What's New in the Solaris 8 Operating Environment

Sun Microsystems, Inc.
901 San Antonio Road
Palo Alto, CA 94303-4900
U.S.A.

Part No: 805-6332–05
August 1999

Contents

Preface

What's New in the Solaris 8 Operating Environment highlights and describes the new features of the Solaris™ 8 operating environment.

How This Book Is Organized

Chapter 1 contains tables that list new features and functionality in the Solaris 8 software release and previous releases of the Solaris operating environment.

Chapter 2 provides more extensive descriptions of the new features and functionality in the Solaris 8 operating environment.

Ordering Sun Documents

The Sun Software Shop stocks select manuals from Sun Microsystems™, Inc. You can purchase individual printed manuals and AnswerBook2™ CDs.

For a list of documents and how to order them, visit the Software Shop at `http://www.sun.com/software/shop/`.

Accessing Sun Documentation Online

The docs.sun.com[SM] Web site enables you to access Sun technical documentation online. You can browse the docs.sun.com archive or search for a specific book title or subject. The URL is `http://docs.sun.com`.

What Typographic Conventions Mean

The following table describes the typographic changes used in this book.

TABLE P–1 Typographic Conventions

Typeface or Symbol	Meaning	Example
`AaBbCc123`	The names of commands, files, and directories; on-screen computer output	Edit your `.login` file. Use `ls –a` to list all files. `machine_name% you have mail.`
`AaBbCc123`	What you type, contrasted with on-screen computer output	`machine_name%` **`su`** `Password:`
AaBbCc123	Command-line placeholder; replace with a real name or value	To delete a file, type **`rm`** *filename.*
AaBbCc123	Book titles, new words or terms, or words to be emphasized.	Read Chapter 6 in *User's Guide.* These are called *class* options. Do *not* save changes yet.

CHAPTER 1

What's New at a Glance

This chapter highlights new features of the Solaris 8 operating environment. Table 1–1 provides a brief description of new features in this release. For more extensive descriptions of these features, see Chapter 2.

The Solaris operating environment is the foundation for web-based computing. It is scalable and has the capacity to run and grow businesses on the Internet. Solaris software is the WebTone for the Internet. The Solaris 64–bit operating environment provides the capacity, performance, and precision needed for handling very large files. Reliable, solid, and multifaceted, Solaris software is built to provide capacity, security, interoperability, manageability, and global connectivity.

Key Features of the Solaris 8 Release

The following key features are the highlights of this release. Table 1–1 overviews these new features and Chapter 2 provides details on each feature.

- The IPv6 stack and utilities integrate IPv6 into the Solaris 8 operating environment, providing a platform for improved Internet functionality.
- The Java™ 2 Software Development Kit (SDK) for Solaris significantly improves scalability and performance of Java applications.
- The Solaris Installation CD provides users a graphical, wizard based, Java powered application to install the Solaris operating environment and other software.
- The Solaris 8 operating environment supports the Universal Disk Format (UDF) file system, enabling users to exchange data stored on CD-ROMs, disks, diskettes, DVDs, and other optical media.
- The Solaris 8 CD includes support for more than 90 locales, covering 37 languages.

- The Solaris Common Desktop Environment (CDE) contains new and enhanced features that incorporate easy to use desktop productivity tools, PC interoperability, desktop management tools, and standards.

TABLE 1–1 Solaris 8 Features

Feature	Description
Enhanced Internet Protocol	
IPv6	IPv6 is a new version of Internet Protocol (IP). It is an increment to IPv4 that provides a platform for new Internet functionality.
Java Enhancements	
Java 2 Software Development Kit (SDK)	The Java 2 SDK, formerly the Java Development Kit (JDK™) 1.2.1_03, is the first Solaris release of Java technology based on Java 2. It includes: ■ Substantially increased scalability and performance ■ Improved class libraries, including the new Java 2 APIs ■ Enhanced memory system ■ High-performing, scalable Java Virtual Machine (JVM) ■ Fast Java thread synchronization
Installation and Management	
Booting a system over the network with Dynamic Host Configuration Protocol (DHCP)	Network installs can now use DHCP to acquire boot parameters and network configuration information needed to boot a client over the network. DHCP booting is supported on certain SPARC™ and Intel based systems.
DHCP Manager	DHCP Manager provides a Java-based graphical interface for configuring and managing the Solaris DHCP server and DHCP databases. It allows the system administrator to use a single tool to perform all DHCP management duties: set up and manage DHCP servers, manage client configuration options and macros, and manage networks and IP addresses that are under DHCP management.
Support for domain name system (DNS) in system identification utilities	DNS has been added to the list of name services that can be configured through the system identification utilities.
Support for IPv6 in system identification utilities	Systems can now be configured to use IPv6 in addition to IPv4 at install time.
Networking	

TABLE 1–1 Solaris 8 Features *(continued)*

Feature	Description
Enhanced FTP server	The FTP server software in this Solaris release is modeled after the popular Washington University FTP server, `wu-ftpd`, but has been enhanced to include simplified system administration procedures.
IPSec for IPv4	The IP Security Architecture (IPSec) provides protection for IP datagrams. The protection can include confidentiality, strong integrity of the data, partial sequence integrity (replay protection), and data authentication.
IPv6 NFS/RPC compliant	This feature adds IPv6 support to NFS™ and RPC in a seamless manner. There are no changes to existing commands related to NFS. Most RPC applications will also run over IPv6 without any change. Some advanced RPC applications with transport knowledge might require updates.
Logical Link Controller 2 (LLC2)	The Class II logical link control driver (LLC2) interfaces network software (NetBIOS, SNA, OSI), running under the Solaris operating environment to a physical LAN network controlled by one of the supported communications adapters. This version of the LLC2 driver includes support for both connectionless and connection-oriented logical link control class II LLC2 operations for Ethernet, Token Ring, and FDDI adapters when accessed through the appropriate Solaris MAC layer driver.
NIS/NIS+ over IPv6 transports	This feature enables users to store IPv6 addresses in the NIS and NIS+ naming services.
`sendmail` 8.9.3	New options and utilities improve the storage and security functionality of `sendmail`.
Service Location Protocol (SLP)	SLP is an Internet Engineering Task Force (IETF) standards-track protocol for discovering shared resources (such as printers, file servers, netcams, and so on) in an enterprise network. The Solaris 8 operating environment contains a full implementation of SLP that includes APIs that allow developers to write SLP-enabled applications, and provides system administrators a framework for ease of network extensibility.
File System Enhancements	
Universal Disk Format (UDF) file system	The UDF file system, the industry-standard format for storing information on optical media technology, is supported in this Solaris release. The UDF file system can be used to exchange data on the following components when they contain a UDF file system: ■ CD-ROMs ■ Disks and diskettes ■ Digital versatile disc or digital video disc (DVD) — DVD-ROM on supported platforms

TABLE 1–1 Solaris 8 Features *(continued)*

Feature	Description
NFS server logging	NFS server logging allows an NFS server to provide a record of file operations performed on its file systems. This feature is particularly useful for sites that make anonymous FTP archives available to NFS and WebNFS™ clients.
WebNFS JavaBeans component	The WebNFS JavaBeans™ component contains an XFileChooser class that extends the JFileChooser graphical component of the Java 2 API. This bean can be used by any Java 2 application that needs to display a file chooser to enable users to select a file for input (open) or output (save). Using XFileChooser an application can access a file on a local disk or on an NFS server through the use of NFS URL naming.
Diagnostic and Availability Enhancements	
The `coreadm` command	The `coreadm` command provides flexible core file naming conventions and better core file retention.
Examining core files with proc tools	Some of the proc tools have been enhanced to examine process core files as well as live processes. The proc tools are utilities that can manipulate features of the `/proc` file system.
Improved device configuration (`devfsadm`)	The `devfsadm` command provides an improved mechanism for managing the special device files in the `/dev` and `/devices` directories, including support for dynamic reconfiguration events.
Improved system error messages	The system boot and error message format now provides a numeric identifier, module name, and time stamp to messages generated by the `syslog(1M)` logging facility. In addition, messages that were previously lost after a system panic and reboot are now saved.
Remote console messaging	New console features improve the ability to troubleshoot remote systems.
TCP/IP internal trace support	TCP/IP now provides internal trace support by logging TCP communication when a connection is terminated by an RST packet. When an RST packet is transmitted or received, information on as many as 10 packets (transmitted or received immediately before on that connection) is logged with the connection information.
Performance and Scalability Enhancements	
`apptrace`	A new application debugging tool, `apptrace` enables application developers and system support personnel to debug application or system problems by providing call traces to Solaris shared libraries, which may show the series of events leading up to a point of failure.

TABLE 1–1 Solaris 8 Features *(continued)*

Feature	Description
`busstat` (*SPARC™ Platform Edition* only)	A new system monitoring tool, `busstat` provides access to bus-related performance counters on supported SPARC platforms. Viewing these performance counters with `busstat` enables you to measure hardware clock cycles and bus statistics including DMA and cache coherency transactions on a multiprocessor system.
Fast boot for servers	Large servers now require significantly less time to boot.
New alternative to `poll()` interface	`/dev/poll` is a second form of polling for the completion of I/O events that provides much higher performance when a very large number of events must be polled for on file descriptors that remain open for a long time. This feature supplements `poll(2)`; it does not replace `poll(2)`.
`prstat`	The `prstat` utility iteratively examines all active processes on the system and reports various statistics based on the selected output mode and sort order.
Realtime Systems Enhancements	
High resolution timers	The high resolution timers (HRTs) bypass the traditional 10 millisecond clock interface to expose the granularity of the physical clock interrupt from the hardware. Thus, the HRT interface allows a real time process to take control of one processor (of a multi-processor system) and operate to any required degree of precision in timing events.
Common Desktop Environment (CDE) Desktop Enhancements	
Ease of Use	
Hot Key Editor	The Hot Key Editor enables users to predefine a series of commands to a given function key, resulting in increased productivity and efficiency.
SDTImage	SDTImage is a screen snapshot feature that enables users to easily and quickly capture a screenshot image from the command line.
ToolTips	ToolTips provides users with a simple and short description of an icon function.
Standards	
Java Media Framework (JMF)	The Java Media Framework (JMF), a Java-based application, provides smooth streaming video file format support for MPEG1, MPEG2, Quicktime, and AVI, as well as audio support for MIDI. This feature enables users to take advantage of the real-time video creation and broadcast functionality.

