

Sun Blade™ 1000 and 2000 Workstations

Just the Facts



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Positioning



Figure 1. Sun Blade™ 1000 and 2000 workstations

Introduction

The Sun Blade™ 1000 and 2000 workstations are Sun's UltraSPARC™ III 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 1000 and 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 36-GB (Sun Blade 1000) or 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 available including Sun™ Creator3D, Sun Elite3D m6, Sun Expert3D, Sun Expert3D-Lite, and Sun XVR-1000 graphics. These graphics accelerators range from the very affordable, Sun PGX64 graphics to the entry-level 3D acceleration of Sun Expert3D-Lite graphics, to the very high-performance, hardware-based texture mapping acceleration of Sun XVR-1000 graphics. A number of multi-monitor configurations are possible.

The Sun Blade 1000 and 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 1000 and 2000 workstations also include an external 40 MB/second UltraSCSI interface and 100 Mb/second Fast 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 1000 and 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 1000 and 2000 workstations support only the Solaris™ 8 Operating Environment. There is no support for earlier versions of the Solaris Operating Environment; however, these workstations maintain full binary compatibility with applications compiled on previous versions of the operating environment. For Sun Blade 1000 systems with UltraSPARC III Cu processors, Sun recommends the 10/01 version of the Solaris 8 Operating Environment (Solaris 8, Update 6) or later. Sun Blade 2000 systems require the 2/02 version of the Solaris Operating Environment (Solaris 8, Update 7).

Introducing the Sun Blade 2000 20 Year Celebration Edition Workstations

The Sun Blade 2000 system is the latest addition to the Sun Blade family of workstations, and is a very close relative to the Sun Blade 1000 system. It is configured with up to two 900-MHz or 1050-MHz UltraSPARC III Cu processors, has a larger disk capacity (up to two 73-GB disks), and comes with a minimum of 1-GB RAM. The Sun Blade 2000 workstation is the first 1-GHz, 64-bit UNIX workstation.

In addition, Sun is celebrating 20 years of innovation with a limited edition 20 Year Celebration Edition Sun Blade 2000 workstation. At the time of the announcement, this is perhaps the highest performing workstation on the market. This "personal visualization system" comes fully configured with two 1050-MHz UltraSPARC III Cu processors, 8 GB of memory, and the newly announced Sun XVR-1000 graphics accelerator.

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 100	Sun Blade 1000	Sun Blade 2000
Placement	Economy Workstation	Value Workstation	Performance Workstation
CPU	One UltraSPARC-IIe with 256-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
Configured Processor Speeds	500 MHz	750 MHz 900 MHz	900 MHz 1050 MHz (limited avail.)
Memory Capacity	2 GB	8 GB	
Drive Capacity	Up to two 20 GB	Up to two 36 GB Standard 73 GB Optional	Up to two 73 GB Standard
Drive Type	EIDE	Fibre Channel	



Feature	Sun Blade 100	Sun Blade 1000	Sun Blade 2000
Graphics Supported	Sun PGX64, Sun Expert3D-Lite	Sun PGX64, Sun Creator3D, Sun Elite3D, Sun Expert3D, Sun Expert3D-Lite Sun XVR-1000	
Solaris Operating Environment Support	Solaris 8 (7/01) or newer	<ul style="list-style-type: none"> Solaris 8 (10/00) or newer recommended Solaris 8 (10/01) or later for systems using the UltraSPARC-II Cu processor 	Solaris 8 (2/02) or newer
OBP Revision	—	4.X or newer	4.5.X or newer

Key Messages

- The Sun Blade 1000/2000 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 configurations of the Sun Blade 2000 come with 900-MHz UltraSPARC III Cu processors. Configurations with the high-performance 1050-MHz processor module are available in limited quantities.
 - Standard configurations for the Sun Blade 1000 workstations come with one or two 750-MHz UltraSPARC III processors; upgrades to the 900-MHz UltraSPARC III Cu module are very affordable.
 - All Sun Blade 1000/2000 processors come with 8 MB of L2 cache.
 - 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 1000/2000 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 graphics is a low-cost option for those customers that only require 2D graphics. Up to four cards are supported in a single system.
 - Sun Expert3D graphics is Sun's high-end, hardware-accelerated, texture mapping option. Up to two graphics cards are supported.
 - Sun Expert3D-Lite provides texture-mapping acceleration at a bargain price. It is Sun's best price-performance graphics option.
 - Sun Creator3D graphics is Sun's low-end 3D graphics option.
 - 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.



- **The 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 1000 and 2000 workstations, but the system also maintains connectivity with 10 Mbps networking technology through an autosensing speed switch feature.
 - Advanced networking options include FDDI and 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 1000/2000 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

System	Expected Availability
Sun Blade 1000 workstation	Currently available
900-MHz configuration of the Sun Blade 2000 workstation	March 12, 2002
1050-MHz 20 Year Celebration Edition of the Sun Blade 2000 workstation	April 22, 2002

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 1000 and 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 1000 and 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 Expert3D graphics card, the Sun Blade 1000 and 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 Highlight
Digital Content Creation (DCC)	<ul style="list-style-type: none"> • 8-GB RAM to support large data sets • High floating point performance for complex compute rendering • Dual CPUs to handle simultaneous tasks
Electronic Design (EDA) <ul style="list-style-type: none"> • Chip designers, board designers • System houses • Telco 	<ul style="list-style-type: none"> • High-performance, full 64-bit processing • Large memory capacity • Availability of applications
Financial <ul style="list-style-type: none"> • Stock and commodity traders • Banks 	<ul style="list-style-type: none"> • High performance CPUs • Compact design • Multimedia capabilities • Multi-headed display capability
Mechanical Design (MCAD/MCAE) <ul style="list-style-type: none"> • Automotive • Aerospace • Defense industry • Mechanical equipment designers 	<ul style="list-style-type: none"> • High-performance, full 64-bit processing • High-end graphics performance and functionality • Availability of applications
Oil and Gas <ul style="list-style-type: none"> • 2D, 3D, and 4D seismic analysis • Production engineering • Reservoir engineering 	<ul style="list-style-type: none"> • 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
Publishing and Imaging <ul style="list-style-type: none"> • Newspapers • Magazines • Image banks • Advertising agencies 	<ul style="list-style-type: none"> • High-performance CPUs • High-end graphics performance and functionality for imaging operations • Dual graphics monitor capability
Research and Development <ul style="list-style-type: none"> • In-house development • Research institutions 	<ul style="list-style-type: none"> • High computing performance • Feature-rich Solaris Operating Environment
Software Development (CASE) <ul style="list-style-type: none"> • ISVs • In-house development at large organizations 	<ul style="list-style-type: none"> • High-performance Solaris Operating Environment • A full, 64-bit environment • Availability of applications • Multithreaded application development
Visualization and Simulation <ul style="list-style-type: none"> • Scientific visualization • Technical simulation 	<ul style="list-style-type: none"> • High-performance CPUs • tuned for high-end graphics performance and functionality • Sun Expert3D or Sun XVR-1000 graphics with high-end texture mapping • Multi-monitor capability



Selling Highlights

Compatibility

The Sun Blade™ 1000 and 2000 workstations run the Solaris™ 8 Operating Environment. They can also run 64-bit applications unmodified from the Solaris 7 Operating Environment, as well as 32-bit applications from previous versions of the Solaris Operating Environment making these systems compatible with previous systems and software. Sun Blade 1000 systems using the UltraSPARC III Cu processors require the 10/01 version of the Solaris Operating Environment or later. Sun Blade 2000 systems require the 2/02 version of the Solaris Operating Environment (Solaris 8, Update 7) or later.

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- 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 1000 or 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 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 and UltraSPARC III Cu Processors

The Sun Blade™ 1000 and 2000 workstations are shared-memory, multitasking systems built around the UltraSPARC™ III and 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 1000 workstation comes with 750-MHz UltraSPARC III processors, and supports the 900-MHz versions of the UltraSPARC III and UltraSPARC III Cu processors. The Sun Blade 2000 workstation comes with 900-MHz or 1050-MHz versions of the UltraSPARC III Cu processor.

- As a member of the UltraSPARC family of CPUs, full binary compatibility is provided.
- Modules have the 64-bit SPARC V9 architecture.
- Systems have up to 8 MB of Ecache per CPU.
- An on-chip memory controller is included for reduced latency.

I/O Interfaces

The Sun Blade 1000 and 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 1000 and 2000 workstations have four (Type A) USB connectors on the rear panel.

- **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 1000 and 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 1000 and 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 1000 and 2000 workstations.



System Architecture

Technology Overview

Sun Blade™ 1000 and 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 1000 and 2000 workstation board is shown in the figure below.

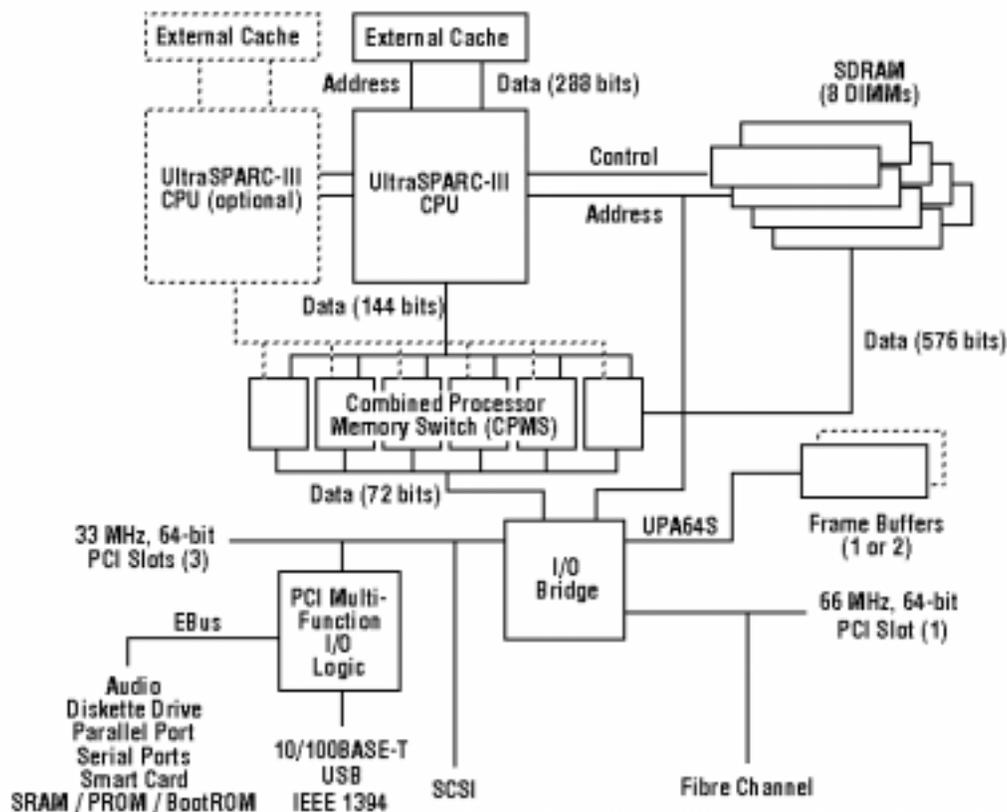


Figure 2. Architecture of the Sun Blade 1000 and 2000 system

The Sun Blade 1000 and 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 1000 and 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 1000 workstations use one or two 750-MHz UltraSPARC™ III processors, and supports an X-option upgrade to 900-MHz UltraSPARC III or UltraSPARC III Cu processors.
- Sun Blade 2000 workstations use one or two 900-MHz or 1050-MHz UltraSPARC III Cu processors.
- 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 1000 comes with one 36-GB FC-AL disk. 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 or nearly than 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 at mid-level prices with Sun Elite3D, Sun Expert3D, and Sun XVR-1000 graphics
- Fast Ethernet, 100BASE-T, autosensing, and autoswitching to 10BASE-T for backward compatibility in networking; advanced networking options include Gigabit Ethernet, ATM, token ring, and FDDI.

