Sun Fire™ E2900 Server

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Chapter 1: Sun Fire™ E2900 Server Positioning

Introduction

The Sun Fire™ E2900 server is first entry-priced, midrange data center server built to Sun's Throughput Computing Strategy. Based on the the dual-threaded UltraSPARC™ IV processor, Sun's first Chip Multithreading (CMT) processor, the Sun Fire E2900 offers more than twice the throughput of prior UltraSPARC™ III based systems in the same footprint.

At the heart of the Throughput Computing strategy is Chip Multithreading (CMT) that enables the processor to execute tens of threads simultaneously, thus enabling tremendous increases in application throughput. The first generation CMT processors--the UltraSPARC IV family of processors-- can more than double UltraSPARC III system throughput. Ongoing UltraSPARC IV development is expected to increase throughput performance by as much as 3 to 4 times current UltraSPARC III levels.

The UltraSPARC IV processor is the fourth generation UltraSPARC processor and it maintains Sun's tradition of binary compatibility, preserving the investment customers have made in development tools and application software, and it will also help current Sun Fire V1280 server customers preserve the investments made in their systems.

This investment protection is a cornerstone of the entire product line. The current UltraSPARC III based Sun Fire V1280 can be upgraded with UltraSPARC IV processor boards, and the Sun Fire E2900 server can be configured to mix customers' existing UltraSPARC III boards with new UltraSPARC IV boards.

A high-performance, low cost datacenter server for enterprise network computing, the Sun Fire E2900 rack-optimized server is designed to be flexible, scalable, and dense. The Sun Fire E2900 server is ideal for medium and large enterprises which use large numbers of servers in a data center environment, or other environments where high performance, low cost, and rack density are important.

The Sun Fire E2900 server may be configured with up to twelve processors, running Solaris™ Operating Environment, version 8, 9, or 10. As always, existing applications running on earlier versions of the Solaris platform are fully compatible with the Solaris OE running on the Sun Fire E2900 server.

The Sun Fire E2900 server is ideal for applications that require more processing power than available on previous generations of UltraSPARC II or III based rack-optimized servers, such as the Sun Enterprise 4500 server or Sun Fire V1280 server. It incorporates many reliability, availability,and serviceability (RAS) features, such as hot swap CPU/memory boards using Dynamic Reconfiguration, hot swap power supplies, disks and fans and has alarms and Lights Out Management. All systems have redundant (2N) power supplies with independent power cords. The Sun Fire E2900 server incorporates "smart fans," which speed up if necessary to improve cooling when higher temperatures are experienced.

The Lights Out Management (LOM) module provides remote monitoring and administration capabilities independent of the Solaris Operating Environment. Higher system availability may be achieved by clustering two or more Sun Fire E2900 servers. With the emphasis on availability and reliability, the Sun Fire E2900 server is a prudent choice for many mission critical applications.

Basic Features

Processors	4, 8, 12 UltraSPARC IV @ 1.05GHz, 1.2GHz, 1.35GHz
Cache/processor	16MB
Memory	16GB or 32 per board, 96GB system maximum
Network	2 x GbE
Disk	2 x 73GB SCSI (146GB available as x-option upgrade)
PCI	6 x ½ length slots; 1 x 66MHz / 64 bit, 5 x 33MHz / 64bit
Height	12RU
Depth	22" (558mm)
Ports	2 serial; 1 reserved, 1 for LOM
RMM	DVD-ROM, optional DAT72 tape
Power	2N AC or DC, hot swap
Fans	Smart, hot swap
Software	Solaris 8, 9, or 10; System firmware; SunCluster; LOMLite

Product Family Placement

The goals of the Sun Fire E2900 Server team were to build a server that:

- offers exceptional price/performance
- is highly scalable
- is rack optimized
- incorporates the latest generation UltraSPARC processors, the Sun™ Fireplane interconnect architecture and the Solaris 8, 9, and 10 operating environment technology.

The following chart provides a comparison of the family of Sun Fire midrange data center servers.

	Sun Fire E2900	***Sun Fire™ E4900***	***Sun Fire™ E6900***
Product Positioning	Low cost data center server	Mission critical, data center server	Mission critical, data center server
Packaging	Rack 21" high (12RU), 22" deep	Rack 32" high 17.5 RU, 28" deep	Datacenter Rack 75" high, 24” wide, 53” deep
Typical Environment	Data Center	Data Center, desk side	Data Center
CPUs	4, 8 or 12	4, 8 or 12	4, 8, 12, 16, 20 or 24
Memory	96GB	96 GB	128 GB
System Bus	9.6 GB/sec	9.6 GB redundant	9.6 GB redundant
I/O bandwidth	1.2 GB/sec	3 GB/sec.	6 GB/sec.
Internal Storage	146 GB (292GB x-option)	None	None
Removable Media	DVD, optional DAT72 tape	None	None
PCI slots: @66 MHz @33 MHz	6 short PCI slots 1 5	16 PCI+ 12 4	32 PCI+ 24 8
Domains	1	2	4
Integrated Network	10/100 and two Gbit Ethernet	None	None
Input Power (110/240 VAC)	3300W @ 220V	3920W @220Vmax.	8040W @ 220V max.
RAS Features	Hot swap CPU boards, power supplies, fans, and disks. Redundant power supplies & Fireplane switches. Smart fans. Fault indicators front and back. Lights Out Management.	Hot swap CPU boards, power supplies, fans, and I/O boards. Full H/W redundancy: power, fans, Fireplane switches, & system controllers. Self diagnostics, service indicators on all FRUs	Hot swap CPU boards, power supplies, fans, and I/O boards. Full H/W redundancy: power, fans, Fireplane switches, & system controllers. Self diagnostics, service indicators on all FRUs
Rack Density	24 processors (48 threads) per rack	12 processors (24 threads) per rack	24 processors (48 threads) per rack
Uniboard support	No	Yes	Yes
Mixed speed CPU support	Yes with US III 900MHz & 1.2GHz CPU boards	Yes with US III 900MHz, 1.05GHz & 1.2GHz CPU boards	Yes with US III 900MHz, 1.05GHz & 1.2GHz CPU boards
Backwards upgradability	Yes to Sun Fire V1280	Yes to Sun Fire E4900	Yes to Sun Fire E6900

	Sun Fire E2900	*Sun Fire™ E4900*	*Sun Fire™ E6900*
Warranty	Duration: 1 year Phone support: M-F, 8AM-5PM Hardware response time: next business day On-site hours of coverage: M-F, 8AM-5PM Delivery method: repair on-site Call-back response: 8 hours Software installation and media support: 90 days	Duration: 1 year Phone support: 7 x 24 x 365(including holidays) Hardware response time: 4 hour average On-site hours of coverage:7 x 24 x 365 (including holidays) Delivery method: repair on-site Call-back response: Customer Defined Priority Replacement of defective media or missing documentation	Duration: 1 year Phone support: 7 x 24 x 365(including holidays) Hardware response time: 4 hour average On-site hours of coverage:7 x 24 x 365 (including holidays) Delivery method: repair on-site Call-back response: Customer Defined Priority Replacement of defective media or missing documentation
Minimum O/E	Solaris 8 2/04 Solaris 9 4/04 Solaris 10	Solaris 8 2/04 Solaris 9 4/04 Solaris 10	Solaris 8 2/04 Solaris 9 4/04 Solaris 10
Minimum Firmware	5.17 for 1.05/1.2GHz 5.18.1 for 1.35GHz	5.16 for 1.05/1.2GHz 5.18.1 for 1.35GHz	5.16 for 1.05/1.2GHz 5.18.1 for 1.35GHz

Comparison Sun Fire E4900 & E6900 vs. Sun Fire E2900

The previous chart details many of the physical aspects which differentiate the Sun Fire E2900 server from the Sun Fire E4900 and E6900. The following chart focuses on market segmentation relative to the management and operations staff.

Criteria	***Sun Fire E4900 and E6900***	***Sun Fire E2900***
Focus	Highest performance and RAS, mission critical data center applications	Highest price/performance, rack optimized, tier 2 & 3 data center applications
Scope	Enterprise-wide	Enterprise-wide
Hardware Availability	99.9 - 99.99% - depending upon configuration, i.e. domains and clustering	Typically 99.9%+, depending on configuration, clustering, etc.
Storage	Centralized	Integrated boot disks, DVD and optionally tape; connection to external arrays
Backup	Centralized via network	Centralized
Connectivity	Broad range of connectivity options; Hot swap or non-hot-swap PCI; large number of IO ports. User choice of SCSI or FC-AL attachment via optional PCI cards	Smaller, focused IO capability; integrated Ultra3 SCSI; smaller number of PCI slots; no hot swap for PCI
Price Consideration	Priority 2 or 3 after performance and availability	High priority with performance, rack density, and availability
Response time expected	Critical, Service Level Agreements (SLAs), Domains guarantee dedicated resources to particular applications	Either lower expectation of response time or achievement of critical SLAs via clustering
Management	Centralized	Centralized
Upgrades/security	Planned activity	Planned activity
Performance	Highest performance with • fast processors • large L2 cache • large memory • $\geq$ 2X IO bandwidth	Excellent performance with • fast processors • large L2 cache • large memory • IO bandwidth 1.2GB/sec • two GbE network ports

Key Messages

High-performance UltraSPARC IV Processors

- Double the number of compute threads in the same footprint as the Sun Fire V1280
- 64 bit SPARC® architecture that may be upgraded to take advantages of extensions to the microprocessor family
- Supports mixing different speed CPU boards in same system for enhanced investment protection
- 16 MB of external (L2) cache per processor
- Numerous on-chip caches for enhanced performance
- Binary compatibility with previous SPARC processors, thereby providing ease of migration for existing applications

Scalability and Performance

- Offers 4, 8 or 12-way multiprocessing system based upon boards containing four processors and memory
- 9.6 GB/sec., Sun Fireplane Interconnect (system bus)
- Large and multiple concurrent data accesses from memory, i.e. 512 data bits per access, ECC protected
- Integrated SCSI disk subsystem with capacity for two 73 GB disks (or two 146GB disks as x-option) and one external SCSI port
- Large memory capacity allowing high performance through data-in-memory applications

Integrated Controllers

- Integrated UltraSCSI 3 LVD disk controller, two Gbit Ethernet ports, 10/100 Ethernet (dedicated to LOM), DVD and serial port
- Saves PCI slots for user -selectable controllers
- Cost effective, familiar to those migrating/expanding from the PC environment

I/O Subsystem

- 2.4 GB/sec. throughput architectural capability; 1.2GB/sec implementation in this version of the product
- Integrated controllers and user selectable PCI cards distributed across four independent PCI buses to minimize contention among controllers and maximize processing capabilities
- PCI based controllers provide industry standard, economical I/O adapters

Operating Environment

- Rack-optimized
- Designed to integrate with external arrays, SAN or NAS
- Compact size
- Many features for higher levels of availability and ease of management, hot swap power supplies, disks and PCI slots, smart fans and Lights Out Management (LOM)

Key Features and Benefits

Features	Benefits
• Up to twelve 1.05, 1.2GHz, or 1.35GHz UltraSPARC IV processors, each with 16 MB external (L2) cache	• UltraSPARC IV technology offers twice the performance capability compared to previous UltraSPARC III processors
• Up to 96 GB memory	• High throughput and low response times may be achieved by keeping data in memory.
• Integrated Ultra3 SCSI storage subsystem	• Provides capacity for boot disk (which could be mirrored with software) and extended with external disk arrays.
• Integrated two 10/100/1000 Mbit Ethernet (copper), SCSI disk controller and serial ports	• Reduces the cost of the most commonly required I/O interfaces and optimizes the use of PCI slots. Well suited to a high performance network environment.
• Multipathing to storage and networks, optional	• Higher availability to data and networks as well as possibly higher bandwidth/throughput. Fewer disruptions for users means more effective processing as well as ability to participate in a data center environment at a lower cost.
• Sun Fireplane Interconnect operating at 9.6 GB/sec.	• High bandwidth interconnect insures scalability with minimal contention and latency between processing and I/O subsystems

• 6 short PCI slots, 1 at 66 MHz, 64 bit wide and 5 at 33 MHz, 64 bit wide	• Allows users to configure systems according to their needs with additional network and storage adapters. Helps eliminate contention among peripheral controllers thereby maximizing processing capabilities. Ability to add functions such as encryption.
• Hot swap processor boards, disks, fans and power supplies	• On-line maintenance and repair enhances system availability
• 2N power supplies with single input power cords.	• Enhances system availability by masking an individual failure of a power supply or power source. Enables servicing of power sources while system remains running.
• Lights Out Management (LOM)	• Monitors and reports system and component status. Allows remote management via network, serial or modem connection. Reduces the overall cost of system management.
• SunCluster support	• Enhances availability. Facilitates incremental growth with full utilization of previous investments. Facilitates resource sharing.
• Solaris 8 (2/04), 9 (4/04), & 10	• Provides full compatibility for binary applications across the UltraSPARC product line. Offers users a most flexible, feature rich, resilient operating system. Excellent availability, particularly compared to PC operating systems.

Target Users

The Sun Fire E2900 Server was designed as a general purpose rack-optimized server capable of meeting the needs of a wide range of industry applications, users and environments. This four to twelve-way multiprocessor, combined with two gigabit Ethernet ports and 9.6 GB/second interconnect, ensures scalability for compute-intensive applications as well as I/O-demanding applications such as database and Web serving.

Target Industries

The following table indicates some possible industries and applications that the Sun Fire E2900 can serve, but is not comprehensive.

Target Markets	*Applications*
Financial Services • Insurance • Stock and commodity traders • Banking	Most data center applications including customer relationship management (CRM), data base, OLAP, portfolio analysis, application server; front and back office applications
Service Providers • Internet Service Providers • Network Providers • Portals • Commerce Providers • Application Service Providers	All aspects of Internet capabilities including access, web hosting, and supporting on-line merchants and service providers, i.e. order processing, scheduling, call center tracking, etc.
Manufacturing • Discrete manufacturing • Process manufacturing	IT, Finance and Accounting, Human Resources, ERP/MRP solutions, Supply Chain management, Engineering, Sales & Marketing, Customer Service, and Electronic Commerce
Telecommunications and Internet Services	Internet HTTP, email, FTP, directory servers, and electronic commerce and message switching
Retail	Back office (data center) electronic retail systems, merchandising systems, inventory management, distribution, and electronic commerce, CRM
Healthcare • Hospitals and Clinics • HMOs and Managed Care Providers • Medical equipment OEMs	Patient records, billing, claims processing, medical imaging systems, picture archival, and communications systems
Education	Registration and student records, financial aid administration, academic research, repositories for data from research
Scientific/Research/Analysis (Compute Farms) • **EDA** • **MCAD**	High performance applications, MCAD, EDA, CFD (computational fluid dynamics), simulation and modeling, statistical analysis, scientific research, departmental repositories; grid computing

Target Applications

Applications	*Key Features to Highlight*
Database or Digital Media Management	• Storage capacity (multiple 1 TB external with SANs) • Outstanding storage performance with Ultra3 SCSI • Exceptional network connectivity and I/O bandwidth
Transaction Processing (TP)	• Balanced computational and I/O capacity • Storage I/O and Network I/O performance • Robust development environment • Scalable operating system

Applications	*Key Features to Highlight*
E-mail **Web Mail Services** **Internet Gateway**	• Connectivity with heterogeneous systems and networks • Exceptional scalable multithread performance • Exceptional total system throughput
Decision Support • Online analytical processing	• Scalable computing power • Storage capacity and storage I/O performance
Groupware, Collaboration • Lotus™ Notes	• Enterprise networking and PC interoperability • Supports hundreds of UNIX® or PC clients
Internet • Internet Providers • Application Service Providers	• Secure, reliable and cost effective • Sun Fire E2900 server works extremely well in a rack optimized environment, typical of Service Providers • Two gigabit Ethernet connections provides high network bandwidth • Sun is a leading Internet provider
Interoperability	• PC Netlink
Compute Intensive • ECAD • CFD • Simulations • Grid Computing	• Large memory with low access latency • High system bandwidth • Scalability from 4 to 12 processors • Multiple processors efficiently manage independent streams for faster job completion

Chapter 2: Selling Highlights

Market Value Proposition

- UltraSPARC IV nearly doubles the compute performance extending the processing capabilities beyond previous generations on an individual processor basis.
- The Sun Fire E2900 Server is the market leader in rackability, with shallow depth, industry leading density, cable arms, in-rack servicing, front-to-back cooling and status lights front and back.
- The hot swap CPU/memory boards improve availability by allowing on-line expansion, upgrades, and servicing.
- Support for Capacity On Demand (COD) enabling single-CPU increments to maximize system utilization and minimize hardware, software, and service costs by using & paying for only the exact number of processors required.
- The two integrated gigabit Ethernet ports provide the high speed connection required by today's networks.
- The two internal disks provide boot capability (optionally extended to software mirroring) and work well in the growing SAN / NAS / disk array environment.
- Small physical size allows two Sun Fire E2900 server to be deployed in two or four post racks from 24" (600mm) deep and up.
- The Sun Fireplane interconnect helps insure scalability and minimal latency for applications and workloads across the range of 4 to 12-way multiprocessing systems.
- The integrated I/O controllers provide the most commonly used interfaces at low cost without consuming valuable PCI slots.
- The integrated boot disks and DVD and optional tape drive avoid the need for an external media tray.
- Hot swappable components such as processor boards, disks, power supplies and fans help maximize system availability by allowing maintenance and upgrades to occur during normal operations.
- Smart fans speed up to compensate for unusually high temperatures or for degradation in the performance of any one fan. In combination with alarms, this minimizes the prospect that high temperatures or fan failure will cause unscheduled system down time.
- Lights Out Management (LOM) offers sophisticated CLI (command line interface), diagnosis and console access via network/Ethernet, serial port or modem connections. LOM facilitates remote and/or centralized management of systems, thereby encouraging faster and more convenient response.
- There are redundant power supplies and independent power cords. The system has four power supplies, any two of which are sufficient to run a fully configured system. This allows for failure of any two power supplies *or* of any one power source (of two) and the system will continue to run.

Applications

Please refer to the Section entitled *Target Industries* above and the associated chart.

Compatibility

The Sun Fire E2900 server runs the Solaris 8 (2/04), Solaris 9 (4/04), and Solaris 10 Operating Environments for which thousands of applications are available.

Compatibility with the Solaris Operating Environment brings with it the ability to run any existing Solaris application developed for the SPARC 32-bit or 64-bit processor architecture. The same application programming interfaces (APIs) and the same application binary interface (ABI) in previous versions of Solaris Operating Systems exist in Solaris 8-10 Operating Systems running on the Sun Fire E2900 server. Customers can also take advantage of the Solaris Application Guarantee program to enable a smooth migration from previous versions of Solaris or earlier versions of the SPARC processor architecture. See Chapter 5 later in this document for details.

The Sun Fire E2900 server is fully compatible with existing Sun servers and may coexist in networks and/or within a Sun Cluster. See Chapter 8 later in this document for supported Sun PCI adapters, storage, and other options.