TABLE 1–1 Solaris 8 Features *(continued)*

Feature	Description
Personal Digital Assistant (PDA) support	The PDA Synchronization (PDASync) is a Java-based application that enables users to easily synchronize their desktop calendar, mail, address book, and memos with their PDA.
X11R6.4 support	This new and enhanced version of XServer includes key new features that increase user productivity and mobility. These new features include: ■ Web-enabled X application access on any browser-based desktop, providing users with access to corporate X applications through the Internet or intranet ■ Xinerama, one logical screen image support that enables users to display an image across multiple monitors ■ Minimized colormap flashing
Interoperability	
Netscape Application Launcher	The Netscape™ Application Launcher enables users to easily access and automatically launch Netscape files and associated Netscape applications such as Composer. This feature eliminates the need to run the entire Netscape environment, simplifying access to Netscape applications.
Management	
Print Client	This feature enables users to easily configure their own set of printers and default printer without any intervention from an administrator.
Web Browser Enhancements	
Java Plug-In	Java Plug-In for the Solaris operating environment is an add-on product for Netscape Navigator™ that enables Java applets and JavaBeans components to run on Web pages using Java Runtime Environment (JRE) 1.2 instead of the default Java Virtual Machine (JVM) bundled with Navigator.
Netscape Communicator 4.51	Solaris 8 includes Netscape Communicator 4.51 and now installs it by default on your system.
Printing	
Print naming enhancement	This Solaris release supports the `printers` database in `/etc/nsswitch.conf`, the name service switch file. The `printers` database provides centralized printer configuration information to print clients on the network.

TABLE 1–1 Solaris 8 Features *(continued)*

Feature	Description
Solaris Print Manager	Solaris Print Manager is a Java-based graphical user interface that enables you to manage local and remote printer access. This tool can be used in the following name service environments: NIS, NIS+, NIS+ with Federated Naming Service (FNS), and files.
Language Support	
Universal language coverage	Solaris 8 now includes support for more than 90 locales, covering 37 languages, as a standard feature on the Solaris CD.
Improved language installation and setup	Changes to packaging on the language CD have reduced the storage requirements for a mixed language installation. A redesign of the install interface makes language selection and grouping extremely intuitive.
Expanded Unicode support	Solaris 8 continues to broaden support for Unicode with the addition of new Unicode (UTF-8) locales for Simplified Chinese and Traditional Chinese.
Customer-extensible codeset conversion (`geniconvtbl`)	With the Solaris 8 operating environment, developers can easily create and add to the Solaris system their own user-defined codeset conversions by using the `geniconvtbl` utility. Modification to existing Solaris codeset conversions is also supported.
Improved data interoperability	Data interoperability with non-Solaris environments has been improved in Solaris 8 with the addition of the following new `iconv` data conversion utilities: ■ `iconv` for Japanese mainframe data types ■ `iconv` for Microsoft data encodings (including user defined characters) ■ `iconv` for UTF-8 interoperability in China and Korea ■ `iconv` for various Unicode encoding formats and international and de facto industry standard codesets
New locales added	Two new locales have been added to Solaris 8 for Iceland (ISO8859-15) and Russia (ANSI1251). The new Russian locale is in addition to the existing Russian (8859-5) locale and provides native Microsoft data encoding support.
Documentation	
AnswerBook2 Documentation Server updates	The AnswerBook2™ Documentation Server has been updated for this release. Major changes since the Solaris 7 release include replacing the AnswerBook2 navigation icons with text, improved support for non-English locales, and minor changes to improve overall performance and stability.

TABLE 1–1 Solaris 8 Features *(continued)*

Feature	Description
Reference Manual reorganization	The section of the *SunOS™ Reference Manual* that describes the C library functions (but does not include the system calls) now contains six books instead of one. These books are ■ Basic Library Functions ■ Networking Library Functions ■ Curses Library Functions ■ Threads and Realtime Library Functions ■ Extended Library Functions ■ Libraries and Headers In addition, many of the man page suffixes have been changed to reflect the library that contains the function.
Audio Enhancements	
Audio mixer driver (*SPARC Platform Edition* only)	The audio mixer driver now allows multiple applications to play and record audio simultaneously.
Software Developer Environment	
64–bit Kodak Color Management System (KCMS) libraries (*SPARC Platform Edition* only)	Kodak Color Management System™ (KCMS™) is now providing a 64–bit version of the libraries. Applications that currently use KCMS and are converted to the 64–bit operating environment can now retain color management.
Extensions to runtime link auditing	Additional means of invoking runtime link auditing libraries is provided by the link editor options `-p` and `-P`. Additional runtime link auditing interfaces `la_activity( )` and `la_objsearch( )` have been added.
Practical Extraction and Report Language (Perl) 5	The popular programming language, Perl 5.005_03, is included in the Solaris 8 release. Perl is commonly used for CGI scripting as well as automating complex system administration tasks.
Secure path name change from `/usr/lib` to `/usr/lib/secure`	The secure directory from which files can be preloaded is now `/usr/lib/secure` for 32–bit objects and `/usr/lib/secure/sparcv9` for 64–bit SPARCV9 objects.
`$ISALIST` token support	Greater flexibility in establishing instruction set specific dependencies is provided with the new `$ISALIST` dynamic string token.
Intel Platform Specific Enhancements	

TABLE 1–1 Solaris 8 Features *(continued)*

Feature	Description
Advanced Configuration and Power Interface (ACPI) (*Intel Platform Edition* only)	ACPI is a new, more flexible way to configure and control Intel Architecture hardware. ACPI obsoletes Plug and Play BIOS and the Intel Multi-Processor Specification (MPSPEC). If ACPI is available on your Intel architecture system, Solaris 8 automatically uses it to configure the hardware.
Added support for Physical Address Extension (PAE) mode (*Intel Platform Edition* only)	With the release of Pentium Pro, Intel introduced a mode called PAE on its advanced processors. By using PAE, Solaris *Intel Platform Edition* can address up to 32 Gbytes of physical memory.
Boot partition in Solaris 8 (*Intel Platform Edition* only)	Machines running Solaris 8 *Intel Platform Edition* may now designate a separate boot partition during installation.
CD-ROM boot (*Intel Platform Edition* only)	This new feature enables the user to boot a system from an installation CD (rather than the Device Configuration Assistant diskette, as was the case in the past) using the "El Torito" standard.
Large disk support (*Intel Platform Edition* only)	By using improved BIOS interfaces to access the disk, Solaris 8 *Intel Platform Edition* now fully uses disks larger than 8 Gbytes.
PCI hot-plug support (*Intel Platform Edition* only)	This feature enables standard PCI adapters to be hot-plugged into a machine with the hot-plug capability that is running Solaris *Intel Platform Edition*. You can now add (hot-add) or remove (hot-remove) adapters from a system while the system is still running.
Universal Serial Bus (USB) support for keyboards and mouse devices (*Intel Platform Edition* only)	Solaris *Intel Platform Edition* now provides USB support for keyboards and mice.
Xeon enhancements (*Intel Platform Edition* only)	To maximize performance, Solaris 8 *Intel Platform Edition* now supports the Page Attribute Table (PAT) feature of Intel x86-32 processors (Pentium II and Pentium III).
Extended Memory (XMEM) support (*Intel Platform Edition* only)	XMEM support provides a mechanism that allows a single 32-bit process to efficiently allocate and manage more than 4 Gbytes of physical memory. The XMEM feature is implemented as a file system (`xmemfs`) that system administrators can mount and use to reserve memory for applications.

TABLE 1–1 Solaris 8 Features *(continued)*

Feature	Description
X Server video driver enhancement (*Intel Platform Edition* only)	Solaris *Intel Platform Edition* now provides support for the following video devices: ■ Cirrus Logic GD5465 ■ 3Dlabs Permedia2 (Diamond Fire GL 1000 Pro) ■ S3 Trio3D ■ Matrox Productiva G100 ■ Matrox Millennium G200 ■ Matrox Mystique G200
Intel Platform SCSI Drivers	
`cadp` driver enhancements (*Intel Platform Edition* only)	The Solaris `cadp` driver now supports Adaptec Ultra2 adapters.
`ncrs` device driver enhancements (*Intel Platform Edition* only)	The Solaris `ncrs` device driver now supports the SCSI hot-plugging functionality and Ultra2 devices, in addition to including general functionality and performance improvements.
`symhisl` device driver (*Intel Platform Edition* only)	The `symhisl` device driver, which supports the adapters SYM22910 and SYM21002, is now included in Solaris *Intel Platform Edition*.

Features Added in Previous Solaris Releases

This section describes features introduced in previous Solaris releases.

Solaris 7 Release

Table 1–2 describes new and enhanced features of the Solaris 7 release.