Processors in the Sun Blade 1000 and 2000 Workstations

Sun Blade 1000 and 2000 workstations are powered by up to two UltraSPARC III or UltraSPARC III Cu microprocessors with 8 MB of external cache. Binary compatible with all Sun SPARC™ processor-based systems, the UltraSPARC III and III Cu processors provide excellent integer and floating-point performance to address the needs of the most computationally demanding applications.

UltraSPARC III Processors

All the processors of the UltraSPARC III family share the same basic processor core characteristics. These processors are a high-performance, highly-integrated, superscalar processor. UltraSPARC III processors fully implement the 64-bit SPARC-V9 architecture, supporting a 64-bit virtual address space and a 43-bit physical address space. The core instruction set is extended to include new SIMD operations. The processors were designed to offer very high clock speeds as well as wide superscalar issue to exploit instruction-level parallelism. The processors offer large level-1 instruction and data caches, large flexible memory management units (MMUs), and support for a large external cache. The processors were designed to work in systems ranging from single processor workstations through cache-coherent servers with more than a thousand processors. For building a wide range of system configurations, the processors have built-in support for both snooping-based cache coherency and directory-based cache coherency. These processors have a number of important features:

- 8-MB cache, improved branch prediction, lower cache latency, and higher clock rates all combine to double (or more) the performance of the UltraSPARC-II CPU
- 6-way superscalar issue, no-stall, 14-stage pipeline
- Enhanced VIS™ instruction set with three additional instructions for high performance on multimedia and networking applications
- High-efficiency trap management



- Four-way associative on-chip 64-KB data and 32-KB instruction cache, with up to 8 MB of external L2 cache through integrated controller
- Integrated DRAM controller with support for up to 8 GB of memory can transfer data at up to 2.4 GB/sec.

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 1050-MHz 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 processor 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	900/1050 MHz
Can mix processor speeds?	Yes	No
Solaris Operating Environment Support	Solaris 8 (10/00) or newer recommended	Solaris 8 (10/01) or newer
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	533/610
SPECfp2000 (peak)	395/410	731/827

Notes:

- The UltraSPARC III benchmarks were performed with the Forte Developer 6 update 1 compiler on the Solaris 8 10/00 Operating Environment.
- The UltraSPARC III Cu benchmarks were performed with Forte Developer 7 EA compiler and the Solaris 8 10/01 Operating Environment

Note that UltraSPARC III Cu modules cannot be mixed with the UltraSPARC III modules. The 10/01 version of the Solaris Operating Environment is required for Sun Blade 1000 systems prior to installing the 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 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 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 1000 and 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 1000 workstations come with one or two 36-GB drives and the Sun Blade 2000 workstations comes 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 1000 and 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 1000 and 2000 workstation models provide standard 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 1000 and 2000 workstations have four USB connectors on the rear panel.

- **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 1000 and 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 1000 workstations mark the debut 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 1000 and 2000 workstations.

- **SCSI**

Sun Blade 1000 and 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 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	Option	2
Sun Elite3D m6 graphics	Option	Option	2
Sun Expert3D graphics	Option	Option	2
Sun Expert3D-Lite graphics	Standard configuration	Standard configuration	3
Sun XVR-1000 graphics	Option	Standard configuration	2

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.

Sun PGX64 Graphics

Sun PGX64 graphics is the next generation 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, XGL, XIL 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
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 100	on-board version	Yes	3	NA	NA
Sun Blade 1000	Yes	Yes	4	1 in 66-MHz slots; 3 in 33-MHz slots	1 or 2
Sun Blade 2000	Yes	Yes	4	1 in 66-MHz slots; 3 in 33-MHz slots	1 or 2

On the Sun Blade 1000 and 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 1000 and 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.

Sun Creator3D Graphics Series 3 Overview

Sun Creator3D graphics series 3 is the latest generation of the Sun Creator graphics family of accelerators. With one architecture it can accelerate and support diverse types of graphic needs ranging from 8-bit and 24-bit windowing to high-end 3D graphics.



Sun Creator graphics is designed as an integral part of Sun Blade and Sun Ultra workstations or Sun Enterprise servers and is, therefore, designed to take advantage of the UltraSPARC CPU performance increases to 300 MHz and beyond. The original generation of Sun Creator graphics has a single graphics/frame buffer clock for all on-board logic. This generation has one clock for the internal graphics processing and another clock for the frame buffer. This design makes it possible to drive each part at its maximum speed.

Key Messages

- **Solid graphics performance**

Sun Creator3D graphics performance is based upon the Sun Creator approach to designing graphics. In series 3, the Sun Creator graphics technology is enhanced, with up to 50 percent graphics performance improvement over series 1.

- UltraSPARC CPU

Sun Creator graphics relies on the power of the UltraSPARC CPU for floating point calculations, and on the visual instruction set (VIS software) to accelerate imaging-related operations. This eliminates the need for a dedicated graphics processor, and results in a significant cost advantage.

- Ultra port architecture (UPA) high-speed interconnect for graphics

UPA provides a high-speed, high-bandwidth interconnect between the CPU, Sun Creator graphics, and main memory. It raises overall graphics performance while maintaining a balanced throughput. Unlike the peripheral buses, such as SBus or PCI, the UPA interconnect ties Sun Creator graphics directly to the CPU and memory, and delivers greater bandwidth by orders of magnitude.

UPA also allows Sun Creator3D to utilize main system memory for texturing, allowing large texture mapping possibilities.

- Sun Creator-rendering ASIC (FBC2)

FBC2 ASIC renders graphic primitives at very high speeds. FBC2 accelerates fills, scrolling, text, lines, and polygon rendering.

- 3D-RAM graphics memory

This generation of the 3D-RAM breakthrough in graphic memory provides high-bandwidth and built-in acceleration for 3D graphics.

- **Scalable performance**

The performance of Sun Creator3D graphics takes advantage of general system performance enhancements and scales up with increases in CPU clock rate, making it unnecessary to upgrade graphics as new generations of CPUs become available.

- **More standard functionality**

All Sun Creator graphics products come standard with high resolution and 24-bit true color, as well as an 8-bit overlay plane. Sun Creator3D graphics supports 24-bit double buffering and a 28-bit Z-buffer. In addition, stereo output support is built-in. Sun Creator graphics established a new standard for workstation graphics functionality.

Sun Creator3D graphics series 3 also adds support for high-resolution monitors (up to 1920 x 1200) and hardware acceleration of color-space conversion during video playback.

Four 8-bit color maps for dynamic color-map segment allocation within the 8-bit color overlay plane and support for adjustable gamma correction give applications greater access to colors even in 8-bit mode and give the user the ability to color adjust (gamma correct) for optimal display quality.



- Fully compatible with existing APIs

Sun Creator graphics accelerates existing APIs, including OpenGL®, X11, XIL™, and XGL™ graphics libraries.

Sun Elite3D Graphics Overview

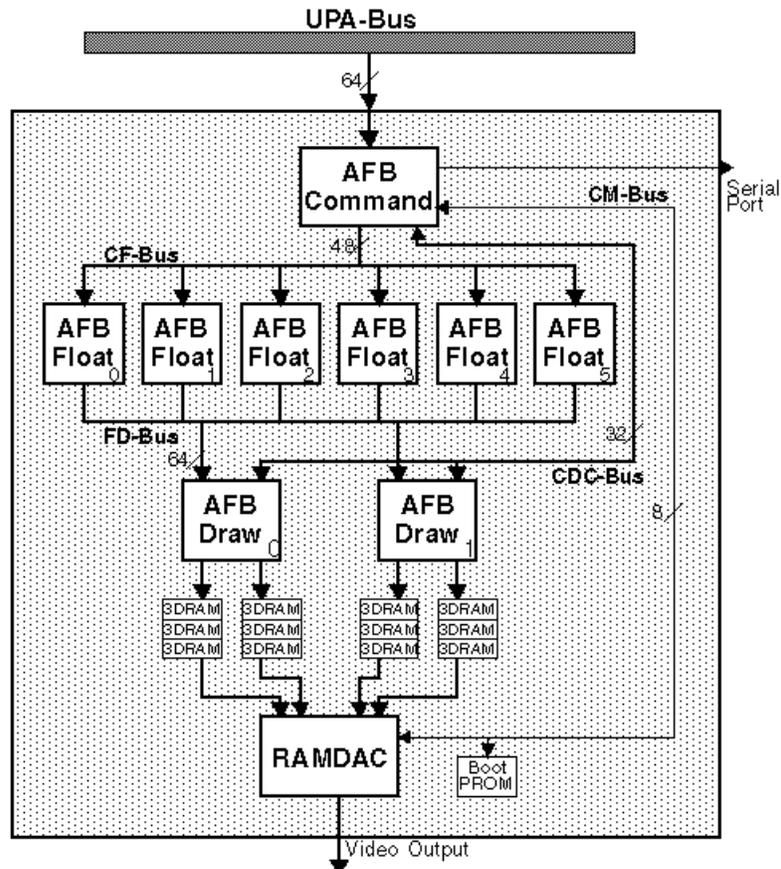


Figure 3. Sun Elite3D m6 graphics chip-level diagram

Sun Elite3D graphics greatly accelerates the rendering of 3D triangles, vectors, and texture maps over what is possible with Sun Creator or a raw CPU. It does this by adding specialized graphics floating-point units and more powerful pixel-drawing chips. It supports a 1280 x 1024 96-bit-deep frame buffer, configured the same as the double-buffered and Z-buffered Sun Creator3D graphics. The 96-bit pixels support two 24-bit color buffers, an 8-bit pseudo-color overlay buffer and a 28-bit Z buffer, plus some miscellaneous control planes.

