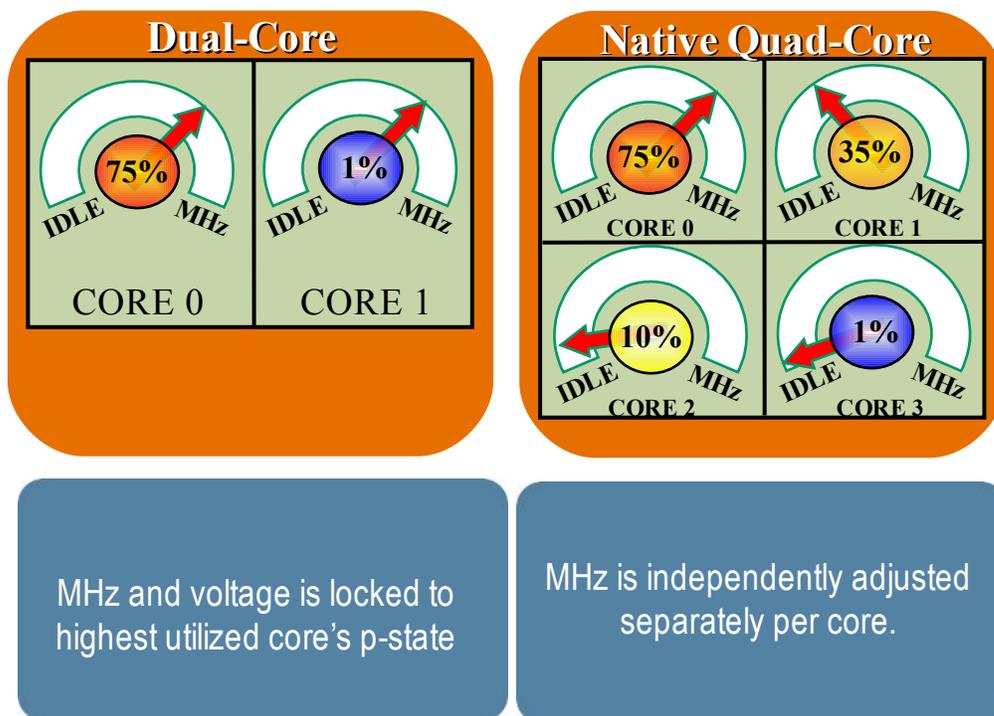


Figure 5. AMD Enhanced PowerNow! Technology – Dual core versus Quad core

Dual Dynamic Power Management™

This technology allows each processor to maximize the power-saving benefits of AMD PowerNow! technology without compromising performance. Dual Dynamic Power Management can reduce idle power consumption and allow for per-processor power management in multi-socket systems to decrease power consumption.

Today's AMD Opteron™ processor use a unified voltage plane for the memory controller and processor cores. AMD's Second-generation CPUs (Rev F) work in unified plane motherboards and will not offer the benefits of Dual Dynamic Power Management as described below.

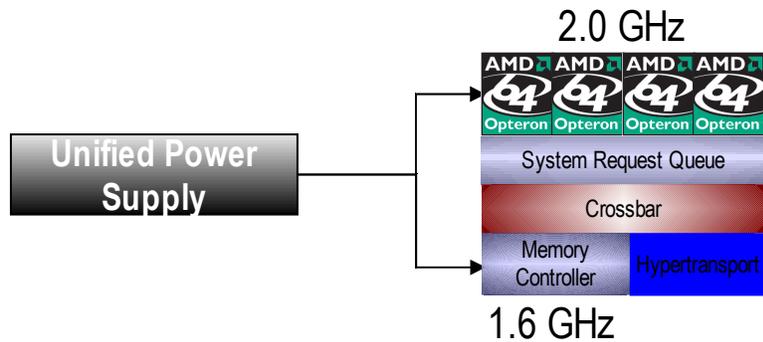


Figure 6. AMD's Unified Power Supply for Second-Generation

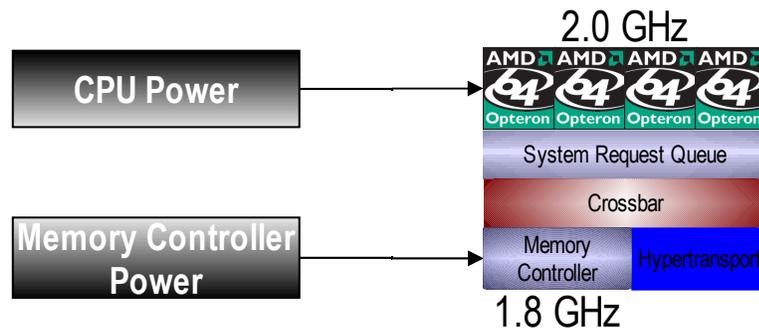


Figure 7. AMD's Independent Supply Voltage for Third-Generation

The above block diagram shows that AMD's third generation power for the CPU and Memory Controller are powered from independent voltage supplies, offering greater performance and better power management. Second-Generation AMD (Rev F) Opteron processors are still compatible with motherboards designed to support Dual Dynamic Power Management but they will deliver the same voltage to the CPU and Memory Controller power.

High Performance Computing

Sun's high performance dual- and quad-core AMD Opteron servers are used in a host of applications including data centers, research universities, oil and gas exploration, molecular modeling, video rendering, large compute clusters, and many more. Sun's significant contribution to high performance multi-core computing is mainly due to Sun's innovative design characteristics of the system.

Hypertransport Dual Link

Hypertransport Dual Link refers to a two or four socket CPU system configuration in which the processors are connected by a pair of HyperTransport™ Technology links. Each link represents a HyperTransport path that runs at speeds up to 1GHz. This means that each link has up to 8GB/s available of theoretical bandwidth between each CPU and each CPU's attached controllers. With dual link the peak available bandwidth between the two processors doubles to 16GB/s – 3-5% actual system performance gain. The Sun Fire X4140 and X4240 servers are designed in a multi-processor configuration using two AMD's 2000 series processors. The 2000 series processor has one coherent Hypertransport links. The coherent link allows each processor to access another's memory. Dual links work together to "gang" coherent and non-coherent links to provide a 3-5% performance boost.

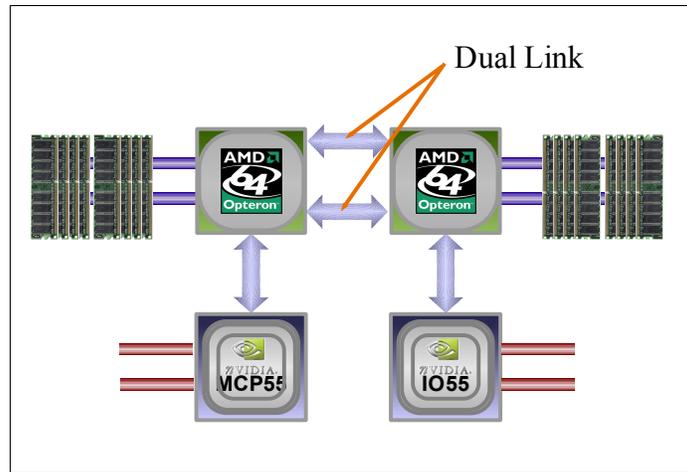


Figure 8. Dual Link HyperTransport Technology

Memory Technology

AMD's Opteron processors integrate a DDR memory controller directly into the processor. The memory controller is running close to the processor's core frequency and greatly increases bandwidth to the processor at significantly reduced latencies. The performance-enhancing effect is even more dramatic within an AMD Opteron multiprocessing environment, because each additional processor has its own memory controller thereby scaling memory bandwidth within the server.

The processors in the Sun Fire X4140 and X4240 servers are designed to work with Double Data Rate (DDR) SDRAM. Similar to first-generation DDR memory, DDR2 memory cells transfer data both on the rising and falling edge of the clock (a technique called "dual pumping"). The key difference between DDR and DDR2 is that in DDR2 the bus is clocked at twice the speed of the memory cells, so four words of data can be transferred per memory cell cycle. Thus, without speeding up the memory cells themselves, DDR2 can effectively operate at twice the bus speed of DDR.

The third-generation processor's monolithic design allow much faster sharing of data between all four cores, the integration of the memory controller within the processor allows for much faster data retrieval from system memory. The memory controller access external DRAM with 128-bit wide and supports up to eight (8) registered DDR DIMMs per processor on both the Sun Fire X4140 and X4240 servers. The available memory bandwidth for each processor is up to 10.7 GB/s (with PC2-5300 memory) when the memory bus is clocked at 333 MHz (DDR2-667). If the Sun Fire X4140 and X4240 servers are configured with all eight DIMM slots occupied with DDR2-667 the memory buss will operate at 667MHz. Quad-core AMD Opteron processors will be eventually configured with 800MHz DDR2 DIMMs and will operate at 800MHz with

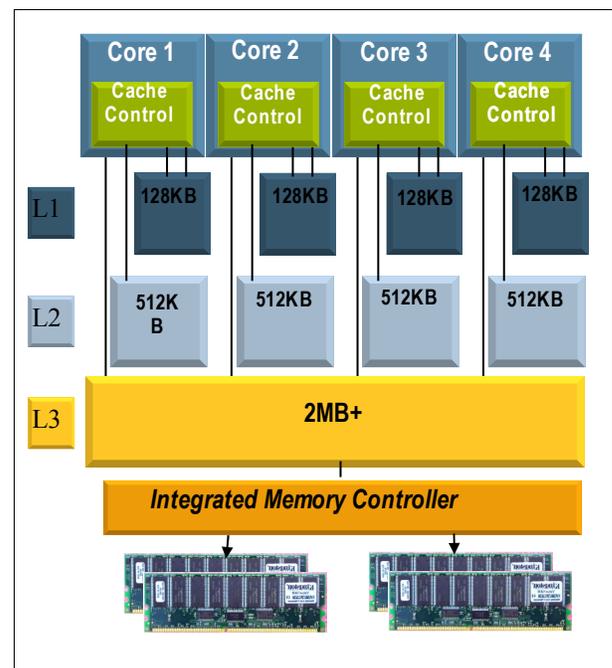


Figure 9. Third-Generation Opteron Processor Architecture

four DIMMs per processor. However, with more than four 800 Mhz DIMMs, the bus clocks down to 667 Mhz.

The following diagram shows AMD's Opteron processor architecture featuring the cache controller and three stages of caches. The dedicated 128KB L1 cache with 64KB used for instructions and 64KB for data. Unlike Intel's processor it delivers 2 data loads per cycle instead of one. The latency for the L1 cache is three clock cycles with very fast access time.

The quad-core architecture also has dedicated 512KB L2 cache to eliminate conflicts common in shared caches. The L2 cache was designed for those applications that are running on a single core and use up all or most of the L3 2MB cache. This is a problem on other architectures that do not have three levels of cache because the shared cache is servicing one core and the others are starved. Processor threads running on other cores can run effectively from the L2 cache which is sized to accommodate the majority of working sets today. The Opteron processor is shown in the following diagram with four separate 512KB L2 caches. These caches are 16-way set associative, and the latency for each core to retrieve data from its L2 cache is 12 clock cycles.

The Sun Fire X4140 and X4240 processor features a large, shared L3 cache that is 2MB in size. The L3 cache is shared by all cores, whether it's a dual- or quad-core processors. The L3 cache is 32-way set associative and is based on a non-inclusive victim cache architecture. The latency for any core to retrieve data from the L3 cache is less than 38 clock cycles.

The memory controller for the Sun Fire X4140 and X4240 servers are built directly into the Opteron 64 bit processors. Normally, memory controllers are part of the motherboard to which the processor is attached. With the memory controller built on the processor this considerably reduces the time it takes the processor to access memory, since data need only travel between the processor and the physical memory. Communication with the controller that arranges the data flow does not need to be passed outside the processor, reducing the amount of computing cycles lost while waiting for the memory to respond.

AMD has selected to support the proven technology of DDR2 memory for its Next-Generation and third-Generation Quad-Core AMD Opteron processors for both cost and technology stability reasons. DDR2 memory reduces the cost of system acquisition as DDR2 DIMMs are priced less than FBDIMM.

DDR2 memory features lower operational costs as DDR2 memory requires less power than FBDIMM. FBDIMM utilizes a first-generation memory buffer chip that draws additional power. As shown in the following table, DDR2 memory uses 30% less power¹ than DDR1 and DDR2 memory uses 58% less power¹ than FBDIMM.

Processor	Memory Type	Memory Power ¹ (W) for 8 DIMM
Single- and Dual-Core AMD Opteron	DDR1	50 W
Intel Irwindale and Paxville	DDR2	35 W
Next-Generation AMD Opteron	DDR2	35 W
Intel Dempsey, Woodcrest	FBDIMM	83 W
Quad-Core AMD Opteron	DDR2	35 W
Intel Clovertown	FBDIMM	83 W

(1) Measurement based on average power of DDR1, DDR2 and FBDIMM.

Figure 10. Power Requirements for DDR and FBDIMM Technology



AMD Virtualization™ Technology

Virtualization enables data centers to achieve higher levels of efficiency, utilization and flexibility by dividing a computer into several virtual machines or consolidating many systems onto one physical machine. AMD's Virtualization (AMD-V) technology, which takes some tasks that virtual machine managers (VMMs) perform in software, through emulation, and simplifies them through enhancements to the AMD Opteron instruction set. AMD Virtualization Technology was announced in 2004, under the code-name Pacifica, and AMD released technical details in mid-2005.

Quad-Core AMD Opteron processors with Direct Connect Architecture enable industry leading virtualization platform efficiency. Featuring AMD-V technology with Rapid Virtualization Indexing, Quad-Core AMD Opteron processors can accelerate the performance of virtualized applications and improve efficiency of switching among virtual machines. This feature will allow Sun customers to host more virtual machines and users per system to maximize the consolidation and power saving benefits of virtualization.

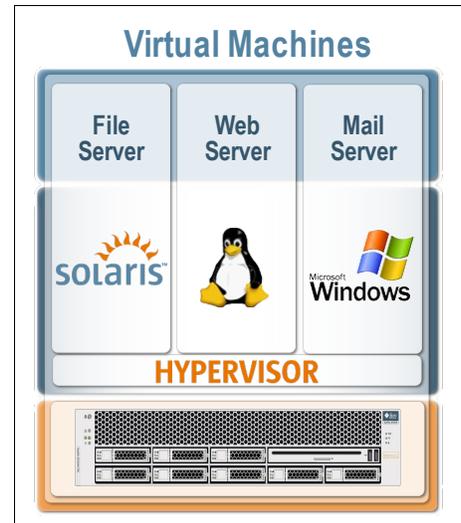


Figure 11. Virtualization on the Sun Fire server

Virtualization technology is a very memory intensive application that places a heavy demand on servers resources. Virtualization software must manage multiple virtual environments while still delivering application and data services to users in a timely fashion. The Sun Fire X4140 and X4240 servers are a natural fit because of their performance within this type of environment.

Second-Generation AMD Opteron processors improve virtualization by improving system performance and security of virtual environments. AMD Virtualization technology, consisting of hardware extensions to the x64 system architecture, is designed to help virtualization software more efficiently run applications. These applications run in separate isolated environments and hide the complexity of hardware infrastructure to help simplify management. AMD-V leverages Direct Connect Architecture to provide fast and efficient memory handling, a must-have for memory intensive applications like virtualization.

Third-Generation AMD Opteron processors offer enhancements to AMD-V that provide a balanced approach to improve virtualization performance and enable near-native performance on virtualized applications. One of those enhancements, Rapid Virtualization Indexing (formally “nested paging”), will reduce the overhead of switching between virtual machines. This feature used by virtualization software will improve the performance of many virtualized applications. Some of the AMD-V enhancements that are built into the third-generation architecture:

- Silicon feature-set enhancements designed to improve performance, reliability, and security of existing and future virtualization environments supports more users
- Direct Connect Architecture host more virtual machines (VMs) per server
 - AMD's Direct Connect Architecture helps improve application performance within a virtual machine. This architecture provides direct CPU-to-memory, CPU-to-I/O, and CPU-to-CPU connections to streamline server virtualization.
 - The Integrated Memory Controller is designed to improve performance on memory-intensive virtualization environments through high bandwidth, low latency, and scalable access to memory.
 - HyperTransport technology optimizes the movement of data and the sharing of resources among VMs and I/O for greater system scalability.
- Tagged Translation Look-aside Buffer for increase responsiveness in virtualization environments
 - Unique to AMD Opteron processors, the Tagged Translation Look-aside Buffer (TLB) allows for faster

switching times between virtual machines by maintaining a mapping to the VMs individual memory spaces. Competing solutions can't distinguish one VM's memory space from another's, resulting in additional memory management overhead and reduced responsiveness when switching between virtual machines.

- Device Exclusion Vector (DEV) for more efficient security
 - DEV performs security checks in hardware. Protecting memory access to un-authorized requests from external devices, such as disks, NICs, etc. The DEV acts like a traffic cop, controlling access to virtual machine memory based on permission, isolating virtual machines for secure operation.
 - The DEV performs these security checks in hardware, rather than software, for greater efficiency by creating Protection Domains that deny memory access for unauthorized requests from external devices, such as hard disks, network controllers, etc.
- Rapid Virtualization Indexing for better performance in a virtualization environment
 - Rapid Virtualization Indexing is an enhancement to AMD-V technology in Quad-Core AMD Opteron processors. It is designed to dramatically increase the performance of virtualized applications while enabling faster switching between virtual machines (VMs). This will allow users to host more VMs per server and maximize the benefits of virtualization. This feature will need to be supported in the virtualization software and was formerly called Nested Page Tables.

Enhanced Third-Generation (Quad-Core) AMD Opteron Processor (Shanghai)

Building on the strengths of the original Quad-Core AMD Opteron Processor (Barcelona), the new Quad-Core AMD Opteron processor represents the most thermally efficient and highest performing processor from AMD. The new processor will consume approximately 20 percent less power at idle than Barcelona, and will offer 6MB of shared L3 cache as opposed to 2MB of shared L3 cache in Barcelona. Other features include AMD-V enhancements and support for DDR2-800 memory.

The new Quad-Core processor can be characterized as an upgrade to the Barcelona architecture with performance improvements and reduced power consumptions. Most of the information in the Third-Generation (Quad-Core) AMD Opteron Processor still apply and only the changes to the enhanced version will be covered in this section.