TABLE 1–2 Solaris 7 Features

Feature	Description
Solaris 64-bit Operating Environment	
64-bit operating environment (SPARC only)	The 64-bit Solaris operating environment is a complete 32-bit and 64-bit application and development environment supported by a 64-bit operating system. This permits maximum compatibility and interoperability for existing applications, both source and binary. At the same time, the 64-bit Solaris operating environment overcomes many of the limitations of the 32-bit system, most notably by supporting a 64-bit virtual address space as well as removing other existing 32-bit system limitations. (For SPARC Platform Edition only.)
Web Browser	
Netscape Communicator	Solaris 7 software now ships with Netscape Communicator.
Network Management and System Administration	
UFS logging	UFS logging is the process of storing transactions (changes that make up a complete UFS operation) in a log before the transactions are applied to the UFS file system. Once a transaction is stored, the transaction can be applied to the file system later. UFS logging provides two advantages. It prevents file systems from becoming inconsistent, therefore eliminating the need to run `fsck(1M)`. And, because `fsck` can be bypassed, UFS logging reduces the time required to reboot a system if it crashes, or after an unclean halt.
`–o noatime` UFS mount option	To ignore access time updates on files, you can specify the `–o noatime` option when mounting a UFS file system. This option reduces disk activity on file systems where access times are unimportant (for example, a Usenet news spool).
LDAP	The Lightweight Directory Access Protocol (LDAP) is an open-standard, platform-independent, access protocol based on the X.500 informational model. It is designed to run over TCP/IP and uses simple string encodings. LDAP applications are client-server applications and the client library included in this release enables developers to write LDAP applications and users to run LDAP enabled applications.
Dynamic reconfiguration	Dynamic reconfiguration allows the service provider to add, or remove and replace, hot-pluggable system boards in a running system, eliminating the time lost in rebooting. (For certain SPARC systems only.)
New commands: `pgrep` and `pkill`	The `pgrep` command looks at the active processes on the system and displays the process IDs of the processes whose attributes match the specified criteria on the command line. The `pkill` command works the same way as the `pgrep` command except that each matching process ID is signaled by `kill(2)` instead of having the process ID displayed.
`sendmail` 8.9	This version includes hooks that enable restriction of spam (unsolicited, bulk email); virtual hosting that allows email to be received using different domain names; and an improved configuration hierarchy that makes building your own `sendmail` configuration file much easier.

TABLE 1–2 Solaris 7 Features *(continued)*

Feature	Description
Traceroute utility	Solaris 7 software bundles the popular traceroute utility. The traceroute utility is used to trace the route an IP packet follows to an Internet host. It is especially useful for determining routing misconfiguration and routing path failures.
System crash dump utility	The system crash dump features include the following: ■ The `dumpadm` command enables system administrators to configure crash dumps of the operating system. ■ Dump data is now stored in compressed format on the dump device. ■ Saving core files is run in the background when a dedicated dump device–not the primary swap area–is part of the dump configuration.
Network Performance	
TCP with SACK	TCP selective acknowledgment (TCP SACK) provides the support described in RFC 2018 to solve the problems related to congestion and multiple packet drops, especially in applications using TCP large windows (RFC 1323) over satellite links or transcontinental links.
Network Security	
`RPCSEC_GSS`	RPC has been modified based on the GSS-API. This increases security integrity and confidentiality, and NFS services are no longer tied down to a specific or a single security mechanism.
NIS+ extended Diffie-Hellman	NIS+ enhances NIS+ security by increasing the authentication key length from 192 bits to 640 bits.
BIND 8.1.2	Berkeley Internet Name Daemon (BIND), the most popular DNS implementation, has been upgraded to 8.1.2. It provides a new configuration file that enhances network security through the use of access control lists (ACLs).
Ease-of-Use and Management Improvements	
Installation	
SPARC: Installing a 64-bit operating environment	The Solaris 7 installation programs have a new check box for selection of 64-bit support; it is selected by default when installing on UltraSPARC™ platforms.
Installing AnswerBooks with Web Start	The Web Start product (on the Documentation CD) provides a point-and-click interface with selections for installing the AnswerBook2 server, all document collections on this CD, or selected document collections.

TABLE 1–2 Solaris 7 Features *(continued)*

Feature	Description
More locale selections	In the Solaris 7 release, the English and European localized versions of Solaris software have been combined on a single CD. As a result, more locale selections are available during installation of this combined CD than were seen for Solaris 2.6 software.
Documentation	
Man pages available in AnswerBook2 format	Man pages are available in AnswerBook2 (SGML), rather than AnswerBook format. This provides improvements in navigation and links to man pages directly from other AnswerBook2 documents.
Running an AnswerBook2 server directly from the Documentation CD	With a Documentation CD and root access to the system on which the CD is connected, the AnswerBook2 server can run directly from the CD using the `ab2cd` script. The documentation can be viewed from the CD.
Ability to use CGI-based web servers	The AnswerBook2 server can run on top of an existing web server, such as Sun WebServer™, rather than requiring an additional web server run on the system solely for AnswerBook2 support.
Ability to control display of style sheet errors	An environment variable, *AB2_DEBUG*, can be set on the AnswerBook2 server. It controls whether style sheet errors are displayed to the user with a red "BUG."
Language Support	
Enhanced language framework	■ Solaris software has expanded its Unicode support with the addition of six new UTF-8 locales: French, German, Italian, Spanish, Swedish, and Europe. Also, enhanced Unicode locale with multiscript capability is included. Users can input and display text from different writing scripts such as Japanese, Thai, and Russian, and easily switch between the scripts without having to change to or install a new locale. ■ Complex text support has been integrated for complex text layout languages such as Arabic, Hebrew, and Thai, which require special text pre-processing to handle bidirectional, composite, and context-sensitive text. ■ Solaris 7 software implements the Internet Intranet Input Method Protocol (IIIMP) to enable seamless interoperability between the input methods provided in Solaris, Java, and non-X Windows applications. ■ The Desktop Font Downloader enables users to download, remove, re-encode and convert fonts, check status, and perform other administrative tasks on a PostScript™ printer.

TABLE 1–2 Solaris 7 Features *(continued)*

Feature	Description
Expanded locale support	■ The European Community (EC) has agreed to standardize on a single currency - the "Euro" currency. Beginning January 1999, all foreign exchange, banking, and finance industries in the EC will convert from using their local currencies to using the Euro. In anticipation of this changeover, Solaris 7 software has added support for the Euro currency with six new user locales. ■ Solaris software has added support for the Eastern European, Thai, and the Middle Eastern regions.
Standards	
UNIX 98 branding	Solaris 7 software is branded UNIX® 98.
Software Developer Environment	
64-bit developer environment (SPARC only)	The Solaris 7 operating environment provides developers with complete 32-bit and 64-bit development environments.
Runtime linker	The runtime linker permits programs to find shared libraries without having to set `LD_LIBRARY_PATH` and makes the loading of shared libraries even more efficient.
`man` utility now displays SGML code	The `man` utility is now able to display man pages that are coded with SGML, as well as the traditional `nroff`.
Solaris 64-bit X Window libraries	All of the core X11 shared libraries (`.so`) and all lint libraries (`.ln`) for programmers provided in 32-bit versions are available in 64-bit versions for 64-bit Solaris software.
Java Development Kit for Solaris performance improvements	The Java Development Kit 1.1.5 for Solaris has been specially tuned and tested. As a result, it offers significantly improved scalability and performance for Java applications developed for, and deployed in, the enterprise and across the network.
WebNFS Software Development Kit included	The WebNFS Software Development Kit (SDK) provides remote file access for Java applications using WebNFS. Since it implements the NFS™ protocol directly, it requires no NFS support on the host system.
`truss` now performs function-call tracing	The `truss` utility traces the system calls, signals, and machine faults of a process. It has been enhanced with a new option to enable entry and exit tracing of user-level function calls executed by the traced process.

TABLE 1–2 Solaris 7 Features *(continued)*

Feature	Description
Improved device configuration library	The `libdevinfo` library, used to obtain device configuration information, has been made more robust and comprehensive in Solaris 7 software. For more information, see the man page `libdevinfo`(3).
Graphics/Imaging	
XIL™	The XIL foundation imaging library is suitable for libraries or applications requiring imaging or digital video, such as document imaging, color prepress, or digital video generation and playback. New support for stereoscopic image display enables the presentation of image pairs representing a left-eye/right-eye view. This provides an image display with depth perception. The XIL Developer's Kit is now separate from Solaris and is available free of charge.
Desktop	
Common Desktop Environment, (CDE)	CDE contains new tools to make it easy to find, manipulate, and manage address cards, applications, email addresses, files, folders, hosts, processes, and web addresses. Included in CDE is support for Motif 2.1, which includes five new Motif widgets and is MT-safe. Motif 2.1 supports ISO standard Complex Text Language locales in which a single binary developed on the Solaris 7 operating environment provides advanced and standard support for Hebrew, Arabic, and Thai customers.
Printing	
Enhanced Font Management	The Desktop Font Downloader allows users to download, remove, re-encode and convert fonts, check status, and perform other administrative tasks on a PostScript printer.
Intel Platform Edition Hardware Support	
SCSI disk driver `sd`	The `sd` SCSI disk target driver, formerly supplied only on Solaris (SPARC Platform Edition) systems, is now used for SCSI disk support and ATAPI CD-ROM support in place of `cmdk`. The `cmdk` driver is still available to support non-SCSI hard disks.
Intelligent I/O framework support	Intelligent I/O (I2O) is an emerging standard for modular, high-performance I/O subsystems. This feature, which is dependent on I2O-capable hardware, is only available for Solaris (Intel Platform Edition).

Solaris 2.6 Release

Table 1–3 describes new and enhanced features of the Solaris 2.6 release.

TABLE 1–3 Solaris 2.6 Features

Feature	Description
Java	
Java Virtual Machine	The Java Virtual Machine 1.1 integrates the Java platform for the Solaris operating environment. It includes the Java runtime environment and the basic tools needed to develop Java applets and applications.
HotJava™ browser	The HotJava browser provides an easy-to-use, customizable user interface for exploring the Internet and corporate intranets. It can run executable content in the form of applets. (Applets are Java programs that can be included in an HTML page, much like images can be included.)
Intranet/Internet Services	
WebNFS software	The WebNFS software enables file systems to be accessed through the Web using the NFS protocol. This protocol is very reliable and provides greater throughput under a heavy load.
Performance Improvements	
Database Performance	
UFS direct I/O	For UFS files, direct I/O enables a program to read and write data directly from and to the disk, bypassing the virtual memory buffer cache. An example of a bulk I/O operation is downloading large amounts of satellite data to a file.
Raw I/O	Improvements were made to low-level I/O support routines that dramatically improve throughput for I/O to disk devices without a file system (raw devices often used for database files.). The driver for the SPARCstorage™ Array was rewritten to improve its throughput.
Network/Web Performance	
Kernel sockets	The kernel sockets implementation provides improved compatibility with SunOS 4.x and BSD sockets, and enables higher socket performance.
TCP large windows	TCP large windows provides the support described in RFC1323. It improves performance over high-bandwidth networks such as ATM, or high-delay networks such as satellite links, by using windows that exceed the normal 64-Kbyte limit.
Zero copy TCP/ hardware checksum	Zero copy TCP has been used to eliminate copying from user-space to kernel-space. Support for hardware checksum has been added as well. Performance is improved by avoiding software computation of the checksum, off-loading the work to a network adapter that supports it. This is currently only supported on the SunATM™ card.

