What's New in the Solaris 9 Operating Environment

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Contents

Preface

What's New in the Solaris 9 Operating Environment describes the new features of the Solaris™ 9 operating environment. Chapters 1 through 4 summarize new features for desktop users, system administrators, and software developers. Chapter 5, "What's New: A Closer Look," provides more extensive descriptions for some features. The appendixes describe features in the previous Solaris 7 and Solaris 8 software releases.

For the most current list of new features in the Solaris 9 release, see *What's New in the Solaris 9 Operating Environment* at `http://docs.sun.com`. For further information on the Solaris 9 features summarized in this book, please refer to the following documentation:

International Language Environments Guide

Multithreaded Programming Guide

Programming Interfaces Guide

Solaris 9 Installation Guide

Solaris Common Desktop Environment: User's Guide

Solaris DHCP Service Developer's Guide

Solaris Modular Debugger Guide

Solaris Tunable Parameters Reference Manual

Solaris Volume Manager Administration Guide

Solaris WBEM SDK Developer's Guide

Solaris WBEM Services Administration Guide

System Administration Guide: Advanced Administration

System Administration Guide: Basic Administration

System Administration Guide: IP Services

System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)

System Administration Guide: Naming and Directory Services (FNS and NIS+)

System Administration Guide: Resource Management and Network Services

System Administration Guide: Security Services

Writing Device Drivers

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Typographic Conventions

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.`

TABLE P–1 Typographic Conventions *(Continued)*

Typeface or Symbol	Meaning	Example
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. You must be *root* to do this.

Shell Prompts in Command Examples

The following table shows the default system prompt and superuser prompt for the C shell, Bourne shell, and Korn shell.

TABLE P–2 Shell Prompts

Shell	Prompt
C shell prompt	`machine_name%`
C shell superuser prompt	`machine_name#`
Bourne shell and Korn shell prompt	`$`
Bourne shell and Korn shell superuser prompt	`#`

CHAPTER 1

What's New Highlights

The Solaris™ operating environment is the foundation for web-based computing. Solaris provides the manageability, scalability, and high performance that compute-intensive tasks require.

Key Features in Solaris 9

The following key features and enhancements are highlights from the Solaris 9 software release. For a complete list of new features, see chapters 2–4.

- **Solaris 9 Resource Manager** – Solaris 9 Resource Manager improves functionality for allocating, monitoring, and controlling system resources. Key features include the new fair share scheduler (FSS) and resource pools for partitioning system resources. See "System Resources Enhancements" on page 16.
- **Linux Compatibility** – Many Linux applications run virtually unchanged in the Solaris operating environment. The Solaris 9 release enables users to maintain productivity in mixed environments by further adding to the Linux commands and applications that are integrated into the release. In addition, software application developers can now develop and compile their Linux applications more easily in the Solaris operating environment. See "Development Tools" on page 43 and "Freeware" on page 72.
- **Increased Security** – The Solaris 9 release includes significant security enhancements, such as the following features:
  - **Internet Key Exchange** – Internet Key Exchange (IKE) enables administrators to manage larger numbers of secure networks.
  - **Solaris Secure Shell** – Secure shell allows a user to securely access a remote host over an unsecured network.
  - **Secure LDAP Client** – A new Lightweight Directory Access Protocol (LDAP) library provides for SSL (TLS) and CRAM-MD5 encryption mechanisms.

- **Strong Encryption** – Strong encryption with a maximum size of 128 bits is available as a default for certain functionality.

  For further information, see "Security Enhancements" on page 35.

- **iPlanet Directory Server 5.1** – iPlanet™ Directory Server 5.1 is now an integrated part of the Solaris 9 software release. See "Networking" on page 18.
- **Solaris Volume Manager** – Solaris Volume Manager provides storage management tools that enable you to create and manage RAID 0, RAID 1, and RAID 5 volumes, as well as transactional (logging) devices and soft partitions. See "System Administration Tools" on page 24.
- **File System Enhancements** – The Solaris 9 release contains several file system enhancements, such as extended file attributes and Direct I/O improvements. See "File System Enhancements" on page 27.
- **Solaris Live Upgrade 2.0** – Solaris Live Upgrade provides a method of upgrading that substantially reduces the usual service outage that is associated with an operating system upgrade. See "Installation" on page 29.
- **Web Start Flash** – You can create a reference installation of the Solaris operating environment and replicate that installation on other machines. See "Installation" on page 29.
- **Minimal Installation** – You can choose to install a minimal set of packages with the Solaris 9 operating environment, then add only the packages you need. See "Installation" on page 29.
- **Multiple Page Size Support** – Multiple Page Size Support (MPSS) allows a program to use any hardware-supported page size to access portions of virtual memory. See "System Performance Enhancements" on page 33 and "Development Tools" on page 43.
- **Improved Multithreading Library** – The Solaris 9 software release contains an improved and faster multithreading library. See "System Performance Enhancements" on page 33.

Available With the Solaris 9 Release

Netscape™ 6.2.1 for the Solaris Operating Environment – Netscape™ 6.2.1 Enterprise, the most customizable, convenient, and connected browser, is available in the Early Access directory of the Solaris 9 release. In addition, it will be available for the Solaris 7 and Solaris 8 operating environments. For further information on Netscape 6.2.1, see "Other Software" on page 71.

Available on the Web

GNOME 2.0 Desktop for the Solaris Operating Environment – GNOME 2. 0 is an upcoming feature that is planned for the Solaris 9 operating environment and is currently available for preview on the Web. Built on free source software, GNOME 2.0 is designed to integrate seamlessly with the Internet. GNOME 2.0 provides a user experience that will increase personal productivity. Get an early preview of GNOME 2.0. For information, see “Other Software” on page 71.

CHAPTER 2

What's New for System Administrators

This chapter highlights new system administration features that have been added to the Solaris 9 operating environment.

System Resources Enhancements

Description	Release Date
Solaris 9 Resource Manager Solaris 9 Resource Manager provides improvements to the management of system resources and enables system administrators to do the following: ■ Allocate computing resources on a system. ■ Monitor how these resources are being used and adjust allocations as necessary. ■ Generate extended accounting information on resource usage. This information can be used for capacity planning and billing. The resource controls framework allows you to set constraints on the system resources that are consumed by processes and tasks, which are collections of processes that are related to a single activity. Resource pools provide a way to partition system resources, such as processors, and maintain those partitions across reboots. A new fair share scheduler (FSS) has been added that allows the fine-grained sharing of CPU resources on a system. These features enhance your ability to manage how resources are allocated to applications in a server consolidation environment. In the Solaris 9 release, the full functionality is administered through a command-line interface. Performance monitoring and the setting of resource controls can also be done through the Solaris Management Console. For more information on resource management, see the following: ■ *System Administration Guide: Resource Management and Network Services* ■ Man pages `prctl`(1), `pooladm`(1M), `poolcfg`(1M), `rctladm`(1M), `project`(4), and `FSS`(7)	Solaris 9
New Fixed-Priority (FX) Scheduling Class The FX scheduler provides a scheduling policy for processes that require user or application control of scheduling priorities. The priorities of processes that run under FX are fixed. These priorities are not dynamically adjusted by the system. The FX class has the same priority range as the TS, IA, and FSS classes. For more information on the FX scheduler, see the *Programming Interfaces Guide* and the *Multithreaded Programming Guide*, and the `priocntl`(1) and `dispadmin`(1M) man pages. For restrictions on using the FX and FSS schedulers on the same system, see "Fair Share Scheduler" in the *System Administration Guide: Resource Management and Network Services*.	Solaris 9

Description	Release Date
New Display Options for the `df`, `du`, and `ls` Commands The `df`, `du`, and `ls -l` commands have a new `-h` option to display disk usage and file or file system sizes in powers of 1024. This option simplifies interpretation of the output of the `df`, `du`, and `ls -l` commands by providing disk space in Kbytes, Mbytes, Gbytes, or Tbytes if the file or directory size is larger than 1024 bytes. For additional information on these display options, see "New `df`, `du`, and `ls` Options" on page 70. See the `df`(1M), `du`(1), and `ls`(1) man pages for further information.	Solaris 9
Improved Process Debugging With the `pargs` and `preap` Commands Two new commands, `pargs` and `preap`, improve process debugging. You can use the `pargs` command to print the arguments and environment variables that are associated with a live process or core file. Use the `preap` command to remove zombie processes. For additional information on these commands, see "`pargs` and `preap` Commands" on page 69. See the `preap`(1) man page and the `proc`(1) man page for information on using these commands.	Solaris 9

Networking

Feature Description	Release Date
iPlanet Directory Server Integration The Solaris 9 release provides an integrated version of the iPlanet Lightweight Directory Access Protocol (LDAP) directory. The iPlanet Directory Server is a powerful, distributed directory server that is designed to manage an enterprise-wide directory of users and resources. This scalable directory service can be used for intranet applications, extranets with trading partners, and e-commerce applications to reach customers over the Internet. The Directory Server is managed through the iPlanet Console, the graphical user interface that is provided with the iPlanet Directory Server. Administrators use the Console to grant access rights, manage databases, configure the directory, and replicate the data to multiple directory servers. Users access the data through any LDAP-enabled client application, such as applications that were developed with the iPlanet LDAP Software Developers Kits (SDKs) for C and the Java™ programming language. Configuration for setup of the iPlanet Directory Server has been simplified by using `idsconfig`. Server and client configuration information is available in the *System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)*. See also the iPlanet Directory Server 5.1 Collection at `http://docs.sun.com`. This collection includes the following books: ■ *iPlanet Directory Server 5.1 Deployment Guide* ■ *iPlanet Directory Server 5.1 Administrator's Guide* ■ *iPlanet Directory Server 5.1 Configuration, Command, and File Reference* ■ *iPlanet Directory Server 5.1 Schema Reference* The iPlanet LDAP Directory Server 5.1 is integrated in the Solaris 9 release. For licensing terms, refer to the binary code license.	Solaris 9
Naming Service Support for Lightweight Directory Access Protocol (LDAP) Naming service support has been enhanced in the Solaris 9 release. Changes include the following: ■ Simplified configuration for setup of the iPlanet Directory Server 5.1, the LDAP directory server, using `idsconfig`. ■ A more robust security model – Supports strong authentication and TLS-encrypted sessions. A client's proxy credentials are no longer stored in a client's profile on the directory server. ■ `ldapaddent` command – Enables you to populate and dump data onto the server. ■ Service search descriptors and attribute mapping. ■ New profile schemas. For information on security features in the Solaris 9 release, including the Secure LDAP Client, see "Security Enhancements" on page 35. For further information, see the *System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)*.	Solaris 9

Feature Description	Release Date
NIS+-to-LDAP Migration Tools The Solaris 9 release announces end-of-software-support for NIS+ and the move to the LDAP-based naming environment. This release includes migration tools to use for migrating from NIS+ to LDAP. For more information on the NIS+ announcement, refer to the following Web site: `http://www.sun.com/directory/nisplus/transition.html` A detailed discussion of how to migrate from the NIS+ naming service to LDAP is included in the *System Administration Guide: Naming and Directory Services (FNS and NIS+)*. For further information, see the *System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)*.	Solaris 9

Solaris PPP 4.0
 	
Solaris PPP 4.0 enables a system in one location to communicate over telephone lines or leased communications media with a system at a remote location. This implementation of the Point-to-Point Protocol (PPP) is based on the widely used Australian National University (ANU) PPP, and is entirely new for the Solaris operating environment. PPP 4.0 is easily configured through a set of files. PPP 4.0 supports both asynchronous and synchronous communications and offers Password Authentication Protocol (PAP) and Challenge-Handshake Authentication Protocol (CHAP) authentication. Because Solaris PPP 4.0 is highly configurable, customers can easily tailor PPP to fit their remote communications needs. Also provided is the `asppp2pppd` conversion script for migrating from the earlier Solaris PPP `(asppp)` to Solaris PPP 4.0.
 	
PPP 4.0 now includes the PPPoE feature, which enables the use of tunneling with PPP. Support for PPPoE was introduced in the Solaris 8 10/01 release.
 	
For further information, see the PPP module in the *System Administration Guide: Resource Management and Network Services* and the `pppd`(1M) man page.
 	
