Sun Blade™ 2000 Workstations

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Last Update: 3/28/2003

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Positioning

Figure 1. Sun Blade™ 2000 workstations

Introduction

The Sun Blade™ 2000 workstations are Sun's UltraSPARC™ III Cu processor-based workstation platforms. They can be configured as either single- or dual-processor workstations, and offer the user outstanding system performance through superscalar processor technology, a high-performance system interconnect, high-bandwidth I/O, and accelerated graphics.

The Sun Blade 2000 workstations are outstanding solutions for customers who require high-performance and high-capacity computing. These workstations can expand to up to two CPUs, two 73-GB Sun Blade 2000 FC-AL disks, 8-GB RAM, and two high-performance UPA graphics accelerators. The generous expansion capacity in these workstations allow customers to tailor a solution directly for their needs.

Several graphics accelerators are supported including Sun PGX64 , Sun XVR-100, Sun XVR-500, Sun XVR-1000 graphics and Sun XVR-1200 . These graphics accelerators range from the very affordable, Sun PGX64 and XVR-100 graphics to the entry-level 3D acceleration of Sun XVR-500 graphics, to the very high-performance, hardware-based texture mapping acceleration of Sun XVR-1000 and XVR-1200 graphics. A number of multi-display configurations are possible.

The Sun Blade 2000 workstations include three industry-standard interfaces that enable the use of Sun and third-party peripherals. These are:

• A universal serial bus (USB) for low-speed devices (such as a keyboard and a mouse)

• An IEEE 1394 interface for digital video use

• A Fibre Channel arbitrated loop (FC-AL) interface to enable high-speed disk access

All Sun Blade 2000 workstations also include an external 40 MB/second UltraSCSI interface and 10/100 Mbit Ethernet.

The tower enclosure is designed for ease of expansion and service. Memory, CPU modules, PCI cards, disk drives, and removable media peripherals are all independently accessible. The Sun Blade 2000

workstations also offer exceptional power-management features. These enable various subsystems to independently enter and exit a low power state depending on activity levels, while maintaining an active network connection.

Note that the Sun Blade 2000 workstations support the Solaris™ 8 2/02 Operating Environment or later, including all Solaris 9 updates. The preferred release is Solaris 9 12/02.

Although earlier versions of the Solaris Operating Environment are not supported, these workstations maintain full binary compatibility with existing Solaris SPARC applications. All currently shipping Sun Blade 2000 systems have a dual boot capability (a choice between the Solaris™ 8 HW 12/02 or Solaris™ 9 12/02 Operating Environment,).

Sun Blade Workstation Product Line Placement

Sun Blade workstations and their predecessors, the Ultra™ systems, have several things in common, including:

- The SPARC™ processor

- 100 percent binary compatibility throughout Sun's product line

- Modularity — easy-to-swap components

The table below shows a feature comparison between the three Sun Blade workstations.

Feature	Sun Blade 150	Sun Blade 1000	Sun Blade 2000
Placement	Economy Workstation	Value Workstation	Performance Workstation
CPU	One UltraSPARC-IIi with 512-KB L2 cache	Up to two UltraSPARC III; UltraSPARC III Cu as X-option only with 8-MB L2 cache	Up to two UltraSPARC III Cu with 8-MB L2 cache
Processor Speeds	550/650 MHz	750 MHz 900 MHz	900 MHz or 1.2 GHz
Memory Capacity	2 GB	8 GB	
Drive Capacity	Up to two 40 GB	Up to two 36 GB standard 73 GB optional	Up to two 73 GB standard
Drive Type	EIDE	Fibre Channel	
Graphics Supported	Sun PGX64, Sun XVR 500	Sun PGX64,Sun XVR-100 Sun XVR-500, Sun XVR-1000 Note: Sun Blade 2000 has optional XVR-1200	
Solaris Operating Environment Support	Solaris 8 2/02 or newer	• Solaris 8 10/00 or newer recommended • Solaris 8 10/01 or later for systems using the UltraSPARCIII Cu processor	Solaris 8 2/02 supported up to 1.05 Ghz, Solaris 8 HW12/02 and Solaris 9 12/02 required for 1.2GHz
OBP Revision	—	4.X or newer	4.5.X or newer

Key Messages

- **The Sun Blade 2000 systems are very high-performance, 64-bit workstations that support technical applications that require exceptional computational speed and lots of memory for large data sets.**

  – Standard and Random configurations of the Sun Blade 2000 come with 900-MHz or 1.2 GHz UltraSPARC III Cu processors.

  – All Sun Blade 2000 processors come with 8 MB of L2 cache per CPU.

  – Systems have an 8-GB memory capacity. Memory is installed in banks of four DIMMs to take advantage of the architecture's 576-bit-wide memory path.

  – UPA provides a crossbar-oriented interconnection establishing a 144-bit wide, ECC-protected data path to the CPU. Clocked at up to 150 MHz, the UPA crossbar gives a peak throughput of over 1.2 GB/second.

- **The Sun Blade 2000 workstations provide customers with several graphics solutions from the single-display, low-cost 2D graphics solutions to multi-display, high-performance texture-mapping 3D graphics solutions.**

  – Sun PGX64 or XVR-100 graphics are a low-cost option for those customers that only require 2D graphics. Up to four cards are supported in a single system.

  – Sun XVR-500 graphics accelerator is a mid-range graphics option that allows customers with small, medium, and large datasets to choose the system to meet their demanding application needs. This board provides support for multiple frame buffers in a single system; up to four are supported to drive four synchronized displays.

  – Sun XVR-1000 graphics is an ideal solution for customers who need the highest possible workstation image quality for personal visualization applications. Each card drives two monitors and up to two graphics cards are supported in each system.

  – Sun XVR-1200 graphics accelerator is Sun's high-performance 3D graphics for demanding 3D applications. It is aimed at technical markets where high performance and high quality are requirements. The Sun XVR-1200 provides an outstanding graphics solution for highly demanding 3D graphics applications that require fast geometry performance and ultra-fast texture mapping performance.

- **Sun Blade workstations continue to be the industry leaders in networking, connectivity, and I/O performance and versatility ratings**

  – 100-Mbps Fast Ethernet through twisted pair is a standard feature on all Sun Blade 2000 workstations, but the system also maintains connectivity with 10 Mbps networking technology through an autosensing speed switch feature.

  – Advanced networking options includes additional Fast Ethernet ports through industry-standard PCI option cards

  – The Sun Blade workstations come with USB and IEEE 1394 (FireWire®) ports to support the newer peripherals that come with these I/O interfaces.

- **The Sun Blade 2000 workstations run the same applications that run throughout Sun workstation and server product lines. Binary compatibility continues to be of the most important ways that Sun protects its customers' investments.**

Availability

The Sun Blade 2000 workstations with 900-MHz UltraSPARC III Cu processors or the high-performance 1.2-GHz processors are currently available. Sun Blade 2000 workstaitions with 1.015GHz and 1.05 GHz UltraSPARC III Cu processors have been EOLed. Last Order Date 07/18/2003; Last Ship Date 10/17/2003

Target Users

The target customer is the user who requires maximum computer resources — CPU, memory, and disk capability — in a deskside system. In particular, the Sun Blade 2000 systems are excellent workstations for users who run applications that require extremely high floating-point performance or who need high-performance graphics for visualization applications.

Target Markets

Designed for the power user who requires high-performance, multiprocessing capability, high-end graphics, and large amounts of expansion capacity, the Sun Blade 2000 workstations meet the needs of users in a number of disciplines. Primary market areas are:

- Electronic design automation (EDA)

- Mechanical design (MCAD/MCAE)

- Earth resources/GIS (oil and gas)

- Visualization and simulation

- Research and development

Secondary markets are:

- Defense/government

- Financial modeling

- Medical imaging

With the Sun XVR-1000, the Sun Blade 2000 workstations can perform complex DCC operations for visual/simulation applications, and texture memory operations for intense graphics use. Its two-way CPU capability is ideal for financial services applications that perform simultaneous financial simulations and trading activities.

Industry	Key Features to Highlght
Digital Content Creation (DCC)	• 8-GB RAM to support large data sets • High floating point performance for complex compute rendering • Dual CPUs to handle simultaneous tasks • XVR 500 or XVR-1200 Graphics Accelerators

Industry	Key Features to Highlight
Electronic Design (EDA) • Chip designers, board designers • System houses • Telco	• High-performance, full 64-bit processing • Large memory capacity • Availability of applications • PGX 64, XVR-100 or XVR 500 Graphics Accelerators
Financial • Stock and commodity traders • Banks	• High performance CPUs • Compact design • Multimedia capabilities • Multi-headed display capability • PGX 64, XVR-100 or XVR 500 Graphics Accelerators
Mechanical Design (MCAD/MCAE) • Automotive • Aerospace • Defense industry • Mechanical equipment designers	• High-performance, full 64-bit processing • High-end graphics performance and functionality • Availability of applications • XVR 500 or XVR 1200 Graphics Accelerator s
Oil and Gas • 2D, 3D, and 4D seismic analysis • Production engineering • Reservoir engineering	• High-performance, full 64-bit processing to handle computation with large data sets • High-end graphics performance and functionality for imaging operations • Dual-headed monitor capability • 3D support for 24-inch displays • XVR 500 Graphics Accelerator, XVR 1000, XVR 1200
Publishing and Imaging • Newspapers • Magazines • Image banks • Advertising agencies	• High-performance CPUs • High-end graphics performance and functionality for imaging operations • Dual graphics monitor capability • XVR 1000, XVR 1200 Graphics Accelerator
Research and Development • In-house development • Research institutions	• High computing performance • Feature-rich Solaris Operating Environment • XRV 500 or XVR1200 Graphics Accelerator
Software Development (CASE) • ISVs • In-house development at large organizations	• High-performance Solaris Operating Environment • A full, 64-bit environment • Availability of applications • Multithreaded application development • PGX 64, XVR-100 or XVR 500 Graphics Accelerators
Visualization and Simulation • Scientific visualization • Technical simulation	• High-performance CPUs • Tuned for high-end graphics performance and functionality • Sun XVR-1000 /XVR-1200 graphics with high-end texture mapping • Multi-monitor capability

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Selling Highlights

Compatibility

The Sun Blade™ 2000 workstations run the Solaris™ 9 or Solaris™ 8 Operating Environment. They can run 64-bit or 32-bit applications unmodified from previous releases of the Solaris Operating Environment. All currently shipping Sun Blade 2000 systems have a dual boot capability (a choice between Solaris™ 8 HW 12/02 Operating Environment or Solaris™ 9 12/02 Operating Environment).

Market Value Propositions

- Sun re-emphasizes its position with leading-edge compute performance and high-end 3D visualization capabilities with the best price/performance available in the 64-bit workstation marketplace.

- Due to the exceptional application and graphics performance, customers in manufacturing who use graphics and compute intensive applications to visualize large data sets will see a marked increase in their productivity level. The workstation will help enable customers to more accurately view their datasets, make better decisions based on what they see, and reduce errors and manufacturing cycle times.

- By utilizing the Sun Blade 2000 workstation's exceptional dual-processing compute performance and large 8-GMB memory capacity in addition to Sun Grid Engine software, customers in electronic design automation and MCAE environments who work with complex, compute-intensive and visually intensive applications should see a marked increase in their productivity.

- Because of Sun's continued focus on investment protection, Sun customers can realize significant cost savings by upgrading/adding to their Sun Blade 2000 workstation to newer processors and components rather than purchasing new systems.

- The Sun Blade 2000 workstations exceptional performance along with its ability to support four high-performance monitors driving by two Sun XVR-1000/XVR-12000 or four Sun XVR-500 graphics accelerators, allows customers to provide "personal visualization systems" at a fraction of the cost of large visualization solutions.

- Assemble-To-Order configurations offer customers a customized configuration that is configured for their needs, instead of pre-configured system with standard features.

Enabling Technologies

UltraSPARC III Cu Processors

The Sun Blade™ 2000 workstations are shared-memory, multitasking systems built around the UltraSPARC III Cu microprocessors. These processors are Sun's latest generation of the SPARC™ processor family and the second generation of 64-bit UltraSPARC chips.

The Sun Blade 2000 workstation comes with 900-MHz or 1.2-GHz versions of the UltraSPARC III Cu processor. Note: The Sun Blade 2000 UltraSPARC III Cu 1.2 GHz systems do not support adding or mixing 600/750/900-MHz CPU modules from Sun Blade 1000 systems or UltraSPARC III Cu 900 Mhz, 1.015 GHz or 1.05 GHz modules from Sun Blade 2000 systems. In short, no speed mixing is allowed.

- As a member of the UltraSPARC family of CPUs, full binary compatibility is provided.

- Modules have the 64-bit SPARC V9 architecture.

- Systems have 8 MB of Ecache per CPU.

- An on-chip memory controller is included for reduced latency.

I/O Interfaces

The Sun Blade 2000 workstations include two advanced I/O interfaces, which greatly increase customers' access to peripherals.

- **USB interface**

  Universal serial bus (USB) support is provided for low-speed devices. Initially devices such as the Sun™ Type-6 keyboard and mouse are supported along with USB hubs. Sun Blade 2000 workstations have four (Type A) USB connectors on the rear pane (12 Mbps/second).

- **IEEE 1394 interface**

  IEEE 1394 — also known in the industry as FireWire® — has emerged as a standard for medium-speed devices such as digital cameras and digital video cameras. IEEE 1394 interfaces provide an isochronous service that provides latency along with delivering a 400-Mbps bandwidth that is required for transferring large images and other multimedia data. The Sun Blade 2000 workstations have two IEEE 1394 (6-pin) connectors on the rear panel.

Fiber Channel Arbitrated Loop (FC-AL)

Sun has been an early and aggressive adopter of Fiber Channel arbitrated loop (FC-AL) technology in its higher end systems and disk array technologies. The Sun Blade 2000 workstations are Sun's first desktop systems using this exciting high-bandwidth (1 Gbit/second) technology, offering considerable performance advantage and deployment flexibility over the slower UltraSCSI technology. Only FC-AL disk drives are supported for internal disk storage in the Sun Blade 2000 workstations.

Technology Overview

Sun Blade™ 2000 workstation architecture is designed to provide high-performance multiprocessing power, scalability, reliability, and flexibility in a balanced package that does not compromise economy. The very high levels of integration achieved with Sun workstations through the use of application-specific integrated circuits (ASICs) have resulted in a greatly reduced part count, high reliability, and low cost without compromising access to a full complement of expansion options through high performance, standardized interfaces.

An architectural block diagram of the Sun Blade 2000 workstation board is shown in the figure below.
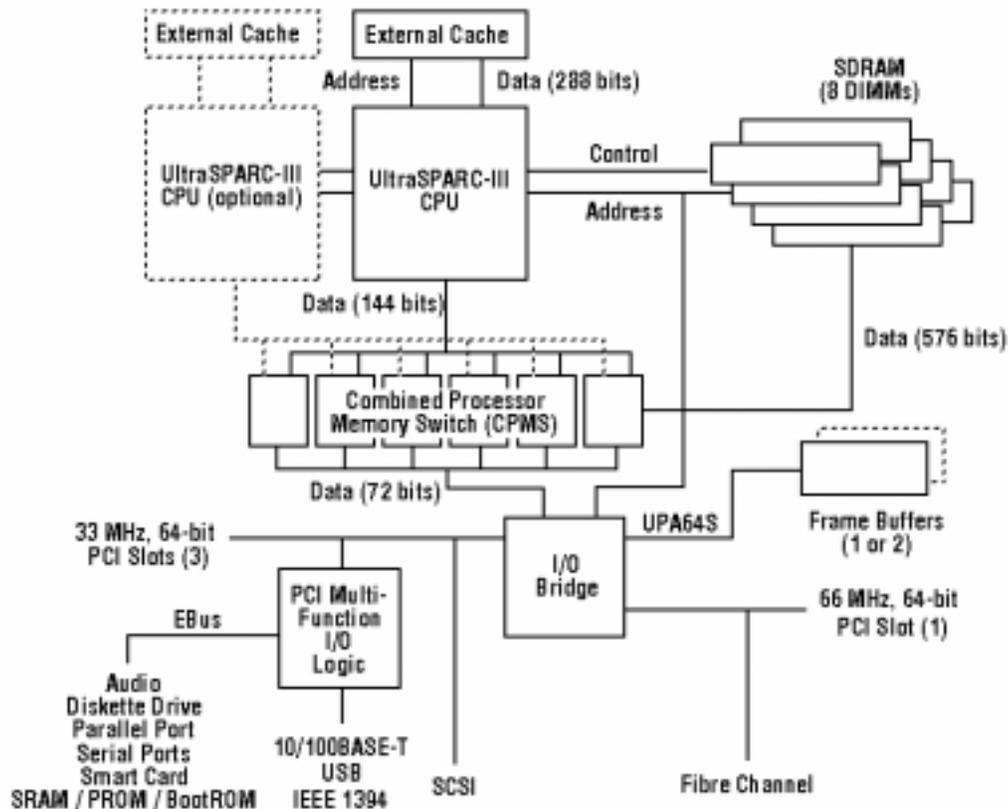
Figure 2. Architecture of the Sun Blade 1000 and 2000 system

The Sun Blade 2000 workstations are designed for balanced system performance, accelerating applications at every step. Faster I/O and networking, together with the Sun™ Fireplane interconnect, allow fast data fetching. This interconnect is based on a packet-switched, crossbar architecture. The Sun Blade 2000 workstations have nine buffered crossbar-switched processors that allow the memory and the graphics to interconnect. This architecture provides supercomputing power, and moves data through the interconnect at high speed.