TABLE 1–3 Solaris 2.6 Features *(continued)*

Feature	Description
Ease-of-Use and Management Improvements	
Installation	
Solaris Web Start browser-based installation	Solaris Web Start is a browser-based utility that guides users through selection and installation of both Solaris and bundled application software.
Installation documentation	A documentation reorganization makes finding information on how to install Solaris software easier.
x86 device configuration	The Configuration Assistant interface is part of the new booting system for the Solaris (Intel Platform Edition) software. It determines which hardware devices are in the machine, accounts for the resources each device uses, and enables users to choose which device to boot from.
x86 configuring peripherals	The `kdmconfig` program is used to configure the mouse, graphics adapter, and monitor on an x86 system. If an `Owconfig` file already exists, `kdmconfig` will extract any usable information from it. In addition, this updated version of `kdmconfig` will also retrieve information left in the `devinfo` tree by the `devconf` program, and use that information to automatically identify devices.
Changed Solaris CD layout	Slice 0 on the Solaris CD has been reorganized to make it more intuitive and extensible.
Upgrade with disk space reallocation	The `upgrade` option provides an auto-layout feature to reallocate disk space if the current file systems don't have enough space for the upgrade.
Testing upgrade profiles	The `pfinstall` command is now available to test profiles that use the upgrade option.
Changing a system's boot device	A system's boot device is now changeable during installation.
Preconfiguring system Configuration information	Using the `sysidcfg` file, you can now preconfigure system configuration information through a set of keywords. You can choose to provide one or more of the keywords to preconfigure varying levels of system information.
Optional 8-bit locales	The installation window in the English Solaris 2.6 CD offers several English language locales. To use 8-bit characters, users should install through one of the –`en_XX` options. The locale used in the installation becomes the default system locale.
Documentation	

TABLE 1–3 Solaris 2.6 Features *(continued)*

Feature	Description
AnswerBook2 documentation	Solaris online documentation can be accessed with any popular browser. The AnswerBook2 viewer uses a web browser-based interface that enables users to view and print a variety of Solaris information, including existing AnswerBook™ documents and man pages.
Desktop	
Common Desktop Environment (CDE)	Solaris CDE is an advanced Motif-based desktop with an easy-to-use interface that provides a consistent look and feel across UNIX® platforms. With Solaris CDE you can run OpenWindows™ applications without modifications. In addition, CDE applications are integrated with the Web; for example, you can click on an HTTP address in a CDE Mailer message and a browser will open to the selected address.
Power Management™ for SPARC desktops	Power Management software enables users to be more frugal with power consumption on desktop systems when they are not being used. By default, all UltraSPARC desktop systems power off when left alone for 30 minutes. Users can modify or turn off Power Management if needed.
OpenWindows desktop	The OpenWindows 3.6 desktop and libraries have been updated with bug fixes and prepared for the year 2000.
New user locales	Ten new locales are added for Eastern European, Russian, Greek, and Baltic states.
Unicode 2.0 support	Two locales that are Unicode 2.0 and ISO 10646 compliant have been added. These locales enable multiscript input and output and are the first locales provided in the Solaris environment with this capability. These locales support the CDE environment only, including the Motif and CDE libraries
Font administration	- Font Admin enables easy installation and usage of fonts for the X Window System. It supports TrueType, Type0, Type1, and CID fonts for multibyte languages, and provides comparative font preview capability. It is fully integrated into the CDE desktop. - TrueType fonts are supported through X and Display PostScript. Font Admin enables easy installation and integration of third-party fonts into the Solaris environment.
Asian language enhancements	Solaris 2.6 software has been re-architected to the historical dependency on the Extended UNIX Codeset (EUC). Additional codeset support and locales for popular Asian PC encoding standards (ShiftJIS (PCK) in Japan, Big5 in PRC, and Johap) in Korea are also provided. These locales support the CDE environment only, including the Motif and CDE libraries.
Solaris user registration	Users who register using Solaris electronic registration will receive information about new Solaris offerings and support.
Standards	
Year 2000 compliance	The Solaris 2.6 operating environment is year-2000 ready. It uses unambiguous dates and follows the X/Open guidelines where appropriate.

TABLE 1–3 Solaris 2.6 Features *(continued)*

Feature	Description
X/Open UNIX 95 (Spec 1170)	The previous release of the Solaris software was compliant with much of Spec 1170. The Solaris 2.6 release now meets all the requirements.
X/Open XFN CAE	Federated Naming Service (FNS) is now compliant with the X/Open XFN CAE definition.
POSIX 1003.1b	POSIX real-time functionality is added. This includes full support for POSIX AIO (with the exception of the –`PRIORITIZED I/O` option) and some new extensions to support 64-bit files, (see "Large Files").
ISO 10646	The ISO 10646 standard defines Unicode 2.0, including UCS-2 and UTF-8 (the standard UNIX implementation). All implementations specified in this standard are Unicode 2.0 compliant.
Robust Software Developer Environment	
Large files	Large files are supported on UFS, NFS, and CacheFS™ file systems. The interfaces defined by the Large File Summit are supported.
Versioning/ scoped libraries	Developers of shared libraries can now have better control over the public interfaces that they offer. This helps to control the dependencies that applications have on these shared libraries. It also means the applications are more portable and less affected by changes in the shared libraries, thus leading to higher-quality products for both. In the Solaris 2.6 operating environment, the system libraries take advantage of this technology and have been both scoped and versioned.
Scheduler activations	Scheduler activations provide additional kernel scheduling support for multithreaded applications.
Pre-emption control	Pre-emption control allows application control over kernel pre-emption.
`/proc` File system and watchpoints	The previous flat `/proc` file system has been restructured into a directory hierarchy that contains additional subdirectories for state information and control functions. It also provides a watchpoint facility to monitor access to and modifications of data in the process address space. The `adb(1)` command uses this facility to provide watchpoints.
Federated naming service (FNS)	FNS is now compliant with the X/Open XFN CAE definition. FNS has also been enhanced to include support for Lightweight Directory Access Protocol (LDAP) and provides improved support for the files and NIS back ends.
Asynchronous I/O	Asynchronous I/O support for tapes provides an interface to improve performance on high-performance tape devices. With the ability to queue up I/O requests, this feature significantly improves the I/O throughput.

TABLE 1–3 Solaris 2.6 Features *(continued)*

Feature	Description
Solaris Developer Kit (SDK)	The SDK software is now built into the Solaris operating environment and is no longer an unbundled product. All the information a developer needs to produce applications and graphics handlers for end-user Solaris runtime environments is now available in this Solaris release.
Graphics	
XGL™	The XGL 2-D and 3-D immediate-mode API provides portability across hardware platforms and optimal performance from graphics acceleration. The XGL API includes support for raster text, environment and vertex-level texture mapping, four-component texture mapping, DGA transparent overlay, and triangle list Gcache.
XIL	The XIL foundation imaging library is suitable for libraries or applications requiring imaging or digital video, such as document imaging, color prepress, or digital video generation and playback. The following features are new in the Solaris 2.6 release. The XIL 1.3 library: - Is MT-hot - Supports the 32-bit, single-precision, floating-point data type - Supports temporary images - Supports the new `XIL_GENERAL` storage format - Includes Kodak Color Management System (KCMS) support - Supports the new `XIL_BAND_SEQUENTIAL` storage format for all data types - Saves on memory use with tiled storage
PEX™ 3.0.2 runtime environment	The PEX application programmer interface (API) provides application portability across platforms and 3-D graphics on local and remote displays.
KCMS multithreaded programming	KCMS now supports multithreaded programs: it is multithread safe (MT-safe). A KCMS application using multithreaded capabilities does not require locks around KCMS library calls.
X11R6 base window system	The X11R6 Base Windowing System includes the latest fixes and patches from the X Consortium.
X11 double buffer extension	The double buffer extension (DBE) provides a standard way to use double-buffering within the framework of the X Window System. Double-buffering uses two buffers, called "front" and "back," that hold images. The front buffer is visible to the user; the back buffer is not. A detailed specification is available via an Internet browser at `ftp://ftp.x.org/pub/DOCS/DBE/`
Large Files Support	

TABLE 1–3 Solaris 2.6 Features *(continued)*

Feature	Description
Large files	Large files are supported on UFS, NFS, and CacheFS file systems. Applications can create and access files up to one Tbyte on UFS-mounted file systems and up to the limit of the NFS server for NFS- and CacheFS-mounted file systems. A new –`mount` option is available to disable the large-file support on UFS file systems. This –`mount` option gives the system administrator a way to ensure that older applications that are not able to safely handle large files will not accidentally operate on large files.
64-bit AIO	The Solaris operating environment provides a new set of interfaces for developers who want to do asynchronous I/O to large files. These interfaces are integrated with KAIO in an implementation technique that optimizes I/O to raw files. They are automatically selected by either the Solaris AIO interfaces or the new POSIX AIO interfaces. KAIO is the optimized path for doing I/O to raw files. When using the interfaces with KAIO to raw files, there is a significant performance improvement.
Network Security	
NFS Kerberos	Kerberos authentication uses DES encryption to improve security over the network. The kernel implementations of NFS and RPC network services now support a new RPC authentication flavor that is based on the Generalized Security Services API (GSS-API). This support contains the hooks to add stronger security to the NFS environment.
`RPCSEC_GSS`	The user-level RPC implementation supports a new authentication flavor. This flavor is based on the GSS-API and provides the hooks to add stronger authentication, privacy, and integrity for RPC-based services.
Authentication modules (PAM)	The PAM framework enables you to “plug in” new authentication technologies.
BIND version 4.9.4-P1	Berkeley Internet Name Daemon (BIND), the most popular DNS implementation, has been upgraded to 4.9.4-P1. It addresses many of the security problems found in earlier versions of the implementation.
Network Management and System Administration	
Network time protocol (NTP)	Solaris software now supports NTP, which provides both precise time and/or network clock synchronization for use in distributed computing environments. In the past, Solaris customers could use a publicly available version of NTP. The new support provides increased time precision.
Solstice™ Enterprise Agents™	Solstice Enterprise Agents (SEA) is based on the new extensible agent technology or master/subagent technology. SEA is for component developers and system and network managers who want to develop custom Simple Network Management Protocol (SNMP), or Desktop Management Interface (DMI) subagents, to instrument different components, subsystems, and applications within a device to enable management from an SNMP management console.