For information on licensing terms, refer to the incorporated material at the following locations:
 	
`/var/sadm/pkg/SUNWpppd/install/copyright`
 	
`/var/sadm/pkg/SUNWpppdu/install/copyright`
 	
`/var/sadm/pkg/SUNWpppg/install/copyright`
	Solaris 8 7/01
	
	Updated in Solaris 8 10/01 and Solaris 9

Sun Internet FTP Server Sun Internet FTP Server™, hereafter called the FTP Server, is fully compatible with the Solaris 8 FTP software while offering new capability and improvements to performance for Solaris 9 users. The Solaris 9 FTP Server is based on WU-ftpd. Originally developed by Washington University, WU-ftpd is widely used for the distribution of bulk data over the Internet and is the preferred standard for large FTP sites.	Solaris 9

Feature Description	Release Date
Sun RPC Library Extensions The RPC library extensions project extends the Sun ONC+™ RPC library with an asynchronous protocol. Programming interfaces have been added to the Transport Independent Remote Procedure Calls to provide one-way asynchronous messaging and non-blocking I/O. Sun's Telco Platform users can use the RPC library extensions to help with significant semantic changes to the RPC interface. The extensions are useful to customers who require synchronous and asynchronous protocols that require a single-vendor solution. The library extensions provide a range of operations and a level of availability that Sun's network equipment provider customers demand. For further information on ONC+ development, see the *ONC+ Developer's Guide*.	Solaris 9

Feature Description	Release Date
Enhancements to `sendmail`	Solaris 8 4/01
The following new features are available in `sendmail` version 8.12, which is included in the Solaris 9 operating environment: ■ A new configuration file, `submit.cf` ■ New command-line options ■ New and revised configuration file options ■ New defined macros ■ New macros that are used to build the configuration file ■ New and revised `m4` configuration macros ■ New compile flags ■ New delivery agent flags ■ New queue features ■ New uses for LDAP ■ A method for identifying IPv6 addresses in configuration ■ Changes to `mail.local` ■ Changes to `mailstats` ■ Changes to `makemap` ■ A new maintenance utility, `editmap`(1M) The following details might be of particular interest: ■ Per RFC 2476, `sendmail` now listens for submissions on port 587, a feature that was added, but not mentioned, in version 8.10. ■ Because the `AutoRebuildAliases` option is no longer available, `newaliases` must be run manually now in order for changes to `/etc/mail/aliases` to become effective. Also, because `sendmail` is no longer `setuid root`, only `root` can run `newaliases`. For further information, see the "Mail Services Topics" in *System Administration Guide: Resource Management and Network Services*. The series of chapters on mail services provides overview information, some procedures for setting up and modifying your mail service and for troubleshooting, some background information, and details about all of the new features. **Note –** Version 8.10 of `sendmail` was first available in the Solaris 8 4/01 operating environment. Version 8.12 of `sendmail` is available in the Solaris 9 operating environment.	Updated in Solaris 9

Feature Description	Release Date
Solaris Network Cache and Accelerator (NCA)	Solaris 8 7/01
The Solaris Network Cache and Accelerator (NCA) has been improved with the addition of a sockets interface to NCA, through which any web server can communicate with NCA with minimal modifications. Web servers such as Apache, iPlanet Web Server, and Zeus are able to make use of NCA performance by using standard socket library functions. Also, NCA now supports vectored sendfile, which provides support for AF_NCA. Finally, the `ncab2clf` command has been enhanced by adding new options to support the ability to skip records before a selected date and to process a particular number of records when converting log files. For more information about NCA, see "Managing Web Cache Servers" in the *System Administration Guide: Resource Management and Network Services*.	Updated in Solaris 9
IP Network Multipathing	Solaris 8 10/00
IP network multipathing provides your system with recovery from single-point failures with network adapters and increased traffic throughput. As of the Solaris 8 10/00 release, if a failure occurs in the network adapter, and if you have an alternate adapter connected to the same IP link, the system switches all the network accesses automatically from the failed adapter to the alternate adapter. This process ensures uninterrupted access to the network. Also, when you have multiple network adapters connected to the same IP link, you achieve increased traffic throughput by spreading the traffic across multiple network adapters. As of the Solaris 8 4/01 release, dynamic reconfiguration (DR) uses IP network multipathing to decommission a specific network device, with no impact on existing IP users. The Solaris 8 7/01 release introduced the new IPMP Reboot Safe feature. When a failed NIC is removed from the system by using dynamic reconfiguration, and a reboot occurs prior to reinsertion of a functioning NIC, the system attempts, but fails, to plumb an interface for the missing NIC. Rather than lose the IP address, the IPMP Reboot Safe feature transfers the IP address to another NIC in the IPMP interface group. For more information, see "IP Network Multipathing Topics" in the *System Administration Guide: IP Services*.	Updated in Solaris 8 4/01 and 7/01
IP Network Multipathing DLPI Link-Up and Link-Down Notification Support	Solaris 9
Link-down notifications enable the IP multipathing daemon to detect physical link failures faster. When a network interface is started, the IP multipathing daemon attempts to enable link-up and link-down notifications from the network interface driver. If the driver supports this feature, a link-down notification is generated when the interface detects the loss of the physical link to the network. A link-up notification is generated when the physical link is restored. The `RUNNING` flag is unset when a link-down notification is received, and set when a link-up notification is received. The IP multipathing daemon uses the `RUNNING` flag to monitor the physical link state. For more information, see the IP network multipathing chapters in the *System Administration Guide: IP Services*.	

Feature Description	Release Date
Mobile Internet Protocol	Solaris 8 6/00
Mobile Internet Protocol (Mobile IP) enables the transfer of information to and from mobile computers, such as laptop and wireless communications. As of the Solaris 8 6/00 release, the mobile computer can change its location to a foreign network and still access and communicate with and through the mobile computer's home network. The Solaris implementation of Mobile IP supports only IPv4. As of the Solaris 8 4/01 release, Mobile IP enables system administrators to set up reverse tunnels. By setting up a reverse tunnel from the mobile node's care-of address to the home agent, you ensure a topologically correct source address for the IP data packet. By using reverse tunnels, system administrators can also assign private addresses to mobile nodes. For more information on the Mobile Internet Protocol, see "Mobile IP Topics" in the *System Administration Guide: IP Services*.	Updated in Solaris 8 4/01
Mobile Internet Protocol (Mobile IP) Agent Advertisements Over Dynamic Interfaces Dynamically created interfaces are interfaces that are configured after the `mipagent` daemon starts. You can now configure the foreign agent implementation to send advertisements over dynamically created interfaces. You can also enable or disable some unsolicited advertisements over the advertising interfaces. For more information on Mobile Internet Protocol, see "Mobile IP Topics" in the *System Administration Guide: IP Services*.	Solaris 9
Berkeley Internet Name Domain	Solaris 8 4/01
An updated version of Berkeley Internet Name Domain (BIND) has been integrated in the Solaris 9 release. The updated version is BIND version 8.2.4. BIND functionality includes the following: ■ `In.named` configuration options – See the `named.conf`(4) and the `named-bootconf`(1M) man pages. ■ Extensions to the resolver (3RESOLV) interface that are safe to use in multithreaded applications. ■ The addition of the `ndc`(1M) command, which is used to start or stop reconfigure `in.named`, and the `dnskeygen`(1M) command, which is used to create TSIG and DNSSEC keys. See the `dig`(1M) man page for instructions on how to gather information from the DNS servers. For more information, see the *System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)*.	Updated in Solaris 9

Feature Description	Release Date
Networking Freeware See "Freeware" on page 72 for information about `GNU wget 1.6`, `Ncftp Client 3.0.3`, and `Samba 2.2.2` in the Solaris 9 release. ■ `Ncftp Client 3.0.3` uses the File Transfer Protocol (FTP) and is an alternative to the UNIX® `ftp` program. ■ `GNU wget 1.6` retrieves files from the Web by using HTTP and FTP. ■ `Samba 2.2.2` is a free SMB and CIFS client and server for UNIX and other operating systems.	Solaris 9

System Administration Tools

Feature Description	Release Date
Solaris Volume Manager Solaris Volume Manager provides storage management tools that enable you to create and manage RAID 0, RAID 1, and RAID 5 volumes, as well as transactional (logging) devices and soft partitions. Solaris Volume Manager provides all of the capabilities of Solstice DiskSuite™ and adds the following: ■ Soft partitions – Allow numerous partitions on a single drive, thus breaking the 8-slice barrier ■ Device ID support – Preserves Solaris Volume Manager configuration even if disks are moved or rearranged ■ Active monitoring of disks – Detects silent failures ■ Solaris Management Console based interface – Enables you to manage the enhanced storage devices through the same management interface that is used for other Solaris management tasks ■ Solaris Volume Manager WBEM application programming interface (API) – Enables standards-based management of Solaris Volume Manager from any compliant tool The Solaris 9 release seamlessly supports upgrading existing systems that run Solaris DiskSuite (SDS) to the Solaris Volume Manager without disturbing or changing the configuration. Upgrades of mirrored root file systems are fully and automatically supported. For more information, see the *Solaris Volume Manager Administration Guide*.	Solaris 9

Feature Description	Release Date
Solaris Management Console	Solaris 8 1/01
Solaris Management Console 2.1 is a GUI-based "umbrella application" that serves as the starting point for a variety of management tools. The console comes complete with a default toolbox that contains the following tools: ■ System Information – Display read-only data about the host, hardware, and software. ■ Log Viewer – View application and command-line messages and manage log files. ■ Processes – View, suspend, resume, and delete processes. ■ Performance – Track the usage and consumption of system resources. ■ Users – Set up and maintain user accounts, user templates, groups, mailing lists, administrative roles, and rights. Grant or deny rights to users and to administrative roles to control the specific applications each can work with and which tasks each can perform. ■ Projects – Constrain how resources are allocated, by processes and by tasks that run in the current project. ■ Computers and Networks – View and manage computers, networks, and subnetworks. ■ Patches – Manage patches on systems that run the Solaris operating environment. ■ Scheduled Jobs – Schedule, start, and manage jobs. ■ Mounts and Shares – View and manage mounts, shares, and usage information. ■ Disks – Create and view disk partitions. ■ Enhanced Storage – Create and manage RAID 0 (concatenation and stripe), RAID 1 (mirror), RAID 5, soft partitions, and transactional volumes. Assemble flexible storage configurations that are resistant to data loss or downtime. ■ Serial Ports – Configure and manage existing serial ports. You can add or delete tools from the default toolbox or create a new toolbox to manage a different set of tools by using the console Toolbox Editor. You can also manage diskless clients, but with commands only, not through the GUI. For further information, see "Solaris Management Console (Overview)" in the *System Administration Guide: Basic Administration*.	Updated in Solaris 9
Patch Manager	Solaris 9
Patch Manager manages patches that are created for the Solaris 9 operating environment and compatible releases. You can display installed patches and their properties, add patches to one or more systems concurrently, remove patches, analyze a system's patch requirements, and download patches from the SunSolve Online service. The new `smpatch`(1M) command installs patches on single or multiple machines, analyzes patch requirements, and downloads required patches. See the `smpatch`(1M) man page for further information.	

Feature Description	Release Date
Solaris WBEM Services 2.5 Solaris WBEM Services 2.5 is Sun Microsystems' implementation of Web-Based Enterprise Management (WBEM). WBEM is a set of management and Internet-related technologies that are intended to unify the management of enterprise computing environments. Solaris WBEM Services was updated to version 2.5 in the Solaris 9 release. Further information is provided in "Web-Based Enterprise Management Tools" on page 48.	Solaris 9
WBEM CIM Object Manager Now Listens to HTTP Port 5988 The CIM Object Manager listens for remote method invocation (RMI) connections on RMI port 5987 and now listens for XML/HTTP connections on HTTP port 5988. (In the Solaris 8 software release and updates of the Solaris 8 release, the CIM Object Manager listened for XML/HTTP connections on default HTTP port 80.) For further information, see the *Solaris WBEM Services Administration Guide*.	Solaris 9
SNMP Adapter for WBEM Intended for use by system administrators, the SNMP Adapter for WBEM enables Simple Network Management Protocol (SNMP) management applications to access system management information that is provided by Solaris WBEM Services. Used with the Solstice™ Enterprise Agent (SEA) Master Agent, the SNMP Adapter for WBEM maps SNMP requests into equivalent WBEM Common Information Model (CIM) properties or instances. The SNMP Adapter for WBEM also remaps the response from the CIM Object Manager into an SNMP response, which is returned to the management application. A mapping file contains the corresponding Object Identifier (OID), class name, property name, and Abstract Syntax Notation One (ASN.1) type for each object. The *Solaris WBEM Services Administration Guide* contains information about the SNMP Adapter for WBEM.	Solaris 9
Solaris Product Registry 3.0 This registry includes these new features: ■ The ability to uninstall individual system packages. ■ All of the Solaris system products that you installed in their localized version appear in the System Software Localizations folder. ■ The registry is compatible with more installation wizards. For further information, see the *System Administration Guide: Basic Administration*.	Solaris 8 1/01
Modify Software Groups in Solaris Web Start Program The Solaris Web Start installation method was updated to enable you to modify the selected Solaris Software Group by adding or removing software packages. For further information, see the *System Administration Guide: Basic Administration*.	Solaris 8 1/01

Feature Description	Release Date
System Administration Freeware Tools For information about GNU `grep 2.4.2` and GNU `tar 1.13`, see "Freeware" on page 72. GNU `grep 2.4.2` is a pattern matcher. GNU `tar 1.13` is an archiver.	Solaris 9

File System Enhancements

Feature Description	Release Date
Extended File Attributes The UFS, NFS, and TMPFS file systems have been enhanced to include extended file attributes, which enable application developers to associate specific attributes to a file. For example, a developer of a file management application for a windowing system might choose to associate a display icon with a file. Extended attributes are logically represented as files within a hidden directory that is associated with the target file. You can use the extended file attribute API and a set of shell commands to add and manipulate file system attributes. See the `fsattr`(5), `openat`(2), and `runat`(1) man pages for more information. Many Solaris file system commands have been modified to support file system attributes by providing an attribute-aware option that you can use to query, copy, or find file attributes. For more information, see the specific file system command in the man pages. See also the *System Administration Guide: Basic Administration* for more information.	Solaris 9
Improved UFS Direct I/O Concurrency The performance of direct I/O, which is used by database applications to access unbuffered file-system data, has been improved by allowing concurrent read and write access to regular UFS files. Previously, an operation that updated file data would lock out all other read or write accesses until the update operation was completed. See the *System Administration Guide: Basic Administration* and the man page, `mount_ufs`(1M), for more information.	Solaris 8 1/01