Sun Elite3D graphics has a highly parallel and efficient graphics pipeline. The Sun Elite3D graphics architecture uses a new generation of 3D-RAM chip. This chip speeds up a read/modify/write pixel access from 160 ns to 10 ns, changing all of the rules about graphics pipeline behavior.

AFB-Command, at the interface level, is a superset of the Sun Creator ASIC chip. The additional functionality supports rendering of model space geometry. The main change is to allow the most important bits to be packaged up into single-header words that can be passed down with the geometric



data without stopping the pipeline. Additional functionality includes complete binary compatibility with the register set and functions of Sun Creator3D graphics and support for the OpenGL platform.

Given the technological changes brought on by 3D-RAM, the primary justification for the existence of a 3D graphics accelerator is to deliver an order of magnitude more floating-point performance than a contemporary general purpose RISC CPU, at a price less than that of a single CPU and cache.

Sun Elite3D systems are available in two models, the m3 and the m6. Both models are supported on the Sun Blade 1000 and 2000 workstations. Sun Elite3D m6 graphics provides a high level of performance with six high-performance, floating-point processors while Sun Elite3D m3 graphics reduces this number to three processors. Note that Sun Elite3D m3 graphics board has been discontinued and is no longer available for purchase.

The Sun Elite3D m6 graphics accelerator comes as part of some of the standard Sun Blade 1000 and 2000 configurations. It provides significantly higher levels of performance and functionality than the m3 model including:

- Standard 24-bit color, 1280 x 1024 resolution, MPEG playback acceleration at 30+ frames per second, greater than 4.7 million 2D vectors per second, greater than 8.2 million 3D vectors per second, over 5.9 million triangles per second, and on-board image acceleration functions.
- 88-bit planes, including full 24-bit double-buffer planes for smooth animation. A 28-bit Z-buffer is included to provide support for hidden surface removal and dynamic rendering of 3D objects.
- Support for a wide array of important graphics functions, including Bresenham lines; polygons; fonts; accelerated dots, lines, triangles, and quadrilaterals; antialiasing of dots and lines; Gouraud shaded triangles; specular lighting; hardware per-pixel depth cueing; transparency; texture map support; compressed 3D geometry decompression; viewport clipping; flexible blending operations; and a full set of Boolean operations.
- Sun/Mitsubishi developed 3D-RAM to improve 3D graphics rendering performance
- Exploits the high floating-point performance and VIS instruction set of the UltraSPARC III processor
- High speed RAMDAC can display 8-bit and 24-bit images simultaneously, and features a programmable video timing generator for multiple resolution support
- Completely compatible with existing Sun graphics APIs, including X11, XGL, and XIL graphics libraries. Also compatible with the OpenGL API, a vendor-neutral 2D and 3D graphics API In line with its philosophy of uninhibited expansion potential, the Sun Blade 1000 and 2000 workstations have two UPA64S slots to allow "dual-headed" (two monitor) Sun Elite3D graphics operation.

Sun Elite3D Graphics Features and Benefits

Features

- Integrated imaging
- Very high-performance, accelerated, 24-bit, double-buffered 3D graphics
- 28-bit Z-buffer
- 8-bit overlay plane
- Gouraud shading

Benefits

- Performs fast imaging and 3D on unified frame buffer
- Smooth animation and interactivity of 3D graphics
- Improves visual quality and depth accuracy
- Allows overlay of 8-bit windows on top of the 24-bit visuals without damaging the underlying visual, allowing virtually seamless integration and manipulation of windows
- Allows smooth shading of solid geometry



Features

- Acceleration for geometry decompression
- Alpha blending and screen door transparency
- Line and big dot antialiasing
- Per-pixel depth cueing
- Per-pixel alpha interpolation
- 4-bit stencil support with hardware acceleration of OpenGL API stencil functions
- Accelerated lighting
- Four 8-bit color maps
- Adjustable gamma correction
- NTSC/PAL video timing support
- Stereo 960 x 680 at 112 Hz supported with 21-inch monitor
- 1280 x 1024 at 76-Hz resolution standard
- Two serial-port connectors
- Dual-headed support: two Sun Elite3D m6 frame buffers and/or two Sun Creator3D frame buffers
- Sun™ OpenGL® for Solaris, XGL 3.0, XIL, X, and Java 3D™ API support
- Binary compatibility with Sun Creator graphics product family

Benefits

- Allows complex compress geometry to be decompressed at hardware rates
- Simulates transparent materials such as glass
- Needed in MCAD and visualization for better visual quality
- More accurate depth cueing or fog
- Variable transparency
- Enables hardware acceleration for OpenGL API
- More lights can be turned on for enhanced visual display without encountering large performance penalties
- Dynamic color map segment allocation when running 8-bit window systems should eliminate color flashing problems
- Allows users to gamma-correct visuals for enhanced visual quality
- Supports frame buffer to video timing
- With frame buffer, monitor, and window systems support for stereo, users can see better representation of 3D data
- High-resolution display quality
- For VR peripherals
- For users who need to be able to do multiple things simultaneously, such as command and control applications, 3D and video playback for animators, design and analysis for engineers, and so on
- A choice of APIs
- Interoperability with existing applications and users

Sun Expert3D Graphics Overview

The Sun Blade 1000 and 2000 workstation configurations with Sun Expert3D graphics offer a high-performance graphics adapter with on-board texture mapping memory. This PCI graphics adapter provides an outstanding and affordable high-performance graphics solution for demanding 2D and 3D graphics applications that specifically require hardware-based texture mapping acceleration.



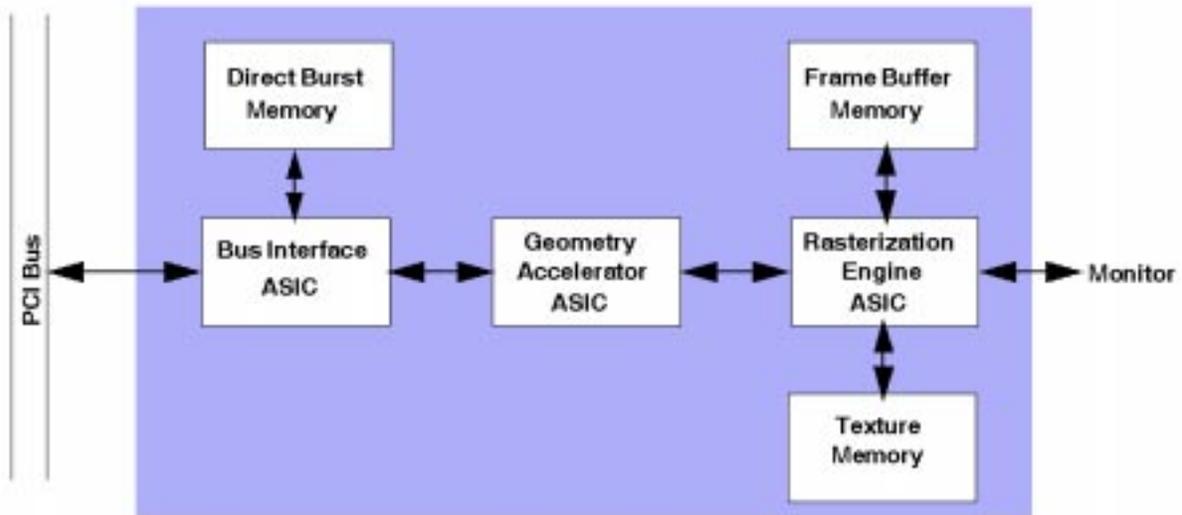


Figure 4. Sun Expert3D graphics schematic

For demanding applications in geothermal, high-end MCAD, digital content creation, visualization and simulation — where hardware-based texture mapping is essential — the Sun Blade 1000 and 2000 workstations support the Sun Expert3D graphics accelerator. Sun Expert3D graphics presents a high-performance, affordable solution with the following features:

- 128 MB total on-board memory with 64 MB for accelerated texture-mapping performance for acceleration of complex 2D and 3D textures
- True-color 3D double and Z-buffering at very high resolutions for large screen HDTV monitor support as well as stereo-mode graphics for enhanced realism at high resolutions.
- On-board geometry accelerator delivers up to six million triangles per second with up to 3.2 Gigaflops of floating point performance.
- On-board rasterization engine performs triangle setup, texture processing, and pixel operations at up to 143 Mpixels per second fill rate.
- Compatibility with Sun's graphics APIs including the Sun OpenGL for Solaris API version 1.1.2 or later and Java 3D API. The Sun Expert3D accelerator can be installed in one of the Sun Blade 1000 and 2000 workstations' PCI slots and up to two Sun Expert3D accelerators can be installed per system.

Other features of the Sun Expert3D frame buffer include double-buffering/Z-buffering (3D) support at super high resolutions of 1920 x 1200, stereo-video mode support at 1280 x 1024, and hardware support for 3D SuperScene antialiasing.

The Sun Expert3D frame buffer is ideal for Sun customers and resellers in the technical marketplace. The Sun Blade 1000 and 2000 workstation configurations with Sun Expert3D graphics are especially appropriate for customers working with CAD wire-frame models or highly textured seismic data, such as in the oil and gas industry.

Sun Expert3D Graphics Features and Benefits

Features	Benefits
<ul style="list-style-type: none">• On-board 64-MB texture-mapping memory• On-board 64-MB frame-buffer memory• Supports double-buffering and Z-buffering at up to 1920 x 1200 resolution• Supports stereo mode graphics at 1280 x 1024 resolution• Supports SuperScene antialiasing• Graphics framelock support	<ul style="list-style-type: none">• Accelerates applications requiring texture maps• Provides support for 24-bit truecolor 2D and 3D up to 1920 x 1200, supporting Sun's 24-inch display• Allows customers to use large-screen monitors including Sun's 24-inch monitor to display their 2D and 3D data• Allows customers to display 3D data in stereo mode at higher resolutions, providing enhanced realism for immersive applications• Improves rendered image quality• Enables multiple graphics frame buffers to be used in a single or multiple systems to render to very high-screen resolutions

Up to two Sun Expert3D cards can be installed in the Sun Blade 1000 and 2000 workstations. Implemented as a full-length PCI graphics card, Sun Expert3D graphics features internal I/O ports for multi-viewing and external I/O ports for external video synchronization and stereo capabilities. Connecting these multi-viewing ports together, allows frame locking and rate locking of multiple Sun Expert3D cards in a single workstation in order to display synchronous multiscreen applications.