New in Shanghai

Quad-Core AMD Opteron Features "Barcelona"	New in Shanghai
65nm Technology	45nm Technology Immersion Lithography Better clock speed scaling
2MB of L3 cache	6MB of L3 cache Better performance
HyperTransport 1.0 @ 2GT/s (8GB/s)	HyperTransport 3.0 @ 4.4GT/s (17.6GB/s) Available April (not all platforms)
AMD Balanced Smart Cache	AMD Smart Fetch Allows cores to sleep while still providing full cache access
AMD-V with Rapid Virtualization Indexing	Designed for 25% fast "world switch" time Enhanced Rapid Virtualization Indexing (More Virt-Phys translation held in cache)
AMD CoolCore Technology	Extends power savings to L3 cache (L3 powered down when not in use)

Figure 12. Enhanced Shanghai features

AMD's native Quad-Core Opteron processors incorporate four processor cores on a single die of silicon. The Quad-Core AMD Opteron processors are electrical-, thermal-, and socket-compatible with the Next-, and Third-Generation AMD Opteron Socket F (1207) processors. The new Quad-Core Opterons clock frequency will be in the range from 2.3 to 2.7GHz and will fit into the same 75W thermal envelope. This is according to AMD's Average CPU Power (ACP) rating method.

AMD's 45-nm fabrication process will produce faster switching speeds at lower power levels as compared to the past generation 65-nm fabrication. Most of the additional transistors (versus Barcelona) come from the expansion of the L3 cache. The expansion from 2MB to 6MB will have performance benefits for the Sun Fire

servers for many server-class workloads.

Shanghai's memory controller supports memory clock frequencies from 667MHz to 800MHz. HyperTransport 3 (HT3) support will be supported by the spring of 2009 (subject to change). The first Shanghai processors will not support HT3 and therefore Sun servers will only support HT1. Sun engineering is currently working on a full validation test of HT3 on Sun platforms and changes on system board may be required. HT3 will double the available bandwidth for CPU-to-CPU communication in Opteron systems. With HyperTransport clock speeds up to 2.2GHz, HT3 will allow for up to 17.6 GB/s of bandwidth (the bidirectional total) per link.

Memory Enhancements

The enhanced Quad-Core processor has 6MB of L3 cache but the same amount of L1 and L2 cache as Barcelona - as shown in the following Figure. In order to make sure its larger caches don't cause data integrity problems, AMD has built in a new feature it calls L3 Cache Index Disable. This feature allows the CPU to turn off parts of the L3 cache if too many machine-check errors occur. This capability will apparently require OS-level support and is not supported as of this writing.

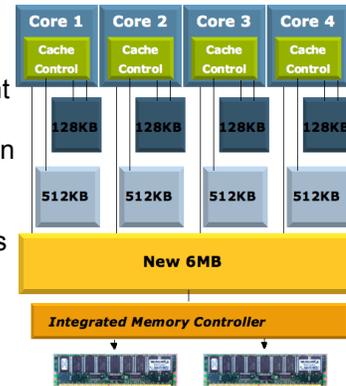


Figure 13. Shanghai memory architecture

AMD Virtualization Enhancements

One tweak in Shanghai that affects not just the cache but the entire memory hierarchy has to do with the chip's support for nested page tables, a feature that accelerates memory address translation with system virtualization software. Shanghai maintains the same basic feature set as Barcelona, but AMD claims a reduction in "world switch time" of up to 25% for Shanghai. That means the system should be able to transition from guest mode to hypervisor mode and then back to guest mode much more quickly. Hypervisors that support the AMD-V feature set could see a marked improvement in performance in cases where virtual server performance is hampered by world-switch latency. Sun has done some Vmmark performance testing between the two Quad-Core processors with VMware ESX 3.5 and the results showed dramatic performance advantages.

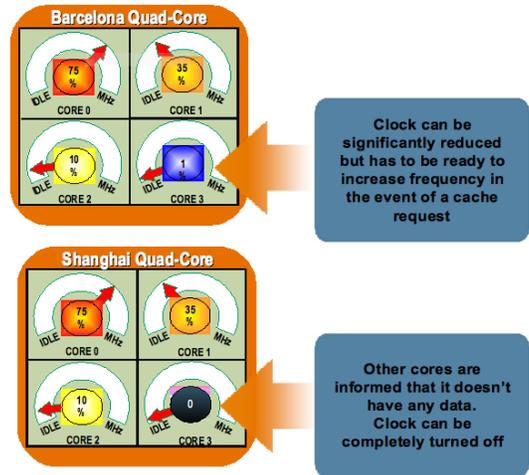
Faster World Switch means that AMD has done some tuning of its world switch. A "world switch" is when CPU control passes from one Guest OS, to the hypervisor, to another Guest OS (or back to the original one). Faster switching means the CPU can get back to work on running the virtualized application.

Rapid Virtualization Index works by caching the address translations from Guest Virtual memory to Guest Physical memory to Host Physical memory. To translate between each of these states can require dozens of incremental translations. Shanghai improves Rapid Virtualization Indexing over Barcelona by caching more of these incremental address translation steps.

These virtualization enhancements can benefit by allowing Sun servers to support more users while offering best performance. These virtualization enhancements are supported in VMware Virtual Infrastructure 3.5 Update 1, Microsoft Hyper-V, and Xen.

AMD Smart Fetch Technology

Smart Fetch is primarily a power-saving feature intended to work around the fact that AMD's caches are exclusive in nature. That is, the lower-level caches don't replicate the entire contents of the higher-level caches. In Barcelona, for instance, a completely idle core would have to continue operating, though at a lower frequency, in order to keep its caches active and their contents available. Shanghai, by contrast, will dump the contents of that core's L1 and L2 caches into the L3 cache and put the core entirely to sleep, essentially reducing its clock speed to zero. A flag (bit) is set to notify the other cores that it does not have any data they need. This can dramatically reduce idle power draw on a server. One core in the system must remain active at all times, but in a four-socket system, only a single core in one socket must stay active.



Next Generation (Six-Core) AMD Opteron Processor (Istanbul)

Building on the strengths of the enhanced Quad-Core AMD Opteron Processor (Shanghai), the new Six-Core AMD Opteron processor offers higher processing core count (Six-Core) delivering 20-30% higher performance in the same power envelope. The new processor will implement HT Assist, which helps increase overall system performance in multi-socket systems. Another feature includes the APML Remote Power Management Interface (RPMI).

The new Six-Core processor can be characterized as an upgrade to the Shanghai architecture with performance improvements and reduced power consumptions. Most of the information in the Enhanced Third-Generation (Six-Core) AMD Opteron Processor still apply and only the changes to the Six-Core AMD Opteron processor version will be covered in this section.

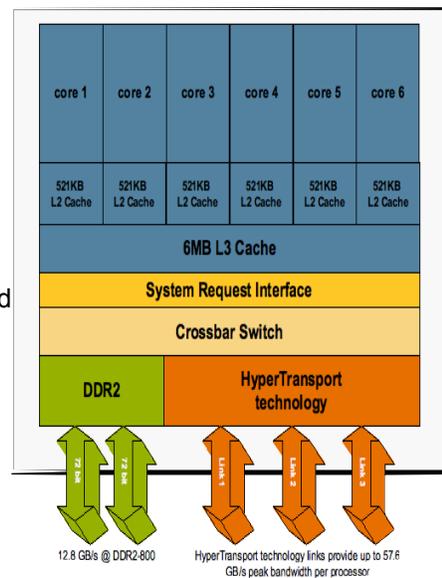


Figure 14. Next Generation Six-Core Processor Block Diagram

New in Istanbul

Processor	Shanghai	Istanbul
Socket	Socket F (1207)	
Cores	4-Cores	6-Cores
Wattage (ACP)	105W/75W/55W	
Virtualization	AMD-Vi	
Power Efficiency	Cool Core™ Technology Enhanced PowerNow!	
RAS	ECC	
Power Management	Enhanced AMD PowerNow!	Enhanced AMD PowerNow! APML
Memory	Dual Channel RDDR2 400/533/667/800	Dual channel RDDR2 400/533/667/800 HT Assist
HyperTransport	3x HT1 or 3x HT3 (HT 3.0) Up to 17.6 GB/s @ 4.4GT/s per link	3x HT1 or 3x HT3 (HT 3.0) Up to 19.2 GB/s @ 4.8GT/s per link
Cache	512KB L2 (per core) 6MB L3 (per socket)	
Process	45 nm	
Halogen free packaging	NO	YES
Pb-Free (Lead-Free)	NO	YES

Figure 15. Shanghai vs. Istanbul Features

AMD's native Six-Core Opteron processors incorporate six processor cores on a single die of silicon. The new Six-Core Opterons clock frequency will be in the range from 2.2 to 2.6GHz and will fit into the same 75W thermal envelope. This is according to AMD's Average CPU Power (ACP) rating method.

Istanbul's memory controller supports memory clock frequencies from 667MHz to 800MHz. Coherent HyperTransport 3 (HT3) is supported, which will double the available bandwidth for CPU-to-CPU communication in Opteron systems. With HyperTransport clock speeds up to 2.2GHz, HT3 will allow for up to 19.2 GB/s of bandwidth (the bidirectional total) per link.

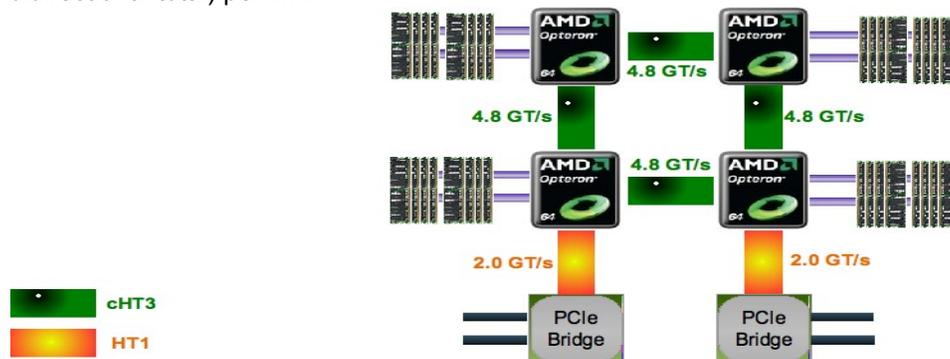


Figure 16. Coherent HyperTransport 3 (cHT3)

AMD HT Assist

HT Assist sets up “indexes” in the cache on each processor. Prior to HT Assist, the core had to search each cache to find the latest version of a piece of data. With HT Assist, the core can simply look at the cache registry and see if the data is in there. This saves time and reduces probe filter traffic, thereby increasing performance.

- Removes latency from inter-processor communication
- Increases STREAM memory bandwidth by as much as 60% (your mileage may vary)
- Significant improvements in HPC, database & virtualization workloads
- Increase performance for cache sensitive applications on 4- and 8-socket systems

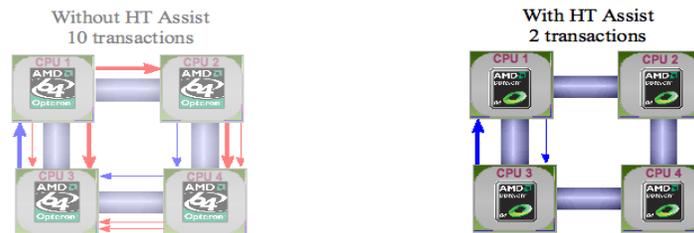


Figure 17. HT Assist

Sun Integrated Lights-Out-Manager (ILOM)

Sun Integrated Lights-out Manager is driven by an integrated system service processor that follows x86 standards. It provides for full remote KVMs (Keyboard, Video, Mouse, Storage) support together with remote media functionality. Lights-out management (LOM) is achieved using a new on-board, independently powered AST2000 service processor with its own robust, security hardened OS. ILOM provides remote administration via an intuitive browser-based GUI, DTMF CLI, remote console, SNMP V1, v2c, v3 or IPMI v2.0 protocols using the out-of-band management Ethernet, or using in-band communication through the server's operating system. With out-of-band management, the system administrator can remotely control power of the system, monitor system FRU status, and load system firmware. With in-band management, the system administrator can monitor system status and control system power down.

The Service Processor (SP) provides the following functions:

- Capability to remotely manage the server through remote keyboard, video, mouse, and storage redirection
- Extensive control and reporting over environmentals, power, hardware and BIOS/OS features
- Remote flash upgrades of system BIOS and service processor software
- Remote diagnosis of failed components allows for rapid correction
- User configurable serial console accessible via a physical port or re-directed through the management network

Sun xVM Ops Center

Management of One to Thousands of Sun Systems

Sun xVM Ops Center software, the industry's only complete solution for virtualizing and managing your data

center infrastructure for rapid and simplified discovery, OS provisioning and updates and management of multi-vendor Solaris and Linux OS-based x86 and SPARC systems . This optional software combines the benefits of N1System manager with the administration of virtualized datacenter assets by merging with Sun Connection. Sun xVM Ops Center reduces cost pressure of (server name) and improves manageability by centralizing control of heterogenous architectures across the entire IT infrastructure.

Sun xVM Ops Center software provides full Life Cycle management for physical, and soon virtual, data center infrastructure. Highly scalable building on the proven N1SM and Sun Connection, xVM Ops Center provides End-to-End Systems Management:

- Discover & Inventory
- Check & Provision Firmware
- Bare Metal Provision OS
- Manage Hypervisors
- Provision applications
- Automate software lifecycle/update
- Monitor HW and SW
- Compliance reporting

System Architecture

Overview

The Sun Fire X4140 and X4240 servers features AMD's Direct Connect Architecture to connect four processors, integrated memory controllers, and I/O directly to each other. Communication between the four processors and I/O are interconnected by a dedicated 8.0 GB/sec HyperTransport link. Each processor controls 4 pairs of DIMM slots, with over 10.0 GB/sec access between processor and memory. The coherent HyperTransport link enables each processor to access the other processor's memory. The Sun Fire X4140 and X4240 servers can be populated with 8GB DDR2 DIMMs utilize 8 DIMM slots per CPU to provide up to 128GB of memory.

The Sun Fire X4140 and X4240 can be configured with either two or four six-core AMD Opteron processors. Mixing of different processors or clock speeds is not supported. Memory options for the dual-core are DDR2-667 registered ECC memory installed in pairs. Supported DIMM capacity is either 2GB, 4GB, or 8GB and must be the same vendor and vendor part number for each pair. Failure to follow these configuration parameters may result in undefined behavior on systems and will produce system warnings.

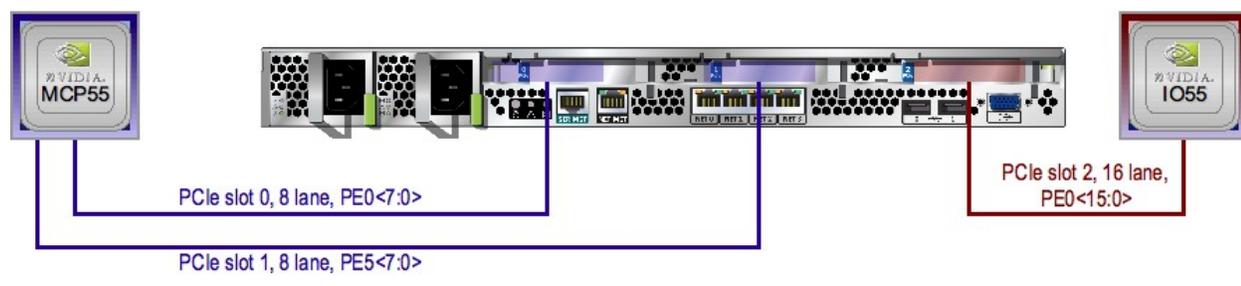


Figure 1. Nvidia's nForce Professional PCIe interconnects for the Sun Fire X4140 Server

The I/O architecture for the Sun Fire X4140 and X4240 servers are designed to provide balanced I/O, with high bandwidth connectivity to multiple devices. Nvidia's nForce® Professional 3600 (MCP-55) and nForce® Professional 3050 (IO-55) chips provide on-board 6 independent PCIe expansion slots, quad gigabit Ethernet support, 6 USB 2.0 ports, and 8 integrated SATA disk controllers (available post RR).

The Nvidia's nForce® Professional 3600 (MCP-55) connects to CPU0 via the 1GHz Hypertransport link. The MCP-55 supports three 8-lane (X8) PCIe interconnects with a theoretical maximum bandwidth of 4GB/s. The 8-lane interconnects have connectors that are mechanically 8-lane and can operate with 1-, 4-, and 8-lane PCIe cards. The I/O hub has five available USB 2.0 ports and an additional two USB 2.0 ports dedicated to the service processor. A dedicated legacy PCI buss provides connectivity to the service processor. The MCP-55 also provides four integrated SATA disk controllers to support low-cost internal SATA storage (available post RR).

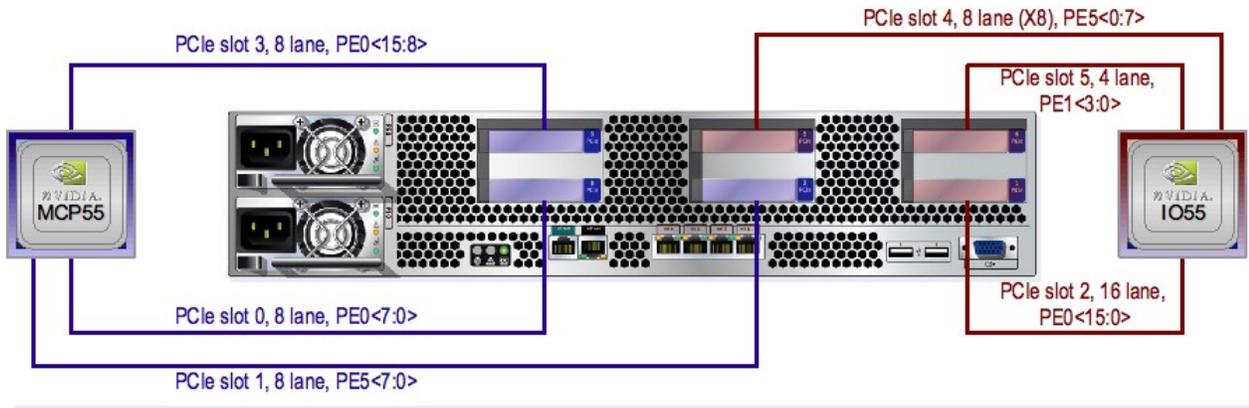


Figure 2. Nvidia's nForce Professional PCIe interconnects for the Sun Fire X4240 Server

The Nvidia's nForce® Professional 3050 (IO-55) connects to CPU1 via the 1GHz Hypertransport link. There is one 4-lane, one 8-lane, and one 16-lane PCIe interconnects with a theoretical maximum bandwidth of 2, 4 and 8GB/s respectively. The 8- and 4-lane PCIe interconnects have connectors that are mechanically X8 to allow up to X8 PCIe cards. The IO-55 chip also provides four integrated SATA disk controllers to support low-cost internal SATA storage (available post RR).