Feature Description	Release Date
DNLC Improvements The directory name look-up cache (DNLC) is enhanced to provide improved performance when you access files in large directories with 1000 or more files. The DNLC is a general file-system service that caches the most recently referenced directory names and their associated vnodes. UFS directory entries are stored linearly on disk. This means that locating an entry requires searching each entry for the name. Adding a new entry requires searching the entire directory to ensure the name does not exist. To solve this performance problem, entire directories are cached in memory by the DNLC. Another feature in this release is that DNLC caches file objects that have been looked up, but do not exist. This feature is known as negative caching, and is useful because some applications repeatedly test to check if a file exists. New tunable parameters are associated with the DNLC improvements. These parameters are set optimally and should not be changed casually. See the *Solaris Tunable Parameters Reference Manual* for further information.	Solaris 8 6/00
UFS Snapshots `(fssnap)` You can use the `fssnap` command to create a snapshot of a file system. A snapshot is a file system's temporary image that is intended for backup operations. When the `fssnap` command is run, it creates a virtual device and a backing-store file. You can back up the virtual device, which looks and acts like a real device, with any of the existing Solaris backup commands. The backing-store file is a bitmapped file that contains copies of pre-snapshot data that has been modified since the snapshot was taken. See the *System Administration Guide: Basic Administration* and the man page, `fssnap`(1M), for more information.	Solaris 8 1/01
Updated `mkfs` **Command** The `mkfs` command has been updated to improve performance when you create file systems. Improved `mkfs` performance is often 10 times faster than in previous Solaris releases. Performance improvements are seen on systems when you create both large and small file systems. However, the biggest `mkfs` performance improvements occur on systems with high-capacity or high-speed disks.	Solaris 8 1/01

Installation

Feature Description	Release Date
Solaris Live Upgrade 2.0	Solaris 8 7/01
Solaris Live Upgrade provides a method of upgrading that substantially reduces the usual service outage that is associated with an operating system upgrade. You can duplicate your current running boot environment, then while the original boot environment continues to run, you can upgrade the duplicate. The duplicate boot environment is then activated to become the active boot environment when the system is rebooted. If a failure occurs, you can quickly fall back to the original boot environment with a simple reboot, thereby eliminating the downtime for the production environment associated with the normal test and evaluation process. In addition to upgrading a boot environment, you can install a Web Start Flash archive on an inactive boot environment. When you reboot the system, the configuration that you installed on an inactive boot environment is active. The Solaris 9 release includes several Live Upgrade enhancements that apply to the command-line interface only. The enhancements affect the following: ■ Progress reporting ■ Changes to the `lumount` and `luumount` commands ■ Scheduling priorities ■ Naming boot environments For information on these command-line enhancements, see "Live Upgrade Command-Line Features" on page 68. For further information on Solaris Live Upgrade, see "Solaris Live Upgrade Topics" in the *Solaris 9 Installation Guide*.	Updated in Solaris 9
Web Start Flash Installation Feature	Solaris 8 4/01
The Web Start Flash installation feature enables you to create a single reference installation of the Solaris operating environment on a machine and then replicate that installation on several machines. For further information, see "Web Start Flash Installation Feature Topics" in the *Solaris 9 Installation Guide*.	
Web Start Flash Archive Retrieval Using FTP	Solaris 9
The Web Start Flash program has been updated to allow you to retrieve a Web Start Flash archive by using FTP. When installing an archive, you can specify the location of an archive on an FTP server. For more details about how to retrieve an archive from an FTP server, see the *Solaris 9 Installation Guide*.	

Feature Description	Release Date
Minimal Installation Files that constitute several features in the core software group, or metacluster, are now moved into separate, more logically organized packages. You can optionally exclude these packages from the Solaris operating environment when you install the Solaris software. You can also remove these packages by using `pkgrm`(1M) after installation. Files that constitute the following features are moved into new or existing packages: ■ Cache file system ■ NFS ■ Kerberos security ■ Distributed file system ■ NIS-related ■ Network routing daemons ■ Remote network `r*` commands ■ `telnet` server ■ `tftp` server ■ Domain name server ■ DARPA name server ■ Remote procedure call services ■ Boot or install server ■ `setuid` and `setgid`	Solaris 9
Longer Package Names The `pkgmk` utility can now be used to create packages with names up to 32 characters in length. See the `pkgmk`(1) and `pkgadd`(1M) man pages.	Solaris 9
Installation From the Solaris DVD You can now install the Solaris operating environment and additional software from the Solaris DVD. The DVD enables you to perform either a Solaris™ Web Start installation or a custom JumpStart™ installation. The Solaris DVD includes the Solaris software, ExtraValue software, and the Solaris documentation. For detailed instructions, see the *Solaris 9 Installation Guide*.	Solaris 8 2/02
Solaris Web Start Program Uses `sysidcfg` File The Solaris Web Start installation method has been modified to use the `sysidcfg` file to configure system information during an installation or upgrade. If you create a `sysidcfg` file with configuration information for your system, the Solaris Web Start program does not prompt you to enter the system information during installation. For detailed instructions, see the *Solaris 9 Installation Guide*.	Solaris 8 2/02

Feature Description	Release Date
Solaris Web Start Program Enhancements The Solaris Web Start installation method was updated to enable you to perform the following functions during the Solaris installation or upgrade: ■ Select to automatically reboot the system after installation. ■ Select to automatically eject the CD or DVD after installation. ■ Select to preserve file systems. For detailed instructions, see the *Solaris 9 Installation Guide*.	Solaris 8 2/02
Additions to Time Zone Selections The number of time zones available in the Solaris 9 operating environment has dramatically increased. When you install the Solaris operating environment, you can select time zones by geographic region. The time zone selections in the lists of continents and countries have been expanded. For detailed instructions, see the *Solaris 9 Installation Guide*.	Solaris 9
Solaris Web Start Wizards SDK 3.0.1 Solaris Web Start Wizards™ SDK simplifies the installation, setup, and administration of native Solaris, Java™, and non-Java applications. With Solaris Web Start Wizards software, developers can copackage both Solaris versions and Microsoft Windows versions of their applications. The installation wizard manages the platform specifics. The Web Start Wizards SDK 3.0.1 is now included with the Solaris 9 release and can be installed by using the Solaris Web Start installation program.	Solaris 9
New Boot Options for a Custom JumpStart Installation New options have been added for use with the `boot` command when you perform a custom JumpStart installation. With the `boot` command, you can specify the location of the configuration files to use to perform the installation. You can specify a path to an HTTP server, an NFS server, or a file that is available on local media. If you do not know the path to the files, you can require that the installation program prompt you for the path after the machine boots and connects to the network. The `nowin` option enables you to specify that the custom JumpStart program not begin the X program. You do not need to use the X program to perform a custom JumpStart installation, so you can shorten the installation time by using the `nowin` option. For detailed instructions about how to use these new options, refer to "Custom JumpStart Installation Topics" in the *Solaris 9 Installation Guide*.	Solaris 8 7/01

Feature Description	Release Date
Upgrading Mirrors The Solaris 9 release now supports operating environment upgrades of root mirrors and metadevices that were created by Solaris Volume Manager (formerly Solstice DiskSuite). If you are upgrading a system that has a metadevice that was created by Solaris Volume Manager, you no longer need to edit the system's `vfstab`. As for root mirrors, the mirror is detected and the operating environment on the mirror is upgraded just as would happen in a typical upgrade without metadevices.	Solaris 9
Default Routing With System Identification Utilities The system identification utilities automatically attempt to determine the default router during installation. For installation information, see the *Solaris 9 Installation Guide*.	Solaris 8 4/01
Configuration With System Identification Utilities During system identification, the system identification utilities can configure systems to be LDAP clients. Prior Solaris releases allowed the configuration of a machine only as an NIS, NIS+, or DNS client. For installation information, see the *Solaris 9 Installation Guide*.	Solaris 8 1/01
Patch Analyzer The Patch Analyzer is now available when you use the Solaris Web Start program to upgrade to a Solaris Update release. The Patch Analyzer performs an analysis on your system to determine which (if any) patches will be removed or downgraded by upgrading to a Solaris Update release. You do not need to use the Patch Analyzer when you upgrade to the Solaris 9 release. For further installation information, see the *Solaris 9 Installation Guide*.	Solaris 8 1/01

System Performance Enhancements

Feature Description	Release Date
Multiple Page Size Support Multiple Page Size Support (MPSS) allows a program to use any hardware-supported page sizes to access portions of virtual memory. Previously only 8–KB pages were available for a program's stack, heap, or anonymous memory mapped with `mmap()`. You can use MPSS to run legacy applications with specific memory page size settings where they benefit from this sort of performance tuning. The use of larger page sizes might significantly improve the performance of programs that intensively use large amounts of memory. For more information, see the man pages for `pagesize`(1), `mpss.so.1`(1), and `ppgsz`(1).	Solaris 9
Improved Multithreading Library This release includes an improved and faster multithreading library, which was available as the alternate `libthread` in previous Solaris software releases. For further information, see the *Multithreaded Programming Guide* and the `threads`(3THR) man page.	Solaris 9
Solaris Network Cache and Accelerator (NCA) The Solaris Network Cache and Accelerator (NCA) has been improved with the addition of a sockets interface to NCA through which any web server can communicate with NCA with minimal modifications. See "Networking" on page 18.	Solaris 8 7/01
Performance Improvement for Servers Enhancements have been made to the algorithm that controls virtual/physical pages and how they are cached. These enhancements deliver increased system performance of around 10% for general user loads in servers.	Solaris 8 1/01
Dynamic Intimate Shared Memory (DISM) Dynamic Intimate Shared Memory (DISM) allows a database to dynamically extend or reduce the size of the shared data segment, eliminating the misconfiguration problem and denial-of-service security vulnerability present with Intimate Shared Memory (ISM). The ISM is a shared memory segment consisting of large locked memory pages. The ISM number of locked pages remains constant (cannot be changed). Dynamic ISM (DISM) is pageable ISM shared memory, where the number of locked pages is variable (can be changed). Therefore, the DISM supports releasing or adding more physical memory to the system during dynamic reconfiguration. The size of the DISM can span available physical memory plus disk swap. See the man page `shmop`(2).	Solaris 8 1/01

Server and Client Management

Feature Description	Release Date
Dynamic Host Configuration Protocol (DHCP) The Dynamic Host Configuration Protocol (DHCP) service enables host systems to receive IP addresses and network configuration information at boot time from a network server. The Solaris DHCP service has been enhanced in several ways to enable it to support larger numbers of clients: ■ The Solaris DHCP server now uses multithreading to serve multiple clients simultaneously. ■ A new data store that stores data in binary files can support larger numbers of clients with faster access than with the ASCII files and NIS+ data stores. ■ Access to files and NIS+ data stores has been redesigned to support server multithreading. ■ Data access architecture has been changed to enable third parties to write code modules to enable the DHCP server to use any data service to store DHCP data. In addition, the Solaris DHCP server now supports dynamic DNS updates. You can enable the DHCP service to update the DNS service with the host names of DHCP clients that request a specific host name. The Solaris DHCP client can now be configured to request a specific host name. For more information, see the *System Administration Guide: IP Services*.	Solaris 8 7/01
Diskless Client Management Diskless client management is available through the command line. You can manage diskless clients, list OS services for diskless clients, and manage patches on all existing diskless clients. For information on diskless client management, see "Managing Diskless Client Support (Tasks)" in the *System Administration Guide: Basic Administration*.	Solaris 8 1/01

Security Enhancements

Feature Description	Release Date
Internet Key Exchange (IKE) Protocol Internet Key Exchange (IKE) automates key management for IPsec. IKE replaces manual key assignment and refreshment on an IPv4 network, which enables the administrator to manage larger numbers of secure networks. System administrators use IPsec to set up secure IPv4 networks. The `in.iked` daemon provides key derivation, authentication, and authentication protection at boot time. The daemon is configurable. The administrator sets up the parameters in a configuration file. After the parameters are set up, no manual key refreshment is required. For further information, see "Internet Key Exchange" in the *System Administration Guide: IP Services*.	Solaris 9
Solaris Secure Shell Secure Shell allows a user to securely access a remote host over an unsecured network. Data transfers and interactive user network sessions are protected from eavesdropping, session hijacking, and intermediary attacks. Solaris 9 Secure Shell supports SSHv1 and SSHv2 protocol versions. Strong authentication is provided that uses public key cryptography. The X Window System and other network services can be tunneled safely over Secure Shell connections for additional protection.	Solaris 9

Feature Description	Release Date

Kerberos Key Distribution Center (KDC) and Administration Tools
 	
System administrators can improve system security by using Kerberos V5 authentication, privacy, and integrity. NFS is an example of an application that is secured with Kerberos V5.
 	
The following list highlights the new features of Kerberos V5.
■ Kerberos V5 Server – The server includes the following components:
  ■ Principal (user) administration system – Includes a centralized server for local and remote administration of principals and security policies
  The system includes both a GUI and a CLI administration tool.
  ■ Key Distribution Center (KDC) – Uses the principal database information that was created by the administration server and issues tickets for clients
  ■ Principal database replication system – Duplicates the KDC database to a backup server
■ MIT and Microsoft Windows 2000 password change interoperability – Kerberos V5 passwords can now be changed from a Solaris client to a MIT Kerberos server and Windows 2000.
■ Tuned DES – Kerberos V5 kernel DES operations have been optimized for Sun4u systems.
■ Kerberos encrypted communications now supported with the Solaris core – Previously, to encrypt user information that was sent by using Kerberos, an encryption module that used a web download was required. Solaris 9 release includes Kerberos privacy support that is used by protocols like NFS.
■ Addressless tickets – System administrators and users can now specify addressless tickets. This ability can be necessary in multi-homed and NAT network environments.
■ Kerberos V5 PAM module supports password aging – The `pam_krb5` module supports password aging set in the KDC for each user principal.
 	