Technical Fact Summary

- Sun Blade 2000 workstations use one or two 900-MHz or one or two 1.2-GHz UltraSPARC III Cu processors. The Sun Blade 2000 UltraSPARC III Cu 1.2 GHz systems do not support adding or mixing 600/750/900-MHz CPU modules from Sun Blade 1000 systems or UltraSPARC III Cu 900 MHz,1.015 GHz or 1.05 GHz modules from Sun Blade 2000 systems. In short, no speed mixing is allowed.

- High-performance Sun Fireplane interconnect with 4.8 GB/second throughput provides fast access to memory and graphics.

- Internal FC-AL interface for disk access supports up to two internal FC-AL disks in these system (up to 144-GB capacity). The Sun Blade 2000 workstation comes with up to two 73-GB FC-AL disks.

- Up to 8 GB of memory for configurations (using 8 x 1-GB DIMMs)

- High performance interconnect at up to 150 MHz /1.2 GB/second peak throughput.

- High-performance 64-bit PCI I/O bus offering dual independent PCI buses, plus 66-MHz PCI support

- High-end graphics functionality and performance with Sun XVR 500 and Sun XVR-1000/XVR-1200 graphics

- Fast Ethernet, 100 BASE-T, autosensing, and auto switching to 10/100 BASE-T for backward compatibility in networking; advanced networking options include Gigabit Ethernet and ATM.

Processors in the Sun Blade 2000 Workstations

Sun Blade 2000 workstations are powered by up to two UltraSPARC III Cu microprocessors with 8 MB of external cache. Binary compatible with all Sun SPARC™ processor-based systems, the UltraSPARC III Cu processors provide excellent integer and floating-point performance to address the needs of the most computationally demanding applications.

UltraSPARC III Cu Processor Features

The UltraSPARC III Cu processor, the second model in this family, offers a number of performance enhancements. This processor incorporates a number of data prefetching mechanisms to exploit memory level parallelism. The processor offers an enhanced data memory management unit (DMMU) that has 1040 TLB entries and more support for flexibly using large pages, up to 4-MB pages, to more effectively map gigabytes of data. The processor supports a two-way set-associative external cache instead of a direct-mapped cache. This updated processor includes all the features of its predecessor, with a few significant improvements. It is currently available at 900 and 1.2-GHz speeds.

- Prefetch is enabled in the UltraSPARC III Cu modules. This feature significantly improves floating point and integer arithmetic performance (up to 15 percent).

- The performance gain also comes from a combination of support for the two-way, set-associate external cache and a larger cache table.

- Specific applications in the oil and gas, MCAE/MCAD, and EDA markets have seen significant performance boosts over the same speed UltraSPARC III CPU modules that do not have prefetch enabled.

Data Prefetching Support

The UltraSPARC III Cu processor makes use of an advanced data prefetching mechanism. This mechanism is used to both overlap load misses to increase memory-level parallelism and to hide load-miss latency. This mechanism allows software to explicitly expose the memory-level parallelism and to schedule memory operations. This mechanism is extra important because the processors in the UltraSPARC III family have blocking loads; when the processor reaches a load instruction that misses in the cache, the processor waits for the load to complete before executing any other instructions. The processors supports software prefetching where the compiler (or Java JIT) can schedule prefetching of data to exploit memory-level parallelism. Some versions of the processor will also support hardware prefetching, where the processor observes common data sequences and attempts to prefetch the data automatically. There are a number of variations of software prefetches. Software prefetches can specify if the data should be brought into the processor either for reading or both reading and writing. Software can also specify if the data should be installed into the external cache, for data that will be reused frequently, or only brought into the prefetch cache.

One of the main mechanisms for implementing prefetches is a special prefetch cache. The prefetch cache is a small (2 KB) cache that is accessed in parallel with the data cache for floating-point loads. Floating-point load misses, hardware prefetches and software prefetches bring data into the prefetch cache. The prefetch cache is 4-way set-associative and has 64-byte lines which are broken into two 32-byte subblocks with separate valid bits. The prefetch cache is write invalidate.

Enhanced Data Memory Management Unit

The data memory management unit of UltraSPARC III Cu is enhanced to provide more translation entries and to provide more support for using large pages for translation. For the data reference address stream translation there are three TLBs accessed in parallel. The first TLB is a 16-entry fully-associative TLB. This TLB can translate page sizes of 8K, 64K, 512K and 4M. The second TLB is a 256-set, 2-way set-associative (512 entries) TLB. This TLB can translate at 8K, 64K, 512K and 4M page sizes, but at any one time it is configured to only handle one of the page sizes.

The third TLB is identical to the second. This TLB, like the second, can handle one of four page sizes and can be configured to the same or a different page size than the second TLB.

Having the two large TLBs is very important for general use of large pages for translation. One of the TLBs can be set for large pages (such as 4-MB pages) while the other can be set to the default page size (usually 8-KB pages). With this configuration the processor has robust support for large pages.

Enhanced External Cache Unit

The external cache for UltraSPARC III Cu can be configured as two-way set-associative. This offers substantial improvements in the hit rate of cache. The cache size and line size remains the same.

UltraSPARC III and UltraSPARC III Cu Processor Comparison

Feature	UltraSPARC III	UltraSPARC III Cu
Speeds Available	750/900 MHz	900 MHz or 1.2 GHz
Can mix processor speeds?	Yes	No
Solaris Operating Environment Support	Solaris 8 10/00 or newer recommended	Solaris 8 HW12/02 or Solaris 9 12/02

Feature	UltraSPARC III	UltraSPARC III Cu
OBP Revision	4.X or newer	4.5.X or newer
Prefetch Settings	off	on
On-chip SRAM protection	no	ECC/parity
SPECint2000 (peak)	396/466	533/710
SPECfp2000 (peak)	395/410	722/1118

Notes:

- The UltraSPARC III 1.2 GHz Cu benchmarks were performed with latest release of K2 E compiler and the Solaris 9 12/02 Operating Environment

Note: SPEC results are based on the current estimates, final numbers may vary. The SPEC numbers will be final after they are approved by the SPEC.org

Note that UltraSPARC III Cu modules cannot be mixed with the UltraSPARC III modules. The Solaris 8 12/02 Operating Environment or later should be installed on Sun Blade 1000 systems prior to installing UltraSPARC III Cu module upgrades.

Additional improvements were made to the UltraSPARC III Cu processor to enhance performance:

- A number of changes to the array parity protections were made

- The Ecache initialization process was streamlined

- The processor clock and the Ecache modes were modified to support higher clock frequencies

Sun Fireplane Interconnect

In recent years, processor technology has moved so quickly that memory systems and interconnects have been hard-pressed to keep up. As a result, many designs fail to deliver the data bandwidth that modern processors are capable of. With the updated system interconnect, Sun Microsystems continues the tradition of providing superior memory and I/O bandwidth on its desktop systems.

Features of this system interconnect include:

- Fast 150-MHz operating frequency offers greatly increased performance over previous designs

- Low latency memory access

- Completely separate address/control and data paths for flexible implementation

- Out-of-order transaction processing enables multiple "in-flight" transactions on the bus at one time.

- More economical implementation through distributed control (no central memory controller required)

- Integrated support for multiprocessor configurations

- 4.8 GB/sec. peak data bandwidth

- Separate address and data paths, so no ordering on data and better load balancing

- Distributed arbitration for address control; no need for central arbiter

- Boot bus provides alternate path for booting and diagnostic

- Energy Star mode built-in

- ECC on data, parity on private data bus, parity on address control

The Sun Fireplane interconnect directly connects the two UltraSPARC III Cu processors and the I/O bridge. The address bus runs at half the speed of the data paths, and utilizes DTL signaling. One of the major architectural innovations of this interconnect is the ability to combine the simplicity of a single bus with the high bandwidth normally associated with a switch-based interconnect. This is accomplished with the complete separation and independence of address and data paths. The address and data paths in most computer systems are very closely related, especially in their low-level sequencing, forcing a strong coupling between the transport of addresses and data between system components. The system interconnect breaks away from this traditional methodology by completely separating the address and data paths — both at the topological level and in low-level sequencing. For addresses, a hierarchical bus is used. For data, a high bandwidth point-to-point data network is used. This interconnect supports high-performance servers with up to 24 processor sockets.

For larger scale systems, a directory protocol can be used to connect many smaller groups of CPUs together. The directory protocol is based on Sun's scalable shared memory (SSM) architecture. Within each group, snooping is used for coherency, and the directory protocol is used between groups. The CPUs of the UltraSPARC III Cu family all have built-in support for both the snooping and the directory-based cache coherency protocols. With the directory protocol, coherent multiprocessor with more than a thousand CPUs can be built.

Memory

The Sun Blade 2000 workstations support up to 8 GB of 50-ns, 232-pin, 3.3-volt, dynamic RAM memory. Memory is organized into two banks of four DIMMs. DIMMs are added in groups of four.

Storage

Internal data storage is provided by up to two 3.5-inch, FC-AL disk drives. The Sun Blade 2000 workstations come with up to two 73-GB drives. These 10000-rpm drives offer a peak data transfer rate of 100 MB/second.

In addition to internal and external high-speed fixed storage capabilities, the Sun Blade 2000 workstations provide three removable media bays that support DVD-ROM, 1.44-MB, 3.5-inch manual-eject floppy, or 4-mm tape for software installation and system management.

Networking and I/O

All Sun Blade 2000 workstation models provide standard 10/100-Mbps Fast Ethernet, which can autosense and drop to 10 Mbps operation. In addition, a wide range of serial I/O options are supported, bringing additional capabilities and higher levels of performance to desktop workstations:

- **USB interface**

  Universal serial bus (USB) support is provided for low-speed devices. Initially devices such as the Sun Type-6 keyboard and mouse are supported along with USB hubs. The Sun Blade 2000 workstations have four USB connectors on the rear panel (12 Mbps/second).

- **IEEE 1394 interface**

  IEEE 1394 — also known as FireWire®— has emerged as a standard for medium speed devices such as digital cameras and digital video cameras. IEEE 1394 interface provides an isochronous service

which helps ensure latency along with providing the needed 400-Mbps bandwidth for transferring large images and other multimedia data. The Sun Blade 2000 workstations have two IEEE 1394 connectors on the rear panel.

*   **Fiber Channel arbitrated loop (FC-AL)**

    Sun has been an early and aggressive adopter of Fiber Channel arbitrated loop (FC-AL) technology in its higher end systems and disk array technology. The Sun Blade 2000 workstations continued the precedent set by the eoled Sun Blade 1000 workstations of this exciting high-bandwidth (1 Gbit/second) technology in desktop systems, offering considerable performance advantage and deployment flexibility over slower UltraSCSI. Only FC-AL disk drives are supported for internal storage in Sun Blade 2000 workstations.

*   **SCSI**

    Sun Blade 2000 workstations still support 40 MB/second UltraSCSI (Fast-20) for support of internal removable media devices and legacy external SCSI devices. UltraSCSI is completely compatible with earlier fast (10 MB/second) and standard 8-bit (5 MB/second) SCSI peripherals. A standard external 68-pin connector is provided.

*   **Terminal/modem interface**

    Two serial ports are provided, both supporting synchronous communication. The maximum baud rate is 384-Kbaud synchronous and 460.8-Kbaud asynch. Both RS232 and RS423 standards are supported via a software setting. The default configuration is RS423. Connection is via two DB25 standard connectors.

Supported Graphics

The Sun Blade™ 1000 (recently EOLed) and 2000 workstations provide access to Sun's most popular and most powerful graphics accelerators. The table below shows the graphics systems supported on these workstations.

Graphics Accelerator	Sun Blade 1000 Workstation	Sun Blade 2000 Workstation	Max. Number Supported
Sun™ PGX64 graphics	Standard configuration	Standard configuration	4
Sun Creator3D series 3 graphics	Option	EOL	2
Sun Elite3D m6 graphics	Option	EOL	2
Sun Expert3D graphics	Option	EOL	2
Sun Expert3D-Lite graphics	Standard configuration	EOL	3
Sun XVR-500 graphics	Option	Random configuration	4
Sun XVR-1000 graphics	Option	Random configuration	2
Sun XVR-1200 graphics	Option	Option	2
Sun XVR-100 graphics	Option	Standard Configuration	4

Sun's existing graphics product lines maintain binary-compatibility with all other Sun graphics products. The following sections describe these graphics accelerators in more detail.

Note: Sun Creator3D series 3 graphics and Sun Elite3D m6 graphics accelerators have been EOLed.

The Last Order Date for both EOLed graphics accelerators was September 6, 2002 and the Last Ship Date for both was December 6, 2002. Sun PGX64 graphics has been EOLed. Last Order Date is 7/18/2003, Last Ship Date is 10/17/2003.

Sun PGX64 Graphics

Sun PGX64 graphics is the low-cost PCI graphics product in the PGX™ family. It is the PGX32™ graphics successor. Sun PGX64 graphics provides Sun with a very low-cost, flexible 24-bit, 2D graphics board supporting the widest range of Sun systems and supporting up to four boards in systems that can accommodate four PCI boards. Sun PGX64 graphics is a PCI-based graphics board providing support for all current Sun PCI-based workstations and workgroup and enterprise servers; as well as future workstations and workgroup servers supporting PCI.

Sun PGX64 graphics include the following features:

- *ATI's RageXL graphics processor*
  - *2D graphics acceleration*
  - *8-MB SGRAM*
  - *24-bit-only true color video support up to 1920 x 1200*
  - *8-bit-only pseudo color video support up to 1600 x 1000*
- *33-MHz, 32-bit, 5-volt PCI card, short form factor (< 7-inch length)*
- *Low power consumption (< 8 watts)*
- *HD15 video connector on the motherboard supports composite and separate video sync timing*
- *Compatible with OpenWindows™ environment, CDE windowing, and supports the following APIs: X11, Motif, JDK and OpenGL® API via a software pipeline.*
- *Backwards compatibility with Sun's PGX24™ and PGX32 graphics accelerators (including MUX support, support for VESA/Sun resolutions, flexibility, and so on)*
- *Support for all Sun monitor products released since 1995*
- *A HD15-to-13W3 video connector cable is included to connect to monitors with the 13W3 interface.*

Sun PGX64 graphics supports the resolutions shown in the table below.

Display Resolution	Vertical Refresh Rate	Sync Standard	Aspect Ratio	Color Depth
1920 x 1200	70 Hz	Sun	16:10	8-bit
1920 x 1080	72 Hz	Sun	16:9	24-bit
1600 x 1280	76 Hz	Sun	5:4	24-bit
1600 x 1200	75 Hz	VESA	4:3	8-bit
1600 x 1000	66, 76 Hz	Sun	16:10	24-bit
1440 x 900	76 Hz	Sun	16:10	24-bit
1280 x 1024	60, 75, 85 Hz	VESA	5:4	24-bit
1280 x 1024	67, 76 Hz	Sun	5:4	24-bit
1280 x 800	76 Hz	Sun	16:10	24-bit

Display Resolution	Vertical Refresh Rate	Sync Standard	Aspect Ratio	Color Depth
1152 x 900	66, 76 Hz	Sun	5:4	24-bit
1152 x 864	75 Hz	VESA	4:3	24-bit
1024 x 768	60, 70, 75, 85 Hz	VESA	4:3	24-bit
800 x 600	56, 60, 72, 75, 85 Hz	VESA	4:3	24-bit
720 x 400	85 Hz	VESA	9:5	24-bit
640 x 480	60, 72, 75, 85 Hz	VESA	4:3	24-bit

Note: *8-bit color support is via emulation in 24-bit window. Sun PGX64 graphics outputs separate sync for VESA resolutions and composite sync for Sun resolutions.*

Sun PGX64 graphics supports 64-bit/66-MHz, 64-bit/33-MHz, or 32-bit/33-MHz PCI slots in all PCI-based Sun workstations and servers . Specific support for the Sun Blade workstations is shown in the following table.

System	Standard Configuration?	X-option?	Max. Number of Boards per System	Slot Configuration	Number Supported, if UPA Graphics also Configured
Sun Blade 150	on-board version	Yes	3	NA	NA
Sun Blade 2000	Yes	Yes	4	1 in 66-MHz slots; 3 in 33-MHz slots	1 or 2

On the Sun Blade 2000 systems, the Sun PGX64 graphics board cannot be installed if there is a double-wide UPA frame buffer (Sun Elite3D m6 graphics) installed in the adjacent UPA slot. And, while the Sun Blade 2000 systems support four Sun PGX64 frame buffers, installing the fourth buffer in the 66-MHz slot slows performance of the entire 66-MHz PCI bus to operate at 33 MHz.