Chapter 3: Enabling Technology

UltraSPARC IV Microprocessor

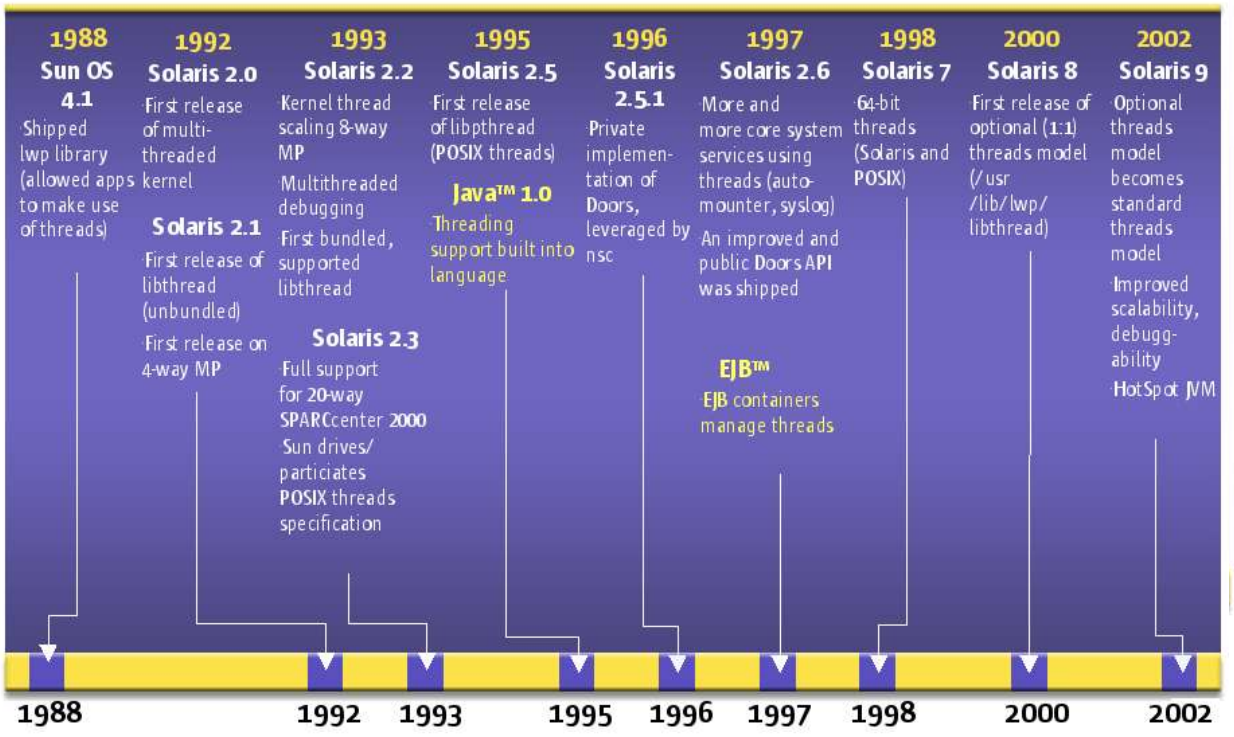
Chip MultiThreading

The UltraSPARC IV introduces Chip MultiThreading (CMT) technology into Sun's mid-range and high-end server products. It doubles the peak throughput of these systems via a dual-core architecture, while preserving the customer's investment in existing systems and software.

UltraSPARC IV is part of the first wave of processors from Sun able to significantly improve the aggregate throughput of systems by exploiting the fact that network computing workloads consist of many threads that can execute in parallel. With multi-core designs our hardware takes advantage of a software trend that's been gaining momentum for the past 15 years. Multithreading has now become so pervasive in the software environment that it is now a given almost anywhere in the network computing environment. All new UltraSPARC processors under development will provide Chip MultThreading capability. To support this, Sun has developed an architectural specification for CMT processors, ensuring a common set of features and functions for handling multiple hardware threads.

Threaded workloads are not new at Sun. Sun starting providing support for threads all the way back in SunOS. 4.1 in 1988. By the time Sun introduced Java in 1995, threads were treated as a given, and became an intrinsic part of the Java language. Sun has continued to both deepen and broaden support for threads in software. Threads are now literally everywhere in both the Solaris O/E and Java software. Given today's growing transistor budgets, it makes good business sense to build processors with multithreading capability.

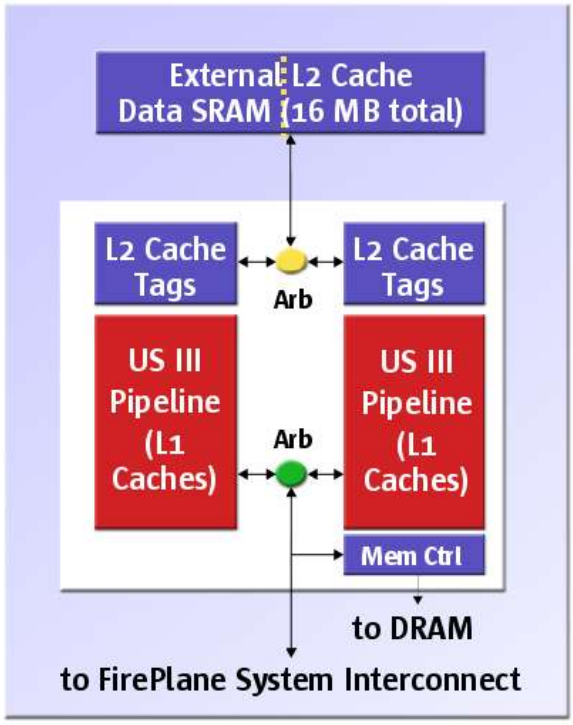
Figure 3-1: Sun history of multithreading support



UltraSPARC IV

UltraSPARC IV consists of two UltraSPARC III cores, or pipelines, each complete with its associated Level 1 cache, and on-chip tags for 8 MB of off-chip Level 2 cache. Access to the 16 MB of off-chip cache data is shared, with the 2 cores arbitrating for access to the Level 2 cache bus. However, the off-chip cache data itself is not shared – rather, each core enjoys exclusive access to its own 8 MB half of this cache. As with the UltraSPARC III, there is a memory controller and a shared interface to the Sun Fireplane system interconnect. The arbitration scheme used for all the shared system resources in UltraSPARC IV ensures that each core receives fair access to these resources.

Figure 3-2: UltraSPARC IV

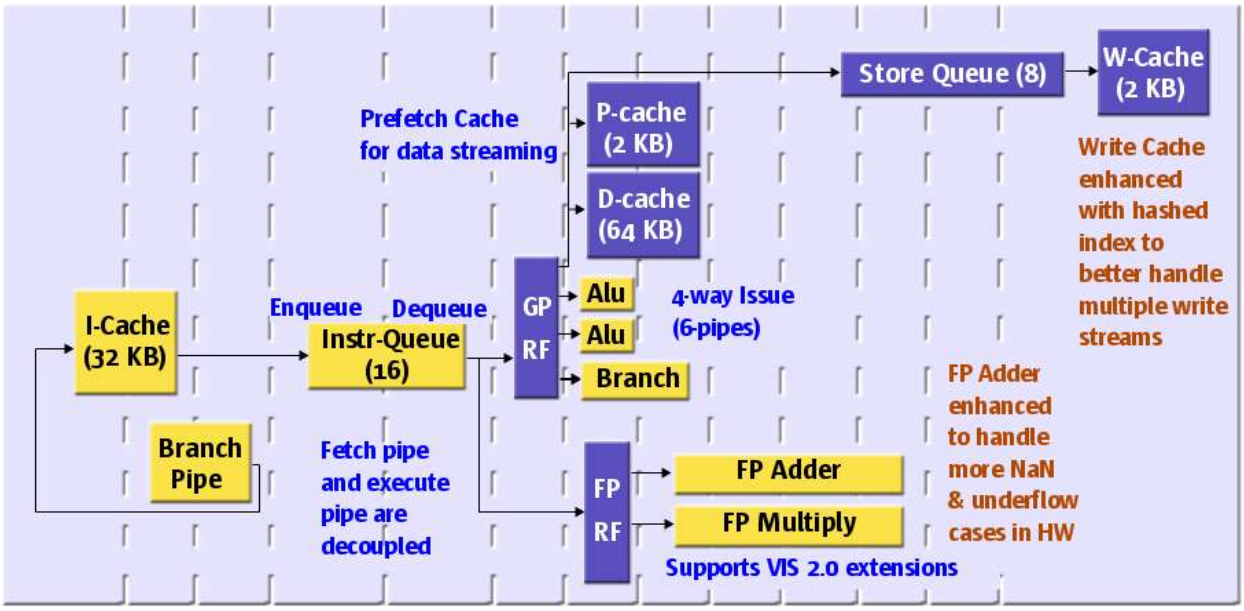


UltraSPARC IV execution pipeline

The UltraSPARC IV uses the same pipeline as the UltraSPARC III, as shown in the Figure 3-3. The left part of the pipe handles instruction fetch and branch prediction, the right part of the pipe handles instruction execution and result retirement. The two parts of the pipe are decoupled by a 16-entry instruction queue. Data comes out of a 64 KB L1 data cache. Floating-point data can also come from a small 2 KB prefetch cache used to stream data. Stores are decoupled by an 8-entry store queue, and use a 2 KB write cache to exploit spacial and temporal locaility in the store stream, greatly reducing write-through traffic to the Level 2 cache.

UltraSPARC IV makes two significant enhancements to the UltraSPARC III pipeline. First, the FP Adder execution unit has been redesigned with additional logic to handle some uncommon cases directly in hardware, notably cases related to NaN and underflow. Second, the write cache has been redesigned to provide a hashed index, enabling it to better handle multiple write streams. For some applications, one or the other of these enhancements will usually provide notably better performance when running on an UltraSPARC IV processor than when running on an UltraSPARC III processor.

Figure 3-3: UltraSPARC IV execution pipeline

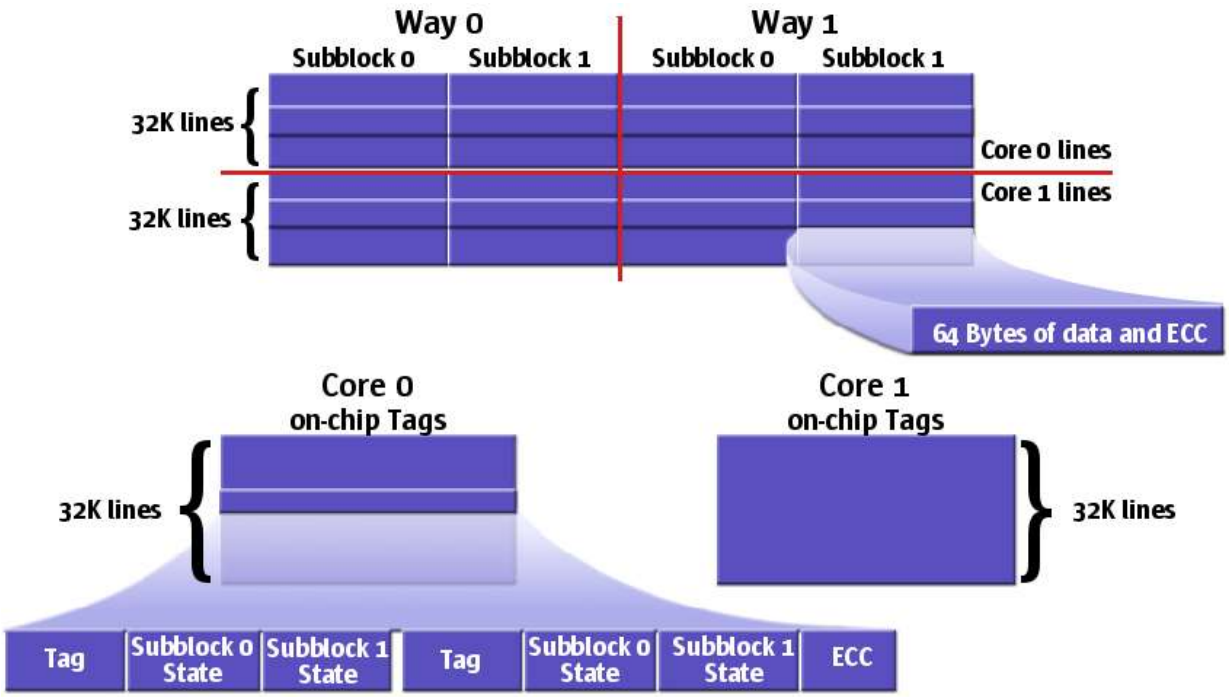


UltraSPARC IV Level 2 cache

The Level 2 cache in UltraSPARC IV, like the Level 2 cache in UltraSPARC III, provides fast hit/miss determination at CPU frequencies through on-chip tags and provides large data capacity through off-chip SRAM. Improvements to the Level 2 cache scheme in UltraSPARC IV include a shorter line length of 128 bytes (composed of two 64-byte sub-blocks), vs. the 512-byte (8eight sub-blocks) line used in UltraSPARC III. This substantially reduces sub-block contention. Further, the pseudo-random line replacement scheme used in UltraSPARC III has been upgraded to a more sophisticated LRU scheme. The Level 2 bus has adequate bandwidth to support most applications with both cores running at full speed. A dynamic arbitration scheme ensures that each core receives its fair share of the available bandwidth when both cores compete for the bus, while enabling a single core to use maximum bandwidth when appropriate.

The Figure 3-4 shows some detail on the physical structure of the Level 2 cache. As you can see, the 16 MB of physically united off-chip cache data is logically divided, with each core allocated its own block of 32K sets of lines, with each set divided into two ways, and with each line divided into two 64-byte sub-blocks. The 64-byte sub-blocks are the units actually used for purposes of line fill and coherency. Corresponding to the structure of the off-chip data are the on-chip tags, which also consist of a block of 32K sets of lines for each core, with each set consisting of separate tags for the two ways of the cache. Separate state fields are then provided for the two sub-blocks in each way. Finally, there is a set of ECC check bits for the line.

Figure 3-4: UltraSPARC IV Level 2 cache structure

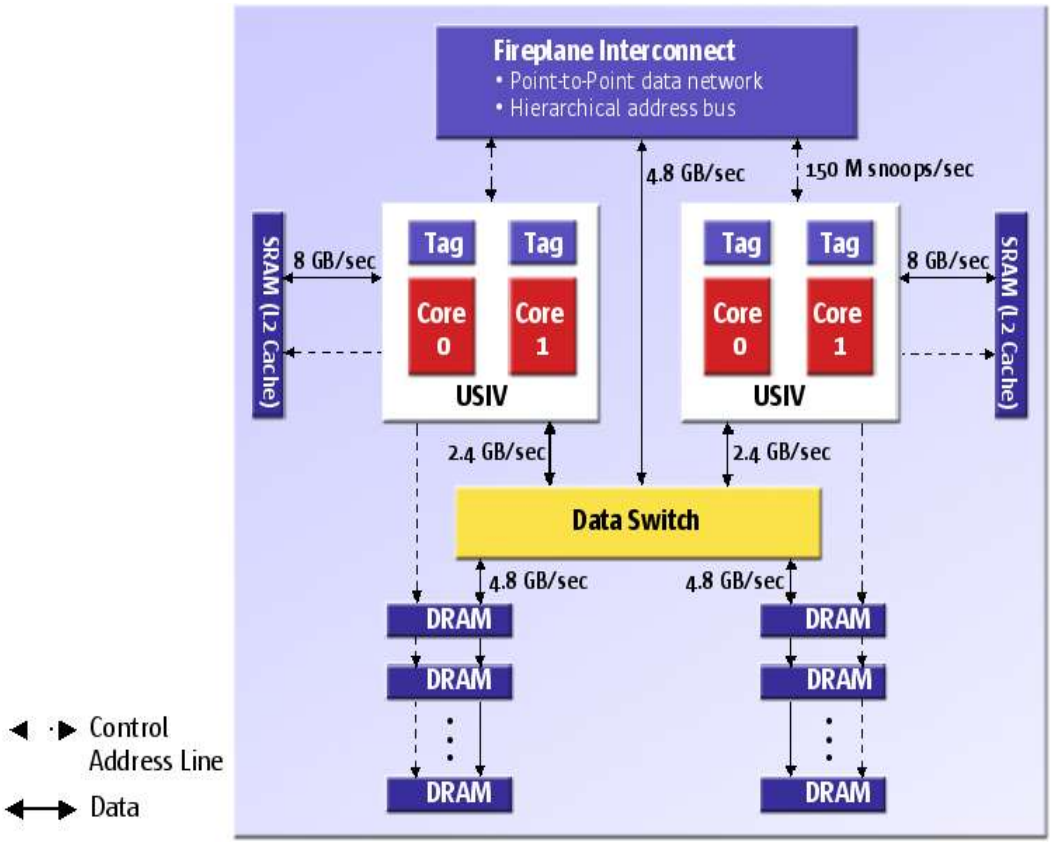


UltraSPARC IV system interface

The above graphic illustrates how an UltraSPARC IV fits into a Sun Fireplane interconnect-based system. Memory address and control signals go directly from the on-chip memory controller to DRAM. However, all data traffic--both to and from memory and from the Sun Fireplane point-to-point interconnect fabric--is routed through a dual-processor data switch. This high-performance switch can handle up to 19.2 GB a second of aggregate data from two processor chips, the Sun Fireplane interconnect, and memory. In addition, each processor has a separate 8 GB/second interface to its Level 2 cache data. Each processor also has a separate address bus to the Sun Fireplane interconnect, able to support up to 150 million coherency transactions a second. Like the UltraSPARC III processor, the US IV processor directly supports snoopy cache coherency, directory-based cache coherency, or a hybrid of the two.

In addition to the Level 2 cache interface, the shared system resources on the processor chip include the memory controller and the interface to the Sun Fireplane system interconnect. The on-chip memory controller provides up to 16 GB of DRAM per processor, shared between the two cores. From the standpoint of the Fireplane bus, the two cores appear as a single client. Each core `has its own unique interrupt ID, allowing it to be managed individually.

Figure 3-5: UltraSPARC IV System interface

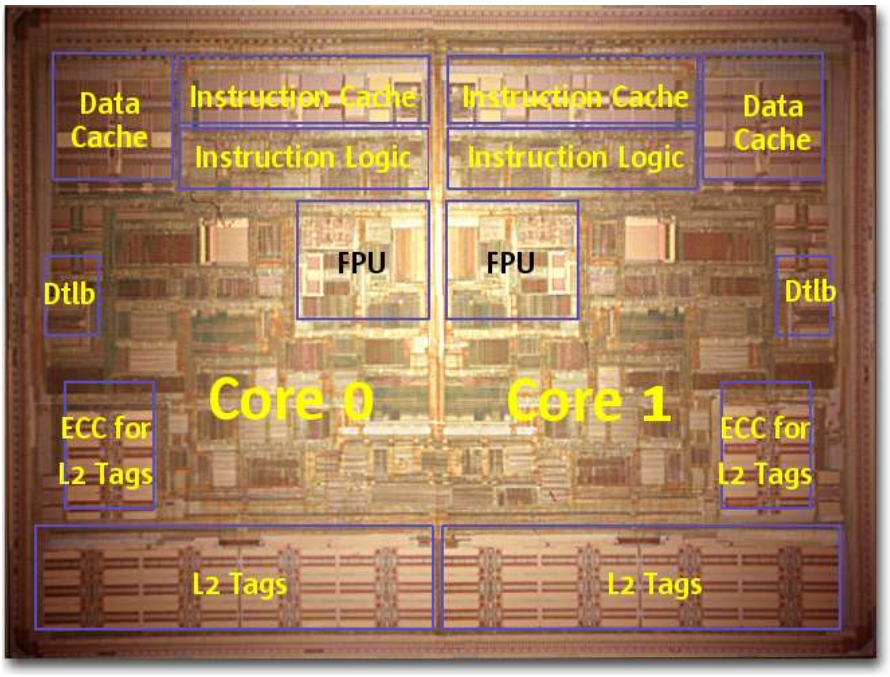


UltraSPARC IV chip technology

UltraSPARC IV, the first member of the UltraSPARC IV processor family, is built in Texas Instrument's 130 nm technology. The chip has about 66 million transistors, with 7 layers of Cu interconnect. The die is about 356 square millimeters. Frequencies for the UltraSPARC IV family started where UltraSPARC III processors topped out at 1.05GHz & 1.2 GHz, and now stand at 1.35GHz, but will continue to increase over time. Maximum power consumption at the initial 1.2 GHz frequency, using a 1.35 volt core supply, is about 100 watts with both cores in operation.

As you can see in the die photo below, the two identical cores that comprise the bulk of the chip are oriented to be mirror images of one another. This placement proved optimal for minimizing routing congestion to the central area of shared logic. Mirror image placement put the two floating point units next to one another, creating a potential hot spot on the die. To dissipate the heat in this area, extra bumps were placed on top of this part of the chip.