For further information, see "Administering the Kerberos Database" in the *System Administration Guide: Security Services*.
	Solaris 9

Secure LDAP Client The Solaris 9 release includes new features for LDAP client-based security. A new LDAP library provides for SSL (TLS) and CRAM-MD5 encryption mechanisms. These encryption mechanisms enable customers to deploy methods for encryption over the wire between LDAP clients and the LDAP server. For further information about the iPlanet Directory Server 5.1, the LDAP directory server, see "Networking" on page 18.	Solaris 9
Encryption Maximum of 128 Bits In the Solaris 9 release, strong encryption with a maximum size of 128 bits is available as a default for certain functionality. This default can be used to create secure customer solutions.	Solaris 9

Feature Description	Release Date
Role-Based Access Control (RBAC) Enhancements Role-based access control (RBAC) databases can be managed through the Solaris Management Console graphical interface. Rights can now be assigned by default in the `policy.conf` file. In addition, rights can now contain other rights. For further information about RBAC, see "Role-Based Access Control" on page 65. For further information, see "Role-Based Access Control" in the *System Administration Guide: Security Services*.	Solaris 8 1/01
Xserver Connection Security Options New options enable system administrators to allow only encrypted connections to the Solaris X server. For further information, see "Xserver Features" on page 37.	Solaris 9
Generic Security Services Application Programming Interface (GSS-API) The Generic Security Services Application Programming Interface (GSS-API) is a security framework that enables applications to protect the data they transmit. The GSS-API provides authentication, integrity, and confidentiality services to applications. The interface permits those applications to be entirely generic with respect to security. That is, they do not have to check for the underlying platform (such as the Solaris platform) or security mechanism (such as Kerberos) being used. This means that applications that use the GSS-API can be highly portable. For more information, see the *GSS-API Programming Guide*.	Solaris 8 6/00
Additional Security Software For information about SunScreen™ 3.2, a firewall product, see "Additional Software" on page 71. See also "Freeware" on page 72 for information about the `Tcp-wrappers 7.6` freeware in the Solaris 9 release. `Tcp-wrappers 7.6` are small daemon programs that monitor and filter incoming requests for network services.	Solaris 9

Xserver Features

Feature Description	Release Date
X11 Support for IPv6 on Solaris The Solaris X Window System servers and client libraries now support the Internet Protocol Version 6 (IPv6) in addition to the Internet Protocol Version 4 (IPv4). This extension enables you to use IPv6 addresses and connections when displaying X applications across the network.	Solaris 9

Feature Description	Release Date
Xserver Connection Security Options New options enable system administrators to control which transport methods are used by the Solaris X server. Administrators who need to secure a host can now disable remote TCP connections directly to the Xserver, while allowing encrypted connections to be tunneled through Secure Shell. See the description of the `-nolisten` option in the `Xserver`(1) man page for further details.	Solaris 9
Xsun Keyboard Bell Option The Xsun server can now be configured to play a tone through an audio device instead of ringing the keyboard bell when a program emits a beep. By using this option, users can customize the volume, pitch, and length of beeps through the Xset program or CDE control panel. Users adjust the beep to match their hearing ability and personal preferences. See the description of the `-audiobell` option in the `Xsun`(1) man page for further details.	Solaris 9
Using Xsun Server as a Display-only Device New options enable the Xsun server to run without a keyboard or a mouse. You can run the Solaris window manager in display-only mode, without a mouse or a keyboard, in the following ways: ■ As a display-only device ■ As a display with alternative input devices other than a mouse or a keyboard ■ Without a display to drive a frame buffer for hardware-accelerated offscreen rendering See the `Xsun` man page for further information.	Solaris 8 2/02

Removable Media Management

Feature Description	Release Date
Write CD File Systems With the `cdrw` Command The `cdrw` command enables you to write CD file systems in ISO 9660 format with Rock Ridge or Joliet extensions on CD-R or CD-RW media devices. You can use the `cdrw` command to do the following: ■ Create data CDs ■ Create audio CDs ■ Extract audio data from an audio CD ■ Copy CDs ■ Erase CD-RW media Go to the following Web site for information on recommended CD-R or CD-RW devices: `http://www.sun.com/io_technologies/pci/removable.html` See the `cdrw`(1) man page for information on using this command.	Solaris 9
Improved Removable Media Management Volume management features have been improved in this release to fully support removable media. This improvement means that DVD-ROMs, Iomega and Universal Serial Bus (USB) Zip drives and Jaz drives, CD-ROMs, and diskettes are mounted and available for reading when they are inserted. With Common Desktop Environment (CDE) and Solaris command-line enhancements, you can: ■ Format, label, and set read or write software protection on removable media with the new `rmformat` command. This command replaces the `fdformat` command for formatting removable media. ■ Create and verify a PCFS file system on removable media with the `mkfs_pcfs` and `fsck_pcfs` commands. ■ Create an `fdisk` partition and a PCFS file system on removable media on a SPARC™ system to facilitate data transfers to IA systems. See the *System Administration Guide: Basic Administration* for information on managing removable media with the command-line interface. See the *Solaris Common Desktop Environment: User's Guide* for information on managing removable media with CDE's File Manager.	Solaris 8 6/00 Updated in Solaris 8 10/00

Device Management

Feature Description	Release Date
Sun Gigaswift Ethernet Driver As of the Solaris 8 7/01 release, Solaris functionality includes support for the Sun™ Gigaswift 1000Base-T Ethernet driver. This product gives exceptional performance of a 1-Gbyte twisted-pair copper Ethernet link. For further information, see the `ce`(7D) man page.	Solaris 8 7/01
USB Devices This release includes support for USB devices such as keyboards, mouse devices, audio devices, mass storage devices, and printers. Sun Microsystems support for USB devices includes the following: ■ Sun Blade™ 100 and Sun Blade 1000 systems that run the Solaris 8 10/00, Solaris 8 1/01, Solaris 8 4/01, Solaris 8 7/01, the Solaris 8 2/02 release, or the Solaris 9 release support USB devices. ■ Sun Blade, Netra™ X1/T1, and Sun Fire™ 280R systems that run the Solaris 9 release support USB devices. ■ Sun Ray™ systems also support USB devices. For information on using USB devices with a Sun Ray system, see the Sun Ray documentation.	Solaris 8 1/01
Using USB Mass Storage Devices Many USB mass storage devices are supported in the Solaris 9 environment. Some non-compliant USB devices might work by following the information given in the `/kernel/drv/scsa2usb.conf` file to see if a particular device can be supported. For more information, see the *System Administration Guide: Basic Administration*.	Solaris 8 1/01
Hot-Plugging USB Devices With the `cfgadm` Command With the `cfgadm`command, you can simply hot-plug a USB device from a running system without having to shut down the system. You can also use the `cfgadm` command to logically hot-plug a USB device without physically removing the device. This scenario is convenient when you are working remotely and you need to reset a USB device. For more information, see the `cfgadm_usb`(1M) man page.	Solaris 8 1/01

Feature Description	Release Date
USB Printer Support You can use Solaris Print Manager to set up a USB printer that is attached to a system with USB ports. The new logical device names for USB printers are: `/dev/printers/[0...N]*` Therefore, when you add a USB printer to a printer server, select one of these devices for a USB printer under Printer Port on the Add New Attached Printer screen. For more information on using Solaris Print Manager to set up printers, see the *System Administration Guide: Advanced Administration*. Although the new Solaris USB printer driver supports all USB printer-class compliant printers, a list of recommended PostScript™ printers is in the `usbprn`(7D) man page. For information and cautions about hot-plugging USB printers, refer to the Notes and Diagnostics sections of the `usbprn`(7D) man page.	Solaris 8 1/01
Reconfiguration Coordination Manager (RCM) Dynamic reconfiguration of system resources enables you to reconfigure system components while the system is still running. This feature has been available with the `cfgadm` command since the Solaris 8 release. The Reconfiguration Coordination Manager is the framework that manages the dynamic removal of system components. By using RCM, you can register and release system resources in an orderly manner. You can use the new RCM script feature to write your own scripts to shut down your applications, or to cleanly release the devices from your applications during dynamic reconfiguration. The RCM framework launches a script automatically in response to a reconfiguration request, if the request impacts the resources that are registered by the script. Previously, you had to release resources from applications manually before you could dynamically remove the resource. Or, you could use the `cfgadm` command with the `-f` option to force a reconfiguration operation, but this option might leave your applications in an unknown state. Also, the manual release of resources from applications commonly causes errors. See the *System Administration Guide: Basic Administration* and the `rcmscript`(4) man page for more information.	Solaris 8 1/01
`mp` **Program Enhancement** In the `mp`(1) program enhancement, the `mp` command is modified to work as an X Print Server client. With a properly configured X Print Server running in the host machine, `mp` can print output in any Print Description Language that the X Print Server supports. The newly introduced options, `-D` and `-P`, can be used for making `mp` work as an X Print Server client. For more information, see "Print Filter Enhancement mp(1)" in the *International Language Environments Guide*.	Solaris 8 4/01

Feature Description	Release Date
New Dynamic Reconfiguration Error Messages The dynamic reconfiguration software has been enhanced to improve troubleshooting dynamic reconfiguration problems. See the *System Administration Guide: Basic Administration* and the `cfsadmin`(1M) man page for more information.	Solaris 8 1/01

Language Support

Feature Description	Release Date
Universal Language Coverage The Solaris 9 operating environment now includes support for 162 locale environments, covering 39 languages on the Solaris 9 Software CDs, the Solaris 9 DVD, and the Solaris 9 Languages CD. Further information about language support in Solaris is provided in "Language Support" on page 52.	Solaris 9
Support for the New Chinese `GB18030-2000` Character Set Beginning with the Solaris 8 2/02 release, the Solaris platform allows for input, display, and print of the entire `GB18030-2000` character set (including nearly 30,000 characters). Any application that runs on the Solaris platform can thus benefit from a wider set of Chinese characters. For additional information on this feature, see "Language Support" on page 61.	Solaris 9

CHAPTER 3

What's New for Software Developers

This chapter highlights new software development features that have been added to the Solaris 9 operating environment.

Development Tools

Feature Description	Release Date
Compatibility of Solaris and Linux Application Programming Interfaces Some of the freeware libraries and supporting utilities that were available on the Solaris 8 Software Companion CD are now integrated in the Solaris 9 operating environment. As a result, software application developers can now develop and compile their freeware applications more easily in the Solaris operating environment. Libraries include `glib`, `GTK+`, `Jpeg`, `libpng`, `Tcl/Tk`, `libtif`, and `libxm12`. For further information about freeware available on the Solaris media, see "Other Software" on page 71.	Solaris 9
Choice of XML Output for Live Upgrade Messages When using Solaris Live Upgrade at the command line, you can now choose XML output with the `-X` option. This option is for use when writing programs or shell scripts that use Solaris Live Upgrade as a tool. The default output is text, but with the `-X` option, the XML suitable for machine parsing and interpretation is created. The output for the `-X` option is XML for all messages, including error, warning, informational, general. See the man page, `lucreate`(1M).	Solaris 9

Feature Description	Release Date
Multiple Page Size Support Multiple Page Size Support (MPSS) allows a program to use any hardware-supported page size to access portions of virtual memory. Previously only 8–KB pages were available for a program's stack, heap, or anonymous memory mapped with `mmap()`. You can tune large, memory-intensive applications performance to use any page size that is supported by hardware for stack, heap, or `/dev/zero` private memory mapped with `mmap()`. The use of larger page sizes might significantly improve the performance of programs that intensively use large amounts of memory. For more information, see the man pages for `pagesize`(1), `mpss.so.1`(1), `ppgsz`(1), `memcntl`(2), `mmap`(2) and `getpagesizes`(3C).	Solaris 9
Improved Multithreading Library The Solaris 9 release includes an improved and faster multithreading library, which was available as the alternate `libthread` in previous Solaris software releases. For further information, see the *Multithreaded Programming Guide* and the `threads`(3THR) man page.	Solaris 9
Sysevent Framework The `sysevent` framework enables notification of kernel-level and user-level system events, such as hardware and software state changes, errors, and faults, to applications that should be notified of these events. Components of the `sysevent` framework include the following: ■ `syseventd`(1M) daemon ■ `syseventadm`(1M) command ■ Library APIs for event data extraction and `sysevent` subscription ■ A driver-level system event notification interface, `ddi_log_sysevent`(9F) The `syseventd` daemon is a user-level daemon that accepts delivery of system event buffers from the kernel. After an event buffer has been delivered to `sysevent`d, the daemon then attempts to propagate the event to all interested end-event subscribers. The `syseventadm` command can be used to configure event specifications that are subsequently used to invoke commands, applications, or scripts in response to a system event. For information on the `sysevent` kernel and library APIs, see the man pages `syseventadm`(1M), `syseventconfd`(1M), and `syseventd`(1M). See `ddi_log_sysevent`(9F) for information about driver-level event notification logging.	Solaris 8 1/01 Updated in Solaris 8 4/01

Feature Description	Release Date
Kernel Pseudo-Random Number Generator The Solaris Pseudo-Random Number Generator (PRNG) which is available through the `/dev/random` and `/dev/urandom` devices provides ISVs with a standard interface to access pseudo-random numbers for cryptographic operations, scientific applications, and simulation tools. The PRNG operates in the Solaris kernel and protects the contents of the entropy pool. The PRNG gathers entropic data from kernel memory pages and maintains a high level of randomness at all times. For further information, see the `random`(7D) man page.	Solaris 9
Application Interface to Remote Shared Memory on Clusters If you develop applications that extend the use of a Sun Cluster environment, you can benefit from this interface. Using the new Remote Shared Memory (RSM) API, you can program your applications to lower the latency for message passing over high-speed cluster interconnects. Such cluster-aware applications can significantly reduce the time that is required to respond to events in a clustered configuration. You must have Sun Cluster 3.0 installed. Existing Sun Cluster applications will need to be modified to exploit the new interface. For further information, see the *Programming Interfaces Guide*. Also, the `librsm`(3LIB) man pages and the "Section 3: Extended Library Functions" (3RSM) man pages include references to RSM.	Solaris 8 10/01
GNU-Compatible Version of the `gettext` API Functions The Solaris 9 release provides a GNU-compatible version of the `gettext` API functions, while maintaining backward compatibility with Solaris `gettext` API functions. ■ Existing `gettext()`, `dgettext()`, `dcgettext()`, `textdomain()`, and `bindtextdomain()` functions in `libc` now can handle both Solaris and GNU-compatible message files. ■ New GNU-compatible `ngettext()`, `dngettext()`, `dcngettext()`, and `bind_textdomain_codeset()` functions in `libc` can handle GNU-compatible message files. ■ The `msgfmt` and the `gettext` utilities now can handle both Solaris and GNU-compatible message files. For further information, see the `gettext`(3C) man page.	Solaris 9
Extended File Attributes The UFS, NFS, and TMPFS file systems have been enhanced to include extended file attributes, which enable application developers to associate specific attributes to a file. For example, a developer of a file management application for a windowing system might choose to associate a display icon with a file. For further information, see "File System Enhancements" on page 27.	Solaris 9