TABLE 1–3 Solaris 2.6 Features *(continued)*

Feature	Description
DHCP	Dynamic Host Configuration Protocol (DHCP) enables a host to get an Internet protocol address and other system configuration parameters without preconfiguration by the administrator.
NFS client failover	Client failover provides a high level of availability of read-only file systems by enabling the client to automatically mount the file system from another server if the first server becomes unavailable.
Variable length subnet mask (VLSM)	VLSM enables more efficient use of IP address space by enabling the TCP/IP administrator to use Classless Inter-Domain Routing (CIDR) to partition this space in a flexible manner.
Routing sockets	Conformance with the de facto routing socket interface as implemented by 4.4 BSD, which allows use of CIDR-aware routing protocols such as OSPF, BGP-4, and RIPv2, is now included.
`autofs`	The new `autofs` automount daemon is now fully multithreaded. This enables concurrent servicing of multiple mount requests and increases reliability.
Processor sets	Processor sets give the system administrator control over the allocation of processes to sets of processors.
NIS+ `backup`/ fast `restore`	NIS+ `backup` and `restore` provide a quick and efficient method of backing up and restoring NIS+ namespaces.
NIS+ over a wide area network (WAN)	Server-use customization enables NIS+ administrators to specify NIS+ server search order for clients that need naming services. Server use can be balanced among various clients by designating different servers for different clients as “preferred” (primary). If a client cannot obtain information from its preferred servers, the order in which the client seeks out other servers can be specified. This feature is particularly useful when a NIS+ domain spans a WAN link, because administrators can reduce network traffic over the WAN link by specifying that clients first try to obtain the naming service from servers on the client’s side of the link.
NIS server	Solaris software now natively supports the NIS server. In previous Solaris releases, the NIS server was supported under emulation mode by the NIS+ server or using an unbundled product named NSkit.
CFS boot	CFS Boot enables AutoClient™ systems to boot more quickly with less network traffic by booting from a local CacheFS disk cache. The first system boot populates the cache. System boots that follow are satisfied from the cache.
Patch tools	Patch tools, including `patchadd` and `patchrm` commands to add and remove patches, are now part of the Solaris software, rather than shipping with each individual patch as `installpatch` and `backoutpatch` commands.

TABLE 1–3 Solaris 2.6 Features *(continued)*

Feature	Description
`isalist` utilities	`isalist` is a set of utilities that enables users to find out which instruction sets are supported on their machines and also to determine which one performs best for them.
Printing	
Printing	The Solaris 2.6 print software offers a better solution than the LP print software in previous Solaris releases. System administrators can easily set up and manage print clients using the NIS or NIS+ name services. This means print administration can be centralized for a network of systems and printers. New features include: - Redesign of print packages - Print protocol adapter - SunSoft™ Print Client - Network printer support
Hardware Support	
PCMCIA PC card	PCMCIA delivers a PCMCIA supplement into a Solaris Device Driver Kit to enable OEMs and third parties to develop PC Card device drivers that will be source-compatible across all Solaris platforms.
Nomadic Support	
`filesync`	`filesync` ensures that data is moved automatically between a portable computer and a server.

CHAPTER 2

What's New: A Closer Look

This chapter describes new features of the Solaris 8 release in detail. For a list of features with brief descriptions, see Chapter 1.

The Solaris 8 operating environment includes advanced technologies for multithreading, symmetric multiprocessing, integrated TCP/IP-based networking, large file handling on the 64–bit operating environment, and centralized network administration tools. This Solaris release provides many new features that improve an already powerful, stable, operating environment.

Some of the new features are:

- The IPv6 stack and utilities integrate IPv6 into the Solaris 8 operating environment, providing a platform for improved Internet functionality.
- The Java 2 Software Development Kit (SDK) for Solaris significantly improves scalability and performance of Java applications.
- The Solaris Installation CD provides users a graphical, wizard based, Java powered application to install the Solaris operating environment and other software.
- The Solaris 8 operating environment supports the Universal Disk Format (UDF) file system, enabling users to exchange data stored on CD-ROMs, disks, diskettes, DVDs, and other optical media.
- The base Solaris 8 CD includes support for more than 90 locales, covering 37 languages.
- The Solaris Common Desktop Environment (CDE) contains new and enhanced features that incorporate easy to use desktop productivity tools, PC interoperability, desktop management tools, and standards.

IPv6

The IPv6 protocol stack and utilities integrates IPv6 into the Solaris 8 operating environment. IPv6 is a new version of Internet Protocol (IP) designed to be an evolutionary step from the current version, IPv4. It is an increment to IPv4. Deploying IPv6, using defined transition mechanisms, does not disrupt current operations. In addition, IPv6 provides a platform for new Internet functionality.

For more information, see the *System Administration Guide, Volume 3*.

Java Enhancements

Java 2 SDK

The Java 2 Software Development Kit (SDK), formerly the Java Development Kit (JDK) 1.2.1_03, provides substantially increased scalability and performance compared to the 1.1 releases, especially for server-class applications. This increased performance for large applications running large numbers of threads on multiprocessor (MP) systems is due to:

- Exact garbage collection
- Fast Java thread synchronization
- Fine-grained locking
- Excellent MP scaling capability
- Direct-pointer, non-conservative, fully compacting, generational memory system (providing faster object allocation and faster garbage collection)

Installation and Management

The Solaris operating environment is a large, feature-rich environment; its structure gives customers the flexibility to meet their needs. New features enable customers to easily install and manage the Solaris environment.

Web Start Enhanced Installation CD

Solaris Web Start, Sun's graphical, wizard based, Java powered software application that installs the Solaris operating environment and other software, is now distributed on a separate installation CD. Web Start also now includes an upgrade capability and the "Kiosk", a browser-based environment in which information, such as documentation, web pages, and other content is displayed as the user installs the Solaris operating environment.

For more information, see the *Solaris 8 (SPARC Platform Edition) Installation Guide* or the *Solaris 8 (Intel Platform Edition) Installation Guide*

Booting a System Over the Network With DHCP

Dynamic Host Configuration Protocol (DHCP) support for booting a system over the network has been added to this Solaris release.

A system on the network can now use DHCP to acquire boot parameters and network configuration information needed to boot over the network. DHCP booting is supported on SPARC sun4u systems and x86 systems.

Previously, a system was booted over the network using Reverse Address Resolution Procotol (RARP) by default. Now you can choose either DHCP or RARP for network booting.

A DHCP server must be installed and configured for your network prior to using DHCP to boot a system over the network. For information on setting up a DHCP server, see the *System Administration Guide, Volume 3*.

For information on booting a system over the network, see the *System Administration Guide, Volume 1*.

DHCP Manager

DHCP Manager provides a Java-based graphical interface for configuring and managing the Solaris DHCP server and DHCP databases. It allows the system administrator to use a single tool to perform all DHCP management duties: set up and manage DHCP servers, manage client configuration options and macros, and manage networks and IP addresses that are under DHCP management.

DHCP Manager can be used instead of the Solaris DHCP command-line utilities, or in combination with them.

DHCP Manager provides the following benefits:

- A convenient, integrated point-and-click interface for the Solaris DHCP server's most sophisticated functions

- DHCP management wizards that guide you through tasks such as configuring the DHCP server, configuring networks, and adding addresses
- A graphical view of the relationships between `dhcptab` macros and options, making it easier for you to determine where to place option values for the most efficient client configurations

For more information about DHCP Manager, see the **`dhcpmgr`**(1M) man page and the *System Administration Guide, Volume 3*.

Support for DNS in System Identification Utilities

Domain name system (DNS) has been added to the list of name services that can be configured through the system identification utilities. DNS is presented as a choice if no other name services are auto-detected, but can also be specified in the `sysidcfg` file. DNS cannot be auto-detected without the `sysidcfg` file.

For more information, see the *Solaris Advanced Installation Guide*.

Support for IPv6 in the System Identification Utilities

Systems can now be configured to use IPv6 in addition to IPv4 at install time. There is currently no way to auto-detect IPv6, so users are asked at install time whether or not a system is to be configured to use IPv6 unless a user specifies that IPv6 be used in a `sysidcfg` file.

For more information, see the *Solaris Advanced Installation Guide*.

Networking

The Solaris operating environment provides a stable and reliable networking environment. New network management and system administration features in this release expand tools for managing this environment.

Enhanced FTP Server

The FTP server software in this Solaris release is modeled after the popular Washington University FTP server, `wu-ftpd`, but has been enhanced to include simplified system administration procedures.

Traditionally, system administrators have compiled `wu-ftpd` from scratch after modifying `#define` statement to change limits or control the behavior of the FTP server. The Solaris FTP software server simplifies this procedure by making many of these parameters configurable or eliminating them where appropriate.