On-board management for the Sun Fire X4140 and X4240 servers are provided by a separately-powered Aspeed AST2000 Graphics & Remote Management Processor that communicates with the two main system processors and the rest of the system. The AST2000 is a high-end remote server management processor, incorporating VGA/2D Graphics Controller, BMC Controller and KVMoIP Controller into one silicon chip. Accessible to the end user through a serial port and a dedicated 10/100 Ethernet NIC, ILOM provides the administrator with full lights-out manageability of these servers which includes the ability to power cycle, setup, manage, monitor and maintain the system locally or remotely. ILOM supports both local and remote management, including remote KVM and media connectivity. ILOM also provides industry standard GUI and CLI interfaces. IPMI 2.0 and SNMP V1, v2c, V3 support also enable fast integration into a customer's existing monitoring schema.

Hypertransport Bridge Card

The Sun Fire X4140 and X4240 comes with a Hypertransport Bridge Card, X-Option X4285A, that is installed on the system board when ordered with quad-core processors. The Hypertransport Bridge Card provides a single hypertransport link between CPU0 and CPU1. The first hypertransport link is built into the system board and the Hypertransport Bridge providing the second hypertransport link. The system will function properly if the Hypertransport Bridge Card is not installed.

The Hypertransport Bridge Card will increase the system performance up to 5% quad-core processors only. The Bridge Card will not have any performance gains dual-core processors.

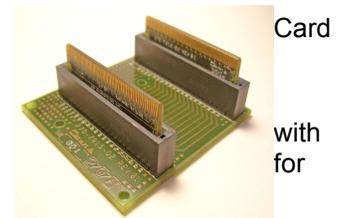


Figure 3. Processor Jumper Kit

Single CPU Sun Fire Servers

In a system with a single CPU, the processor must be placed into the designated processor slot0 that connects to the MCP-55 I/O infrastructure. An Processor Jumper Kit will be need to be installed in CPU1 for connectivity

to the IO-55 chip and it's associated PCIe and SATA interconnects. With the Processor Jump processor installed, only memory slots on CPU0 can be accessed with a maximum of 64GB using 8GB DIMMs. The reason memory cannot be accesses off of CPU1 is there is no memory controller on the Processor Jumper Kit.

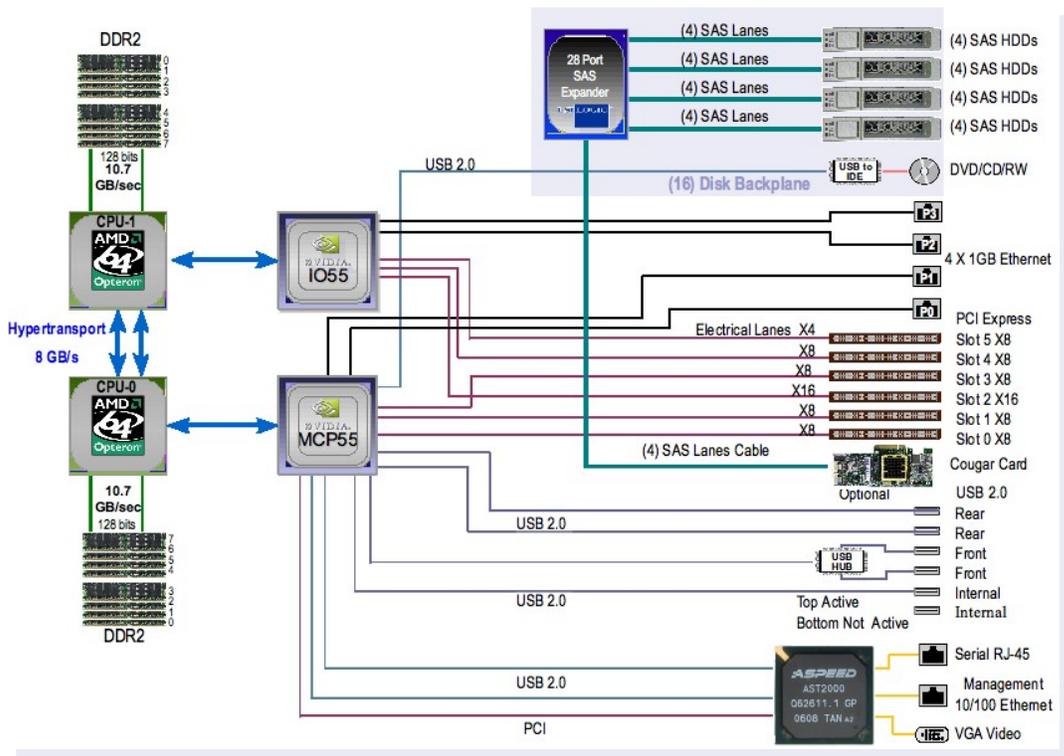
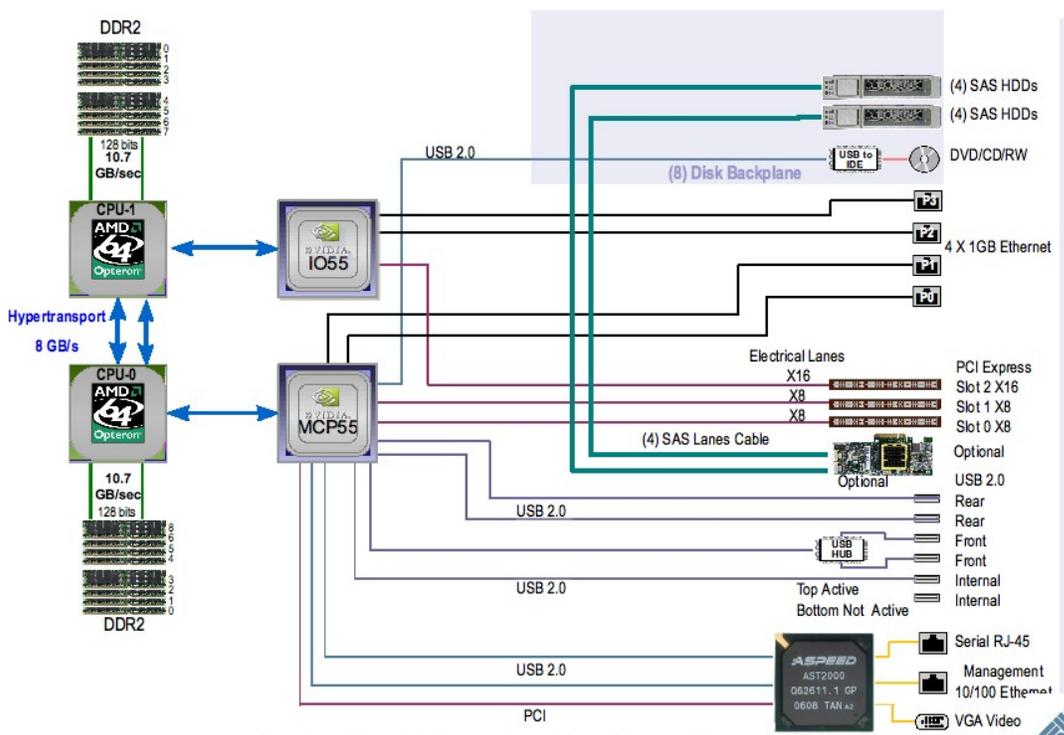


Figure 4. Sun Fire X4240 Server Block Diagram



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Figure 5. Sun Fire X4140 Server Block Diagram

Reliability, Availability, and Serviceability (RAS)

Reliability

- Software RAID 0, 1 with SATA on-board controller.
- 8-port SAS host bus adapter supports RAID 0, 1, 0+1.
- 8-port SAS SRL RAID host bus adapter has 256MB of DDR2 memory and battery-backed write cache for 72 hour backup, in addition to supporting RAID 0, 1, 10, 1E, 5, 50, 5EE, 6, 60.
- ECC memory with ChipKill supported.

Availability

- High CPU density available with quad core combined with the small form factor of the Sun Fire X4140 and X4240 servers allow redundant deployment in a compact space to increase overall service availability.
- Redundant hot-swappable power supplies and fan modules allow for system service without downtime.
- Built-in quad Gigabit Ethernet ports provide redundancy.

Serviceability

- Front-accessible, hot-swappable disk drives.
- Front-accessible DVD±RW drive can be easily removed without opening the top cover of the chassis.
- Fan modules can be replaced without power down or complete removal of system from rack.
- Identical Indicator LEDs on the front and back of the chassis allow problems to be detected and isolated easily.
- A fault indicator LED stays on following a fault even if the system has been powered off (but still connected to the power source).
- Diagnostic LEDs are included on the motherboard.
- Front power switch (toggles between standby and power-on) provides easy access.
- Rack mounting slide rails for easy installation and removal of a unit are available as x-options.
- Single-step power supply removal: Power-supplies can be serviced without sliding the servers out of the rack.

Operating System

Sun Fire X4140 and X4240 Server Operating Systems

A world-class performance platform, the 64-bit Sun Fire X4140 and X4240 servers allow customers to run the operating system that best fits their needs. With a multitude of operating systems fully supported and/or certified, the Sun Fire X4140 and X4240 servers provide customers with more choices, within the same hardware architecture, than competing servers in its class.

Operating Systems		Dual Core Support	Quad Core Support	Factory Installed	Sold by Sun	Supported by Sun
Solaris 10 Update 4	64-bit	Yes	Yes	Yes	Yes	Yes
VMware ESX 3.0.2	64-bit	Yes	Yes	No	Yes	Yes
VMware ESX 3.5	64-bit	Yes	Yes	No	Yes	Yes
Windows Server 2003, SP2	32-bit/ 64-bit	Yes	Yes	No	No ²	Yes ³
Windows Server 2008	32-bit/ 64-bit	Yes	Yes	No	No ²	Yes ³
Red Hat Enterprise Linux 4, Update 6	32-bit/ 64-bit	Yes	Yes	No ¹	Yes	Yes
Red Hat Enterprise Linux 5, Update 2	32-bit/ 64-bit	Yes	Yes	No ¹	Yes	Yes
SUSE Linux Enterprise Server 10, SP2	64-bit	Yes	Yes	No ¹	Yes	Yes

1. Red Hat Enterprise Linux 4, SUSE Linux Enterprise Server 10, and Solaris 10 can be ordered from Sun. Support contracts are also available.

2. "Designed for Windows" designation as a certified platform.

3. Sun System Service Plans for Windows Server 2003 & 2008 are available from Sun.

Latest OS Information

For more information on the latest OS support for the Sun Fire X4140 Server, see <http://www.sun.com/servers/entry/X4140/os.html>

For more information on the latest OS support for the Sun Fire X4240 Server, see <http://www.sun.com/servers/entry/X4240/os.html>

Solaris 10 OS – The most advanced operating system on the planet

Key Messaging

In a class by itself, the Solaris Operating System is a significant leap forward from the Solaris 9 OS, establishing it in a class by itself when compared to competing operating systems. It offers many innovative technologies that fundamentally change the equation for organizations needing to reduce costs, reduce complexity, and minimize risk. The new features in the Solaris 10 OS bring mainframe-quality software to even the smallest single-processor servers and provide a stepping stone into tomorrow's data center.

For CIOs and Line of Business Managers who are dissatisfied with high infrastructure costs and security vulnerabilities in their workgroup server environments, the Solaris 10 OS on x64 brings a proven, enterprise-class OS at 1/11th the cost of Microsoft and 20-60% off the cost of Red Hat over three years. The Solaris 10 OS is designed to help organizations optimize system utilization levels, deliver extreme performance and provide virtually unparalleled security – all with relentless, around-the-clock availability.

- **Optimal Utilization** of computing systems is a priority for IT managers where server consolidation is a common approach and is improved in the Solaris environment by:
 - **Solaris Containers** enable as much a 4x increase in system utilization by helping to efficiently and securely support thousands of applications per system. Highly configurable, Solaris Containers can dynamically adjust system resources to business goals within and across Containers with the added benefit of isolating applications from each other and from system faults, so a problem in one application cannot affect the system or other applications.
 - **Solaris ZFS File System** (zetabyte file system) integrates devices, storage, and file systems structures into a single structure, simplifying file system management and providing a reliable and flexible solution that can help reduce cost, complexity, and risk.
- **Extreme Performance** is delivered with optimization for the latest UltraSPARC(R), AMD Opteron and Intel Xeon processors as well as:
 - **Dynamic Tracing (DTrace)**, designed for use live use in production situations, is a powerful tool for analyzing and diagnosing elusive problems and increasing system performance. It is non-invasive and has no system overhead when not in use, but with its pervasive coverage, root cause for intermittent system problems can be found quickly and performance gains in real-world applications have been optimized to run as much as 30 times faster.
 - **A Unified TCP/IP Stack** where the TCP and IP layers are partially merged, delivers a 30- to 50-percent improvement in network throughput with a 10- to 15-percent lower CPU load than previous Solaris OS versions.
- **Unparalleled Security** continues to be a focus as Solaris 10 OS adds significant features that can help defend against attacks by preventing unauthorized access to data and applications with:
 - **Process Rights Management** replaces the traditional UNIX(R) platform's "all or nothing" root mechanism with a fine-grained set of privileges for control over the resources and objects that processes can manipulate.
 - **Solaris Cryptographic Framework** library secures data flows by providing a set of programming interfaces for application-level and kernel-level cryptographic operations, allowing developers to utilize highly optimized cryptographic algorithms and providing transparent access to the same hardware encryption acceleration devices used by the operating system kernel.
- **Relentless Availability** – Expected in a Solaris OS environment, predictive self-healing technologies

provide new levels of application availability with:

- **Solaris Fault Manager** proactively handles system problems by removing components before failure. CPU, memory and I/O problems are diagnosed and corrected – before they can cause downtime.
- **Solaris Service Manager** manages application software running on the system, monitoring applications and restarting entire application trees if necessary.

Compatibility

- **Same OS—Low-End to High-End Systems.** The Solaris OS is built from a single source base and optimized to run on multiple platforms, providing customers with the same best of breed OS on SPARC, Opteron AMD64 64-bit, and x86 32-bit processor-platforms.
- **Solaris Application Guarantee Program.** This program guarantees binary compatibility between versions of Solaris OS on each platform and has been extended to include source code compatibility as well.
- **Linux Compatibility.** With unwavering support for interoperability and open standards, and a commitment to delivering customer choice, Sun has made Linux interoperability a high priority.
 - **Six Key Linux Libraries included in Solaris OS are:** Glib, Gtk+, JPEG, PNG, TIFF, and XML2
 - **Hundreds of Linux applications and libraries** are provided with the Solaris OS including the GNOME desktop.
 - **Linux Compatibility Assurance Toolkit (LinCat)** helps to simplify the process of porting Linux applications to run natively on the Solaris OS.

Pricing/Support

Solaris 10 OS is free to end-users upon registration and is available via free download. Media kits are available for purchase. Support is available at an additional charge.

Linux - Complementing Sun's Solaris OS Strategy

Key Messaging

Sun, the #1 systems provider, brings a Comprehensive Systems Approach to Linux--providing customers with a full Linux solution of hardware, OS choice with Sun's value added Sun Java(TM) Enterprise System, Sun Java Desktop System, tools, and services. Sun enhances standard Linux distributions with an integrated systems offering that includes fully supported OS, x64 rack-mount servers, and the Sun Java Enterprise System that simplifies platform support for customers and partners. Sun brings added value to the system offering with faster, low-cost hardware which is the primary concern for most Linux customers seeking cost-sensitive server alternatives.

- **Choice and Platform Neutrality – “The right tool for the right job”**

Customers can choose the OS platform to best meet their server to desktop computing needs.

- With the Sun Java Enterprise System for Linux, customers can standardize on a set of Java technology-based network services across their heterogeneous infrastructure of volume x86 systems based on the Solaris OS or standard Linux to large SMP systems from Sun on x64 or SPARC processor based systems.
- A growing line of Sun and third-party Intel Xeon and AMD Opteron processor-based servers allows Linux customers to scale to 64-bit computing

- **Systems Approach - Simplified Operations - One-Stop Linux Support**

Sun brings a complete systems approach to Linux: a value-added web services stack for the entire system, hardware, OS, tools, and applications backed by Sun's global support infrastructure.

- Delivering Linux--from leading vendors (Red Hat and SUSE Linux)--with front-line support and training worldwide from Sun on x64 (Xeon and Opteron processors) hardware platforms from Sun and third parties.
- Selling the simplest and most comprehensive middleware & web services offering with Sun Java Enterprise System.

- **Optimized Java Technology – Java Everywhere – Broaden the reach of Java technology investments**

- Sun is focused on maximizing Java technology performance benefits and stretching customers' application investments by creating a common application engine.
- Linux and Java platform integration - Alliances with Red Hat and SUSE Linux to distribute Sun's latest Java Virtual Machine (JVM(TM) machine) included as part of the OS distributions. (The JVM software technology allows the Java 2 Software to host applications on any computer or operating system without rewrite or recompile).

Pricing/Support

Sun resells subscriptions for Red Hat Enterprise Linux (RHEL) & SUSE Linux Enterprise Server/Desktop (SLES/D). Support includes access to either Red Hat Network or Novell Customer Center. During the support period, if any new versions of SLES/D or RHEL for Intel Xeon are made available, users with current support entitlements have access to those new versions from the maintenance sites of Red Hat and SUSE. Please see the "Services" section for more details.

Windows OS

The Sun Fire X4140 and X4240 Servers are certified to run the Microsoft Windows Server 2003 Enterprise and Standard Edition operating systems. Sun System Service Plans will be available from Sun Microsystems at an additional charge. Please see the "Services" section for more details.

VMware OS

The Sun Fire X4140 and X4240 Server is certified to run VMware ESX 3.0.2 operating system. Sun System Service Plans will be available from Sun Microsystems at an additional charge. Please see the "Services" section for more details.

