Sun Ultra™ 5 Workstation

Just the Facts

Sun microsystems

Copyrights

Table of Contents

Positioning

Figure 1. The Sun Ultra™ 5 workstation

The Sun Ultra™ 5 Workstation

The Sun Ultra™ 5 workstation is an entry-level UNIX® workstation based upon the 400-MHz UltraSPARC™-IIi processor. The Ultra 5 workstation is Sun's lowest priced UltraSPARC-II processor-based workstation, designed to meet the needs of price-sensitive and high-volume customers without sacrificing performance. The Ultra 5 workstation has the following features:

- **Processor**
  - 400-MHz UltraSPARC-IIi
  - 2-MB L2 cache
- **Graphics**
  - PGX24™ on-board 24-bit graphics
  - Sun and third-party PCI graphics cards
- **Internal storage**
  - 20-GB, 7200-rpm EIDE hard disk
  - 48X-speed CD-ROM drive standard
  - 1.44-MB floppy standard
- **Memory**
  - Up to 512-MB EDO error correcting DRAM (50 ns)
- **Networking**
  - 10/100BASE-T Ethernet

In addition, the Ultra 5 workstation comes with the Solaris™ 7 and 8 Operating Environments and the StarOffice™ productivity suite preinstalled, which makes it ready to run right out of the box.

Key Messages

- **Built-in accelerated, high-resolution, 24-bit PGX24 graphics**
  - On-board, 24-bit-capable graphics support
  - Up to 1152 x 900 resolution at 85 Hz in 24-bit-only mode
  - Up to 1280 x 1024 resolution at 76 Hz in 8-bit-only mode
  - 4 MB of SGRAM video RAM
  - Support for 17-inch color, 19-inch color, and 21-inch color monitors
  - On-board 24-bit graphics provide fast acceleration for typical workstation customers and leave the PCI slots open for other uses
- **High performance for an entry price-point workstation**
  - Up to 512 MB of 168-pin EDO JEDEC DRAM with ECC error correction
- **Multiple PCI options available**
  - Three PCI slots provide access to a variety of Sun and third-party PCI cards
  - Additional graphics cards, SCSI expansion cards, and audio/video input cards are also available
  - The ability to expand and change is key to today's technical professional, and the availability of PCI options meets this need today and in the future
- **Large internal storage and expansion**
  - 20-GB, 7200-rpm EIDE hard drive (second optional)
  - Internal 48X-speed EIDE CD-ROM, photo-CD compatible
  - Standard 1.44-MB floppy drive (must be removed if second internal disk drive is installed)
  - PCMCIA bay provided for third-party PCMCIA options
  - Generous local storage capacity for large files, data and technical applications
- **Advanced networking capabilities**
  - FastEthernet, 100BASE-T, autosensing, and autoswitching down to 10BASE-T for backward compatibility
  - Just plug in and turn on; the Ultra 5 workstation adjusts to the customer's network environment
- **Robust, reliable, scalable, secure, network-centric Solaris Operating Environment**
  - Preinstalled Solaris 7 and Solaris 8 Operating Environment, 64-bit ready-to-run
  - One of the technical industry's leading enterprise operating environments with over 12,000 applications to choose from
  - Scalable from the lowest priced Ultra workstation (the Ultra 5 workstation) to the most powerful Sun server (the Sun Enterprise™ 10000 server), the Solaris Operating Environment provides the ability to scale both up and down as a customer's business needs change
  - The Solaris Desktop Extensions administration tools provide simple setup, use, and management, facilitating more reliable installations and simpler system maintenance

- **World-class Sun Enterprise Services offers the SunClient℠ program, an inexpensive, customizable service and support plan**
  - Allows customers to save costs by choosing only the services needed
  - Easy administration reduces administrative workload and costs
  - Another example of Sun's commitment to reducing the costs and overhead of technical computing for Sun customers

Product Family Placement

The Ultra 5 workstation is the beginning of Sun's desktop workstation product family. Sun's desktop product family scales from the lowest entry-priced Sun Ultra 5 workstation up to the multiprocessing Sun Ultra 80 workstation.

System	Description
Ultra 5	The Ultra 5 workstation is Sun's lowest-priced UltraSPARC-II based workstation. Designed to meet the needs of price-sensitive and volume-purchase customers requiring Solaris 7 Operating Environment and earlier OS support without sacrificing performance, the Ultra 5 workstation is Sun's entry-level offering in the personal workstation market. The Ultra 5 workstation is Sun's lowest priced UltraSPARC-II based workstation. Designed to meet the needs of price-sensitive and volume-purchase customers that require Solaris 7 or earlier OS support, the Ultra 5 workstation is a long standing member of Sun's entry-level offering in the personal workstation market. Target markets include software development, 2-D content creation, finance, EDA, telecommunications, and embedded systems.
Ultra 10	The Ultra 10 workstation is the entry point of Sun's high-performance graphics computing systems. The Ultra 10 workstation provides optional UPA-based graphics cards and greater PCI expansion, faster processing, and twice the memory capacity when compared to the Ultra 5 workstation. Target markets for this workstation include software development, MCAD, electronic design automation, financial analysis, and modeling. With the installation of Sun Creator3D, Sun Elite3D m3, or Sun Elite3D m6 graphics, the markets are extended to animation, 3-D content creation, and simulation.
Ultra 60 and 80 Sun Blade™ 1000	The Ultra 60, Ultra 80, and Sun Blade 1000 workstations are designed for the technical user who requires high performance and multiprocessing capability in a Solaris Operating Environment. They also address the needs of graphics intensive users and continue to support and build upon the upgradability features to which Ultra workstation users have grown accustomed. The target customer is the traditional "power desktop" user who has performance and expansion requirements that exceed the capabilities of the Ultra 5 and Ultra 10 systems. This includes both technical and commercial users who need the large number of applications and the functional capabilities of the Solaris Operating Environment, the high-performance of the UltraSPARC CPU, dual-headed graphics, and excellent throughput.

Availability

The Ultra 5 workstation is currently available.

Target Users

Sun Ultra 5 systems are ideal for price-sensitive and volume-purchase customers who do not wish to sacrifice performance or the stability of a Solaris Operating Environment. Also, due to its slimline design and size the Ultra 5 workstation is optimal for customers who are space-constrained. Embedded systems are an ideal match for the Ultra 5 workstation.

Target Markets

The market opportunities for the Sun Ultra 5 workstation are software development, 2-D content creation, EDA, finance, research/development, telecommunications, and embedded systems.

Industry	Key Features to Highlight
Software Development • ISVs • In-house development at large organizations	• High-performance Solaris Operating Environment • Availability of applications
Entertainment/DCC Industry • 2-D content creation	• CPU performance
Electronic Design (EDA) • PC board design and layout • System houses • Telco	• High-performance CPUs • Memory capacity • Availability of applications
Financial • Stock and commodity traders • Banks	• High performance • Ample local storage
Research and Development • In-house development • Research institutions	• Computing performance • Feature-rich Solaris Operating Environment
Telecommunications Industry • Front-end for central-office PBX switches	• High-speed serial I/O for PCI bus
OEM Systems • Embedded systems	• Performance, price, small form-factor, PCI expansion

Compatibility

The Ultra 5 workstation runs the following versions of the Solaris Operating Environment:

• Solaris 8 preinstalled

• Solaris 7 preinstalled

• Solaris 2.6 Hardware: 3/98

• Solaris 2.5.1 Hardware: 11/97

Key Applications

Sun works closely with major software vendors to provide applications that have been tested and will be available and officially supported soon after all new releases. All major applications that are available can be found in Sun Developer Connection℠ program catalog of third-party solutions.

Target Market	ISV	Software Applications
Entertainment, Animation, and Content Creation	Adobe	PhotoShop
	ArSciMed	Kinema/Sim
	Electric Image	Electric Image
	Engineering Animation Inc.	Vislab
	Lightwork	Kinetix (rendering tool kit)
	NewTek	Lightwave 3D
	Nichimen	NWorld
	XaosTools	Pandemonium
EDA	Avant!/ISS	DRC/ERC product
	Avant!/Meta Software	HSpice
	Cadence Design	Vampire Dracula
	Compass Design	Pathfinder
	K2 Technologies	Mask Compose and QuickView
	Mentor Graphics	Caliber ICVerify Checkmate
	Mentor/Precedence	Co-Simulation Backplane Simulators
	Silvaco	Atlas Athena Spice
	SpeedSim	SpeedSim
	Systems Science	Vera
	Viewlogic/Vantage Analysis	SpeedWave MT
	Simplex	Thunder and Lightning Fire and Ice
	Silvaco	Virtual Wafer Fab Automation Tools

	For general information see:
	
	`http://www.sun.com/`
	`http://www.dacafe.com:80/DACafe/CORPORATE/`	

Target Market	ISV	Software Applications
Healthcare	Cemax	VIP 2.0
	Context Vision	Imaging processing for refining MT data
	Geovision	Vision
	ISG	Silohet
	Virtual Vision Software	
MCAE	ANSYS, Inc.	ANSYS
	Computational Dynamics, Inc.	StarCD
	ESI	Pam-Crash
	EXA Corporation	Powerflow
	Fluent, Inc.	Fluent, Fluent UNS, Rampant, Nekton
	Fluid Dynamics, Inc. (FDI)	FIDAP
	Hibbitt, Karlsson & Sorensen, Inc.	ABAQUS
	Livermore Software Technology Corporation (LSTC)	LSDyna 3D
	MacNeal-Schwendler (MSC)	PATRAN, NASTRAN
	MARC Analysis Research Corp.	Mentat, MARC
	For general information see: `http://www.sun.com/`	
MCAD	Computervision	CADDS5, Medusa
	Dassault	Catia, Catia Studio
	EDS/ Unigraphics	Unigraphics
	Parametric Technology Corp.	Pro Engineer, Pro CDRS, ProFlythrough
	SDRC	I-Deas Master Series

Enabling Technology

UltraSPARC™-IIi Processor

The Sun Ultra™ 5 workstation uses the UltraSPARC™-IIi processor, a highly integrated, 64-bit SPARC™ V9 superscalar processor. Created for the Ultra 5 and Ultra 10 workstations, the UltraSPARC-IIi processor is part of a second generation of products based on the UltraSPARC processor. In addition to using a new process technology, the UltraSPARC-IIi processor provides a higher clock frequency, multiple SRAM modes and system-to-processor clock ratios that accommodate varying economics for a range of products. At the same time, it provides software compatibility with existing systems based on the UltraSPARC processor architecture.