Note:Sun PGX64 graphics has been EOLed. Last Order Date is 7/18/2003, Last Ship Date is 10/17/2003

Sun(tm) XVR-100 graphics accelerator

Sun(tm) XVR-100 graphics accelerator is Sun's new 2D graphics solution and it provides users with low-cost, high performance, 24-bit, 2D graphics solution. XVR-100 replaces Sun PGX64 graphics and provides continuity of supply of 2D graphics for Sun systems. XVR-100 graphics accelerator provides functionality of PGX64 graphics and supports Sun Blade 150 and Sun Blade 2000 workstations, Sun Fire V120, Sun Fire 280R, Sun Fire V480, and Sun Fire V880 servers. XVR-100 supports Solaris 8 and Solaris 9 Operating Systems. Some of the target markets include, software development, entry-level EDA, Finance, Management and Support.

Sun XVR-100 graphics features:

• Based on ATI Radeon 7000 (Mac edition)

- 32 MB memory

- 24-bit color support for resolutions up to 1920x1200

- HD-15 and DVI-I video connectors

- dual display support through a single graphics board

- HD-15 to 13W3 adapter cable

- Solaris 8 and Solaris 9 support

- Supports Sun monitors shipped since 1997

- Supports all standard Sun video and VESA timings

- low power consumption (6W)

- multiple platform support

- Up to four XVR-100 cards supported in most platforms

- 5-volt PCI card, short form factor

- Compatible with OpenWindows™ environment, CDE windowing, and supports the following APIs: Java, X11, graphics APIs Java 2, Xlib, Motif, or OpenGL 1.3

Display Resolutions

Sun XVR-100 graphics video resolution support matrix is displayed below.

Display Resolution	Vertical Refresh Rate	Sync Standard	Aspect Ratio
1920 x 1200	60 Hz	Sun	16:10
1920 x 1200	60, 70, 75 Hz	Sun	16:10
1920 x 1080	60, 72 Hz	Sun	16:9
1600 x 1280	76 Hz	Sun	5:4
1600 x 1200	65, 70, 75, 80 Hz	VESA	4:3
1600 x 1000	66, 76 Hz	Sun	16:10
1440 x 900	76 Hz	Sun	16:10
1280 x 1024	60, 75, 85 Hz	VESA	5:4
1280 x 1024	67, 76 Hz	Sun	5:4
1280 x 800	76 Hz	Sun	16:10
1152 x 900	66, 76 Hz	Sun	5:4
1152 x 864	75 Hz	VESA	4:3
1024 x 768	60, 70, 75, 85 Hz	VESA	4:3
800 x 600	56, 60, 72, 75 Hz	VESA	4:3
720 x 400	85 Hz	VESA	9:5
640 x 480	60, 72, 75, 85 Hz	VESA	4:3

Note: ***The DVI-Analog only supports resolution up to 1280x1024*** Customers can get a listing of all supported resolutions using the `fbconfig` command. Type `fbconfig -res \?` to get the list.

Sun XVR-500 Graphics Accelerator

The Sun XVR-500 graphics accelerator doubles the geometry performance and improves the texture performance by up to 50 percent over the Sun Expert3D-Lite graphics, which it replaces. The Sun XVR-500 graphics accelerator provides a very affordable graphics solution for demanding 3D graphics applications that require fast geometry performance and reasonable texture mapping performance. Key markets for the Sun XVR-500 graphics accelerator are MCAD, MCAE, medical imaging, high-end EDA, GIS, and energy markets. This product for Sun workstations and workgroup servers provides an integrated solution for compute-intensive modeling applications.

The Sun XVR-500 graphics accelerator is based on the 3Dlabs Wildcat architecture. It is positioned as part of a total solution serving the technical and professional workstation market. The Sun XVR-500 graphics accelerator also provides 3D graphics for powerful servers such as the Sun Fire™ V880 server. The Sun XVR-500 graphics outperforms previous Sun graphics accelerators such as the Sun Creator3D and Sun Elite3D graphics for most MCAD/MCAE applications. It outperforms Sun Expert3D-Lite graphics by up to twice the geometry performance and in geometry applications outperforms Sun Expert3D graphics by up to 33 percent.

The Sun XVR-500 graphics accelerator offers state-of-the-art handling of color and gamma correction, and advanced 3D functionality, including hardware-accelerated texture mapping with on-board texture memory. The Sun XVR-500 graphics accelerator supports monitor refresh rates of up to 112 Hz and provides double-buffered/Z-buffered support for 3D graphics up to 1920 x 1080 with support for stereoscopic 3D up to 1280 x 800.

Feature	Sun XVR-500 Graphics
Frame Buffer Memory	32 MB
Texture Memory	16 MB
Max. 2D Resolution	1920 x 1080 @ 72 Hz
Max. 3D Resolution	1920 x 1080 @ 72 Hz
Max. 3D Stereo Resolution	1152 x 900 @ 120 Hz, 1280 x 800 @ 112 Hz

Key Features

The Sun XVR-500 graphics accelerator, like Sun Expert3D graphics, is a 64-bit board and is supported in both the 33-MHz and 66-MHz PCI bus slots. It provides the following advanced features:

- 32-MB frame buffer memory

- 16-MB on-board texture mapping memory and acceleration

- Support for resolutions up to 2 megapixels (1920 x 1080, double-buffered/Z-buffered)

- 32-bit Z-buffering at all supported resolutions

- Synchronization of two to four displays at 1280 x 800 @ 112 Hz stereo

- Multidisplay support (up to four) in the Sun Blade 1000 and 2000 workstations and the Sun Fire V880 server

- Performance up to 8M triangles per second (10-pixel, smooth, lit) and a trilinear texture fill rates of 88 Mpixels/second with Z-buffering or 166 Mpixels/second without Z-buffering

- Hardware acceleration for the features listed above in OpenGL applications using Sun OpenGL for Solaris API versions 1.3 and later

Display Resolutions

The Sun XVR-500 graphics accelerator's video timings/monitor screen resolutions (32-MB frame buffer) and HD15 output is listed below.

Display Resolution	Vertical Refresh Rate	Sync Standard	Aspect Ratio
1920 x 1080	72 Hz	Sun	16:9
1600 x 1280	76 Hz	Sun	5:4
1600 x 1200	75 Hz	VESA	4:3
1600 x 1000	66, 76 Hz	Sun	16:10
1440 x 900	76 Hz	Sun	16:10
1280 x 800	112 Hz	Sun-Stereo	16:10
1280 x 800	76 Hz	Sun	16:10
1280 x 1024	60, 75, 85 Hz	VESA	5:4
1280 x 1024	67, 76 Hz	Sun	5:4
1152 x 900	120 Hz	Sun-Stereo	5:4
1152 x 900	66, 76, 120 Hz	Sun	5:4
1024 x 800	84 Hz	Sun	5:4
1024 x 768	75 Hz	VESA	4:3
1024 x 768	60, 70, 77 Hz	Sun	4:3
960 x 680	108, 112 Hz	Sun-Stereo	Sun-Stereo
768 x 575	50i Hz	PAL	PAL
640 x 480	60 Hz	VESA	4:3
640 x 480	60i Hz	NTSC interlaced	NTSC

Sun XVR-1000 Graphics Accelerator

Sun XVR-1000 graphics is Sun's third-generation fast frame buffer graphics accelerator, designed for use in UltraSPARC processor-based systems. Sun XVR-1000 graphics provides Sun's most complete acceleration of the OpenGL API to date, including 2D and 3D texture mapping, image processing, OpenGL 1.2, and a significant number of extensions beyond the OpenGL 1.2 API.

The Sun XVR-1000 graphics accelerator introduces an entirely new graphics accelerator architecture with the MAJC graphics processor at its core. It is part of Sun's commitment to steadily increase graphics performance and capabilities over time in new products. Sun XVR-1000 graphics is offered as part of random configurations or could be installed as an option for the Sun Blade 2000 workstations.

This new graphics accelerator allows Sun to better support graphics-demanding technical markets, especially those who require a high-performance visualization engine, including the GEO/GIS,

biomedical, government/defense, and product design/styling fields. This graphics accelerator provides Sun's UPA-based workstations with a competitive advantage due to its superior 3D performance, higher levels of quality, and new levels of flexibility.

Feature	Sun XVR-1000 Graphics
Frame Buffer Memory	72 MB
Texture Memory	256 MB
Max. 2D Resolution (30-bit color)	1920 x 1200 @ 75 Hz
Max. 3D Resolution (30-bit color)	1920 x 1200 @ 75 Hz
Max. 3D Stereo Resolution	1280 x 1024 @ 112 Hz
Single-Pass Supersampling Capable	Yes
Dual Video Output	Yes

Key Features

- High-performance 2D and 3D graphics acceleration, including on-board geometry acceleration resulting in a display rate of 19.9M triangles per second. (two to four times that of Sun Elite3D m6 and Sun Expert3D graphics)

- Hardware-based, high-performance texture mapping (up to 163 MP/sec. texture fill rate) and with dedicated 256 MB of texture memory

- Superior quality 3D via single-pass supersampled antialiasing

- High resolutions supported in 2D and 3D up to HDTV resolutions

  – Supports up to 1920 x 1200 30-bit color, DB, 26-bit Z-buffered

  – Support up to 1280 x 1020 @ 112 stereo output

- 30-bit (10-bit/channel) color support with 10-bit alpha channel (38-bit RGBA), which provides not only more colors, but eliminates color banding effects with high-definition images

- 26-bit floating-point Z-buffer

  – Requires fewer bits/pixel compared to the fixed point format: (26 versus 32) thereby reducing the Z-buffer memory requirements

  – Is much better in resolving far away pixels; a floating-point Z gives things at the front of the scene more precision than those at the back

- Multiple, flexible video-output capabilities from a single board

  – Analog S-Video output for displaying graphics on a TV monitor or recorded to a VCR

  – Dual display RGB support from single frame buffer

  – Supports standard 13W3 and HD-15 analog, as well as the new digital DVI standard for driving digital flat panels and high-end projection systems

- The ability to program resolutions in the hardware allows end users to define non-standard resolution output for specialty displays

Display Resolutions

Sun XVR-1000 graphics video timings/monitor screen resolutions for the main 13W3 are listed below. Sun XVR-1000 graphics supports full 30-bit 2D and 3D (double/Z-buffered) at all supported resolutions.

Display Resolution	Vertical Refresh Rate	Sync Standard	Aspect Ratio	13W3	S-Video	HD15	DVi-D	Samples	Dual
1920 x 1200	60d Hz	Sun	16:10	X		X	X	1	
1920 x 1200	70, 75 Hz	Sun	16:10	X				1	
1920 x 1080	60d Hz	Sun	16:9	X		X	X	1	
1920 x 1080	72 Hz	Sun	16:9	X				1	
1792 x 1344	60, 75 Hz	VESA	4:3	X				1	
1600 x 1280	76 Hz	Sun	5:4	X				1	
1600 x 1200	60d Hz	VESA	4:3	X		X	X	1	
1600 x 1200	60, 73, 75 Hz	VESA	4:3	X				1	
1600 x 1024	60 Hz			X				2	
1600 x 1000	66, 76 Hz	Sun	16:10	X				2	
1440 x 900	76 Hz	Sun	16:10	X		X	X	2	
1280 x 1024	96, 108, 112 Hz	Sun-Stereo	5:4	X				2	
1280 x 1024	60, 75, 85 Hz	VESA	5:4	X		X	X	2	X
1280 x 1024	67, 76 Hz	Sun	5:4	X		X	X	2	X
1280 x 800	112 Hz	Sun-Stereo	16:10	X		X		2	
1280 x 800	76 Hz	Sun	16:10	X		X	X	3	X
1280 x 768	56 Hz	Sun	5:3	X		X	X	5	X
1152 x 900	120 Hz	Sun-Stereo	5:4	X		X		2	
1152 x 900	66, 76 Hz	Sun	5:4	X		X	X	3	X
1024 x 800	84 Hz	Sun	4:3	X		X	X	4	X
1024 x 768	77 Hz	Sun	4:3	X		X	X	5	X
1024 x 768	60, 70, 75 Hz	VESA	4:3	X		X	X	5	X
960 x 680	108, 112 Hz	Sun-Stereo	14:10	X		X		6	X
800 x 600	75 Hz	VESA	4:3	X		X	X	8	X
768 x 575	50i Hz	PAL	PAL	X	X	X		10	X
640 x 480	180fsc Hz			X				16	X
640 x 480	60, 72, 75 Hz	VESA	4:3	X		X	X	16	X
640 x 480	60i Hz	NTSC	NTSC	X	X	X		16	X

Note: *All resolutions marked VESA use separate sync; the remainder use composite sync.*

With two Sun XVR-1000 graphics boards in a workstation, up to four displays can be driven at 1280 x 1024 resolution in mono mode. If the four-display environment requires stereo graphics, the maximum resolution that the four displays can be driven at is 960 x 680 @ 112 Hz.

Sun XVR-1000 graphics has a VESA standard 8-pin mini-DIN stereo connector and supports stereoscopic graphics video output in the standard Sun stereo resolutions supported by both Sun Creator3D and Sun Elite3D graphics. It also supports the much higher stereo resolutions supported by the Sun FD 21-inch display and Sun 24-inch display. Frame Lock and sync is also provided through the connector.

Sun XVR-1200 Graphics Accelerator

The Sun XVR-1200 graphics accelerator is Sun's newest high-end graphic offering. It is an ideal graphics choice for customers who run demanding CAD/MCAE, EDA, geo-technical engineering (GTS), research, and health care applications. It is available as an Xoption for the Sun Blade 2000 workstation.

The Sun XVR-1200 graphics accelerator provides many of the same freatures as the Sun XVR-500 accelerator, while providing much higher performance, more rendering and texture memory, dual screen support and dual DVI-I video connectors for digital and analog displays.

The Sun XVR-1200 graphics accelerator is based on the 3Dlabs Wildcat architecture. It is positioned as part of a total solution serving the technical and professional workstation market. The Sun XVR-1200 outperforms all previous Sun graphics accelerators.

The Sun XVR-1200 graphics accelerator offers state-of-the-art handling of color and gamma correction, and advanced 3D functionality, including hardware-accelerated texture mapping with on-board texture memory. It can support up to two monitors and since a Sun Blade 2000 can support two Sun XVR-1200 a Sun Blade 2000 can support up to four monitors at up to 1920 x 1200 @ 75 HZ resolution on each monitor. It can also support up to 2048 x 1536 @ 40 Hz to drive special purpose displays.

Key Features

Feature	Sun XVR-1200 Graphics
Frame Buffer Memory	128 MB
Texture Memory	256 MB
Max. 2D Resolution	2048 x 1536 @ 40 Hz 1920 x 1200 @ 75 Hz
Max. 3D Resolution	2048 x 1536 @ 40 Hz 1920 x 1200 @ 75 Hz
Max. 3D Stereo Resolution	Dual displays at 1280 x 1024 @ 112 Hz
Synchronization Capabilities	Two to four displays
Connectors	Dual DVI-I 7-pin mini-DIN stereo

The Sun XVR-1200 graphics accelerator is a 64-bit board and is supported in both the 33-MHz and 66-MHz PCI bus slots. It provides the following advanced features:

• Superscene full-scene multisampled antialiasing, up to 16 samples per pixel

- 2 video lookup tables

- 10-bit gamma correction provides true 32-bit RGBA color fidelity

- 32 hardware-accelerated light sources for added realism

- Hardware cursor (black/white and color)

- Stereoscopic viewing support, interlaced or frame sequential

- Data display channel (DDC) monitor support for bidirectional communication

- Display power management signaling (DPMS) to enable monitor power-saving mode

- Advanced configuraiton and power interface (ACPI) support for D1, D2, and D3-hot states

- Software selection of single- or dual-display mode

- Framelocking of the video timing to an external timing source

- Multiview functinality that allows framerate locking of multiple workstations

Display Resolutions

The Sun XVR-1200 graphics accelerator's supportst the following video timings/monitor screen resolutions .