Sun Expert3D-Lite Graphics

Sun Expert3D-Lite graphics is a derivative product based on the Sun Expert3D graphics board. Sun Expert3D-Lite graphics offers many of the same features as its predecessor, but at a lower cost. Features include on-board 3D geometry acceleration, hardware-based texture mapping, and high-resolution 24-bit, 3D support for all of Sun's PCI-based workstations.

Sun Expert3D-Lite graphics accelerates 3D geometry at up to 4 million triangles/second and provides up to three times the texture mapping performance of Sun Elite3D m3 graphics, at a much lower price.

Sun Expert3D-Lite graphics is a single, full-length, 64-bit PCI board. It is a 66-MHz card, and operates at 66 MHz when plugged into a 66 MHz-capable slot and at 33 MHz when plugged into a 33-MHz slot.

Key Features and Benefits

Features	Benefits
<ul style="list-style-type: none">• High-performance 3D graphics and texture mapping performance at an affordable entry-level cost — provides great geometry performance of up to 4 million tris/sec. with up to 88 Mpixels/sec. of texture fill rate	<ul style="list-style-type: none">• Aggressive price/performance allows users to capitalize on 3D application functionality in a cost-effective manner



Features

Benefits

- High resolution 24-bit 3D double-buffering with 32-bit Z-buffer, up to 1920 x 1080 HDTV (16:9 aspect ratio) resolution
- Hardware-accelerated texture mapping with 16 MB of dedicated on-board texture memory
- Stereoscopic graphics support at 960 x 680, 1152 x 900, and 1280 x 800 resolutions
- Support for up to four Sun Expert3D-Lite boards in a single system (depending on system)
- 32-bit Z-buffer at all supported resolutions
- Full acceleration support of Sun™ OpenGL® for Solaris and Java 3D™ APIs
- Supports 24-bit, 2D and 3D graphics on all of Sun's displays including the 24-inch color monitor. With the 24-inch monitor, users can display many applications windows with little or no overlap
- Provides high-performance for texture mapping operations
- Large texture storage accelerates complex 2D and 3D texturing
- No trade-offs between resolution support and texture storage capabilities
- Allows customers to use stereoscopic viewing for immersive applications, which enhances data comprehension
- Enables applications to take advantage of more screen real estate
- Provides high level of three-dimensional accuracy, helping to eliminate anomalies such as the flickering of objects when moving around a 3D image
- Applications automatically receive performance benefits of these APIs. Single application binary for Sun graphics options

Sun Expert3D-Lite Graphics Specifications

- On-board geometry accelerator ASIC performs transform, clipping, and lighting
- On-board rasterization ASIC performs 2D/3D rasterization, 2D/3D texturing, pixel transfers, imaging and fragment processing
- High-resolution DAC with 10-bit RGB analog video at dot rates up to 350 MHz.
- Memory
 - 8-MB direct burst memory
 - 16-MB dedicated texture memory
 - 32-MB dedicated frame buffer memory
- Standard HD15 video connector with support for Composite and Separate sync provides support for a DDC link for monitor query and control.
- VESA Standard 3-pin mini-DIN stereo connector



Display Resolutions

Sun Expert3D-Lite graphics supports the following resolutions.

Display Resolution	Vertical Refresh Rate	Sync Standard	Aspect Ratio Format
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 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	NTSC

Sun Expert3D-Lite and Sun Expert3D Graphics Comparison

Feature	Sun Expert3D-Lite	Sun Expert3D
Maximum 3D resolution	1920 x 1080	1920 x 1200
Maximum 3D stereo resolution	1280 x 800	1280 x 1024
Total board memory	48 MB	128 MB
Frame buffer memory	32 MB	64 MB
Texture memory	16 MB	64 MB
Geometry acceleration	4 M tris/sec.	6 M tris/sec.
Max. texture fill rate	88 Mpixels/sec.	110 Mpixels/sec.
Superscene antialiasing support	No	Yes
Frame lock sync	No	Yes
Multiview (syncing for stereo)	No	Yes
Display connector	HD15	13W3



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 OpenGL 1.2.

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 an option for the Ultra 60, Ultra 80, Sun Blade 1000, and 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



Display Resolution	Vertical Refresh Rate	Sync Standard	Aspect Ratio	13W3	S-Video	HD15	DVi-D	Samples	Dual
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.

Graphics Comparison Summary

The table below provides a feature comparison for Sun's graphics boards.

Feature	Sun PGX64	Sun Creator3D	Sun Elite3D m6	Sun Expert3D	Sun Expert3D-Lite	Sun XVR-1000
Bus	PCI 32 bit, 33 MHz 64 bit, 66 MHz	UPA	UPA	PCI 64 bit, 66 MHz	PCI 64 bit, 66 MHz	UPA
Max. 2D resolution	1920 x 1200	1920 x 1200	1280 x 1024	1920 x 1200	1920 x 1080	1920 x 1200
Max. 3D resolution	—	1280 x 1024	1280 x 1024	1920 x 1200	1920 x 1080	1920 x 1200
Stereo resolution	not supported	<ul style="list-style-type: none"> 960 x 680 @ 112 Hz 	<ul style="list-style-type: none"> 960 x 680 @ 108, 112 Hz 	<ul style="list-style-type: none"> 1280 x 1024 @ 112 Hz 960 x 680 @ 108, 112 Hz 	<ul style="list-style-type: none"> 1280 x 800 @ 112 Hz 1152 x 900 @ 120 Hz 960 x 680 @ 108, 112 Hz 	<ul style="list-style-type: none"> 1280 x 1024 @ 96-112 Hz 1280 x 800 @ 112 Hz 1152 x 900 @ 120 Hz 960 x 680 @ 108, 112 Hz
Memory type	SGRAM	3D-RAM	3D-RAM	SDRAM	SDRAM	DRDRAM
Frame buffer memory	8 MB	15 MB	15 MB	64 MB	32 MB	72 MB
On-board texture memory	—	System memory	16 x 16 texel cache	64 MB	16 MB	256 MB
Geometry performance (tris/sec.)	—	1.5 M	5.9 M	6.0 M	4.1 M	19.1 M



Feature	Sun PGX64	Sun Creator3D	Sun Elite3D m6	Sun Expert3D	Sun Expert3D-Lite	Sun XVR-1000
Texture fill rate (pix/sec.)	—	Host bound	56 M	118 M	88 M	157 M
APIs supported (software interfaces)	OpenGL, XGL™, XIL™, Xlib, Java 3D™			OpenGL, Xlib, Java 3D (XIL via X-shared memory only)		OpenGL, Java 3D

750-MHz Sun Blade 1000 Workstation Graphics Benchmarks

Benchmarks	Sun PGX64	Sun Creator3D	Sun Expert3D-Lite	Sun Elite3D m6	Sun Expert3D
Xmark93	16.9	42.2	24.2	44.5	27.9
2D Vectors per sec.	558 K	4.9 M	6.8M	5.8 M	7.9 M
3D Performance					
• 3D vectors/sec.	—	3.7 M	8.1 M	8.8 M	10.5 M
• 3D tris/sec.	—	1.5 M	4.1 M	5.8 M	6.0 M
• 3D quads/sec.	—	698 K	2.0 M	2.1 M	2.7 M
• 3D texture fill pixels/sec.	—	11 M	88 M	56 M	118 M
ViewPerf 6.1.1					
• ProCDRS-02	—	10.3	22.9	23.3	28.7
• DX-05	—	16.5	37.2	32.3	38.9
• AWadvs-03	—	17.1	51.9	21.4	61.8
ViewPerf 6.1.2					
• ProCDRS-03	—	5.7	13.6	12.2	17.3
• DX-06	—	5.1	12.5	10.0	12.9
• AWadvs-04	—	16.6	43.9	18.5	55.3

Note: Configuration for timing includes the Solaris™ 8 Operating Environment and OpenGL 1.2.1 performance data collected in December 2000. Performance data is subject to change. See Sun's web site at <http://www.sun.com/desktop/> for latest performance numbers.



900-MHz Sun Blade 2000 Workstation Graphics Benchmarks

Benchmarks	Sun PGX64	Sun Creator3D	Sun Expert3D-Lite	Sun Elite3D m6	Sun Expert3D	Sun XVR-1000
Xmark93	16.9	44.7	26.0	47.9	29.8	—
2D Vectors per sec.	558 K	4.9 M	6.8M	6.1 M	7.9 M	—
3D Performance						
• 3D vectors/sec.	—	3.7 M	8.1 M	8.8 M	10.5 M	11.1 M
• 3D tris/sec.	—	1.5 M	4.1 M	5.9 M	6.0 M	19.1 M
• 3D quads/sec.	—	698 K	2.0 M	2.1 M	2.7 M	5.6 M
• 3D texture fill pixels/sec.	—	13 M	88 M	56 M	118 M	157 M
ViewPerf 6.1.1						
• ProCDRS-02	—	10.8	22.9	24.1	29.2	—
• DX-05	—	17.6	37.3	34.8	39.0	—
• AWadvS-03	—	19.6	55.1	23.4	65.1	—
ViewPerf 6.1.2						
• ProCDRS-03	—	6.0	13.6	12.6	17.2	38.47
• DX-06	—	5.4	12.5	10.6	12.8	15.91
• AWadvS-04	—	18.9	44.0	20.6	55.2	58.25

Note: Configuration for timing includes the Solaris™ 8 Operating Environment and OpenGL 1.2.1 performance data collected in January 2002. 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.
- Sun Elite3D m6 graphics utilize a connector for stereo viewing synchronization, a 7-pin mini-DIN style of connector. (StereoGraphics Corporations sells a cable adapter for connecting the old and new styles of connectors. It can be ordered from them using the part number ESUN.)