PGX24™ Graphics

PGX24™ is the onboard graphics built into the motherboard of the Ultra 5 workstation. PGX24 graphics is the entry-level, 24-bit-capable graphics subsystem for cost-conscious customers who do not need the higher performance capabilities offered by the Creator graphics accelerator. PGX24 graphics utilizes the ATI RagePRO graphics processor with 4 MB of SGRAM, and provides up to 1152 x 900 resolution for 24-bit-only windowing and up to 1280 x 1024 resolution for 8-bit-only windowing.

Note: *Unlike Sun™ Creator and Sun Elite3D graphics, PGX24 graphics does not offer both 24-bit and 8-bit windowing environments simultaneously. PGX24 graphics is user configurable to display either 24-bit-only windowing or 8-bit-only windowing. A minority of applications require an 8-bit-only windowing environment to operate properly. Customers who require the use of these applications must configure the PGX24 graphics to display 8-bit-only windowing.*

PGX24 graphics include the following features:

*   ATI's RagePRO graphics processor
*   2-D graphics acceleration
*   220-MHz integrated DAC and 4-MB SGRAM provide:
    *   24-bit-only true color video support up to 1152 x 900 @ 85 Hz
    *   8-bit-only pseudo color video support up to 1280 x 1024 @ 76 Hz
*   HD15 video connector on the motherboard supports composite and separate video sync timing
*   Compatible with OpenWindows™ environment and CDEPCI technology

System I/O for the Ultra 5 workstation is provided by a industry-standard peripheral component interconnect (PCI) data bus. The PCI bus in the Ultra 5 workstation complies with the 2.1 revision of the PCI specification, released in March 1995. The Ultra 5 workstation has three PCI 33-MHz/32-bit expansion slots.

SunPCi™ II PC Coprocessor Card

The SunPCi™ II card is a cost-effective hardware and software product that provides PC compatibility to customers who wish to run PC applications on Sun workstations using Solaris™ Operating Environment software. The SunPCi II card brings together the ease of use of Microsoft Windows programs and the

powerful features of the Solaris Operating Environment, giving users access to powerful workstation technology without sacrificing access to Microsoft Windows applications.

The SunPCi II card is integrated with the workstation in which it is installed. It uses the workstation's keyboard, mouse, floppy drive, and Ethernet port as if they were its own, and it uses files from the Solaris file system to emulate C:\ and D:\ drives. If the VGA port on the card is not used for a second display, the video from the SunPCi II card is routed to an X11 window on the workstation's monitor.

Other Solaris Operating Environment services are available to the SunPCi II card. Any file system which is mounted on the hosting workstation, local or networked, including CD-ROMs, can be mapped to a network drive symbol on the PC. In addition, SunPCi II can access printers connected to a Solaris Operating Environment network.

Nearly any Solaris Operating Environment service for which there is a Microsoft Windows client can be used from the SunPCi II card. The SunPCi II card must be assigned its own IP address, and the SunPCi II Solaris Operating Environment drivers select net traffic addressed to the card and pass it to the card. This is transparent to the SunPCi II card.

If users experience colormap flashing on the workstation when running SunPCi II in an X window within the Solaris Operating Environment desktop, users should alter the following settings:

- Check available color depths using the `xdpyinfo` command. If a 24-bit truecolor visual is available, then change the SunPCi II display driver to use 16 million colors. This avoids colormap flashing inside Microsoft Windows, but not in DOS, or when the machine is booting.

  Run: `/usr/openwin/bin/xdpyinfo|grep depths`

  If one of the depths is 24, your system is 24-bit capable.

- If no 24-bit truecolor visuals are available, or if you must run the SunPCi II card at 8-bits per pixel, run the appropriate framebuffer `config` utility (`ffbconfig`, `afbconfig`, `m64config`, and so on) to determine if the framebuffer can be configured to display 24-bit. If it can, then rerun the `config` utility to make 24-bit the default, and make the modifications described to the X servers file below:

  Create: `mkdir -p /etc/dt/config`

  Copy: `cp /usr/dt/config/Xservers /etc/dt/config/Xservers`

  Edit: `/etc/dt/config/Xservers`

  Add: `"-dev /dev/fb defdepth 24"`

  `"-dev /dev/fb defclass TrueColor"`

  to the line beginning `:0 Local`

The user should now restart the X server.

Product Architecture
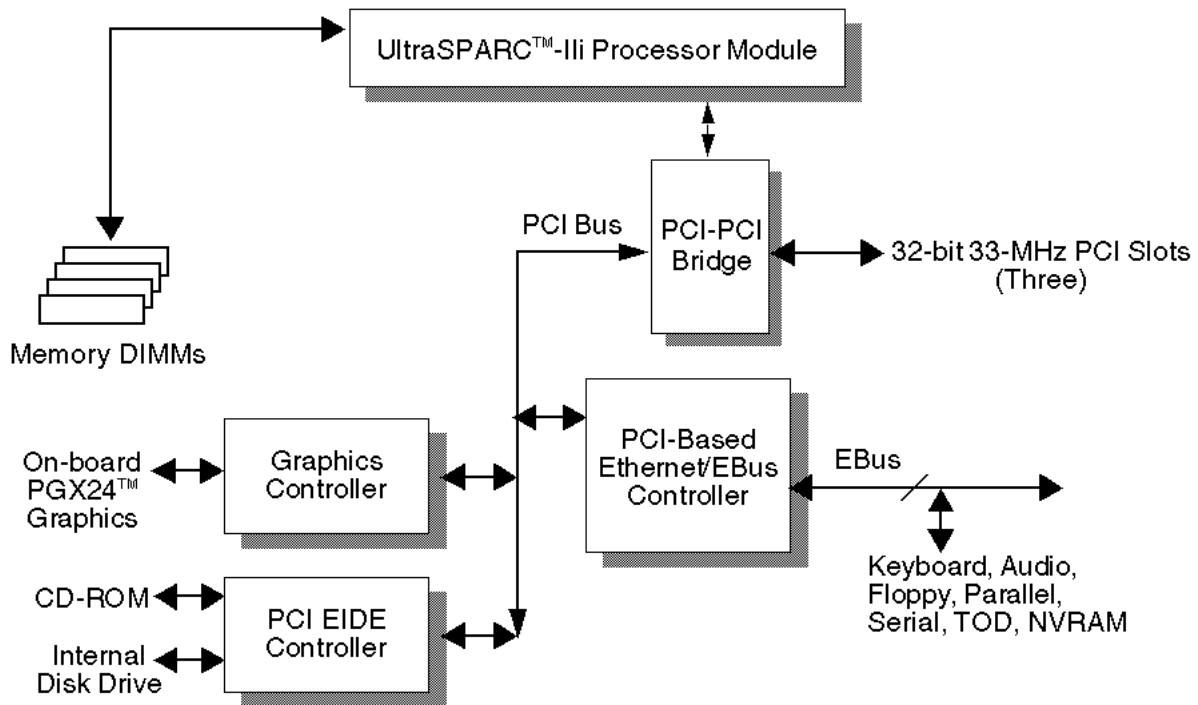
Figure 2. Sun Ultra™ 5 workstation system block diagram

The Sun Ultra™ 5 workstation is designed to provide high performance, scalability, and flexibility at low cost. The use of high-volume components and 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 standardized high-performance interfaces.

On the Ultra 5 workstation, a single LPX-sized motherboard is used. Features integrated into or supported by the motherboard include:

- 400-MHz UltraSPARC™-IIi modular processor card with 2-MB external cache
- PGX24™ on-board graphics with 4-MB SGRAM video RAM (DB15 connector)
  - 24-bit-only support for resolutions up to 1152 x 900 @ 85 Hz
  - 8-bit-only support for resolutions up to 1280 x 1024 @ 76 Hz
  - Supports 17-inch color, 19-inch color, and 21-inch color monitors
- Four DIMM sockets, 168-pin EDO JEDEC DRAM with ECC error correction
- Riser card connector to support three (two long, one short), 32-bit, 33-MHz, 5-volt PCI slots
- 10BASE-T/100BASE-T Fast Ethernet, self-sensing
- Two 16.7 MB/second EIDE connectors for hard drive and CD-ROM

- Two serial ports
  - Asynchronous/synchronous RS423A/RS232A, DB25 connector
  - Asynchronous RS423A, DB9 connector
- Centronics-compatible, parallel-port interface, IEEE 1284 bidirectional, DB25 connector
- Sun Type 6 keyboard and mouse support
- CD-quality, EBus-based audio
- Time-of-day NVRAM for clock and ID functions

Refer to the *Ultra 5 and Ultra 10 Architecture* White Paper (see the Materials Abstract section) for more detailed information about the product architecture.

UltraSPARC-IIi Processor

The Ultra 5 workstation is a high-performance system built around the UltraSPARC-IIi microprocessor. The UltraSPARC-IIi processor is Sun's latest release of the SPARC™ processor family and the second generation of 64-bit UltraSPARC processors. It utilizes the latest 0.22-micron technology. This process technology is the key to the UltraSPARC-IIi processor's higher clock rates and increased performance. This also enables the UltraSPARC-IIi processor to operate at a core voltage of 1.9 volts, rather than the UltraSPARC-I processor's 3.3 volts. This lower voltage reduces power consumption and allows the chip to operate at higher frequencies without increasing total power requirements or heat dissipation—both major design issues in today's high-performance systems.

The UltraSPARC-IIi processor supports both 2-D and 3-D graphics as well as image processing, video compression and decompression, and video effects through the sophisticated VIS™ instruction set. VIS provides high levels of multimedia performance, including real-time H.261 video compression and decompression and two streams of MPEG-2 decompression at full broadcast quality with no additional hardware support.

The UltraSPARC-IIi processor interfaces have been optimized to the "sweet spot" of typical uniprocessor system requirements. This provides a balanced price-performance solution delivering the power and features that the majority of high-end applications need, optimizes power utilization and supports manufacturability and ease of use.

Features	Benefits
• Integrated VIS instruction set	• Ready for increased performance on multimedia and networking operations
• Uses the latest 0.22-micron process technology which greatly decreases the die size	• Results in a significant increase in performance and a decrease in power consumption (due to a lower core voltage of 1.9 volts)
• CPU is mounted on field-installable module card with associated UPA data buffers and external cache	• Facilitates easy system service and upgrades

Memory

The Ultra 5 workstation supports up to 512 MB of 168-pin EDO JEDEC DRAM with ECC error correction. The four double in-line memory modules (DIMMs) used by the Ultra 5 workstation are the

same as those used in the Ultra 10 workstation, but are not compatible with DRAM modules used in any other Sun workstation. The Ultra 5 workstation supports 32-, 64-, and 128-MB DIMM modules.