Display Resolution	Vertical Refresh Rate	Sync Standard	Aspect Ratio
1920 x 1536	40 Hz	Sun	16:10
1920 x 1200	60, 70, 75 Hz	Sun	16:10
1920 x 1200	60_240T Hz	Sun	16:10
1920 x 1080	72 Hz	Sun	16:9
1792 x 1344	75 Hz	VESA	4:3
1600 x 1280	76 Hz	Sun	5:4
1600 x 1200	60, 75 Hz	VESA	4:3
1600 x 1000	66, 76 Hz	Sun	16:10
1440 x 900	76 Hz	Sun	16:10
1280 x 1024	60, 75, 85 Hz	VESA	5:4
1280 x 1024	67, 76 Hz	Sun	5:4
1280 x 1024	112 Hz	Sun-stereo	5:4
1280 x 800	112 Hz	Sun-stereo	16:10
1280 x 800	76 Hz	Sun	16:10
1152 x 900	66, 76 Hz	Sun	5:4
1152 x 900	120 Hz	Sun-stereo	5:4
1024 x 800	84 Hz	Sun	5:4
1024 x 768	75 Hz	VESA	4:3
1024 x 768	60, 70, 77 Hz	Sun	4:3

Display Resolution	Vertical Refresh Rate	Sync Standard	Aspect Ratio
960 x 680	108, 112 Hz	Sun-stereo	Sun-stereo
800 x 600	75 Hz	VESA	4:3
640 x 480	60 Hz	VESA	4:3

Graphics Comparison Summary

The two tables below provide a feature comparison for Sun's best 3D graphics boards.

Feature	Sun XVR-500	Sun XVR-1000	Sun XVR-1200
Bus	PCI 32/64 bit, and 33/66 MHz	UPA	PCI 64 bit at 33/66 MHz
Max. 2D resolution	1920 x 1080	1920 x 1200	2048 x 1536 @40 Hz 1920 x 1200 @75 Hz
Max. 3D resolution	1920 x 1080	1920 x 1200	2048 x 1536 @40 Hz 1920 x 1200 @ 75 Hz
Stereo resolutions	1280 x 800 @112 Hz 1152 x 900 @120 Hz 960 x 680 @108, 112 Hz	1280 x 1024 @96-112 Hz 1280 x 800 @112 Hz 1152 x 900 @120 Hz 960 x 680 @108, 112 Hz	1280 x 1024 @112 Hz 1280 x 800 @112 Hz 1152 x 900 @120 Hz 960 x 680 @108, 112 Hz
Memory type	SDRAM	DRDRAM	SDRAM
Frame buffer memory	32 MB	72 MB	128 MB
On-board texture memory	16 MB	256 MB	256 MB
Geometry performance (tris/sec.)	8.2M	19.1 M	33 M (66-MHz slots) 20.4 (33-MHz slots)
Texture fill rate (pix/sec.)	166M	157 M	400 M
APIs supported (software interfaces)	OpenGL, Xlib, Java 3D™	OpenGL, Java 3D	OpenGL, Java 3D

Graphics Benchmarks

The benchmarks in the table below are for the Sun Blade 2000 workstation.

Benchmarks	Sun XVR-500 900 MHz Sun Blade 2000	Sun XVR-1000 900 MHz Sun Blade 2000	Sun XVR-1200 2x1200 MHz Sun Blade 2000 Supports only 33 MHz PCI
2D Vectors per sec.	15.2 M	—	21.2 M
3D Performance • 3D vectors/sec. • 3D tris/sec. • 3D quads/sec. • 3D texture fill pixels/sec.	13.1 M 8.0 M 3.7 M 166 M	11.1 M 19.1 M 5.6 M 157 M	26.0 M 20.4 M 5.4 M 412 M
ViewPerf 6.1.2 • ProCDRS-03 • DX-06 • AWadvs-04	28.0 15.8 69.3	38.47 15.91 58.25	59.11 15.05 62.12

Note: *Configuration for timing for the Sun XVR-1200 includes the Solaris™ 9 Operating Environment and OpenGL 1.3 performance data collected in January 2003. Performance data is subject to change. See Sun's web site at http://www.sun.com/desktop/ for latest performance numbers.*

Metrics defined:

• 2D vectors are 10 pixels long, X11 perf numbers

• 3D vectors are 10 pixels long, depth cued, clip tested, perspective projection, solid line through the OpenGL API

• 3D triangles: 25 pixel triangle mesh, one light source

• 3D quads: 100 pixel, independent quadrilaterals, with one directional light source

• Both 3D mesh and quads are Gouraud shaded, randomly oriented, transformed, clip tested, with perspective projection and Z-buffered via the OpenGL API

Special Features

• Accelerated imaging and advanced 3D graphics with Gouraud shading, line antialiasing, per-pixel depth cueing, subpixel addressing, transparency, and stereo viewing with monitor.

System Configuration

Feature	Sun Blade™ 1000	Sun Blade 2000
Dimensions	45.5 cm x 25.6 cm x 61.0 cm (H x W x D) 17.9 inches x 10.1 inches x 24.0 inches	
Weight	31.1 kg (70 lb.)	
CPU and UPA		
• Architecture	UltraSPARC™ III or UltraSPARC III Cu superscalar, 64 bit, V9	UltraSPARC III Cu superscalar, 64 bit, V9
• Clock rate	750 MHz (or higher with options)	900Mhz or 1.2GHz
• Processor slots	2	2
• Cache on chip	64-KB D-cache 32-KB I-cache	64-KB D-cache 32-KB I-cache
• External cache	8 MB	8 MB
• Sun™ Fireplane system interconnect speed	150 MHz	150 MHz
• UPA	Two 120-MHz graphics slots	Two 120-MHz graphics slots
Memory		
• Memory type	ECC	ECC
• Number of slots	8	8
• Capacity	512 MB to 8 GB	1 to 8 GB
• DRAM speed	50 ns	50 ns
• Bus width	576 bits	576 bits
• DIMMs	128-MB, 256-MB, and 1-GB SDRAM	256-MB, 512-GB, and 1-GB SDRAM
I/O Interfaces		
• UltraSCSI	68-pin Ultra Wide SCSI (40 MB/sec.)	
• Serial ports • USB • 1394	Two RS-232C/RS423 serial ports, 384K Baud sync/460.8K Baud asynch (DB25-F). Industry-standard USB port IEEE 1394	
• Parallel port	Centronics compatible; one DB25 connector	
• UPA graphics	Two UPA slots	
• Internal disk access	FC-AL access for mass storage	
• PCI I/O bus	Three full-size and one half-size PCI slots (version 2.1): Three at 33 MHz; one at 33 or 66 MHz	

Feature	Sun Blade 1000	Sun Blade 2000
Graphics, Imaging, and Video		
• Graphics supported in PCI slots	Sun XVR-100, Sun XVR-500 or Sun XVR-1200	
• Graphics supported in UPA slots	Sun XVR-1000	
• Monitors supported	All Sun monitors since 1996, including 17-, 21-, and 24-inch color monitors; 18-inch flat panel, 24-inch flat panel	
• Digital media	Sun 1394 Visual Collaboration Kit	
Networking Ports	10/100BASE-T autosensing Fast Ethernet	
Internal Storage		
• Disks	Up to two 10000-rpm, FC-AL disks 36-GB disks standard 73-GB disks optional	Up to two 73-GB, 10000-rpm, FC-AL disks standard (total maximum = 146 GB)
Three front-access, removable media bays: • One 5.25 x 1.6 inch • One 3.5 x 1.0 inch • One bay that accommodates a device of either size	1.4-MB triple-density manual-eject floppy 4-mm tape drive (opt.) 10X DVD-ROM (opt.) Smart card reader standard	1.4-MB triple-density manual-eject floppy 4-mm tape drive (opt.) 10X DVD-ROM (opt.) Smart card reader standard
External Storage		
• Tape/optical	Automated tape products Sun StorEdge™ UniPack and MultiPack systems	
• Disk, via FC-AL interface	FC-AL MultiPack	
Solaris™ Operating Environment Support	• For UltraSPARC III modules: Solaris 8 10/00; plus patches • For UltraSPARC III Cu modules: Solaris 8 10/01 or later	Solaris 8 HW 12/02 Solaris 9 12/02
Input Devices		
• USB keyboard	Sun Type 6 (USB interface). Third-party USB keyboards are not supported	
• USB mouse	Opto-mechanical, 3-button	
• Microphone	SunMicrophone™ II	

Sun Blade 1000 /2000 support in PCI slots EOLed graphics: Sun Expert3D, Sun Expert3D-Lite, Sun PGX 64

Sun Blade 1000/2000 supports in UPA slots EOLed graphics: Sun Creator3D, Sun Elite3D m6

Requirements and Specifications

Environment

Feature	Specification
Temperature	
• Operating	5 to 35°C with removable media 5 to 40°C without removable media
• Nonoperating	-40°C to 60°C
Humidity	
• Operating	20 to 80% RH, max. wet bulb of 27°C with internal tape media installed
• Nonoperating	5 to 93% RH noncondensing at 40°C
Altitude	
• Operating	3,000 meters (70KPa)
• Nonoperating	12,000 meters (19.3KPa)
Shock	
• Operating	5G for 11 msec. half-sine, wave form
• Nonoperating	30G for 11 msec.
Vibration	
• Operating	0.2 G peak, three mutually perpendicular axes, 5 to 500 Hz
• Nonoperating	1.0 G peak, all axes, 5 to 500 Hz
Acoustic	
• Operating	5.64 bels
• Idle	4.77 bels
Drop and Topple	50-mm drop height

Regulations

Regulation	Details
Safety	UL 1950, CSA 950, TUV EN60950 with Nordic deviations, CB Scheme
RFI/EMI	FCC Class B, CRF 47 Part 15, 6dB margin below the limit ICES-003 Class B (for Canada) EN55022 Class B (for the European Union) EN61000-3-2 (for the European Union as of 01JUN98 or 01JAN01) VCCI Class B (for Japan) GOST-R Class B (for Russia) EZU Class B (for Czech Republic) EZU Class B (for Slovakia) RRL Class B (for Korea) BCIQ Class B (for Taiwan) AS/NZS 3548 Class B (for Australia & New Zealand)
Immunity	EN 50082-1 SUN 990-1151-01 Rev A
X-ray	DHHS 21 Subchapter J PTB German X-ray Decree
Environmental	Enhanced Energy Star (certain configurations) Network aware in low power mode
Monitors and Keyboards	TCO95

Power

All Sun Blade™ 2000 configurations using 900 Mhz UltraSPARC III Cu procecssors are compliant with Energy Star specifications under the Solaris™ 8 and 9 Operating Environment and meet EPA guidelines *without* check-pointing and restoring the system. **All Sun Blade 2000 configurations using 1.2GHz UltraSPARC III Cu processors do not meet Energy Star compliance requirements**. An innovative approach to power management enables Sun Blade 2000 workstations to remain network-aware, even in low-power mode. The Sun Blade 2000 UltraSPARC III Cu 1.2 GHz systems do not support adding or mixing 600/750/900-MHz CPU modules from Sun Blade 1000 systems or UltraSPARC III Cu 900 Mhz, 1.015 GHz or 1.05 GHz modules from Sun Blade 2000 systems. In short, no speed mixing is allowed. All Sun Blade™ 2000 configurations using 1.015 Ghz and 1.05 Ghz UltraSPARC III Cu procecssors have been EOLed. Last Order Date: 7/18/2003, Last Ship Date: 10/17/2003.

Note: *All Sun Blade 2000 standard and random configurations using 900 Mhz UltraSPARC III Cu procecssors fully meet Energy Star compliance requirements. Modifying any of these configuration by adding any available Sun or third-party option may render the configuration non-compliant. All Sun Blade 2000 configurations using 1.2GHz UltraSPARC III Cu processors do not meet Energy Star compliance requirements.*

Feature	Specifications
AC power	100 to 240 VAC, 47 to 63 Hz, 0.8 KVA
Power supply output	670 Watts max.
Power control	Front panel on/off switch

Power Consumption for PCI and UPA Busses:

-Maximum allowable power consumption for all PCI slots is 100 Watts.

-Maximum allowable consumption for all PCI and UPA slots is 130 Watts.

Advanced Power Management

Sun Blade 2000 workstations come equipped with a single 670-Watt power supply providing all the power needed for internal expansion options. With Sun Blade 2000 workstations, Sun has gone beyond the need for environmentally sensitive construction and provides an innovative approach to compliance with EPA Energy Star specifications when running the Solaris 8 or Solaris 9 Operating Environment. Power management software on Sun Blade 2000 workstations allows the system to enter a "low-power" mode after a programmed period of time. Rather than completely pausing the system (checkpoint-and-resume), power management software detects idle subsystems and brings them to a low-power, but operational state. For instance, selected Sun Blade 2000 workstations remain network-aware, even when running in low-power mode.

To support this power management model, the various subsystems within Sun Blade 2000 workstations are designed to enter a low-power state independently, for example:

- Processors and other internal ASICs including those which operate the Sun™ Fireplane system interconnect reduce their power consumption by running at a lower internal clock frequency.

- The 33-MHz PCI bus frequency is reduced to 1 MHz. When activity is pending, the bus clock is returned to full frequency.

- The USB, IEEE 1394, and Ethernet subsystems are set in their lowest power-consuming modes.

- The audio module is disabled.

The graphics subsystem is configured for lowest DC power consumption The checkpoint-and-resume approach to power management is still available and can be configured by power management software. The Solaris Operating Environment allows users to quickly resume work in progress before the shutdown.

Note: *Assemble-To-Order (ATO) configurations are compliant with Energy Star specifications only when ordered with 900 MHz UltraSPARC III Cu CPUs.   Adding any available Sun or third-party option may render the configuration non-compliant.*

Reliability, Availability, and Serviceability (RAS)Reliability

The Sun Blade™ 2000 workstations support the following features to help ensure data integrity and reliable operation of the system:

- End-to-end ECC on all memory transfers (SEC-DED-S4ED) to the CPUs and to the I/O subsystems (except UPA64S)

- The ECC code detects and correct all single bit errors. It also detects all double, triple, and quadruple bit errors that occur in the same nibble. The Sun Blade 2000 workstation implementation allows detection of SDRAM chip failures due to a customized routing of the memory bus.

- ECC protection on external cache

- ECC or parity on all major data buses

- Parity protection on interconnect address/command bus, all interconnect miscellaneous signals, PCI and EPCI, major data buses, and cache RAM

- Internal error detection and reporting on all ASICs

- Generation of reset on fatal error by BBC (as much state as possible is preserved in processor and ASICs for analysis)

- Checksum on Boot PROM

- Extensive power on self-test (POST)

- Power-down of subsystems when not in use

In addition to supporting the above features, reliability is designed in by:

- Extensive signal integrity analysis

- Providing adequate decoupling

- Extensive EM susceptibility and interference analysis/design

- Software memory scrubbing

Availability

Hardware, software, and diagnostic features that support availability include:

- Deconfiguration of faulty memory DIMM banks

- Deconfiguration of faulty I/O boards

- Thermal sensors controlling fan speed and cooling

- Thermal faults detected by software result in customer alerts and system shutdown to protect components

- SunVTS™ diagnostics can run at scheduled times to periodically validate system functionality

- Automatic reboot of the system on fatal errors

Serviceability

Features that are designed to minimize downtime include the following:

- Simple enclosure layout

- All FRUs can be accessed independently; that is, each FRU can be serviced without needing to remove any other FRU

- Minimal internal cabling

- Action-oriented diagnostic messages indicating failed FRUs (at the POST and SunVTS diagnostic levels)

- JTAG scan support on ASICs, processor module and frame buffers and EPCI connector

- No configuration jumpers

- Modular components include the motherboard, disks, memory DIMMs, graphics options, processor modules, and power supply
- Common fasteners used throughout for easy servicing

FRUs and Serviceability Details

- **Motherboard**

  The motherboard FRU is removed by disconnecting all cables, removing daughtercards (PCI, frame buffer, audio), removing three screws from the rear panel, and sliding the board forward and directly upward.

- **Hard disk drives**

  All internal hard drives plug directly into the internal FC-AL backplane. No drive jumpering or configuration is required. Drives are secured with the "spud bracket" which provides the necessary shock and vibration isolation, drive-to-chassis grounding, and chassis mounting/locking features.

- **Power supply**

  The power supply is secured to the chassis by six loose screws. Supply removal is accomplished by removing the side cover, disconnecting cables from the motherboard, removing the power supply screws, sliding the supply back, and lifting it out of the chassis.

- **DIMMs**

  Accessible by removing the top panel. A built in ejector facilitates removal and installation of the memory DIMMs.

- **Side cover**

  The side cover may be removed by hand, without the use of tools.

- **Chassis bottom housing**

  The chassis provides securing points for the power supply, motherboard, and disk drives. The motherboard and power supply drop into securing hooks or slides and are secured with screws. Hard disk drives slide into brackets in the chassis and are secured by latches on the drives themselves. Removable media devices are secured to a bracket with common (M3) Phillips screws.

System Management

Software Requirements

All currently shipping Sun Blade 2000 systems run Solaris 8 HW 12/02 0r Solaris 9 12/02 or later. OBP 4.5.21

System Administration

Sun Blade 2000 workstations deliver the power and graphics needed by customers who use heavy compute-intensive applications. These customers require a system like the Solaris Operating Environment that can provide a highly reliable, available, fast and safe desktop computing environment. Built into the Solaris Operating Environment are systems management and security features that help deliver the computing environment demanded by these customers. Sun also offers unbundled systems management products that supplement the systems management features in the Solaris Operating Environment. Together, the Solaris Operating Environment management features and Sun's unbundled systems management products create one the most stable and available desktop computing environment in the industry.