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)	900 or 1050 MHz
• 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-MB, and 1-GB SDRAM
I/O Interfaces		
• UltraSCSI	68-pin Ultra Wide SCSI (40 MB/sec.)	
• Serial ports	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 <ul style="list-style-type: none"> Graphics supported in PCI slots Graphics supported in UPA slots Monitors supported Digital media 	<p>Sun PGX64, Sun Expert3D, Sun Expert3D-Lite</p> <p>Sun Creator3D, Sun Elite3D m6, Sun XVR-1000</p> <p>All Sun monitors since 1996, including 17-, 19-, 21-, and 24-inch color monitors; 18-inch flat panel</p> <p>Sun 1394 Visual Collaboration Kit</p>	
Networking Ports	10/100BASE-T autosensing Fast Ethernet	
Internal Storage <ul style="list-style-type: none"> Disks <p>Three front-access, removable media bays:</p> <ul style="list-style-type: none"> One 5.25 x 1.6 inch One 3.5 x 1.0 inch One bay that accommodates a device of either size 	<p>Up to two 10000-rpm, FC-AL disks 18- or 36-GB disks standard 73-GB disks optional</p> <p>1.4-MB triple-density manual-eject floppy 4-mm tape drive (opt.) 10X DVD-ROM (opt.) Smart card reader standard</p>	<p>Up to two 73-GB, 10000-rpm, FC-AL disks standard (total maximum = 146 GB)</p> <p>1.4-MB triple-density manual-eject floppy 4-mm tape drive (opt.) 10X DVD-ROM (opt.) Smart card reader standard</p>
External Storage <ul style="list-style-type: none"> Tape/optical Disk, via FC-AL interface 	<p>Automated tape products Sun StorEdge™ UniPack and MultiPack systems</p> <p>FC-AL MultiPack</p>	
Solaris™ Operating Environment Support	<ul style="list-style-type: none"> For UltraSPARC III modules: Solaris™ 8 (10/00); plus patches For UltraSPARC III Cu modules: Solaris 8 (10/01) or later 	Solaris 8 (2/02) or later
Input Devices <ul style="list-style-type: none"> USB keyboard USB mouse Microphone 	<p>Sun Type 6 (USB interface). Third-party USB keyboards are not supported</p> <p>Opto-mechanical, 3-button SunMicrophone™ II</p>	



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

Some Sun Blade™ 1000 and 2000 configurations are compliant with Energy Star specifications under the Solaris™ 8 Operating Environment and meet EPA guidelines *without* check-pointing and restoring the system. An innovative approach to power management enables Sun Blade 1000 and 2000 workstations to remain network-aware — even in low-power mode.

Note: *All Sun Blade 1000 and 2000 standard and random configurations 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.*

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

Advanced Power Management

Sun Blade 1000 and 2000 workstations come equipped with a single 670-Watt power supply providing all the power needed for internal expansion options. With Sun Blade 1000 and 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 Operating Environment. Power management software on Sun Blade 1000 and 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 1000 and 2000 workstations remain network-aware, even when running in low-power mode.

To support this power management model, the various subsystems within Sun Blade 1000 and 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 Sun Creator3D graphics. This includes models with up to two CPUs and 8-GB RAM. Any other graphics option ordered with Sun Blade 1000 and 2000 workstations does not currently conform to Energy Star guidelines.*



Reliability, Availability, and Serviceability (RAS)

Reliability

The Sun Blade™ 1000 and 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 1000 and 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 BootPROM
- 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 help 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

The Sun Blade™ 1000 workstations run Solaris™ 8 Operating Environment (Hardware: 10/00) or later versions. Sun Blade 1000 systems with UltraSPARC™ III Cu processors require the 10/01 version or later. Sun Blade 2000 systems run the 2/02 version of the Solaris Operating Environment (Solaris 8, Update 7) or later.

Recommended Patches for the Sun Blade 1000 Workstation

For optimal performance and reliability of Sun Blade 1000 systems, Update 6 (10/01) of the Solaris 8 Operating Environment or later is strongly recommended. If earlier versions of the Operating Environment are being used, Sun recommends that the following patches for the Sun Blade 1000 workstation be installed. Note, if Solaris (10/01) or later is installed, no patches are required.

The recommended patches for the Sun Blade 1000 workstation are listed below.

- 108528-09 or later
- 109882-04 or later
- 109888-05 or later (see Note 1)
- 110383-01 or later
- 110460-03 or later (see Note 2)
- 110723-02 or later
- 110800-01 or later
- 111228-01 or later
- 111292-03 or later
- 111293-03 or later

Note 1: Patch must be installed if Solaris 8 Update 3 (1/01) is installed. Solaris 8 Update 4 (4/01) or later does not require patch.

Note 2: Patch must be installed if Solaris 8 Update 2 (10/00) is installed. Solaris 8 update 3 (1/01) or later does not require patch.

Customers should consult a Sun Enterprise Field Service Representative about the appropriate Field Information Notice (FIN). The patches noted are the minimum level required for the Sun Blade 1000 system. Customers should also periodically check for the latest available patch revisions on SunSolve. To check for the most up-to-date recommended patch matrix, it is necessary to refer to the FIN document.

System Administration

Sun Blade 1000 and 2000 workstations deliver the power and graphics needed by the customers who use heavy compute-intensive applications. Customers who run these compute-intensive applications 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 supplements the systems management features in the Solaris 8 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.



Solstice AdminTools™ Software

Solstice AdminTools™ software is a set of GUI-based administration tools that have been shipping since the Solaris 2.2 Operating Environment release and can be used to provide local systems administration. Solstice AdminTools software can be used to manage user accounts, groups, hosts, printers, serial ports, and installation/removal of software.

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.

Solstice Enterprise Agents™ Software

Solstice Enterprise Agents™ software allows the workstation to be managed from simple network management protocol (SNMP)-based system/network management tools. Solstice Enterprise Agents software is based on the extensible agent technology or manager/subagent technology. The Manager agents receive and respond to SNMP or desktop management interface (DMI) requests. After retrieving the appropriate values from the respective subagents, responses are sent. The subagents manage information bases (MIBs or MIFs) designed for specific components and applications.

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 8 Operating Environment

Sun Blade 1000 systems are supported by the Solaris 8 Operating Environment (Hardware: 10/00). Sun Blade 1000 systems require an upgrade to the 10/01 version prior to module upgrades to the UltraSPARC III Cu processors. Sun Blade 2000 systems require the 2/02 version of the Solaris Operating Environment (Solaris 8, Update 7) or later.

The Solaris 8 Operating Environment is the latest release of one of the industry's leading enterprise operating environments. The Solaris 8 Operating Environment contains the complete functionality required for all supported Sun Workstation™ systems. The Solaris 8 Operating Environment is a solid, scalable 64-bit operating environment that also supports 32-bit applications.

The Solaris 8 Operating Environment includes:

- Reliable, Internet-ready operating environment for 32- and 64-bit SPARC™ processor-based platforms and Intel 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, the customer must first upgrade to the 10/01 version of the Solaris Operating Environment (Solaris 8, Update 6) or later.*

Features and Benefits

The Solaris 8 Operating Environment continues the tradition of reliability, availability, and scalability (RAS) of the earlier operating environment releases, including features IPv6/IPsec/Mobile IP, realtime application support, filesystem logging, and remote console.

Existing applications that adhere to the Solaris application binary interface (ABI) runs unmodified with Solaris 8 software on both SPARC processor-based platforms and Intel platforms. In addition, Sun provides an easy-to-use AppCert testing tool for developers, so they can verify existing Solaris application binaries and report on any potential incompatibilities.



Features

Benefits

- Desktop management and productivity tools
 - Advanced networking features
 - Bundled software
 - Enhancements to the Common Desktop Environment (CDE)
 - Improved system error messages, system debugging capabilities, and remote console capability
 - File system logging
 - Live Upgrade
- Helps increase productivity with intuitive desktop, printer, PDA sync, HotKey, and CDE 1.4 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.
 - Support for IPv6 in the Solaris 8 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.
 - Includes Oracle 8i Enterprise Edition, `lxrun` for Linux application compatibility (for Solaris on Intel), Apache Webserver, Netscape™ Communicator, i-Planet 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.
 - Provides workstation users with an easy-to-use, open, secure platform. CDE features 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.
 - Allows the customer to apply scarce system expertise remotely across the enterprise.
 - Logging file system features and parallel SCSI probes help make rebooting faster.
 - Allows Solaris 8 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 Solaris 8 Operating Environment to take control. Since Live Upgrade includes a version migration and fallback feature, the customer can also fallback to the previous release — through a simple reboot — without losing administration information.



Features	Benefits
<ul style="list-style-type: none"> • Real-time video creation and broadcast support 	<ul style="list-style-type: none"> • 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.
<ul style="list-style-type: none"> • 100 percent binary compatibility 	<ul style="list-style-type: none"> • Software investment protection — all of today's Solaris Operating Environment-certified 32-bit applications continue to run on Solaris 8 Operating Environment without modification
<ul style="list-style-type: none"> • Reliability, availability, and serviceability (RAS) 	<ul style="list-style-type: none"> • Less downtime, more productivity, and faster project completion
<ul style="list-style-type: none"> • 64-bit computing 	<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 64-bit compilers 	<ul style="list-style-type: none"> • Quickly develop and certify 64-bit applications for SPARC and IA-64 processors using Solaris Operating Environment APIs, 64-bit C/C++ and FORTRAN compilers, and ABI certification tools
<ul style="list-style-type: none"> • Java 2 SDK 	<ul style="list-style-type: none"> • Provides a high-performance, scalable Java virtual machine • Offers improved memory management, optimized JIT compiler and faster Java thread synchronization
<ul style="list-style-type: none"> • IPv6/IPsec/Mobile IP 	<ul style="list-style-type: none"> • 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.
<ul style="list-style-type: none"> • Scale from 1 to 512 processors per node 	<ul style="list-style-type: none"> • 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.
<ul style="list-style-type: none"> • LDAP directory services 	<ul style="list-style-type: none"> • High-speed, enterprise-class directory service, using the Solaris 8 Operating Environment LDAP client and the iPlanet™ Directory Server, supports complex, data intensive network applications. Includes Microsoft Active Directory support.
<ul style="list-style-type: none"> • System management tools 	<ul style="list-style-type: none"> • Helps reduce the time spent on system administration duties using Web-based wizards and Java technology-powered graphical interfaces.
<ul style="list-style-type: none"> • Extended device and support 	<ul style="list-style-type: none"> • I/O Connect with Sun, using the customer's favorite devices, including DVD, ZIP and JAZ drives, and USB, 1394, SCSI, UPA, and PCI buses.
<ul style="list-style-type: none"> • Internationalization 	<ul style="list-style-type: none"> • The Solaris 8 Operating Environment is a comprehensive global product that supports 37 languages and over 90 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.