Note: *DRAM DIMMs must be installed in pairs of identical size. Adding DIMMs in a set of four results in the best memory-system performance.*

Features	Benefits
• Lower cost, industry-standard memory modules	• Less expensive, allowing customers to move up to higher levels of memory at lower cost
• ECC memory	• Outstanding error correction and system reliability, superior to parity error correction

Storage

Internal data storage for the Ultra 5 workstation is provided by a high-capacity, internal, 20-GB, 3.5-inch enhanced IDE hard drive running at 7200 rpm.

• A 1.6-inch, 48X-speed EIDE CD-ROM drive is standard.

• A 1.44-MB, 3.5-inch, manual-eject floppy drive is standard.

• A second 20-GB, 7200-rpm disk drive can be installed optionally using an X-option bracket, X5236A. (Note: The second internal disk's installation requires the removal of the floppy disk drive. It also occupies the PCMCIA bay.)

• The Ultra 5 workstation low-profile enclosure features the following device bays:

   – One half-height, 5.25-inch, front-accessible bay for CD-ROM

   – One 3.5-inch internal hard-drive mount for hard drive

   – One 3.5-inch floppy-drive bay

   – One PCMCIA-ready front-access bay with flip-up access door
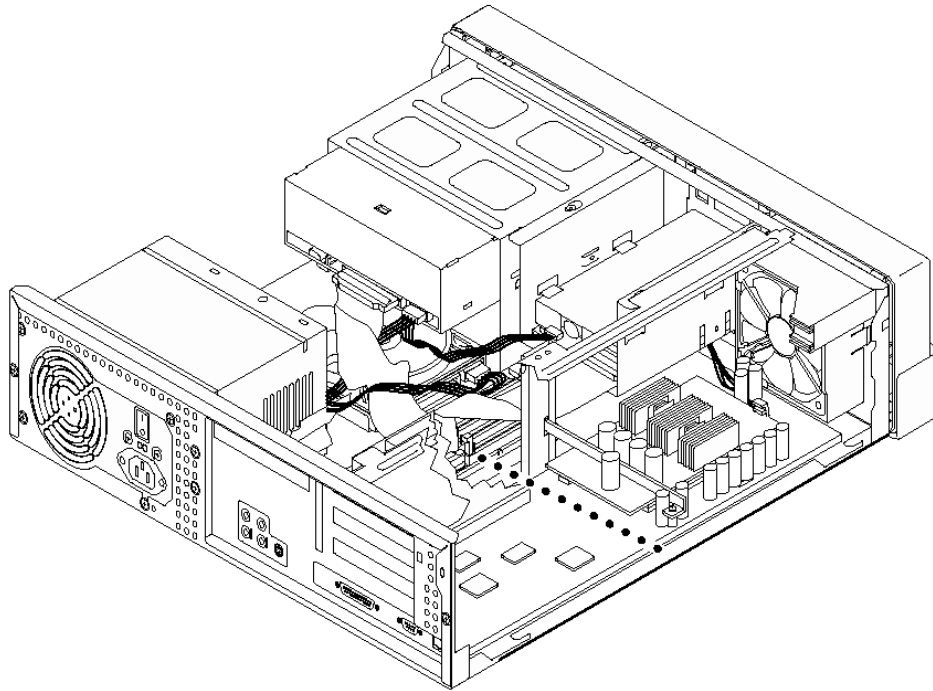
Figure 3. Sun Ultra 5 workstation chassis with access panel removed, providing full access to internal options

System I/O—High-performance PCI Technology

System I/O for the Ultra 5 workstation is provided by the industry-standard peripheral component interconnect (PCI) data bus. The PCI bus in the Ultra 5 workstation complies with the 2.1 revision of the PCI specification, released in March 1995. To provide maximum expandability, the Ultra 5 workstations feature three (two long, one short) 32-bit, 33-MHz, 5-volt PCI slots.

PCI I/O

Sun supports a variety of PCI-based adapter cards, including Ethernet, token ring, ATM, and FDDI networking cards, video and audio input, SCSI adapters, and high-speed serial and parallel interfaces. In addition, Sun is working with a host of third-party partners to develop PCI hardware and software that is certified for operation on Sun's entire line of workstations, including the Ultra 5 workstation.

Refer to the Ordering Information section of this document for a listing of Sun PCI cards that have been qualified on the Ultra 5 workstation. For a list of tested PCI cards, refer to the following URL: `http://www.sun.com/io_technologies/pci/index.html`.

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, 2-D 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 Sun PCI-based workstations ,workgroup and enterprise servers including the Sun Blade 100, 1000, Ultra™ 5, 10, 60, and 80 workstations, Sun Enterprise™ 250, 220R, 420R, and 450 workgroup servers and Sun Enterprise 3500, 4500, 5500 and 6500 mid-range servers as well as future workstations and workgroup servers supporting PCI.

Sun PGX64 graphics include the following features:

- ATI's RageXL graphics processor

  - 2-D 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 vide 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, as indicated 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 Ultra 5		Yes	3		NA
Sun Ultra 10		Yes	4		1
Sun Ultra 60		Yes	4	1 in 66-MHz slots; 3 in 33-MHz slots	2
Sun Ultra 80		Yes	4	1 in 66-MHz slots; 3 in 33-MHz slots	1 or 2
Sun Blade™100	on-board version	Yes	3		NA
Sun Blade 1000	ATO	Yes	4	1 in 66-MHz slots; 3 in 33-MHz slots	1 or 2
Sun Enterprise 250, 450, 220R, 420R	ATO	Yes	4	1 in 66-MHz slots; 3 in 33-MHz slots	NA
Sun Enterprise 280R		Yes	4	1 in 66-MHz slots; 3 in 33-MHz slots	1 or 2
Sun Enterprise 3500, 4500, 5500, 6500	ATO	Yes	4		N/A

On the Ultra 60, Ultra 80, and Sun Blade 1000 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.

In addition, it is suggested for the Sun Enterprise server systems that at least one CPU be installed for each Sun PGX64 card.

Sun Ultra 5 Workstation System Configuration

Feature	Specifications
Dimensions	
• Height • Width • Depth	112 mm (4.4 inches) 436 mm (17.1 inches) 430 mm (16.9 inches)
CPU	
• Architecture • Clock rate • External cache	UltraSPARC-IIi 400 MHz 2 MB
Memory	
• Memory type • Number of slots • Capacity • DRAM speed • DIMM sizes	168-pin EDO JEDEC, ECC error correction 4 128 MB to 512 MB 50 ns 32, 64, and 128 MB (installed in pairs)
Storage	
• Maximum internal	20-GB, 7200-rpm EIDE hard disk
Graphics	
• On-board PGX24™ 24-bit graphics	Accelerated text, windowing, 2-D and 3-D wireframe 1152 x 900 resolution at 85 Hz in 24-bit-only mode 1280 x 1024 resolution at 76 Hz in 8-bit-only mode Support for Sun color monitors up to 21-inch; compatible third-party monitors
I/O Interfaces	
• PCI I/O bus	Three PCI slots (two long, one short), 33 MHz (version 2.1)
• Serial port	One D-Sub 25-pin, asynch/synch RS423A/RS232A One D-Sub 9-pin, asynch RS423A
• Parallel port	One D-Sub 25-pin, IEEE 1284 bidirectional
• PCMCIA bay	One front-access bay with flip-up access door
Networking Ports	10BASE-T/100BASE-T Fast Ethernet, self-sensing
Backup and Distribution	
• Floppy • CD-ROM	1.44-MB, 3.5-inch, manual-eject floppy 48X-speed EIDE, photo-CD compatible standard
Operating Environment	Solaris 8 (Hardware 01/00 preinstalled) Solaris 7 Hardware: 3/99 (Hardware : 11/99 preinstalled) Solaris 2.6 Hardware: 3/98 Solaris 2.5.1 Hardware: 11/97

Sun microsystems

Sun Ultra 5 Workstation Performance Numbers

These figures are based on a 512-MB, 50-ns memory configuration.

SPECint_95	16.5
SPECfp_95	21.3

Software

Ultra™ 5 and Ultra 10 Workstations Plug-and-Play Systems

The Solaris™ Desktop Edition is preinstalled on all Ultra™ 5 and Ultra 10 workstations. This plug-and-play feature provides users with a ready-to-run workstation right out of the box. Customers are up and running within minutes. The following software is preinstalled on Ultra 5 workstations.

Solaris 7 11/99 Preinstalled Software	Solaris 8 01/00 Preinstalled Software
• Solaris 7 11/99 Operating Environment	• Solaris 8 Operating Environment
• Solaris 7 11/99 AnswerBook 2 documentation	• Solaris 8 AnswerBook 2 documentation
• Java™ Development 1.17 and Java 2 Software Development 1.2.1	• Java 2 Software Development Kit 1.2.2
• Java Plug-In 1.1.1	• Java Plug-In 1.2.1
• Java 3D™ 1.1.1	• Java 3D 1.1.2
• Java Media Framework 2.1	• Java Media Framework 2.1
• Netscape™ Communicator 4.5	• Netscape Communicator 4.7
• OpenGL® for Sun™ Solaris 1.2	• OpenGL for Sun Solaris 1.2.1
• ShowMe TV™ 1.3	• ShowMe TV 1.3
• SunForum™ 3.1	• SunForum 3.1
• ODBC Driver Manager 2.11	• StarOffice 5.2
• mediaLib™ 1.2	• Apache Server 1.3.9
• StarOffice ™ 5.2	• Perl 5
	• Java Communications API 2.0
	• PC Launcher 1.0

- The AnswerBook2™ software includes:
    - Sun Ultra 5 and Ultra 10 Hardware AnswerBook™
    - Solaris Operating Environment User Collection
    - Solaris Operating Environment System Administration Collection, Volume 1 and Volume 2
    - Solaris Operating Environment Software Developer Collection, Volume 1 and 2
    - Solaris Operating Environment on Sun Hardware AnswerBook
- The Solaris Operating Environment preinstalled software comes with the following languages:
    - English
    - French
    - German
    - Italian
    - Spanish

- Swedish

- Traditional Chinese

- Simplified Chinese

- Korean

- Japanese

The Solaris 8 Operating Environment

Sun Ultra 5 systems are supported by the Solaris 2.5.1 Hardware: 11/97, Solaris 2.6 Hardware: 5/98, Solaris 7, and Solaris 8 Operating Environments.

The Solaris 8 Operating Environment is Sun's latest release in this product family. 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) run 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.

Key Features in the Solaris 8 Operating Environment

- **Productivity features**

  Solaris 8 software offers enhanced diagnosing capabilities, availability, scalability, performance, Java technology, and graphics. With the Solaris 8 Operating Environment, the customer gets a full suite of integrated tools for browsing, collaborating, and interoperating with PCs. The Solaris 8 Operating Environment provides a 32-bit and 64-bit UNIX platform that provides customizable workspaces, graphical system monitoring, and business/office productivity tools, including the StarOffice productivity suite.