Feature Description	Release Date
New Fixed-Priority (FX) Scheduling Class The FX scheduler provides a scheduling policy for processes that require user or application control of scheduling priorities. See "System Resources Enhancements" on page 16.	Solaris 9
Dynamic Host Configuration Protocol (DHCP) The Dynamic Host Configuration Protocol (DHCP) service enables host systems to receive IP addresses and network configuration information at boot time from a network server. Before the Solaris 8 7/01 release, DHCP configuration data could only be stored in text files or NIS+. Now, data access in the Solaris DHCP service has been redesigned to use a modular framework. Solaris DHCP provides an API that enables you to write shared objects to support any data storage facility for storing DHCP data. The *Solaris DHCP Service Developer's Guide* provides an overview of the data access framework that is used by Solaris DHCP, general guidelines for developers, and a listing of the API functions that you can use to write a module to support a new data store. For further information, see the *Solaris DHCP Service Developer's Guide*.	Solaris 8 7/01
Solaris Web Start Wizards SDK 3.0.1 Solaris Web Start Wizards simplify the installation, setup, and administration of native Solaris, Java, and non-Java applications. With Solaris Web Start Wizards software, developers can copackage both Solaris and Microsoft Windows versions of their applications. The installation wizard manages the platform specifics. The Web Start Wizards SDK 3.0.1 is now included with the Solaris 9 release and can be installed by using the Solaris Web Start installation program.	Solaris 9
Modular Debugger `(mdb)` `mdb`(1) is an extensible utility for low-level debugging and editing of the live operating system, operating system crash dumps, user processes, user process core dumps, and object files. In the Solaris 9 release, `mdb` provides new symbolic debugging support for the Solaris kernel, new kernel debugger commands, new features for examination and control of live running user processes, and the ability to examine raw disk files and devices. The *Solaris Modular Debugger Guide* and `mdb`(1) man page provide more information.	Solaris 9

Feature Description	Release Date
Audio Enhancements New audio directories have been added to the Solaris 9 operating environment. `/usr/include/audio` is a new directory for application audio header files. The audio file format has a new header file, `/usr/include/audio/au.h`, and man page, `au`(4). `/usr/share/audio` is a new depository for miscellaneous audio files. The audio files from `/usr/demo/SOUND/sounds` have been moved here. A symbolic link from `/usr/demo/SOUNDS/sounds` to `/usr/share/audio/samples/au` has been created so that current applications and scripts run without failure. Numerous bug fixes have been made to the audio kernel modules to improve reliability. For further information, see the *System Administration Guide: Basic Administration*.	Solaris 9
Vectored Sendfile System Call: `sendfilev()` `sendfilev()`, a vectored sendfile system call, enables better performance for sending data from application buffers or files. For example, in web performance, a web server can construct an HTTP response (header, data, and trailer as well as server side includes) in a single system call. This feature provides optimal performance with the Solaris Network Cache and Accelerator (NCA), because it enables the return of multiple chunks, which might come from various files for the response. For further information, see the man page `sendfilev`(3EXT).	Solaris 8 7/01
Verify File Conformance With the `appcert` Utility The `appcert` utility verifies an object file's conformance to the Solaris ABI. Conforming to the Solaris ABI greatly increases an application's probability of being compatible with future releases of Solaris software. For more information, see "Using appcert" in the *Programming Interfaces Guide*.	Solaris 8 4/01
Generic Security Services Application Programming Interface (GSS-API) The Generic Security Services Application Programming Interface (GSS-API) is a security framework that enables applications to protect the data they transmit. See "Security Enhancements" on page 35.	Solaris 8 6/00

Web-Based Enterprise Management Tools

Feature Description	Release Date
Solaris WBEM Services 2.5 Solaris WBEM Services 2.5 is Sun Microsystems' implementation of Web-Based Enterprise Management (WBEM). WBEM is a set of management and Internet-related technologies that are intended to unify the management of enterprise computing environments. Developed by the Distributed Management Task Force (DMTF), WBEM enables organizations to deliver an integrated set of standards-based management tools that support and promote World Wide Web technology. Solaris WBEM Services was updated to version 2.5 in the Solaris 9 release. For further developer information about WBEM, see the *Solaris WBEM SDK Developer's Guide*.	Solaris 9
New WBEM Batching API Added The Java Web-Based Enterprise Management (WBEM) client application programming interface (API) now supports the batching of multiple Common Interface Model (CIM) operations by a client into a single request and response. The CIM Object Manager now accepts and services these batched requests as well. This facility is defined in the Distributed Management Task Force (DMTF) Specification for CIM Operations Over HTTP. The number of remote calls that a client needs to make is consequently reduced. For further information, see the *Solaris WBEM SDK Developer's Guide*.	Solaris 9

Feature Description	Release Date
WBEM CIM WorkShop Enhanced CIM WorkShop provides a graphical user interface for the WBEM development tool through which instrumentation, system, and network application developers can view and create WBEM classes and instances. In CIM WorkShop, you can do following: ■ View and select namespaces ■ Add and delete namespaces ■ View, create, modify, and delete classes ■ Add and delete properties, qualifiers, and methods to new classes ■ View, create, and delete instances ■ View, modify, and delete instance values ■ Traverse associations ■ Execute methods ■ Display contextual help Enhancements and new features that are available in CIM Workshop include the following: ■ Updated and corrected contextual help. ■ Ability to traverse associations. ■ Ability to subscribe to and display information about events for a selected class, thus enabling you to debug applications that use events more easily. You can use this new feature only when you select the RMI protocol. ■ Ability to submit WBEM Query Language (WQL) queries to search for and display WBEM information. For further information, see the *Solaris WBEM SDK Developer's Guide*.	Solaris 9
Support for WBEM Process Indication (Extrinsic) Events Added Currently, WBEM event services enable client applications to asynchronously receive indications when conditions of interest are met. However, the only supported indications belong to the class life cycle indications, which denote the modification, the creation, and the deletion of an instance. While this class of indications is very flexible and wide ranging, instrumentation might need to publish indications that do not fall into this category. Given this requirement, the DMTF introduced the process indication hierarchy as an extension to the current indication hierarchy. The process indications for WBEM services now handle this extended hierarchy. Process indications for WBEM services is Sun Microsystems' implementation of the process indication portion of the event model. The process indication class is the superclass of all indications that are published by instrumentation, which also includes the life cycle indications. The process of subscribing to process indications is the same as the process of subscribing to life cycle indications. For further information, see the *Solaris WBEM SDK Developer's Guide*.	Solaris 9

Feature Description	Release Date
WBEM `mofcomp` Command Enhanced The Managed Object Format (MOF) compiler (`mofcomp`) now allows you to specify a namespace on the command line. If the namespace does not exist, it is created. In addition, the MOF Compiler now generates Java interface and class source files. This feature enables you to use standard Java interfaces, as opposed to having to learn the CIM constructs and the CIM object model application programming interfaces (APIs). For each `CIMClass`, an interface and a class file are generated. The interface is generated to enable you to create different implementations while maintaining interoperability. For further information, see the *Solaris WBEM SDK Developer's Guide*.	Solaris 9
New Java WBEM SDK Sample Programs Added The Java WBEM Software Developer's Kit (SDK) now includes a new sample Java applet and sample programs. The Java applet and sample programs are installed in `/usr/demo/wbem`. The Java WBEM SDK sample programs show you how to use events, queries, and batching. You can use these samples as a basis for developing your own programs. For further information, see the *Solaris WBEM SDK Developer's Guide*.	Solaris 9
Solaris WBEM Software Developer's Kit The Solaris Web-Based Enterprise Management (WBEM) Software Developer's Kit (SDK) includes APIs that developers use to create applications, based on WBEM, that access data and manage resources in the Solaris operating environment. The Solaris WBEM SDK also includes CIM WorkShop, a Java application that developers can use to create WBEM applications and view the sample WBEM client and provider programs included with the software. For more information, see the *Solaris WBEM SDK Developer's Guide*.	Solaris 8 4/01

Feature Description	Release Date

New Solaris Providers
 	
The new Solaris Providers enable developers to create software that gets and sets information about managed devices in a Common Information Model (CIM) environment. A Solaris Provider provides the CIM Object Manager with instances of managed resources in the Solaris operating environment.
 	
Five new Solaris Providers are available in the Solaris 9 software:
■ WBEM Solaris Device/System Performance Monitor Provider – Provides a variety of statistical information about a system on which the Solaris operating environment is running.
■ WBEM Product Registry Provider – Provides the ability to add, delete, or modify new or existing products that are installed on a system.
■ WBEM SNMP Provider – Enables WBEM services to deliver information by means of the Simple Network Management Protocol (SNMP), a protocol of the Internet reference model that is used for network management.
■ WBEM EEPROM Provider – Enables the display and modification of configuration information in the EEPROM.
■ WBEM System Availability Provider – Provides reboot information about a system so that applications can compute the percentage of time that a system has been up and running. This provider also supplies reasons why a system failed:
  ■ System panic occurred
  ■ System halted by a user
  ■ System shut down by a user
 	
For further information, see the *Solaris WBEM SDK Developer's Guide*.
	Solaris 9

Writing Device Drivers

Feature Description	Release Date
Frame Buffer Power Management Some devices, such as certain tape drives and frame buffers, should not lose power (even in a power cycle) when their drivers are detached. A new interface, `ddi_removing_power`(9F), checks if a device will lose power as a result of a suspend operation. A new property, `no-involuntary-power-cycles`, can be specified to ensure that the device is not powered down unintentionally. For more information, see the `ddi_removing_power`(9F) and `no-involuntary-power-cycles`(9P) man pages.	Solaris 9

Feature Description	Release Date
Driver Fault Injector Harness The driver fault injector harness is a Solaris device driver development tool. The harness injects a wide range of simulated hardware faults when the driver under development accesses its hardware. The harness tests the impact of the test fault conditions on a SPARC based device driver. For more information, see the man pages `th_define`(1M) and `th_manage`(1M).	Solaris 8 1/01
Generic LAN Driver Driver developers can use the Generic LAN driver (GLD) to implement much of the STREAMS and Data Link Provider Interface (DLPI) functionality for a Solaris network driver. Until the Solaris 8 10/00 release, the GLD module was available only for Solaris *Intel Platform Edition* network drivers. Now GLD is available for the Solaris operating environment *SPARC Platform Edition* network drivers. For more information, see "Drivers for Network Devices" in *Writing Device Drivers*.	Solaris 8 10/00

Language Support

Feature Description	Release Date
Universal Language Coverage The Solaris 9 operating environment now includes support for 162 locale environments, covering 39 languages on the Solaris 9 Software CDs, the Solaris 9 DVD, and the Solaris 9 Languages CD. For further information, see "Language Support" on page 61. Also, see the *International Language Environments Guide*.	Solaris 9
Enhanced Asian Language Support The Solaris 9 release offers broader support for the Asian languages with new input methods and collation sequences for Simplified Chinese, Traditional Chinese, Korean, and Thai. This release also supports new native locale environments for Hong Kong `(zh_HK.BIG5HK)` and China `(GB18030)`. For further information about Asian language support in the Solaris 9 release, see "Language Support" on page 61. Also, see the *International Language Environments Guide*.	Solaris 9

Feature Description	Release Date
Support for the New Chinese `GB18030-2000` Character Set Beginning with the Solaris 8 2/02 release, the Solaris platform enables input, display, and print for the entire `GB18030-2000` character set (including nearly 30,000 characters). Any application that runs on the Solaris platform can thus benefit from a wider set of Chinese characters. See "Language Support" on page 61 for further information on this feature.	Solaris 8 2/02
Improved Data Interoperability Data interoperability with non-Solaris environments has been improved in the Solaris 9 release with the addition of new `iconv` utilities for data conversion between UTF-8 and the following native encodings: HKSCS, GB18030, ISO 8859-11, and Hindi. Additionally, Japanese language support has been expanded through `iconv` modules that convert between Solaris Japanese locale codesets and Japanese mainframe codesets from Fujitsu, Hitachi, and NEC. For further information on language support in the Solaris 9 release, See "Language Support" on page 61. Also, see the *International Language Environments Guide*.	Solaris 9
New European and Middle Eastern Keyboard Support The Solaris 9 release has added Sun I/O keyboard support for TurkeyQ, TurkeyF, and Arabic, and support for the Sun Ray USB keyboard for TurkeyQ, TurkeyF, Belgian, and Arabic. For further information about European and Middle Eastern language support in the Solaris 9 release, see "Language Support" on page 61. Also, see the *International Language Environments Guide*.	Solaris 9
New TrueType Fonts The new TrueType fonts provide a common appearance between the codesets and offer support for the same typefaces across the codesets. The TrueType fonts are common to all European locales. Each Asian locale has its own TrueType fonts file. For further information, see the *International Language Environments Guide*.	Solaris 9
Expanded Unicode Support The Solaris 9 release offers broader support for Unicode with the addition of new Unicode (UTF-8) locales for Thailand, India, Hong Kong, Turkey, Egypt, Brazil, Finland, and Belgium-Walloon. For further information about Unicode support in the Solaris 9 release, see "Language Support" on page 61. Also, see the *International Language Environments Guide*.	Solaris 8 10/00 Updated in Solaris 8 4/01 and in Solaris 9