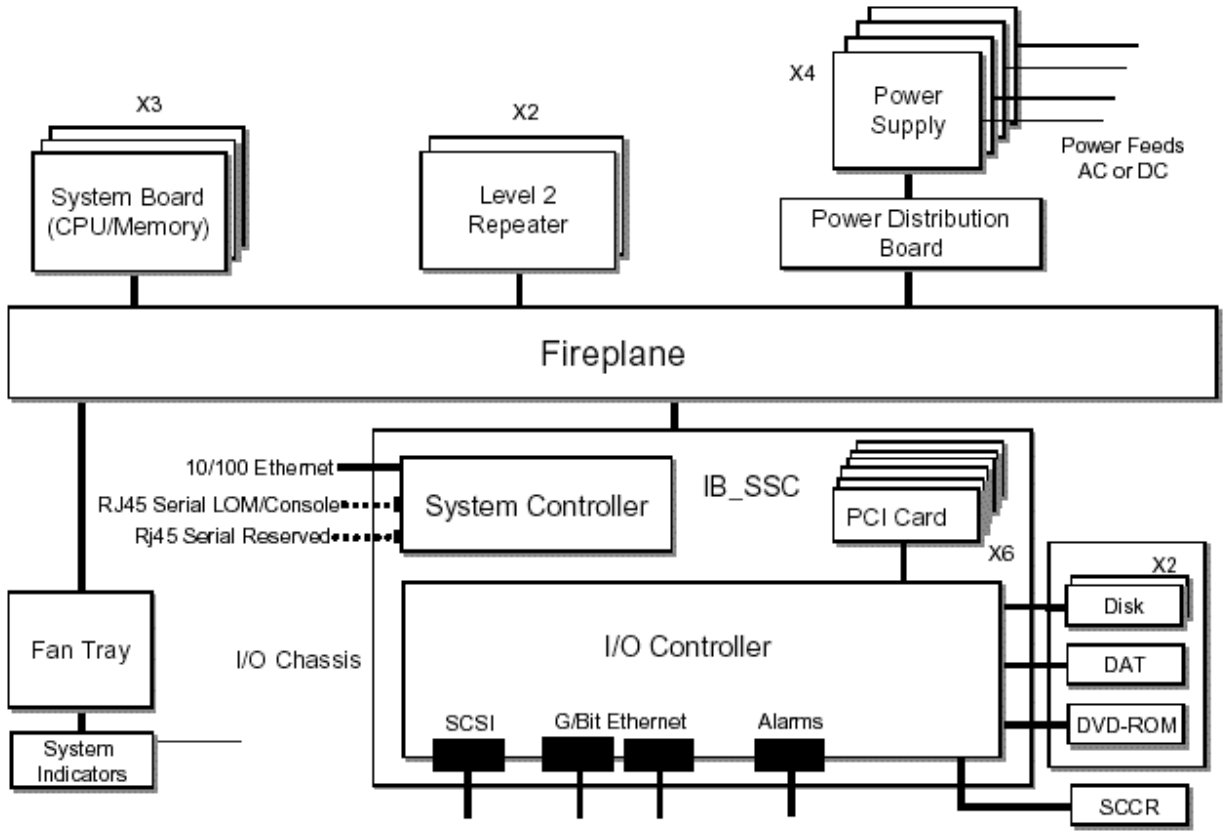
Figure 3-6: UltraSPARC IV die photo



The US IV die is packaged in a 1368-pin ceramic Land Grid Array. This is the same package used for our UltraSPARC III processors

Chapter 4: System Architecture

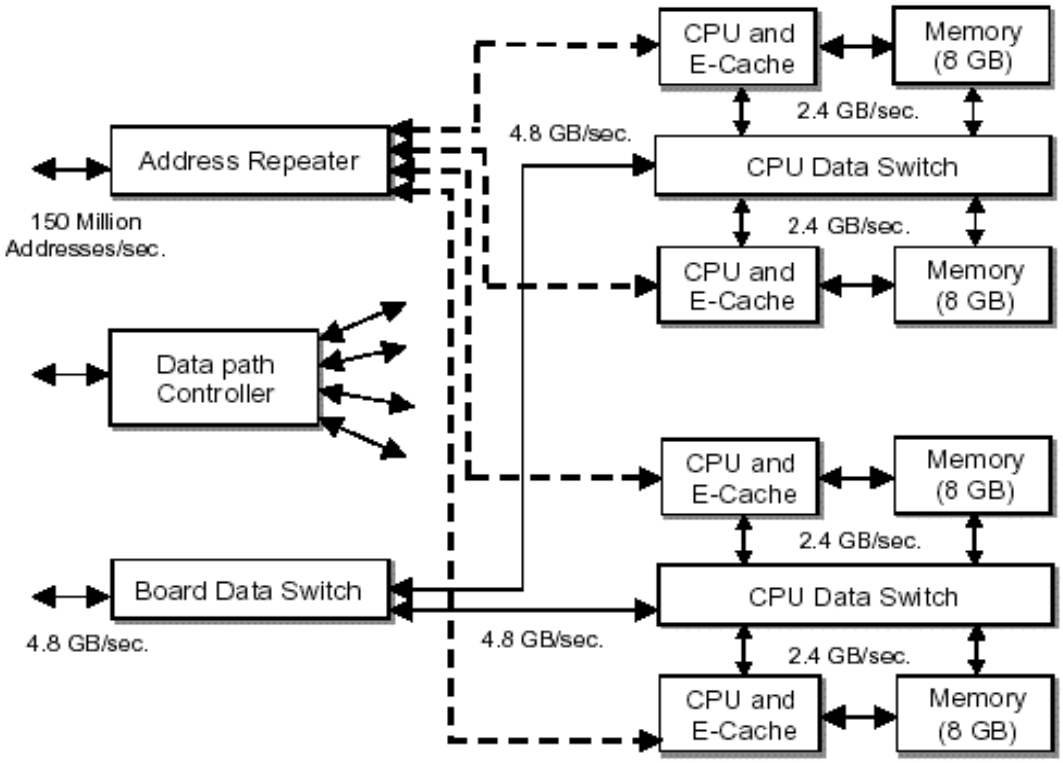
Figure 4-1: Sun Fire E2900 system architecture



CPU/Memory Boards

The Sun Fire E2900 server can accommodate up to twelve UltraSPARC IV processors populated on three CPU/memory boards. Each board includes four processors, all cache, and main memory. While all of the processors on a single CPU/memory board must be the same speed, other CPU/memory boards within the system may use processors clocked at a different speed. This mixed-speed CPU support results in better investment protection when upgrading by precluding the need to replace all of the existing processors in a system. The block diagram of the CPU/memory board used in the Sun Fire E2900 servers is shown below. Address and control paths are illustrated with dashed lines, and data paths with solid lines. The interconnect components on the left connect to the Sun Fireplane interconnect switch boards. The bandwidths shown are the peak at each point on the board.

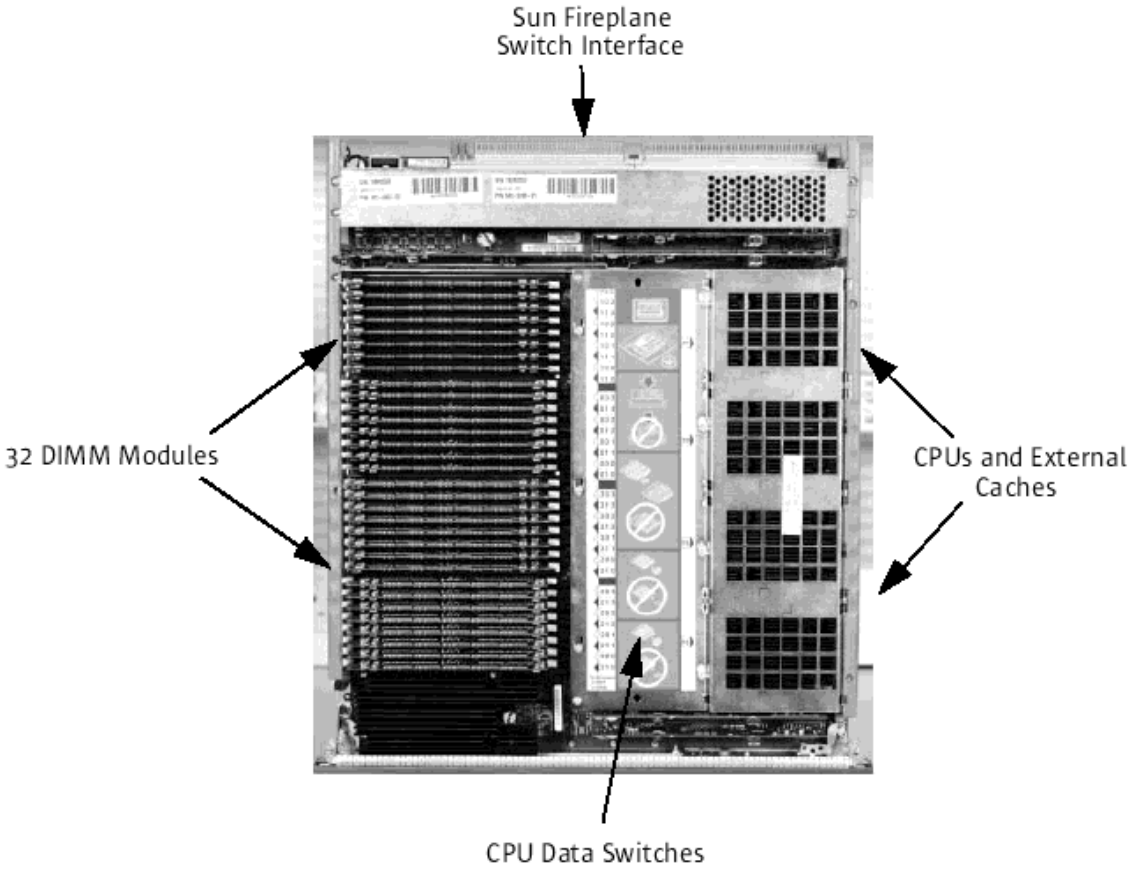
Figure 4-2: CPU/memory board block diagram



Memory

Memory is distributed across the processor boards with each processor controlling a portion of the total memory. In order to minimize latency, the memory controller is integrated into the processor chip. Latency to non-local memory is substantially less than that incurred by more traditional approaches that utilize a single, external memory controller for all accesses. SDRAM DIMMs (Dual In-line Memory Modules) are used. There are 32 DIMM sockets per CPU/memory board, divided into four groups of eight DIMMs each. Two sizes of DIMM modules are available: 512 MB & 1 GB, yielding 16GB and 32GB board options for a maximum of 96 GB in a twelve-processor system. To increase memory system performance, the design employs a wide, dual 576-bit memory architecture. DIMMs must be added to the system in groups of four. Each group must use the same size DIMMs, although different sized groups may be used. Because the memory controller circuitry is required to access memory, and is embedded in the CPU, there must be a processor in the processor slot associated with each memory bank. Memory interleaving is a function of the number of DIMMs and their capacity relative to other memory groups on the quad-CPU/memory board. Interleaving is implemented on a 64-byte boundary to coincide with the width of the memory data bus. If successive accesses alternate between two distinct logical groups, the sustainable bandwidth is 1.6 GB/second. When the access pattern involves four logical groups, the sustainable bandwidth is 2.4 GB/second. The memory subsystem is capable of supporting up to four GB per memory group, allowing a total capacity of 32 GB with a four-way interleaving system.

Figure 4-3: Fully configured CPU/memory board (32 GB memory and four CPUs)

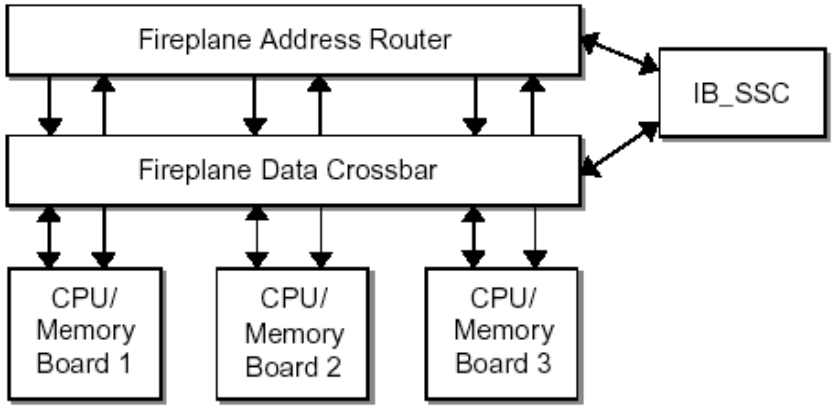


Sun Fireplane Interconnect (System Bus)

Along with the rest of the Sun Fire E2900-E25K family, the Sun Fire E2900 is based on the Sun Fireplane interconnect. The Sun Fireplane interconnect has two interconnects, one for address transactions, and the other for moving data. Data is moved only when responding to an address transaction request. The peak system bandwidth of 9.6 GB/second is determined by the system address bandwidth of 150 million addresses per second times the cache line width of 64 bytes.

The address repeater ASIC on each CPU/memory board and the IB_SSC collects address requests from the processors or IB_SSC. These board-level address repeaters send address transactions to the address repeater on a Sun Fireplane interconnect switch board. The interconnect is a tree-structure of point-to-point connections. Multiple parity bits are used to detect errors on the address interconnect.

Figure 4-4: Sun Fireplane Interconnect



A new address can be sent to all the of the processors and the IB_SSC every system clock. All system units see each address at the same time, and reply whether or not they have the requested item in local caches. Each processor also has an embedded SDRAM controller, which controls accesses to its local SDRAM memory.

The address and command structure of Sun Fireplane interconnect is based on a five-port crossbar switch. The address and command lines are extended through two levels of repeaters that preserve the bus model. The Sun Fireplane interconnect is a 288-bit bus implemented inside a set of four identical ASICs. This approach couples a wide data path with a high clock frequency of 150 MHz. The connection between devices (UltraSPARC processors and a custom I/O bridge) and the crossbar ASICs use a point-to-point model that allows the best possible clocking rate for chip-to-chip communication. The crossbar ASICs also provide a switch between the internal data bus and the processor.

With the bus model of the Sun Fireplane interconnect, the need for a centralized arbitration is eliminated, and control is distributed among all attached devices. The arbitration for the address and control lines is performed simultaneously by all devices, with the added benefit of reducing latency.

Cache Coherency

To maintain the high level of performance demanded by today's applications, Sun Fire systems use external cache located on the processor module. Data that has been recently used, or for which impending use is anticipated, is retrieved and kept in cache memory closer to the processor that will need it. In a multi-processor, shared-memory system, the task of keeping all of the different caches within the system consistent requires assistance from the system interconnect.

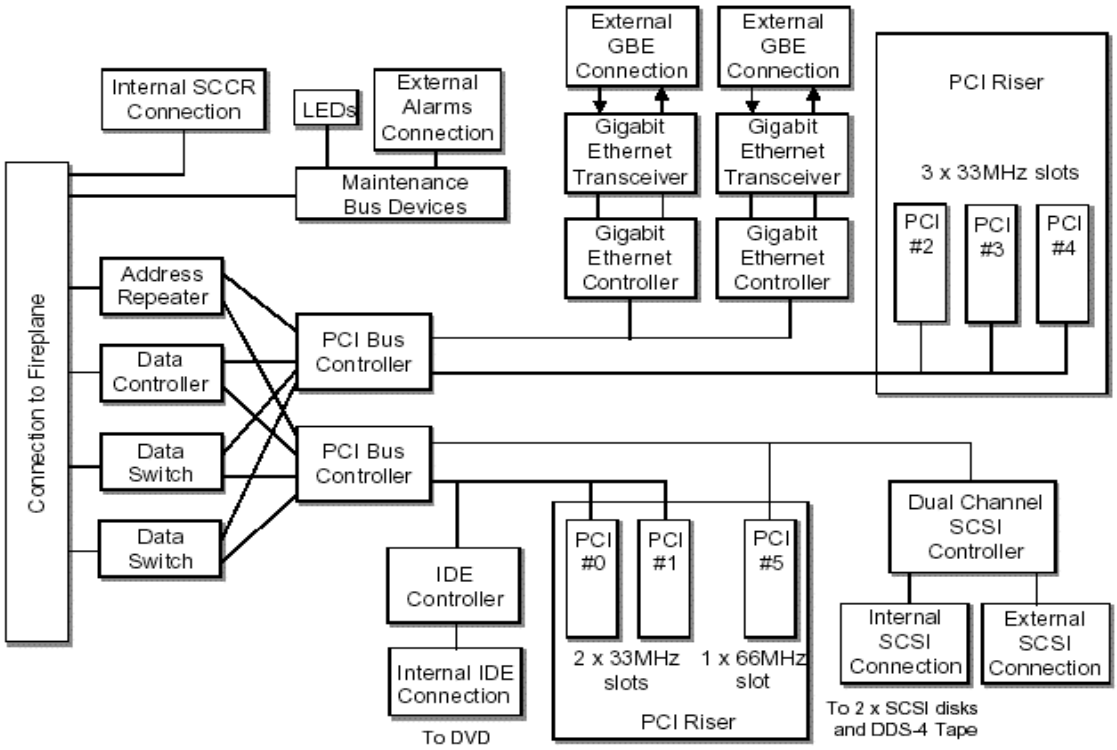
The Sun Fireplane interconnect implements cache coherency through a technique known as snooping. With this approach, each cache monitors the addresses of all transactions on the system interconnect, watching for transactions that update addresses it possesses. Since all processors need to see the

broadcasted addresses on the system interconnect, the address and command signals arrive simultaneously. The address and command lines are connected in a point-to-point fashion.

I/O Subsystem Architecture

The I/O subsystem of the Sun Fire E2900 servers resides on an IB_SSC module and interfaces to the system bus via two PCI bus controller chips, as shown in the architecture diagram below. The IB_SSC Module houses the majority of the I/O facilities, as well as the Standby System Controller board.

Figure 4-5: Sun Fire E2900 IO subsystem



To help enable sustained high performance, the bus controller chips each control two independent PCI buses, one 66 MHz, 64-bit PCI bus and one 33 MHz, 64-bit PCI bus, for a total of four PCI buses. One 66 MHz bus is reserved for the gigabit Ethernet controllers and the other supports the Ultra3 SCSI controller and the 66 MHz PCI slot. 33 MHz cards that are capable of 3.3 V operation may also be used in this slot but will cause that bus segment to operate at 33 MHz. The two 33 MHz PCI buses support up to five short (7-inch) cards. Despite the fact that all slots are 64-bit capable, 32-bit cards can be used as well without forcing the entire bus to operate in 32-bit mode. The six slots are allocated 90 watts of power. Any card can use up to 25 watts as long as the sum of all usage is 90 W or less. In addition, the standard DVD-ROM drive is connected to the I/O subsystem via an integrated IDE controller. The Standby

System Controller (SSC) board provides a number of system-wide control and monitoring facilities. It contains a MicroSPARC II processor used to implement Lights Out Management functionality. The SSC allows access to LOM through one of the RJ45 serial ports or through a Telnet service on the 10/100 Ethernet port.

Standby System Controller

Following the tradition of leveraging high-end server features across product lines, these servers include the same Standby System Controller (SSC) technology as the Sun Fire E4900 and E6900. However, it has different functionality tailored to the capabilities of these servers. The SSC is an embedded controller for system and resource management that is a key component for high availability. It constantly monitors server operation, and is able to notify administrators when problems are detected. It enables administrators to remotely initiate diagnostics and corrective actions without requiring physical proximity to the server. The SSC is responsible for hardware configuration and reconfiguration during booting and during dynamic reconfiguration procedures, and also plays a critical role in error detection, logging, identification, and reporting.

Key functions of the Standby System Controller are:

- Provides system clock, console interface, and power on/off operation
- Controls power to selected circuit boards
- Monitors and reports environmental conditions
- Monitors and controls status of failed and failing components
- Manages information collected from EEPROM on selected components
- Integrates with Sun Management Center software to provide remote management

The Sun Fire E2900 server ships standard with the enhanced memory (version 2) IB-SSC, that has additional memory capacity compared to SCs currently shipping on the Sun Fire V1280 server. The enhancement will enable the servers to take advantage of future system management function updates, such as persistent error logging.