The FTP server software can be configured to perform the following tasks:

- Define FTP server classes
- Create messages for FTP users
- Set FTP user login limits
- Enable or disable FTP user access to files
- Deny or grant FTP access to particular hosts

The FTP server software works with IPv6 clients.

For more information, see the *System Administration Guide, Volume 1* and the man page **`ftpd`**(1M).

IPSec for IPv4

The IP Security Architecture (IPSec) provides protection for IP datagrams. The protection can include confidentiality, strong integrity of the data, partial sequence integrity (replay protection), and data authentication. IPSec is performed inside the IP processing, and it can be applied with or without the knowledge of an Internet application.

For more information, see the *System Administration Guide, Volume 3*.

IPv6 NFS/RPC Compliant

This feature adds IPv6 support to NFS and RPC in a seamless manner. There are no changes to existing commands related to NFS. Most RPC applications will also run over IPv6 without any change. Some advanced RPC applications with transport knowledge might require updates.

For more information, see the *System Administration Guide, Volume 3*.

LLC2 Protocol

The Class II logical link control driver (LLC2) interfaces network software (NetBIOS, SNA, OSI), running under the Solaris operating environment to a physical LAN network controlled by one of the supported communications adapters. The LLC2 driver, which appears as a driver to the network software, resides in the kernel and is accessed by standard UNIX STREAMS functions.

This version of the LLC2 driver includes support for both connectionless and connection-oriented logical link control class II LLC2 operations for Ethernet, Token Ring, and FDDI adapters when accessed through the appropriate Solaris MAC layer driver. The Data Link Provider Interface (DLPI) to the LLC2 driver enables multiple and different protocol stacks, (including NetBIOS and SNA), to operate simultaneously over one or more local area networks.

For more information on LLC2, see the *System Administration Guide, Volume 3*. For more information on DLPI, see the *STREAMS Programming Guide* and the man page **dlpi**(7P).

NIS / NIS+ Over IPv6 Transports

Users can store IPv6 addresses in the NIS, NIS+, and DNS naming services, and also use NIS and NIS+ over IPv6 RPC transports to retrieve any NIS or NIS+ data. Two new maps have been added for NIS: `ipnodes.byname` and `ipnodes.byaddr`. These maps can contain both IPv4 and IPv6 information. A new table, `ipnodes.org_dir`, has been added for NIS+, and it can also contain both IPv4 and IPv6 addresses. While use of the new `ipnodes(4)` database is preferred for both IPv4 and IPv6, the `hosts(4)` database continues to be supported for IPv4 addresses.

For more information, see the *System Administration Guide, Volume 3*.

`sendmail` 8.9.3

This version includes a new option, `MaxHeadersLength`, that limits the length of the sum of all header lines in any given message, which can prevent a denial-of-service attack. Also included is a new version of `mail.local` that implements the Local Mail Transfer Protocol, RFC 2033. This change allows for re-queuing of mail to the recipients that did not receive a message, rather than re-sending the message to all of the recipients if an error occurs. A new file called `/etc/default/sendmail` can be used to store options to start `sendmail` with, so that the options are not touched during a upgrade. In addition, a new utility called `smrsh` increases security by reducing the number of commands that can be run using the `|program` syntax of `sendmail`.

For more information, see the *System Administration Guide, Volume 3*.

Service Location Protocol

The Service Location Protocol (SLP) is an Internet Engineering Task Force (IETF) standards-track protocol for discovering shared resources (such as printers, file servers, netcams, and so on) in an enterprise network. The Solaris 8 operating environment contains a full implementation of SLP that includes APIs that allow developers to write SLP-enabled applications, and provides system administrators a framework for ease of network extensibility.

File System Enhancements

This section describes new features in the Solaris 8 operating environment that affect file system logging and security.

Universal Disk Format File System

The Universal Disk Format (UDF) file system, the industry-standard format for storing information on optical media technology is supported in this Solaris release. The UDF file system can be used to exchange data on the following components when they contain a UDF file system:

- CD-ROMs
- Disks and diskettes
- Digital versatile disc or digital video disc (DVD) — DVD-ROM on supported platforms

The UDF file system is provided as dynamically loadable, 32–bit and 64–bit modules, and contains system administration utilities for creating, mounting, and checking the file system on both SPARC and x86 platforms.

When a UDF file system is mounted, users can read, write, or list files from the device and applications can access UDF file and directories with standard system calls.

See the *System Administration Guide, Volume 1* and the man page **`mount_udfs`**(1M) for more information.

NFS Server Logging

NFS server logging allows an NFS server to provide a record of file operations performed on its file systems. The record includes information to keep track of what is accessed, when it is accessed and who accessed it. The location of the logs that contain this information can be specified through a set of configuration options.

These options also can be used to select the operations that should be logged. This feature is particularly useful for sites that make anonymous FTP archives available to NFS and WebNFS clients.

For more information, see the *System Administration Guide, Volume 3*.

WebNFS JavaBeans Component

The WebNFS JavaBeans component contains an XFileChooser class that extends the JFileChooser graphical component of the Java 2 API. This bean can be used by any Java 2 application that needs to display a file chooser to enable users to select a file for input (open) or output (save). Using XFileChooser an application can access a file on a local disk or on an NFS server by using NFS URL naming.

For more information, see the *WebNFS Developer's Guide*.

Diagnostic and Availability Enhancements

This section describes new features in the Solaris 8 operating environment that affect system configuration and troubleshooting.

Improved Core File Management

The `coreadm` command

This release introduces the `coreadm` command, which provides flexible core file naming conventions and better core file retention. For example, you can use the `coreadm` command to configure a system so that all process core files are placed in a single system directory. This means it is easier to track problems by examining the core files in a specific directory whenever a Solaris process or daemon terminates abnormally.

Two new configurable `core` file paths, per-process and global, can be enabled or disabled independent of each other. When a process terminates abnormally, it produces a `core` file in the current directory as in previous Solaris releases. But if a global core file path is enabled and set to `/corefiles/core`, for example, then each process that terminates abnormally produces *two* core files: one in the current working directory and one in the `/corefiles` directory.

By default, the Solaris core paths and core file retention remain the same.

See the *System Administration Guide, Volume 2* and the man page **coreadm**(1M) for more information.

Examining Core Files With Proc Tools

Some of the proc tools have been enhanced to examine process core files as well as live processes. The proc tools are utilities that can manipulate features of the `/proc` file system.

The `/usr/proc/bin/pstack`, `pmap`, `pldd`, `pflags`, and `pcred` tools can now be applied to core files by specifying the name of the core file on the command line, similar to the way you specify a process ID to these commands. For example:

```
$ ./a.out
Segmentation Fault(coredump)
$ /usr/proc/bin/pstack ./core
core './core' of 19305: ./a.out
 000108c4 main     (1, ffbef5cc, ffbef5d4, 20800, 0, 0) + 1c
 00010880 _start   (0, 0, 0, 0, 0, 0) + b8
```

For more information on using proc tools to examine core files, see the man page **proc**(1).

Improved Device Configuration (`devfsadm`)

The `devfsadm` command provides an improved mechanism for managing the special device files in the `/dev` and `/devices` directories, including support for dynamic reconfiguration events.

In previous Solaris releases, device configuration was handled by `drvconfig`, which managed the physical device entries in the `/devices` directory, and five link generators, `devlinks`, `disks`, `tapes`, `ports`, and `audlinks`, which managed the logical device entries in the `/dev` directory. For compatibility purposes, `drvconfig` and the other link generators are symbolic links to the `devfsadm` utility.

Both reconfiguration boot processing and updating the `/dev` and `/devices` directories in response to dynamic reconfiguration events are handled by `devfsadmd`, the daemon version of the `devfsadm` command. This daemon is started from the `/etc/rc*` scripts when a system is booted.

Since `devfsadmd`, the `devfsadm` daemon, automatically detects device configuration changes generated by any reconfiguration event, there is no need to run this command interactively.

For more information, see the man page **devfsadm**(1M).

Improved System Error Messages

The system boot and error message format now provides a numeric identifier, module name, and time stamp to messages generated by the `syslog(1M)` logging facility. In addition, messages that were previously lost after a system panic and reboot are now saved.

The new message format can be enabled or disabled by setting the `msgid` property in the `log.conf` file. The new message format is enabled by default.

For more information on enabling and disabling system message IDs, see the *System Administration Guide, Volume 2*, and the man page **`log`**(7D).

Remote Console Messaging

The following new console features improve your ability to troubleshoot remote systems:

- The `consadm` command enables you to select a serial device as an *auxiliary* (or remote) console. Using the `consadm` command, a system administrator can configure one or more serial ports to display redirected console messages and to host `sulogin` sessions when the system transitions between run levels. This feature enables you to dial in to a serial port with a modem to monitor console messages and participate in `init` state transitions.

  While you can log in to a system using a port configured as an auxiliary console, it is primarily an output device displaying information that is also displayed on the default console. If boot scripts or other applications read and write to and from the default console, the write output displays on all the auxiliary consoles, but the input is only read from the default console.

- Console output now consists of kernel and `syslog` messages written to a new pseudo device, `/dev/sysmsg`. In addition, `rc` script startup messages are written to `/dev/msglog`. Previously, all of these messages were written to `/dev/console`.

  Scripts that direct console output to `/dev/console` need to be changed to `/dev/msglog` if you want to see script messages displayed on the auxiliary consoles. Programs referencing `/dev/console` should be explicitly modified to use `syslog()` or `strlog()` if you want messages to be redirected to an auxiliary device.

- The `consadm` command runs a daemon to monitor auxiliary console devices. Any display device designated as an auxiliary console that disconnects—hangs up or loses carrier—is removed from the auxiliary console device list and is no longer active. Enabling one or more auxiliary consoles does not disable message display on the default console; messages continue to display on `/dev/console`

For more information, see the man page **`consadm`**(1M) and the *System Administration Guide, Volume 2*.

TCP/IP Internal Trace Support

TCP/IP now provides internal trace support by logging TCP communication when a connection is terminated by an RST packet. When an RST packet is transmitted or received, information on as many as 10 packets, transmitted or received immediately before on that connection, is logged with the connection information.