Features	Benefits
<ul style="list-style-type: none"> • X11R6.4 • Real Time application • Enhanced security features 	<ul style="list-style-type: none"> • Runs X applications in a browser and provides single logical screen across multiple display devices • 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. • 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 8, Update 7

The latest update of the Solaris 8 Operating Environment is Solaris 8, Update 7 or Solaris 2/02. The following features are new in this update.

Feature	Benefit
<ul style="list-style-type: none"> • Solaris Web Start Program enhancements 	<ul style="list-style-type: none"> • Users can now perform the following functions during installation or upgrade: <ul style="list-style-type: none"> – Automatically reboot the system after installation. – Automatically eject the CD or DVD after installation. – Select to preserve file systems. – Customize fdisk partitions (Intel platform only). – Automated installations can now use sysidcfg file
<ul style="list-style-type: none"> • Support for the new Chinese GB18030 locale encoding 	<ul style="list-style-type: none"> • Customers can input, print, and display the latest 32-bit Chinese characters • Backward compatibility to previous Chinese codesets (GBK and GB2312) • Conversion to other codesets such as Unicode.
<ul style="list-style-type: none"> • Enhancements to the optional alternative multithreading libraries 	<ul style="list-style-type: none"> • The Solaris 8 2/02 release includes an improved alternative multithreaded library that provides better performance
<ul style="list-style-type: none"> • Two new options to Xsun server to allow it to run as a display-only device 	<ul style="list-style-type: none"> • Customers can run Solaris window manager in display-only mode without the need for a mouse or a keyboard
<ul style="list-style-type: none"> • The Locator Command 	<ul style="list-style-type: none"> • Customers can quickly identify a system among a large number of systems by using the new locator command to illuminate the locator LED on some new UltraSPARC systems (SPARC platform only)
<ul style="list-style-type: none"> • Netra X1 platform support 	<ul style="list-style-type: none"> • Solaris 8 2/02 now includes integrated support for the Netra X1 system, making it easier to install and maintain these systems (SPARC platform only)



Feature	Benefit
<ul style="list-style-type: none"> CPR for Sun Blade 100, 1000, and 2000 workstations 	<ul style="list-style-type: none"> Allows users to suspend a system to save power or power off temporarily for transport (SPARC platform only)
<ul style="list-style-type: none"> LTO/Ultrium tape driver support 	<ul style="list-style-type: none"> The Solaris 8 2/02 release provides support for major linear tape open (LTO) tape drives (SPARC platform only)
<ul style="list-style-type: none"> 14 new and 7 updated Open Source packages 	<ul style="list-style-type: none"> Provides the benefits of Open Source operating systems, such as Linux, while continuing to provide datacenter quality stability and scalability
<ul style="list-style-type: none"> Solaris media kit contents extended to include the iPlanet Integration Server, EAI Edition 	<ul style="list-style-type: none"> Allows legacy applications to be turned into web services by providing SOAP, WSDL, XML, and UDDI interfaces; limited licensing for evaluation and development only (SPARC platform only) Customers who are moving their information services to the services-on-demand model can preserve their existing software applications investment by utilizing the capabilities of the iPlanet Integration Server, EAI Edition

Graphics Software Interfaces

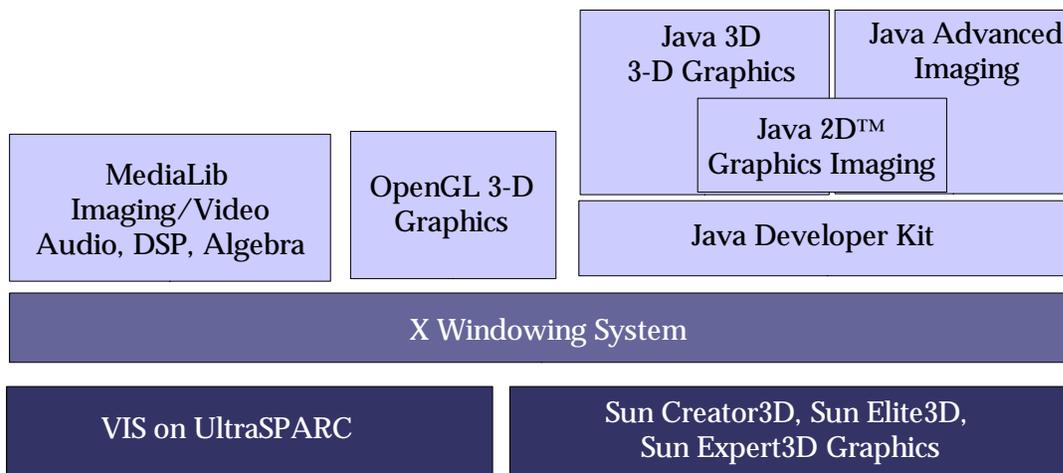


Figure 5. Graphics software interfaces

The Sun Blade 1000 and 2000 systems support all Solaris 8 Operating Environment graphics and window system APIs, including OpenGL® and Display PostScript™. A large number of Sun and third-party graphics APIs are also supported, including IRIS GL, OpenGL, GKS, HOOPS, and Java 3D™ software. Industry-standard X-extension libraries, such as Xlib and PEXlib, are available.



The Solaris Operating Environment System Requirements

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

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 8 Operating Environment available to everyone who accepts the terms of the Solaris 8 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 capacity of eight or fewer processors; 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 systems of 8 or fewer CPUs for customers who accept the terms of the Solaris 8 Binary Code License and the free Solaris Binary License Program
- Solaris 8 Operating Environment software is provided via the Solaris 8 Media Kit available for purchase on-line at <http://www.sun.com/solaris/binaries>
- Single Solaris Media Kit can be used to install multiple systems
- Solaris Media Kit contains additional bundled software
 - Solaris Supplemental CD of bundled user and system management tools
 - Oracle 8i Enterprise Edition (with development license)
 - StarOffice 5.2 productivity suite
 - Solaris Software Companion CD of popular freeware
 - iPlanet Advantage Software (with development licenses)

Sun™ OpenGL® for Solaris™ 1.2.3 Software

Sun™ OpenGL® for Solaris™ 1.2.3 software provides a powerful 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 Ultra family of graphics workstations at a compelling price-to-performance ratio.

Sun OpenGL for Solaris software 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 texture mapping, NURBS, fog, alpha blending, and motion blur. Sun OpenGL for Solaris software works in both immediate and non-editable display-list modes.

Using the Xinerama X window extension available in Solaris 7 or 8 Operating Environment (release 11/99 or later), users can configure their systems to utilize multiple frame buffers as one large, super-high resolution, virtual display. Sun OpenGL for Solaris software allows existing OpenGL API-based applications to run virtually without change in a multi-screen Xinerama environment.

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 1.2 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 PGX64, Sun Creator, Sun Creator3D, Sun Elite3D, Sun Expert3D, Sun Expert3D-Lite, and Sun XVR-1000 graphics products. It is also compatible with legacy SPARCstation™ systems equipped with GZ, ZX, PGX, PGX24, and PGX32 frame buffers.

Features and Benefits

Sun OpenGL for Solaris software provides the following features:

Features	Benefits
<ul style="list-style-type: none">• Multiscreen rendering for super-high resolution 3D visualization (Xinerama)	<ul style="list-style-type: none">• Users no longer need to rewrite their 3D applications to take advantage of the multiple screens
<ul style="list-style-type: none">• 64-bit OpenGL library support	<ul style="list-style-type: none">• Allows OpenGL applications to take advantage of the full 64-bit addressing in the Solaris Operating Environment
<ul style="list-style-type: none">• Additional interface imaging and 3D texturing<ul style="list-style-type: none">– Texture level of detail control– BGRA and packed-pixel formats– Texture specular color– Texture edge clamping– Constant texture data extension	<ul style="list-style-type: none">• Offers a more portable interface for imaging operation during 3D texture mapping<ul style="list-style-type: none">– Offers better texture memory utilization– Supports more file- and hardware-data types– Allows more realistic lighting effects with texturing– Avoids blending border and image texels during texturing– Helps reduce texture mapping memory utilization and loading time
<ul style="list-style-type: none">• General performance improvements<ul style="list-style-type: none">– Improved drivers	<ul style="list-style-type: none">– Helps enable better performance for all supported graphics cards; in particular, there has been some substantial performance gains for Sun Elite3D frame buffers — for some applications over 100 percent



Features	Benefits
<ul style="list-style-type: none"> – Occlusion culling test extension 	<ul style="list-style-type: none"> – Enables applications to trivially reject occluded objects in a scene, resulting in big improvements in interactive rendering performance for visualization of large models
<ul style="list-style-type: none"> • Additional extensions <ul style="list-style-type: none"> – Triangle list primitive – Vertex extension – Global alpha extension 	<ul style="list-style-type: none"> – Allows multiple triangle strips or fans to be specified within a single <code>glBegin glEnd</code> pair; improves performance – Allows applications to specify all vertex data (color, normal, coordinates, and so on) in a single function call; saves function call overhead – Allows applications to specify an alpha component which can be applied globally to all primitives; useful for cases where many vertices share the same alpha value because the application does not have to send an alpha component for each vertex

Sun OpenGL for Solaris Software Tech Facts

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

Feature	Requirements
Platforms	UltraSPARC™ and SPARC processor-based systems using Sun Elite3D, Sun Creator, Sun Creator3D, Sun Expert3D, Sun Expert3D-Lite, Sun XVR-1000, GZ, ZX, PGX™, PGX24, and PGX32 frame buffers
Operating environments supported	Solaris 2.6, 7, 8, or later Note: Multi-display Xinerama support requires Solaris 7 Operating Environment (11/99 or later) or later.
Recommended patches	
<ul style="list-style-type: none"> • Using PGX graphics on an Ultra™ 5 or 10 workstation 	Solaris 2.6: patch 105362-19 (or later)
<ul style="list-style-type: none"> • Using Sun Elite3D graphics 	Solaris 2.6: patch 105362-19 (or later) Solaris 7: patches 106148-03 and 106144-05 (or later)
Window system supported	CDE or OpenWindows™
Disk space	
<ul style="list-style-type: none"> • For end-user runtimes 	32 MB for 32 bit; 55-MB for 64 bit
<ul style="list-style-type: none"> • For ISV developers (total to build examples) 	54 MB for 32 bit; 77 MB for 64 bit
Memory	64 MB minimum with 128 MB or more recommended



Ordering Information

Sun Blade™ 1000 Workstation Part Numbers

Part Number	Description
A28UNF1-9C-D1024JB	Entry-level Sun Blade™ 1000 workstation with one 750-MHz UltraSPARC™ III processor with 8-MB cache, Sun™ PGX64 graphics, 1-GB memory, 36-GB 10000-rpm FC-AL internal disk, 10/100-Mbit Ethernet, IEEE 1394, USB, Solaris™ 8 Operating Environment preinstalled (standard configuration)
A28UNF1-9A-D2048JB	Sun Blade 1000 workstation with 750-MHz UltraSPARC III processor, 8-MB cache, Sun Expert3D-Lite graphics, 2-GB memory, 36-GB 10000-rpm FC-AL disk drives, Solaris 8 Operating Environment preinstalled
A28UNF2-9C-D2048JB	Sun Blade 1000 workstation with two 750-MHz UltraSPARC III processors, 8-MB cache, Sun PGX64 graphics, 2-GB memory, 36-GB 10000-rpm FC-AL disk drives, Solaris 8 Operating Environment preinstalled

Note: All Sun Blade 1000 and 2000 standard and random configurations 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.