SSH (Secure Shell)

System firmware version 5.18 enables implementation of a secure communication channel for network based administration of the system controllers. The SC offers SSH server functionality, and the SSH server responds to SSHv2 (SSH protocol version 2) client requests. SSH will allow encrypted, secure remote access to the midrange system controller (SC). Note that this feature is only supported on the enhanced memory system controller in the Sun Fire E2900. Existing Sun Fire V1280 customers would need to upgrade their SC to the newer version.

PCI Connectivity

The PCI bus is based on the industry-standard PCI specification version 2.1. Unlike most standards, the PCI specification is very broad. It covers everything from multiple form factors and voltages to connector

types. Sun has chosen to implement the most common PCI options available: 33 MHz (standard) and 66 MHz buses:

- 2-bit or 64-bit cards
- 5 volt cards (33 MHz bus) and 3.3 volt cards (33 and 66 MHz bus)
- 7-inch (short) cards
- PCI Specification 2.1 compliance
- Low power operation

These servers support a variety of PCI-based adaptor cards, including Ethernet & ATM networking cards, SCSI, FC-AL, and high speed serial interfaces. In addition, Sun has developed a host of third-party alliances to develop PCI hardware and software that is certified for operation on all systems running the Solaris Operating Environment.

PCI configuration

	PCI Slot Number					
	0	1	2	3	4	5
33/66 MHz Clock						x
33 MHz Clock	x	x	x	x	x	x
5 Volt or Universal Cards	x	x	x	x	x	
3.3 Volt or Universal Cards						x
64-bit slot	x	x	x	x	x	x

Peripherals, Networking, and Back Panel

In addition to PCI connectivity, these servers support a standard complement of I/O devices through connectors on the back panel, as well as enclosure status LEDs:

- Dual 10/100/1000 BaseT Ethernet (RJ45) network connectors
- Ultra3 SCSI connector & Alarms port (DB-15)
- Serial-port (RJ45) for LOM/console
- Enclosure status LEDs, including system locator beacon, system fault, and system active

Ethernet Support

To support higher performance network connectivity, all Sun Fire E2900 server models support dual 10/100/1000 Mbps Ethernet interfaces through RJ-45 copper connectors. Gigabit (1000 Mbps) Ethernet is typically deployed as a backbone interconnect between 10/100 Mbps Ethernet switches, and as a connection to high- performance servers. Gigabit Ethernet is an ideal way to connect multiple workgroups accessing information stored on high-end servers or for server-to-server back-ups. Gigabit

Ethernet also provides a natural upgrade path for systems that require more bandwidth than can be provided by fast Ethernet.

Serial Port

A 9600-baud serial port, accessible through an RJ45 connector, provides a convenient way to connect a system to a terminal. Supplied adapters enable administrators to use a standard RJ-45 serial cable to connect directly from the serial connector on the back panel to any device that is equipped with a DB-25 or DB-9 connector.

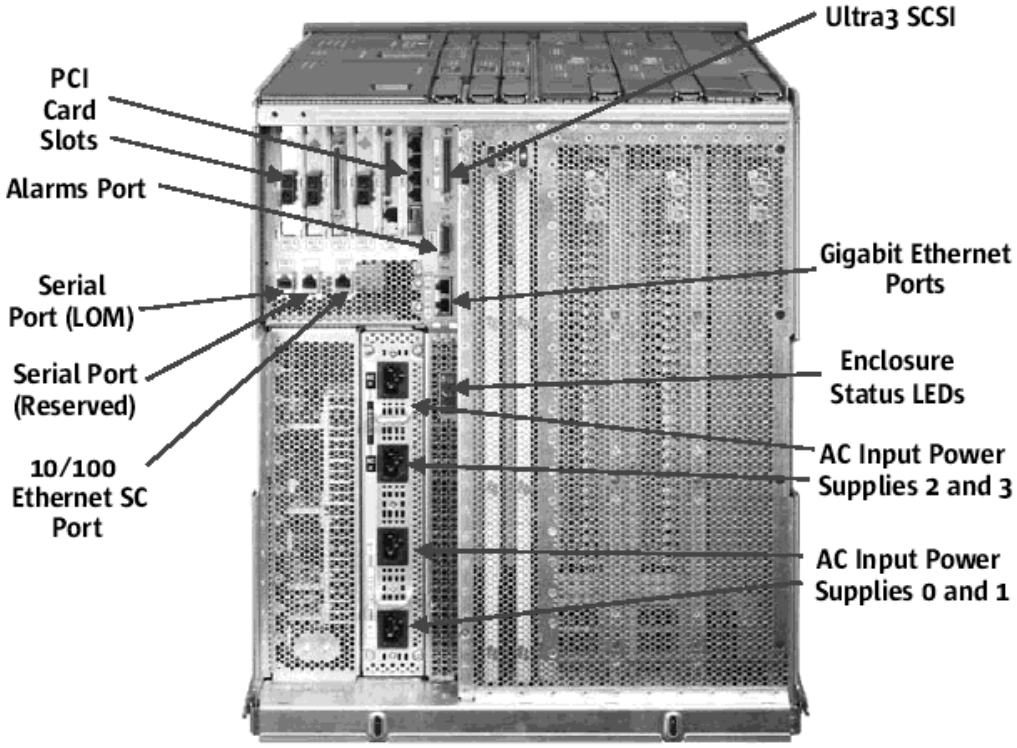
Ultra3 SCSI Storage Controller

The Sun Fire E2900 server provides an internal storage subsystem with an integrated Ultra3 SCSI Storage Controller capable of supporting a maximum of 15 SCSI devices, of which two 73GB disks are provided as standard internally. The SCSI controller also has an external LVD SCSI interface on the rear of the system, to which external SCSI arrays may be connected. Dual pathing to external arrays may be achieved by adding SCSI PCI adapters.

Ultra3 SCSI has the following characteristics:

- Industry standard. Ultra3 SCSI is the latest version of the SCSI protocol.
- Broadly supported. All major disk vendors support Ultra3 SCSI, thereby ensuring wide choice and interoperability.
- Performance. Ultra3 SCSI runs at burst speeds of up to 160 MB/sec.
- Capacity. Ultra3 SCSI supports up to 16 devices (including the controller).

Figure 4-6: System connectivity



Power Distribution System

The required power is provided by four power supplies each providing 1,500 watts output. The power supplies are located on the right hand side of the front of the system cabinet. Only two PSUs are required at any one time, providing 2N redundancy. As a result, the failure of up to two PSUs or of one of the two power sources do not interrupt internal power.

The Sun Fire E2900 requires 200-240V power. It will not work with 110V.

Fans

The two fans that cool the PCI enclosure are redundant; if one fan fails, the remaining one will provide sufficient cooling until the faulty fan is repaired.

Although the fans on the power supplies are not redundant, the power supplies themselves are, so a fan failure on a PSU does not interrupt system power. The power supply itself indicates a fault.

The Sun Fire E2900 does not have redundant fans for cooling the main system boards. Given the tight space constraints in the chassis there is no room for redundant fans to cool these boards. To minimize the impact of failure of one of these fans, intelligence has been built in to the cooling system.

All fan rotation is monitored and faults indicated when rotation speed begins to drop – typically towards end of life. The main fans run in two modes; 1) externally controlled 'off' or 'maximum speed' ; or 2) an internally controlled speed to match the ambient temperature at the fan location. Normally the main fans are run on internal control to reduce noise and extend life.

Whenever the system is running, the temperature of key components is monitored. Should any component or board temperature reach a warning limit, the main fans will be set to maximum to increase cooling. This may occur, for example, if there is something locally blocking a portion of the air inlet. If there is a failure of the data center or central office air conditioning system and the ambient temperature starts to rise then the main fans will increase speed automatically to compensate. However as soon as a warning limit is reached, all fans will be set to maximum speed.

Furthermore, it is rare for a cooling fan to have a sudden complete failure. More common is for a component--such as the lubrication for a bearing--to start to wear, causing the fan to gradually slow down. When this is detected, the failing fan will issue an alert. When they receive this alert, operations staff can place a call for an engineer to replace the failing fan. When a fan failure alert is detected, all the other fans will be set to maximum speed to increase air flow and compensate the failing fan.

System Configuration Card

The Sun Fire E2900 contains a System Configuration Card (SCC). This card retains the server's MAC address, hostid, and NVRAM settings that identifies the server to the network and to software for licensing purposes. Should a Sun Fire E2900 need to be replaced by another Sun Fire E2900, changing the SCC will make the new system appear to have the same identity as the one it replaces.

Lights Out Management (LOM)

With the LOM module, the Sun Fire E2900 server can be configured to allow administrators to monitor the system board, fan power/rpm, and temperature via a dedicated LOM serial port, combined console/LOM serial port, or alarm software that can be tied into SNMP. The LOM module also has a remote power on/off cycle.

Environmental Monitoring and Control (EM&C) System

The environmental monitoring and control (EM&C) system helps protect the system against:

- Extreme temperatures
- Lack of adequate air flow
- Power supply problems

Monitoring and control capabilities reside at the operating system level as well as within the system's PROM firmware. Consequently, protection is assured even if the system is halted or unable to boot.

The EM&C system uses an industry standard I2C bus to monitor and control temperature sensors, fans, power supplies, status LEDs and the front panel on/standby switch. Temperature sensors monitor ambient temperature throughout the system as well as that of each CPU.

The hardware and software components of the EM&C system help ensure that the temperature remains within a predetermined range for safe operation. Failure to remain within that range will result in either:

- A 'warning' or 'critical' condition with the appropriate error message to the system console, if present,
- An entry in the system log file if the CPU is blacklisted (but not is shut down)
- The illumination of the system LED indicators on the front status panel.

A critical condition that cannot be resolved by blacklisting a CPU will be followed by a graceful shutdown of the system.

The EM&C system will also detect a failure of the cooling fans.

Rack mounting

The Sun Fire E2900 server is intended to operate within a rack in a data center. The server is 12 rack units (RU) high. Within a standard 72" high rack, the Sun Fire E2900 servers may be mounted two in a rack, occupying the lowest positions in the rack, and no higher than 52" high for the top surface of the upper system. Each server weighs up to 251 lb. (114kg) or up to 263 lb. (120kg) including the transport plinth which is removed during installation. To facilitate rack mounting, a lifting tool is required to mount the Sun Fire E2900 within a rack or to remove it from a rack.

When a single Sun Fire E2900 server is mounted within a rack, it should occupy the lowest position for weight considerations. The remainder of the rack may be used for storage arrays, other systems, etc. with an air flow from front to rear as with the Sun Fire E2900 server.

The Sun Fire E2900 is attached to the rack on slider rails, which allow in-rack servicing.

A stabilizer/extender foot is provided on many industry standard racks. Prior to installation or servicing, the extender should be positioned forward to prevent the entire rack from tilting forward as the center of gravity changes. Then the slides may be extended forward from the rack and the processor boards, PCI cards or other boards added, changed or removed. If the rack does not have an extender foot, the rack must be stabilized in some other fashion to ensure safety during installation or servicing (e.g. Bolted to the floor)

Third party racks that comply with EIA-310-D-1992 Standard and are 24" (600mm cm.) or deeper may be used. However, sufficient space for cable management must be allowed. In addition, the presence of doors and whether or not they are solid may lead to a requirement for a deeper rack to allow for airflow at the front and/or back of the rack.

NOTE: Carefully evaluate all aspects and dimensions of the intended rack including:

- Rail-to-rail depth: this must be 450mm to 780mm between mounting rails
- Space for cable management
- Protrusions mounted on doors, etc. which might interfere with systems and/or cables
- Compatibility for front-to-back air flow requirements
- Stabilizer/extender foot for servicing considerations
- Sufficient space in the aisle to allow the Sun Fire E2900 to be extended on its rails and for service personnel space to move around it

No third-party rack products have been tested and, consequently, are neither endorsed nor recommended.

Chapter 5: Reliability, Availability, and Serviceability

Reliability, availability, and serviceability (RAS) are three aspects of a system's design that contribute to continuous operation and the reduction of system downtime.

The Sun Fire E2900 server brings together the finest aspects of “High Availability” engineering, extending the feature set offered by the current UltraSPARC III Sun Fire line.

Reliability

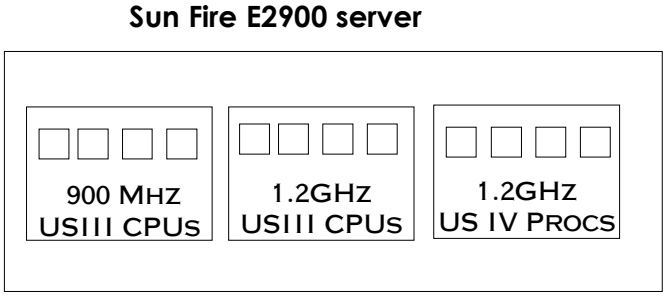
Reliability refers to a system's ability to operate continuously without failures and to maintain data integrity. The Sun Fire E2900 server includes the following features that enhance reliability, many of which are detailed in Chapter 3, Enabling Technology

- Extensive environmental monitoring, which helps ensure that the system is not allowed to operate outside its specifications.
- End-to-end ECC error detection and correction on all data paths within the system to detect and correct single-bit errors. This feature maintains data integrity without the need to halt system operation in the case of single-bit errors. ECC will also detect double bit errors and log them to the System Controller.
- Enhanced ECC to protect against naturally occurring radiation. Up to four hard failures on adjacent bits from naturally occurring radiation can be corrected. (see the 'System Architecture' section for details).
- Parity detection on all address path segments for improved data integrity. This is in addition to ECC on all data paths.
- Memory scrubbing to enable the memory contents to be frequently refreshed. This feature reduces the chance of single-bit errors.
- Extensive component and interconnect Power On Systems Test (POST) and other tests performed prior to system boot to help ensure that faulty components are excluded from the system configuration.
- Passive centerplane helps provide high mean time between failures (MTBF). Because the centerplane is passive--that is, it contains no chips on board--it is less likely to fail.
- Boards are locked in place and I/O connectors are secure, which prevents system errors due to loose connections. Boards also have different form factors, minimizing the chance of inserting the wrong board in a centerplane slot.

Availability

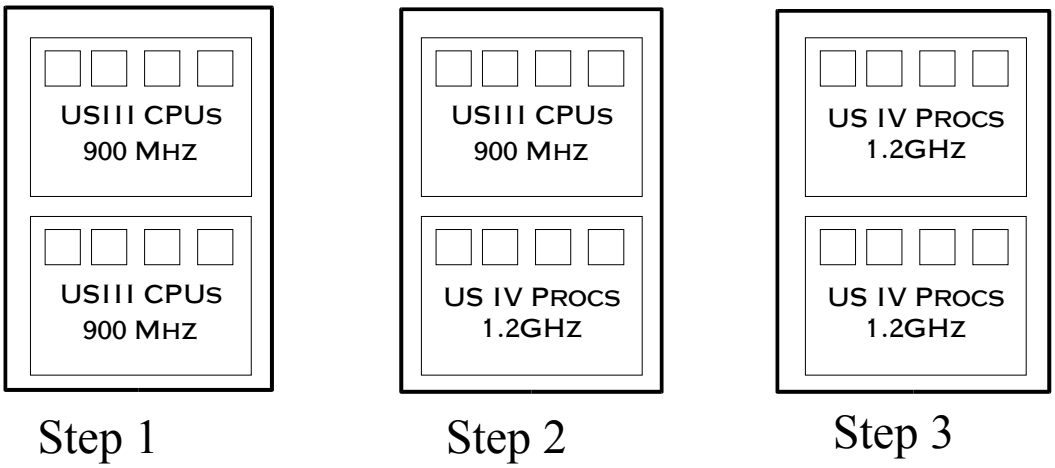
System availability refers to the percentage of time that a system remains accessible and usable. Sun Fire E2900 server offers many advanced availability features.

- **Hardware Redundancy**
  - Redundant CPUs
  - memory banks
  - CPU/memory boards
  - Sun Fireplane interconnect system switches
  - Power supplies (2N) for dual power grids
- **Hot swap CPU/memory boards with Dynamic Reconfiguration technology**
- **Hot pluggable power supplies, disks, and fans**
- **Mixed-speed CPUs**
  - By separating the clock signals and device arbitration on this family of servers, the clock signals for CPUs within the system are generated by multiplying the 150 MHz signal from the system controller on a board-by-board basis. The benefit to the customer is that they have the flexibility to add processors of different speeds online as long as they do not mix processors of differing speeds within one system board.
  - All UltraSPARC IV and UltraSPARC III Cu (900MHz and faster) processor/memory boards can be mixed together on the same system and even in the same domain.
  - The diagram below illustrates how processors of different speeds can be intermixed and deployed on a Sun Fire E2900 server.



  - The diagram below illustrates the three-step upgrade process to upgrade all CPUs on two CPU/memory boards. During this online upgrade process, the application remains available.

Hot CPU Upgrade



- IP multi-pathing to provide automatic network path failover
- When two I/O paths can be defined to connect a network to a Sun Fire server through the presence of two I/O adapter cards, the IP multi-pathing (IPMP) feature of the Solaris 8 OE can be employed to map out a dual-path network connection with automatic network failover capability.
- The automatic network failover capability helps ensure that in the event of a failure of a single I/O card, the server will be able to continue communicating over the network.
- Parallel device probing
- In the event of a system reboot, if your configuration is composed of more than one CPU, then the CPUs are used to probe for devices concurrently, significantly reducing the time it takes for the operating environment to identify and configure attached devices. This feature helps to shorten down time.

Serviceability

Serviceability relates to the time it takes to restore a system to service following a system failure. Some of the serviceability features of the Sun Fire E4900 & E6900 server family include:

- Hot swappable CPU/memory boards, I/O assemblies, redundant transfer switch modules, power supplies and cooling units, which provide for on-line replacement
- LED status indicators, repeated front and back
- Lights Out Management (LOM) for monitoring and administrative capability
- Dynamic reconfiguration and IP multi-pathing, which allow for CPU/memory boards and I/O assemblies to be taken off-line for service without interruption to the Solaris OE or to the application

- Virtual key switch and virtual console features on the system controller, which allows the system to be powered on or off and rebooted remotely; with optional diagnostics
- Mechanical Serviceability
  - In rack serviceability on sliding rails
  - Cable management arm
  - No jumpers are required for configuration of the Sun Fire E2900 servers
  - All FRUs (Field-Replaceable Units) are designed for quick and easy replacement
  - Safe electrical voltages (48 VDC and below) used throughout all system boards
  - All FRUs identified with LED service indicators for positive indication of whether a FRU can be removed
  - Electronic serial numbers on all FRUs enabling improved component tracking
- Sun ™ Validation Test Suite software (SunVTS) allows administrators to perform system diagnostics
- Sun Remote Services provides remote monitoring, diagnostics and service dispatching
- The Serial EEPROM is a part of all system FRUs. It consists of a small amount of read-only memory containing information to identify the FRU. This feature enhances serviceability.

Auto Diagnosis and Recovery Features

- Auto diagnosis and recovery provides new levels of reliability, availability, and serviceability for the Sun Fire E2900 server to help customers minimize both planned and unplanned downtime and significantly reduce business interruptions through faster time to service.
- Auto diagnosis with messaging: auto diagnosis detects the first instance of an error and records the component health status (CHS) of the faulty or suspect components. Auto diagnosis provides easy-to-understand error reports that identify faulty or suspect components to a single-field replaceable unit (FRU) or multi-FRUs. The server's Power On Self Test (POST) then uses the CHS information to deconfigure the faulty component out of the system. Diagnostic information is reported through the platform and domain console event message or the loghost output.
- Component health status: deconfigures faulty components (CPU/memory boards, CPUs, L2_SRAM modules, DIMMs, I/O boards, and Fireplane switches) after a hard failure. CHS identifies ("blacklists") faulty components due to a fault or suspected fault. The reconfigured system is automatically rebooted. The fault is isolated from the new configuration, significantly reducing the chances of a similar failure.
- CHS and diagnostic information are persistently stored on a component, which prevents the reoccurrence of a fault even if the component is moved to a different location. Preventing the reoccurrence of a fault improves the availability characteristic of Sun Fire E4900 & E6900 servers. As the diagnosis information is contained inside the component, service and repair of these systems becomes faster and more efficient. Valuable service information is collected and reported to help Sun detect hardware errors and improve product quality.
- Auto restoration: working in conjunction with the auto diagnosis engine and CHS, auto restoration automatically restores the system with the fault isolated in the event of a fatal error as a result of a

faulty component. If a FRU or component is disabled because of its CHS, immediate replacement is not necessary because the domain is restored with the fault isolated.