The Sun Fire X4140 and X4240 servers are ideal for running the latest virtualization technologies including Solaris Containers, VMware ESX, & Microsoft Virtual Server. The combination of Sun Fire X4140 and X4240 servers & VMware virtualization software enable:

- Server consolidation for greater energy & space efficiencies
- Advanced business continuity for critical applications
- Streamlined multi-OS software development on high-performance Sun Fire servers
- Standardized enterprise desktop environments
- Migration of legacy OSs & applications to new hardware for increased reliability

Installation Data

Sun Fire X4140 and X4240 Server Specification

Processor Options	
Processor	One or two AMD Opteron Processors; <ul style="list-style-type: none"> • Dual-Core AMD Opteron 2218 HE (2.6GHz/1MB, 55W) • Dual-Core AMD Opteron 2222 (3.0GHz/1MB, 75W) • Dual-Core AMD Opteron 2224 SE (3.2GHz/1MB, 105W) – Only on Sun Fire X4240 • Quad-Core AMD Opteron 2356 (2.3GHz/512KB L2, 2MB L3, 75W) • Quad-Core AMD Opteron 2360 SE (2.5GHz/512KB L2, 2MB L3, 105W) – Only on Sun Fire X4240 • Enhanced Quad-Core AMD Opteron 2380 (2.5GHz/512KB L2, 6MB L3, 75W) • Enhanced Quad-Core AMD Opteron 2384 (2.7GHz/512KB L2, 6MB L3, 75W) • Six-Core AMD Opteron 2427 (2.2GHz, 3MB L2, 6MB L3, 75W Six Core, 2.2GHz NB) • Six-Core AMD Opteron 2431 (2.4GHz, 3MB L2, 6MB L3, 75W Six Core, 2.2GHz NB) • Six-Core AMD Opteron 2435 (2.6GHz, 3MB L2, 6MB L3, 75W Six Core, 2.2GHz NB)

Main Memory	
16 DIMM slots total for PC2-5300 667 MHz ECC DDR2 DIMMs	
System configurations from 4GB (2x 2GB) to 128GB (16x 8GB) of memory	

Standard/Integrated Interfaces		
Network		Four 10/100/1000Base-T Ethernet ports
Network management		One dedicated 10/100Base-T Ethernet port
Serial		One TIA/EIA-232-F asynchronous RJ45 Port
SAS		Four channel SAS interface, internal access only.
USB		Two USB 2.0 ports (Front), Two USB 2.0 ports (Rear), One USB 2.0 port (Internal)
Expansion bus	Sun Fire X4140	Three internal MD2 Low Profile PCI-Express slots (1x 16-lane, 2x 8-lane)
	Sun Fire X4240	Six internal MD2 Low Profile PCI-Express slots (1x 16-lane, 4x 8-lane, 1x 4-lane)

Mass Storage and Media		
Hot-swappable, 2.5" Internal disk – Sun Fire X4140		Up to eight SAS disk drives with add-on SAS Host Bus Adapter Up to four SATA solid state drives
Hot-swappable, 2.5" Internal disk – Sun Fire X4240		Up to sixteen SAS disk drives with add-on SAS Host Bus Adapter Up to eight SATA solid state drives
Removable Media		One DVD±RW drive
External disk	Sun Fire X4140	See http://www.sun.com/servers/entry/X4240/storage.html
	Sun Fire X4240	See http://www.sun.com/servers/entry/X4240/storage.html



Software

Operating environment	Solaris 10 Update 4 Red Hat Enterprise Linux 4 Update 5, 32-bit/64-bit Red Hat Enterprise Linux 5, 64-bit SUSE Linux 10 Professional 64-bit Windows Server 2003, Enterprise Edition, 32-bit/64-bit Windows Server 2003, Standard Edition, 32-bit/64-bit Windows Server 2008 VMware ESX 3.0.2 VMware ESX 3.5 See http://www.sun.com/servers/entry/X4140/OS.html See http://www.sun.com/servers/entry/X4240/OS.html
Sun Java Enterprise System 5	Solaris 10 on x64 Operating System Standard Linux distributions
Languages	C/C++, FORTRAN, Java programming language, all other standard Sun-supported languages
Networking Software	ONC™, ONC+(TM), NFS(TM), WebNFS(TM), TCP/IP, SunLink™, OSI, MHS, IPX™/SPX, SMB technologies, and XML
Management	CLI (in-band and out-of-band), IPMI 2.0 (in-band and out-of-band), SNMP (out-of-band only)

Power Supplies

Dual redundant, hot -swappable power supply

UL Maximum (AC Input)	Sun Fire X4140	8.2 Amps RMS at 100 VAC
	Sun Fire X4240	~12 Amps RMS at 100 VAC
Power Supply Rating (DC output)	Sun Fire X4140	658 W (A221)
	Sun Fire X4240	1050 W (A217)
Earth Leakage	658 W (A221)	0.8mA max at 264V
	1050 W (A217)	0.8mA max at 264V
Inrush Current	658 W (A221)	<25A peak excluding X-Caps
	1050 W (A217)	<25A peak excluding X-Caps

Environment – Sun Fire X4140

AC power	100-200 V/200-240 V AC (50/60 Hz)
Operating temperature/humidity (single, non-rack system)	5 °C to 35 °C (41 °F to 95 °F), 10% to 90% relative humidity, 27 °C max wet bulb non-condensing
Non-operating temperature/humidity (single, non-rack system)	-40 °C to 65 °C (-40 °F to 149 °F), up to 93% relative humidity, non-condensing
Altitude (operating) (single, non-rack system)	Up to 3,000 m, maximum ambient temperature is derated by 1 °C per 300 m above 900 m
Altitude (non-operating) (single, non-rack system)	Up to 12,000 m

Environment – Sun Fire X4240

Sun Fire X4140 & X4240 Server
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AC power	100-200 V/200-240 V AC (50/60 Hz)
Operating temperature/humidity (single, non-rack system)	5 °C to 35 °C (41 °F to 95 °F), 10% to 90% relative humidity, 38 °C max wet bulb non-condensing
Non-operating temperature/humidity (single, non-rack system)	-40 °C to 65 °C (-40 °F to 149°F), up to 93% relative humidity, non-condensing
Altitude (operating) (single, non-rack system)	Up to 3,000 m, maximum ambient temperature is derated by 1 °C per 300 m above 900 m
Altitude (non-operating) (single, non-rack system)	Up to 12,000 m

Acoustic Noise Emissions – Sun Fire X4140

Declared noise emissions in accordance with ISO 9296, A-weighted, operating and idling:

LwAd (1B = 10dB) at max ambient	6.6 B
LpAm bystander at max ambient	51 dB

Acoustic Noise Emissions – Sun Fire X4240

Declared noise emissions in accordance with ISO 9296, A-weighted, operating and idling:

LwAd (1B = 10dB) at max ambient	6.8 B
LpAm bystander at max ambient	53 dB

Regulations

Meets or exceeds the following requirements:

Safety	IEC 60950, UL/CSA 60950, EN60950, CB Scheme with all country differences
RFI/EMI	FCC CFR 47 Part 15 Class A, EN 55022 Class A, EN 61000-3-2, EN 61000-3-3, EN 300-386
Immunity	EN55024, EN300-386
Certifications: Safety EMC	UL/cUL, UL DEMKO, CE, BSMI, CCC, GOST-R, S-Mark CE, FCC, VCCI, ICES, C-Tick, MIC, CCC, GOST-R, BSMI Class A
Other	Complies with WEEE Directive (2002/96/EC) and RoHS Directive (2002/95/EC)

Dimensions and Weight – Sun Fire X4140

Chassis	
Height	44 mm (1.746 in.)
Width	426 mm (16.75 in.)
Depth	443.9 mm (17.47 in.)
Minimum Weight	714 mm (28.125 in.)
Maximum Weight	16.55 kg (36.49 lb.) minimum without rack mounting slide rail kit 18.55 kg (40.90 lb.) maximum assuming PCIe card weighs 0.12 kg (0.25 lb) each and without rack mounting slide rail kit

Dimensions and Weight – Sun Fire X4240

Chassis	
Height	88 mm (3.49 in.)
Width	426 mm (16.75 in.)
Depth	711.25 mm (28 in.)
Minimum Weight	20.65 kg (45.53 lb.) minimum without rack mounting slide rail kit
Maximum Weight	25.75 kg (56.77 lb.) maximum assuming PCIe card weighs 0.12 kg (0.25 lb) each and without rack mounting slide rail kit

System Requirements, Configuration and Management

System Requirements

The Sun Fire X4140 and X4240 servers run the Solaris 10, standard Linux distributions, Microsoft Windows Server 2003 and 2008, as well as VMware operating systems. For a list of supported OS versions, please refer to section "Sun Fire X4140 and X4240 Server Operating Systems Support".

System Configuration

The Sun Fire X4140 servers have the following standard components:

- One or two Dual-Core, Quad-Core, enhanced Quad-Core or Six-Core AMD Opteron processors
- Sixteen memory slots supporting PC2-5300 667 MHz ECC DDR2 DIMMs - Up to 128GB of main memory with 8GB DIMMs
- Eight 2.5-inch SAS disk drives (with SAS Host Bus Adapter)
- Four 2.5-inch SATA solid state drives
- DVD±RW drive (optional)
- Four 10/100/1000Base-T Ethernet ports
- Five USB 2.0 ports: two front, two rear, one internal
- Three MD2 Low Profile PCIe slots (1x 16-lane, 2x 8-lane)
- Redundant hot-swappable fan modules
- 658 Watt AC power supply (hot-swappable in redundant configuration)
- Integrated Lights Out Manager (ILOM) with dedicated 10/100Base-T Ethernet port
- 19-inch rack-mount kit (optional)
- Cable management arm (optional)

The Sun Fire X4240 servers have the following standard components:

- One or two Dual-Core, Quad-Core, enhanced Quad-Core or Six-Core AMD Opteron processors
- Sixteen memory slots supporting PC2-5300 667 MHz ECC DDR2 DIMMs - Up to 128GB of main memory with 8GB DIMMs
- Sixteen 2.5-inch SAS disk drives (with SAS Host Bus Adapter)
- Eight 2.5-inch SATA solid state drives
- DVD±RW drive (optional)
- Four 10/100/1000Base-T Ethernet ports
- Five USB 2.0 ports: two front, two rear, one internal
- Six MD2 Low Profile PCIe slots (1x 16-lane, 4x 8-lane, 1x 4-lane)
- Redundant hot-swappable fan modules
- 1050 Watt AC power supply (hot-swappable in redundant configuration)
- Integrated Lights Out Manager (ILOM) with dedicated 10/100Base-T Ethernet port
- 19-inch rack-mount kit (optional)

- Cable management arm (optional)

Licensing/Usage

The Sun Fire X4140 and X4240 servers can be ordered with the Solaris 10 and Sun Java Enterprise Server pre-installed. Solaris 10 RTU is given when the system is registered with Sun.

MTBF Information

The MTBF (Mean Time Between Failure) for the Sun Fire X4140 and X4240 servers vary depending upon configuration. For more specific information, please refer to MTBF Tool at <http://ram-server.eng>

BTU Information

BTUs/hr for the Sun Fire X4140 and X4240 servers will vary depending upon configuration.

Min BTU:

744 BTUs/hr at idle for Sun Fire X4140 with one Dual-Core AMD Opteron 2218 HE processor (2.6GHz/1MB, 68W), 2x 1GB DDR2-667 MHz ECC DIMM, No DVD±RW, two 73GB 10K RPM 2.5" SAS drive, 8-port internal SAS Host Bus Adapter, one PSU.

Max BTU:

931 BTUs/hr at max stress for Sun Fire X4140 with two Dual-Core AMD Opteron 2224 SE processors (3.2GHz/1MB, 120W), 16x 4GB DDR2-667 MHz ECC DIMM, DVD±RW drive, eight 146GB 10K RPM 2.5" SAS drive, 8-port internal SAS Host Bus Adapter, two PSUs.

Min BTU:

943 BTUs/hr at idle for Sun Fire X4240 with one Dual-Core AMD Opteron 2218 HE processor (2.6GHz/1MB, 68W), 2x 1GB DDR2-667 MHz ECC DIMM, No DVD±RW, two 73GB 10K RPM 2.5" SAS drive, 8-port internal SAS Host Bus Adapter, one PSU.

Max BTU:

1528 BTUs/hr at max stress for Sun Fire X4240 with two Dual-Core AMD Opteron 2224 SE processors (3.2GHz/1MB, 120W), 16x 4GB DDR2-667 MHz ECC DIMM, DVD±RW drive, sixteen 146GB 10K RPM 2.5" SAS drive, 8-port internal SAS Host Bus Adapter, two PSUs.

Power Consumption Information

Please refer to Power Calculator at <http://www.sun.com/servers/x64/X4140/calc/index.jsp>

Please refer to Power Calculator at <http://www.sun.com/servers/x64/X4240/calc/index.jsp>

Rack Mounting

The Sun Fire X4140 server is 1.746 inches (44 mm) high, 16.75 inches (426 mm) wide and 28.125 inches (714 mm) deep. The Sun Fire X4240 server is 3.49 inches (88 mm) high, 16.75 inches (426 mm) wide and 28.125 inches (714 mm) deep. The air-flow direction is from front to back. I/O ports are located on the front and rear panels. Informational LEDs are located on the front and rear panels. Access to the power connection is at the rear of the chassis.

Every current Sun Rack is supported for in-field installation and for shipment pre-installed by Sun(SM) Customer Ready Program. Field installation in the Sun Fire Hardware Expansion Cabinet, the Sun StorEdge(TM) Array Cabinet as well as 3rd party ANSI/EIA 310-D-1992 or IEC 60927 compliant cabinets is supported with the optional Rack Mounting Slide Rail Kit (X6326A) and optional Cable Management Arm (X6324A).

The optional rack mounting slide rail kit is a 4-point mounted slide rail kit and is designed to enable Sun Fire X4140 and X4240 servers to be racked in the Sun Rack 938, the Sun Rack 1038, the Sun Rack 1042 and 3rd party ANSI/EIA 310-D-1992 or IEC 60927 compliant racks. No other kits will be available to allow 2 point, front-mount, nor mid-mount configuration. The slide kit will include hardware that enables mounting to any of the following types of rack rails:

- 6 mm threaded holes
- #10-32 threaded holes
- #10 clearance holes
- square unthreaded holes per EIA and IEC standards listed above

Rack requirements to support installation are:

- rack horizontal opening and unit vertical pitch conforming to ANSI/EIA 310-D-1992 and/or IEC 60927
- four-post structure (i.e. mounting at both front and rear)
- distance between front and rear mounting planes between 610mm and 915mm (24 to 36 inches)
- clearance depth (to front cabinet door) in front of front rack mounting plane at least 25.4mm (1 inch)
- clearance depth (to rear cabinet door) behind front rack mounting plane at least 800mm (31.5inches), or 700mm (27.5inches) without cable management arm
- clearance width (between structural supports, cable troughs, etc.) between front and rear mounting planes at least 456mm (18 inches)

Please note that not all 3rd party racks meet these parameters and are not compatible with these slide rail kits. Also, some third-party rack vendors do not support a completely filled rack with this type of server, due to the amount of power required.

The Tool-less Rack Mounting Rail Kit cannot be used to mount servers prior to shipment.

Rack Density

Sun Fire X4140 and X4240 server rack density will vary widely based on systems installed, power distribution installation (in-cabinet, external), power source (single-phase, three-phase) and whether redundant power is required.

Up to 29 Sun Fire X4140 can be mounted in the Sun Rack 938 or the Sun Rack 1038.

Up to 29 Sun Fire X4140 can be mounted in the Sun Rack 1042 using a 60A 3 phase MPS.
Up to 18 Sun Fire X4240 can be mounted in the Sun Rack 938 or the Sun Rack 1038.
Up to 18 Sun Fire X4240 can be mounted in the Sun Rack 1042 using a 60A 3 phase MPS.

Sun Cluster Support

The support of Sun Fire X4140 and X4240 servers by Sun Cluster will be announced at a later date.
For the latest information, please go to: <http://suncluster.sfbay.sun.com>

Origin Statement

The Sun Fire X4140 server has components from various countries of origin. The motherboard and various board assemblies are manufactured in China. The power supply is from Thailand. The chassis is manufactured in Guadalajara, Mexico. The commodity parts such as disk drivers, memory, and CPU come from a variety of countries. Final system assembly is performed in Aachen, Germany or Fremont, California, USA.

The Sun Fire X4240 and X4440 servers have components from various countries of origin. The motherboard and various board assemblies are manufactured in Shanghai, China. The power supply is from the Dominican Republic. The chassis is manufactured in Guadalajara, Mexico. The commodity parts such as disk drivers, memory, and CPU come from a variety of countries. Final system assembly is performed in Aachen, Germany or Fremont, California, USA.

Hardware Global compliance

Hardware Global compliance for this product complies with the guidelines as specified for hardware at: <http://global.eng/compliance/i18nl10nbigrules.html>

The localized documents will be located at: <http://www.sun.com/products-n-solutions/hardware/docs/Servers/>