Sun Blade 2000 Workstation Part Numbers

Part Number	Description
A29-PS1-9C-1GAJ	Standard Configuration Sun Blade 2000 workstation with one 900-MHz UltraSPARC III Cu processor with 8-MB cache, 1-GB memory, one 73-GB 10000-rpm FC-AL internal disk, Sun PGX64 graphics, 10/100-Mbit Ethernet, IEEE 1394, USB, Solaris 8 (2/02) Operating Environment preinstalled
A29-PS1-9V-1GAJN	Random (Non-Standard) Configuration Sun Blade 2000 workstation with one 900-MHz UltraSPARC III Cu processor with 8-MB cache, 1-GB memory, one 73-GB 10000-rpm FC-AL internal disk, Sun Expert3D-Lite graphics, 10/100-Mbit Ethernet, IEEE 1394, USB, Solaris 8 (2/02) Operating Environment preinstalled with a SunPCi IIpro coprocessor card



Part Number	Description
A29-PS1-9Z-2GAJN	<p>Random (Non-Standard) Configuration</p> <p>Sun Blade 2000 workstation with one 900-MHz UltraSPARC III Cu processors with 8-MB cache, 2-GB memory, one 73-GB 10000-rpm FC-AL internal disk, Sun XVR-1000 graphics, 10/100-Mbit Ethernet, IEEE 1394, USB, Solaris 8 (2/02) Operating Environment preinstalled</p>
A29-PS2-9C-2GAJ	<p>Standard Configuration</p> <p>Sun Blade 2000 workstation with two 900-MHz UltraSPARC III Cu processor with 8-MB cache, 2-GB memory, one 73-GB 10000-rpm FC-AL internal disk, Sun PGX64 graphics, 10/100-Mbit Ethernet, IEEE 1394, USB, Solaris 8 (2/02) Operating Environment preinstalled</p>
A29-PS2-9Z-4GAJN	<p>Random (Non-Standard) Configuration</p> <p>Sun Blade 2000 workstation with two 900-MHz UltraSPARC III Cu processor with 8-MB cache, 4-GB memory, one 73-GB 10000-rpm FC-AL internal disk, Sun XVR-1000 graphics, 10/100-Mbit Ethernet, IEEE 1394, USB, Solaris 8 (2/02) Operating Environment preinstalled</p>
A29-UT2-9Z-8GAJP	<p>Limited Edition Promo: Sun Blade 2000 20 Year Celebration Edition (available through October 2002)</p> <p>Sun Blade 2000 workstation with two 1050-MHz UltraSPARC III Cu processors with 8-MB cache, 8-GB memory, two 73-GB 10000-rpm FC-AL internal disks, DVD-ROM drive, one Sun XVR-1000 graphics accelerator, 10/100-Mbit Ethernet, IEEE 1394, USB, Solaris 8 (2/02) Operating Environment preinstalled with a SunPCi IIpro coprocessor card and 1394 Vis Kit (This configuration is not compliant with Energy Star requirements.)</p>

Note: All Sun Blade 1000 and 2000 standard and random configurations 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.

Ordering Guidelines and Notes

- **The 600-MHz model of the Sun Blade 1000 workstation is no longer available.**
- **Memory**
 - The Sun Blade 1000 and 2000 workstations support 8 GB of main memory. This architecture currently accepts 128-MB, 256-MB, 512-MB, and 1-GB memory modules.
 - The Sun Blade 1000 and 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.
- **Graphics**
 - The Sun Blade 1000 and 2000 workstations support the Sun PGX64 PCI graphics for non-3D applications, as well as Sun Expert3D, Sun Expert3D-Lite, and Sun XVR-1000 high-performance 3D graphics.



- **Monitors**
 - Monitors are not included with any Sun Blade 1000 or 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 1000 workstation.

Sun Blade 1000/2000 Assemble-to-Order (ATO) Options

The Sun Blade 1000 and 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 1000 workstation.

Step 1: Select a chassis (Required)

Select one of the following chassis combinations.

Part Number	Description
A28-AA	Sun Blade 1000 workstation chassis, motherboard, power supply, smart card internal cables
A28-AAV	Sun Blade 1000 workstation chassis, motherboard, Danish power supply, smart card, internal cables
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 CPU module is a direct replace for the 750-MHz module. The 900-MHz module, when used to upgrade from the 750-MHz module, requires an OS patch and OBP update.

Part Number	CPU, Memory Module	Max. per System
Sun Blade 1000 Workstations		
6990A	750-MHz UltraSPARC III CPU, 8-MB Ecache	Two
7009A	900-MHz 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 1000 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
7050A	512 MB (4 x 128 MB)	2
7053A	1024 MB (4 x 256 MB)	2
7051A	2048 MB (4 x 512 MB)	2
7052A	4096 MB (4 x 1024 MB)	2

The table below lists memory sizes and required memory kits.

Size	Bank Configuration	Kit Selection
512 MB	1 bank 128-MB DIMMs	7050A
1024 MB	2 bank 128-MB DIMMs or 1 bank 256-MB DIMMs	two 7050A or one 7053A
1536 MB	1 bank 128-MB DIMMs and 1 bank 256-MB DIMMs	one 7050A and one 7053A
2048 MB	2 banks 256-MB DIMMs	two 7053A
2048 MB	1 bank 512-MB DIMMs	one 7051A
2560 MB	1 bank 512-MB DIMMs and 1 bank 128-MB DIMMs	one 7051A and one 7050A
3072 MB	1 bank 512-MB DIMMs and 1 bank 256-MB DIMMs	one 7051A and one 7053A
4096 MB	1 bank 1024-MB DIMMs	one 7052A
4096 MB	2 banks 512-MB DIMMs	two 7051A
4608 MB	1 bank 1024-MB DIMMs and 1 bank 128-MB DIMMs	one 7052A and one 7050A
5120 MB	1 bank 1024-MB DIMMs and 1 bank 256-MB DIMMs	one 7052A and one 7053A
6144 MB	1 bank 1024-MB DIMMs and 1 bank 512-MB DIMMs	one 7052A and one 7051A
8192 MB	2 banks 1024-MB DIMMs	two 7052A



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 1000 and 2000 workstations is as follows:

- Sun Creator3D graphics, maximum 2
- Sun Elite3D m6 graphics, maximum 2
- Sun PGX64 graphics, maximum 4
- Sun Expert3D graphics, maximum 2 (must be installed in 33-MHz PCI slot)
- Sun Expert3D-Lite graphics, maximum 3 (must be installed in 33-MHz PCI slot)
- Sun XVR-1000 graphics, maximum 2

Part Number	Description	Max. # Supported	Bus	Connections
3670A	Sun Creator3D graphics	2	UPA	13W3
3679A	Sun Elite3D m6 graphics	2	UPA	13W3
3768A	Sun PGX64 graphics	4	PCI66	HD15
3678A	Sun Expert3D graphics	2	PCI66	13W3
3684A	Sun Expert3D-Lite graphics	3	PCI66	HD15
3256A	Sun XVR-1000 graphics	2	UPA	13W3, HD15, DVi

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 Creator3D	2	X		X			
Sun Elite3D m6 ^A	2	X		X			
Sun PGX64 ^B	4		X		X	X	X
Sun Expert3D-Lite ^C	3		X		X	X	
Sun Expert3D ^C	2		X		X	X	
Sun XVR-1000	2	X		X			

Notes:

- Sun Elite3D graphics cards take up a UPA slot AND an adjacent PCI slot.
- Installing the Sun PGX64 card in the 66-MHz slot slows performance of the entire 66-MHz PCI bus to operate at 33 MHz.
- The Sun Expert3D and Sun Expert3D-Lite cards cannot be used in the 66-MHz PCI slot.



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 (6741A, 6747A, or 6766A).