- Automatic recovery of hung domains: system detects and recovers from hung domains. A domain hang occurs when a domain does not respond to user commands or is not reachable via the network.
- Recovery from repeated domain panics: domain panics can be caused by both software and hardware. To prevent hardware faults from causing panic reboot loops, the SC firmware has been enhanced to run POST diagnostics at more detailed diagnostic levels. On the first panic the domain reboots and writes a core file. The core file can be used to analyze the problem. However, if further panics occur within a short time period, it is desirable to run POST automatically at a higher level as part of domain restoration. POST diagnostics verify the status of the hardware and could identify and isolate faulty components (if any). After identifying faulty components, POST updates their CHS appropriately.
- Solaris OE Enhancements: kernel Updates for Solaris 8 OE (02/04) and Solaris 9 (04/04) OE on systems enhance the correctable error (CE) DIMM and L2_SRAM module handling. Multiple CEs on accessing a DIMM or L2_SRAM module indicate a higher probability of experiencing an uncollectible error (UE). To prevent a fatal UE, memory pages are retired and CPUs are automatically off-lined. The availability of domain increases, because the Solaris OE does not access pages or L2_SRAM modules that have an increased failure probability.

Chapter 6: Installation Data

For more details on any of the data in this section, please see the *Sun Fire E2900 Site Preparation and Installation Guide*.

Dimensions

Hardware Dimensions

	U.S.	***Metric***
Height	20.75" 12 RU	527 mm 12 RU
Width	17.5"	445 mm
Depth	22"	558 mm
Weight (minimum/maximum)	242/290lbs.	110/132 kg.

Environment

Power Requirements

Overall System

	Sun Fire E2900 Power Consumption (W)
4 processors 8GB memory	1400
8 processors 16GB memory	2150
12 processors 24 GB memory	2900
12 processors 96GB memory	3300

Details of Individual Power Supplies

	Sun Fire E2900
Operating • 4 power supplies providing 2N hot-pluggable redundancy • 4 supplies maximum	1710 W input; 1500 W output @ **200 - 240 V AC** per supply. But only two can draw this or otherwise >2 PS share the input power load.
Frequency	47 - 63 Hz

Notes

- T**he Sun Fire E2900 supports 200-240V power only**. It does **not** support 110V. In the USA (and countries that use similar power systems) the power cord used should be the **NEMA6-15** US standard. This is a 250V 15 amp cord. Please note that this is not the 6-30 cord (a 30 amp cord).
- There are four power supplies in a system. Only two are required for the system to run. Hence they are 2N redundant.

Temperature

Sun Fire E2900

	Fahrenheit	***Celsius***
Operating	+41° - +95° F	+5° - +40° C
Non-operating	-4° - +140° F	-20° - +60° C

Noise

In accordance with ISO 9296:

Operating acoustic noise	73 dB(A)

BTU/Heat-load Data

	Sun Fire E2900
Base system, including: • *4 * 1.2GHz CPUs* • *8 GB memory* • *2 - 73 GB disk* • *6 PCI boards*	4,780 BTU/Hr.
Medium system, including: • *8 * 1.2GHz CPUs* • *16 GB memory* • *2 - 73 GB disk* • *6 PCI boards*	7330 BTU/hr
Large system, including: • *12 * 1.2GHz CPUs* • *24 GB memory* • *2 - 73 GB disk* • *6 PCI boards*	9890 BTU/hr

Loaded system, including: • *12 * 1.2GHz CPUs* • *96GB memory* • *2 - 73 GB disks* • *6 PCI boards*	11,300 BTU/Hr.

Humidity (non-condensing)

Sun Fire E2900

Operating	10% - 80% non-condensing
Non-operating	10% - 80% unpackaged

Regulatory

Meets or exceeds the following requirements.

Safety	North America: UL 60950 3rd edition, CSA C22.2 No 60950-00 3rd edition (Certified: UL + UL for Canada) European Community: EN 60950:2000, (Certified: UL for Germany/GS-Mark + GOST R for Russia) Worldwide except North America: IEC 60950:1999 + CB Bulletin (Certified: DEMKO + UL for Argentina/IRAM S-Mark)
RFI/EMI	Class A: Australia/New Zealand AS/NZ 3548, Industry Canada ICES-003, European Community EN55022/CISPR22, Japan VCCI, Taiwan CNS 13438, and US FCC 47CFR15.B.
Immunity	EN55024, i.e. EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-6, EN61000-4-8, and EN61000-4-11

Chapter 7: The Sun Fire E2900 Server and Racks

This section should be read and discussed with a customer *when a system is proposed and also when planning installation.*

Overview

From the time the Sun Fire E2900 Server was first conceived, rack fit was a very high priority. Its depth of 22" means it will fit a wider range of racks than any other server in its class. Its 2N redundant power supplies make it less susceptible to downtime caused by power or power supply failure than many other servers. Front and rear indicators, lights out management, sliders, two cable management arms and even the rack buddy are all designed to make it as simple as possible to install, use and maintain in a rack.

However, it is also different from other servers and this chapter has been written to describe the most important considerations when planning for installation of a Sun Fire E2900 Server in a rack.

Power

The Sun Fire E2900 uses 220V power only: it does not support 110V. Plugging it into a 110V supply may lead to some indicators becoming lit, but the system will not start. Various power cord kits have been specified for different countries around the world. In general, the power cord will be rated for 200-240VAC and 10-15 amps. When you order a Sun Fire E2900, you must order a power cord x-option, depending on the country in which it is to be used. Each x-option contains four power cords corresponding to the four power supplies in the Sun Fire E2900; consequently you require one x-option per system.

In the United States and other countries that have similar power systems, the power cords shipped with the Sun Fire E2900 are the NEMA 6-15 type from the National Electrical Code Handbook. Some other servers or racks in this class use NEMA6-30 power cords, which support 30 amp circuits. These were not used on the Sun Fire E2900 because they are extremely bulky and have excessively high current rating. You should check that the Sun Fire E2900 Server power cords are supported in your customer's environment. (The Sun Fire E4900 also use NEMA6-15 power cords in the United States).

The Sun Fire E2900 does not have to use a power sequencer. It does not require an RTS (Redundant Transfer Switch). In particular, the RTS used in the Sun Fire rack is superfluous and are NOT supported.

Power Supplies

The Sun Fire E2900 contains four power supplies. It can run using only two of these power supplies; in other words it is "2N redundant." This means that the power supplies can be paired and each pair

plugged into a separate power source. As a result, neither of the following events will cause system downtime:

- Failure of one or two of the power supplies in a Sun Fire E2900; or
- Failure of a power source

Failed power supplies can be hot-plugged.

When both power sources and all power supplies are working (the normal situation), the power consumption is shared across the power supplies.

Racks

The Sun Fire E2900 is 22” (about 550mm) deep. This means that it potentially will fit into 24” (600mm) deep racks. Whether a specific Sun Fire E2900 will fit into a rack of this size depends on many factors including

- whether the rack has doors
- whether the doors are solid or perforated
- the thickness of any doors
- the type and thickness of cables (e.g. FC-AL, Ethernet, SCSI) that attach to the Sun Fire E2900 and their bend radius

Within a standard 72" high rack, the Sun Fire E2900 Servers may be mounted two in a rack, occupying the lowest positions in the rack, and no higher than 52" high for the top surface of the upper system. Each server weigh can weigh up to 251 lb. (114kg) or up to 263 lb. (120kg) including the transport plinth which is removed during installation. To facilitate rack mounting, a lifting tool is required to mount the Sun Fire E2900 within a rack or to remove it from a rack.

When a single Sun Fire E2900 server is mounted within a rack, it should occupy the lowest position for weight considerations. The remainder of the rack may be used for storage arrays, other systems, etc., with front-to-rear air flow like the Sun Fire E2900 server. **See installation manual for precise placement rules.**

Cable Management Arm

The Sun Fire E2900 is supplied with a cable management arm. Use of this is optional but very highly recommended as it makes it much easier to service in a rack. The cable arm attaches to the rear of the Sun Fire E2900 and has one section for power cables and one for I/O cables.

Sliders

The Sun Fire E2900 is shipped with a standard set of sliders. The Sun Fire E2900 attaches to these sliders which are themselves attached to the rack as part of the installation procedure. The use of these sliders, together with the cable management arm allows the system to stay up and running during any of the following operations:

- Adding new processor boards to a four-processor or eight-processor Sun Fire E2900 Server
- Removing a failed processor board from an eight-processor or twelve-processor Sun Fire E2900 Server
- Installing a memory upgrade on an eight-processor or twelve-processor Sun Fire E2900 Server

Whenever the Sun Fire E2900 is extended on its sliders, the rack must be stabilized to allow for the weight of the server being outside the frame. This may be achieved, for example, by extending the feet of the rack where this is possible or by having the rack itself bolted to the floor and/or ceiling. Failure to stabilize the rack will result in significant risk of the rack tipping and of injury.

Recommended Sun Microsystems Rack

The recommended Sun Microsystems rack for the Sun Fire E2900 server is the Sun Rack 900.

- At 900mm deep, it contains plenty of space for the Sun Fire E2900, cable management arm, cables and free air flow.
- The extending leg will support the Sun Fire E2900 Server when it is extended on its sliders.
- Power sequencing within the rack avoids multiple inrush when the source returns.

The Sun Rack 900 has an X-option X6827A which contains 20 power connectors that will connect from the power strips in the Sun Rack 900 to the power inlets on the rear of the Sun Fire E2900 Server.

It is also possible to use the StorEdge expansion rack or the Sun Fire rack, but these are not ideal because they are deeper and contain functions such as RTS, fans and Frame Manager that are costly and not required by the Sun Fire E2900 Server.

Third-Party Racks

Third-party racks that comply with EIA-310-D-1992 Standard and are 24" (600mm cm.) or deeper may be used. When planning to install the Sun Fire E2900 Server in a third-party rack, the following points should be considered.

- **Depth**. As noted above, the Sun Fire E2900 can potentially fit into a 24”/600mm rack. Often a 32”/800mm rack may be more appropriate, particularly if the rack has doors on the front or back or both. Space needs to be allowed for cables and airflow.
- **Power**. Power requirements are described above. In summary, the Sun Fire E2900 Server may need to draw up to 16amps at 200V. Careful planning is recommended to allow for the 2N power sources and power consumption figures should be re-checked when upgrading.
- **Sliders**. Rail-to-rail depth must be between 450mm and 780mm.
- **Stabilization**. It must be possible to stabilize the rack, either by the use of extensible feet or fixing it to the floor or ceiling, to prevent it from tipping when the Sun Fire E2900 Server is slid out on its rails.

No third-party rack products have been tested and, consequently, are neither endorsed nor recommended.

Chapter 8: Requirements and Configuration

System Requirements

The Sun Fire E2900 Server requires minimum Solaris Operating System 8 Update 8 (2/04), Solaris 9 (04/04) or Solaris 10. It is suggested that all recommended patches be applied. Minimum firmware level for the Sun Fire E2900 support is version 5.17 for 1.05/1.2GHz and 5.18.1 for 1.35GHz.

Licensing/Usage

Operating System Environment

The Sun Fire E2900 Server is supplied standard with Solaris.

Upgrades to Solaris 8 from Previous Versions

Solaris Operating System 8 Update 8 (2/04) or Solaris 9 Update 6 (04/04) or later is required for the Sun Fire E2900 server. For customers who are running an earlier version of Solaris platform, the *Solaris Application Guarantee Program* ensures that existing applications will run without modification on Solaris 8 or Solaris 9 OE.

For more details on this program, refer to:

http://www.sun.com/solaris/programs/guarantee

Alarms

The Sun Fire E2900 has an alarms feature primarily for use in telecommunications applications. This is to allow volts-free alarms to be raised for a variety of service fault conditions. There are two user-programmable alarms (Alarm 1 and Alarm 2) and one fixed Solaris OE not running alarm (system). The system indicator is only set and cleared to match the state of the Solaris OE. The user-programmable alarms 1 and 2 are only set and cleared in response to user-initiated function calls.

Each alarm has a visible indicator at the front of the system and a set of relay contacts available at the rear of the system.

Each alarm relay has a common connection, a normally open connection and a normally closed connection. All three alarms use a single 15-way D-Type port.

The indicators for the user and system alarms are different. The system alarm indicator is green and lit whenever the Solaris OE is running. The user alarms are amber and lit whenever the alarm is set to 'on'.

The user-configurable alarms 1 and 2 are set/cleared through the LOM 'setalarm' command or the Solaris 'lom -A' command.

Detection of the state of the Solaris OE is done through the "cpu signatures" mechanism (present on Sun Fire 3800-6800 and E4900/E6900 systems as well as the Sun Fire E2900) which indicates whether the Solaris OE clock is still incrementing. If the clock is incrementing then the system indicator (green) is lit. When the Solaris OE clock is not incrementing, the system indicator is extinguished. This could be due to a Solaris OE hang or crash or a user-initiated request to shutdown to OBP or to standby.

Pin Number	*Signal Name*	*System has no external power*	*System has external power but is in Standby*	*Solaris OE running*	*Alarm1 on*	*Alarm2 on*
1	No Connection					
2	No Connection					
3	No Connection					
4	No Connection					
5	SYSTEM Running Normally Open	link p5-7	link p5-7	open		
6	SYSTEM Running Normally Closed	open	open	link p6-7		
7	SYSTEM Running Common	link p5-7	link p5-7	link p6-7		
8	Alarm1Normally Open	open	open		Link p8-10	
9	Alarm1Normally Closed	Link p9-10	Link p9-10		open	
10	Alarm1Common	Link p9-10	Link p9-10		Link p8-10	
11	Alarm2Normally Open	open	open			Link p11-13
12	Alarm2Normally Closed	Link p12-13	Link p12-13			open
13	Alarm2Common	Link p12-13	Link p12-13			Link p11-13
14	No Connection					
15	No Connection					

Table A Alarms Connector Pinout

Chapter 9: System Management

System Administration

Built into the Solaris are systems management and security features that will help deliver the computing environment demanded by these customers. Sun also offers unbundled system management products that will supplement the systems management features in the Solaris 8 OE. Together, the Solaris management features and Sun unbundled systems management products create one of the most stable and available computing environment, in the industry.

Virtually any administrative task can be executed over a remote connection from any client by an authenticated administrator and since a Solaris OE rarely requires rebooting, administrators will not lose their network connection when adding new software or reconfiguring the system. Solaris OE applications can be installed or upgraded on a Solaris server without affecting users and without disabling the network services running on that computer.

Management Function	***Sun Management Tools***	***Standard or Licensed Separately***
System installation, software installation	• OpenBoot™ firmware • Solaris Web Start and Solaris Web Start Wizards™ software	• Standard • Standard
System configuration	• Solaris Management Console	• Standard
User administration	• Solaris Management Console	• Standard
Security management	• SunScreen™ Secure Net • SunScreen SPF-200	• Licensed separately • Licensed separately
Storage management	• Solstice DiskSuite™ • VERITAS Volume Manager • VERITAS File System • Sun StorEdge LibMON™ • VERITAS NetBackup • Sun StorEdge™ Instant Image	• Standard • Licensed separately • Licensed separately • Licensed separately • Licensed separately • Licensed separately
System monitoring	• Solaris Management Console	• Standard
Tuning, resource, and performance management	• Solaris Resource Manager • Solaris Bandwidth Manager • Sun Bandwidth Allocator	• Licensed separately?? • Licensed separately?? • Licensed separately???
Fault detection and recovery	• Power On Self Test (POST) • SunVTS™ • Sun Cluster	• Standard • Standard • Licensed separately

Lights Out Management (LOM) and System Controller (SC)

The Sun Fire E2900 server features a system controller (SC) running Lights Out Management (LOM) software, enabling access, monitoring, and control of the server from a remote location, using any client device on the network.

The system controller resides in the IB-SSC module. Configured to allow communications with a variety of client devices through an Ethernet 10/100 interface or through a serial line, LOM allows administrators to remotely query the status of the system, diagnose faults and initiate a system power on/off or reboot. It operates independently of the server and is responsible for the following:

- Providing server console functions through a 10/100 Ethernet or serial port
  - allows remote configuration of the server
  - allows remote running of diagnostic tests on system components
  - allows remote power-on, power-off, reset and reboot of the server

- Providing remote indications of system status
  - error reporting
  - output from power-on self-test (POST)
  - LED states

- Providing remote environmental monitoring
  - device temperatures
  - fan status

OpenBoot Firmware

The OpenBoot firmware is stored in the boot programmable read-only memory (PROM) of the system. It is executed immediately after the customer turns on the system. The primary task of the OpenBoot firmware is to boot the operating system from either a mass storage device or from a network.

The OpenBoot device tree is a data structure that describes both the permanently installed and plug-in devices attached to a system. Both the user and the operating system can determine the hardware configuration of the system by inspecting the OpenBoot device tree.

Power On Self Test (POST)

The POST diagnostic code resides in flash PROM on the system's main logic board. It runs whenever the system is turned on or when a system reset command is issued. POST tests the following system components:

- System boards
- Fireplane interconnect boards

- IO controller – includes SCSI, Ethernet and IDE controllers

POST reports its test results on the system front panel. POST also displays detailed diagnostic and error messages on a local terminal if it is attached to the system's serial port A.

Solaris Bandwidth Manager Software

Solaris Bandwidth Manager software, available with Solaris OE 8 and 9, allows the administrator to control the bandwidth assigned to particular applications, users, and departments that share the same Internet link. By installing Solaris Bandwidth Manager software on their network's major links and application servers, and by setting consistent policies, customers can distribute bandwidth evenly and customers can prioritize traffic, preventing a small number of applications or users from consuming all available bandwidth.

Solaris Bandwidth Manager software helps enable customers to:

- Provide differentiated classes of service to users, and bill accordingly
- Provide bandwidth to priority users, applications, or servers
- Reduce traffic congestion and increase network efficiency
- Control users and applications in their access to network resources
- Gather detailed network use statistics and accounting data for usage-based billing

Solaris Bandwidth Manager software helps to enable network service providers to get the most out of their existing network resources. It helps them to enable adequate levels of service to their customers, and collect accurate accounting information for usage-based billing.

Solaris Management Console Software

Solaris Management Console software makes it easy for administrators to configure and administer Solaris OE systems. Based on Java technology, Solaris Management Console software can launch a UNIX application on a Solaris server in a network. It provides views of servers on the network as well as applications on those servers, which allows for easy local and remote administration of multiple servers running Solaris Management Console software. It also delivers powerful capabilities to make the process of adding users, hosts, or applications as simple as pointing and clicking from virtually any client on the network.

Solaris Management Console software helps enable administrators to register other Solaris Management Console servers and applications on the network. When the console is accessed, it dynamically configures tree views of registered hosts and services, making it easier to manage each Solaris server. Solaris Management Console software helps enable administrators to view activity on all their servers and modify applications and services running on them.

Solaris Management Console software allows administrators to launch applications, such as administration tools on a remote server, while monitoring the application via a light front-end GUI on the client. This virtually eliminates the need to download large applications over the network and install and run them on the client. With Solaris Management Console software, remote servers can be managed

easily with tools already located on the server. This remote capability allows administrators to manage administrative and network services from home or virtually any other location without having to come in to the network operation center when a trouble call comes in.

Solaris Management Console software makes Solaris OE administration easier by providing:

- Centralized administration - current Solaris OE administration tools can be integrated and run from one location
- Centralized management - all servers on a network can be managed from a single console
- Single login helps eliminate multiple logins into applications launched by Solaris Management Console software

Solaris Management Console software also provides a set of wizards to simplify complex administration tasks:

- DNS server configuration
- DNS client configuration
- Default router modification
- Change root password
- Network connection configuration
- Shutdown/restart computer

Solaris Administration Wizards can be run from Solaris Management Console software or invoked via the command line. The wizards make the Solaris OE easy to administer by providing a point-and-click, Java technology-based graphical user interface (GUI) for configuring Solaris systems.