- **Advanced networking**

  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.

- **Bundled software**

  Includes Oracle 8i, `lxrun` for Linux application compatibility (for Solaris on Intel), Apache Webserver, Netscape Communicator, i-Planet Directory Server, `gzip`, `bash`, and `tcsh`.

  The Solaris 8 Operating Environment 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 2.2 software for high availability, and soon, Sun Cluster 3.0 software (shipping in a subsequent update to Solaris 8 software) for even greater application availability through a clustered file system, scalable data services, and built-in load balancing.

- **Enhancements to the Common Desktop Environment (CDE)**

  The latest generation of the Common Desktop Environment (CDE) comes standard, providing workstation users with an easy-to-use, open, secure platform. Personal Digital Assistant (PDA) support synchronizes data from most Palm Computing devices with the CDE calendar, mail, memo,

and address book. CDE now features streaming video using MPEG1, MPEG2, Quicktime, and AVI formats as well as MIDI audio using the Java Media Framework.

- **Improved system error messages, system debugging capabilities, and a new remote console capability**

  Allows the customer to apply scarce system expertise remotely across the enterprise.

- **File system logging**

  Logging file system features and parallel SCSI probes make rebooting faster.

- **Live Upgrade**

  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.

- **Real-time video creation and broadcast support**

  A new 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.

The Solaris 7 Operating Environment, Hardware: 3/99

The Solaris 7 Operating Environment contains the base-level functionality required for all Sun workstations. The Solaris 7 Operating Environment is a solid, scalable 32-bit and 64-bit operating environment. The Solaris 7 Operating Environment includes

- A 32-bit and 64-bit kernel
- Standards-based networking with easy access to a wide range of computing environments and network technologies
- Platform support for both SPARC processor and Intel
- Integrated Java software
- System administration support

The Solaris Operating Environment delivers a competitive advantage to businesses through networked computing, scalability, and multi-architecture 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.

The Solaris 7 Operating Environment Features and Benefits

Features	Benefits
• Higher performance	• A complete 64-bit computing environment provides greater computing capacity, precision, and performance
• Improved scalability	• The 64-bit kernel provides access to and capacity for more system resources; this allows more applications to be consolidated onto a single server, and enables systems to handle much larger problem sets
• Greater ease of use	• Web-based installation, text and voice notes, and graphical process manager make Solaris software easy to install and use
• Comprehensive global product	• Support for the euro currency symbol, complex text formats for Arabic, Thai, and Hebrew languages, and the development of multilingual applications
• 100 percent binary compatibility	• Software investment protection—all of today's Solaris Operating Environment-certified 32-bit applications continue to run on the Solaris 7 Operating Environment with out modification

Graphics Software Interfaces

The Ultra 5 system supports 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.
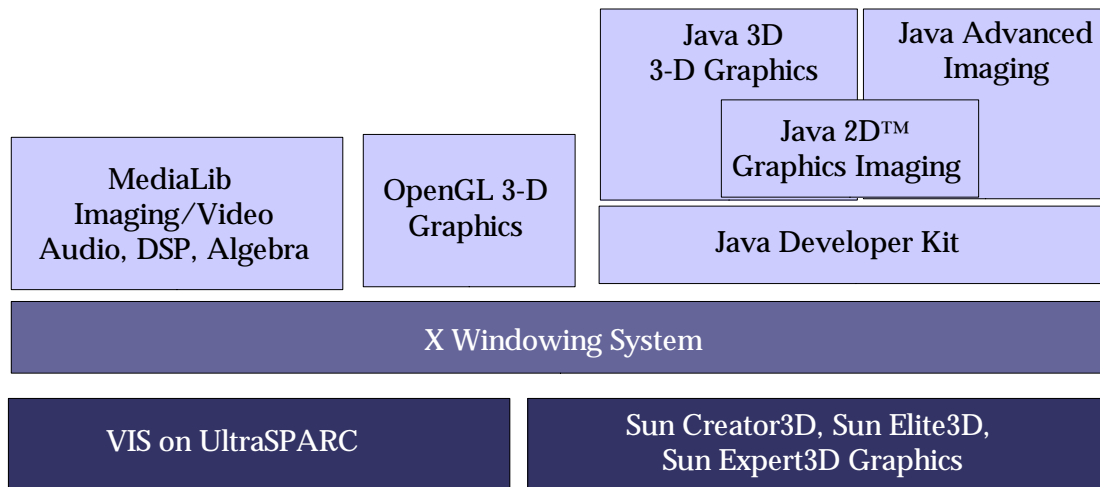
Figure 4. Graphics software interfaces

The Solaris Operating Environment System Requirements

Disk Space	
• End user • Developer	25 MB 40 MB (runtime binaries and header files)
Memory	
• Minimum • Recommended	64 MB 128 MB or higher (for serious applications)

The Solaris Operating Environment Licensing and Usage

All Sun system and system-board products include a Solaris license. The type of Solaris license(s) shipped with each platform reflects the way in which that system is most commonly used. Additional Solaris licenses are available to allow increased usage of the software.

Ultra 5 workstations come with a Solaris Desktop License. The Solaris Desktop License is a limited license. It does not provide several of the services provided by the Solaris Server License, such as

• Allowing more than two users to be directly connected

• Providing database or compute services for more than two continuous users

• Providing swap disk space for any other system

• Providing home directory space for any other system

If a customer plans to use a system that is shipped with a Solaris Desktop License as a server (requires services listed above), the customer must upgrade the system to a Solaris Server license.

Customers using a Solaris Operating Environment version prior to the Solaris 8 Operating Environment release may purchase a Desktop to Workgroup Server license upgrade (part number SOL-DTWG-LU). For the Solaris 8 Operating Environment release, a license covering both desktop and server is included with the system purchase.

OpenGL® for Sun™ Solaris 1.2.1 Software

OpenGL® for Sun™ Solaris 1.2.1 software provides a powerful programming environment for developing and deploying interactive 3-D applications on SPARC workstations. It allows mainstream 3-D graphics and visualization applications to be deployed on Sun's Ultra family of graphics workstations at a compelling price-to-performance ratio.

OpenGL for Sun Solaris 1.2.1 software is an application programming interface (API) that provides 2-D and 3-D 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. OpenGL for Sun Solaris 1.2.1 software works in both immediate and non-editable display-list modes.

Using the Xinerama X window extension available in Solaris 8 or Solaris 7 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. OpenGL for Sun Solaris 1.2.1 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 3-D graphics applications across platforms. OpenGL for Sun Solaris 1.2.1 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 OpenGL for Sun Solaris 1.2.1 software.

OpenGL for Sun Solaris 1.2.1 software is targeted at developers creating interactive 3-D 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.

OpenGL for Sun Solaris 1.2.1 software is compatible with and accelerated for Sun's Ultra workstation systems with the Sun Creator, Sun Creator3D, Sun Elite3D, and Sun Expert3D graphics products. It is also compatible with all legacy SPARCstation™ systems equipped with SX, ZX, GX, GXplus, TurboGX™, TurboGXplus™, S24™, TCX, or FSV frame buffers.

Features and Benefits

OpenGL for Sun Solaris 1.2.1 software provides the following features:

Features	Benefits
• Multi-screen rendering for super-high resolution 3-D visualization (Xinerama)	• Users no longer need to rewrite their 3-D applications to take advantage of the multiple screens
• 64-bit OpenGL library support	• Allows OpenGL applications to take advantage of the full 64-bit addressing in the Solaris Operating Environment
• Interface imaging and 3-D texturing	• Offers a more portable interface for imaging operation during 3-D texture mapping
– Texture level of detail control	– Offers better texture memory utilization
– BGRA and packed-pixel formats	– Supports more file- and hardware-data types
– Texture specular color	– Allows more realistic lighting effects with texturing
– Texture edge clamping	– Avoids blending border and image texels during texturing
– Constant texture data extension	– Helps reduce texture mapping memory utilization and loading time
• General performance improvements	
– Improved drivers	– Enables 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
– Occlusion culling test extension	– Enables applications to trivially reject occluded objects in a scene, resulting in big improvements in interactive rendering performance for visualization of large models
• Additional extensions	
– Triangle list primitive	– Allows multiple triangle strips or fans to be specified within a single glBegin glEnd pair; improves performance

Features	Benefits
– Vertex extension	– Allows applications to specify all vertex data (color, normal, coordinates, and so on) in a single function call; saves function call overhead
– Global alpha extension	– 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

OpenGL for Sun Solaris 1.2.1 Software Tech Facts

OpenGL for Sun Solaris 1.2.1 software system requirements are shown in the following table.

Platforms	UltraSPARC™ and SPARC processor-based systems using Sun Elite3D, Sun Creator, Sun Creator3D, Sun Expert3D, PGX, ZX, GX, TCX, SX, and S24 frame buffers
Operating environments supported	Solaris 2.5.1 Solaris 2.6 Solaris 7 Solaris 8 Note: Multi-display Xinerama support requires Solaris 7 Operating Environment (11/99 or later) or the Solaris 8 Operating Environment
Recommended patches • Using PGX graphics on an Ultra 5 or 10 workstation • Using Sun Elite3D graphics	Solaris 2.5.1: patch 103792-19 (or later) Solaris 2.6: patch 105362-19 (or later) Solaris 2.5.1: patch 105791-16 (or later) 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 • For end-user runtimes • For ISV developers (total to build examples)	32 MB for 32 bit; 55 MB for 64 bit 54 MB for 32 bit; 77 MB for 64 bit
Memory	64 MB minimum with 128 MB or more recommended

Sun microsystems

System Management

Many of Sun's workstations deliver the kind of power and graphics needed by customers who use heavy compute-intensive applications in markets such as MCAE, oil and gas, simulation, visualization, and animation. Customers who run these compute-intensive applications generate and handle critical technical and scientific data, and require an operating environment that can deliver 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. These features are described below.

Admintool

Admintool is a GUI-based administration tool that provides local systems administration. Admintool can be used to manage user accounts, groups, hosts, printers, serial ports, and installation/removal of software.

Sun™ Management Center Software

Sun™ Management Center software is a GUI-based system management tool for Sun systems. Sun Management Center software enables system administrators to proactively monitor and manage the health and status of many Ultra™ workstations from a central location. Sun Management Center software simplifies the management of many workstations, establishing highly stable and reliable workstation computing environment for running business-critical applications. In addition, Sun Management Center software is also scalable enough to run entirely on a workstation as a stand-alone application.