Ordering Information

Sun Fire X4140 and X4240 Server Standard Configurations

Part Number	Description	Availability
B12-FG1-BB-2G-JL8	Sun Fire X4140 x64 Server: 1x AMD Opteron Model 2218 HE (2.6GHz/1MB) dual core processor, 2x 1GB DDR2-667 memory, No HDD, No DVD±RW, 1x PSU, Service quad core processor, 4x 10/100/1000 Ethernet ports, 4x USB 2.0 ports, 1x 16-lane PCIe slot, 2x 8-lane PCIe slots, no Power Cord, order Geo-specific X-option. Standard Configuration. RoHS-5.	EOL 08/05/08 LOD 11/07/08 LSD 02/06/09
B12-FQ2-DB-8G-RD6	Sun Fire X4140 x64 Server: 2x AMD Opteron Model 2222 (3.0GHz/1MB) dual core processor, 4x 2GB DDR2-667 memory, 4x 146GB HDD, HBA RAID Card, DVD±RW, 2x PSU, Service quad core processor, 4x 10/100/1000 Ethernet ports, 4x USB 2.0 ports, 1x 16-lane PCIe slot, 2x 8-lane PCIe slots, no Power Cord, order Geo-specific X-option. Solaris 10 and Java ES Pre-Install. Standard Configuration. RoHS-5.	EOL 08/05/08 LOD 11/07/08 LSD 02/06/09
B12-FQ1-DB-2G-JL8	Sun Fire X4140 x64 Server: 1x AMD Opteron Model 2222 (3.0GHz/1MB) dual core processor, 2x 1GB DDR2-667 memory, No HDD, No DVD±RW, 2x PSU, Service quad core processor, 4x 10/100/1000 Ethernet ports, 4x USB 2.0 ports, 1x 16-lane PCIe slot, 2x 8-lane PCIe slots, no Power Cord, order Geo-specific X-option. Standard Configuration. RoHS-5.	EOL 08/05/08 LOD 11/07/08 LSD 02/06/09
B12-FS2-DC-4G-JL8	Sun Fire X4140 x64 Server: 2x AMD Opteron Model 2356 (2.3GHz/512KB) quad core processor, 4x 1GB DDR2-667 memory, No HDD, No DVD±RW, 2x PSU, Service quad core processor, 4x 10/100/1000 Ethernet ports, 4x USB 2.0 ports, 1x 16-lane PCIe slot, 2x 8-lane PCIe slots, no Power Cord, order Geo-specific X-option. Standard Configuration. RoHS-5.	EOL 08/05/08 LOD 11/07/08 LSD 02/06/09
B12-FS2-DC-8G-RD6	Sun Fire X4140 x64 Server: 2x AMD Opteron Model 2356 (2.3GHz/512KB) quad core processor, 4x 2GB DDR2-667 memory, 4x 146GB HDD, HBA RAID Card, DVD±RW, 2x PSU, Service quad core processor, 4x 10/100/1000 Ethernet ports, 4x USB 2.0 ports, 1x 16-lane PCIe slot, 2x 8-lane PCIe slots, no Power Cord, order Geo-specific X-option. Solaris 10 and Java ES Pre-Install. Standard Configuration. RoHS-5.	EOL 08/05/08 LOD 11/07/08 LSD 02/06/09
B12-FS1-DC-4G-JL8	Sun Fire X4140 x64 Server: 1x AMD Opteron Model 2356 (2.3GHz/512KB) quad core processor, 2x 2GB DDR2-667 memory, No HDD, No DVD±RW, 2x PSU, Service quad core processor, 4x 10/100/1000 Ethernet ports, 4x USB 2.0 ports, 1x 16-lane PCIe slot, 2x 8-lane PCIe slots, no Power Cord, order Geo-specific X-option. Standard Configuration. RoHS-5.	EOL 08/05/08 LOD 11/07/08 LSD 02/06/09
B12-FU1-BC-2G-JL8	Sun Fire X4140 x64 Server: 1x AMD Opteron Model 2347 HE (1.9GHz/512KB) quad core processor, 2x 1GB DDR2-667 memory, No HDD, No DVD±RW, 1x PSU, HT Bridge Card, Service processor, 4x 10/100/1000 Ethernet ports, 5x USB 2.0 ports, 1x 16-lane PCIe slot, 2x 8-lane PCIe slots, no Power Cord, order Geo-specific X-option. Standard Configuration. RoHS-5.	EOL 08/05/08 LOD 11/07/08 LSD 02/06/09
B12-FQ2-DB-8C-RD6	Sun Fire X4140 x64 Server: 2x AMD Opteron Model 2222 (3.0GHz/1MB) dual core processor, 4x 2GB DDR2-667 single rank memory, 4x 146GB HDD, HBA RAID Card, DVD±RW, 2x PSU, Service processor, 4x 10/100/1000 Ethernet ports, 5x USB 2.0 ports, 1x 16-lane PCIe slot, 2x 8-lane PCIe slots, no Power Cord, order Geo-specific X-option. Solaris 10 and Java ES Pre-Install. Standard Configuration. RoHS-5.	EOL 12/09/08 LOD 03/13/09 LSD 06/12/09
B12-FU1-BC-4C-JL8	Sun Fire X4140 x64 Server: 1x AMD Opteron Model 2347 HE (1.9GHz/512KB) quad core processor, 2x 2GB DDR2-667 single rank memory, No HDD, No DVD±RW, 1x PSU, HT Bridge Card, Service processor, 4x 10/100/1000 Ethernet ports, 5x USB 2.0 ports, 1x 16-lane PCIe slot, 2x 8-lane PCIe slots, no Power Cord, order Geo-specific X-option. Standard Configuration. RoHS-5.	EOL 03/10/2009 LOD 06/12/09 LSD 09/11/09
B12-FS1-DC-4C-JL8	Sun Fire X4140 x64 Server: 1x AMD Opteron Model 2356 (2.3GHz/512KB) quad	EOL 03/10/2009

Part Number	Description	Availability
	core processor, 2x 2GB DDR2-667 single rank memory, No HDD, No DVD±RW, 1x PSU, HT Bridge Card, Service processor, 4x 10/100/1000 Ethernet ports, 5x USB 2.0 ports, 1x 16-lane PCIe slot, 2x 8-lane PCIe slots, no Power Cord, order Geo-specific X-option. Standard Configuration. RoHS-5.	LOD 06/12/09 LSD 09/11/09
B12-FU2-BC-8C-RD6	Sun Fire X4140 x64 Server: 2x AMD Opteron Model 2347 HE (1.9GHz/512KB) quad core processor, 4x 2GB DDR2-667 single rank memory, 4x 146GB HDD, HBA RAID Card, DVD±RW, 2x PSU, HT Bridge Card, Service processor, 4x 10/100/1000 Ethernet ports, 5x USB 2.0 ports, 1x 16-lane PCIe slot, 2x 8-lane PCIe slots, no Power Cord, order Geo-specific X-option. Solaris 10 and Java ES Pre-Install. Standard Configuration. RoHS-5.	EOL 03/10/2009 LOD 06/12/09 LSD 09/11/09
B12-FS2-DC-8C-RD6	Sun Fire X4140 x64 Server: 2x AMD Opteron Model 2356 (2.3GHz/512KB) quad core processor, 4x 2GB DDR2-667 single rank memory, 4x 146GB HDD, HBA RAID Card, DVD±RW, 2x PSU, HT Bridge Card, Service processor, 4x 10/100/1000 Ethernet ports, 5x USB 2.0 ports, 1x 16-lane PCIe slot, 2x 8-lane PCIe slots, no Power Cord, order Geo-specific X-option. Solaris 10 and Java ES Pre-Install. Standard Configuration. RoHS-5.	EOL 03/10/2009 LOD 06/12/09 LSD 09/11/09
B12-AW1-DC-4C-JL8	Sun Fire X4140 x64 Server: 1x AMD Opteron Model 2384 (2.7GHz/512KB) quad core processor, 2x 2GB DDR2-667 single rank memory, No HDD, No DVD±RW, 1x PSU, HT Bridge Card, Service processor, 4x 10/100/1000 Ethernet ports, 5x USB 2.0 ports, 1x 16-lane PCIe slot, 2x 8-lane PCIe slots, no Power Cord, order Geo-specific X-option. Standard Configuration. RoHS-5.	EOL 07/21/09 LOD 10/23/09 LSD 01/22/10
B12-AT2-DC-8C-RD6	Sun Fire X4140 x64 Server: 2x AMD Opteron Model 2380 (2.5GHz/512KB) quad core processor, 4x 2GB DDR2-667 single rank memory, 4x 146GB HDD, HBA RAID Card, DVD±RW, 2x PSU, HT Bridge Card, Service processor, 4x 10/100/1000 Ethernet ports, 5x USB 2.0 ports, 1x 16-lane PCIe slot, 2x 8-lane PCIe slots, no Power Cord, order Geo-specific X-option. Solaris 10 Pre-Install. Standard Configuration. RoHS-5.	EOL 07/21/09 LOD 10/23/09 LSD 01/22/10
B12-AW2-DC-8C-RD6	Sun Fire X4140 x64 Server: 2x AMD Opteron Model 2384 (2.7GHz/512KB) quad core processor, 4x 2GB DDR2-667 single rank memory, 4x 146GB HDD, HBA RAID Card, DVD±RW, 2x PSU, HT Bridge Card, Service processor, 4x 10/100/1000 Ethernet ports, 5x USB 2.0 ports, 1x 16-lane PCIe slot, 2x 8-lane PCIe slots, no Power Cord, order Geo-specific X-option. Solaris 10 Pre-Install. Standard Configuration. RoHS-5.	EOL 07/21/09 LOD 10/23/09 LSD 01/22/10

Part Number	Description	Availability
B14-FG1-BB-2G-JL8	Sun Fire X4240 x64 Server: 1x AMD Opteron Model 2218 HE (2.6GHz/1MB) dual core processor, 2x 1GB DDR2-667 memory, No HDD, No DVD±RW, 1x PSU, Service quad core processor, 4x 10/100/1000 Ethernet ports, 4x USB 2.0 ports, 1x 16-lane PCIe slot, 2x 8-lane PCIe slots, no Power Cord, order Geo-specific X-option. Standard Configuration. RoHS-5.	EOL 08/05/08 LOD 11/07/08 LSD 02/06/09
B14-FQ2-DB-8G-RD6	Sun Fire X4240 x64 Server: 2x AMD Opteron Model 2222 (3.0GHz/1MB) dual core processor, 4x 2GB DDR2-667 memory, 4x 146GB HDD, HBA RAID Card, DVD±RW, 2x PSU, Service quad core processor, 4x 10/100/1000 Ethernet ports, 4x USB 2.0 ports, 1x 16-lane PCIe slot, 2x 8-lane PCIe slots, no Power Cord, order Geo-specific X-option. Solaris 10 and Java ES Pre-Install. Standard Configuration. RoHS-5.	EOL 08/05/08 LOD 11/07/08 LSD 02/06/09
B14-FE2-EB-8G-JL8	Sun Fire X4240 x64 Server: 2x AMD Opteron Model 2224 SE (3.2GHz/1MB) dual core processor, 4x 2GB DDR2-667 memory, No HDD, No DVD±RW, 2x PSU, Service quad core processor, 4x 10/100/1000 Ethernet ports, 4x USB 2.0 ports, 1x 16-lane PCIe slot, 2x 8-lane PCIe slots, no Power Cord, order Geo-specific X-option. Standard Configuration. RoHS-5.	EOL 08/05/08 LOD 11/07/08 LSD 02/06/09
B14-FQ1-DB-2G-JL8	Sun Fire X4240 x64 Server: 1x AMD Opteron Model 2222 (3.0GHz/1MB) dual core processor, 2x 1GB DDR2-667 memory, No HDD, No DVD±RW, 2x PSU, Service quad core processor, 4x 10/100/1000 Ethernet ports, 4x USB 2.0 ports, 1x 16-lane PCIe slot, 2x 8-lane PCIe slots, no Power Cord, order Geo-specific X-option. Standard Configuration. RoHS-5.	EOL 08/05/08 LOD 11/07/08 LSD 02/06/09

Sun Fire X4140 & X4240 Server
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Part Number	Description	Availability
B14-FS2-DC-4G-JL8	Sun Fire X4240 x64 Server: 2x AMD Opteron Model 2356 (2.3GHz/512KB) quad core processor, 4x 1GB DDR2-667 memory, No HDD, No DVD±RW, 2x PSU, Service quad core processor, 4x 10/100/1000 Ethernet ports, 4x USB 2.0 ports, 1x 16-lane PCIe slot, 4x 8-lane PCIe slots, 1x 4-lane PCIe slot, no Power Cord, order Geo-specific X-option. Standard Configuration. RoHS-5.	EOL 08/05/08 LOD 11/07/08 LSD 02/06/09
B14-FS2-DC-8G-RD6	Sun Fire X4240 x64 Server: 2x AMD Opteron Model 2356 (2.3GHz/512KB) quad core processor, 4x 2GB DDR2-667 memory, 4x 146GB HDD, HBA RAID Card, DVD±RW, 2x PSU, Service quad core processor, 4x 10/100/1000 Ethernet ports, 4x USB 2.0 ports, 1x 16-lane PCIe slot, 4x 8-lane PCIe slots, 1x 4-lane PCIe slot, no Power Cord, order Geo-specific X-option. Solaris 10 and Java ES Pre-Install. Standard Configuration. RoHS-5.	EOL 08/05/08 LOD 11/07/08 LSD 02/06/09
B14-FS1-DC-4G-JL8	Sun Fire X4240 x64 Server: 1x AMD Opteron Model 2356 (2.3GHz/512KB) quad core processor, 2x 2GB DDR2-667 memory, No HDD, No DVD±RW, 2x PSU, Service quad core processor, 4x 10/100/1000 Ethernet ports, 4x USB 2.0 ports, 1x 16-lane PCIe slot, 4x 8-lane PCIe slots, 1x 4-lane PCIe slot, no Power Cord, order Geo-specific X-option. Standard Configuration. RoHS-5.	EOL 08/05/08 LOD 11/07/08 LSD 02/06/09
B14-FU1-BC-2G-JL8	Sun Fire X4240 x64 Server: 1x AMD Opteron Model 2347 HE (1.9GHz/512KB) quad core processor, 2x 1GB DDR2-667 memory, No HDD, No DVD±RW, 1x PSU, HT Bridge Card, Service processor, 4x 10/100/1000 Ethernet ports, 5x USB 2.0 ports, 1x 16-lane PCIe slot, 4x 8-lane PCIe slots, 1x 4-lane PCIe slot, no Power Cord, order Geo-specific X-option. Standard Configuration. RoHS-5.	EOL 08/05/08 LOD 11/07/08 LSD 02/06/09
B14-FQ2-DB-8C-RD6	Sun Fire X4240 x64 Server: 2x AMD Opteron Model 2222 (3.0GHz/1MB) dual core processor, 4x 2GB DDR2-667 single rank memory, 4x 146GB HDD, HBA RAID Card, DVD±RW, 2x PSU, Service processor, 4x 10/100/1000 Ethernet ports, 5x USB 2.0 ports, 1x 16-lane PCIe slot, 4x 8-lane PCIe slots, 1x 4-lane PCIe slot, no Power Cord, order Geo-specific X-option. Standard Configuration. RoHS-5.	EOL 12/09/08 LOD 03/13/09 LSD 06/12/09
B14-FU1-BC-4C-JL8	Sun Fire X4240 x64 Server: 1x AMD Opteron Model 2347 HE (1.9GHz/512KB) quad core processor, 2x 2GB DDR2-667 single rank memory, No HDD, No DVD±RW, 1x PSU, HT Bridge Card, Service processor, 4x 10/100/1000 Ethernet ports, 5x USB 2.0 ports, 1x 16-lane PCIe slot, 4x 8-lane PCIe slots, 1x 4-lane PCIe slot, no Power Cord, order Geo-specific X-option. Standard Configuration. RoHS-5.	EOL 03/10/2009 LOD 06/12/09 LSD 09/11/09
B14-FS1-DC-4C-JL8	Sun Fire X4240 x64 Server: 1x AMD Opteron Model 2356 (2.3GHz/512KB) quad core processor, 2x 2GB DDR2-667 single rank memory, No HDD, No DVD±RW, 1x PSU, HT Bridge Card, Service processor, 4x 10/100/1000 Ethernet ports, 5x USB 2.0 ports, 1x 16-lane PCIe slot, 4x 8-lane PCIe slots, 1x 4-lane PCIe slot, no Power Cord, order Geo-specific X-option. Standard Configuration. RoHS-5.	EOL 03/10/2009 LOD 06/12/09 LSD 09/11/09
B14-FU2-BC-8C-RD6	Sun Fire X4240 x64 Server: 2x AMD Opteron Model 2347 HE (1.9GHz/512KB) quad core processor, 4x 2GB DDR2-667 single rank memory, 4x 146GB HDD, HBA RAID Card, DVD±RW, 2x PSU, HT Bridge Card, Service processor, 4x 10/100/1000 Ethernet ports, 5x USB 2.0 ports, 1x 16-lane PCIe slot, 4x 8-lane PCIe slots, 1x 4-lane PCIe slot, no Power Cord, order Geo-specific X-option. Solaris 10 and Java ES Pre-Install. Standard Configuration. RoHS-5.	EOL 03/10/2009 LOD 06/12/09 LSD 09/11/09
B14-FS2-DC-8C-RD6	Sun Fire X4240 x64 Server: 2x AMD Opteron Model 2356 (2.3GHz/512KB) quad core processor, 4x 2GB DDR2-667 single rank memory, 4x 146GB HDD, HBA RAID Card, DVD±RW, 2x PSU, HT Bridge Card, Service processor, 4x 10/100/1000 Ethernet ports, 5x USB 2.0 ports, 1x 16-lane PCIe slot, 4x 8-lane PCIe slots, 1x 4-lane PCIe slot, no Power Cord, order Geo-specific X-option. Solaris 10 and Java ES Pre-Install. Standard Configuration. RoHS-5.	EOL 03/10/2009 LOD 06/12/09 LSD 09/11/09
B14-FT2-EC-8C-JL8	Sun Fire X4240 x64 Server: 2x AMD Opteron Model 2360 SE (2.5GHz/512KB) quad core processor, 4x 2GB DDR2-667 single rank memory, No HDD, No DVD±RW, 2x PSU, HT Bridge Card, Service processor, 4x 10/100/1000 Ethernet ports, 5x USB 2.0 ports, 1x 16-lane PCIe slot, 4x 8-lane PCIe slots, 1x 4-lane PCIe slot, no Power Cord, order Geo-specific X-option. Standard Configuration. RoHS-5.	EOL 12/09/08 LOD 03/13/09 LSD 06/12/09
B14-AT2-DC-8C-RD6	Sun Fire X4240 x64 Server: 2x AMD Opteron Model 2380 (2.5GHz/512KB) quad core processor, 4x 2GB DDR2-667 single rank memory, 4x 146GB HDD, HBA	EOL 07/21/09



Part Number	Description	Availability
	RAID Card, DVD±RW, 2x PSU, HT Bridge Card, Service processor, 4x 10/100/1000 Ethernet ports, 5x USB 2.0 ports, 1x 16-lane PCIe slot, 4x 8-lane PCIe slots, 1x 4-lane PCIe slot, no Power Cord, order Geo-specific X-option. Solaris 10 Pre-Install. Standard Configuration. RoHS-5.	LOD 10/23/09 LSD 01/22/10
B14-AW2-DC-8C-RD6	Sun Fire X4240 x64 Server: 2x AMD Opteron Model 2384 (2.7GHz/512KB) quad core processor, 4x 2GB DDR2-667 single rank memory, 4x 146GB HDD, HBA RAID Card, DVD±RW, 2x PSU, HT Bridge Card, Service processor, 4x 10/100/1000 Ethernet ports, 5x USB 2.0 ports, 1x 16-lane PCIe slot, 4x 8-lane PCIe slots, 1x 4-lane PCIe slot, no Power Cord, order Geo-specific X-option. Solaris 10 Pre-Install. Standard Configuration. RoHS-5.	EOL 07/21/09 LOD 10/23/09 LSD 01/22/10

Sun Fire X4140 and X4240 Server XATO Chassis Options

Part Number	Description	Availability
B12-AA	Sun Fire X4140 Base Chassis with 2x processor sockets, 16x memory slots, 8x 2.5" disk bays, 1x DVD drive bay, 3x PCIe slots, 4x GbE ports, 5 USB 2.0 ports, ILOM, No PSU	Announce 04/15/08 RR 05/22/08
B14-AA	Sun Fire X4240 Base Chassis with 2x processor sockets, 16x memory slots, 16x 2.5" disk bays, 1x DVD drive bay, 6x PCIe slots, 4x GbE ports, 5 USB 2.0 ports, ILOM, No PSU	Announce 05/13/08 RR 05/22/08
B14-AB	Sun Fire X4240 Base Chassis with 2x processor sockets, 16x memory slots, 16x 2.5" disk bays, 1x DVD drive bay, 6x PCIe slots, 4x GbE ports, 5 USB 2.0 ports, ILOM, No PSU - Support for SE Processors	Announce 10/14/08 RR 10/14/08

Power Cords

Due to regulatory requirements of other countries, Sun Fire X4150 server Standard Configurations and XATO Chassis options are required to bundle their power cord separately. These are shippable anywhere in the world.