Sun℠ Install Check Tool

To verify the basic installation and configuration of your system, Sun has created the **Sun**[SM] Install Check Tool. This one-time-use tool is currently being offered at no charge over the Web. After you complete the basic installation and configuration of your system, you can use the tool to check the following aspects of your Sun hardware:

* Patches for the Solaris" Operating Environment
* System firmware levels
* Unsupported hardware configurations

The tool identifies potential problems in these areas and provides recommendations that you can use to resolve the problems.

You must accept the terms of the license agreement at the Sun Install Check Tool web site in order to run the tool. Follow the directions at the web site to download and use the Sun Install Check Tool. The Sun Install Check Tool is available at:

http://sunsolve.sun.com/pub-cgi/show.pl?target=installcheck/ installcheck

Accessing Sun Documentation

You can view, print, or purchase a broad selection of Sun documentation, including localized versions, at: http://www.sun.com/documentation.

Sun Welcomes Your Comments

Sun is interested in improving its documentation and welcomes your comments and suggestions. You can email your comments to Sun at::

 docfeedback@sun.com

Please include the part number (817-0440-10) of the document in the subject line of your email.

Solaris Administration Tools

Java™ technology-based suite of integrated GUI-based tools, providing a centralized point of administration for the Solaris Operating Environment.

Solaris Volume Manager

The Solaris Volume Manager, an integrated component of the Solaris 9 OE, is an enterprise class volume manager integrated into the Solaris platform. It provides storage management tools and allows users to manage large numbers of disks and effectively utilize storage resources. Includes all capabilities of Solstice DiskSuite[tm] plus: soft partitions, active monitoring of disks, Solaris Management Console based interface, and WBEM application programming interface. A new Graphical User Interface (GUI) is accessible through the Solaris Management Console which simplifies the task of defining logical volumes.

Sun ONE Directory Server

The Sun ONE Directory Server is now fully integrated into the Solaris platform. It provides robust, scaleable naming and directory services and is a fundamental building block for services on demand.

Patch Manager

Provides automatic patch inventory and configuration-based analysis of systems, as well as automatic verification of digital patch signatures, and automatic resolution of patch dependencies and install order.

Live Upgrade

Solaris Live Upgrade technology enables the current running boot environment to be duplicated. While the original boot environment continues to run, the duplicate environment can be upgraded. The duplicate boot environment is then activated to become the active boot environment when the system is rebooted. Downtime is reduced significantly. In the case of an upgrade failure, you can quickly fall-back to the original environment with a simple reboot, thereby eliminating the downtime for the production environment associated with normal test and evaluation processes.

Solaris Flash

Solaris Flash enables the creation of a reference installation of the Solaris Operating Environment and application software stack which can then be replicated on several machines. Customers can now rapidly provision thousands of complete systems over the LAN or WAN. This significantly reduces installation time, configuration complexity, and administrative resources, while improving deployment scalability. Servers can be easily reprovisioned or retasked to a different service based on demand. In case of disaster, systems can be restored in minutes by reinstalling Flash archives.

Sun Management Center

 Sun Management Center provides a powerful single point of management for the enterprise, making better use of administrative resources. It enhances application availability, optimizes performance and scalability, while simplifying the management of Sun hardware, the Solaris Operating Environment and applications resulting in increased efficiency.

SunVTS™ Software

The SunVTS™ system exerciser is a graphically oriented UNIX® 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.

Solaris Web Start Software

Solaris Web Start software is an easy-to-use Java™ technology-based application that guides users through the installation of both the Solaris Operating Environment and copackaged application software with a single on-screen button. Its graphical user interface facilitates file system configuration. It also features a built-in suite of on-line information and answers questions about the product itself, the software it installs, and the hardware platform it supports.

Solaris Desktop Extensions Software

Solaris Desktop Extensions software features ideal systems management tools for those non-UNIX platform users who want to quickly view processes and system resources. The process manager in Solaris Desktop Extensions software is a GUI-based tool that enables users to quickly identify, sort, suspend, and eliminate processes based on attributes such as CPU consumption and time elapsed.

Solaris Desktop Extensions software also features a GUI-based performance monitor, enabling users to quickly monitor some of the key system resources such as CPU, load, disk, page, context, job swaps, interrupts, packets, collisions, and errors.

ShowMe How™ Software: State-of-the-Art Installation and Maintenance Instruction

ShowMe How™ software is a documentation system that presents information in a highly understandable multimedia format. Installation and service tutorials as well as reference information provide users with comprehensive, easy-to-use instruction. ShowMe How software streamlines installation and maintenance to help lower service costs and maximize system uptime. Some of the features of this tool are:

- Distributed on CD-ROM

- Movies of installation and replacement procedures played through ShowMe TV™ software packaged with application

- Photo sequences with narrated installation and replacement procedures

- Text-based instructions can be viewed on-line and printed, excerpted from standard Sun documentation

- Photos with active callouts link to more detailed photos and text-based reference information

The Solaris Operating Environment

All currently shipping Sun Blade 2000 systems offer dual boot Solaris 8 HW 12/02 or Solaris 9 12/02. OBP 4.15.21)

The Solaris Operating Environment is one of the industry's leading enterprise operating environments. The Solaris Operating Environment contains the complete functionality required for all supported Sun Workstation™ systems. The Solaris Operating Environment is a solid, scalable 64-bit operating environment that also provides full support for either existing or new 32-bit applications.

The Solaris Operating Environment includes:

- Reliable, Internet-ready operating environment for 32- and 64-bit SPARC™ processor-based platforms and x86 platforms

- Enhanced ease of use and PC-interoperability features

- Integrated, high-performance Java™ technology and tools

- Robust software developer environment

- Advanced, standards-based networking

- Improved systems installation and management tools

- Enterprise-class directory services

- Enhanced desktop tools, I/O standards, and security

The Solaris Operating Environment delivers a competitive advantage to businesses through networked computing, scalability, and multiarchitecture support. The Solaris Operating Environment provides an advanced, superior solution for all customer IT needs, both technical and business. With its strength in enterprise-class reliability, scalability, and performance, the Solaris Operating Environment is an industrial-grade solution with the quality and robustness required to deliver mission-critical computing.

Note: *In order to upgrade to the UltraSPARC III Cu module from Sun Blade 1000 systems, the customer must first upgrade to the Solaris 8 2/02 Operating Environment or later, or Solaris 9 12/02 if they install 1.2 GHz CPU, OBP 4.15.21)*

Features and Benefits

The Solaris Operating Environment continues the tradition of reliability, availability, and scalability (RAS) of earlier Solaris releases, including features such as IPv6/IPsec/Mobile IP, realtime application support, file system logging, and remote console.

Existing applications that adhere to the Solaris application binary interface (ABI) runs unmodified on the Solaris 9 or 8 OE . In addition, Sun provides an easy-to-use testing tool for developers called AppCert, allowing them to verify existing Solaris application binaries and generate reports on any potential incompatibilities.

Features	Benefits
• Desktop management and productivity tools	• Helps increase productivity with intuitive desktop, printer, PDA sync, HotKey, and CDE control panel tools. The StarOffice™ productivity suite easily handles Microsoft Office documents, and creates complex documents, spreadsheets, and presentations. Use PC Launcher and the SunPCi™ IIpro coprocessor card to run Windows, Lotus 1-2-3, and AutoCAD applications on Sun workstations.

Features	Benefits
• Advanced networking features	• Support for IPv6 in the Solaris Operating Environment is integrated into NFS, RPC, NIS, NIS+, and DNS. IPsec enables secure virtual private networks and network access control. Mobile IP provides Internet disconnect/reconnect capabilities with no data loss.
• Bundled software	• Includes Oracle 9*i* Enterprise Edition, `lxrun` for Linux application compatibility (for Solaris x86), Apache Webserver, Netscape™ Communicator, Sun ONE™ Directory Server, `gzip`, `bash`, and `tcsh`.
	• Ships with support for a number of software components that increase overall availability including Solaris Resource Manager software for fine-grained control of system resources, Solaris Bandwidth Manager software for enhanced network resource availability, Sun Cluster 3.0 software for greater application availability through a clustered file system, scalable data services, and built-in load balancing.
• Enhancements to the Common Desktop Environment (CDE)	• Provides workstation users with an easy-to-use, open, secure platform. CDE features support for streaming video using MPEG1, MPEG2, Quicktime, and AVI formats as well as MIDI audio using the Java Media Framework.
	• Personal Digital Assistant (PDA) support synchronizes data from most Palm Computing devices with the CDE calendar, mail, memo, and address book.
• Improved system error messages, system debugging capabilities, and remote console capability	• Allows the customer to apply scarce system expertise remotely across the enterprise.
• File system logging	• Logging file system features and parallel SCSI probes help make rebooting faster.
• Live Upgrade	• Allows Solaris software to be installed on a separate partition from the currently running version of the operating environment. When installation is complete, a simple reboot enables the newly-installed version of the Solaris Operating Environment to take control. Live Upgrade includes a version migration and fallback feature, so the customer can also fallback to the previous release — through a simple reboot — without losing administration information.
• Real-time video creation and broadcast support	• The Java Media Framework (JMF) player provides access to the latest industry-standard audio and video files, including MPEG1/2, Quicktime, VIVO, AVI, AIFF, GSM, WAV, RMF, AU, and MIDI.

Features	Benefits
• 100 percent binary compatibility	• Software investment protection — all of today's Solaris Operating Environment-certified 32-bit applications continue to run on new releases of the Solaris Operating Environment without modification
• Reliability, availability, and serviceability (RAS)	• Less downtime, more productivity, and faster project completion
• 64-bit computing	• Higher performance, capacity, and precision on 64-bit SPARC processor-based systems and Intel systems with 32-bit binary compatibility • Compliant with UNIX® 98 and Aspen Group LP64 standards
• 64-bit compilers	• Quickly develop and certify 64-bit applications using Solaris Operating Environment APIs, 64-bit C/C++ and FORTRAN compilers, and ABI certification tools
• Java 2 SDK	• Provides a high-performance, scalable Java virtual machine • Offers improved memory management, optimized JIT compiler and faster Java thread synchronization
• IPv6/IPsec/Mobile IP	• Helps increase addressing range, provides better authentication and privacy, and enables additional quality of service capabilities. Mobile IP permits intermittent connection to the Internet with no data loss.
• Scale from 1 to 512 processors per node	• Helps increase compute resources as a customer's needs grow. Expand to four processors on the desktop, or use up to 64 processors per server, with up to eight servers per cluster.
• LDAP directory services	• High-speed, enterprise-class directory service, using the Solaris Operating Environment LDAP client and the Sun ONE Directory Server; supports complex, data intensive network applications. Includes Microsoft Active Directory support.
• System management tools	• Helps reduce the time spent on system administration duties using Web-based wizards and Java technology-powered graphical interfaces.
• Extended device support	• Access the customer's favorite devices, including DVD, ZIP and JAZ drives, and USB, 1394, SCSI, UPA, and PCI buses.
• Internationalization	• The Solaris Operating Environment is a comprehensive global product that supports 39 languages and over 133 locales, the euro currency symbol, and complex text formats for the Arabic, Thai, and Hebrew languages. Additional language installation tools, expanded Unicode support, and improved data interoperability utilities greatly simplify the development and testing of applications for international markets.

![Sun microsystems]

Features	Benefits
• X11R6.4	• Runs X applications in a browser and provides single logical screen across multiple display devices
• Real Time application	• Offers scalable, fixed-priority, and fully preemptive scheduling using multiple high-resolution, per-CPU interval timers. Provides priority inheritance for synchronization by multi-threaded realtime applications, such as simulation, telemetry, data acquisition, signal processing, and video-on-demand.
• Enhanced security features	• Increased support for security protocols and additional technologies including IPSec, AMI, Kerberos v5, and smart cards reduce the chance of security-related downtime

New Features in Solaris 9 12/02

The latest update of the Solaris Operating Environment is Solaris 9 12/02. The following features are new in Solaris 9 (features added in an update are noted):

Features	Benefits
• Solaris Solaris 9 Resource Manager	• Resource management technologies are now built into the Solaris Operating Environment, allowing customers to easily allocate, monitor, and control system resources. Delivers improved resource accounting and monitoring capabilities due to tight integration with the Solaris OE kernel. • Provides a broader set of mechanisms for controlling resources and increases ease of manageability for resource allocation.
• Solaris Flash/Live Upgrade	• Updated, integrated technologies to enable fast, integrated system installation and software updates • Minimizes system downtime during upgradesProvides fallback environment in case of problems during upgrade

Features	Benefits
• Performance enhancements	• The Solaris OE multithreading library has been enhanced to provide better performance and higher quality while preserving full binary and source compatibility with existing threaded applications. • Multiple Page Size Support (MPSS) can be used to provide better throughput for memory-intensive applications via large page size. Applications do not need to be recompiled or recoded to take advantage of MPSS, and can in fact be tuned "on the fly" without restarting the application. • Memory Placement Optimization (MPO) enhances performance and reduces processing time by directing the system to identify and use the closest memory to the CPU an application is executing on. • Enhancements to UNIX filesystem logging provide significant performance as well as availability benefits.
• Integrated Sun ONE services	• Integration of Sun ONE Application Server, Sun ONE Directory server and other components provide significant acquisition cost benefits while dramatically reducing the time, effort and complexity of providing complete web service solutions.
• New patch management tool	• New tools allow administrators to easily determine the current patch configuration of a system and then acquire any appropriate new patches from Sun in a simple and secure fashion.
• Enhanced Role-Based Access Control (RBAC)	• RBAC provides a powerful mechanism to delegate administrative authority without requiring root access to be given out.
• Integrated security technologies: Secure Shell, TCP Wrappers, and more	• New commands and utilities reinforce the Solaris OE's already strong security features, giving administrators powerful tools for controlling system access in a secure, supported way.
• Linux compatibility support	• Sun has built many features into the Solaris OE to make it compatible with Linux, including APIs, commands, tools, utilities, and services. Many freeware libraries and supporting utilities that were on the Solaris 8 Companion CD are now integrated in the Solaris 9 OE. LinCAT, the Linux Compatibility Assurance Toolkit, is available to run against source code to help port to the Solaris platform.
• Integrated disk volume manager	• The integrated Solaris Volume Manager provides storage management tools and allows users to manage large numbers of disks and effectively utilize storage resources. Includes all capabilities of Solstice DiskSuite™ plus: Soft partitions, active monitoring of disks, Solaris Management Console based interface, and WBEM application programming interface. A new Graphical User Interface (GUI) is accessible throughout the Solaris Management Console which simplifies the task of defining logical volumes.

Features	Benefits
• Simplified language and locale support	• All Solaris media kits now include support for 39 languages, 133 locales, and ten full translations of system messages and documentation.

Graphics Software Interfaces
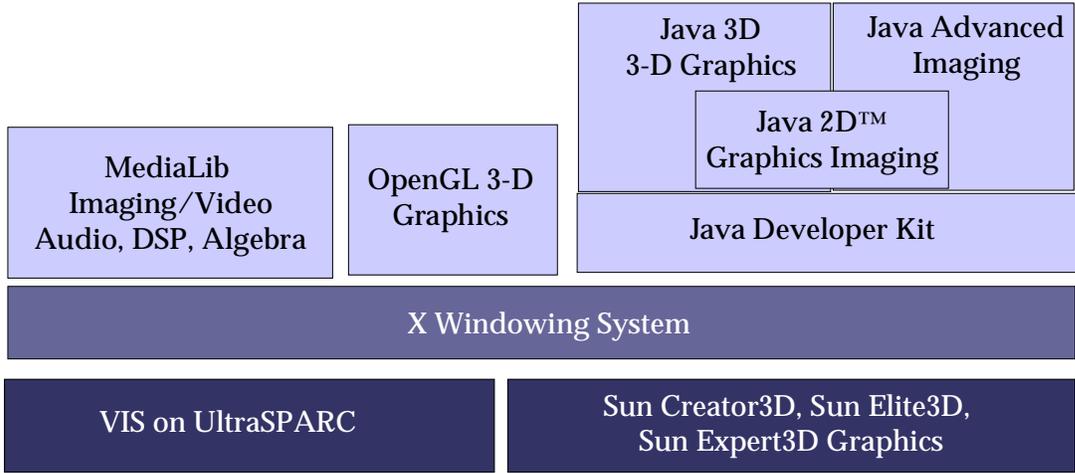
Figure 5. Graphics software interfaces

Disk Space	
• End user • Developer	25 MB 40 MB (runtime binaries and header files)
Memory	
• Minimum • Typical	1 GB 2 GB (for memory intensive applications)

The Sun Blade 2000 systems support all Solaris 8 Operating Environment graphics and window system APIs, including Xlib, OpenGL® and and Java 3DTM software.

Note: *Required disk space varies based on OS packages selected, desktop or server use, desired swap tmp space, localization or translations, online documentation, and applications installed.*

The Solaris Operating Environment Licensing and Usage

Under the Free Solaris Binary License Program program, Sun is making the binary (runtime) version of its Solaris Operating Environment available to everyone who accepts the terms of the Solaris Binary Code License (BCL) and the Free Solaris Binary License Program. There are no fees for the right to use the software on computers with a single-CPU capacity; just a small charge for the media kit.