Key Features

- **Performance monitoring and management**

  Provides proactive monitoring and management of workstation hardware and the Solaris Operating Environment, by detecting impending failures

- **Predictive failure analysis**

  Enables administrators to predict potential memory and disk hardware failures on a statistical bases, thereby enhancing the decision making process and increasing machine availability

- **Fault and event management**

  Collects alarms and events, and then helps users identify the root cause of the problems.

- **Physical view of workstations**

  Provides enhanced serviceability with visual view that highlights failed hardware components

Solstice AutoClient™ Software

Solstice AutoClient™ software reduces the cost of Ultra workstation management by enabling centralized administration. This centralization eliminates the need to do backups, installations, and software management on the workstation itself. Solstice AutoClient software caches the Solaris Operating Environment, required applications, and user data onto the workstation's disk from a network server.

Key Features

• **Centralized software management model**

  Reduces workstation administration costs by allowing workstations to be managed from a server

• **Hands-off installation**

  When an application is needed, Solstice AutoClient automatically pulls the software from the server and loads it onto the workstation disk, resulting in built-in software distribution

• **Workstations become field-replaceable units**

  Ultra workstations can be replaced easily in the event of hardware failure, minimizing user down time

• **No workstation backups required**

  Solstice AutoClient workstations only have cached data, so there is no need to back up the workstation; the backup occurs on the server, saving considerable time and resources

Performance Meter

This GUI-based performance meter enables users to quickly monitor some of the key system resources such as CPU, load, disk, page, context, job swaps, interrupts, packets, collisions, and errors.

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.

ShowMe How™: 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 for lower service costs and maximum system uptime.

Key Features

• Distributed on CD-ROM with every system

• Movies of installation and replacement procedures played through ShowMe TV™ software

• Photo sequences with narrated installation and replacement procedures

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

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

AnswerBook2™ Tool: System Administration Guide

The AnswerBook2™ product is Sun's on-line documentation system. It uses a web-browser interface that lets the customer view and print a variety of Solaris information, including SGML-based AnswerBook™ collections, Display PostScript™ AnswerBook collections, and man pages.

The AnswerBook2 product provides a search engine that lets the customer find information throughout the documentation library. The customer can install AnswerBook2 document collections on a centralized documentation server or on a local server.

Features and Functions

- Uses a web-browser-based interface so that the customer can view on-line documentation from any platform (running any operating system), provided that the customer's web browser supports HTML 3.2

- Contains support for multimedia (video and audio) content

- Provides a search engine for finding words and word phrases throughout the documentation library

- Lets the user define a subset of document collections (a Personal Library) to be displayed when using a specific documentation server

- Lets users copy information from AnswerBook2 documents and paste it into other locations, such as the command line, depending on the web browser's functionality

- Gives users the ability to print sections and books directly from the AnswerBook2 interface in a PostScript™ format that is near print-quality output

- Allows the user to choose a language in which to view on-screen instructions and Help information

- Provides a command-line interface (CLI) and a browser-based interface (GUI) for performing documentation server administration functions

The Sun Ultra™ 5 workstation utilizes a marketing part-number scheme that includes the Solaris™ Operating Environment version preinstalled on the hard drive and the choice of country kit in the marketing part number. This page explains how to read the part number scheme, and the next section explains the changes in specifying or ordering the country kit.

A11AAA1A1A-A111AAC

| System |
| Microprocessor family |
| Microprocessor speed |
| Ecache Size |
| Number of Microprocessors |
| Country Kit code |
| Monitor |
| Frame Buffer |
| Operating Environment Version Preinstalled |
| Memory |
| Hard drive/CD-ROM |
| "Non-standard" System |
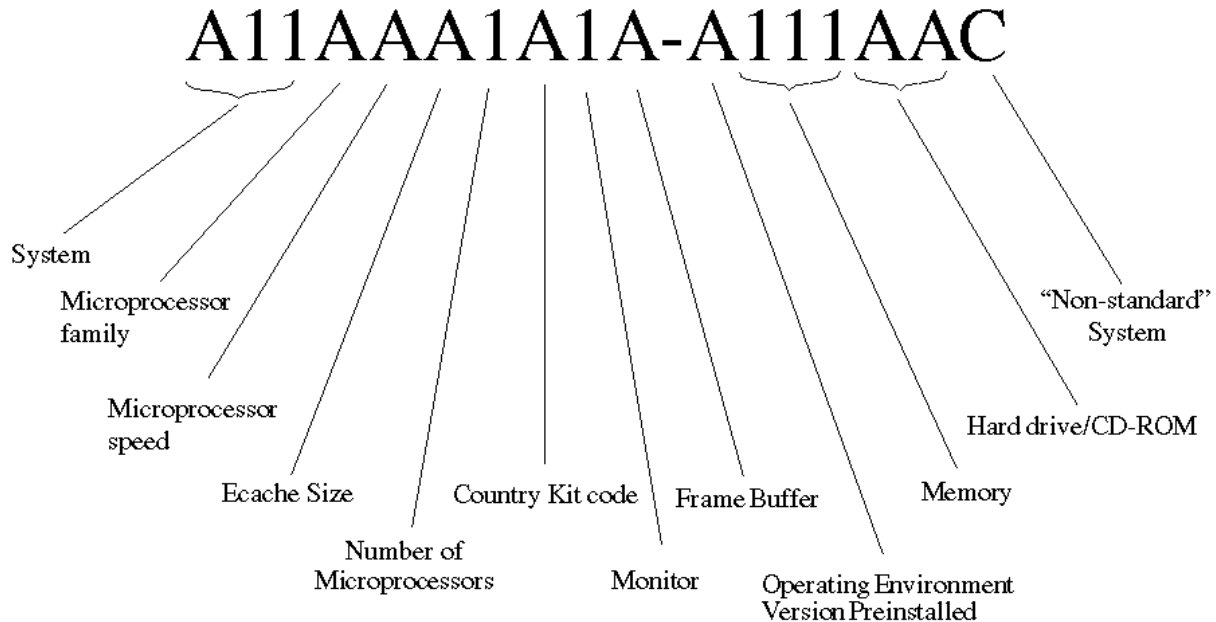
(Note: A = alpha character, 1 = numeric character, C = optional alpha or numeric character)

Model Key (Subset of Part Number Definitions)

System	Number of Processors	Monitor	Memory
A21 = Sun Ultra 5	1 = Single processor	9 = No monitor	128 = 128 MB
			256 = 256 MB
Microprocessor Family	**Country Kit**	**Frame Buffer**	
U = UltraSPARC™-IIi	A = North America UNIX®	P = On-board PGX24™	**Hard Drive/CD-ROM**
	B = Japanese Language		CY = 20-GB, 7200-rpm
Microprocessor Speed	Z = No Included Ship Kit	**Operating Environment**	hard drive,
J = 400 MHz		**Version Preinstalled**	48X CD-ROM
		C = Solaris 7 11/99 and	
Ecache Size		Solaris 8 01/00	
C = 2 MB			

Sun microsystems

Choice of Country Kit

Unlike traditional Sun systems, the Ultra 5 workstation has the country kit physically included within the System Ship Kit. The choice of country kit is specified by adding an additional character to the Ultra 5 workstation marketing part number. The eighth character of the Ultra 5 workstation marketing part number specifies the choice of country kit. The single-character country kit codes are listed below.

Code	Country Kit
A	North American UNIX
B	Japanese language
Z	No included country kit

To order a country kit that is not shown on the table, specify the country kit code "Z" and order the country kit as a separate line item. Ultra 5 systems ordered with the "Z" code are shipped to the customer in a separate box—in other words, the customer receives the CPU system in one box and the country kit in a separate box. Customers who order country kit codes: A or B receive the CPU system and country kit in a single box.

Three examples using the same base Ultra 5 workstation Model 400 configuration (128-MB RAM, 20-GB 7200-rpm hard drive) are shown below.

1. North American UNIX with 17-inch entry color monitor

A21UJC1A9P-C128CY	Note that the eighth character is "A" for North American UNIX
X7103A	Marketing number for 17-inch entry color monitor

2. Japanese language with 21-inch color monitor

A21UJC1B9P-C128CY	Note that the eighth character is "B" for Japanese language
X7121A	Marketing number for 21-inch color monitor
X471A	Marketing number for required 13W3-to-HD15 video adapter cable

3. No included country kit with 21-inch color monitor and separate Italian country kit

A21UJC1Z9P-C128CY	Note that the eighth character is "Z" for no country kit
X3574A	Marketing number for separate Italian country kit
X7121A	Marketing number for 21-inch color monitor
X471A	Marketing number for required 13W3-to-HD15 video adapter cable

Sun microsystems

Sun Ultra 5 Workstation Model 400 Workstation Configurations

Part Number	System
	Sun Ultra 5 workstation Model 400, 1 x 400-MHz UltraSPARC-IIi CPU, 2-MB L2 cache, 128-MB DRAM, onboard PGX24 graphics, 20-GB 7200-rpm EIDE internal disk, 48X CD-ROM, 1.44-MB floppy, Solaris 7 (11/99) and Solaris 8 Operating Environment preinstalled
A21UJC1A9P-C128CY	North American UNIX country kit
A21UJC1B9P-C128CY	Japanese UNIX country kit
A21UJC1Z9P-C128CY	No included UNIX country kit
	Sun Ultra 5 workstation Model 400, 1 x 400-MHz UltraSPARC-IIi CPU, 2-MB L2 cache, 256-MB DRAM, onboard PGX24 graphics, 20-GB 7200-rpm EIDE internal disk, 48X CD-ROM, 1.44-MB floppy, Solaris 7 (11/99) and Solaris 8 Operating Environment preinstalled
A21UJC1A9P-C256CY	North American UNIX country kit
A21UJC1B9P-C256CY	Japanese UNIX country kit
A21UJC1Z9P-C256CY	No included UNIX country kit

Ordering Guidelines and Notes

- **Software**

  The Solaris 7 (11/99) Operating Environment, the Solaris 8 (01/00)Operating Environment, and the StarOffice™ productivity suite are preinstalled on all Ultra 5 systems.

- **Memory**

  – The Ultra 5 workstation supports up to 512 MB of 168-pin EDO JEDEC DRAM with ECC error correction. The DIMMs are the same as those used in the Ultra 10 systems but are not compatible with other Sun workstations. The Ultra 5 workstation supports 32-MB, 64-MB, and 128-MB DIMM modules.

  – The Ultra 5 workstation can accommodate up to four DIMM modules which must be installed in pairs. Adding DIMMs in a set of four identically sized DIMMs results in the best memory system performance.