Each Geography must select their specific Country Power cord kit as listed in table to be included with each system or chassis.

Part Number	Description
X311L	(US/Asia (except China) Localized power cord kit
X312E	(China) Localized power cord kit
X312L	(Continental Europe) Localized power cord kit
X314L	(Switzerland) Localized power cord kit
X317L	(U.K.) Localized power cord kit
X332A	(Taiwan) Localized power cord kit
X383L	(Danish) Localized power cord kit

Part Number	Description
X384L	(Italian) Localized power cord kit
X386L	(Australian) Localized power cord kit
X312F	(Argentina) Localized power cord kit
X312G	(Korean) Localized power cord kit

Sun Fire X4140 and X4240 Server Compliant Options

The Sun(SM) Customer Ready Program part numbers are “Customer Ready Systems”, and can be combined with other Sun and 3rd party products into customer-specific systems by the Sun(SM) Customer Ready Program. These servers are identical to their Standard Configuration counterparts, but require Sun(SM) Customer Ready Program specific part numbers for factory integration.

The following part numbers are available as X- , XATO and Sun(SM) Customer Ready Program options as noted for the Sun Fire X4140 and X4240 servers.

X-Option	XATO	Customer Ready Program	Description	Notes
X6300A	6300A	6300A	Dual-Core AMD Opteron 2218HE processor (2.6GHz/1MB, 55W Dual Core)	EOL12/09/08 LOD 03/13/09 LSD 06/12/09
X6301A	6301A	6301A	Dual-Core AMD Opteron 2222 processor (3.0GHz/1MB, 75W Dual Core)	EOL12/09/08 LOD 03/13/09 LSD 06/12/09
X6302A	6302A	6302A	Dual-Core AMD Opteron 2224 SE processor (3.2GHz/1MB, 105W Dual Core) – Only For the Sun Fire X4240	EOL12/09/08 LOD 03/13/09 LSD 06/12/09
X6307A	6307A	6307A	Quad-Core AMD Opteron 2347 HE processor (1.9GHz/512KB, 55W Quad Core)	EOL 04/14/09 LOD 07/17/09 LSD 10/16/09
X6305A	6305A	6305A	Quad-Core AMD Opteron 2356 processor (2.3GHz/512KB, 75W Quad Core)	EOL 04/14/09 LOD 07/17/09 LSD 10/16/09
X6306A	6306A	6306A	Quad-Core AMD Opteron 2360 SE processor (2.5GHz/512KB, 105W Quad Core) – Only For the Sun Fire X4240	EOL12/09/08 LOD 03/13/09

X-Option	XATO	Customer Ready Program	Description	Notes
				LSD 06/12/09
X8252A	8252A	8252A	Quad-Core AMD Opteron 2376 HE processor (2.3GHz/512KB, 55W Quad Core)	EOL 07/21/09 LOD 10/23/09 LSD 01/22/10
X8253A	8253A	8253A	Quad-Core AMD Opteron 2380 processor (2.5GHz/512KB, 75W Quad Core)	EOL 07/21/09 LOD 10/23/09 LSD 01/22/10
X8254A	8254A	8254A	Quad-Core AMD Opteron 2384 processor (2.7GHz/512KB, 75W Quad Core)	EOL 07/21/09 LOD 10/23/09 LSD 01/22/10
X5392A	5392A	5392A	Quad-Core AMD Opteron 2427 processor (2.2GHz/512KB, 75W Six Core)	Announce 07/21/09 RR 07/21/09
X5381A	5381A	5381A	Quad-Core AMD Opteron 2431 processor (2.4GHz/512KB, 75W Six Core)	Announce 07/21/09 RR 07/21/09
X5382A	5382A	5382A	Quad-Core AMD Opteron 2435 processor (2.6GHz/512KB, 75W Six Core)	Announce 07/21/09 RR 07/21/09
X6320A	6320A	6320A	2GB memory kit with 2x 1GB PC2-5300 667 MHz ECC DDR2 DIMM	EOL 08/05/08 LOD 11/07/08 LSD 02/06/09
X6321A	6321A	6321A	4GB memory kit with 2x 2GB PC2-5300 667 MHz ECC DDR2 DIMM	EOL 08/05/08 LOD 11/07/08 LSD 02/06/09
X6321A-C	6321A-C	6321A-C	4GB memory kit with 2x 2GB PC2-5300 667 MHz ECC DDR2 Single-Rank DIMM	Announce 08/05/08 RR 08/29/08
X6322A	6322A	6322A	8GB memory kit with 2x 4GB PC2-5300 667 MHz ECC DDR2 DIMM	Announce 04/15/08 RR 04/02/08
X4287A	4287A	4287A	16GB memory kit with 2x 8GB PC2-5300 667 MHz ECC DDR2 DIMM	Announce 08/05/08 RR 11/30/08
XRA-SS2CF-73G10K	RA-SS2CF-73G10K	RA-SS2CF-73G10K	73GB 10K RPM 2.5" SAS disk drive	EOL 04/28/09 LOD 07/31/09 LSD 10/30/09
XRA-SS2CF-73G15K	RA-SS2CF-73G15K	RA-SS2CF-73G15K	73GB 15K RPM 2.5" SAS disk drive	Announce 04/15/08



X-Option	XATO	Customer Ready Program	Description	Notes
				RR 04/02/08
XRA-SS2CF-146G10K	RA-SS2CF-146G10K	RA-SS2CF-146G10K	146GB 10K RPM 2.5" SAS disk drive	EOL 04/28/09 LOD 07/31/09 LSD 10/30/09
XRA-SS2CF-300G10K	RA-SS2CF-300G10K	RA-SS2CF-300G10K	300GB 10K RPM 2.5" SAS disk drive	Announce 01/27/09 RR 01/16/09
XRB-SS2CF-146G10K	RB-SS2CF-146G10K	RB-SS2CF-146G10K	146GB 10K RPM 2.5" SAS disk drive	Announce 04/14/09 RR 04/14/09
X6323A	6323A	6323A	DVD±RW drive	Announce 04/15/08 RR 04/02/08
X6327A	6327A	6327A	Redundant hot-swappable 658W power supply	Announce 04/15/08 RR 04/02/08
X6328A	6328A	6328A	Redundant hot-swappable 1050W power supply	Announce 04/15/08 RR 04/02/08
X6324A	-	6324A	Cable management arm	Announce 04/15/08 RR 04/02/08
X6325A	-	6325A	Tool-less rack mounting slide rail kit	Announce 04/15/08 RR 04/02/08
X6326A	-	6326A	Rack mounting slide rail kit	Announce 04/15/08 RR 04/02/08
-	6329A	6329A	73GB Solaris 10 and Java ES pre-install image	EOL 09/02/08 LOD 12/05/08 LSD 03/06/09
-	6330A	6330A	Solaris 10 pre-install image	Announce 04/15/08 RR 05/22/08
-	6331A	6331A	Disk bay filler panel	Announce 04/15/08 RR 05/22/08
-	6332A	6332A	DVD drive filler panel	Announce 04/15/08 RR 05/22/08
-	6333A	6333A	658W power supply filler panel	Announce 04/15/08 RR 05/22/08

X-Option	XATO	Customer Ready Program	Description	Notes
-	6334A	6334A	1050W power supply filler panel	Announce 04/15/08 RR 05/22/08
-	6335A	6335A	Processor Jumper Kit	Announce 04/15/08 RR 05/22/08
-	6383A	6383A	Memory Filler Panel – X4240 and X4440	Announce 04/15/08 RR 05/22/08
-	4280A	4280A	X4140 Cable kit for internal SAS drives	Announce 04/15/08 RR 05/22/08
-	4282A	4282A	X4240 Cable kit for internal SAS drives	Announce 04/15/08 RR 05/22/08
-	4284A	4284A	X4440 2U Air Duct for Systems with Only 2 Processors	Announce 04/15/08 RR 05/22/08
X4285A	4285A	4285A	Hyper-Transport Bridge Card used with Quad-Core processors	Announce 05/13/08 RR 05/13/08
SG-XPCIE8SAS-I-Z	SG-PCIE8SAS-I-Z	SG-PCIE8SAS-I-Z	8-port internal SAS host bus adapter	Announce 04/15/08 RR 04/02/08
SGXPCIESAS-R-INT-Z	SG-PCIESAS-R-INT-Z	SG-PCIESAS-R-INT-Z	8-port internal SRL RAID host bus adapter	Announce 04/15/08 RR 04/02/08
SG-XPCIE8SAS-E-Z	-	SG-PCIE8SAS-E-Z	8-port external SAS host bus adapter	Announce 04/15/08 RR 04/02/08
SGXPCIESAS-R-EXT-Z	-	SGPCIESAS-R-EXT-Z	8-port external SRL RAID host bus adapter	Announce 04/15/08 RR 04/02/08
SG-XPCIE2SCSIU320Z	-	SG-PCIE2SCSIU320Z	Ultra320 SCSI 2-port host bus adapter	Announce 04/15/08 RR 04/02/08
SG-XPCIE1FC-QF4	-	SG-PCIE1FC-QF4	4Gb single-port FC-AL PCI-Express card	Announce 04/15/08 RR 04/02/08
SG-XPCIE2FC-QF4	-	SG-PCIE2FC-QF4	4Gb dual-port FC-AL PCI-Express card	Announce 04/15/08 RR 04/02/08
SG-XPCIE1FC-EM4	-	SG-PCIE1FC-EM4	4Gb single-port FC-AL PCI-Express card	Announce 04/15/08 RR 04/02/08
SG-XPCIE2FC-EM4	-	SG-PCIE2FC-EM4	4Gb dual-port FC-AL PCI-Express card	Announce 04/15/08



X-Option	XATO	Customer Ready Program	Description	Notes
				RR 04/02/08
X1236A-Z	-	1236A-Z	Dual-port 4x Infiniband host channel adapter	Announce 04/15/08 RR 04/02/08
X4217A-Z	-	4217A-Z	Dual-port 4x Infiniband host channel adapter (No Memory)	Announce 04/15/08 RR 04/02/08
X7280A-2	-	7280A-2	Dual Gigabit-Ethernet PCI-Express card (copper)	Announce 04/15/08 RR 04/02/08
X7281A-2	-	7281A-2	Dual Gigabit-Ethernet PCI-Express card (fiber)	Announce 04/15/08 RR 04/02/08
X4446A-Z	-	4446A-Z	Quad Gigabit-Ethernet PCI-Express card (copper)	Announce 04/15/08 RR 04/02/08
X1027A-Z	-	1027A-Z	10 Gigabit-Ethernet PCI-Express card	Announce 04/15/08 RR 04/02/08
X5558A	-	5558A	10 Gigabit-Ethernet short range Transceiver	Announce 04/15/08 RR 04/02/08
X5560A-Z	-	5560A-Z	10 Gigabit-Ethernet long range Transceiver	Announce 04/15/08 RR 04/02/08
X1106A-Z	-	1106A-Z	10 GbE 1-port SR Oplin (Intel)	Announce 04/15/08 RR 04/02/08
X1107A-Z	-	1107A-Z	10 GbE 2-Port SR Oplin (Intel)	Announce 04/15/08 RR 04/02/08

General Configuration Notes:

1. Single processor systems can be expanded with a second processor of the identical model/speed only, e.g. 1x Dual-Core AMD Opteron 2222 processor based system can only use another Dual-Core AMD Opteron 2222 processor; mixing with a different processor is not supported.
2. Memory must be installed in pairs. Pairs of different densities may be mixed, e.g. 2x1GB and 2x2GB can be used in the same system chassis.
3. The internal disk drives must be of the same type: they must all be SAS drives or all be SATA drives.
4. The diskless standard configurations come with cable kit for SAS drives. When adding SAS drives to these diskless standard configurations, SAS disk drives and the SAS host bus adapter must be ordered. SATA cables will be available within the accessory kit.
5. The standard configuration with disks come with cable kit for SAS drives. If these configurations are converted to be using SATA drives with the on-board HDD controller, cable kits for SATA drives are within the

accessory package.

6. If RAID 1 mirroring is going to be used, the drives to be mirrored must be identical in size.
7. There are two SAS host bus adapter options for the Sun Fire X4140 and X4240 server. The 8-port SAS host bus adapter supports RAID 0, 1, 0+1. The 8-port SAS SRL RAID host bus adapter has 256MB of DDR2 memory and battery-backed write cache for 72 hour backup, and also supports RAID 0, 1, 10, 1E, 5, 50, 5EE, 6, 60.
8. HT Bridge Card (X4285A) is needed with the AMD Opteron Quad-Core processors for optimal performance. Only Standard Configurations with Quad-Core will automatically have this option pre-installed.

XATO Configuration Notes:

1. XATO allows the configuration of systems to exact customer requirements. This provides the customer with a fully tested and configured system that requires little, if any, additional configuration prior to deployment. All XATO orders require a working configuration.
2. A minimum of one CPU option required. Single processor systems can be expanded with a second processor of the identical model/speed only, e.g. 1x Dual-Core AMD Opteron 2222 processor based system can only use another Dual-Core AMD Opteron 2222 processor; mixing with a different processor is not supported.
3. Memory must be installed in pairs. Pairs of different densities may be mixed, e.g. 2x1GB and 2x2GB can be used in the same system chassis.
4. A disk filler panel is required for any hard disk drive slot that is not filled.
5. A power supply filler panel is required for any power supply slot not filled.
6. A HT Bridge Card is required for any AMD Opteron Quad-Core processor being installed.
7. A DVD+/-RW drive or DVD filler panel is required when selecting the B12-AA or B14-AA base chassis.
8. A cable kit must be ordered with each system. Order the cable kit for SAS drives if the Sun Fire X4140 and X4240 will be populated with internal SAS drives. Order the cable kit for SATA drives if the Sun Fire X4140 and X4240 will be populated with internal SATA drives. If the Sun Fire X4140 and X4240 is a diskless configuration, the default is the cable kit for SAS drives with plastic caps at the end of the cable within the system. The cable kits should be automatically added within WebDesk when ordering SAS or SATA HDDs.

Sun Fire X4140 and X4240 PCIe Card Support by OS

For the latest information on PCIe card support, go to <http://www.sun.com/X4140/optioncards.jsp>

For the latest information on PCIe card support, go to <http://www.sun.com/X4240/optioncards.jsp>

<i>PCIe Card</i>	<i>Sun P/N</i>	<i>Max Config (X4140/X4240)</i>	<i>S10</i>	<i>RHEL 4</i>	<i>SLES 10</i>	<i>Win 2003</i>	<i>VMware</i>
Software RAID 0,1	Onboard SATA controller	N/A	Yes	Yes	Yes	Yes	Yes
8-port Internal SAS HBA	SG-PCIE8SAS-I-Z; SG-XPCIE8SAS-I-Z	1/1	Yes	Yes	Yes	Yes	Yes
8-port External SAS HBA	SG-XPCIE8SAS-E-Z	2/3	Yes	Yes	Yes	Yes	Yes



PCIe Card	Sun P/N	Max Config (X4140/X4240)	S10	RHEL 4	SLES 10	Win 2003	VMware
8-port Internal SAS SRL RAID HBA	SGPCIESAS-R-INT-Z; SGXPCIESAS-R-INT-Z	1/1	Yes	Yes	Yes	Yes	Yes
8-port External SAS SRL RAID HBA	SGXPCIESAS-R-EXT-Z	2/3	Yes	Yes	Yes	Yes	Yes
Ultra320 SCSI 2-port HBA	SG-XPCIE2SCSIU320Z	2/4	Yes	Yes	Yes	Yes	Yes
4Gb Single-Port FC-AL	SG-XPCIE1FC-QF4	2/3	Yes	Yes	Yes	Yes	Yes
4Gb Dual-Port FC-AL	SG-XPCIE2FC-QF4	2/3	Yes	Yes	Yes	Yes	Yes
4Gb Single-Port FC-AL	SG-XPCIE1FC-EM4	2/3	Yes	Yes	Yes	Yes	Yes
4Gb Dual-Port FC-AL	SG-XPCIE2FC-EM4	2/3	Yes	Yes	Yes	Yes	Yes
Dual Port 4x Infiniband HBA	X1236A-Z	2/2	Yes	Yes	Yes	No	No
Dual Port 4x Infiniband HBA (No Memory)	X4217A-Z	2/2	Yes	Yes	Yes	No	No
10 GbE 1-port SR Oplin (Intel)	X1106A-Z	TBD	Post GA	Yes	Yes	Yes	Post GA
10 GbE 2-port SR Oplin (Intel)	X1107A-Z	TBD	Post GA	Yes	Yes	Yes	Post GA
Dual Gigabit-Ethernet (copper)	X7280A-2	3/4	Yes	Yes	Yes	Yes	Yes
Dual Gigabit-Ethernet (fiber)	X7281A-2	3/4	Yes	Yes	Yes	Yes	Yes
Quad Gigabit-Ethernet (copper)	X4446A-Z	2/4	Yes	Yes	Yes	Yes	Yes
10 Gigabit-Ethernet (fiber)	X1027A-Z	2/2	Yes	No	No	No	No
10 Gigabit Ethernet SR XFP Transceiver	X5558A	N/A	N/A	N/A	N/A	N/A	N/A
10 Gigabit Ethernet LR XFP Transceiver	X5560A	N/A	N/A	N/A	N/A	N/A	N/A



Sun Fire X4140 and X4240 Storage Options

<i>Workgroup Storage Options</i>	<i>Sun SKU</i>	<i>S10</i>	<i>RHEL 4</i>	<i>SLES 10</i>	<i>Win 2003</i>
Sun StorageTek 2540 FC Array	ST2540	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4
Sun StorageTek 2530 SAS Array	ST2530	SG-XPCIE8SAS-E-Z	SG-XPCIE8SAS-E-Z	SG-XPCIE8SAS-E-Z	SG-XPCIE8SAS-E-Z
Sun StorageTek 1400 SAS Array	ST1400	SG-XPCIE8SAS-E-Z, SGXPCIESAS-R-EXT-Z	SG-XPCIE8SAS-E-Z, SGXPCIESAS-R-EXT-Z	SG-XPCIE8SAS-E-Z, SGXPCIESAS-R-EXT-Z	SG-XPCIE8SAS-E-Z, SGXPCIESAS-R-EXT-Z
Sun StorEdge 3320 SCSI (RAID)	XTA3320	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z
Sun StorEdge 3320 SCSI (JBOD)	XTA3320	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z
Sun StorEdge 3510 FC Array (RAID)	XTA3510	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4
Sun StorEdge 3510 FC Array (JBOD)	XTA3510	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4
Sun StorEdge 3120 SCSI (JBOD)	XTA3120	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z
Sun StorageTek 2510 iSCSI Array	ST2510	Ethernet	Ethernet	Ethernet	Ethernet