For more information, see the *System Administration Guide, Volume 3*.

Performance and Scalability Enhancements

This section describes new tools in the Solaris 8 operating environment for monitoring and improving system performance.

`apptrace`

A new application debugging tool, `apptrace` enables application developers and system support personnel to debug application or system problems by providing call traces to Solaris shared libraries, which may show the series of events leading up to a point of failure.

The `apptrace` tool provides more reliable call-tracing than the previously available `sotruss` command. It also provides better display of function arguments, return values, and error cases for any Solaris library interface.

By default, `apptrace` traces calls directly from the executable object, specified on the command line, to every shared library the executable depends on.

For more information, see the man page **`apptrace`**(1).

SPARC: `busstat`

A new system monitoring tool, `busstat` provides command line access to the bus-related hardware performance counters in the system. It enables the gathering of system-wide bus performance statistics directly from the system hardware. The current list of supported hardware is SBus, AC and PCI devices. These are all SPARC system devices. Currently, there are no x86 supported devices.

The `busstat` command enables the measurement of system-wide statistics such as memory bank reads/writes, clock cycles, number of interrupts, streaming DVMA read/write transfers etc.

Superuser can use `busstat` to program these counters. Ordinary users can only read counters programmed previously by superuser.

The `busstat` command lists the devices in a system that are found to support these hardware performance counters. If no supported devices are found in the system, the following message is displayed:

```
busstat: No devices available in system.
```

For more information on using this monitoring tool refer to the `busstat` whitepaper available at `http://www.sun.com/software/whitepapers.html`.

Fast Boot for Servers

In the Solaris 8 operating environment, large servers now require significantly less time to boot. As a part of the boot performance improvement, the operating system probes for SCSI devices in parallel. Some old dual-port SCSI devices do not support parallel probing and should be removed from the system before installing or upgrading to the Solaris 8 operating environment.

New Alternative to `poll()` Interface

`/dev/poll` is a second form of polling for the completion of I/O events that provides much higher performance when a very large number of events must be polled for on file descriptors that remain open for a long time. This feature supplements `poll(2)`; it does not replace `poll(2)`.

For more information, see the *Network Interfaces Programmer's Guide*.

`prstat`

The `prstat` utility iteratively examines all active processes on the system and reports various statistics based on the selected output mode and sort order. `prstat` can also be used to report microstate accounting information and to summarize CPU and memory usage.

Realtime Systems Enhancements

High Resolution Timers

The high resolution timers (HRTs) bypass the traditional 10 millisecond clock interface to expose the granularity of the physical clock interrupt from the hardware. Thus, the HRT interface allows a real time process to take control of one processor (of a multi-processor system) and operate to any required degree of precision in timing events.

This is the last element needed to allow traditional real-time applications to be run under Solaris.

For more information, see the *System Interface Guide.*

Common Desktop Environment Desktop Enhancements

The Common Desktop Environment (CDE) provides an advanced Motif-based desktop with an easy-to-use interface. The latest release of CDE includes new comprehensive features in desktop productivity, standards, interoperability, and desktop management.

Ease of Use

Hot Key Editor

The Hot Key Editor enables users to automate repetitive tasks, such as running executables or CDE actions, by predefining a series of commands to a given function key. This feature provides a GUI that enables users to view a hot key list containing the key, context and function, as well as the ability to edit, delete, and create new hot keys.

SDTImage

SDTImage is a screen snapshot feature that enables users to easily and quickly capture a screenshot image from the command line.

ToolTips

ToolTips provides users with a simple and short description of an icon function. Users can now place their cursor on an icon and the function of the icon is displayed.

Standards

Java Media Framework

The Java Media Framework (JMF), a Java-based application, provides smooth streaming video file format support for MPEG1, MPEG2, Quicktime, and AVI, as well as audio support for MIDI. This feature enables users to take advantage of the real-time video creation and broadcast functionality.

PDA Support

The PDA Synchronization (PDASync) application synchronizes the data from Sun applications such as Desktop Calendar, Desktop Mail, Memo, and Address, with data in similar applications on your Personal Digital Assistant (PDA). The PDASync software also allows you to install applications and databases from your workstation or server to your PDA.

PDASync supports most Palm Computing platform handheld devices, including the Palm V, Palm III, and Palm Pilot Professional Edition.

For more information on the PDASync application, see the Help information on the PDASync software.

X11R6.4 Support

This new and enhanced version of XServer includes key new features that increase user productivity and mobility. These new features include:

- Web-enabled X application access on any browser-based desktop, providing users with access to corporate X applications through the Internet or intranet
- Xinerama, one logical screen image support that enables users to display an image across multiple monitors
- Minimized colormap flashing
- X Print support

Interoperability

Netscape Application Launcher

The Netscape Application Launcher enables users to easily access and automatically launch Netscape files and associated Netscape applications such as Composer. This feature eliminates the need to run the entire Netscape environment, thus simplifying access to Netscape applications.

Management

Print Client

This feature enables users to easily configure their own set of printers and default printer without any intervention from an administrator.

Web Browser Enhancements

Java Plug-In

Java Plug-In for the Solaris operating environment is an add-on product for Netscape Navigator that enables Java applets and JavaBeans components to run on Web pages using Java Runtime Environment (JRE) 1.2 instead of the default Java Virtual Machine (JVM) bundled with Navigator.

Netscape Communicator 4.51

Solaris 8 includes Netscape Communicator 4.51 and now installs it by default on your system.

Netscape Communicator 4.51 enables users to communicate, share and access information over the Internet, and consists of the following tools:

- Netscape Navigator, a tool that enables users to find and view information on the Web
- Netscape Messenger, a tool that enables users to send and receive email and participate in news groups and chat groups
- Netscape Composer, a tool that enables users to create and publish web pages

Printing

Print Naming Enhancement

This Solaris release supports the `printers` database in `/etc/nsswitch.conf`, the name service switch file. The `printers` database provides centralized printer configuration information to print clients on the network.

By including the `printers` database and corresponding sources of information in the name service switch file, print clients automatically have access to printer configuration information without having to add it to their own systems.

If you use Solaris Print Manager to set up printing in your network, the source of the printer configuration information is selected from the Select Naming Service menu rather than the `printers` database in the `/etc/nsswitch.conf` file.

The following table describes the default `printers` entry in the `/etc/nsswitch.conf` file for the files, NIS, and NIS+ environments. The `nisplus` keyword represents the `printers.org_dir` table. The `xfn` keyword represents the FNS printer contexts.

If Your Name Service Is ...	**The Default `printers` Entry Is ...**
`files`	`printers: user files`
`nis`	`printers: user files nis`
`nis+`	`printers: user nisplus files xfn`

For example, if your name service is NIS, printer configuration information on print clients is looked up in the following sources in this order:

1. `user` — represents the user's `$HOME/.printers` file
2. `files` — represents the `/etc/printers.conf` file
3. `nis` — represents the `printers.conf.byname` table

For more information, see the man page **`nsswitch.conf`**(4) and the *Solaris Naming Administration Guide.*

Solaris Print Manager

Solaris Print Manager is a Java-based graphical user interface that enables you to manage local and remote printer access. This tool can be used in the following name

service environments: NIS, NIS+, NIS+ with Federated Naming Service (FNS), and files. You must be logged in as superuser to use this tool.

Using Solaris Print Manager is the preferred method for managing printer access instead of Admintool:Printers because Solaris Print Manager centralizes printer information when it is used in a name service environment.

Solaris Print Manager recognizes existing printer information on the printer servers, print clients, and in the name service databases. There are no conversion tasks required to use the new Solaris Print Manager as long as the print clients are running the Solaris 2.6 release or a compatible version.

For more information, see the *System Administration Guide, Volume 2*.

Language Support

The Solaris 8 operating environment provides support for over 90 locales, a new, intuitive interface for installing languages, expanded Unicode support, and improved data interoperability utilities.

Universal Language Coverage

Solaris 8 will now include, as a standard feature, support for more than 90 locales, covering 37 languages - all on the Solaris CD (see the *International Language Environments Guide* for a listing of supported languages).

This new packaging approach greatly simplifies the development and testing of applications for international markets and no longer requires the purchase of an optional media kit to set up a non-English development or production environment.

Optional language media kits are still available for those users who require a fully localized user interface and documentation. Customers who only need support for input, display, and printing of text in their target language, and can operate with an English interface, will find this new packaging very flexible.

Improved Language Installation and Setup

Users will find the setup and installation to be significantly easier, whether installing only a single language or the full range of 37 languages packaged with the Solaris 8 operating environment.

Changes to packaging on the Solaris 8 CD have reduced the storage requirements for a mixed language installation and a redesign of the install interface makes language selection and grouping extremely intuitive.

Expanded Unicode Support

Solaris 8 continues to broaden support for Unicode, with the addition of new Unicode (UTF-8) locales for Simplified Chinese and Traditional Chinese.

Also, complete support for Complex Text Layout (CTL) scripts at en_US.UTF-8 locale has been enabled. This allows proper rendering of text for bidirectional and also context-sensitive shaping scripts like Arabic, Hebrew, and Thai in the Unicode locale.

Unicode is often used in a mixed script environment, where it is necessary to display text from multiple languages in a single environment. In those cases where it is necessary to provide support for cultural-specific conventions such as date and time, monetary format, and collation, the multiple Unicode locales provided in Solaris are quite useful.

Customer-Extensible Codeset Conversion (`geniconvtbl`)

Developers have the ability, with Solaris 8, to create user-defined codeset converters, allowing table driven creation and easy addition of new codeset conversions by using the `geniconvtbl` utility.

This permits user-defined and user-customizable codeset conversions with a standard system utility and interface like `iconv(1)` and `iconv(3)`. This new capability enhances the ability of an application to deal with incompatible data types, particularly data generated from proprietary or legacy applications. Modification to existing Solaris codeset conversions is also supported.