Solaris Resource Manager Software

Solaris Resource Manager software is a tool for enabling resource availability for users, groups and applications. It provides the ability to allocate and control major system resources such as CPU, virtual memory, and number of processes. Solaris Resource Manager software is the key enabler for server consolidation and increased system resource utilization. With this product, multiple applications and groups receive a consistent level of service on a single server. In fact, resources can be allocated to the individual user. Resource utilization can actually increase because unused capacity is dynamically allocated to active users and applications. Systems can become easier to manage because system administrators have the ability to set and enforce resource usage policies. Solaris Resource Manager software makes resource usage data available for use in user-defined reports, accounting tools and scripts.

Solaris Resource Manager software includes the following features:

- Ability to control CPU, virtual memory, number of processes, number of logins, and connect time
- Dynamically allocate resources according to predefined policies

- Map resources to groups within applications and individual users within groups
- Ability to automate dynamic resource allocation through easy to set resource policies

Solaris Web Start Software

Solaris Web Start software, a key component of the Solaris OE, is an easy-to-use Java technology-based application that guides system administrators through the installation of both the Solaris OE and co-packaged application software. Solaris Web Start software makes installing the Solaris OE as simple as clicking a button. Solaris Web Start software offers the industry's first Web-based installation process, enabling all of the setup and administration to be done locally or remotely through a web browser. It also virtually eliminates the UNIX system administration normally associated with software installation and setup. As a result, Solaris OE and co-packaged software can be installed by less-experienced administrators safely and easily.

Solaris Web Start Wizards Software

Solaris Web Start Wizards technology extends the point-and-click simplicity of Solaris Web Start software, bringing this same ease of use to applications written for the Solaris OE. Built into new applications, Solaris Web Start Wizards software simplifies the installation, setup, and administration of native Solaris OE and Java technology-based applications.

Applications built with Solaris Web Start Wizards software can be installed on a Solaris OE system locally or remotely from virtually any client running a web browser supporting the Java programming language.

With Solaris Web Start Wizards software, the source for an application may be a CD-ROM drive on the administrator's PC, a drive on the network, or a URL on the Web. The administrator may be using a Solaris OE workstation, a Microsoft Windows or Macintosh PC, or a network computer.

Solaris Web Start Wizards software is based on technology supplied by and supported by InstallShield Software Corporation, a industry-leading install tools vendor. For administrators, the inclusion of Solaris Web Start Wizards software with the Solaris OE makes installing applications as easy as installing Microsoft Windows applications.

Solstice Backup Software

The Solstice Backup software products provide a tightly integrated backup and storage management solution for distributed enterprise environments. It provides scalable, high-performance, lights-out data protection and management services for environments ranging from a stand-alone server to networks with hundreds of multi-platform systems and multi-gigabytes of data. The heterogeneous data protection delivered by this solution ranks among the best available today. It provides consistent, reliable data protection as well as comprehensive, automated storage management. These products help reduce administrative overhead, improve data accessibility to users and applications, and reduce cost of ownership.

Solstice Backup software allows a Solaris OE server to provide automated, high-performance backup, recovery, and storage management services to a wide array of machines on the network. This heterogeneous platform support helps to provide a consistent, centralized approach to data storage management across the enterprise. Solstice Backup software, through the use of its SNMP module, can be integrated with Solstice Site ManagerTM software, Solstice Domain ManagerTM software, and Solstice Enterprise Manager software for improved, centralized network management of larger, complex environments.

Solstice Backup software provides simple, centralized administration through a single, unified view of the entire data management operation from any point on the network. All Solstice BackupTM software applications are cooperatively managed and fully integrated, greatly simplifying administration in a large, dynamic environment. Intuitive user interfaces simplify administrative tasks such as configuring clients and servers and setting up enterprise-wide backup schedules for file systems and databases. Network users can also backup, recover, or archive their local files without assistance from the system administrator.

Solstice Backup software delivers high-speed backup through parallel processing of client backup that can be directed to multiple devices simultaneously. This dramatically improves client performance and backup throughput for reduced backup time.

Through archival services, data can be optionally removed from disk for conservation of storage space once it has been safely stored off-line. Hierarchical storage management services automatically move less-frequently-used data on disk to less-expensive media, freeing up on-line storage space. Automated media handling-such as labeling and mounting media-reduces operator intervention.

Solstice Backup Server Edition software brings high-performance, automated, unattended parallel backup and restore capabilities to stand-alone servers. The Server Edition software is ideally suited for backup/restore services for high-volume database and file servers. The Server Edition software can be upgraded to the Network Edition software to support network backups.

Solstice Backup Network Edition software delivers network storage backup for distributed networks of servers and clients. The Network Edition software is ideally suited for multiplatform, enterprise-wide installations.

Solstice DiskSuite Software (Solaris 8 OE) and Solaris Volume Manager (Solaris 9 OE)

Solstice DiskSuite Software for the Solaris 8 OE and Solaris Volume Manager for the Solaris 9 OE, are disk and storage management solution for enterprise environments. They provide high data availability and reliability, deliver excellent I/O performance, and simplify large system and disk administration. With Solstice DiskSuite Software and Solaris Volume Manager, customers get a powerful set of tools to enhance data availability.

- **Mirroring**

  Solstice DiskSuite Software for the Solaris 8 OE and Solaris Volume Manager for the Solaris 9 OE provide a comprehensive data-redundancy solution. They transparently maintain a mirror copy of data on another disk, and automatically use the surviving copy in the event of hardware failure.

- **RAID 5**

  The RAID 5 feature in Solstice DiskSuite Software for the Solaris 8 OE and Solaris Volume Manager for the Solaris 9 OE provides highly available data storage at a lower cost by using less disk space than mirroring. Rather than having a single disk dedicated for parity, the parity information is distributed across all disks, thereby promoting relatively uniform usage of all disks associated with the logical unit.

- **Hot spare**

  On-line system recovery is supplemented by the use of a hot-spare utility that automatically replaces failed mirror or RAID-5 components. This facility migrates new partitions to replace failing ones. Users continue to access the surviving copy of the data while a new mirror is automatically generated, with no interruptions of operation.

Solstice DiskSuite Software for the Solaris 8 OE and Solaris Volume Manager for the Solaris 9 OE offer a powerful yet simple GUI in addition to the traditional command-line interface. The GUI provides error-free setup of disks such as mirrors and UFS logs, as well as easy, on-going administration of disk subsystems. It delivers a visual representation of the storage subsystem along with drag-and-drop capabilities, both of which are invaluable in managing large, complex disk subsystems.

Other Solstice DiskSuite Software for the Solaris 8 OE and Solaris Volume Manager for the Solaris 9 OE features:

- Disk striping enables parallel I/O and load balancing for improved performance
- Multipathing support enables Solstice DiskSuite software to use multiple data paths in the case of failure
- A performance monitor helps eliminate bottlenecks
- Concatenation and the grow file system command allow the construction of large, logical devices, and enable online expansion and reconfiguration

Sun Cluster Software

Sun Cluster software provides higher levels of availability than is possible with a single server. This solution automates recovery from any single hardware or software failure by automatically restarting a failed application or migrating the application and its resources to a backup server in the event of a hardware failure.

Sun Cluster software provides mainframe-class reliability, availability, and scalability for e-commerce, ERP, data warehousing and other mission-critical applications and services. It delivers an easy-to-use, continuously available, multiplatform clustering solution that is completely integrated with the Solaris OE.

Key features of Sun Cluster software include support for the Solaris 8 OE, up to four clustered nodes from Sun’s entire line of servers, failover agents for key applications, and a unified clustering foundation for standard and parallel applications.

Highlights include the following:

- Cluster up to eight servers to meet the needs of any workgroup, department, or data center
- Run both standard and parallel applications on the same cluster
- Dynamically add nodes
- Manage the cluster through the easy-to-use Sun Cluster Management Console
- Fault management API to customize applications for high availability
- Individual application failover, local application restart, and local network adaptor failover for fast recovery
- High-speed cluster interconnects and high-bandwidth networking deliver exceptional throughput
- The Sun Fire E2900 server supports Sun Cluster 3.1 and includes support for the numerous storage arrays. Please refer to www.sun.com/software/cluster for more details.

SEAM (SEAM) Software

SEAM (SEAM) software delivers an extra layer of security inside the firewall to protect the enterprise from unauthorized access. Through powerful authentication and single sign-on capabilities, SEAM software provides increased data privacy and integrity.

While firewalls are designed to fend off intruders from the outside, they cannot address security incidents that originate from within. Today, growing evidence indicates that most security breaches start with people inside the enterprise. For true network security, customers need to take steps to protect the company's valuable data resources from unauthorized access from both inside and outside the enterprise.

SEAM software provides the extra layer of security customers need to protect the enterprise. By combining centralized authentication with strong encryption, SEAM software provides a more secure login process, which helps customers to better protect their data privacy and integrity.

- **Centralized authentication and management**

  SEAM software offers a single repository for enterprise authentication information called the Key Distribution Center (KDC). The KDC maintains a database of user, server, and password information. Through that database, SEAM software can authenticate users, servers, and applications. Anyone and everyone attempting to access information must first be checked against the KDC database before being ticketed as an authenticated user. Because security information is centralized, SEAM software allows customers to manage and control all enterprise-wide logins from a single console, which helps their enterprise reduce the total cost of administering and managing security.

- **Strong encryption support**

  SEAM software provides strong encryption support. During the authentication process, all the information exchanged between customers and the KDC is encrypted for an extra level of security. SEAM software also uses an encrypted channel when storing KDC entries over the network.

- **Ease of use**

  SEAM software supports a Java technology-based administrative tool for easy access and configuration. It also helps to enable users to load authentication information in batch mode, which is particularly useful if the enterprise loses or gains large numbers of users each year.

  SEAM software supports single sign-on capabilities. With single sign-on, SEAM software can authenticate users to gain access to multiple applications by ticketing them only once when they first log in. It also spares users the need to memorize multiple passwords, or enter passwords multiple times in a session.

- **Higher availability**

  SEAM software's distributed architecture provides enterprises with higher availability. With SEAM software, customers can replicate their security information. This provides faster access to information as well as duplicate copies in the event of an emergency. Should the master KDC fail, the read-only replicated slave KDC still holds the necessary information for the authentication process to take place without interruption. What's more, if the master becomes unrecoverable, customers can easily convert the replicated slave to be the new master.

- **Faster performance**

  SEAM software is faster and more reliable because its replicated KDCs reduce contention for security verification from across the enterprise. For example, replicas may be created for use by different business divisions or remote offices. Instead of competing for a single copy, the division or office has its own copy. Consequently, access to secured applications becomes faster.

- **Multiple realms**

  SEAM software supports multiple realms. A realm is the set of users or servers registered with a specific KDC basically, the scope of authentication for a given KDC. Separating an enterprise into multiple realms helps enable SEAM software to operate across organizational boundaries and between different systems. A client in one realm can be authenticated to a server in another.

  SEAM software allows enterprises to isolate individual departments from each other, decentralizing control to local network administrators. For large corporations, realms enable SEAM software to be configured to allow administration at the local level.

- **A more secure environment**

  Currently, SEAM software supports secure FTP, NFS software, Telnet, and r* commands. These secure network services, combined with strong encryption support, allows the enterprise to preserve data privacy and data integrity by helping to eliminate snooping around the network and tampering with data. With SEAM software, users can access files securely over the network.

- **Interoperability**

  SEAM software is compliant with Internet RFC 1510 and RFC 1964. These RFCs define the Kerberos V5 protocols, the de facto industry standard. Through this standards compliance, SEAM software allows enterprises to integrate with other vendors' compliant security products.

- **Cost-effective**

  Because SEAM software is included in Solaris Easy Access Server software, it offers feature-rich security mechanisms with unlimited usage at a significantly lower cost than many third-party solutions available today.

It requires fewer administrators because it is centrally managed, enabling customers to lower the cost of securing their enterprise.

- **Programmable security APIs**

  SEAM software allows ISVs to secure their applications by Remote Procedure Call API (RPCSEC_GSS). This API is an implementation of the RPCSEC_GSS security protocol defined in Internet RFC 2203. When future security products from Sun or third-parties become available, these products can be easily plugged into the interface without requiring modifications to the application, helping to enable customers to adopt evolving security technologies quickly and easily. For example, if Sun developed a public-key security mechanism in the future, this mechanism would be easily accessible by any application that uses the RPCSEC-GSS interface.

VERITAS NetBackup Software

VERITAS NetBackup software provides high-performance, industrial-strength backup, archive, recovery and space management services for UNIX and PC clients in the large enterprise. With high-speed backup of large databases, centralized management capabilities, mainframe-class media management, and support for high-end tape drives and robotics, VERITAS NetBackup software is specially geared for the large data center customer.

VERITAS NetBackup software cost-effectively automates backup and recovery for thousands of nodes across multiple servers, while enabling the enterprise to manage its storage from a single console. With optional add-on modules, VERITAS NetBackup software provides high-performance hot or cold database backup, as well as archive capabilities that allow the enterprise to effectively manage data that is rarely accessed yet requires long-term storage. VERITAS NetBackup software features sophisticated media and device management capable of managing media across the enterprise from a single location, and enabling sharing of tape robotics hardware with other applications.

Sun StorEdge Instant Image Software

Sun StorEdge Instant Image software is a point-in-time copy facility which runs on a Solaris OE application or storage server. Instant Image is designed to enhance the ability of businesses to achieve non-stop business processing by capturing frequent snapshots of live data for independent read and write purposes. Sun StorEdge Instant Image software enables point-in-time copies, or shadow volumes, to be created on a Sun storage system. A shadow volume is a replicated view of data which has been frozen at a specific point in time and is used to enable a secondary application to non-disruptively access a primary application’s data. Product applications include the following:

- **Backups:** Enable on-line processing to continue while backup processes backup a point-in-time snapshot image of on-line data.
- **Data warehouse loading:** Populate a data warehouse from a snapshot image of on-line data.
- **Application development and testing:** Make a snapshot image of production data available as test data for new applications.
- **Data migration:** Use Sun StorEdge Instant Image software to help migrate from one storage platform to another.

SunVTS Software

The Sun Validation Test Suite, or SunVTS software, is an online diagnostics tool and system exerciser for verifying the configuration and functionality of Sun hardware controllers, devices, and platforms. SunVTS software is standard on the Solaris Supplemental CDROM.

Customers can run SunVTS software using any of these interfaces: a command line interface, a terminal interface, or a graphical interface that runs within a windowed desktop environment.

SunVTS software lets customers view and control a testing session over modem lines or over a network. Using a remote system, customers can view the progress of a SunVTS testing session, change testing options, and control all testing features of another system on the network.

The SunVTS system exerciser is a graphically oriented UNIX software application that permits the continuous exercising of system resources and internal and external peripheral equipment. Used to determine if the system is functioning properly, SunVTS software incorporates a multifunctional stress test of the system through operating-system-level calls, and allows the addition of new tests as they become available.

VERITAS File System Software

VERITAS File System (VxFS) software is a high-performance, quick-recovery file system. VxFS software augments UNIX file management with high availability, increased bandwidth, and up-to-date and reliable structural integrity. It provides scalable performance and capacity to meet the demands of increased user loads and client/server environments.

VxFS software provides fast recovery following a system crash or reboot. The system completes a file system check (fsck) in seconds, regardless of file system size. In addition, VxFS software supports on-line backup, on-line resizing (shrinking and growing of a file system), and on-line defragmentation. These capabilities allow administrators to respond to dynamic data capacity and performance requirements while reducing scheduled maintenance interruptions.

VxFS software allocates disk space to files in large, contiguous areas called extents, rather than in small fixed-size blocks. This results in a significant reduction in the number of I/O operations required to read and write large amounts of data.

The Sun Fire E2900 is classified in license class 2b by Veritas at time of announcement.

Capacity on Demand (COD 2.0)

The Sun Fire E2900 server now supports Capacity On Demand (COD) 2.0. With COD, customers can purchases servers installed with extra CPU/memory resources that they can activate at a later date when needed - with no disruption to operations - by purchasing Right to Use (RTU) licenses. By providing instant access to additional hardware resources, Capacity On Demand 2.0 helps improve availability, increase utilization, and lower Total Cost of Ownership (TCO) in your data center with Sun Fire E2900,

How It Works

Through the COD program, customers purchase new servers with unlicensed CPU/memory boards or install unlicensed COD CPU/Memory boards in existing systems. Each COD CPU/Memory board contains four UltraSPARC IV CPUs, which are considered as available processing resources. However, customers do not have the right to use these COD CPUs until they also purchase the right-to-use (RTU) licenses for them. The purchase of a permanent COD RTU license entitles the customer to receive a license key, which will enable the appropriate number of COD processors.

(Note that as the memory is directly controlled by the CPU, the physical memory banks associated with a particular CPU will be disabled if that CPU is disabled. It is possible to have a single CPU/memory board with a combination of enabled/disabled CPUs. Only the memory associated with the enabled CPUs would be accessible.)

RTU licenses are ordered with a separate part number when COD processors are ready to be used. When COD 2.0 RTU licenses are ordered, the customer will receive a COD 2.0 license certificate card that contains a serial number and instructions on contacting Sun's License Processing System (LPS) centers to receive the COD 2.0 license keys for the COD RTU licenses purchased. If more than one RTU license has been purchased, it is possible to request the LPS center to combine the RTUs into a single license key for easier administration. COD 2.0 licenses keys are to be entered into the system using the COD 2.0 software Command Line Interface commands.

Note that the RTUs for the Sun Fire E2900 Server COD boards are keyed only to the Sun Fire E2900/V1280 servers. Attempts to use a Sun Fire E2900 Server RTU on a Sun Fire E4900–E25K server will result in a failed CPU.

• The Sun Fire E2900 RTU part number is XCOD-E2900-RTU

• The Sun Fire E4900–E25K RTU part number is XCOD-2-RTU

For complete configuration rules and details, see page 60.

Key Features & Benefits

Higher Availability

COD 2.0 improves server availability by allowing instant access to unlicensed resources with no disruption to operations. This "headroom" feature means that additional system resources that can be dynamically reconfigured into your production environment—without the need to reboot your system. With the Sun Fire E2900, customers can use up to four CPUs as "hot spares" for previously activated

COD CPUs or for non-COD CPUs. However, when used as a spare for a non-COD CPUs, customers must repair the failed non-COD CPU and deactivate the hot-spare within 30 days or purchase a permanent right to use license.

Increased Utilization

COD allows customers to activate additional resources in single CPU increments, which helps increase system utilization by better matching system usage with asset acquisition. This enables IT organizations to instantly scale to meet peak demands without having to pay for the entire amount until the extra capacity is needed.

Reduced Cost

COD enables organizations to purchase larger system configurations than are currently required at lower up-front costs. This allows customers to be prepared for growth without having to pay in advance! For example, the price of a single-CPU COD Sun Fire E2900 is 35% lower than the standard 4-CPU system.

In addition to lower entry prices, COD also helps reduce third-party software and service costs that are applied to active CPUs. Inactive COD CPUs are not charged software licensing fees by those Independent Software Vendors (ISVs) that charge per CPU or per CPU core until the COD CPUs are activated. Furthermore, unlicensed COD CPUs are not subject to Sun Service contract charges. When a COD CPU/memory board is purchased, the monthly service support contract price is split into 5 parts - one for the board and one for each CPU. Therefore, an unlicensed COD board is charged 20% of the standard CPU/memory board Service contract price with each activated CPU adding another 20%.

By utilizing only the specific number of CPU resources needed, you can minimize hardware, software , and maintenance costs while maximizing system utilization for lower Total Cost of Ownership.

There is no premium price for COD 2.0 options over standard options and there is no time requirement to purchase RTU licenses. For data center environments with unpredictable growth or sudden increases in peak usage, COD 2.0 provides a cost-effective method for adding reserve or growth capacity.