Part Number	Description
6741A	18-GB FC-AL 10000-rpm drive option, Solaris Operating Environment preinstalled (recommended default)
6747A	36-GB FC-AL 10000-rpm drive option, Solaris Operating Environment preinstalled
6728A	18-GB FC-AL 10000-rpm drive option
6724A	36-GB FC-AL 10000-rpm drive option
6766A	73-GB FC-AL 10000-rpm drive option, Solaris Operating Environment preinstalled
6742A	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™ 1000 and 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 1000 and 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			
X6990A	750-MHz UltraSPARC™ III module	2	USIII and USIII Cu processors cannot be mixed. Cu processor speeds cannot be mixed
X7009A	900-MHz UltraSPARC III Cu module	2	
<i>X6898A</i>	<i>600-MHz UltraSPARC III module</i>	2	
<i>X7000A</i>	<i>900-MHz UltraSPARC III module</i>	2	
Mass Storage: Internal			
X6724A	36-GB, 10000-rpm FC-AL disk	2	
X6742A	73-GB, 10000-rpm FC-AL disk	2	
X6728A	<i>18.2-GB, 10000-rpm FC-AL disk</i>	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	Comments
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			
	<i>The following FlexiPack options come with a 68 to 68 pin SCSI cable:</i>		
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			
SG-XDSK020C-36G	36.4-GB (2 x 18.2-GB) 10000-rpm MultiPack	1	One Sun StorEdge MultiPack is supported per SCSI channel
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			
SG-XARY150A-72G	72-GB Sun StorEdge A1000 tabletop array (4 x 18-GB, 10000-rpm disks)		One array can be connect to each channel of the X6541A controller card or three Sun StorEdge A1000 arrays daisy-chained per channel.
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)		
<i>SG-XARY144A-36G</i>	<i>36-GB Sun StorEdge A1000 tabletop array (4 x 9.1-GB, 10000-rpm disks)</i>		
<i>SG-XARY144A-109G</i>	<i>109-GB Sun StorEdge A1000 tabletop array (12 x 9.1-GB, 10000-rpm disks)</i>		
<i>SG-XARY146A-36G</i>	<i>36-GB Sun StorEdge A1000 rackmountable array (4 x 9.1-GB, 10000-rpm disks)</i>		
<i>SG-XARY151A-218G</i>	<i>218-GB Sun StorEdge A1000 tabletop array (12 x 18.2-GB, 10000-rpm disks)</i>		
<i>SG-XARY161A-291G</i>	<i>291-GB Sun StorEdge A1000 tabletop array (8 x 36.4-GB, 10000-rpm disks)</i>		
Mass Storage: Sun StorEdge D1000 Arrays			
SG-XARY153A-72G	72-GB Sun StorEdge D1000 tabletop array (4 x 18-GB, 10000-rpm disks)		System accepts max. one array per X6541A controller card Sun StorEdge D1000 arrays cannot be daisy-chained.
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			
XT3WG-TT-11-163	163-GB (9 x 18-GB) tabletop single array	2	Cannot mix Sun StorEdge T3 with A5200 on a single system
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	10BASE-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 8 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™ Ipro 733-MHz coprocessor card, 128-MB memory	4	
X7042A	128-MB DIMM memory expansion for SunPCi Ipro PCI option card	2	
X7044A	256-MB DIMM memory expansion for SunPCi Ipro PCI option card	2	
X7045A	512-MB DIMM memory expansion for SunPCi Ipro PCI option card	2	
X1152A	<i>SunFDDI™ single-attach PCI bus interface adapter 2.0</i>	4	
X1153A	<i>SunFDDI dual-attach PCI bus interface adapter 2.0</i>	4	
X1131A-64.2	<i>SunPCi™ I coprocessor card with 300-MHz processor and 64-MB memory</i>	1	
X2131A	<i>SunPCi II coprocessor card with 600-MHz processor and 64-MB memory, 3.3 to 5 volts</i>	1	
X2154A	<i>Token ring interface for Solaris 8 Operating Environment</i>	4	
X1089A	<i>SunVideo Plus™ 3.1 video/audio capture</i>	1	
X499A-EU	<i>PCI multimedia Kit, SunVideo Plus 1.3, a PAL SunCamera™ II, Sun Microphone™ II, and documentation (Continental Europe), supports SunForum™ 3.0</i>	1	
X499A-UK	<i>PCI multimedia Kit, SunVideo Plus 1.3, a PAL SunCamera II, Sun Microphone II, and documentation (U.K), supports SunForum 3.0</i>	1	
X499A	<i>PCI Multimedia Kit, SunVideo Plus 1.3, a NTSC SunCamera II, Sun Microphone II, and documentation (U.S.), supports SunForum 3.0</i>	3	



Part Number	Option Description	Maximum Number Supported	Comments
X2069A	<i>FC-AL/Gigabit Ethernet for Solaris™ 8 Operating Environment</i>	2	
X7041A	<i>64-MB DIMM memory expansion for SunPCi I</i>	2	
X7035A	<i>128-MB DIMM memory expansion for SunPCi I</i>	2	
Graphics and Imaging			
X3256A	Sun XVR-1000 graphics	2	
X3768A	Sun PGX64 graphics card	4	
X3670A	Sun Creator3D series 3 graphics card	2	
X3679A	Sun Elite3D m6 series 2 graphics accelerator	2	
X3678A	Sun Expert3D graphics board	2	
X3684A	Sun Expert3D-Lite PCI-based graphics	2	
X3682A	Sun 1392 Visual Collaboration Kit	1	
X3677A	<i>Sun Elite3D m3 series 2 graphics accelerator</i>	2	
X3668A	<i>PGX32™ 8- and 24-bit color graphics PCI adapter frame buffer, CD, and cable</i>	3	
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		
X7127A	<i>18.1-inch TFT LCD color monitor</i>		
X7135A	<i>19-inch flat screen color Trinitron monitor</i>		
X7136A	<i>21-inch flat screen color Trinitron monitor</i>		
Miscellaneous Options			
X5681A	Smart card reader for serial or USB port		
X1400A	Extra cards for smart card reader, 25 pack		
Type6 Country Kits			
X3531A	US/Canada Universal	1	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.
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 Allowance Program offers customers outstanding investment protection for their existing Sun equipment. Upgrades are available for specific configurations within the Sun Blade 1000 and 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.

Sun Upgrade Allowance 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. Allowances CANNOT be applied to X-options or CTO options.

Allowance Code Numbering Scheme

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

Allowance code = ALW-02-T-A-A28-P2

- **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.
- **A28** = 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 1000/2000 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 1000 or 2000 workstations. Only USB keyboards are supported.

Upgrading to UltraSPARC III Cu Processor

Sun Blade 1000 workstation customers can upgrade the system's processors to the 900-MHz UltraSPARC III Cu processors (X-option #7009A).

Notes:

- All customer VEUs are different.
- Processor speeds cannot be mixed on the same workstation.
- The UltraSPARC III Cu 900-MHz module does not mix with existing 600/750/900-MHz UltraSPARC III CPU modules. Customers must remove their existing 600/750/900-MHz modules from the system and then install UltraSPARC III Cu 900-MHz module.
- Before upgrading to the UltraSPARC III Cu processors, customers must be running the 10/01 version of the Solaris 8 Operating Environment.



Upgrade Paths

System/ Component	Upgrade From	Upgrade To	Allowance Code Part Number	Customer Returns
Sun Workstations	Any Sun workstation	A Sun Blade 1000 or 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 1000 or 2000 workstation	See Desktop System Migration and Allowance Matrix for available configurations and trade-in allowances. SunWIN #94726	A complete functioning system
CPUs	600-MHz UltraSPARC III (X6898A)	900-MHz UltraSPARC III Cu (X7009A)	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)	Same as above	A 750-MHz CPU option
	900-MHz UltraSPARC III (X7000A)	900-MHz UltraSPARC III Cu (X7009A)	Same as above	A 900-MHz CPU option
Memory: Increasing Density 2x	512 MB (4 x 128-MB DIMMs) X7050A	1 GB (4 x 256-MB DIMMs) X7053A	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) X7051A	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) X7052A	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) X7051A	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) X7052A	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 SunSpectrumSM 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 SolarisSM Operating Environment software, and telephone support for SunSM 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 PlatinumSM 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 GoldSM 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 SilverSM Support	Combines the service expertise, responsive on-site support and technical support by telephone and SunSolve SM CD/on-line services. Support is provided 8 a.m. to 8 p.m. Mon. through Fri.
Self-Directed SunSpectrum BronzeSM 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.

SunClientSM Support Program

The SunClientSM 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 BladeSM 1000 and 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
<ul style="list-style-type: none"> • Unbundled hardware and software support 	<ul style="list-style-type: none"> • <i>Flexibility</i> Select the type and amount of coverage needed for desktop systems, so service dollars are targeted where they are needed most.
<ul style="list-style-type: none"> • Next business day (SunClient Maintenance) or second business day (SunClient Central Maintenance) on-site response 	<ul style="list-style-type: none"> • <i>Cost savings</i> Pay only for the support services needed. • <i>Cost efficiency</i> Because Sun can more efficiently manage spare inventory and labor scheduling, the savings can be passed on to the customer.



Features	Benefits
<ul style="list-style-type: none"> • Single contract with choice of automatic warranty upgrade 	<ul style="list-style-type: none"> • <i>Simplicity</i> One contract covers a predefined number of systems at one low price. Additional systems acquired can be upgraded to the SunClient service level.
<ul style="list-style-type: none"> • SunClient Central Maintenance 	<ul style="list-style-type: none"> • <i>Cost savings</i> 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.
<ul style="list-style-type: none"> • Service delivery by Sun experts 	<ul style="list-style-type: none"> • <i>Consistency</i> 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>



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	<i>See</i> 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™ 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.



Materials Abstract

All materials are available on SunWIN except where noted otherwise.

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
PowerPack				
– <i>Sun Blade™ 1000 and 2000 Workstation: Just the Facts</i>	Reference Guide (this document)	Training Sales Tool	SunWIN, Reseller Web	124808
– <i>Sun Blade Workstation Customer Presentation</i>	Presentation with Slide Notes	Sales Tool	SunWIN, Reseller Web	124810
Product Literature				
– <i>Sun Blade 1000 and 2000 Workstation Architecture White Paper</i>	Technical White Paper	Sales Tool	SunWIN, Reseller Web	124809
– <i>Literature - Sun Blade 1000 Workstation Data Sheet</i>	Data Sheet	Sales Tool	SunWIN, Reseller Web	121205 DE1211-1
– <i>Literature - Sun Blade 2000 Workstation Data Sheet</i>	Data Sheet	Sales Tool	SunWIN, Reseller Web	336012 DE1590-0
– <i>Graphics Solution Guide</i>	Graphics Overview	Sales Tool	SunWIN	75271
– <i>Sun Blade 1000 Benchmark Index</i>	Benchmark Index	Sales Tool	SunWIN	125774
References				
– <i>Sun™ Creator3D Graphics: Just the Facts</i>	Reference Guide	Training Sales Tool	SunWIN, Reseller Web	75246
– <i>Sun PGX64 Graphics, Just the Facts</i>	Reference Guide	Training Sales Tool	SunWIN, Reseller Web	301866
– <i>Sun Expert3D Graphics: Just the Facts</i>	Reference Guide	Training Sales Tool	SunWIN, Reseller Web	114214
– <i>Sun Expert3D-Lite Graphics: Just the Facts</i>	Reference Guide	Training Sales Tool	SunWIN, Reseller Web	125033
– <i>Sun Elite3D Graphics: Just the Facts</i>	Reference Guide	Training Sales Tool	SunWIN, Reseller Web	75245
– <i>Sun XVR-1000 Graphics Accelerator Just the Facts</i>	Reference Guide	Training Sales Tool	SunWIN, Reseller Web	335930
– <i>Sun XVR-1000 Graphics Accelerator Technical White Paper</i>	Technical Brief	Training Sales Tool	SunWIN, Reseller Web	335932
– <i>Sun Elite3D Graphics White Paper</i>	Technical Brief	Training Sales Tool	SunWIN, Reseller Web	75265



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