Feature Description	Release Date
Print Filter Enhancement – the `mp` Program The `mp`(1) program accepts international text files from various Solaris locales and produces output for the specified locale. Because the complex text layout (CTL) is supported in `mp`, the output contains proper text layout, such as bidirectional text rendering and shaping. Depending on the `mp` system font configuration for each locale, the PostScript output file can contain glyph images from Solaris system-resident scalable or bitmap fonts. For more information, see "Print Filter Enhancement mp(1)" in the *International Language Environments Guide*.	Solaris 8 4/01

Java Releases

Feature Description	Release Date
JavaHelp v. 1.1.2 JavaHelp™ v. 1.1.2 is a full-featured, platform-independent, extensible help system that enables developers and authors to incorporate online help in applets, components, applications, operating systems, and devices. For more information, refer to the following Web site: `http://java.sun.com/products`	Solaris 9
Java 2 SDK, Standard Edition v. 1.4.0 The Java 2 SDK Standard Edition v. 1.4.0 (J2SE™ 1.4.0) is an upgrade release for Java 2 SDK, Standard Edition. The upgrade release includes new platform features, and new tools and utilities. For full details on these enhancements, see the J2SE 1.4.0 platform documentation at the following Web site: `http://java.sun.com/j2se/1.4/docs/relnotes/features.html`	Solaris 9

Feature Description	Release Date
JSP 1.2 and Java Servlet 2.3 Support in Apache Web Server With the addition of Jakarta Tomcat 4.0.1 and the `mod_jserv` module, the Apache web server now supports JavaServer Pages™ (JSP Version 1.2) and Java Servlets (Version 2.3). The following files are stored in `/etc/apache`: ■ `tomcat.conf` ■ `README.Solaris` ■ `zone.properties` ■ `jserv.properties` ■ `jserv.conf` See the `README.Solaris` file for information on enabling Tomcat support. Also refer to the following Web site for configuration information: `http://jakarta.apache.org/tomcat/tomcat-4.0-doc/index.html` Tomcat and the `mod-jserv` module, like the rest of Apache software, is open source code that is maintained by a group external to Sun. This group seeks to maintain compatibility with previous releases.	Solaris 9

CHAPTER 4

What's New for Desktop Users

This chapter highlights desktop features that have been added to the Solaris 9 operating environment.

Desktop Features

Feature Description	Release Date
Xterm Terminal Emulator Support for Multibyte Character Set The Xterm terminal emulator now supports multibyte character sets. This feature enables the use of Xterm windows in UTF-8 and other multibyte locales. The Xterm command line and resources incorporate new options to specify X font sets. See the `Xterm` man page for further information.	Solaris 9
Graphical Workspace Manager Graphical Workspace Manager provides a graphical representation of all workspaces, the ability to navigate across different workspaces with the press of a button, and the ability to drag and drop applications across different workspaces. You are no longer limited to viewing nine workspaces. Also, the Graphical Workspace Manager Options dialog box has been added to provide a number of additional display options. For more information, see "Graphical Workspace Manager" in the *Solaris Common Desktop Environment: User's Guide*.	Solaris 8 6/00 Updated in Solaris 8 4/01

Feature Description	Release Date
Workspace Manager The Workspace Manager provides a graphical user interface (GUI) for controlling behavior and the number of workspaces. You can add and delete workspaces by using a slider. You can also display the Graphical Workspace Manager in the Workspace Switch Area of the Front Panel. For more information, see "Workspace Manager" in the *Solaris Common Desktop Environment: User's Guide*.	Solaris 8 4/01
Window List The Window List provides a list of all currently running applications. The Window List enables you, with the click of a mouse button, to locate any application, even those in workspaces other than the current workspace. The Window List also provides the ability to perform window actions on a selected group of applications. You can choose to display or not display the Workspace column. For more information, see "Window List" in the *Solaris Common Desktop Environment: User's Guide*.	Solaris 8 6/00 Updated in Solaris 8 4/01
Energy Star Standards X11R6.4 standards have been enhanced with Frame Buffer Power Management (FBPM), an extension to the Display Power Management System (DPMS). This enhancement is added to fulfill the U.S. government's Energy Star program requirements and only works on Energy Star-compliant hardware.	Solaris 8 6/00
Print Format for Non-ISO-1 Files By default, `dtlp`(1) uses `mp`(1) before sending the output to `lp`(1). This feature enables many of the non-ISO-1 standard text files to be correctly printed in CDE. The same filtering effect is also applied in the printing of dtmail mail messages. For further information, see the `mp`(1) man page.	Solaris 9
Adding Multiple Files to Emails This feature enables you to keep the Mailer - Attachment - Add dialog box open in order to add two or more files to an email. The need to select Add Files from the Attachment menu multiple times is eliminated. For more information on the Mailer, see "Using Mailer" in the *Solaris Common Desktop Environment: User's Guide*.	Solaris 8 1/01
Removable Media Manager Removable Media Manager centralizes access to removable devices in one window. You can format, query properties, view directory structures, and where applicable, protect and slice media. See "Removable Media Management" on page 39. See also "Using Removable Media Manager" in the *Solaris Common Desktop Environment: User's Guide*.	Solaris 8 6/00

Feature Description	Release Date
Audio Enhancements Audio directories have been added to the Solaris 9 operating environment. `/usr/include/audio` is a new directory for application audio header files. The audio file format has a new header file, `/usr/include/audio/au.h`, and man page, `au`(4). `/usr/share/audio` is a new depository for miscellaneous audio files. The audio files from `/usr/demo/SOUND/sounds` have been moved here. A symbolic link from `/usr/demo/SOUNDS/sounds` to `/usr/share/audio/samples/au` has been created so that current applications and scripts run without failure. Numerous bug fixes have been made to the audio kernel modules to improve reliability. For further information, see the *System Administration Guide: Basic Administration*.	Solaris 9
Universal Language Coverage The Solaris 9 operating environment now includes support for 162 locale environments, covering 39 languages on the Solaris 9 Software CDs, the Solaris 9 DVD, and the Solaris 9 Languages CD. See "Language Support" on page 52 for further information about language support in the Solaris 9 release.	Solaris 9
Desktop Freeware See "Freeware" on page 72 for information about `GNU grep 2.4.2`, `GNU tar 1.13`, `GNU wget 1.6`, and `Ncftp Client 3.0.3` in the Solaris 9 release. ■ `GNU grep 2.4.2` is a pattern matcher. ■ `GNU tar 1.13` is an archiver. ■ `GNU wget 1.6` retrieves files from the Web by using HTTP and FTP. ■ `Ncftp Client 3.0.3` uses the File Transfer Protocol and is an alternative to the UNIX `ftp` program.	Solaris 9

CHAPTER 5

What's New: A Closer Look

The Solaris 9 operating environment provides many new features that improve an already powerful and stable operating environment. This chapter describes some of the new features of the Solaris 9 release in more detail:

- Enhanced language support
- Advanced technologies for centralized network administration
- Live Upgrade command line features
- Improved system information displays
- Other software in the Solaris 9 release
- Companion software and preview software

For a complete list of Solaris 9 features with brief descriptions, see chapters 2–4.

Language Support

The Solaris 9 operating environment now includes support for 162 locale environments, covering 39 languages on the Solaris 9 DVD, the Solaris 9 Software CDs, and the Solaris 9 Languages CD. See an overview of the language support features in Chapter 4. The following section provides more detail on some of these features.

New Asian Locale Support

Support for the New Chinese GB18030-2000 Character Set

Beginning with the Solaris 8 2/02 release, the Solaris platform enables input, display, and print for the entire GB18030-2000 character set (including nearly 30,000 characters). Any application that runs on the Solaris platform can thus benefit from a wider set of Chinese characters. These glyphs are primarily Han characters, but the encoding also includes glyphs for minority languages such as Tibetan, Wei, Yi, and Mongolian.

GB18030-2000 support in the Solaris 9 release also includes backward compatibility to previous Chinese codesets (GBK and GB2312), as well as conversion to other codesets such as Unicode. Solaris developers do not need to change their procedures to access this new encoding support. Standard toolkits can use the new support.

For Java applications that need GB18030-2000 support, review J2SE™ at the following Web site:

```
http://java.sun.com/j2se/1.4
```

New Chinese and Korean Collation Locales

Collation locales provide different collation options to users, such as stroke count and radical, phonetic, and dictionary options.

Wordbreaker Modules for Thai

The wordbreaker module is used to correctly break the Thai text into proper paragraphs, sentences, and words within Motif.

New Asian UTF-8 (Unicode) Locales

The File System Safe Universal Transformation Format, or UTF-8, is an encoding that is defined by X/Open® as a multibyte representation of Unicode. UTF-8 encompasses almost all of the characters for traditional single-byte and multibyte locales for European and Asian languages for Solaris locales.

- th_TH.UTF-8 locale is the Unicode locale for Thailand.
- hi_IN.UTF-8 locale is the Unicode locale for India.
- zh_HK.UTF-8 locale is the Unicode locale for Hong Kong, China.

New Thai Input Method

The new Thai input method supports the Thai input standard, called the WIT, that is specified by the Thai government. The WIT has 3 levels: level 0, level 1, and level 2.

New Chinese input methods

More popular and powerful input methods (IM) in the Traditional Chinese and Simplified Chinese locales have been added for new character sets and new locales:

- New Chuyin IM for Traditional Chinese locales
- Cantonese IM for all Chinese locales
- English-Chinese IM for all Chinese locales

New Auxiliary Window for Chinese Input Methods

The Auxiliary window provides an input method user interface (UI) that is "friendly" and extensible for all Chinese locales. New functions that are supported by the auxiliary window are as follows:

- Input method switching
- Input method properties configuration
- Look-up tables for GB2312, GBK, GB18030, HKSCS, CNS, Big–5, and Unicode character sets
- Code table management tool
- A visual keyboard

New `iconv` Modules

`iconv` modules enable conversion between native encoded data and Unicode. The following new `iconv` modules have been added to support new character sets:

- UTF-8 <---> HKSCS
- UTF-8 <---> GB18030
- UTF-8 <---> ISO8859-11
- UTF-8 <---> Hindi

New `zh_CN.GB18030` Locale Enhanced From `zh_CN.GBK`

This new `zh_CN.GB18030` locale is provided to support the new GB18030 standard encoding that is required by a new law that the Chinese Government has enacted.

New `zh_HK.BIG5HK` Locale to Support HKSCS for Hong Kong, China

The new `zh_HK.BIG5HK` locale is provided to support the Hong Kong Supplementary Character Set (HKSCS). The HKSCS, as a supplementary character set of the Big-5 and ISO 10646 coding schemes, contains Chinese characters that are needed in Chinese computing in Hong Kong. However, these characters are not contained in either the Big-5 or ISO 10646 standard character sets.

Japanese Module Support

Additional Japanese `iconv` Modules

Additional Japanese language support includes `iconv` code conversions between Solaris Japanese locale codesets, such as eucJP, PCK, and UTF-8, and Japanese mainframe codesets, such as Fujitsu JEF, Hitachi KEIS, and NEC JIPS.

New European Locale Support

New Unicode (UTF-8) Locales for Europe and the Middle East

For the Solaris 8 10/00 release, Russian, Polish, and two new locales for Catalan were added to the European and Middle Eastern locales. For the Solaris 8 4/01 release, two additional languages, Turkish UTF-8 Codeset and Russian UTF-8 Codeset, were added.

In the Solaris 9 release, European and Middle Eastern language support also includes the addition of UTF-8 locales for Turkey, Egypt, Brazil, Finland, and Belgium-Walloon.

The locale names are as follows:

- `ca_ES.ISO8859-1` locale is a Unicode locale for Spain (Catalan).
- `ca_ES.ISO8859-15` locale is an additional Unicode locale for Spain (Catalan).
- `pl_PL.UTF-8` locale is the Unicode locale for Poland.
- `ru_RU.UTF-8` locale is the Unicode locale for Russia.
- `tr_TR.UTF-8` locale is the Unicode locale for Turkey.
- `ar_EG.UTF-8` locale is the Unicode locale for Egypt.
- `pt_BR.UTF-8` locale is the Unicode locale for Brazil.

- `fi_FI.UTF-8` locale is the Unicode locale for Finland.
- `fr_BE.UTF-8` locale is the Unicode locale for Belgium-Walloon.

Euro Default Currency Support

The following locales have changed from their national currency unit (NCU) to the euro currency glyph:

`ca_ES.ISO8859-15` (Spain)

`de_AT.ISO8859-15` (Austria)

`de_DE.ISO8859-15` (Germany)

`de_DE.UTF-8` (Germany)

`en_IE.ISO8859-15` (Ireland)

`es_ES.ISO8859-15` (Spain)

`es_ES.UTF-8` (Spain)

`fr_BE.ISO8859-15` (Belgium)

`fr_BE.UTF-8` (Belgium)

`fi_FI.ISO8859-15` (Finland)

`fi_FI.UTF-8` (Finland)

`fr_FR.ISO8859-15` (France)

`fr_FR.UTF-8` (France)

`it_IT.ISO8859-15` (Italy)

`it_IT.UTF-8` (Italy)

`nl_BE.ISO8859-15` (Belgium)

`nl_NL.ISO8859-15` (Netherlands)

`pt_PT.ISO8859-15` (Portugal)

Enhanced Dtpad File Open/Save Codeset Conversion

Enhancements include the addition of an "encoding" option to the File Open/Save dialog box that supports file encoding changes with `iconv`(3C). This option enables users to open or save files in various encodings, such as UTF-8 and UTF-16.