Improved Data Interoperability

Data interoperability with non-Solaris environments has been improved in Solaris 8 with the addition of the following new `iconv` data conversion utilities (for more information on `iconv`, see the *International Language Environments Guide*):

- `iconv` for Japanese mainframe data types
- `iconv` for Microsoft data encodings (including user defined characters)
- `iconv` for UTF-8 interoperability in China and Korea
- `iconv` for various Unicode encoding formats and international and de facto industry standard codesets

New Locales Added

Two new locales have been added to Solaris 8 for Iceland (ISO8859-15) and Russia (ANSI1251). The new Russian locale is in addition to the existing Russian (8859-5) locale and provides native Microsoft data encoding support.

Documentation

This section describes improvements in the AnswerBook2 server software and the reorganization of the Solaris 8 Reference Manual.

For more information on changes in the Solaris 8 documentation set, see *About Solaris 8 Documentation*.

AB2 1.4.2 AnswerBook2 Server

The AnswerBook2 version 1.4.2 server software provides improved performance, a textual, rather than graphical, navigation interface, and the ability to view and search information by collection.

For more information, see the *Solaris 8 (SPARC Platform Edition) Installation Guide* or the *Solaris 8 (Intel Platform Edition) Installation Guide.*

Reference Manual Reorganization

The section of the *SunOS Reference Manual* that describes the C library functions (but does not include the system calls) now contains six books instead of one. These books are:

- Basic Library Functions
- Networking Library Functions
- Curses Library Functions
- Threads and Realtime Library Functions
- Extended Library Functions
- Libraries and Headers

In addition, many of the man page suffixes have been changed to reflect the library that contains the function (for example, all man pages describing functions contained in `libnsl` now have the suffix `.3nsl`).

For more information, see the Solaris 8 Reference Manual Collection and *About Solaris 8 Documentation*.

Audio Enhancements

SPARC: Audio Mixer Driver

The audio mixer driver now allows multiple applications to play and record audio simultaneously. In the past only a single play application and a single record application were supported.

Note - The mixing function is turned on by default; however, SunVTS™ should be run only when the mixing function is disabled. The mixing function can be turned off using the new `mixerctl(1)` utility, or through other methods described in the man page **`audiocs`**(7D).

For more information, see the man pages **`audiocs`**(7D), **`audio_support`**(7I) and **`mixer`**(7I).

Software Developer Environment

The Solaris operating environment provides developers with the documentation, development software libraries, productivity tools, sample code, and testing tools needed to develop software applications for the Solaris runtime environments.

SPARC: 64–bit KCMS libraries

Kodak Color Management System (KCMS) is now providing a 64–bit version of the libraries. Applications that currently use KCMS and are converted to the 64–bit operating environment can now retain color management.

Extensions to Runtime Link Auditing

Additional means of invoking runtime link auditing libraries is provided by the link editor options `-p` and `-P`. Additional runtime link auditing interfaces `la_activity( )` and `la_objsearch( )` have been added.

For more information, see the *Linker and Libraries Guide.*

Perl 5

The popular programming language, Practical Extraction and Report Language (Perl) 5.005_03, is included in the Solaris 8 release. Perl is commonly used for CGI scripting as well as automating complex system administration tasks.

For more information, use the `perldoc` command to examine the Perl pod (portable documentation) in the `/usr/perl5/pod directory`:

```
% cd /usr/perl5/pod
% /usr/perl5/bin/perldoc perlfaq1.pod
```

Secure Path Name Change From `/usr/lib` to `/usr/lib/secure`

The secure directory from which files can be preloaded is now `/usr/lib/secure` for 32–bit objects and `/usr/lib/secure/sparcv9` for 64–bit SPARCV9 objects.

For more information, see the *Linker and Libraries Guide*.

`$ISALIST` Token Support

Greater flexibility in establishing instruction set specific dependencies is provided with the new `$ISALIST` dynamic string token.

For more information, see the *Linker and Libraries Guide*.

Intel Platform Specific Enhancements

This section describes new features in the Solaris 8 operating environment specific to the Intel (x86) platform.

x86: Added Support for PAE Mode

With the release of Pentium Pro, Intel introduced a mode called Physical Address Extension (PAE) on its advanced processors. By using PAE, Solaris *Intel Platform Edition* can address up to 32 Gbytes of physical memory. Individual processes are still limited to a maximum of 3.5 Gbytes of virtual address space.

PAE mode enables the user to run multiple instances of databases and memory-intensive applications, and to support large numbers of online users on a machine.

It is best to use PCI disk controllers that support Dual Address Cycle (DAC) in your machine because they can transfer data to and from any physical location. Other cards are limited to 4 Gbytes of physical memory, and as a result performance may slow down because the system needs to copy additional memory to transfer data.

Caution - Some device drivers are not yet able to take advantage of PAE mode. Sun has tested PCI device drivers written by Sun on x86–based machines with more than 4 Gbytes of memory. Sun's OEM partners intend to test their machines with devices they supply on x86-based machines with more than 4 Gbytes of memory. In some cases however, if you add a third-party device driver to your system, it may become unstable, and panics and data corruption may result. If your system becomes unstable and you need that driver, you must disable PAE mode support. For more information, see the *Solaris 8 (Intel Platform Edition) Device Configuration Guide.*

x86: ACPI

Advanced Configuration and Power Interface (ACPI) is a new, more flexible way to configure and control Intel Architecture hardware. ACPI obsoletes Plug and Play BIOS and the Intel Multi-Processor Specification (MPSPEC). If ACPI is available on your Intel architecture system, Solaris 8 automatically uses it to configure the hardware. Solaris 8 does not yet support ACPI-based power management.

For more information, see the *Solaris 8 (Intel Platform Edition) Device Configuration Guide.*

x86: Boot Partition in Solaris 8

Machines running Solaris 8 *Intel Platform Edition* may now designate a separate boot partition during installation. This boot partition, which requires 10 Mbytes of disk space, can be installed on a separate disk from the rest of the Solaris operating environment, thus enabling the user to install more than one operating system on a machine. Only the boot partition needs to be located on the boot disk.

For more information, see the *Solaris Advanced Installation Guide.*

x86: CD-ROM Boot

This new feature enables the user to boot a system from an installation CD (rather than the Device Configuration Assistant diskette, as was the case in the past) using the "El Torito" standard.

The BIOS on most x86-based motherboards manufactured since late 1997 supports the "El Torito" standard and thus recognizes CD-ROM drives as boot devices. To turn on this capability, the user runs the system's BIOS setup tool.

x86: Large Disk Support

By using improved BIOS interfaces to access the disk, Solaris 8 *Intel Platform Edition* now fully uses disks larger than 8 Gbytes. Previously, only the first 8 Gbytes of any IDE disk could be used by Solaris *Intel Platform Edition*; also, only the first 8 Gbytes could be used for a root slice by either SCSI or IDE disks. Both of these restrictions have been removed on systems with improved BIOSes.

For more information, see the *Solaris 8 (Intel Platform Edition) Installation Guide.*

x86: PCI Hot-Plug Support

This feature enables standard PCI adapters to be hot-plugged into a machine with the hot-plug capability that is running Solaris Intel Platform Edition. You can now add (hot-add) or remove (hot-remove) adapters from a system while the system is still running.

For more information, see the *System Administration Guide, Volume 1* and *Writing Device Drivers.*

x86: Universal Serial Bus Support for Keyboards and Mouse Devices

Solaris *Intel Platform Edition* now provides Universal Serial Bus (USB) support for keyboards and mouse devices. USB is an emerging I/O bus standard that supports a wide variety of peripherals, such as speakers, modems, printers, and cameras, as well as keyboards and mouse devices. While a fairly new standard, USB is quickly gaining wide acceptance in the Intel market. USB ports are becoming a standard on many x86-based machines, and USB support is being integrated into all Intel PCI chip sets. Solaris *Intel Platform Edition* now supports USB keyboard and mouse devices.

x86: XMEM Support

Extended Memory (XMEM) support provides a mechanism that allows a single 32-bit process to efficiently allocate and manage more than 4 Gbytes of physical memory. The XMEM feature is implemented as a file system (`xmemfs`) that system administrators can mount and use to reserve memory for applications.

For more information, see the man pages **`mount_xmemfs`**(1M) and **`xmemfs`**(7FS).

x86: Xeon Enhancements

To maximize performance, Solaris 8 *Intel Platform Edition* now supports the Page Attribute Table (PAT) feature of Intel x86-32 processors (Pentium II and Pentium III). This support allows a device driver writer to take advantage of the write combining feature for a device that can exploit write combining, even if the BIOS does not set up the device for write combining.

For more information, see *Writing Device Drivers.*

x86: X Server Video Driver Enhancement

Solaris *Intel Platform Edition* now provides support for the following video devices:

- Cirrus Logic GD5465
- 3Dlabs Permedia2 (Diamond Fire GL 1000 Pro)
- S3 Trio3D
- Matrox Productiva G100
- Matrox Millennium G200
- Matrox Mystique G200

For more information, see the *Solaris 8 (Intel Platform Edition) Hardware Compatibility List*.

x86: Intel SCSI Drivers

This section describes enhancements in the Solaris 8 *Intel Platform Edition* operating environment.

x86: `cadp` Driver Enhancements

The Solaris `cadp` driver now supports Adaptec Ultra2 adapters.

For more information, see the *Solaris 8 (Intel Platform Edition) Device Configuration Guide.*

x86: `ncrs` Device Driver Enhancements

The Solaris `ncrs` device driver now supports the SCSI hot-plugging functionality and Ultra2 devices, in addition to including general functionality and performance improvements.

For more information, see the *Solaris 8 (Intel Platform Edition) Device Configuration Guide* and the *Solaris 8 (Intel Platform Edition) Hardware Compatibility List*.

x86: `symhisl` Device Driver

The `symhisl` device driver, which supports the adapters SYM22910 and SYM21002, is now included in Solaris *Intel Platform Edition*.

For more information, see the *Solaris 8 (Intel Platform Edition) Hardware Compatibility List*.