Memory Expansion Options	Part Number
64-MB ECC DRAM expansion kit (two 32-MB DIMMs)	X7036A
128-MB ECC DRAM expansion kit (two 64-MB DIMMs)	X7037A
256-MB ECC DRAM expansion kit (two 128-MB DIMMs)	X7038A

- **Keyboard**

  Keyboard are included in all Ultra 5 workstation configurations, except for configurations that have been ordered with the Z country kit code, or in certain upgrades.

- **Internal storage devices**

  The internal hard-disk drive and CD-ROM drive are unique to the Ultra 5 and Ultra 10 workstations and are not compatible with other Sun Workstation™ systems. In addition, all other Sun internal hard disks, CD-ROM drives, and other storage devices are not compatible with the Ultra 10 workstation.

Internal Storage Device	Part Number
Internal 20-GB, 7200-rpm, EIDE hard disk	X6174A
Internal 48X-speed EIDE CD-ROM	X5246A

  Note that a second drive can be added to the Ultra 5 workstation using the X-option bracket, X5326A.

- **External and internal SCSI devices**

  A PCI SCSI adapter card is required to attach any external SCSI device since SCSI is not a feature of the Ultra 5 workstation. In addition, all internal SCSI options are not supported by the Ultra 5 workstation.

- **Monitors**

  Monitors are not included in the Ultra 5 workstation configurations. Customers are not required to order a monitor. Monitors are ordered as a separate line item. The Ultra 5 workstation supports the Sun monitors listed below. For some monitor and frame-buffer combinations, a video adapter cable may be required; consult the table below.

Supported Monitors	Video Adapter Required for On-board 24-bit PGX24
17-inch color (X7103A)	none
18-inch TFT LCD color (X7127A)	X471A
21-inch color (X712136A)	X471A

Options

Below is a comprehensive list of system expansion, networking, graphics, and multimedia options that are supported by Sun Ultra™ 5 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. Options in italics are discontinued and are presented here for reference purposes only.

Part Number	Option Description	Maximum Number Supported	Comments
Memory			
X7036A	64-MB ECC DRAM expansion kit (two 32-MB DIMMs)	2	These are all pairs of DIMM units
X7037A	128-MB ECC DRAM expansion kit (two 64-MB DIMMs)	2	
X7038A	256-MB ECC DRAM expansion kit (two 128-MB DIMMs)	2	
Mass Storage Internal			
X5246A	Internal 48X-speed EIDE CD-ROM	1	
X6174A	Internal 20-GB, 7200-rpm Enhanced IDE hard drive	1	
X5236A	*Internal 9.1-GB, 7200-rpm Enhanced IDE hard drive*	*1*	
X6171A	*Internal 32X-speed EIDE CD-ROM*	*1*	
PCI Expansion Cards			
X1032A	10/100BASE-T Ethernet with SunPCI UltraSCSI	3	
X1033A	10/100BASE-T with MII PCI adapter	3	
X1034A	PCI Quad FastEthernet controller PCI adapter	2	
X1152A	FDDI single-attach PCI adapter	3	
X1153A	FDDI dual-attach PCI adapter	3	
X2154A	Token ring interface PCI adapter	2	
X1155A	High-speed serial interface PCI adapter 2.0	3	
X1157A	SunATM™-155UTP PCI adapter 4.0, update 1	2	
X1158A	SunATM-155/MFiber PCI adapter 4.0, update 1	2	
X1159A	SunATM-622/MFiber PCI adapter 4.0, update 1	1	
X1152A	SunFDDI™ single-attach PCI adapter 2.0	4	
X1153A	SunFDDI dual-attach PCI adapter 2.0	4	
X1155A	High-speed serial interface PCI adapter 2.0	4	
X1157A	SunATM-155 Multimode Fiber 4.0	2	
X1158A	SunATM-155 Cat-5 UTP 4.0	2	
X1159A	SunATM-622 Multimode Fiber 4.0	1	

![Sun microsystems logo]

Part Number	Option Description	Maximum Number Supported	Comments
X2154A	Token ring interface/PCI adapter 5.0 for Solaris™ 8 Operating Environment and earlier releases	2	Requires Solaris 8
X2156A	Serial asynchronous interface PCI adapter 3.0 for Solaris 8 and earlier releases	3	Requires Solaris 8
X5010A	Single-channel, single ended UltraSCSI host adapter	3	
X6540A	Dual-channel, single-ended UltraSCSI controller	2	
X6541A	Dual-channel, differential UltraSCSI controller	2	
X6729A	PCI FC/AL single-channel adapter	1	
X2131A	SunPCi™ II 600-MHz coprocessor card	1	
X7042A	Optional SunPCi II 128-MB SODIMM		
X7044A	Optional SunPCi II 256-MB SODIMM		
X1131A-64.2	*SunPCi™ 400-MHz coprocessor card*	*1*	
X7041A	*64-MB DIMM memory expansion for SunPCi card*		
X7035A	*128-MB DIMM memory expansion for SunPCi card*		
X1035A	*SunFDDI™ single-attach PCI adapter (SAS/5.0)*	*3*	
X1036A	*SunFDDI dual-attach PCI adapter (DAS/5.0)*	*3*	
X1039A	*Token ring interface/PCI adapter*	*3*	*Universal*
X1040A	*High-speed serial interface PCI adapter (1 port)*	*3*	
X1041A	*Serial asynchronous interface (SunSAI) PCI adapter, 8 ports*	*3*	*Universal*
X1066A	*SunATM™/P-155 Multimode Fiber*	*1*	
X1067A	*SunATM/P-155 Cat-5 UTP*	*1*	
X1068A	*SunATM/P-622 Multimode Fiber*	*1*	
Monitor and Graphics Options			
X3677A	Sun Elite3D m3, 24-bit color graphics accelerator, vertical	1	UPA
X3679A	Sun Elite3D m6 graphics accelerator	1	UPA
X3670A	Sun Creator3D series 3, 24-bit color, double-buffered graphics, vertical	1	UPA
X3768A	Sun PGX64 graphics card	4	
X3668A	*PGX32™ 32-bit color PCI graphics frame buffer*	*4*	
X7127A	*18.1-inch flat-panel color display*		One monitor per graphics accelerator; one cable per monitor as needed
X7143A	17-inch entry color monitor		
X7136A	21-inch color monitor		
X7124A	24-inch color monitor		
X7126A	*17-inch color monitor*		
X7135A	*19-inch color monitor*		
X7137A	*24-inch color monitor*		

Sun microsystems

Part Number	Option Description	Maximum Number Supported	Comments
X471A	13W3F-to-HD15M video adapter cable		
X3872A	HD15F-to-13W3M video adapter cable		
X470A	13W3F-to-HD15M video adapter cable		
Input Devices			
SUNX-MICII/G5	SunMicrophone™ II	1	
X180A	SunButtons™ 32-key function I/O device	1	
X190A	SunDials™ 8-dial interactive graphics I/O device for 3-D	1	
X6079	Sun StorEdge L3500 tape library, 3.5-TB capacity, two drive		
X814A	5.0-GB, 8-mm tape backup drive, desktop storage module	2	A PCI SCSI adapter card is required to attach any external SCSI device to the Ultra 5 and Ultra 10
X827A	20-GB, 4-mm tape autoloader, desktop storage module	2	
X545A	1.05-GB Fast SCSI-2 desktop disk pack	4	
X567A	2.1-GB Fast SCSI-2 desktop disk pack	4	
X737A	2.1-GB Fast SCSI-2 desktop disk pack	4	
X579A	SunCD 2Plus™, desktop storage pack	2	
X660A	150-MB QIC tape drive, desktop storage pack	2	
X822A	5.0-GB, 4-mm tape drive, desktop storage pack	2	
X834A	10-GB, 8-mm backup tape drive, desktop storage module	2	
X844A	14.0-GB, 8-mm tape drive, desktop storage pack	2	
Mass Storage Sun StorEdge™ FlexiPack			
SG-XTAP4MM-021A	12-GB, 4-mm DDS-3 in a Sun StorEdge FlexiPack desktop enclosure		A PCI SCSI adapter card is required to attach any external SCSI device to the Ultra 5 and Ultra 10
SG-XTAP4MM-031A	72-GB, 4-mm DDS-3 in a Sun StorEdge FlexiPack desktop enclosure		
SG-XTAP8MM-020A	7-GB, 8-mm drive in a Sun StorEdge FlexiPack desktop enclosure		
SG-XTAP8MM-021A	20-GB, 8-mm drive in a Sun StorEdge FlexiPack desktop enclosure		
X6236A	20 to 40-GB, 8-mm internal tape drive for Sun StorEdge FlexiPack		
X6057A	DLT 4000 tape FlexiPack (68-pin)	4	
X6060A	DLT 7000 tape FlexiPack (68-pin)	4	
X6263A	4 to 8-GB 4-mm DDS-2 tape FlexiPack (68-pin)	4	
X6210A	8705 DX 14-GB 8-mm tape FlexiPack (68-pin)	4	
X6232A	20 to 40-GB tape drive FlexiPack (68-pin)	4	
X6284A	12 to 24-GB 4-mm DDS-3 FlexiPack (68-pin)		

Sun microsystems

Part Number	Option Description	Maximum Number Supported	Comments
Mass Storage Sun StorEdge UniPack	*The following Sun StorEdge UniPack options come with a 68-68 pin SCSI cable*		
SG-XTAP4MM-012A	20-GB 4-mm DDS-4 in a Sun StorEdge UniPack enclosure		A PCI SCSI adapter card is required to attach any external SCSI device to the Ultra 5 and Ultra 10
X5101A	*1.05-GB, 7200-rpm fast/wide SCSI-2 disk UniPack*	*4*	
X5103A	*2.1-GB, 7200-rpm fast/wide SCSI-2 disk UniPack*	*4*	
X5151A	*2.1-GB, 7200-rpm fast/wide SCSI-2 disk UniPack*	*4*	
X5209A	*4.2-GB, 7200-rpm fast/wide SCSI-2 disk UniPack*	*2*	
X5253A	*9.1-GB, 7200-rpm fast/wide SCSI-2 disk UniPack*	*2*	
X6151A	*SunCD™ 4X CD-ROM UniPack*	*1*	
X6201A	*14-GB, 8-mm tape UniPack*	*2*	
X6208A	*14-GB, 8-mm tape UniPack*	*4*	
X6251A	*5-GB, 4-mm tape UniPack*	*4*	
X6157A	*SunCD 12X CD-ROM UniPack*	*4*	
X6261A	*4-GB to 8-GB, 4-mm DDS-2 drive*	*4*	
X6280A	*12-GB to 24-GB, 4-mm DDS-3 tape drive*	*4*	
X6230A	*20-GB to 40-GB, 8-mm tape drive*	*4*	
	The following Sun StorEdge UniPack options come with a 50 to 68 pin SCSI cable:		
X5102A	*1.05-GB, 7200-rpm fast/wide SCSI-2 disk UniPack*	*4*	
X5152A	*2.1-GB, 7200-rpm fast/wide SCSI-2 disk UniPack*	*4*	
X5204A	*2.1-GB, 7200-rpm fast/wide SCSI-2 disk UniPack*	*4*	
X5213A	*4.2-GB, 7200-rpm fast/wide SCSI-2 disk UniPack*	*2*	
X5254A	*9.1-GB, 7200-rpm fast/wide SCSI-2 disk UniPack*	*2*	
X6152A	*SunCD 4X CD-ROM UniPack*	*1*	
X6202A	*14-GB, 8-mm tape UniPack*	*4*	
X6209A	*14-GB, 8-mm tape UniPack*	*4*	
X6252A	*5-GB, 4-mm tape UniPack*	*4*	
X6158A	*SunCD 12X CD-ROM UniPack*	*4*	
X6262A	*4-GB to 8-GB, 4-mm DDS-2 tape drive*	*4*	
X6281A	*2-GB to 24-GB, 4-mm DDS-3 tape drive*	*4*	
X6231A	*20-GB to 40-GB, 8-mm tape drive*	*4*	