<i>Midrange Storage Options</i>	<i>Sun SKU</i>	<i>S10</i>	<i>RHEL 4</i>	<i>SLES 10</i>	<i>Win 2003</i>
Sun StorageTek 6140	ST6140	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4
Sun StorageTek 6540	ST6540	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4

The ST9900 High End Data Center Storage System supports a wide variety of Sun servers based on SPARC, AMD Opteron and Intel Xeon processors. Please refer to your local Sun Storage Sales or SE Specialist, and have them refer to the following documents:

- "What Works With What" document located at SunWin Token 344150
- "Feature Availability Report" document located at SunWin Token 385413

Data Center Storage Options	Sun SKU	S10	RHEL 4	SLES 10	Win 2003
Sun StorEdge 9985	SE9985	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4
Sun StorEdge 9990	SE9990	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4
Sun StorEdge 9970	SE9970	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4
Sun StorEdge 9980	SE9980	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4

NAS Storage Options	Sun SKU	S10	RHEL 4	SLES 10	Win 2003
Sun StorageTek 5220	XTB5220	Ethernet	Ethernet	Ethernet	Ethernet
Sun StorageTek 5320	XTB5320	Ethernet	Ethernet	Ethernet	Ethernet

Sun Fire X4140 and X4240 Tape and Applications

Standalone Tape Options	Sun SKU	S10	RHEL 4	SLES 10	Win 2003
DAT 72 Desktop (SCSI)	SG-XTAPDAT72-D2	SG-XPCIE2SCSIU320 Z	SG-XPCIE2SCSIU320 Z	SG-XPCIE2SCSIU320 Z	SG-XPCIE2SCSIU320 Z
DAT 72 Desktop (USB)	DAT72-USB-DTOP-Z	USB	USB	USB	USB
DAT 72 1U HH Rackmount	SG-XTAPDAT72-R-2	SG-XPCIE2SCSIU320 Z	SG-XPCIE2SCSIU320 Z	SG-XPCIE2SCSIU320 Z	SG-XPCIE2SCSIU320 Z
LTO 2 HH Desktop (SCSI)	SG-XTAPLT02V-D	SG-XPCIE2SCSIU320 Z	SG-XPCIE2SCSIU320 Z	SG-XPCIE2SCSIU320 Z	SG-XPCIE2SCSIU320 Z
LTO 3 FH Desktop (SCSI)	SG-XTAPLT03-D-2	SG-XPCIE2SCSIU320 Z	SG-XPCIE2SCSIU320 Z	SG-XPCIE2SCSIU320 Z	SG-XPCIE2SCSIU320 Z
LTO 2 1U HDD Rackmount (SCSI)	SG-XTAPLT02V-R	SG-XPCIE2SCSIU320 Z	SG-XPCIE2SCSIU320 Z	SG-XPCIE2SCSIU320 Z	SG-XPCIE2SCSIU320 Z



Standalone Tape Options	Sun SKU	S10	RHEL 4	SLES 10	Win 2003
LTO 3 2U FH Rackmount (SCSI)	SG-XTAPLTO3-R-Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z
SDLT 320 Desktop (SCSI)	SG-XTAPSDLT320-D-Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z
SDLT 600 Desktop (SCSI)	SG-XTAPSDLT600-D-Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z
SDLT 600 2U FH Rackmount (SCSI)	SG-XTAPSDLT6-R-Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z
DLT S4 Desktop (SCSI)	DLTS4-DTOP-SC-DR-Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z
LTO 4 FH Desktop (SCSI & SAS)	LTO4-HP-SC-DTOP-Z, LTO4-HP-SAS-DTOP-Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z

Tape and library support varies by backup storage applications listed below. Please refer to your local Sun Storage Sales or SE Specialist, and have them refer to the "Library, Tape and Application" support matrix.

Tape Library Options	Sun SKU	S10	RHEL 4	SLES 10	Win 2003
Autoloader C2 (2RU) SCSI	SG-XAUTO8LTO3-C2, SG-XAUTO16LTO3-C2, SG-XAUTO8LSDT03-C2, SG-XAUTO16LSDT03-C2	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z
Tape Library C4 (4RU) SCSI & FC	SG-XLIBLTOS-C4, SG-XLIBSDLTS-C4	SG-XPCIE2SCSIU320Z, SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE2SCSIU320Z, SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE2SCSIU320Z, SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE2SCSIU320Z, SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4
Autoloader SL24 SCSI & FC	SL24-IL3-SCSI-Z SL24-IL3-FC-Z SL24-IL2H-SCSI-Z	SG-XPCIE2SCSIU320Z, SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE2SCSIU320Z, SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE2SCSIU320Z, SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE2SCSIU320Z, SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4
Tape Library SL48 SCSI & FC	SL48-IL3-SCSI-Z SL48-IL3-FC-Z SL48-IL2H-SCSI-Z	SG-XPCIE2SCSIU320Z, SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE2SCSIU320Z, SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE2SCSIU320Z, SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4	SG-XPCIE2SCSIU320Z, SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4



Tape Library Options	Sun SKU	S10	RHEL 4	SLES 10	Win 2003
StorageTek SL500 SCSI	SL500-30-SCSI-Z, SL500-50-SCSI-Z	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4			
StorageTek SL500 FC	SL500-30-FC-Z, SL500-50-FC-Z	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4			
StorageTek L180 SCSI & FC	YSL-180-140-HV-STK, YSL-180-174-HV-STK, YSL-184-84-HV-STK	SG-XPCIE2SCSIU320Z, SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4			
StorageTek L1400 SCSI	SL1400MA-STK-Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z	SG-XPCIE2SCSIU320Z
StorageTek L1400 FC	SL1400-M1-STK-Z	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4			
Sun StorageTek SL8500 FC	SL8500-BASE-LIB-Z	SG-XPCIE1FC-QF4, SG-XPCIE2FC-QF4, SG-XPCIE1FC-EM4, SG-XPCIE2FC-EM4			

Tape Backup Storage Applications	S10	RHEL 4	SLES 10	Win 2003
Symantec (Veritas) NetBackup	Client Only	Client/Server 32-bit/64-bit	Client Only	Client/Server 32-bit
Sun EBS / EMC (Legato) Networker	Client/Server 64-bit	Client/Server 32-bit/64-bit	Client/Server 64-bit	Client/Server 32-bit/64-bit
CA BrightStor ARCserve	Not supported	Client/Server 32-bit/64-bit	Client/Server 64-bit	Client/Server 32-bit/64-bit
IBM TSM	Client/Server 32-bit/64-bit	Client/Server 32-bit/64-bit	Not supported	Client/Server 32-bit/64-bit
Symantec (Veritas) Backup Exec	Not supported	Not supported	Not supported	Client/Server 32-bit
HP DataProtector	Not supported	Client/Server 64-bit	Client/Server 64-bit	Client/Server 64-bit
BakBone NetVault	Client/Server 32-	Client/Server 32-	Client/Server 64-	Client/Server 32-



<i>Tape Backup Storage Applications</i>	<i>S10</i>	<i>RHEL 4</i>	<i>SLES 10</i>	<i>Win 2003</i>
	bit/64-bit	bit/64-bit	bit	bit/64-bit

Services

Warranty Support

The Sun Fire X4140 and X4240 server has a three year warranty.

Duration:	3 Years
HW Coverage Hours:	Business Hours
HW Response Times:	Next Business Day
Delivery Method:	Parts Exchange or Onsite
HW Phone Coverage:	Business Hours
HW Phone Response Time:	8 Hours

Why the Warranty Isn't Enough

While computer system warranties provide business customers with some assurance of product quality, they do not provide many essential system services or operating system support. In addition, warranties provide default repair times and coverage hours which may not suit customer needs. It's just that a warranty and a Service Plan are two very different things with two very different objectives. Break/fix is no way to live - make sure your customers have Service Plan coverage on all their active Sun systems. For more information, go to: www.sun.com/comparewarranty

SunSpectrum Service Plans

SunSpectrum Service Plans provide integrated hardware and Solaris OS support for Sun systems as well as comprehensive storage system support. For each Sun system, customers can choose the service plan that best fits their needs. Customers benefit from lower SunSpectrum Instant Upgrade (SIU) pricing when purchasing support at time of system sale.

More information at: www.sun.com/service/support/sunspectrum

SunSpectrum Service Plan Highlights:

- Integrated whole-system support, *including the operating system*
- All the essentials for one great price
- Priority service
- No "per incident" limits
- Includes Solaris Operating System releases and updates
- Resources for proactive system management
- A choice of four simple plans
- Proven return on investment * ¹

*1 Based on Total Economic Impact Study by Forrester Research. This study is available at: sun.com/service/support/sunspectrum

SunSpectrum Service Plans

Features	Platinum Service Plan Mission-critical Systems	Gold Service Plan Business-critical Systems	Silver Service Plan Basic System Support	Bronze Service Plan Self-Maintenance Support
Telephone and Online Technical Support	24/7 Live transfer	24/7 Live transfer	8-8, M-F Live transfer	8-5, M-F 4hr response
One-stop Interoperability Assistance	Yes	Yes	No	No
Hardware Service Coverage	24/7 2hr On-site Service	8-8, M-F 4hr On-site Service	8-5, M-F 4hr On-site Service	Replacement parts 2nd business day
Solaris™ Releases	Yes	Yes	Yes	Yes
On-demand Solaris™ Updates	Yes	Yes	Yes	Yes
Online System Admin Resources	Yes	Yes	Yes	Yes
Support Notification Services	Yes	Yes	Yes	Yes
SunSpectrum SM eLearning Library	Yes	Yes	Yes	Yes
System Health Check Subscription	Yes	No	No	No
Additional Services for Qualifying Sites	Customer sites meeting an annual SunSpectrum contract minimum (approximately \$160,000 USD) can receive additional services including the creation of a personalized support plan, periodic support reviews, patch assessments and educational services. For local qualification criteria, visit sun.com/service/support/localinfo.html			

- Availability of specific features, coverage hours and response times may vary by location or product.
- Response times are determined by customer-defined priority. The response times shown are for service requests designated by the customer as "Priority 1."
- To receive the best support, Sun recommends that customers install Sun Net Connect software on SPARC®-based systems. This software creates a secure, customer-controlled link to the Sun Solution Center which helps enable expedited Solaris OS troubleshooting, remote diagnostics, and a number of customer-enabled alerting and reporting functions.

Warranty Upgrade to SunSpectrum Service Plan for Sun Fire X4140 and X4240 Server

The following are part numbers and descriptions for the warranty upgrade to SunSpectrum Service Plan

Part Number	Description
IWU-B12-1S	Sun Fire X4140 server upgrade to 1 year of Silver support
IWU-B12-1G	Sun Fire X4140 server upgrade to 1 year of Gold support
IWU-B12-24-1G	Sun Fire X4140 server upgrade to Gold support + 7X24 On-Site support for 1 year
IWU-B12-1P	Sun Fire X4140 server upgrade to 1 year of Platinum support
IWU-B12-2S	Sun Fire X4140 server upgrade to 2 years of Silver support

Sun Fire X4140 & X4240 Server
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IWU-B12-2G	Sun Fire X4140 server upgrade to 2 years of Gold support
IWU-B12-24-2G	Sun Fire X4140 server upgrade to Gold support + 7X24 On-Site support for 2 years
IWU-B12-2P	Sun Fire X4140 server upgrade to 2 years of Platinum support
IWU-B12-3S	Sun Fire X4140 server upgrade to 3 years of Silver support
IWU-B12-3G	Sun Fire X4140 server upgrade to 3 years of Gold support
IWU-B12-24-3G	Sun Fire X4140 server upgrade to Gold support + 7X24 On-Site support for 3 years
IWU-B12-3P	Sun Fire X4140 server upgrade to 3 years of Platinum support

Part Number	Description
IWU-B14-1S	Sun Fire X4240 server upgrade to 1 year of Silver support
IWU-B14-1G	Sun Fire X4240 server upgrade to 1 year of Gold support
IWU-B14-24-1G	Sun Fire X4240 server upgrade to Gold support + 7X24 On-Site support for 1 year
IWU-B14-1P	Sun Fire X4240 server upgrade to 1 year of Platinum support
IWU-B14-2S	Sun Fire X4240 server upgrade to 2 years of Silver support
IWU-B14-2G	Sun Fire X4240 server upgrade to 2 years of Gold support
IWU-B14-24-2G	Sun Fire X4240 server upgrade to Gold support + 7X24 On-Site support for 2 years
IWU-B14-2P	Sun Fire X4240 server upgrade to 2 years of Platinum support
IWU-B14-3S	Sun Fire X4240 server upgrade to 3 years of Silver support
IWU-B14-3G	Sun Fire X4240 server upgrade to 3 years of Gold support
IWU-B14-24-3G	Sun Fire X4240 server upgrade to Gold support + 7X24 On-Site support for 3 years
IWU-B14-3P	Sun Fire X4240 server upgrade to 3 years of Platinum support

Warranty Upgrade to Sun HW Only Service for Sun Fire X4140 and X4240 Server

Part Number	Description
IWU-B12-SD-1H	Sun Fire X4140 server upgrade to 1 year of same day hardware only support
IWU-B12-SD-2H	Sun Fire X4140 server upgrade to 2 years of same day hardware only support
IWU-B12-SD-3H	Sun Fire X4140 server upgrade to 3 years of same day hardware only support
IWU-B12-24-1H	Sun Fire X4140 server upgrade to 1 year of 7x24 hardware only support with 4 hour response
IWU-B12-24-2H	Sun Fire X4140 server upgrade to 2 years of 7x24 hardware only support with 4 hour response
IWU-B12-24-3H	Sun Fire X4140 server upgrade to 3 years of 7x24 hardware only support with 4 hour response
IWU-B12-22-1H	Sun Fire X4140 server upgrade to 1 year of 7x24 hardware only support with 2 hour response
IWU-B12-22-2H	Sun Fire X4140 server upgrade to 2 years of 7x24 hardware only support with 2 hour response

IWU-B12-22-3H Sun Fire X4140 server upgrade to 3 years of 7x24 hardware only support with 2 hour response

Part Number	Description
IWU-B14-SD-1H	Sun Fire X4240 server upgrade to 1 year of same day hardware only support
IWU-B14-SD-2H	Sun Fire X4240 server upgrade to 2 years of same day hardware only support
IWU-B14-SD-3H	Sun Fire X4240 server upgrade to 3 years of same day hardware only support
IWU-B14-24-1H	Sun Fire X4240 server upgrade to 1 year of 7x24 hardware only support with 4 hour response
IWU-B14-24-2H	Sun Fire X4240 server upgrade to 2 years of 7x24 hardware only support with 4 hour response
IWU-B14-24-3H	Sun Fire X4240 server upgrade to 3 years of 7x24 hardware only support with 4 hour response
IWU-B14-22-1H	Sun Fire X4240 server upgrade to 1 year of 7x24 hardware only support with 2 hour response
IWU-B14-22-2H	Sun Fire X4240 server upgrade to 2 years of 7x24 hardware only support with 2 hour response
IWU-B14-22-3H	Sun Fire X4240 server upgrade to 3 years of 7x24 hardware only support with 2 hour response

Installation Service for Sun Fire X4140 and X4240 Server

Sun's exceptional support for server installation is also available for the Sun Fire X4140 and X4240 server. This service can be purchased at the time of the server sale. Use the following part numbers to order the installation service.

Part Number	Description
EIS-2WYWGS-E	Install 2-way Workgroup Server
EIS-2WYWGS-E-AH	Install 2-way Workgroup Server-AH
EIS-2WYWGS-5-E	Install 5 2-way Workgroup Servers
EIS-2WYWGS-5-E-AH	Install 5 2-way Workgroup Servers-AH
EIS-2WYWGS-10-E	Install 10 2-way Workgroup Servers
EIS-2WYWGS-10-E-AH	Install 10 2-way Workgroup Servers-AH

For additional information about the server installation service see:

<http://www.sun.com/service/support/install/entrylevel-server.html>

Learning Services

Sun offers a wide range of expert training services, from consulting to courseware to certification, to improve expertise and accelerate productivity, to help enable maximum uptime for IT environments, & to provide lower total cost of ownership for technology investments.

All of these courses are available at:

<https://slp.sun.com/sun>



HPC Quick Start Services

Sun provides a suite of services to help customers architect, deploy and manage their High Performance Computing (HPC) environments for faster time to deployment and with reduced risk. Our expertise includes installation, integration, training, and ongoing support of network connections, software stacks, and thousands of cores in a large-scale, high-density environment. More info.: <http://sun.com/service/hpc>



Sun HPC Quick Start Services

Sun HPC Quick Start Services — Implement

Speed design, and implementation of your HPC solution

- Reduce deployment time by up to 80%
- Prepare infrastructure for business
- Reduce risk
- Control & reduce cost

• Key Included Services

- > Application Readiness Services (PS)
- > Installation Services (EIS)
- > Integrated Services for x4500, x4600, 8000, & 8000p servers (System Packs)
- > Professional Services for your specific configuration & migration needs (PS)

Sun HPC Quick Start Services — Optimize

Accelerate the time to optimize and manage HPC solutions

- Speed time to achieve performance goals & improvement
- Reduce risk & cost
- Maximize IT assets

• Key Included Services

- > Managed Services (MS)
- > Performance analysis and tuning to business needs (PS)
- > Professional Services (PS)
- > Proactive & continued infrastructure monitoring (Mgd Ops)
- > Control Tower Appliance included (Mgd Ops)
- > Incident Response Services (Mgd Ops)

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Connected Services

Provision new systems. Manage updates and configuration changes with Sun Connection, the Solaris and Linux life cycle management tool.

<http://www.sun.com/service/sunconnection/index.jsp>

Glossary

1U or RU	One rack unit as defined by the Electronic Industries Alliances (EIA). A vertical measurement equal to 1.75 inches.
ATA	AT-Attachment. A type of hardware interface widely used to connect hard disks, CD-ROMs and tape drives to a PC.
ChipKill ^T	ChipKill, or advanced ECC memory, is an IBM xSeries memory subsystem technology that increases memory reliability several times over, helping to reduce the chances of system downtime caused by memory failures.
ECC	Error Correcting Code. A type of memory that corrects errors on the fly.
Ethernet 10/100/1000Base-T	The most widely used LAN access method defined by the IEEE 802.3 standard; uses standard RJ-45 connectors and telephone wire. 100Base-T is also referred to as Fast Ethernet. And 1000Base-T is also referred to as Gigabit Ethernet.
FRU	Field Replaceable Unit.
Hot-pluggable	A feature that allows an administrator to remove a drive without affecting hardware system integrity.
Hot-swappable	A feature that allows an administrator to remove and/or replace a device without affecting software integrity. This means that, while the system does not need to be rebooted, the new component is not automatically recognized by the system.
EIDE	See ATA.
IKE	Internet Key Exchange. A method for establishing a security association that authenticates users, negotiates the encryption method and exchanges the secret key. IKE is used in the IPSec protocol.
I/O	Input/output. Transferring data between the CPU and any peripherals.
IPSec	IP Security. A security protocol from the IETF (Internet Engineering Task Force) that provides authentication and encryption over the Internet. Unlike SSL, which provides services at layer 4 and secures two applications, IPSec works at layer 3 and secures everything in the network.
IPMI	Intelligent Platform Management Interface. System management architecture for providing an industry-standard interface and methodology for system management.
L2 cache	Also referred to as Ecache or External Cache. A memory cache external to the CPU chip.