Role-Based Access Control

Role-based access control (RBAC) was updated in the Solaris 8 1/01 software release. RBAC databases can now be managed through the User tool in the Solaris Management Console graphical interface. A terminology change has made the term *execution profiles* obsolete. The term has been replaced with *rights profiles*, also referred to as *rights* (in the graphical interface) and *profiles* (on the command line and in files).

In addition to authorizations and commands with security attributes, a rights profile can now include other rights profiles. If the same command appears in more than one subordinate rights profile, the first occurrence in the file assumes precedence.

The `policy.conf`(4) file now recognizes the keyword `PROFS_GRANTED`, which lets you assign rights profiles by default.

The following figure illustrates how the extended user attributes are supplied to the user.

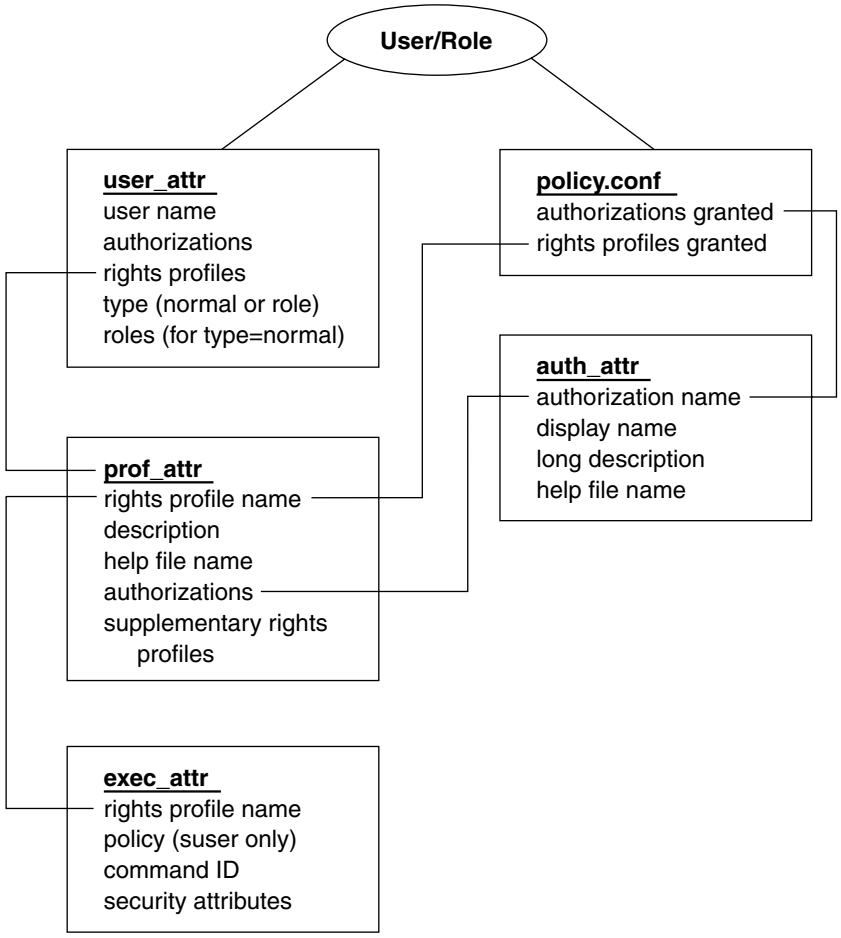

FIGURE 5–1 Extended Attribute Databases

The `user_attr` database contains the attributes that are shown, including a comma-separated list of profile names. The contents of the profiles are split between the `prof_attr` file and the `exec_attr` file. The `prof_attr` file contains rights profile identification information, authorizations that are assigned to the rights profile, and rights profiles that are nested. The `exec_attr` file identifies the policy and contains commands with their associated security attributes. The `auth_attr` file supplies authorization information to the Solaris Management Console tools.

Note – Although you can assign authorizations directly to users through `user_attr`, this practice is discouraged.

The `policy.conf` file supplies default attributes to be applied to all users. For example, if the Printer Management rights profile is assigned to a user or role, the `user_attr` entry for that user or role contains the keyword/value pair: `profiles=Printer Management`. The `prof_attr` file defines this profile, which also specifies the help file and authorizations, with the following line:

```
Printer Management:::Manage printers, daemons,
spooling:help=RtPrntAdmin.html;auths=solaris.admin.printer,
/ solaris.admin.printer.modify,solaris.admion.printer.delete
```

In the `exec_attr` file, the following line assigns an effective user ID = `lp` to the command `/usr/sbin/accept` within the Printer Management profile:

```
Printer Management:suser:cmd:::/usr/sbin/accept:euid=lp
```

The following table lists commands that use authorizations.

TABLE 5–1 RBAC Commands

Command	Associated Authorizations
`at`(1)	solaris.jobs.user
`atq`(1)	solaris.jobs.admin
`crdw`(1)	solaris.device.cdrw
`crontab`(1)	solaris.jobs.user, solaris.jobs.admin
`allocate`(1M)	solaris.device.allocate, solaris.device.revoke
`deallocate`(1M)	solaris.device.allocate, solaris.device.revoke
`list_devices`(1M)	solaris.device.revoke
`smcron`(1M)	solaris.jobs.admin, solaris.jobs.user
`smdiskless`	solaris.admin.dcmgr.clients, solaris.admin.dcmgr.read
`smexec`(1M)	solaris.profmgr.read, solaris.profmgr.write
`smgroup`(1M)	solaris.admin.usermgr.read, solaris.admin.usermgr.write
`smmultiuser`(1M), `smuser`(1M)	solaris.admin.usermgr.pswd, solaris.admin.usermgr.read, solaris.admin.usermgr.write, solaris.profmgr.assign, solaris.profmgr.delegate, solaris.role.assign, solaris.role.delegate
`smmaillist`(1M)	solaris.admin.usermgr.read, solaris.admin.usermgr.write

TABLE 5–1 RBAC Commands *(Continued)*

Command	Associated Authorizations
`smosservice`	solaris.admin.dcmgr.admin, solaris.admin.dcmgr.read
`smprofile`(1M)	solaris.profmgr.read, solaris.profmgr.write
`smrole`(1M)	solaris.admin.usermgr.pswd, solaris.admin.usermgr.read, solaris.admin.usermgr.write, solaris.profmgr.assign, solaris.profmgr.delegate, solaris.role.assign, solaris.role.delegate

For more information on the Solaris Management Console, see "System Administration Tools" on page 24.

Live Upgrade Command-Line Features

In the Solaris 9 release, the following Solaris Live Upgrade new features apply to the command-line interface only.

Progress Reporting

When using Solaris Live Upgrade to upgrade or install a Web Start Flash archive, the percentage of the upgrade or install completed is reported.

Changes to the `lumount` and `luumount` Commands

The `lumount` command mounts all the boot environment's file systems. If you do not explicitly specify a mount point, `lumount` creates a mount point that uses the boot environment name, rather than a random set of numbers. This change prevents a proliferation of mount points and aids in using the `luumount` command.

Here is an example of the old and new mount point naming:

- Mount point name with a number identifier: `/.alt.1234`
- Mount point name with the boot environment name as the identifier: `/.alt.solaris8`.

  In this example, the boot environment name is `solaris8`.

The `luumount` command unmounts the boot environment's root file system. The `luumount` command now accepts a mount point as well as the boot environment name. And with the `-f` option, a boot environment's file system can be forcibly unmounted.

See the man pages, `lumount`(1M) and `luumount`(1M).

Scheduling Priorities

Solaris Live Upgrade's main purpose is to minimize production environment downtime while migrating to a new operating system. Some Solaris Live Upgrade operations, such as upgrading and copying file systems, can cause significant load to a system. Solaris Live Upgrade now has the tools to control scheduling priorities, which helps prevent degrading of performance on the production system. You can change the defaults in the `/etc/default/lu` file.

Naming Boot Environments

To allow long names for boot environments, Solaris Live Upgrade commands that accept a boot environment name can now associate a description of any length with that name.

For further information, see the *Solaris 9 Installation Guide* or the man page, `ludesc`(1M).

`pargs` and `preap` Commands

The `pargs` command enables you to display all the arguments that are passed to a process. Use the `pargs` command in combination with the `pgrep` command to display the arguments that are passed to a process, as follows:

```
# pargs `pgrep ttymon`
579:    /usr/lib/saf/ttymon -g -h -p system-name console login:
-T sun -d /dev/console -l
argv[0]: /usr/lib/saf/ttymon
argv[1]: -g
argv[2]: -h
argv[3]: -p
argv[4]: system-name console login:
argv[5]: -T
argv[6]: sun
argv[7]: -d
```

```
argv[8]: /dev/console
argv[9]: -l
argv[10]: console
argv[11]: -m
argv[12]: ldterm,ttcompat
548:    /usr/lib/saf/ttymon
argv[0]: /usr/lib/saf/ttymon
```

Use `pargs -e` to display the environment variables that are associated with a process, as in the following example:

```
$ pargs -e 6763
6763: tcsh
envp[0]: DISPLAY=:0.0
```

You can use the `pargs` and `preap` commands to examine any process you have privileges to look at. As superuser, you can examine any process.

You can use the `preap` command to clean up a defunct (also called a *zombie*) process. A zombie process is one that has not yet had its exit status reaped (or claimed) by its parent. These processes are generally harmless, but they can consume system resources if they are numerous.

New `df`, `du`, and `ls` Options

The `df`, `du`, and `ls` commands have a new `h` option for displaying disk usage and file or file system sizes that are easy to understand.

The default form of the `df` command displays file system size in blocks (512 bytes). The `df` output, in kilobytes, follows:

```
$ df -k / /usr
Filesystem            kbytes    used   avail capacity  Mounted on
/dev/dsk/c0t0d0s0     192056   94788   78063    55%    /
/dev/dsk/c0t0d0s6    1982988  829966 1093533    44%    /usr
```

The same file system sizes displayed in powers of 1024 follows:

```
$ df -h / /usr
Filesystem             size   used  avail capacity  Mounted on
/dev/dsk/c0t0d0s0      188M    93M    76M    55%    /
/dev/dsk/c0t0d0s6      1.9G   811M   1.0G    44%    /usr
```

The default form of the `du` command displays disk space in blocks (512 bytes). The `du` output, in blocks, follows:

```
% du -s k*
100     kadmin
98      kadmin.local
```

```
98      kdb5_util
90      keyserv
10      killall
```

The same disk space displayed in powers of 1024 follows:

```
% du -h k*
  50K   kadmin
  49K   kadmin.local
  49K   kdb5_util
  45K   keyserv
   5K   killall
```

The default form of the `ls -l` command displays file size in bytes. Use the `ls -lh` command to display file size in powers of 1024:

```
% ls -lh k
-r-xr-xr-x   1 root     bin          49K Nov 30 03:32 kadmin
-r-xr-xr-x   1 root     bin          49K Nov 30 03:32 kadmin.local
-r-xr-xr-x   1 root     bin          49K Nov 30 03:32 kdb5_util
-r-xr-xr-x   1 root     sys          44K Nov 25 04:37 keyserv
-r-xr-xr-x   1 root     bin         4.3K Nov 25 04:36 killall
```

Other Software

Additional Software

The Solaris 9 software release includes an ExtraValue directory that contains two subdirectories, CoBundled and Early Access. The CoBundled directory contains software that previously shipped separately, such as SunScreen 3.2 and Web Start Wizards SDK 3.0.1. The Early Access directory contains preliminary evaluation software, such as Netscape 6.2.1.

The CoBundled and Early Access directories are in the Solaris_9 directory at `Solaris_9/ExtraValue/EarlyAccess` and `Solaris_9/ExtraValue/CoBundled`. The directories are located on the Solaris 9 DVD and the Solaris Software 2 of 2 CD.

For further information about Solaris Web Start Wizards SDK 3.0.1, see “Installation” on page 29.

SunScreen 3.2

SunScreen 3.2 is a stateful, dynamic, packet-filtering firewall that offers high-speed protection to your Solaris server. Some of the features of SunScreen 3.2 are as follows:

- 130 multithreaded stateful packet filters
- Network address translation
- SKIP and IPSec/IKE VPN client support
- Ordered rule sets
- Multiple firewall management
- A Java applet GUI
- Complete command-line control

SunScreen 3.2 offers stealth mode, operating without any visible IP address. SunScreen also offers a traditional routing mode, with each interface protecting individual subnets. Sun recommends that customers deploy firewalls in multiple points throughout their network architecture, including on individual hosts and servers.

Netscape 6.2.1 for the Solaris Operating Environment

Netscape 6.2.1 Enterprise, the most customizable, convenient, and connected browser, is available in the Early Access directory for the Solaris 9 release. In addition, it will be available for the Solaris 7 and Solaris 8 operating environments. Netscape 6.2.1 is the first Internet software to seamlessly integrate browsing, email, and instant messaging.