Part Number	Option Description	Maximum Number Supported	Comments
Mass Storage MultiDisk Pack			
X569A	*4.2-GB SCSI MultiDisk Pack (2 x 2.1-GB Fast SCSI-2disk)*	*2*	A PCI SCSI adapter card is required to attach any external SCSI device to the Ultra 5 and 10
X570A	*8.4-GB SCSI MultiDisk Pack (4 x 2.1-GB Fast SCSI-2disk)*	*1*	
X739A	*8.4-GB, 7200-rpm MultiDisk Pack (4 x 2.1-GB Fast SCSI-2 disk)*	*1*	
X748A	*8.4-GB SCSI MultiDisk Pack (2 x 4.2-GB Fast SCSI-2 disk)*	*2*	
X749A	*16.8-GB SCSI MultiDisk Pack (4 x 4.2-GB Fast SCSI-2 disk)*	*1*	
X771A	*2.1-GB SCSI MultiDisk Pack (2 x 1.05-GB)*	*2*	
X5211A	*8.4-GB (2 x 4.2-GB), 7200-rpm, fast/wide SCSI-2 MultiPack*	*2*	
X5212A	*16.8-GB (4 x 4.2-GB), 5400-rpm, fast/wide SCSI-2 MultiPack*	*1*	
Mass Storage Sun StorEdge MultiPack			
SG-XDSK020-18G	18.2-GB MultiPack (2 x 9.1-GB, 100000-rpm) UltraSCSI		A PCI SCSI adapter card is required to attach any external SCSI device to the Ultra 5 and Ultra 10
SG-XDSK020-36G	36.4-GB MultiPack (2 X 18.2-GB, 100000-rpm) UltraSCSI		
SG-XDSK040-36G	36.4-GB MultiPack (4 x 9.1-GB, 100000-rpm) UltraSCSI		
SG-XDSK040-72G	72.8-GB MultiPack (4 X 18.2-GB, 10000-rpm) UltraSCSI		
X5511A	*4.2-GB (2 x 2.1-GB), 7200-rpm fast/wide SCSI-2 MultiPack*	*1*	
X5512A	*12.6-GB (6 x 2.1-GB), 7200-rpm fast/wide SCSI-2 MultiPack*	*1*	
X5513A	*25.2-GB (12 x 2.1-GB), 7200-rpm fast/wide SCSI-2 MultiPack*	*1*	
X5514A	*8.4-GB (2 x 4.2-GB), 7200-rpm fast/wide SCSI-2 MultiPack*	*1*	
X5515A	*25.2-GB (6 x 4.2-GB), 7200-rpm fast/wide SCSI-2 MultiPack*	*1*	
X5516A	*50.4-GB (12 x 4.2-GB), 7200-rpm fast/wide SCSI-2 MultiPack*	*1*	
X5501A	*8.4-GB MultiPack (2 x 4.2-GB 5400-rpm) fast/wide SCSI-2*	*1*	
X5502A	*16.8-GB MultiPack (4 x 4.2-GB 5400-rpm) fast/wide SCSI-2*	*1*	
X5503A	*25.2-GB MultiPack (6 x 4.2-GB 5400-rpm) fast/wide SCSI-2*	*1*	
X5504A	*18.2-GB MultiPack (2 x 9.1-GB, 7200-rpm) fast/wide SCSI-2*	*1*	
X5505A	*36.4-GB MultiPack (4 x 9.1-GB, 7200-rpm) fast/wide SCSI-2*	*1*	
X5506A	*54.6-GB MultiPack (6 x 9.1-GB, 7200-rpm) fast/wide SCSI-2*	*1*	
X6527A	*18.2-GB MultiPack (2 x 9.1-GB, 7200-rpm) UltraSCSI*	*1*	
X6528A	*36.4-GB MultiPack (4 x 9.1-GB, 7200-rpm) UltraSCSI*	*1*	
X6529A	*54.6-GB MultiPack (6 x 9.1-GB, 7200-rpm) UltraSCSI*	*1*	

Part Number	Option Description	Maximum Number Supported	Comments
Mass Storage - Sun StorEdge A1000/D1000 Arrays			
SG-XARY144A-36G	36-GB (4 x 9.1-GB, 10000-rpm disks) Sun StorEdge A1000 tabletop/deskside array	6	
SG-XARY144A-109G	109-GB (12 x 9.1-GB, 10000-rpm disks) Sun StorEdge A1000 tabletop/deskside array	6	
SG-XARY151A-72G	72-GB (4 x 18-GB, 10000-rpm disks) Sun StorEdge A1000 tabletop/deskside array	6	
SG-XARY151A-218G	218-GB (12 x 18-GB, 10000-rpm disks) Sun StorEdge A1000 tabletop/deskside array	6	
SG-XARY146A-36G	36-GB (4 x 9.1-GB, 10000-rpm disks) Sun StorEdge A1000 rackmount array	6	
SG-XARY152A-72G	72-GB (4 x 18-GB, 10000-rpm disks) Sun StorEdge A1000 rackmount array	6	
SG-XARY146A-36G	36-GB (4 x 9.1-GB, 10000-rpm disks) Sun StorEdge A1000 rackmount array	6	
SG-XARY152A-72G	72-GB (4 x 18-GB, 10000-rpm disks) Sun StorEdge A1000 rackmount array	6	
SG-XARY145A-36G	36-GB (4 x 9.1-GB, 10000-rpm disks) Sun StorEdge D1000 tabletop/deskside array	6	
SG-XARY145A-109G	109-GB (12 x 9.1-GB, 10000-rpm disks) Sun StorEdge D1000 tabletop/deskside array	6	
SG-XARY153A-72G	72-GB (4 x 18-GB, 10000-rpm disks) Sun StorEdge D1000 tabletop/deskside array	6	
SG-XARY153A-218G	218-GB (12 x 18-GB, 10000-rpm disks) Sun StorEdge D1000 tabletop/deskside array	6	
SG-XARY147A-36G	36-GB (4 x 9.1-GB, 10000-rpm disks) Sun StorEdge D1000 rackmount array		
SG-XARY154A-72G	72-GB (4 x 18-GB, 10000-rpm disks) Sun StorEdge D1000 rackmount array		

Part Number	Option Description	Maximum Number Supported	Comments
Other Options			A PCI SCSI adapter card is required to attach any external SCSI device to the Ultra 5 and Ultra 10
X901A	0.8-meter wide-to-narrow 68-68-pin UltraSCSI	1	
X902A	2.0-meter wide-to-narrow 68-68-pin UltraSCSI	1	
X903A	1.2-meter wide-to-narrow 50-68-pin SCSI adapter cable	1	
X904A	2.0-meter wide-to-narrow 50-68-pin SCSI adapter cable	1	
X3856A	Fast-wide 68 to 68 pin SCSI cable and GEO-specific power cord		
X3857A	Fast-narrow 50 to 68 pin SCSI cable and GEO-specific power cord		
X907A	*Optional power cable, CPU-to-monitor, 1.5 meter*	*1*	
X908A	*Optional power cable, CPU-to-monitor, 2.5 meter*	*1*	
X467A	*MII-AUI converter*	*1*	
Type6 Country Kits			Except for "Z" country kit codes, the country kit contents are included with every Ultra 5 and Ultra 10 configuration. Refer to the "Choice of country kit" sub-section (above) for ordering details.
X3508A	North American Universal	1	
X3509A	French	1	
X3510A	German	1	
X3511A	Swiss-French	1	
X3512A	Swiss-German	1	
X3513A	Swedish	1	
X3514A	United Kingdom	1	
X3515A	Euro UNIX (Power Cordless)	1	
X3516A	Japanese UNIX	1	
X3517A	Taiwanese	1	
X3519A	Japanese	1	
X3520A	United Kingdom UNIX	1	
X3522A	Norwegian	1	
X3523A	Portuguese	1	
X3524A	Spanish	1	
X3525A	Danish	1	
X3526A	Italian	1	
X3527A	Dutch (Netherlands)	1	
X3528A	Australian	1	
X3529A	Finnish	1	
X3581A	Chinese	1	
X3584A	Russian	1	
X3518A	*Korean*	*1*	

Upgrade Information

Sun™ upgrades offer customers outstanding investment protection for their existing Sun equipment.

Key Messages

- Sun offers customers a variety of flexible upgrade paths to the most popular Sun systems
- Choose from full array of chassis upgrades
- Existing investments in non-Sun hardware can be leveraged by upgrading to Sun through competitive upgrades

Sun Upgrade Allowance Program (Sun UAP)

Under UAP, allowance codes or part numbers have been created and the percentage allowance is built into this part number. (See below) These allowance codes replace the UG/CU marketing codes for all desktop upgrades.

Allowance codes can be found in the pricebook beginning September 2000. Please note that allowance codes apply to configured systems and CANNOT be applied to X-options (Monitor upgrades are an exception. See ordering notes below)

Allowance Code Numbering Scheme

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

Allowance code = ALW-15-T-D-A21-P2

- **ALW** = Upgrade identifier.
- **15** = Percentage discount. This is the allowance that is subtracted from the list price of the new product.(15 equals 15% off of list, 08 equals 8% off of list, and so on.

  Note: Any other discounts such as volume discounts should also be taken off the list price and not the net of the above.
- **T** = Desktop upgrade, S for server upgrades, and D for storage upgrades.
- **D** = Acceptable trade-ins by Sun. For reporting purposes.
- **A21** = Product family which identifies what the customer is upgrading to.
- **P2** = Promotions used for tracking corporate sponsored and other promotions.