Refer to `http://www.sun.com/software/solaris` for current licensing details. Some features of the Solaris Operating Environment license include the following:

- No longer a distinction between desktop and server licenses

- Free binary (runtime) license for all single CPU systems for customers who accept the terms of the Solaris Binary Code License and the free Solaris Binary License Program

- Solaris Operating Environment software is provided via download or the Solaris Media Kit available for purchase on-line at `http://www.sun.com/solaris/binaries`

- A single Solaris OE image can be used to install multiple systems, as long as those systems are registed via the above website.

- Solaris Media Kit contains additional bundled software

  – Solaris Supplemental CD of bundled user and system management tools

  – Oracle 9*i* Enterprise Edition (with development license)

  – StarOffice productivity suite

  – Solaris Software Companion CD of popular freeware

  – Sun ONE Advantage Software (with development licenses)

Sun OpenGL for Solaris Software

Sun OpenGL for Solaris software provides a powerful and portable programming environment for developing and deploying interactive 3D applications on SPARC processor workstations. It allows mainstream 3D graphics and visualization applications to be deployed on Sun's graphics workstations at a compelling price-to-performance ratio.

OpenGL is an application programming interface (API) that provides 2D and 3D graphics features. Features include modeling, transformations, color, lighting, and smooth shading, as well as advanced features such as 2D and 3D texture mapping, NURBS, fog, alpha blending, and motion blur.

Widespread multivendor availability of OpenGL software allows source-code portability of 3D graphics applications across platforms. Sun OpenGL for Solaris software is a compliant implementation of OpenGL standard specification from the OpenGL Architecture Review Board (ARB) and is source-code compatible with other conformant OpenGL software on the market. Most existing OpenGL applications need only to be recompiled in order to run with Sun OpenGL for Solaris software.

Sun OpenGL for Solaris software is targeted at developers creating interactive 3D graphics applications for technical, creative, and analytical markets. Potential users include those in computer-aided design and manufacturing, global information systems, simulation, industrial design and modeling, entertainment, biochemistry, and petroleum exploration market segments.

Sun OpenGL for Solaris software is compatible with and accelerated for Sun workstations with the Sun Creator, Sun Creator3D, Sun Elite3D, Sun Expert3D, Sun Expert3D-Lite, Sun XVR-500, and Sun XVR-1000 graphics products.

Sun OpenGL software system requirements are shown in the following table.

Feature	Requirements
Platforms	SPARC III Cu processor-based systems using Sun XVR-500, Sun XVR-1000, XVR-1200 and PGX64™ frame buffers
Operating environments supported	Solaris 7 or later
Window system supported	CDE or OpenWindows™
Memory	256 MB or more recommended

Ordering Information

Note: *All Sun Blade 2000 standard and random configurations using 900 Mhz UltraSPARC III Cu CPUs fully comply with Energy Star regulations. Modifying any of these configuration by adding any available Sun or third-party option may render the configuration non-compliant. Configurations using 1.2 Ghz UltraSPARC CPUs do not meet Energy Star regulations.*

The Sun Blade 2000 workstation comes with 900-MHz or 1.2-GHz versions of the UltraSPARC III Cu processor. Note: The Sun Blade 2000 UltraSPARC III Cu 1.2 GHz systems do not support adding or mixing 600/750/900-MHz CPU modules from Sun Blade 1000 systems or UltraSPARC III Cu 900 Mhz, 1.015 GHz or 1.05 GHz modules from Sun Blade 2000 systems. In short, no speed mixing is allowed.

Sun Blade 2000 Workstation Part Numbers

Part Number	Description
A29-PS1-9AA-1GMAJ	**Standard Configuration** Sun Blade 2000 Model 900 Cu with UltraSPARC III Cu 900 MHz Processor with 8-MB Cache, Sun XVR-100 graphics accelerator(HD-15 to 13W3 adapter cable included), 1GB Memory (differentiated DIMMS), 73-GB 10K-RPM FC-AL Internal Disk w/preinstall dual boot OS (Solaris 8 HW 12/02 or Solaris 9 12/02) , 10/100-Mbit Ethernet, IEEE 1394, USB
A29-PS2-9AA-2GMAJ	**Standard Configuration** Sun Blade 2000 Model 2x900MHz Cu with two UltraSPARC III Cu 900 MHz Processors with 8-MB cache each, Sun XVR-100 graphics accelerator, (HD15 to 13W3 adapter cable included), 2 GB Memory (differentiated DIMMS), 73-GB 10K-RPM FC-AL Internal Disk w/preinstall dual boot OS (Solaris 8 HW 12/02 or Solaris 9 12/02), 10/100-Mbit Ethernet, IEEE 1394, USB
A29-PS1-9Y-1GMAJ	**Random (Non-Standard) Configuration** Sun Blade 2000 workstation with one 900-MHz UltraSPARC III Cu processor with 8-MB cache, 1-GB memory(differentiated DIMMS), one 73-GB 10000-rpm FC-AL internal disk w/preinstall dual boot OS (Solaris 8 HW 12/02 or Solaris 9 12/02) , XVR-500 Graphics Accelerator, 10/100-Mbit Ethernet, IEEE 1394, USB
A29-PB1-9AA-1GMAJ	Standard Configuration Sun Blade 2000 Model 1.2 GHz Cu preinstall OS with UltraSPARC III 1.2GHz Cu Processor with 8-MB Cache, 1GB Memory (Differentiated DIMMS), Sun XVR-100 graphics acelerator (HD15 to 13W3 adapter cable included) 73-GB 10K-RPM FC-AL Internal Disk w/preinstall dual boot OS (Solaris 8 HW 12/02 or Solaris 9 12/02), 10/100-Mbit Ethernet, IEEE 1394, USB
A29-PB2-9AA-2GMAJ	Standard Configuration Sun Blade 2000 Model 2x1.2 GHz Cu with two UltraSPARC III Cu 1.2 GHz Processors with 8-MB Cache each, Sun XVR-100 graphics accelerator(HD-15 to 13W3 adapter cable included), 2GB Memory (differentiated DIMMS), 73-GB 10K-RPM FC-AL Internal Disk w/preinstall dual boot OS (Solaris 8 HW 12/02 or Solaris 9 12/02) , 10/100-Mbit Ethernet, IEEE 1394, USB
A29-PB1-9Z-4GMAJN	Random (Non-Standard) Configuration Sun Blade 2000 Model 1.2 GHz Cu preinstall OS with UltraSPARC III 1.2 GHz Cu MHz Processor with 8-MB Cache, XVR-1000 Graphics Accelerator, 4 GB Memory (CR DIMMS), 73-GB 10K-RPM FC-AL Internal Disk w/preinstall dual boot OS (Solaris 8 HW 12/02 or Solaris 9 12/02),10/100-Mbit Ethernet, IEEE 1394,USB

Note: *All Sun Blade™ 2000 configurations using 900 Mhz UltraSPARC III Cu procecssors are compliant with Energy Star specifications under the Solaris™ 8 and 9 Operating Environment and meet EPA guidelines without check-pointing and restoring the system. An innovative approach to power management enables Sun Blade 2000 workstations to remain network-aware, even in low-power mode.*

Note: All Sun Blade 2000 standard and random configurations using 900 Mhz UltraSPARC III Cu procecssors fully meet Energy Star compliance requirements. Modifying any of these configuration by adding any available Sun or third-party option may render the configuration non-compliant. All Sun Blade 2000 configurations using 1.2GHz UltraSPARC III Cu processors do not meet Energy Star compliance requirements.

Ordering Guidelines and Notes

- **Discontinuation of Sun Blade 1000 configurations**

  - The 600-MHz model of the Sun Blade 1000 workstation is no longer available.

  - The 750-MHz configurations of the Sun Blade 1000 workstation are being discontinued, with a last order date of June 30, 2002, and a last ship date of November 8, 2002. The EOLed 750-MHz Sun Blade 1000 system configurations are replaced by 900-MHz UltraSPARC Cu Sun Blade 2000 system configurations.

  - The 1.015GHz and 1.05 GHz configurations of the Sun Blade 2000 workstation are being discontinued, with a last order date of June 13, 2003, and a last ship date of September 12, 2003.

- **Memory**

  - The Sun Blade 2000 workstations support 8 GB of main memory. This architecture currently accepts 128-MB, 256-MB, 512-MB, and 1-GB memory modules. Note: 128-MB DIMM was eoled.

  - The Sun Blade 2000 workstations can accommodate up to 8 DIMM modules in increments of four. DIMM modules within each set *must* be of the same type. DIMM module sets of four may be mixed.

  - NOTE: Some Sun Blade 2000 configurations use differentiated DIMMS. The new differentiated DIMMs will have the same performance and functionality as previous DIMMS, but they are no longer compatible with Sun enterprise servers. These new DIMMs are specifically designed & tested for the Sun Blade 2000/280R products and because they are no longer compatible with Sun enterprise servers, they are called "differentiated DIMMS" to "differentiate" from Sun standard memory DIMMs. It is possible to mix and match differentiated DIMMs with previous DIMMs in a Sun Blade 2000 without any degradation of performance or change in functionality. You can mix and match DIMMs even within the same memory bank. Please note: this mixing and matching of DIMMs ONLY applies to Sun Blade 2000/1000. From the view point of functionality and performance of the DIMM itself, there are no differences. Some minor changes were made (server required capacitors were removed) to remove dependency from server memory. These new differentiated DIMMs are rigorously tested and perform identically to original DIMMs for Sun Blade 2000/1000.

- **Graphics**

  - The Sun Blade 2000 workstations support the Sun PGX64 PCI graphics for non-3D applications as well as Sun XVR-500, Sun XVR-1000 high-performance 3D graphics and Sun XVR-1200 Graphics Accelerator.

- EOLed Sun Expert3D, Sun Expert3D-Lite graphics are supported.

- **Monitors**

  - Monitors are not included with any Sun Blade 2000 systems.

  - The customer can choose among the 17-, 21-, and 24-inch color monitor, or the 18- and 24-inch flat-panel display.

- **SCSI**

  - The internal SCSI host controller operates in Fast-20 (UltraSCSI) mode by default. Installation of non-FAST-20 devices, although allowed, decreases overall SCSI performance.

  - The total combined SCSI cable length must not exceed three meters for Fast/Wide operation or 1.5 meters for Fast-20 (UltraSCSI) operation.

  - To achieve Fast-20 speeds on all devices on the bus, it is recommended that:

    - A maximum of two Sun StorEdge™ UniPack systems using Fast-20 cables be connected to the external connector.

    - All devices on the SCSI bus should be Fast-20 devices. (Non-Fast-20 devices may cause the internal devices to run at Fast/Wide speeds, but are supported.)

- **Keyboard**

  - Type 6 USB keyboards are supported on the Sun Blade 2000 workstations.

Sun Blade 2000 Assemble-to-Order (ATO) Options

The Sun Blade 2000 workstations are available with assemble-to-order (ATO) options. This allows customers to configure systems to match their specifications.

The primary use of ATO for the Sun Blade workstation is for customers who require a specific configuration not available from the list of standard configurations, non-standard configurations, or promotional configurations.

The ATO process requires that the system be built to order and therefore has a longer lead time (estimated at two weeks) than standard configurations.

Follow the steps below to assemble a specific configuration of the Sun Blade 2000 workstation.

Step 1: Select a chassis (Required)

Select one of the following chassis combinations.

Part Number	Description
A29-AA	Sun Blade 2000 workstation in deskside tower; two CPU slots, eight memory slots, four PCI I/O slots, two FC-AL disk bays, bay for DVD drive, 1.44-MB floppy drive removable media bay, 10/100-Mbit Ethernet, Solaris Operating Environment license; no CPU, memory, or disk included; rackmountable on tray
A29-AAV	Sun Blade 2000 workstation in deskside tower with Danish power supply; two CPU slots, eight memory slots, four PCI I/O slots, two FC-AL disk bays, bay for DVD drive, removable media bay, 10/100-Mbit Ethernet, Solaris Operating Environment license; no CPU, memory, or disk included; rackmountable on tray

Step 2: Select a CPU module (Required)

Select one or two of the following, with any combination of CPU speeds. A minimum of one is required. Note that the 900-MHz UltraSPARC Cu CPU module is a direct replace for the 750-MHz module. The 900-MHz UltraSPARC Cu module, when used to upgrade from the 750-MHz module (used in eoled Sun Blade 1000 systems), requires an OS patch and OBP update.

Part Number	CPU, Memory Module	Max. per System
Sun Blade 2000 Workstations		
7009A	900-MHz UltraSPARC III Cu CPU, 8-MB Ecache	Two
7310A	1.2 GHz UltraSPARC III Cu CPU, 8-MB Ecache	Two

Step 3: Specify memory kit (Required)

Select one or two memory kits, any combination. Maximum installed memory is 8 GB. Full physical memory can be accessed with only one CPU; two CPUs are not required. The Sun Blade 2000 has eight DIMM slots. RAM must be installed in banks of four. Memory can be mixed and matched but must be one size per bank of four.

Part Numbers	Memory Size	Number of Maximum Memory Kits per System
7061A	1024 MB (4 x 256 MB)	2
7062A	2048 MB (4 x 512 MB)	2
7063A	4096 MB (4 x 1024 MB)	2

The table below lists memory sizes and required memory kits.

Size	Bank Configuration	Kit Selection
2048 MB	2 banks 256-MB DIMMs	two 7061A
2048 MB	1 bank 512-MB DIMMs	one 7062A
3072 MB	1 bank 512-MB DIMMs and 1 bank 256-MB DIMMs	one 7062A and one 7061A
4096 MB	1 bank 1024-MB DIMMs	one 7052A
4096 MB	2 banks 512-MB DIMMs	two 7062A
5120 MB	1 bank 1024-MB DIMMs and 1 bank 256-MB DIMMs	one 7063A and one 7061A
6144 MB	1 bank 1024-MB DIMMs and 1 bank 512-MB DIMMs	one 7063A and one 7062A
8192 MB	2 banks 1024-MB DIMMs	two 7063A

Step 4: Select a graphics card (Required)

Select a one or more cards, subject to installation combinations listed below. The maximum configuration of graphics cards in the Sun Blade 2000 workstations is as follows:

- Sun PGX64 or XVR-100 graphics, maximum 4

- Sun XVR-500 graphics, maximum 4

- Sun XVR-1000 graphics, maximum 2

- Sun XVR-1200 graphics, maximum 2

Part Number	Description	Max. # Supported	Bus	Connections
3768A	Sun PGX64 graphics	4	PCI	HD15
3769A	Sun XVR-100 graphics	4	PCI	HD15, DVii
3685A	Sun XVR-500 graphics	4	PCI	13W3, HD15
3256A	Sun XVR-1000 graphics	2	UPA	13W3, HD15, Dvid
3689A	Sun XVR-1200 graphics	2	PCI	Dvii,DVii,HD15,HD15

The specific mix and match rules for these graphics options are outlined below. Customers can mix and match until they run out of slots in the system. Any combination of cards is allowed as long as there are no slot conflicts. The slot configurations and physical positions are shown in the table below. Gray areas indicate slots incompatible with the specified graphics card. Customers can install total of four graphics cards on one system.

Graphics Board	Total Supported	UPA Slot 0	PCI Slot 4, 33 MHz	UPA Slot 1	PCI Slot 3, 33 MHz	PCI Slot 2, 33 MHz	PCI Slot 1, 66 MHz
Sun PGX64[B]	4		X		X	X	X
Sun XVR-100	4		X		X	X	X
Sun XVR-500	4		X		X	X	X
Sun XVR-1000	2	X		X			
Sun XVR-1200	2		X		X	X	

Notes:

a. Installing the Sun PGX64 card in the 66-MHz slot slows performance of the entire 66-MHz PCI bus to operate at 33 MHz. Sun XVR-1200 Graphics Accelerator must be installed in one of the 33 Mhz PCI Slots. For optimal performance use 66-MHz PCI Slot for XVR-100 graphics card

Step 5: Select a country kit (Required)

Select one country kit and one power cord kit.