MTBF	Mean Time Between Failures. The average time a component works without failure.
RAM	Random Access Memory.
SAS	Serial Attached SCSI. A serial hardware interface that allows the connection of up to 128 devices and point-to-point data transfer speeds up to 3 Gbits/sec.
SATA	Serial Attached ATA. The resulting evolution of the ATA (IDE) interface from a parallel to a serial and from a master-slave to a point-to-point architecture with data transfer speeds up to 1.5 Gb/s.
SCSI	Small Computer Systems Interface. Pronounced "scuzzy." An ANSI standard hardware interface that allows the connection of up to 15 peripheral devices to a single bus.
SNMP	Simple Network Management Protocol. A set of protocols for managing complex networks. The first versions of SNMP were developed in the early 80s. SNMP works by sending messages, called protocol data units (PDUs), to different parts of a network. SNMP-compliant devices, called agents, store data about themselves in Management Information Bases (MIBs) and return this data to the SNMP requesters.
X86	Refers to the Intel 8086 family of microprocessor chips as well as compatible microprocessor chips made by Intel and others.

Materials Abstract

All materials will be available on SunWIN except where noted otherwise.

Collateral	Audience	Purpose	SunWIN Token #
Sales Tools			
• <i>Sun Fire X4140 Server Datasheet</i>	Customer	Sales Tool, Training	509867
• <i>Sun Fire X4240 Server Datasheet</i>	Customer	Sales Tool, Training	509876
• <i>Sun Fire X4140 and X4240 Server Just the Facts</i>	Sales, SEs, Partners	Sales Tool, Training	509869
• <i>Sun Fire X4140 and X4240 Server Customer Presentation</i>	Sales, SEs, Partners, Customer	Sales Tool, Training	509870
• <i>Sun Fire X4140 and X4240 Server Technical Presentation</i>	Customer Presentation	Sales Tool, Training	509871
• <i>Sun Fire X4140 and X4240 Server Sales Presentation</i>	Sales, SEs, Partners	Training	xxxxxx
• <i>Sun Fire X4140 Server Technical Whitepaper</i>	Sales, SEs, Partners, Customer	Sales Tool, Training	509874
• <i>Sun Fire X4240 Server Technical Whitepaper</i>	Sales, SEs, Partners, Customer	Sales Tool, Training	509874
• <i>Sun Fire X4140 and X4240 Server Reviewer's Guide</i>	Customer	Sales Tool, Training	xxxxxx
External Web Sites			
• <i>Sun Fire X4140 Server Web Site</i>	http://www.sun.com/servers/x64/X4140		
• <i>Sun Fire X4240 Server Web Site</i>	http://www.sun.com/servers/x64/X4240		
Internal Web Sites			
• <i>Sun Fire X4140 Server Internal Web Site - MySales</i>	http://mysales.central.sun.com/public/systems/volume/X4140/		
• <i>Sun Fire X4240 Server Internal Web Site - MySales</i>	http://mysales.central.sun.com/public/systems/volume/X4240/		
Reseller Web Site			
• <i>Sun Reseller General Information</i>	http://TBD		

Competitive Information

Positioning Sun Fire X4140 and 4240 servers

Elevator Pitch

The Sun Fire X4140 and X4240 servers are the best 1-RU and 2-RU 2-socket enterprise class x64 server in terms of performance, density and energy efficiency that runs Solaris, Linux, Windows and VMware.

Value Proposition

- Sun Fire X4140 and X4240 can run a broad range of Solaris, Linux, Windows and VMware applications more efficiently and more quickly.
- Sun Fire X4140 and X4240 has up to two times the memory capacity, internal storage and integrated networking connectivity than other systems in the same class, leaving more headroom to grow.
- Sun Fire X4140 and X4240 is energy efficient, consuming less power, requires less cooling, and reduces negative impact to the environment.
- Sun Fire X4140 and X4240 comes standard with Integrated Lights Out Manager for system management and monitoring at no extra cost. It also has redundant and hot-swappable components, such as cooling fans, power supplies and disk drives, that makes component swap-out fast, easy and effortless.
- Sun Fire Opteron-based x64 servers run the gamut from 1-socket servers to the data-center class Sun Fire X4600 server to serve customer needs in nearly every x64 area. The Sun Fire X4140 and X4240 in combination with these many servers can give customers both in-server and overall competitive advantage like less expensive storage, faster performance, etc...
- Sun Fire X4140 and X4240 can accommodate both current and future AMD Opteron processors along with the fastest current SE Opteron processors.
- Sun Fire X4140 and X4240 density and expandability advantages allow customers to increase rack throughput and save valuable real estate compared to IBM and HP offerings.

Key Differentiators

- Highly expandable with more memory, internal storage and I/O within the same chassis other systems. Sun Fire systems also enjoy better TCO with iLOM, JES, and Solaris x86 bundled. Competitors pay extra for these components.
 - 16 memory DIMM slots (128GB of memory with 8GB DIMMs), 8 DIMM slots per Socket
 - 8 internal disk drives (over 2 TB of internal storage) – 1-RU
 - 16 internal disk drives (over 4 TB of internal storage) – 2-RU
 - 4 GbE ports on-board standard
- Extreme I/O capabilities with 3 PCIe slots within the 1-RU and 6 PCIe slots within the 2-RU
- Integrated Lights Out Manager comes standard at no extra cost
- Solaris x86 or OpenSolaris bundled (no extra cost for virtualization and OS)

- Part of Java Enterprise Server (JES) stack comes bundled saving money over comparable middle-ware deployments

Sun Fire X4140 and X4240 Server Primary Applications

- Web Server (Low End)
- IT Infrastructure (Security, DNS, Proxy, Caching, Firewall, Gateway)
- HPTC/Grid Computing
- SANs
- Messaging/Collaboration
- File/Print
- Video Streaming
- OLTP
- Virtualization

Competitive Positioning – Sun Fire X4140

HP competitive offerings

HP DL365 G5	<p>The Sun Fire X4140 server has multiple strengths to offer, which one is the memory capacity can reach up to 128GB. It can handle up to 8 HDDs within a 1-RU form factor. Also, it has 4 GbE ports on the system board, which will save a PCIe slot for other usages. Oh by the way, the X4140 has 3 PCIe slots available to handle any type of network traffic. On the eco friendly side, the X4140 power supplies uses less power at only 658W.</p> <p>However, the DL365 G5 server only offer up to 32GB of memory max with only a max storage capacity of 6 HDDs. Likewise, it only offers 2 GbE ports on-board and 2 PCIe slots within the system. Additionally, the DL365 G5 uses a higher rated power supply at 700W.</p>
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HP touts the fact that it sells high energy efficient servers.

HP offers Eco-friendly products and services to help customers manage their power consumption of their data centers. With each product HP also provides documentation for use by end-of-life recyclers or treatment facilities. It provides the basic instructions for the disassembly of HP products to remove components and materials requiring selective treatment, as defined by EU directive 202/96/EC, Waste Electrical and Electronic Equipment (WEE).

HP sells the fact that their ProLiant systems are specifically designed for dense server environments by including lights-out technology for reduced reactive support time, fault resilient technologies for reduced downtime, and balanced performance architectures to handle greater transaction. workloads for various applications.

Pushes the fact that they have a broad choice of solutions for customers; Broad range of server & storage with related software & services.

Low cost through factory integrated pre-configured systems: bundled solutions to drive a higher revenue stream and lower-cost solution to users.

Highlights manageability as a strength of HP x86 based systems with iLO.

Promote their best-of breed capabilities with industry partners and the fact with these partnerships HP is able to drive innovation to deliver total solution with less R&D cost.

Claims that HP has the largest breathe of Opteron Products.

IBM competitive offerings

IBM x3455	<p>The Sun Fire X4140 server has multiple strengths to offer, which one is the memory capacity can reach up to 128GB. It can handle up to 8 HDDs within a 1-RU form factor. Also, it has 4 GbE ports on the system board, which will save a PCIe slot for other usages. Oh by the way, the X4140 has 3 PCIe slots available to handle any type of network traffic. On the eco friendly side, the X4140 power supplies uses less power at only 658W.</p> <p>On the other hand, the x3455 servers only offer up to 48GB of memory max with only a quarter of the storage HDD slots available compared to the X4140. Furthermore, it only offers 2 GbE ports on-board and 2 PCIe slots within the system.</p>
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Competitive Positioning – Sun Fire X4140

IBM's System x3455 doesn't have the high RAS features contained in the Sun Fire X4140 server like redundant fans or redundant power. These features are critical in many applications that require 1RU, high-RAS servers. In such cases, IBM is likely to position its System x3555 or its Xeon-based System x3450. The Sun Fire X4140 not only has RAS advantages over the System x3455, but it has numerous expandability advantages like more DIMM slots, more hard disks and more PCIe slots.

IBM will paint Sun as an Opteron only provider with an inadequate Xeon line. They will co-market with Microsoft and Red Hat. IBM sells at higher levels in a corporation, at times above a CIO. IBM will lose money on System x hardware when bundling with IBM middleware, storage, services or financing. IBM will sell its ability to deliver models to customers faster. IBM will use periodic web/hard drive/memory promotions to gain business. IBM will push its qualification matrix (more versions of OSes, more EMC storage, etc...) to its advantage in certain deals. IBM will use its better/longer/more-in-depth expertise in Windows/VMware to advantage to position Sun as a one dimension x86 player.

IBM will also try to position Sun Microsystems as lacking and adequate blades solution without internal switches. IBM may attempt to convert standalone rack customers to its blade solution using lower cable or lower overall power arguments.

Dell competitive offerings

Dell PE SC1435

The Sun Fire X4140 server has multiple strengths to offer, which one is the memory capacity can reach up to 128GB. It can handle up to 8 HDDs within a 1-RU form factor. Also, it has 4 GbE ports on the system board, which will save a PCIe slot for other usages. Oh by the way, the X4140 has 3 PCIe slots available to handle any type of network traffic. On the eco friendly side, the X4140 power supplies uses less power at only 658W.

Then again, the PE SC1435 servers only offer up to 32GB of memory max with only quarter of the storage HDD slots available compared to the X4140. Moreover, the PE SC1435 only offers 2 GbE ports on-board and 1 PCIe/PCI-X slot within the system.

Dell will always sell on price especially in the lower end units as this area is more price sensitive. Dell is looked at being more of a short-term investment with a higher TCO. Dell is not considered a leader in regards to support for integration and services. The PE SC1435 is also used in clustering for HPC applications due to the high number of flops. Specifically, Dell uses the PE SC1435 in a cluster configuration and again the same issues listed above are prevelant. The Dell deals in the HPC market are more on the public sector (education/healthcare/government) side or where price is the issue and they do provide excellent support for Dell products.

Competitive Landscape – Sun Fire X4140

Attribute	Sun Fire X4140	HP DL365 G5	Dell PE SC1435	IBM x3455
Form Factor	1U	1U	1U	1U
Processor	AMD Six Core	AMD Quad Core	AMD Dual Core &	AMD Dual Core &

Attribute	Sun Fire X4140	HP DL365 G5	Dell PE SC1435	IBM x3455
			Quad Core	Quad Core
Socket	2-socket	2-socket	2-socket	2-socket
Memory	16 DIMMs (128GB max)	8 DIMMs (32GB max)	8 DIMMs (32GB max)	12 DIMMs (48GB max)
Disk Drives	8x 2.5" SAS 4x 2.5" SATA SSD	6x 2.5" SAS	2x 3.5" SAS	2x 3.5" SAS/SATA
RAID	RAID 0,1,5,6	RAID 0,1,5	RAID 0,1	RAID 0,1
GigE Ports	4	2	2	2
I/O Slots	3x PCIe	2x PCIe	1x PCIe/PCI-X	2x PCIe
Hot Swap PSU	2x 658W	No, 2x 700W	No, 1x 600W	No, 1x 658W
Hot Swap Fans	Yes	No (Redundant)	None	None
Lights Out Manager	iLOM 2	iLO2	IPMI 2.0 (add-on option)	IPMI 2.0 (add-on option)
Warranty	3 Yr NBD	3 Yr NBD	3 Yr NBD	1 Yr NBD

Competitive Positioning – Sun Fire X4240

HP competitive offerings

HP DL385 G6	<p>The Sun Fire X4240 server has multiple strengths to offer, which one is the memory capacity can reach up to 128GB. It can handle up to 16 HDDs within a 2-RU form factor. Also, it has 4 GbE ports on the system board, which will save a PCIe slot for other usages. Oh by the way, the X4240 has 6 PCIe slots available to handle any type of network traffic. For the future, the X4240 power supplies have plenty of room for expansion at 1050W.</p> <p>However, the DL385 G6 server can offer 16 HDDs, but without an optical drive. Only way to get an optical drive is to have only 8 HDDs max within the system, unlike with the X4240, which can have 16 HDDs and an optical drive together. Additionally, the DL385 G6 uses a higher rated power supply at 1200W.</p>
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HP touts the fact that it sells high energy efficient servers.

HP offers Eco-friendly products and services to help customers manage their power consumption of their data centers. With each product HP also provides documentation for use by end-of-life recyclers or treatment facilities. It provides the basic instructions for the disassembly of HP products to remove components and materials requiring selective treatment, as defined by EU directive 202/96/EC, Waste Electrical and Electronic Equipment (WEE).

HP sells the fact that their ProLiant systems are specifically designed for dense server environments by including lights-out technology for reduced reactive support time, fault resilient technologies for reduced downtime, and balanced performance architectures to handle greater transaction. workloads for various applications.

Pushes the fact that they have a broad choice of solutions for customers; Broad range of server & storage with related software & services.

Low cost through factory integrated pre-configured systems: bundled solutions to drive a higher revenue stream and lower-cost solution to users.

Highlights manageability as a strength of HP x86 based systems with iLO.

Promote their best-of breed capabilities with industry partners and the fact with these partnerships HP is able to drive innovation to deliver total solution with less R&D cost.

Claims that HP has the largest breathe of Opteron Products.

IBM competitive offerings

IBM x3655	<p>The Sun Fire X4240 server has multiple strengths to offer, which one is the memory capacity can reach up to 128GB. It can handle up to 16 HDDs within a 2-RU form factor. Also, it has 4 GbE ports on the system board, which will save a PCIe slot for other usages. Oh by the way, the X4240 has 6 PCIe slots available to handle any type of network traffic. For the future, the X4240 power supplies have plenty of room for expansion at 1050W.</p> <p>On the other hand, the x3655 servers offers up to 64GB of memory max with only half the storage HDD slots available compared to the X4240. Furthermore, it only offers 2 GbE ports on-board and 4 PCIe slots within the system.</p>
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Competitive Positioning – Sun Fire X4240

IBM will paint Sun as an Opteron only provider with an inadequate Xeon line. They will co-market with Microsoft and Red Hat. IBM sells at higher levels in a corporation, at times above a CIO. IBM will lose money on System x hardware when bundling with IBM middleware, storage, services or financing. IBM will sell its ability to deliver models to customers faster. IBM will use periodic web/hard drive/memory promotions to gain business. IBM will push its qualification matrix (more versions of OS', more EMC storage, etc...) to its advantage in certain deals. IBM will use its better/longer/more-in-depth expertise in Windows/VMware to advantage to position Sun as a one dimension x86 player.

IBM will also try to position Sun Microsystems as lacking and adequate blades solution without internal switches. IBM may attempt to convert standalone rack customers to its blade solution using lower cable or lower overall power arguments.

Dell competitive offerings

Dell R805	<p>The Sun Fire X4240 server has multiple strengths to offer, which one is the memory capacity can reach up to 128GB. It can handle up to 16 HDDs within a 2-RU form factor. Also, it has 4 GbE ports on the system board, which will save a PCIe slot for other usages. Oh by the way, the X4240 has 6 PCIe slots available to handle any type of network traffic. For the future, the X4240 power supplies have plenty of room for expansion at 1050W.</p> <p>Then again, the R805 servers only offers up to quarter the storage HDD slots available compared to the X4240. Moreover, the PE1950 only offers 4 PCIe slots within the system.</p>
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Dell will always sell on price especially in the lower end units as this area is more price sensitive. Dell is looked at being more of a short-term investment with a higher TCO. Dell is not considered a leader in regards to support for integration and services. The R805 is also used in clustering for HPC applications due to the high number of flops. Specifically, Dell uses the R805 in a cluster configuration and again the same issues listed above are prevalent. The Dell deals in the HPC market are more on the public sector (education/healthcare/government) side or where price is the issue and they do provide excellent support for Dell products.

Competitive Landscape – Sun Fire X4240

Attribute	Sun Fire X4240	HP DL385 G6	Dell R805	IBM x3655
Form Factor	2U	2U	2U	2U
Processor	AMD Six Core	AMD Six Core	AMD Dual Core & Quad Core	AMD Dual Core
Socket	2-socket	2-socket	2-socket	2-socket
Memory	16 DIMMs (128GB max)	16 DIMMs (128GB max)	16 DIMMs (128GB max)	16 DIMMs (64GB max)
Disk Drives	16x 2.5" SAS	16x 2.5" SAS/SATA	2x 2.5" SAS/SATA	8x 2.5" SAS

Attribute	Sun Fire X4240	HP DL385 G6	Dell R805	IBM x3655
	8x 2.5" SATA SSD	6x 3.5" SAS/SATA		6x 3.5" SAS/SATA
RAID	RAID 0,1,5,6	RAID 0,1,5	RAID 0,1	RAID 0,1,5,6
GigE Ports	4	4	4	2
I/O Slots	6x PCIe	6x PCIe	4x PCIe	4x PCIe
Hot Swap PSU	2x 1050W	No, 2x 1200W	No, 2x 700W	2x 835W
Hot Swap Fans	Yes	No (Redundant)	No (Redundant)	None
Lights Out Manager	iLOM 2	iLO2	IPMI 2.0 (add-on option)	IPMI 2.0 (add-on option)
Warranty	3 Yr NBD	3 Yr NBD	3 Yr NBD	3 Yr NBD

How to Beat Your Competition

Visit <http://competitive.central> (or MySales > Systems > Competitive) for a broad range of tools available to counter competitive claims.

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