Simplified Management

All Sun Fire E2900 servers with firmware 5.18 or later are “COD ready.” Customers can have extra CPU resources installed and decide to activate those resources at their convenience. In addition, customers are not required to install remote system monitoring or generate system usage reports. The net result is a simple, flexible provisioning of hardware resources on demand.

Sun Fire capacity on demand customers and resellers will be required to abide by specific legal terms and conditions, which can be found at the following URL, under your specific country of choice:

http://sunwebcms.central.sun.com:8001/sunweb/cda/mainAssembly/0,2685,455298_12300,00.html

A copy of the end user contract appendix can be viewed by selecting “COD 2.0 Program End User Appendix.” A copy of the channel partner appendix can be viewed by selecting “COD 2.0 Channel Partner Participation Appendix.”)

Chapter 10: Ordering Information

Assemble-to-order Configurations (ATO)

Assemble-to-order configurations will not be available for Sun Fire E2900 systems. For factory configuration of additional CPU/memory boards, PCI adapters, storage, and racking, please use the Customer Ready Systems (CRS) program. See page 66 for more information.

Standard Configurations: Preconfigured Systems

Standard configurations are popular system configurations which can be ordered as a single line item. This offers customers the convenience of an easy-to-order, functional, base-level system. In addition, standard configurations are easy and efficient for Sun sales, manufacturing, and operations.

These configurations include:

- 1, 2, or 3 processor/memory boards
- Integrated Ultra3SCSI disk controller and external port
- Two 73GB SCSI disks
- DVD-ROM
- Two 10/100/1000 gigabit Ethernet ports (copper)
- 10/100 Ethernet (copper) (reserved for system use)
- Four AC power supplies providing 2N redundancy (two power supplies are required)
- LOM module
- Smart fans
- Motherboard and required system boards (i.e. L2 repeaters and IB-SSC)
- Cable management arm
- Solaris 9 or later. English-only version factory installed

Sun Fire E2900 Server Configurations

Order Number	Description
1.05GHz, 512MB DIMMs	
E29-4P16GB-1050	4 * US-IV processors at 1.05GHz & 16GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans
E29-8P32GB-1050	8 * US-IV processors at 1.05GHz & 32GB memory (2 processor/memory boards); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; mart cooling fans
E29-12P48GB-1050	12 * US-IV processors at 1.05GHz & 48GB memory (3 processor/memory boards); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans
1.05GHz, 1GB DIMMs	
E29-4P32GB-1050	4 * US-IV processors at 1.05GHz & 32GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans
E29-8P64GB-1050	8 * US-IV processors at 1.05GHz & 64GB memory (2 processor/memory boards); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans
E29-12P96GB-1050	12 * US-IV processors at 1.05GHz & 96GB memory (3 processor/memory boards); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans
1.2GHz, 512MB DIMMs	
E29-4P16GB-1200	4 * US-IV processors at 1.2GHz & 16GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans
E29-8P32GB-1200	8 * US-IV processors at 1.2GHz & 32GB memory (2 processor/memory boards); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans
E29-12P48GB-1200	12 * US-IV processors at 1.2GHz & 48GB memory (3 processor/memory boards); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans
1.2GHz, 1GB DIMMs	
E29-4P32GB-1200	4 * US-IV processors at 1.2GHz & 32GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans
E29-8P64GB-1200	8 * US-IV processors at 1.2GHz & 64GB memory (2 processor/memory boards); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans
E29-12P96GB-1200	12 * US-IV processors at 1.2GHz & 96GB memory (3 processor/memory boards); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans
1.35GHz, 512MB DIMMs	
E29-4P16GB-1350	4 * US-IV processors at 1.35GHz & 16GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans

Order Number	Description
E29-8P32GB-1350	8 * US-IV processors at 1.35GHz & 32GB memory (2 processor/memory boards); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans
E29-12P48GB-1350	12 * US-IV processors at 1.35GHz & 48GB memory (3 processor/memory boards); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans
1.35GHz, 1GB DIMMs	
E29-4P32GB-1350	4 * US-IV processors at 1.35GHz & 32GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans
E29-8P64GB-1350	8 * US-IV processors at 1.35GHz & 64GB memory (2 processor/memory boards); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans
E29-12P96GB-1350	12 * US-IV processors at 1.35GHz & 96GB memory (3 processor/memory boards); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans

Capacity On Demand (COD) Configurations

Customers can acquire COD Sun Fire E2900 configurations in two ways:

1) Order a single board COD configuration with a one-RTU license purchase requirement. The following two configurations are available. The WebDesk configurator will enforce the one-RTU minimum. The factory will ship the system with one CPU active using the "head-room" COD feature. The customer will receive one or more COD 2.0 license certificate cards that contains a serial number and instructions on contacting Sun's License Processing System (LPS) centers to receive the COD 2.0 license keys for the COD RTU licenses purchased. Once the customer receives the license keys, he needs only to permanently activate the CPUs.

Order Number	Description
E29-1P4GB-1200C	4 * US-IV COD processors at 1.2GHz & 16GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans
E29-1P8GB-1200C	4 * US-IV COD processors at 1.2GHz & 32GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans
E29-1P4GB-1350C	4 * US-IV COD processors at 1.35GHz & 16GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans
E29-1P8GB-1350C	4 * US-IV COD processors at 1.35GHz & 32GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans
XCOD-E2900-RTU	Sun Fire E2900 Capacity On Demand (COD) permanent Right-To-Use (RTU) license to activate one COD CPU. For use with Sun Fire E2900 & V1280 COD CPU/memory boards.

2) Add COD CPU/memory boards to non-COD configurations. Customers can add COD CPU/memory boards to Sun Fire E2900 and V1280 servers. This can be done in the factory via the Customer Ready Systems Program (See page 66) or as a field upgrade. There are two CPU/memory boards available.

XE29BRD-482-1200C	Sun Fire E2900 UltraSPARC IV Capacity On Demand (COD) CPU/memory board with 4 * 1.2GHz UltraSPARC IV processors and 16GB memory (32 * 512MB DIMMs).
XE29BRD-484-1200C	Sun Fire E2900 UltraSPARC IV Capacity On Demand (COD) CPU/memory board with 4 * 1.2GHz UltraSPARC IV processors and 32GB memory (32 * 1GB DIMMs).
XE29BRD-482-1350C	Sun Fire E2900 UltraSPARC IV Capacity On Demand (COD) CPU/memory board with 4 * 1.35GHz UltraSPARC IV processors and 16GB memory (32 * 512MB DIMMs).
XE29BRD-484-1350C	Sun Fire E2900 UltraSPARC IV Capacity On Demand (COD) CPU/memory board with 4 * 1.35GHz UltraSPARC IV processors and 32GB memory (32 * 1GB DIMMs).
XCOD-E2900-RTU	Sun Fire E2900 Capacity On Demand (COD) permanent Right-To-Use (RTU) license to activate one COD CPU. For use with Sun Fire E2900 & V1280 COD CPU/memory boards.

System Requirements

- Firmware version 5.18 for 1.05/1.2GHz, 5.18.1 for 1.35GHz, or later
- Solaris 8 (2/04) or later
- Solaris 9 (4/04) or later
- Solaris 10 - any version.

Any Sun Fire V1280 or E2900 server can be expanded/upgraded with UltraSPARC IV COD boards so long as the firmware and Solaris version levels are updated as described above. No other upgrades are required. Furthermore, the UltraSPARC IV COD boards can be mixed & matched with any existing UltraSPARC III or UltraSPARC IV non-COD boards in any combination. There are no restrictions so long as the software is updated.

Chapter 11: Options

Internal Options

Order Number	*Option Description*	*Max per System*	*Comments*
Processor/Memory Boards			
XE29BRD-482-1050	CPU/memory board. 4 * 1.05GHz UltraSPARC IV processors, each with 16MB external (L2) cache, & 16GB of total memory	3	32 * 512MB DIMMs
XE29BRD-482-1200	CPU/memory board. 4 * 1.2GHz UltraSPARC IV processors, each with 16MB external (L2) cache, & 16GB of total memory	3	32 * 512MB DIMMs
XE29BRD-482-1350	CPU/memory board. 4 * 1.35GHz UltraSPARC IV processors, each with 16MB external (L2) cache, & 16GB of total memory	3	32 * 512MB DIMMs
XE29BRD-482-1200C	Sun Fire E2900 UltraSPARC IV Capacity On Demand (COD) CPU/memory board with 4 * 1.2GHz UltraSPARC IV processors and 16GB memory (32 * 512MB DIMMs).	3	32 * 512MB DIMMs
XE29BRD-482-1350C	Sun Fire E2900 UltraSPARC IV Capacity On Demand (COD) CPU/memory board with 4 * 1.35GHz UltraSPARC IV processors and 16GB memory (32 * 512MB DIMMs).	3	32 * 512MB DIMMs
XE29BRD-484-1050	CPU/memory board. 4 * 1.05GHz UltraSPARC IV processors, each with 16MB external (L2) cache, & 32GB of total memory	3	32 * 1GB DIMMs
XE29BRD-484-1200	CPU/memory board. 4 * 1.2GHz UltraSPARC IV processors, each with 16MB external (L2) cache, & 32GB of total memory	3	32 * 1GB DIMMs
XE29BRD-484-1350	CPU/memory board. 4 * 1.35GHz UltraSPARC IV processors, each with 16MB external (L2) cache, & 32GB of total memory	3	32 * 1GB DIMMs
XE29BRD-484-1200C	Sun Fire E2900 UltraSPARC IV Capacity On Demand (COD) CPU/memory board with 4 * 1.2GHz UltraSPARC IV processors and 32GB memory (32 * 1GB DIMMs).	3	32 * 512MB DIMMs
XE29BRD-484-1350C	Sun Fire E2900 UltraSPARC IV Capacity On Demand (COD) CPU/memory board with 4 * 1.35GHz UltraSPARC IV processors and 32GB memory (32 * 1GB DIMMs).	3	32 * 512MB DIMMs

Order Number	Option Description	Max per System	Comments
Internal Removable Storage Devices			
X6297A	20/40 GB DDS-4 Tape Drive	1	
SG-XTAPDAT72-3F68	Sun StorEdge[TM] DAT 72 tape drive- internal option for 3.5 inch bay/68 pin SCSI connect for V1280, E2900 servers.	1	
X5268A	Internal 146GB 10K Ultra 3 SCSI HDD, 3.5" x 1" drive with barrier plate	2	

Order Number	Option Description	Max per System	Comments
PCI Fibre Channel Host Bus Adapters (HBA)			
SG-(X)PCI1FC-JF2	Single 2Gb Fiber Channel PCI Network Adapter (Amber 2J)	6	
SG-(X)PCI1FC-QF2	Single 2Gb Fiber Channel PCI Network Adapter (Amber 2)	6	
SG-(X)PCI2FC-JF2	Dual 2Gb Fiber Channel PCI Network Adapter (Crystal 2J)	6	
SG-(X)PCI2FC-QF2	Dual 2Gb Fiber Channel PCI Network Adapter (Crystal 2A)	6	
PCI SCSI Host Bus Adapters (HBA)			
(X)6541A	Dual Differential UltraSCSI PCI Host Adapter (UD2S)	4	32Bit, 33MHz
(X)6758A	Dual Ultra3 SCSI Host Adapter (Jasper)	4	
PCI Network Adapters			
(X)3150A	GigaSwift Ethernet UTP PCI Adapter (Cassini)	4	
(X)3151A	GigaSwift Ethernet UTP PCI Adapter (Kuheen)	4	
(X)4422A	Dual FE + Dual SCSI PCI Adapter (Cauldron-S)	4	
LW8-QFE	Quad Fast Ethernet PCI Adapter for Sun Fire 1280 and E2900 only	4	
PCI Communication Adapters			
(X)1155A	Sun High Speed Serial Interface (HSI/P) 2.0 4-port synch	4	
(X)1157A	Sun ATM PCI Adapter 4.0.155 Mbps MMF Interface (Mangeto)	4	
(X)2156A	Sun Serial Asynchronous Interface (SAI/P) card	4	
X1074A	Scalable Coherent Interface (SCI) PCI adapter	2	
X6762A	Crypto Accelerator 1000 (Deimos)	2	

Storage

The following external storage devices and arrays are supported for the Sun Fire E2900 server. Please refer to configuration guidelines for specific details and updates.

Boot Devices

Customers may configure these storage devices as boot devices. The appropriate PCI adapter is listed in parentheses.

- Sun StorEdge S1 array (with X4422A or X6758A)
- Sun StorEdge D2 (with X6758A)
- Sun StorEdge 3120 (with X4422A)

Storage Disks/Arrays

- Sun StorEdge 3000 series
- Sun StorEdge 6000 series
- Sun StorEdge 9000 series

Other Options

Order Number	*Option Description*	*Comments*
X1209A	Small cable arm for power and I/O cables	Note that by default the Sun Fire E2900 is supplied with a large cable arm. The smaller cable arm may be useful where rack depth is constrained, although it is not appropriate if numerous thick PCI cables, such as serial or SCSI cables, are used.
X6806A	Air filter	This will not normally be required. However, on occasion, where the Sun Fire E2900 is installed in an environment with poor air quality, an air filter is recommended.
X1092A	CPU filler panel	Required to cover slots that do not have processor / memory modules. By default new systems are supplied with these filler panels to cover empty slots. However it will be necessary to order one if a processor / memory module is removed permanently from a system.
X1093A	Tape filler panel	Required to cover the tape bay if no tape drive is present. By default new systems are supplied with a tape blanking panel if no tape drive is ordered with the system. This X-option is needed only if a tape drive is to be removed from a Sun Fire E2900.
X6808A	23" 2-post Hendry rack adapter	This adapter is typically limited to being used by Telcos who wish to install the Sun Fire E2900 in a 2-post Hendry rack.

Power Cords

The Sun Fire E2900 server requires one power cord kit. Each kit contains 4 power cords (one for each power supply).

Customers now have the choice between **15 amp country/region specific** or **20 amp generic** or **20 amp generic watertight** power cords. The "original" sets of power cords are rated up to 15 amps (for example, a NEMA L6-15 for North America). Each identified region has its own unique power connector.

The "generic"sets of power cords are rated up to 20 amps with a NEMA L6-20 20A twist lock plug, #12/3 SJT cord and an IEC320 C13 equipment connector plug for North America and a IEC309 3 pin 250VAC 16A splashproof (IP44) plug, 1.5mm2 HAR HO5VV-F cord and an IEC320 C13 equipment connector for International.

	Country/Region Specific	***Generic***	***Generic Watertight***
	10-15 amp	16-20 amp	16-20 amp WT
North America/Asia	X321L	X336L	X338L
Continental Europe	X322L	X337L	X339L
Denmark	X323L	X337L	X339L
Switzerland	X324L	X337L	X339L
Italy	X325L	X337L	X339L
Australia	X326L	X337L	X339L
UK	X327L	X337L	X339L
China	X328L	X337L	X339L
Argentina	X335L	X337L	X339L
Power Cord Jumper, extends any geography specific power cord (must order four)	530-3096-01		

The Sun SM Customer Ready Systems (CRS) Program

The Sun SM Customer Ready Systems (CRS) program is designed to give customers the ability to buy Sun factory integrated products with custom options and services in order to make deploying solutions from Sun Microsystems simpler, safer and swifter.

Simpler – With complete system solutions comprised of Sun and complementary (non-competitive) third- party hardware and software and a range of integration services. Select solutions can be made orderable by a single part number.

Safer -- Thanks to enhanced quality through factory integration and interoperability testing in Sun's ISO 9002 certified factory

Swifter -- Because of operational efficiencies due to reduced integration and deployment times

Early customers have experienced a 90-95% decrease in deployment times with the Sun CRS program, thus reducing time to revenue. The Sun CRS program has also decreased early-life system issues up to 80% as a result of reduced system handling through factory integration.

Sun Fire E2900 Server through CRS

The CRS program offers complete ready-to-deploy Sun Fire E2900 server with internal options such as factory installation of the optional tape drive or PCI cards (e.g. Gigabit Ethernet, FC-AL, QFE, ATM, his, SSL or SAI). One or two Sun Fire E2900 servers can be factory racked and cabled with other qualified Sun products such as StorEdge disks and arrays in the Sun Rack 900 cabinets.

CRS can load the Solaris OE and customer-provided software. Customer-provided software is an SVR4 package or UFS Dump Image that include the Solaris OE as the customer has configured it and may include patch levels, management software, middleware, applications or data provided to Sun by the customer.

Integration services of Sun's CRS program have been developed by Sun for customers with repetitive and/or volume integration needs, including design and validation services, factory integration services, life-cycle management, and managed deployment.

Ordering Sun Fire E2900 Server through CRS

To engage with CRS, customers and iForce partners should contact their Sun sales account team for more information or visit:

www.sun.com/integration.

Sun sales account teams can contact their Integration Manager for more information. A list is available at the Sun internal URL:

http://systems.corp/products/crsp/crsp_contacts.html

The following factory configurable parts are available as building blocks through the CRS program:

Sun Fire E2900 Servers & CPU/memory boards for CRS

E29-4P16-1050-IP	4 * US-IV processors at 1.05GHz & 32GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans. FACTORY CONFIGURATION ONLY
E29-4P32-1050-IP	4 * US-IV processors at 1.05GHz & 32GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans. FACTORY CONFIGURATION ONLY
E29-4P16-1200-IP	4 * US-IV processors at 1.2GHz & 16GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans. FACTORY CONFIGURATION ONLY
E29-4P32-1200-IP	4 * US-IV processors at 1.2GHz & 32GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans. FACTORY CONFIGURATION ONLY
E29-4P16-1350-IP	4 * US-IV processors at 1.35GHz & 16GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans. FACTORY CONFIGURATION ONLY
E29-4P32-1350-IP	4 * US-IV processors at 1.35GHz & 32GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans. FACTORY CONFIGURATION ONLY
E29-1P4GB-1200C-IP	4 * US-IV COD processors at 1.2GHz & 16GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans. FACTORY CONFIGURATION ONLY
E29-1P8GB-1200C-IP	4 * US-IV COD processors at 1.2GHz & 32GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans. FACTORY CONFIGURATION ONLY
E29-1P4GB-1350C-IP	4 * US-IV COD processors at 1.35GHz & 16GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans. FACTORY CONFIGURATION ONLY
E29-1P8GB-1350C-IP	4 * US-IV COD processors at 1.35GHz & 32GB memory (1 processor/memory board); two 73 GB, 1.0", 10,000 RPM, SCSI disks; DVD-ROM; 4 (2N redundant) power supplies; smart cooling fans. FACTORY CONFIGURATION ONLY
E29BRD-482-1050	CPU/memory board. 4 * 1.05GHz UltraSPARC IV processors, each with 16MB external (L2) cache, & 16GB of total memory
E29BRD-482-1200	CPU/memory board. 4 * 1.2GHz UltraSPARC IV processors, each with 16MB external (L2) cache, & 16GB of total memory
E29BRD-482-1200C	Sun Fire E2900 UltraSPARC IV Capacity On Demand (COD) CPU/memory board with 4 * 1.2GHz UltraSPARC IV processors and 16GB memory (32 * 512MB DIMMs).

E29BRD-482-1350	CPU/memory board. 4 * 1.35GHz UltraSPARC IV processors, each with 16MB external (L2) cache, & 16GB of total memory
E29BRD-482-1350C	Sun Fire E2900 UltraSPARC IV Capacity On Demand (COD) CPU/memory board with 4 * 1.35GHz UltraSPARC IV processors and 16GB memory (32 * 512MB DIMMs).
E29BRD-484-1050	CPU/memory board. 4 * 1.05GHz UltraSPARC IV processors, each with 16MB external (L2) cache, & 32GB of total memory
E29BRD-484-1200	CPU/memory board. 4 * 1.2GHz UltraSPARC IV processors, each with 16MB external (L2) cache, & 32GB of total memory
E29BRD-484-1200C	Sun Fire E2900 UltraSPARC IV Capacity On Demand (COD) CPU/memory board with 4 * 1.2GHz UltraSPARC IV processors and 32GB memory (32 * 1GB DIMMs).
E29BRD-484-1350	CPU/memory board. 4 * 1.35GHz UltraSPARC IV processors, each with 16MB external (L2) cache, & 32GB of total memory
E29BRD-484-1350C	Sun Fire E2900 UltraSPARC IV Capacity On Demand (COD) CPU/memory board with 4 * 1.35GHz UltraSPARC IV processors and 32GB memory (32 * 1GB DIMMs).