Type 6 Country Kits	USB I/O	Power Cord	Documentation	MM
US/Universal/Canadian	X3531A	X311L	English	NTSC
French	X3532A	X312L	French	Secam
German	X3533A	X312L	German	PAL
Swiss-French	X3534A	X314L	French	PAL
Swiss-German	X3535A	X314L	German	PAL
Swedish	X3536A	X312L	Swedish	PAL
UK	X3537A	X317L	English	PAL
US UNIX	X3538A	X311L	English	NTSC
Japanese UNIX	X3539A	X311L	Japanese	NTSC
Japanese UNIX Logoless	X3539A-O#	X311L	Japanese	NTSC
Taiwanese	X3554A	X311L	English	NTSC
Korean	X3555A	X311L	English	NTSC
Japanese	X3556A	X311L	Japanese	NTSC
Japanese Logoless	X3556A-O#	X311L	Japanese	NTSC
UK UNIX	X3558A	X317K	English	PAL
European UNIX	X3559A	X312L	English	PAL
Norwegian	X3560A	X312L	English	PAL
Portuguese	X3561A	X312L	English	PAL
Spanish	X3562A	X312L	Spanish	PAL
Danish	X3563A	X383L	Danish	PAL
Italian	X3564A	X384L	Italian	PAL
Dutch	X3565A	X312L	English	PAL
Australian	X3566A	X386L	English	PAL
Finnish	X3567A	X312L	English	PAL
European Universal	X3568A	X312L	English	PAL
Chinese	X3582A	X386L	English	
Euro Cordless	X3583A	X312L**	English	PAL

Notes: **Power cord shipped separately

Step 6: Select disk drives and Solaris Operating Environment pre-installation (Required)

Select the number of disk drives to install. Also, specify whether to pre-install the Solaris Operating Environment on the workstation. The requirement is a maximum of two disk drives, of which at least one has the Solaris Operating Environment pre-installed 6766A

Part Number	Description
6766A	73-GB FC-AL 10000-rpm drive option, Solaris Operating Environment preinstalled
6805A	73-GB FC-AL 10000-rpm drive option

Options

Below is a comprehensive list of system expansion, networking, graphics, and multimedia options that are supported by Sun Blade™ 2000 systems. Refer to the Sun Price Book and configuration guides for currently available option listings, configuration notes, and ordering information. When no maximum number is listed, refer to ordering or configuration notes for that option.

Note: *Options listed in italics are supported by the Sun Blade 2000 workstations, but are no longer available for purchase from Sun. These are listed only for reference purposes.*

Part Number	Option Description	Maximum Number Supported	Comments
Processors			USIII Cu processor speed cannot be mixed. Cu processor cannot be mixed with non Cu processors
X7310A	1.2 GHz UltraSPARC™ III Cu module	2	
X7009A	900-MHz UltraSPARC™ III Cu module	*2*	
	Note: The Sun Blade 2000 UltraSPARC III Cu 1.2 GHz systems do not support adding or mixing 600/750/900-MHz CPU modules from Sun Blade 1000 systems or UltraSPARC III Cu 900 Mhz, 1.015 GHz or 1.05 GHz modules from Sun Blade 2000 systems. In short, no speed mixing is allowed.		
Mass Storage: Internal			
X6805A	73-GB, 10000-rpm FC-AL disk	2	
Mass Storage: Removable Media			
X6006A	3.5-inch, 1.44-MB manual-eject floppy drive (triple density)	1	
X6168A	DVD-ROM 10X speed	1	
X6282A	12-GB to 24-GB, 4-mm DDS-3 tape drive	1	
X6295A	20-GB, 4-mm DDS-4 tape drive	1	
External Tape Options: Sun StorEdge™ FlexiPack and UniPack Systems			
X6540A	Dual-channel SE SCSI		
X5010A	Single-channel SE SCSI		
X1032A	SE SCSI, Fast Ethernet		
Mass Storage: Sun StorEdge UniPack (68-pin SCSI)			
SG-XTAP4MM-012A	20-GB, 4-mm DDS-4 tape drive in a UniPack desktop enclosure	2	
SG-4MMDDS410	4-mm DDS-4 tapes, 10 pack		

Part Number	Option Description	Maximum Number Supported	Comment
SGXMEDDLTCIV-10	SLT Type IV tapes, 10 pack		
SG-XMED4MMCL-10	DDS-4 tape cleaners, 10 pack		
SG-XMEDDLTCL-10	SLT tape cleaners, linear, 10 pack		
SG-XDSK010C-18G	18.2-GB, 7200-rpm UniPack	4	
SG-XDSK010C-36G	36.4-GB, 10000-rpm UniPack	4	
SG-XTAP4MM-011A	12-GB, 4-mm DDS-3 tape drive UniPack desktop enclosure	2	
SG-XTAP8MM-010A	7-GB, 8-mm drive in a UniPack desktop enclosure	2	
SG-XTAP4MM-012A	20-GB, 4-mm DDS-4	2	
SG-XTAP8MM-011A	20-GB, 8-mm drive in a UniPack desktop enclosure	2	
SG-XDSK010C-9G	*9.1-GB, 7200-rpm UniPack*	*4*	
Mass Storage: Sun StorEdge FlexiPack			
	The following FlexiPack options come with a 68 to 68 pin SCSI cable:		
SG-XTAPDLT-021A	35-GB, DLT 7000 tape, desktop, full height	2	
SG-XTAP4MM-021A	12-GB, 4-mm DDS-3 tape FlexiPack, half height	2	
SG-XTAP4MM-031A	72-GB, 4-mm DDS-3 tape FlexiPack, desktop autoloader	2	
SG-XTAP8MM-020A	7-GB, 8-mm tape FlexiPack, half height	2	
SG-XTAP8MM-021A	20-GB, 8-mm tape FlexiPack, desktop, half height	2	
X6166A	SunCD™ 32X internal CD-ROM expansion drive		
X6168A	DVD-ROM, 10X internal		
X6212A	7-GB 8-mm DDS-3 internal tape expansion drive		
X6236A	20-GB, 8-mm internal tape for FlexiPack		
X6282A	12-GB DDS-3 tape drive		
Mass Storage: Sun StorEdge MultiPack			One Sun StorEdge MultiPack is supported per SCSI channel
SG-XDSK020C-36G	36.4-GB (2 x 18.2-GB) 10000-rpm MultiPack	1	
SG-XDSK020C-72G	72.8-GB (2 x 36.4-GB) 10000-rpm MultiPack	1	
SG-XDSK040C-72G	72.8-GB (4 x 18.2-GB) 10000-rpm MultiPack	1	
SG-XDSK040C-144G	145.6-GB (4 x 36.4-GB) 10000-rpm MultiPack	1	
SG-XDSK060C-109G	109.2-GB (6 x 18.2-GB) 10000-rpm MultiPack	1	
SG-XDSK060C-218C	218.6-GB (6 x 36.4-GB) 10000-rpm MultiPack	1	
SG-XDSK020C-18G	*18.2-GB (2 x 9.1-GB) 10000-rpm MultiPack*	*1*	
SG-XDSK040C-36G	*36.4-GB (4 x 9.1-GB) 10000-rpm MultiPack*	*1*	
SG-XDSK060C-54G	*54.6-GB (6 x 9.1-GB) 10000-rpm MultiPack*	*1*	
X5237A	18-GB UltraSCSI 10000-rpm drive		
X5242A	36-GB UltraSCSI 10000-rpm drive		
X5234A	*9-GB UltraSCSI 10000-rpm drive*		

Part Number	Option Description	Maximum Number Supported	Comments
Mass Storage: Sun StorEdge A1000 Arrays			One array can be connect to each channel of the X6541A controller card or three Sun StorEdge A1000 arrays daisy-chained per channel.
SG-XARY150A-72G	72-GB Sun StorEdge A1000 tabletop array (4 x 18-GB, 10000-rpm disks)		
SG-XARY170A-145G	145-GB Sun StorEdge A1000 tabletop array (4 x 36.4-GB, 10000-rpm disks)		
SG-XARY170A-436G	436-GB Sun StorEdge A1000 tabletop array (12 x 36.4-GB, 10000-rpm disks)		
SG-XARY155A-72G	72-GB Sun StorEdge A1000 rackmountable array (4 x 18-GB, 10000-rpm disks)		
SG-XARY171A-145G	145-GB Sun StorEdge A1000 rackmountable array (4 x 36.4-GB, 10000-rpm disks)		
SG-XARY155A-218G	218-GB Sun StorEdge A1000 rackmount array (12 x 18.2-GB, 10000-rpm disks)		
SG-XARY171A-436G	436-GB Sun StorEdge A1000 rackmount array (12 x 36.4-GB, 10000-rpm disks)		
SG-XARY144A-36G	*36-GB Sun StorEdge A1000 tabletop array (4 x 9.1-GB, 10000-rpm disks)*		
SG-XARY144A-109G	*109-GB Sun StorEdge A1000 tabletop array (12 x 9.1-GB, 10000-rpm disks)*		
SG-XARY146A-36G	*36-GB Sun StorEdge A1000 rackmountable array (4 x 9.1-GB, 10000-rpm disks)*		
SG-XARY151A-218G	*218-GB Sun StorEdge A1000 tabletop array (12 x 18.2-GB, 10000-rpm disks)*		
SG-XARY161A-291G	*291-GB Sun StorEdge A1000 tabletop array (8 x 36.4-GB, 10000-rpm disks)*		
Mass Storage: Sun StorEdge D1000 Arrays			System accepts max. one array per X6541A controller card Sun StorEdge D1000 arrays cannot be daisy-chained.
SG-XARY153A-72G	72-GB Sun StorEdge D1000 tabletop array (4 x 18-GB, 10000-rpm disks)		
SG-XARY172A-145G	145-GB Sun StorEdge D1000 tabletop array (4 x 36.4-GB, 10000-rpm disks)		
SG-XARY153A-218G	218-GB Sun StorEdge D1000 tabletop array (12 x 18.2-GB, 10000-rpm disks)		
SG-XARY172A-436G	436-GB Sun StorEdge D1000 tabletop array (12 x 36.4-GB, 10000-rpm disks)		
SG-XARY154A-72G	72-GB Sun StorEdge D1000 rackmountable array (4 x 18-GB, 10000-rpm disks)		
SG-XARY173A-145G	145-GB Sun StorEdge D1000 rackmountable array (4 x 36.4-GB, 10000-rpm disks)		
SG-XARY154A-218G	218-GB Sun StorEdge D1000 rackmount array (12 x 18.2-GB, 10000-rpm disks)		
SG-XARY173A-436G	436-GB Sun StorEdge D1000 rackmount array (12 x 36.4-GB, 10000-rpm disks)		

Part Number	Option Description	Maximum Number Supported	Comments
SG-XARY145A-36G	*36-GB Sun StorEdge D1000 tabletop array (4 x 9.1-GB, 10000-rpm disks)*		
SG-XARY145A-3109G	*1409-GB Sun StorEdge D1000 tabletop array (12 x 9.1-GB, 10000-rpm disks)*		
SG-XARY147A-36G	*36-GB Sun StorEdge D1000 rackmountable array (4 x 9.1-GB, 10000-rpm disks)*		
SG-XARY163A-145G	*145-GB Sun StorEdge D1000 tabletop array (4 x 36.4-GB, 10000-rpm disks)*		
Sun StorEdge A5200 Arrays			
X6727A	PCI dual FC network adapter	1	
SG-XARY540A-127G	127-GB Sun StorEdge 5200 tabletop array (7 x 18.2-GB, 10000-rpm disks)	2	
SG-XARY540A-400G	400-GB Sun StorEdge 5200 tabletop array (22 x 18-GB, 10000-rpm disks)	2	
SG-XARY560A-254G	254-GB Sun StorEdge 5200 tabletop array (7 x 36-GB, 10000-rpm disks)	2	
SG-XARY560A-800G	400-GB Sun StorEdge 5200 tabletop array (22 x 36-GB, 10000-rpm disks)	2	
Sun StorEdge T3 Arrays			Cannot mix Sun StorEdge T3 with A5200 on a single system
XT3WG-TT-11-163	163-GB (9 x 18-GB) tabletop single array	2	
XT3ES-TT-22-327	327-GB (9 x 18-GB) tabletop dual array	2	
XT3WG-TT-11-327	327-GB (9 x 36-GB) tabletop single array	2	
XT3ES-TT-22-655	655-GB (9 x 36-GB) tabletop dual array	2	
XT3WG-TT-11-1310	1310-GB (9 x 73-GB) tabletop single array	2	
XT3ES-TT-22-2620	2620-GB (9 x 73-GB) tabletop dual array	2	
XT3WG-RR-11-163	163-GB (9 x 18-GB) rackmount single array	2	
XT3ES-RR-22-327	327-GB (9 x 18-GB) rackmount dual array	2	
XT3WG-RR-11-327	327-GB (9 x 36-GB) rackmount single array	2	
XT3ES-RR-22-655	655-GB (9 x 36-GB) rackmount dual array	2	
XT3WG-RR-11-1310	1310-GB (9 x 73-GB) rackmount single array	2	
XT3ES-RR-22-2620	2620-GB (9 x 73-GB) rackmount dual array	2	
External Tape Autoloaders and Libraries			
SG-XAUTODLT8D-L9	360-GB Sun StorEdge L9 autoloader, desktop	1	
SG-XRACKIT-L9	Rackmounting kit for Sun StorEdge L9 autoloader		
SG-XLIBDLT81-L20	Sun StorEdge L20 library, deskside	1	
SG-XLIB180-Base2	Sun StorEdge L180 tape library	1	
SG-XLIB9840-Drv	Sun StorEdge L180 tape library with 9840	1	
SG-XLIBDLT8-Drv	Sun StorEdge L180 tape library with DLT	1	

Part Number	Option Description	Maximum Number Supported	Comments
PCI Expansion Cards			
X1033A	10/100 BASE-T Sun FastEthernet PCI adapter with MII interface	3	
X1034A	Sun Quad FastEthernet™ PCI Card (QFE)	4	
X1141A	Sun GigabitEthernet PCI adapter 2.0	4	
X1150A	Sun GigaSwift Ethernet UTP		
X1155A	High-speed serial interface PCI adapter 2.0	4	Universal
X1157A	SunATM™-155/MFiber PCI adapter 4.0	4	
X1158A	SunATM-155/UTP PCI adapter 4.0	4	
X1159A	SunATM-622/MFiber PCI adapter 4.0	2	
X2156A	Serial asynchronous interface PCI adapter 3.0 for Solaris Operating Environment	4	
X1032A	PCI UltraSCSI SE with Ethernet	1	
X5010A	Single-channel SCSI	1	
X6540A	Dual-channel, single-ended UltraSCSI controller	2	
X6541A	Dual-channel, differential UltraSCSI controller	2	
X6799A	PCI single Fibre Channel network adapter	1	
X6727A	PCI dual FC network adapter	1	
X1089A	Real-time video/audio capture and compression	3	
X2132A	SunPCi™ IIpro 733-MHz coprocessor card, 128-MB memory	4	
X7042A	128-MB DIMM memory expansion for SunPCi IIpro PCI option card	2	
X7044A	256-MB DIMM memory expansion for SunPCi IIpro PCI option card	2	
X7045A	512-MB DIMM memory expansion for SunPCi IIpro PCI option card	2	

Part Number	Option Description	Maximum Number Supported	Comments
Graphics and Imaging			
X3685A	Sun XVR-500 graphics	4	
X3256A	Sun XVR-1000 graphics	2	
X3689A	Sun XVR-1200 graphics	2	
X3769A	Sun XVR-100 graphics card	4	
X3768A	Sun PGX64 graphics card	4	EOLed
Monitors and Adapters			
X7143A	17-inch color monitor		
X7137A	18.1-inch TFT LCD color monitor		
X7146A	21-inch flat-screen color Trinitron monitor		
X7134A	Widescreen 24-inch flat-panel monitor		
X7124A	Widescreen 24-inch color monitor		
X471A	13W3F-to-HD15M video adapter cable		
X3872A	HD15F-to-13W3 video adapter		
Miscellaneous Options			
X5681A	Smart card reader for serial or USB port		
X1400A	Extra cards for smart card reader, 25 pack		
Type6 Country Kits			Except for "Z" Country Kit Codes, these kits are included with every Sun Blade system. Refer to the "Choice of Country Kit" sub-section (above) for details.
X3531A	US/Canada Universal	1	
X3532A	French	1	
X3533A	German	1	
X3534A	Swiss-French	1	
X3535A	Swiss-German	1	
X3536A	Swedish	1	
X3537A	United Kingdom	1	
X3538A	US UNIX	1	
X3554A	Taiwanese	1	

Part Number	Option Description	Maximum Number Supported	Comments
X3555A	Korean	1	
X3556A	Japanese	1	
X3558A	United Kingdom UNIX	1	
X3559A	European UNIX	1	
X3560A	Norwegian	1	
X3561A	Portuguese	1	
X3562A	Spanish	1	
X3563A	Danish	1	
X3564A	Italian	1	
X3565A	Dutch (Netherlands)	1	
X3566A	Australian	1	
X3567A	Finnish	1	
X3582A	Chinese	1	
X3583A	European cordless	1	

Upgrades

Key Messages

The Sun™ Upgrade Advantage Program (UAP) offers customers outstanding investment protection for their existing Sun equipment. Upgrades are available for specific configurations within the Sun Blade™ Sun Blade 2000 product family.

- Sun upgrades allow as many components as possible to be carried forward, to protect the customer's hardware investment.

- Existing investments in non-Sun hardware can be preserved by upgrading to Sun through competitive full-system upgrades.

- - The UAP program may be limited to qualified configurations. Please reference the Desktop System Migration and Allowance Matrix at the URL's listed in the next section for these qualified systems.