How to Determine the Right Allowance Code

Scenario: My customer has a SPARCstation™ 10 workstation and would like to upgrade to an Ultra™ 5 workstation. What allowance part number should I select?

1. From left hand column select the platform the **customer has.**

2. From the top row select the platform the customer would like to **UPGRADE TO.**

3. Where the UPGRADE FROM column and the UPGRADE TO row intersect (noted with **) is the allowance part number that is applied to the list price of the standard marketing part number.

DESKTOP SYSTEM MIGRATION AND ALLOWANCE MATRIX

UPGRADE TO:	Ultra 5 (A21)	Ultra 10 (A22)	Ultra 60 (A23)	Ultra 80 (A27)
FROM:				
Early Sun SPARCstation systems	ALW-08-T-A-A21	ALW-08-T-A-A22	ALW-08-T-A-A23	ALW-06-T-A-A27
SS4, 5, 10, or 20**	ALW-12-T-B-A21	**ALW-12-T-B-A22	ALW-10-T-B-A23	ALW-08-T-B-A27
UltraSPARC™ 1,5,10, and 30	ALW-14-T-C-A21	ALW-16-T-C-A22	ALW-16-T-C-A23	ALW-12-T-C-A27
UltraSPARC 2 and 60	ALW-14-T-D-A21	ALW-16-T-D-A22	ALW-18-T-D-A23	ALW-16-T-D-A27
Non-Sun workstations	ALW-10-T-Z-A21	ALW-12-T-Z-A22	ALW-10-T-Z-A23	ALW-10-T-Z-A27

Answer: Allowance part number ALW-12-T-B-A21 should be selected. The customer gets a 12 percent allowance off the list price of any Ultra 5 workstation configuration for returning the SPARCstation 10 system.

Ordering Notes

- No disks, memory, or CD-ROM drives migrate to the Ultra 5 workstation.
- Country kits (keyboard and localized manuals)
  - The Ultra 5 workstation has the country kit physically included within the System Ship Kit. Please note other country kit versions are also available.
  - Country kits are not provided with upgrades from SPARCstation 4, SPARCstation 5, SPARCstation 10, or SPARCstation 20 systems. These platforms are very likely to have Type-5 keyboards and can be migrated to the Ultra 5 workstation. Customers can keep old keyboards or order new.
  - The Ultra 5 workstation does not support the Type-4 keyboard. If a customer has a Type-4 keyboard, please order appropriate country kit. Type-5 keyboards can migrate to the Ultra 5 workstation.
- Monitors
  - Monitors are not included with any Ultra 5 workstation upgrades. If a monitor is needed, order the appropriate X-option or refer to monitor upgrade section of the pricebook and apply the appropriate allowance code.
  - Sun-branded 17-inch and 20-inch monitors migrate from previous generation Sun systems; however, the customer may need to purchase a monitor adapter X471A.

Sun microsystems

–   For some monitors, a video adapter may be required. Please order correct adapter (example: a 21-inch color monitor with on-board 8-bit graphics requires X471A). Adapter choices are:

    •   X3872A—HD15F-to-13W3 video adapter

    •   X471A—13W3F-to-HD15M video adapter (10-inch cable)

–   N1 (Sony GDM 17E10), N2 (Sony GDM 20E20, GDM 17E20), P4 (Sony GDM20D10) are supported monitors on Ultra 5 and 10 workstations. Customer may migrate any of these monitors. However, an adapter is required for operation.

Service and Support

Sun Enterprise Services Offerings

Sun Enterprise Services now provides two service offerings: SunClient℠ program or low-level, low-cost support and SunSpectrum℠ program for high-level support and mission-critical response. Both support programs are available to service Ultra™ 5 workstations.

SunClient Program

Now there is a way to reduce hardware and software support costs for network computers and the Ultra 5 and Ultra 10 workstations. The SunClient support program is a new suite of offerings that is separate, yet complementary to the SunSpectrum program. SunClient Support provides:

- A new 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., M-F telephone coverage	*	*	*
8 a.m.-5 p.m., M-F 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 are charged an additional fee for service activity.

Features and Benefits of the SunClient Program

Features	Benefits

Features

- Unbundled hardware and software support

- Next business day (SunClient Maintenance) or second business day (SunClient Central Maintenance) on-site response

- Single contract with choice of automatic warranty upgrade

- SunClient Central Maintenance

- Service delivery by Sun experts

Benefits

- **Flexibility**: Select the type and amount of coverage needed for desktop systems, so service dollars are targeted where they are needed most.

- **Cost savings**: Pay only for the support services needed.

- **Cost efficiency**: Because Sun can more efficiently manage spare inventory and labor scheduling, the savings can be passed on to the customer.

- **Simplicity**: One contract covers a predefined number of systems at one low price. New systems acquired can be upgraded to the SunClient service level.

- **Cost savings**: Sun realizes an economy of scale by repairing multiple systems with one visit and leverages existing support infrastructures, so cost efficiency is maximized while duplication of effort is minimized.

- **Consistency**: Selected desktops can be deployed anywhere with assurance of cost-effective, quality service and support.

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

The SunSpectrum Program

The SunSpectrum program is an innovative and flexible service offering that allows customers to choose the level of service best suited to their needs, ranging from mission-critical support for maximum solution availability to backup assistance for self-support customers. The SunSpectrum program provides a simple pricing structure in which a single fee covers support for an entire system, including related hardware and peripherals, the Solaris Operating Environment software, and telephone support for Sun™ software packages. The majority of Sun's customers today take advantage of the SunSpectrum program, underscoring the value that it represents. Customers should check with their local Sun Enterprise Services representatives for program and feature availability in their areas.

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.

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

Warranty

A standard Sun warranty offered with all Ultra 5 systems. For warranty terms and conditions, see the warranty web site at: `http://www.sun.com/service/support/warranty/features.html`.

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 3-D objects for enhanced image quality.
3D-RAM	Dual-ported video memory with graphics functionality built into the memory chip.
100BASE-T	*See* Fast Ethernet.
Antialiasing	A graphics technique that greatly enhances the quality of images by eliminating many of the inaccuracies (jaggies) inherent to rendering on a raster display. Typically found only in high-end graphics systems.
DIMM	Double 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.
MII	Media independent interface. Used for connecting external transceivers to Fast Ethernet.
ODBC	Open database connectivity.
OpenGL®	A standard software interface for graphics hardware that allows programmers to create interactive 3-D applications. OpenGL provides a full-featured, network-transparent application programming interface.
PCI	Peripheral component interconnect. An 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, 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 aimed primarily at image and video processing. Some of the instructions allow the CPU to directly access and operate on image data with a high degree of parallelism. Other instructions provide facilities for formatting and moving data at very high rates of speed both within the CPU, and between the CPU and the other system components.

Sun microsystems

Materials Abstract

All materials are available on SunWIN, except as otherwise noted.

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
PowerPack				
– *Sun Ultra™ 5 Workstation: Just the Facts*	Reference Guide (this document)	Training Sales Tool	SunWIN, Reseller Web	75243
– *SunPCi™ IIpro Coprocessor Card: Just the Facts*	Reference Guide	Training Sales Tool	SunWIN, Reseller Web	92629
References				
– *Sun Intro: Sun Ultra 5 with PGX24™ Graphics*	Introduction E-mail	Sales Tool	SunWIN, Reseller Web	93318
– *Five Reasons to Upgrade to Ultra*	Brochure	Sales Tools	SunWIN COMAC	71240 BE614-0
– *The PCI Bus and the Sun Ultra Systems*	Technical Brief	Sales Tool	SunWIN	66738
Quick Reference Cards				
– *Sun Workstation™ Product Line Overview*	Quick Reference Card	Sales Tool	SunWIN, Reseller Web, First Resort	10826
– *Sun Workstation Graphics Products Overview*	Quick Reference Card	Sales Tool	SunWIN, Reseller Web, First Resort	24507
– *Competitive Summary Workstations*	Quick Reference Card	Sales Tool	SunWIN, Reseller Web, First Resort	12259
– *Upgrades Paths*	Quick Reference Card	Sales Tool	SunWIN, Reseller Web, First Resort	24513
Competitive Analysis				
– *Differentiating a PC Workstation from a Sun Workstation Competitive Brief, 1/98*	White Paper	Sales Tool	SunWIN	75269
– *PC Workstation Battle Brief*	White Paper	Sales Tool	SunWIN	75270
– *SGI Competitive Battle Brief*	White Paper	Sales Tool	SunWIN	70605
– *HP Competitive Battle Brief*	White Paper	Sales Tool	SunWIN	70601

Sun microsystems

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Product Collateral				
− *Sun Ultra Desktop Family Brochure*	Data Sheet	Sales Tool	SunWIN, Reseller Web, COMAC	69376 BE604-3
− *Sun Ultra 5 Workstation Data Sheet*	Data Sheet	Sales Tool	SunWIN, Reseller Web, COMAC	69272 DE777-2
− *SunPCi IIpro Coprocessor Data Sheet*	Data Sheet	Sales Tool	SunWIN, Reseller Web, COMAC	97842
Product Presentations				
− *Desktop Product Golden Pitch*	Product Presentation, with Slide Notes	Sales Tool	SunWIN, Reseller Web	75248
− *Graphics Product Presentation*	Product Presentation, with Slide Notes	Sales Tool	SunWIN, Reseller Web	75254
− *Sun in Entertainment Customer Presentation*	Customer Presentation, with Slide Notes	Sales Tool	SunWIN, Reseller Web	75241
− *Sun in Software Development Customer Presentation*	Customer Presentation, with Slide Notes	Sales Tool	SunWIN, Reseller Web	59375
− *Sun in EDA Customer Presentation*	Customer Presentation, with Slide Notes	Sales Tool	SunWIN, Reseller Web	59078
− *Sun in MCAD/MCAE Customer Presentation*	Customer Presentation, with Slide Notes	Sales Tool	SunWIN, Reseller Web	59074
− *Sun in Digital Content Creation Customer Presentation*	Customer Presentation, with Slide Notes	Sales Tool	SunWIN, Reseller Web	75241
White Papers				
− *Ultra 5 and Ultra 10 Architecture White Paper*	White Paper	Sales Tool Training	SunWIN, Reseller Web	75258
− *UltraSPARC-IIi Processor White Paper*	White Paper	Sales Tool Training	SunWIN, Reseller Web	75259
− *SunPCi IIpro Coprocessor Card White Paper*	White Paper	Sales Tool Training	SunWIN, Reseller Web	92632
External Web Sites				
− *Sun Home Page*	`http://www.sun.com/desktop/`			
− *SunStore℠ System Purchases*	`http://sunstore.sun.com/`			