Chapter 12: Upgrades

Sun Upgrade Advantage Program (UAP)

The Sun Fire E2900 server is the latest member of Sun's powerful generation of workgroup servers for enterprise network computing based upon the UltraSPARC IV technology.

Customers can upgrade and trade in one or more qualified Sun or non-Sun systems and receive trade-in value towards the purchase of a new E2900 system. Whether consolidating many servers to one, or trading in one system, the Upgrade Advantage Program offers the flexibility of options to receive trade-in credit towards the new system(s) purchase.

Sun UAP simplifies the upgrade process by providing trade-in value towards the new system or component purchased. This trade-in value is a percentage discount applied to the list price of the new Sun Fire E2900 system configuration or x-option. The upgrade trade-in value or allowance is applied in addition to the Sun contractual discount.

Sun UAP also offers customers the option to upgrade and trade in UltraSPARC III boards, and receive an upgrade allowance towards the purchase of UltraSPARC IV boards with higher processor speeds. Options are also available to trade in qualified systems and receive an upgrade allowance towards the purchase of additional E2900 boards to be installed in existing E2900 systems.

Key Messages

- The Sun Fire E2900 Server is available as standard (fixed) configuration.
- The Sun Fire E2900 Server provides a cost-effective replacement and upgrade from existing Sun UltraSPARC III servers for customers who require more application scalability, higher performance, and built in availability and reliability components.
- Hot swappable components such as disks, power supplies, fans and processor/memory modules help maximize system availability by allowing maintenance and upgrades to occur during normal operations.
- Existing investments in both Sun and non-Sun hardware can be preserved, and total cost of ownership lowered by upgrading using the Sun Upgrade Advantage Program.

How To Order

Determine the trade-in value for the Sun or Non-Sun system, and the allowance to apply to the E2900 system or x-option from the Sun Upgrade Advantage Program Trade-In Matrix. The E2900 allowance code is applied to the applicable system or E2900 board x-option when quoted and booked. The Upgrade Advantage Program is available to resellers and VARs through authorized Sun CDPs.

Reference the following Sun UAP sites for trade-in values, allowance information, and the Sun UAP program terms and conditions, including return requirements.

http://sun.com/ibb/upgrades

http://partner.sun.com/ibb/upgrades

http://ibb.eng/upgrades

Chapter 13: Sun Services

Sun's integrated portfolio of Sun Fire E2900 service solutions is designed to help customers architect, implement, and manage their infrastructures to support sustainable, highly available, and scalable business growth.

Improving time to market is critical in today's business climate and Sun can help customers to configure and deploy multiple Sun Fire E2900 servers into their environments. Our technology experts can help customers reduce time to productivity while establishing a solid foundation for reliability, availability, serviceability, and growth. Sun helps customers to better manage today's fast-paced, constantly evolving environment via easy-to-access flexible training and support.

Sun's portfolio of service solutions for the Sun Fire E2900 includes:

- Professional consulting services to help customers architect, implement, and deploy robust data center environments by leveraging from best practices and a wealth of knowledge and expertise.
- Learning solutions that provide the customer's staff with the skills to assess, design, build, and manage scalable data centers through curriculum designed specifically for their requirements.
- Comprehensive, flexible support services developed to address the unique needs of the data center and complement the customer's business model and operational support strategy.

Professional Consulting Services

Architecture Services

Sun's Architecture Services consist of a technology workshop, assessment, and roadmap service to build a customized architectural plan to meet the customers' long term technology strategy and provide for sustained business growth.

- Architecture Workshop - emphasizes the importance of building architectures with service-level requirements such as reliability, availability, scalability, and securability, which can help customers accomplish their business goals, and provide them with a high-level action plan for next steps.
- Architecture Assessment -examines the technology stack from data center to applications to determine the architecture's ability to operate against a desired set of service level requirements.
- Architecture Roadmap - focuses on identifying, prioritizing and documenting functional and service level requirements for the customer's architecture.

SunReady℠ Availability Assessment Service (SRAA)

The SunReady Availability Assessment Service is designed to identify gaps and assess risks in the customer's technical architecture and/or operational environment that could affect the availability and/or the ability to meet service level commitments to their end users.

Enterprise Security Assessment Service

The Enterprise Security Assessment Service provides a comprehensive security review and assessment of customers' current security environments to identify security exposures and risks within their policies, processes, procedures,networks, and systems.

Performance and Capacity Planning

Sun's consultants can help customers evaluate their server environments and develop a plan to help meet their current and future business needs. By understanding current system performance and capacity needs, customers can evaluate ways to improve server performance, enhance efficiency of their applications, and achieve high-performance computing environments.

Application Readiness Service (ARS)

This service can help customers optimize availability and service levels for multiple deployments of the Sun Fire E2900 in their IT environment. This service focuses on the availability, security and storage requirements of the customer's environment and enables faster time to production by helping to ensure that the system is ready to support specific applications.

Migration Services

Sun's migration services helps enable a smooth transition from legacy environments to Sun servers such as the Sun Fire E2900s. Sun consultants evaluate the best option for the customers' business for migrating applications, data or both to a new Sun platform.

Server Consolidation Assessment Service

Server Consolidation Assessment Service can help customers define a business case, success factors, candidate servers, and potential cost savings for server consolidation.

For more information on the above services from Sun Professional Services, please visit:

http://www.sun.com/service/sunps

Training

Sun Fire Workgroup/Enterprise Server Administration Course

This course provides students with the information needed to configure, monitor and manage the Sun Fire E2900 and other workgroup/enterprise servers. Students learn to implement concurrent maintenance and high availability strategies, troubleshoot hardware problems to the system component level and use firmware tools and applications to assess a system and isolate faults. Course includes classroom lecture with hands-on labs.

Solaris Operating Environment Courseware and Professional Certification

Sun provides Solaris OE training for IT Professional requiring the knowledge and skills to successfully install, manage and troubleshoot the Solaris OE, as well as, validate that they are qualified for the tasks that lie ahead.

Education Consulting Services

Consulting services from Sun Educational Services focuses on the people aspects of IT solutions. Sun can help maximize customers' IT investment by elevating the skill base of their personnel through skills analysis, prescribed learning and expert mentoring and coaching.

Sun Fire Skills Package

Provides customers the opportunity to purchase training at the time of their Sun Fire purchase. Skilled, qualified IT professionals are a key component of Sun Fire availability. A skills package provides the tools necessary to easily integrate training into the hardware sale. The Sun Fire Server Skills Package is a prepackaged training solution that contains the recommended courseware that delivers the skills needed to optimize the Sun Fire server in the computing environment. Once a skills package order is received, an education manager contacts the customer to develop a tailored training program.

Other Applicable Courseware

- Sun Cluster 3.x Administration Training
- Solaris Resource Manager/Bandwidth Manager Training
- Solstice Backup Training
- Solstice DiskSuite Training
- Security Courseware
- Workgroup Server Training

For more information on training and the above courseware, please visit:

http://www.suned.sun.com

Support Services

SunSpectrum℠ Support

The SunSpectrum program is an innovative and flexible service offering that allows customers to choose the level of service best suited to their needs, ranging from mission-critical support for maximum solution availability to backup assistance for self-support customers. The SunSpectrum program provides a simple pricing structure in which a single fee covers support for an entire system, including related

hardware and peripherals, the Solaris OE software, and telephone support for Sun software packages. The majority of Sun's customers today take advantage of the SunSpectrum program, underscoring the value that it represents. Customers should check with their local Sun Services representatives for program and feature availability in their areas.

STANDARD SERVICES	PLATINUM MISSION CRITICAL	GOLD BUSINESS CRITICAL	SILVER BASIC SUPPORT	BRONZE SELF SUPPORT
Skills assessment				
Skills analysis & employee development planning				
System check				
Account support plan				
Account support reviews	Quarterly	Semi-annual		
Account management				
Event monitoring & management service				
Sun Vendor Integration Program (SunVIP™)				
Mission-critical escalation support				
System activity log				
On-site service coverage	24/7	8 am-8 pm M-F	8 am-5 pm M-F	
On-site service response	2 hours	4 hours	4 hours	
Customer-defined priority				
Parts replacement	By Sun	By Sun	By Sun	By Customer
Field change orders				
Online & telephone technical support	24/7	24/7	8 am-8 pm M-F	8 am-5 pm M-F
Online & telephone support response	Next Available Engineer	Next Available Engineer	Next Available Engineer	4 hours
Remote diagnostic analysis				
Online Support Center access				
SunSolve™ Online				
Asset reporting & self-monitoring				
Solaris™ Operating Environment releases				
Bundled & embedded software				
Software patch access				
SunSpectrum InfoExpress™ bulletins				
SERVICE ENHANCEMENTS				
24/7 online & telephone technical support	N/A	N/A	Option	Option
24/7 on-site service coverage	N/A	Option	Option	N/A
2 hr on-site service response	N/A	Option	Option	N/A
RAS Profile service	Option	Option	N/A	N/A
Additional customer support contacts	Option	Option	Option	Option
Additional media & documentation	Option	Option	Option	Option

Availability of specific service features, coverage hours and response times may vary by country or location. Response times are determined by Customer-defined Priority. The response times shown are for service requests designated by the customer as "Priority 1." For the Event Monitoring & Management Service, a one-time startup and installation fee for software agents and remote monitoring infrastructure applies in addition to ongoing telecommunications charges. Customers may be required to meet a minimum annual SunSpectrum™ support contract value to receive specific account-based services within SunSpectrum Platinum™ support and SunSpectrum Gold™ support. See SunSpectrum support Service Listings for specific program deliverables and conditions.

Warranty

Sun Fire E2900

The warranty period for the Sun Fire E2900 server is one year with next business day on-site response.

- Duration: One year
- Phone hours of coverage: M-F, 8AM-5PM
- Call-back response: 8 hours
- Hardware response time: next business day
- On-site hours of coverage: M-F, 8AM-5PM
- Delivery method: repair on-site
- Software installation and media support: 90 days

Note: Installation is not included within the warranty.

SunSpectrum Instant Upgrades (SIU)

SunSpectrum Instant Upgrade is a simplified point-of-sale warranty upgrade program available to customers who want additional support for their computer hardware because they require services not offered by our standard warranty coverage and/or due to the mission critical nature of their IT environment. SIU allows customers to purchase SunSpectrum support at the point of hardware purchase. When customers purchase SIU at time of hardware sale, they increase their opportunity to optimize hardware availability and scalability by contracting for higher levels of support from day one of installation. There are three key features of the SIU program:

- Discountable list price
- Automated service quoting: when a hardware number is quoted, its service equivalent automatically appears on the quote
- Recommended levels of service are available based on type of hardware product

Enterprise Installation Service (EIS) for the Sun Fire E2900 Server

It is highly recommended that customers purchase Sun's Enterprise Installation Services (EIS) for their Sun Fire E2900 system and receive comprehensive configuration and installation support to ensure that their system is optimized for stability and performance with the latest patches and updates.

The EIS services includes the following deliverables:

- Review of environment and installation needs
- Documentation of environmental status
- Planning of system setup requirements, resources

- Identification of risks
- Verification of pre-installation and configuration
- Performance testing
- Installation review
- System reference documentation

Sun RAS Profile

Sun RAS (Reliability, Availability, Serviceability) Profile is designed to identify areas, based on best practices and industry standards, where the customers can improve the operational efficiency and increase the mission-critical reliability of their Sun system.

The Sun RAS Profile process involves comprehensive system assessment which leverages both Sun's unique knowledge bank of product configuration data and the expertise of Sun's senior engineers. Sun experts drill deeply into the configuration and potential operational and environmental issues that can affect the reliability, availability, and serviceability of a customer's Sun system. (Only available to customers with a SunSpectrum Gold or Platinum support contract.)

Online Support Center

The Online Support Center (OSC) provides web-based solutions anytime, anywhere. Providing high-quality availability services has always been a top priority at Sun. As a pioneer in web-based customer solutions, Sun continues to utilize the power and versatility of the Internet to offer customers a broad variety of online service offerings.

The online answer/transaction process can save customers valuable time by eliminating the time spent waiting on the phone for a customer service representative. The Online Support Center empowers the user by offering anywhere, anytime access to web-based support, training, and consulting solutions for Sun hardware and software products. The site serves as a portal for proactive service offerings, systems support features, and resource links.

Sun Remote Services (SRS) Net Connect

Sun Remote Services (SRS) Net Connect 3.x is a collection of services designed to help you better manage system assets, maximize system performance and facilitate services with Sun and Sun service partners. The base bundle of services included in SRS Net Connect include: system self-monitoring, event notification and alarms and comprehensive reporting. These base services are offered at no-cost and help to maximize system performance and prevent downtime issues as well as improve system management efficiencies.

Accredited Installation Provider Program (AIP)

Enables qualified iForce partners to leverage Sun certification, methodologies, tools, and support to market and deliver installation services on Sun systems that include bundled installation. Accredited

Installation Provider Program enables qualified iForce partners to leverage Sun certification, methodologies, tools, and support to market and deliver installation services on Sun systems that include bundled installation.

For more information on the above support offerings, please visit:

http://www.sun.com/service/support

Chapter 14: Glossary

100BASE-T	See Fast Ethernet.
Adapter	A host bus adapter or interface which plugs into a PCI slot to provide connectivity, i.e. to networks, storage, graphics or other I/O devices.
ASR	Automatic System Recovery. A RAS feature that initiates a system reboot sequence that bypasses failed system components or a software failure.
Controller	A microprocessor based device which is dedicated to a specific task, esp. I/O and is embedded within a host-bus adapter or external (storage) array. The term 'controller' is often used synonymously with 'host-bus adapter.'
DIMM	Dual in-line memory module. A memory unit that is available in a range of capacities, such as 256 MB, 512 MB, or 1 GB.
DIMM group	A group of four DIMMs.
Processor/memory module	The basic component of processing capability for the Sun Fire E2900 server. Each module is comprised of exactly four UltraSPARC III microprocessors, a variable amount of memory depending upon the quantity and density of DIMMs selected, and the interconnect logic.
Fast Ethernet	IEEE standard for 100-Mb/second Ethernet. This technology supports a data transfer rate of 100 megabits per second over special grades of twisted-pair wiring.
Fault resilience	Capability of a system to mask many individual errors, but not all. This approach generally requires redundancy of some components and additional software. An example would be the dual path capability and automatic failover for storage and networks. Another term for 'high availability'.
Fault tolerance	Capability of a system to mask any individual point of failure. This type of system is typically implemented with redundancy of components and synchronization of clock signals to maintain each unit in 'lock step' with its counterpart.
FC-AL	Fiber Channel arbitrated loop. A loop topology used with fiber.
I2C	A bus used for environmental monitoring.
High availability	Capability of a system to mask many individual points of failure or to significantly compensate for them. This type of system is built upon standard components with limited hardware and/or software components to minimize the impact of failures. Generally, this type of system is less costly than a fault tolerant system.
Host-bus adapter	Please see Adapter.
Hot-plug	A component that can be electrically safe to remove or add while the system is still running. Typically, the system must be rebooted before the hot-plug component is configured.
Lights Out Management	Please see Remote System Control.

LOM	Lights Out Management. Please see Remote System Control.
Mirroring	Maintaining a redundant, logical copy of a disk volume for higher availability. Also known as volume shadowing or RAID 1.
NFS	Sun's distributed computing file system, i.e. network file system.
PCI	Peripheral component interconnect. An industry-standard for connecting peripherals such as disk drives, tape drives and other external devices.
Pre-configured System	Pre-configured systems that offer discounted prices in comparison to assemble-to-order (ATO) or custom configurations. It is also more convenient for both customers and sales as it assures that all necessary components for a functional system are included with a single line item on the order form.
PTO	Please see Pre-configured System.
RAID	Redundant array of independent disks. A set of disk drives that appear to be a single logical disk drive to an application such as a database or file system. Different RAID levels provide different capacity, performance, high availability, data protection and cost per unit of storage.
RAS	Reliability, availability, and serviceability. Three aspects of the design of a system contributing to continuous operation and minimizing system downtime for services. Together reliability, availability, and serviceability provide for near continuous system operation.
RSC	Remote System Control. A remote monitoring and administration feature that allows systems administrators to access the system console from any host on the network, sends e-mail or pager notice of system faults, and provides boot and run logs of system events.
Redundancy	Duplication for the purpose of achieving fault tolerance. Refers to duplication or addition of components.
Remote System Control	An independent processor which provides remote management and control of a system via a serial line, modem, or Ethernet connection.
SC	System Control. Please see Remote System Control.
SCSI	Small Computer Systems Interface. An ANSI standard for controlling peripheral devices by one or more host computers.
SSP	System Service Processor. Please see Remote System Control.
Standard Configuration	A subset of the Pre-configured Systems (PTOs) which offer accelerated delivery time.
V9	Version 9 of the SPARC™ definition.
Volume shadowing	See Mirroring.

Chapter 15: Materials Abstract

All materials are available on SunWIN except where noted otherwise.

Collateral	*Description*	*Purpose*	*Distribution*	*Token # or COMAC Order #*
Product Literature				
Sun Fire E2900 Server, Just The Facts	Reference Guide (this document)	Training Sales Tool	SunWIN	401325
Sun Fire E2900-E25K Server Customer Presentation	Customer Presentation	Sales Tool	SunWIN	401323
Sun Fire E2900 Server Data Sheet	Data Sheet	Sales Tool	SunWIN	401330
Sun Fire E2900-E25K Server Technical Presentation	Architecture Presentation	Training Sales Tool	SunWIN	401324
Sun Fire E2900 Pocket Facts	Cheat sheet	Training	SunWIN	401336
Sun Fire E2900-E25K Servers Brochure		Sales Tool	SunWIN	401343
Sun Hardware At-A-Glance		Sales Tool	SunWIN	401344
Sun Fire E2900-E25K Servers iTour		Sales Tool	SunWIN	401347
Sun Fire E2900-E25K Family Poster		Sales Tool	SunWIN	401348
Capacity On Demand 2.0 Buyer's Guide	User's reference guide	Sales Tool	SunWIN	426163
Sun Fire Capacity on Demand (COD) 2.0 Customer Presentation	Customer Presentation	Sales Tool	SunWIN	360903
Sun Capacity on Demand 2.0 and Temporary Capacity on Demand Brochure	Sales Tool	Sales Tool	SunWIN	388239
White Papers				
Scaling Application Performance with Throughput Computing – Sun Fire E2900-E25K Servers and the UltraSPARC IV Processor White Paper	White paper	Sales Tool	SunWIN	401329
External Web Sites				
General Information on the Sun Fire E2900 Server	**http://www.sun.com/servers/midrange/sunfire_e2900/**			
Information on Sun's Investment Protection Solutions	http://www.sun.com/ibb/upgrades/index.html			

Collateral	*Description*	*Purpose*	*Distribution*	*Token # or COMAC Order #*
Sun Fire Enterprise Servers Capacity On Demand Program	http://www.sun.com/datacenter/cod/			
Internal Web Sites				
Information on upgrading to Sun Fire E2900 Server - Workgroup Servers Migration and Allowance Matrix	http://ibb.eng/upgrades/			
Server Consolidation Upgrade Program	http://ibb.eng/upgrades/			
Sun Fire Enterprise Servers Capacity On Demand Program	http://systems.corp/programs/datacenter/cod/			

Chapter 16: Change Log

15 November 2004: Added Capacity On Demand information under System Management on page 56, under Ordering Information on page 61, under the CRS Program on page 67, and under Materials Abstract page 81.

15 November 2004: Updated Power Cord information on page 66.

15 November 2004: Updated System Controller information with Secure Shell feature on page 25.

15 November 2004: Updated System Configuration Card information on page 29.

5 January 2005: Updated to include 1.35GHz CPU information, various corrections & updates.