Sun Upgrade Advantage Program (Sun UAP)

Sun UAP offers customers a simple, flexible, and easy-to understand way of ordering desktop workstation upgrades. Sun UAP is a percentage-based model. This model simplifies the upgrades process by providing a trade-in value as a percentage allowance. This percentage allowance can then be applied to the list price of a regular Sun system configuration.

Under Sun UAP, trade-in allowance codes have been created and the percentage allowance is built into this part number (see below). Allowance codes can be found at the following locations:

- Sun Price Book

- Configuration Guide

- Desktop System Migration and Allowance Matrix on SunWIN, #94726

- Internal URL: `http://ibb.eng/upgrades`

- External URL: `http://www.sun.com/ibb/upgrades`

- Partner/CDPs URL: `http://partner.sun.com/ibb/upgrades`

Note: *Allowance codes can be applied to standard marketing part numbers.*

Allowance Code Numbering Scheme

Below is an example allowance code, along with a description of the components.

Allowance code = ALW-02-T-A-A29

- **ALW** = Every upgrade code starts with these letters, identifying it as an upgrade.

- **02** = Percentage allowance. This is the allowance that is subtracted from the list price of the product (02 equals 2% off of list, 08 equals 8% off of list, and so on). Note that any other discounts, such as volume discounts, should also be taken off the list price and not the net of the above.

- **T** = Desktop upgrades, S for server upgrades, and D for storage upgrades.

- **A** = Residue group; acceptable trade-ins by Sun — for reporting purposes.

- **A29** = Product family; identifies the type of product the customer is upgrading to.

How to Apply Allowance Code

- Retrieve a copy of the desktop matrix which includes the allowances from one of the URLs noted above.

- Select the platform the customer is upgrading from

- Choose the allowance code that pertains to the platform the customer is upgrading to

- Subtract the allowance percentage from the list price of the configuration

Note: *The trade-in allowance is in addition to any contracted discounts that the customer may be eligible for. Contracted discounts should also be taken off the LIST PRICE.*

Upgrade Ordering Notes

The following lists what can and cannot migrate from UltraSPARC-II systems to the Sun Blade 2000 product family.

- Memory, internal disks, and controllers do not migrate.

- CPU modules from Ultra™ workstations do not migrate.

- Sun PGX64, Sun Creator3D, and Sun Elite3D m6 graphics cards do migrate.

- Selected SCSI arrays and PCI cards migrate. See Options sections for details.

- Monitors

  – Monitors are not included with any Sun Blade system upgrades.

  – Sun branded 17-inch and 20-inch monitors migrate from previous generation Sun systems.

  – Upgrade trade-ins are available for Non-Sun competitive monitors

- Country kits do not migrate

- Type 4 and Type 5 keyboards are not supported on the Sun Blade 2000 workstations. Only USB keyboards are supported.

Upgrading to UltraSPARC III Cu Processor

Sun Blade 1000/2000 workstation customers can upgrade the system's processors to

the 900-MHz UltraSPARC III Cu processors (X-option #7009A) and 1.2GHz

UltraSPARC III Cu processors (X-option X7310A)

Notes:

- All customer VEUs are different.

- Processor speeds cannot be mixed on the same workstation.

- The UltraSPARC III Cu 900-MHz module UltraSPARC III Cu and 1.2 Ghz UltraSPARC III Cu module do and not mix with 600/750/900-MHz UltraSPARC III CPU modules. Customers who run dual CPU systems must remove their existing 600/750/900-MHz 0r 1.015 GHz and 1.05 GHz modules from the system and then install either two UltraSPARC III Cu 900-MHz modules or two UltraSPARC III Cu 1.2 GHz modules.

Before upgrading to the UltraSPARC III Cu processors, customers must be running Solaris 8 2/02 Operating Environment or Solaris 9 12/02. All currently shipping systems offer dual boot preinstalled Solaris 8 HW 12/02 or Solaris 9 12/02, OBP 4.5.21

Upgrade Paths

System/ Component	Upgrade From	Upgrade To	Allowance Code Part Number	Customer Returns
Sun Workstations	Any Sun workstation	A Sun Blade 2000 workstation	See Desktop System Migration and Allowance Matrix for available configurations and trade-in allowances. SunWIN #94726	A complete functioning system
Non-Sun Workstations	Any Non-Sun workstation	A Sun Blade 2000 workstation	See Desktop System Migration and Allowance Matrix for available configurations and trade-in allowances. SunWIN #94726	A complete functioning system

System/Component	Upgrade From	Upgrade To	Allowance Code Part Number	Customer Returns
CPUs	600-MHz UltraSPARC III (X6898A)	900-MHz UltraSPARC III Cu (X7009A) and 1.2 GHz UltraSPARC III Cu (X7310A)	See Component Migration and Allowance Matrix for trade-in allowance. SunWIN #108142	A 600-MHz CPU option
	750-MHz UltraSPARC III (X6990A)	900-MHz UltraSPARC III Cu (X7009A) and 1.2 GHz UltraSPARC III Cu (X7310A)	Same as above	A 750-MHz CPU option
	900-MHz UltraSPARC III (X7000A)	900-MHz UltraSPARC III Cu (X7009A) and 1.2 GHz UltraSPARC III Cu (X7310A)	Same as above	A 900-MHz CPU option
	1.015-GHz Ultra SPARC III Cu (X7064A)	1.2 GHz UltraSPARC III Cu (X7310A)	Same as above	A 1.015- GHz CPU option
	1.05-GHz UltraSPARC III Cu (X7017A)	1.2 GHz UltraSPARC III Cu (X7310A)	Same as above	A 1.05- GHz CPU option
Memory: Increasing Density 2x	512 MB (4 x 128-MB DIMMs) X7050A	1 GB (4 x 256-MB DIMMs) X7061A	See Component Migration and Allowance Matrix for trade-in allowance. SunWIN #108142	512 MB (4 x 128-MB DIMMs) X7050A
	1 GB (4 x 256-MB DIMMs) X7053A	2 GB (4 x 512-MB DIMMs) X7062A	Same as above	1 GB (4 x 256-MB DIMMs) X7053A
	2 GB (4 x 512-MB DIMMs) X7051A	4 GB (4 x 1-GB DIMMs) X7063A	Same as above	2 GB (4 x 512-MB DIMMs) X7051A
Memory: Increasing Density 4x	512 MB (4 x 128-MB DIMMs) X7050A	2 GB (4 x 512-MB DIMMs) X7062A	Same as above	512 MB (4 x 128-MB DIMMs) X7050A
	1 GB (4 x 256-MB DIMMs) X7053A	4 GB (4 x 1-GB DIMMs) X7063A	Same as above	1 GB (4 x 256-MB DIMMs) X7053A

Note: *For graphics cards and disk upgrades, see Component Migration and Allowance Matrix for trade-in allowance. Refer to SunWIN #108142 or go to any of the following URLs:*

• Sun Price Book

• Configuration Guide

- Desktop System Migration and Allowance Matrix on SunWIN, #94726

- Component Migration and Allowance Matrix on SunWIN, #108142

- Internal URL: `http://ibb.eng/upgrades`

- External URL: `http://www.sun.com/ibb/upgrades`

- **Partner/CDPs URL: http://partner.sun.com/ibb/upgrades**

Service and 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™ Operating Environment 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 Enterprise Services representatives for program and feature availability in their areas.

Support Contracts

SunSpectrum program support contracts are available both during and after the warranty program. Customers may choose to uplift the service and support agreement to meet their business needs by purchasing a SunSpectrum contract.

The four levels of SunSpectrum support contracts are outlined below.

SunSpectrum Program Support

Program	Description
Mission-Critical **SunSpectrum Platinum℠ Support**	Designed to support client-server, mission critical solutions by focusing on failure prevention, rapid recovery and year round technical services planning. Support is provided 24 x 7.
Business-Critical **SunSpectrum Gold℠ Support**	Includes a complete package of proactive and responsive services for customers who require maximum uptime for their strategic business-critical systems. Support is provided 24 x 7.
System Coverage **SunSpectrum Silver℠ Support**	Combines the service expertise, responsive on-site support and technical support by telephone and SunSolve™ CD/on-line services. Support is provided 8 a.m. to 8 p.m. Mon. through Fri.
Self-Directed **SunSpectrum Bronze℠ Support**	Provided for customers who rely primarily upon their own in-house service capabilities. Enables customers to deliver high quality service by giving them access to UNIX® expertise, Sun certified replacement parts, software releases and technical tools. Support is provided 8 a.m. to 5 p.m. Mon. through Fri.

SunClient℠ Support Program

The SunClient℠ support program is a suite of offerings that is separate, yet complementary to the SunSpectrum program. This program helps reduce hardware and software support costs for the Sun Blade™ 2000 workstations. SunClient support program provides:

• A choice for optimizing low-cost workstation support

- Flexibility to select only the services needed

- Administrative simplicity, saving time and money

- Access to world-class UNIX® networking experts

Feature	SunClient Maintenance	SunClient Central Maintenance	SunClient Software Tech Support Option*
Systems approach coverage	*	*	
Solaris and unbundled software technical support	—	—	*
9 a.m.–5 p.m., Monday–Friday telephone coverage	*	*	*
9 a.m.–5 p.m., Monday–Friday on-site coverage	*†‡	*‡	—
Response times (phone/onsite)	4 hour callback/next business day response	4 hour callback/second business day response	4 hour callback
Centralized on-site repair of multiple units	—	*	Not Applicable
Patches	Not Applicable	Not Applicable	*
SunSolve license	Not Applicable	Not Applicable	*
SunSolve EarlyNotifier™ Service	Not Applicable	Not Applicable	*
Software updates	Not Applicable	Not Applicable	Not Applicable

* Can only be sold as an option to SunClient Maintenance or SunClient Central Maintenance.

† Next business day on-site response requires that the request for service be received by 3:00 p.m. If the call is received after 3:00 p.m., service is provided on the second business day.

‡ Customers located more than 50 miles from an authorized service provider or reseller is charged an additional fee for service activity.

Features and Benefits of the SunClient Program

Features	Benefits
- Unbundled hardware and software support	- *Flexibility* Select the type and amount of coverage needed for desktop systems, so service dollars are targeted where they are needed most. - *Cost savings* Pay only for the support services needed.

Features	Benefits
• Next business day (SunClient Maintenance) or second business day (SunClient Central Maintenance) on-site response	• *Cost efficiency* Because Sun can more efficiently manage spare inventory and labor scheduling, the savings can be passed on to the customer.
• Single contract with choice of automatic warranty upgrade	• *Simplicity* One contract covers a predefined number of systems at one low price. Additional systems acquired can be upgraded to the SunClient service level.
• SunClient Central Maintenance	• *Cost savings* Sun realizes an economy of scale by repairing multiple systems with one visit and leverages existing support infrastructures, so cost efficiency is maximized while duplication of effort is virtually eliminated.
• Service delivery by Sun experts	• *Consistency* Selected desktops can be deployed virtually anywhere with enabling cost-effective, quality service and support.

For more information, visit the SunClient support web site at:
http://www.sun.com/service/support/sunclient

Sun Blade 2000 Documentation

A. What ships with the system:

- 816-3254-10, *Setting Up the Sun Blade 1000 and Sun Blade 2000 Workstation* (poster)

- 816-3216-10, *Sun Blade 1000 and Sun Blade 2000 Getting Started Guide*

- 705-0073-10, *Sun Blade 1000 and Sun Blade 2000 Hardware Documentation CD-ROM*, which contains:

  – 816-3217-10, *Sun Blade 1000 and Sun Blade 2000 Service Manual* in PDF and HTML formats. The HTML format contains links to the ShowMe(TM) How animated remove-and-replace procedures.

  – The *Sun Blade 1000 and Sun Blade 2000 Getting Started Guide* in English, French, German, Spanish, Italian, Swedish, Japanese, Korean, and Simplified and Traditional Chinese.

B. Key documentation urls:

All documentation, including Product Notes that contain late-breaking information, is on the web at http://www.sun.com/products-n-solutions/hardware/docs/index.html

Documentation for Solaris is found at http://docs.sun.com

Glossary

24-bit color	The ability to render objects from a palette of 16.7 million colors. It is often referred to as true color and results in much more realistic shading of 3D objects for enhanced image quality.
3D-RAM	Dual-ported video memory with graphics functionality built into the memory chip.
100BASE-T	*See* Fast Ethernet.
Antialiasing	A graphics technique that greatly enhances the quality of images by eliminating many of the inaccuracies ("jaggies") inherent to rendering on a raster display. Typically found only in high-end graphics systems.
DIMM	Dual inline memory module. A memory unit that can come in a variety of sizes, such as 16, 32, 64, and 128 MB.
Fast Ethernet	IEEE standard for 100-Mb Ethernet. This technology supports a data transfer rate of 100 megabits per second over special grades of twisted-pair wiring.
NFS	Sun's distributed computing file system.
ODBC	Open database connectivity.
OpenGL®	The de facto standard software interface for graphics hardware that allows programmers to create interactive 3D applications. The OpenGL API provides a full-featured, network-transparent application programming interface.
PCI	Peripheral component interconnect. A industry standard for connecting peripherals such as disk drives, tapes drives, and other devices used in the PCs.
UPA	Ultra™ port architecture. A high-speed, crossbar-oriented, packet-switched mother board interconnect.
V9	Version 9 of the SPARC™ definition.
VIS™	Visual instruction set. The UltraSPARC III Cu processor implements a special instruction set that is primarily aimed at image and video processing. Some of the instructions allow the CPU to directly access and operate on image data with a high degree of parallelism. Other instructions provide facilities for formatting and moving data at very high rates of speed both within the CPU, and between the CPU and the other system components.

Sun microsystems

Materials Abstract

All materials are available on SunWIN except where noted otherwise.

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
PowerPack				
− *Sun Blade™ 2000 Workstation: Just the Facts*	Reference Guide (this document)	Training Sales Tool	SunWIN, Reseller Web	124808
− *Sun Blade Workstation Customer Presentation*	Presentation with Slide Notes	Sales Tool	SunWIN, Reseller Web	124810
Product Literature				
− *Sun Blade 1000 and 2000 Workstation Architecture White Paper*	Technical White Paper	Sales Tool	SunWIN, Reseller Web	124809
− *Literature - Sun Blade 1000 Workstation Data Sheet*	Data Sheet	Sales Tool	SunWIN, Reseller Web	121205 DE1211-1
− *Literature - Sun Blade 2000 Workstation Data Sheet*	Data Sheet	Sales Tool	SunWIN, Reseller Web	336012 DE1590-0
− *Graphics Solution Guide*	Graphics Overview	Sales Tool	SunWIN	75271
− *Sun Blade 1000 Benchmark Index*	Benchmark Index	Sales Tool	SunWIN	125774
References				
− *Sun PGX64 Graphics, Just the Facts*	Reference Guide	Training Sales Tool	SunWIN, Reseller Web	301866
− *Sun XVR-500 Graphics Accelerator, Just the Facts*	Reference Guide	Training Sales Tool	SunWIN, Reseller Web	343613
− *Sun XVR-500 Graphics Accelerator Data Sheet*	Data Sheet	Sales Tool	SunWIN COMAC	343614

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
– *Sun XVR-1000 Graphics Accelerator Just the Facts*	Reference Guide	Training Sales Tool	SunWIN, Reseller Web	335930
– *Sun XVR-1000 Graphics Accelerator Technical White Paper*	Technical Brief	Training Sales Tool	SunWIN, Reseller Web	335932
– *SunPCi IIpro Coprocessor Card, Just the Facts*	Reference Guide	Training Sales Tool	SunWIN, Reseller Web	92629
– *SunPCi IIpro Coprocessor Card Data Sheet*	Data Sheet	Training Sales Tool	SunWIN, Reseller Web, COMAC	123626 DE1243-1
Quick Reference Cards				
– *Quick Reference Card: Sun Workstation™ Product Line Overview*	Quick Reference Card	Sales Tool	SunWIN, Reseller Web	10826
– *Quick Reference Card Competitive Summary Workstations*	Quick Reference Card	Sales Tool	SunWIN, Reseller Web	12259
– *Quick Reference Card: Sun Workstation Graphics Products Overview*	Quick Reference Card	Sales Tool	SunWIN, Reseller Web	24507
Presentations				
– *Graphics Overview Presentation*	Presentation	Sales Tool	SunWIN, Reseller Web	75254 75255
External Web Sites				
– *General Information on Sun's Desktop Line*	`http://www.sun.com/desktop/`			
– *Detailed Information on the Sun Blade 1000 Workstation*	`http://www.sun.com/desktop/sunblade1000`			
– *Detailed Information on the Sun Blade 2000 Workstation*	`http://www.sun.com/desktop/sunblade2000`			
– *SunPCi IIpro Coprocessor Card Portal*	`http://www.sun.com/desktop/products/sunpci/index.html`			
– *Sun Store*	`http://www.sun.com/sunstore`			
– *Investment Protection Solutions*	`http://www.sun.com/ibb`			