Netscape 6.2.1 includes the following new features:

- Improvements to installation and ease of use
- More industry standards – Including XML, LDAP, Document Object Model (DOM), and Cascading Style Sheets level 1 (CSS1)
- My Sidebar feature – For quick retrieval of important information
- Advanced search capabilities
- Real-time messaging – Integrated with browsing and mail
- Options for personalization
- The following software:
  - The latest Java virtual machine
  - A new Netscape Java Plug-In
  - Java extensions and APIs
  - A cross-platform, Java technology-based XPCOM component that delivers reliable interoperability

Further information is available at the following Web site:

`http://www.sun.com/solaris/netscape`

Freeware

Several freeware tools and libraries are included in the Solaris 9 release. The following freeware packages have been updated for the Solaris 9 release:

Note – To view license terms, attribution, and copyright statements for freeware in this list, the default license path is `/usr/share/src/<freeware name>`. If the Solaris operating environment has been installed anywhere other than the default, modify the given path to access the file at the installed location.

- Apache 1.3.20 – UNIX based HTTP server
- `bash 2.05` – Sh-compatible command language interpreter
- `bzip2 1.0.1` – Block-sorting file compressor
- `gzip 1.3` – GNU Zip compression utility
- `less 358` – A pager, similar to the `more` command
- `mkisofs 1.13` – A utility that builds a CD image by using an ISO9660 file system
- `tcsh 6.0.10` – C shell with file-name completion and command-line editing
- `zip 2.3` – Compression and file-packaging utility
- `zsh 3.0.8` – Command interpreter (shell) usable as an interactive login shell and as a shell script command processor

The following libraries have also been included in the Solaris 9 release:

Note – To view license terms, attribution, and copyright statements for the freeware libraries in this list, the default license path is `/usr/sfw/share/src/<freeware name>`. If the Solaris operating environment has been installed anywhere other than the default, modify the given path to access the file at the installed location.

- `Glib 1.2.10` – A library of useful data types, macros, type conversions, string utilities, and a lexical scanner.
- `GTK+ 1.2.10` – The GIMP toolkit. A set of libraries that can be used to create graphical user interfaces.
- `Jpeg 6b` – Standardized compression software for full-color and gray- scale images.
- `Libpng 1.0.10` – PNG reference library. PNG is a format for storing images that is designed to be the successor to the GIF format and, to some extent, the more complex TIFF format.
- `Tcl/tk 8.33` – TCL-TK GUI Toolkit is an Xqq toolkit that is implemented with the Tcl scripting language.
- `Libtif f3.55` – Provides support for reading and writing TIFF and a small collection of tools for doing simple manipulations of TIFF images.
- `Libxml2 2.3.6` – A C library that provides Extensible Markup Language (XML) support. XML is the universal format for structured documents and data on the web.

The following commands and utilities have also been included in the Solaris 9 release:

Note – To view license terms, attribution, and copyright statements for the freeware commands and utilities in this list, the default license path is `/usr/sfw/share/src/<freeware name>`. If the Solaris operating environment has been installed anywhere other than the default, modify the given path to access the file at the installed location.

- `Gnu Grep 2.4.2` – A pattern matcher that is twice as fast as the standard UNIX `egrep` utility.
- `Gnu Tar 1.13` – An archiver that includes multivolume support, the ability to archive sparse files, automatic archive compression and decompression, remote archives, and other special features.
- `Ncftp Client 3.0.3` – A free set of programs that use the File Transfer Protocol. This set is an alternative to the standard `ftp` program that comes with UNIX systems.
- `Samba 2.2.2` – The free SMB and CIFS client and server for UNIX and other operating systems. SMB and CIFS are protocols by which many PC-related machines share files, printers, and other information.
- `Tcp-wrappers 7.6` – Small daemon programs that monitor and filter incoming requests for network services. These programs log the client host name of incoming requests and thus enhance network security.
- `Gnu Wget 1.6` – A free network utility to retrieve files from the Web by using HTTP and FTP, the two most widely used Internet protocols.

Available With the Solaris 9 Release

GNOME 2.0 is an upcoming feature that is planned for the Solaris 9 operating environment and is currently available for preview on the web.

GNOME 2.0 Desktop for the Solaris Operating Environment

GNOME 2.0 is an advanced new user desktop planned for inclusion in the Solaris 9 operating environment. GNOME 2.0 is designed to integrate seamlessly with the Internet. GNOME 2.0 provides a user experience that will increase personal productivity. Built on free source software, GNOME is evolving into a standard across multiple UNIX platforms.

The GNOME 2.0 desktop provides powerful new features, which include:

- Built-in accessibility solutions that enable users with disabilities to interact with the desktop
- Attractive, intuitive user interface
- Comprehensive personalization capabilities
- Integrated global Internet resources
- Advanced workspace manager
- Convenient front panel for rapid access to favorite programs
- Full suite of powerful applications and accessories
- Latest industry standards to ensure seamless data interchange and interoperability
- Compatibility with existing CDE and Java based applications

Early Preview of the GNOME Desktop – Sun has made "Exploring the GNOME 1.4 Desktop," available for free download at `http://www.sun.com/gnome`. The free download enables you to explore and evaluate the capabilities of the GNOME 2.0 desktop, which is to be supported and distributed with future versions of the Solaris operating environment.

Companion CD

The Solaris 9 media includes a Companion CD with the following supplemental software:

- **Accessibility Software** – For special needs users, Open Source assistive software such as Emacspeak, the W3 browser, and UnWindows.
- **Administration Tools** – Tools for system administrators, such as `ethereal`, `sudo`, and `rpm`.
- **Web Infrastructure Software** – Server software (daemons) for hosting web and Internet services.
- **Desktop Environment and X Window Managers** – Software that provides the graphical user interface for launching applications, file management, drag and drop icons, and so on. Several Window Manager packages are included as well as the K-Desktop Environment.
- **Desktop Applications** – Graphical desktop applications, including productivity and multimedia software.
- **Command-line Tools and Utilities** – Command-line utilities and tools such as the `*utils` packages from the GNU project.
- **Editors** – Applications that are used for writing text documents and software programs.
- **Security Tools** – Tools for system and network security monitoring and detection, such as `snort`, `nmap`, and `tcpdump`.
- **Messaging Software** – Client-side applications and tools for email, WWW, news, and chat.

- **Languages** – The gcc compiler and several high-level (scripting) programming languages.
- **Developer Libraries** – Collections of libraries (software routines) for programmers.
- **Developer Tools** – Tools for programmers, such as `autoconf`, `automake`, and `cvs`.

This freeware can also be downloaded at the following Web site:

`http://www.sun.com/software/solaris/freeware.html`.

APPENDIX **A**

Features in the Solaris 8 Software Release

Appendix A summarizes features in the Solaris 8 operating environment.

Note – This appendix includes only features that were in the initial Solaris 8 software release.

Features that were added in the Solaris 8 Update releases are documented in the Solaris 9 chapters.

Next-Generation Internet Protocol

Feature Description
IPv6 IPv6 adds increased address space and improves Internet functionality by using a simplified header format, support for authentication and privacy, and autoconfiguration of address assignments. IPv6 also enables new quality-of-service capabilities.

Directory Services and Naming Enhancements

Feature Description
Native Lightweight Directory Access Protocol (LDAP)
Native LDAP provides the Naming Service switch back-end support for LDAP-based directory service.

Java Enhancements

Feature Description
Java 2 Software Development Kit (SDK) for Solaris
The Java 2 SDK, Standard Edition version 1.2.1_04 is the latest release of the Java 2 platform for the Solaris operating environment. The SDK includes these enhancements: ■ Improved scalability ■ Improved class libraries, including the new Java 2 APIs ■ Enhanced memory management system ■ High-performance, scalable Java virtual machine (JVM) ■ Just-in-time (JIT) compiler optimizations ■ Faster Java thread synchronization

Installation and Management

Feature Description
Solaris Web Start Enhanced Installation CD
Solaris Web Start, a graphical, wizard-based software application, powered by Java, that installs the Solaris operating environment and other software, is now distributed on a separate installation CD.

Feature Description
Dynamic Host Configuration Protocol (DHCP) Network Booting Network installations can now use DHCP to acquire boot parameters and network configuration information necessary for booting a client over the network. DHCP booting is supported on certain SPARC™ and IA based systems.
IA: Boot Partition in the Solaris 8 Release Users who are running Solaris *Intel Platform Edition* can now designate a separate IA boot partition.
IA: CD-ROM Boot This new feature enables the user to boot a system from an installation CD that uses the "El Torito" standard (rather than from the Device Configuration Assistant diskette, as in previous releases.)
DHCP Manager DHCP Manager provides a Java based graphical interface for configuring and managing the Solaris DHCP server and DHCP databases. The DHCP Manager enables 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.
IA: 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.
Solaris Web-Based Enterprise Management (WBEM) Services Solaris WBEM Services software is an implementation of Web-Based Enterprise Management (WBEM) standards and technologies in the Solaris operating environment. Intended for developers and administrators of WBEM-enabled environments, Solaris WBEM Services provides the Solaris Schema; extensions of the CIM Schema classes; and management, security, and logging services.
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 at installation to use IPv6 in addition to IPv4.
Unlimited Number of Pseudo-Terminals Available Solaris 8 software enables the opening of any number of pseudo-terminals (used by programs like `rlogin` and `telnet`).
Reading Documentation from the Solaris 8 Documentation CD The `ab2cd` script enables all users to read AnswerBook2™ documentation directly from the Solaris 8 Documentation CD. The script has been enhanced to provide better user feedback, to enable users to set the port number on which `ab2cd` runs, and to read documentation already installed on the user's system.

Feature Description
Product Registry The Solaris Product Registry is a tool to manage software that was installed by using Solaris Web Start 3.0 or the Solaris package management commands (`pkgadd`, for example.) This tool enables you to do the following: ■ View a list of installed and registered software and some software attributes ■ Install additional software products ■ Uninstall software ■ Browse for and launch an installer

Networking

Feature Description
SPARC: InterDomain Networks (IDNs) IDNs enable the user to set up high-speed network connections between dynamic system domains without the need for special hardware.
IP Security Architecture (IPsec) for IPv4 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. No changes are made to existing commands that are related to NFS. Most RPC applications can 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) acts as an interface between network software (NetBIOS, SNA, OSI) that runs under the Solaris operating environment and a physical LAN network that is controlled by one of the supported communications adapters. This version of the LLC2 driver includes support for both connectionless and connection-oriented LLC2 operations for Ethernet, Token Ring, and FDDI adapters when the support is accessed through the appropriate Solaris MAC layer driver.
NIS/NIS+ over IPv6 Transports This feature enables users to perform NIS and NIS+ operations over IPv6 RPC transports, and to store IPv6 addresses in the NIS, NIS+, and DNS naming services.
Enhancements to `sendmail` 8.9.3 New options and utilities improve the storage and security functionality of `sendmail`.

Feature Description
Service Location Protocol (SLP) SLP is an Internet Engineering Task Force (IETF) 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 enable developers to write SLP-enabled applications, and provides system administrators a framework for ease of network extensibility.
Solaris STREAMS Framework Enhancements The STREAMS framework enhancements in the Solaris 8 operating environment provide more deterministic response times for real-time processes by ensuring that STREAMS processing uses a priority that does not conflict with the user process priority.
Network Time Protocol NTP provides precise time and network clock synchronization for use in distributed computing environments. The Solaris 8 release has been upgraded to include the 3-5.93e version.

File System Enhancements

Feature Description
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. You can use the UDF file system 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
NFS Server Logging NFS server logging enables an NFS server to provide a record of file operations that are performed on its file systems. This feature is particularly useful for sites that make anonymous FTP archives available to NFS and WebNFS™ clients.
IA: Extended Memory (XMEM) Support XMEM support provides a mechanism that enables 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.

Feature Description
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). By using XFileChooser, an application can access a file on a local disk or on an NFS server through the use of NFS URL naming.
Deferred Access Time Updates on UFS File Systems Two new mount options, `dfratime` and `nodfratime`, enable and disable deferred access time updates on UFS file systems. When writing access time updates for the file system are enabled, they can be deferred until the disk is accessed for tasks other than updating access times.

Diagnostic and Availability Enhancements

Feature Description
`coreadm` **Command** The `coreadm` command provides flexible core file-naming conventions and better core file retention.
Examining Core Files with `proc` **Tools** The `proc` tools are utilities that can manipulate features of the `/proc` file system. Some of the `proc` tools have been enhanced to examine process core files as well as live processes.
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 timestamp to messages that are generated by the `syslog`(1M) logging facility. In addition, messages that were previously lost after a system panic and reboot are now saved.
Modular Debugger `(mdb)` `mdb` is a new extensible utility for low-level debugging and editing of the live operating system, operating system crash dumps, user processes, user process core dumps, and object files.

Feature Description
Remote Console Messaging This release includes the `consadm` command, which enables you to select a serial device as an *auxiliary* (or remote) console for troubleshooting remote system problems.
TCP/IP Internal Trace Support TCP/IP now provides internal trace support by logging TCP communications when a connection is terminated by a reset (RST) packet.

Performance and Scalability Enhancements

Feature Description
IA: Added Support for Physical Address Extension (PAE) Mode 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.
New Application Debugging Tool: `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 might show the series of events leading up to a point of failure.
SPARC: New System Monitoring Tool: `busstat` 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.
Faster 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 but does not replace `poll`(2).
New Utility: `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.

Feature Description
IA: Xeon Enhancements To maximize performance, Solaris 8 *Intel Platform Edition* now supports the Page Attribute Table (PAT) feature of IA32–bit processors (Pentium II and Pentium III).

Security Enhancements

Feature Description
Solaris Smartcards The Solaris Smartcard feature implements the Open Card Framework (OCF) 1.1 standard. Security administrators can use this technology to protect a computer desktop or individual application by requiring users to authenticate themselves by means of a smart card. **Default File System and Directory Permissions** Many system files and directories in the Solaris 8 release have different default ownership and stricter permissions than in previous releases. **Role-Based Access Control (RBAC)** Traditional superuser-based systems grant full superuser powers to anyone who can become superuser. With RBAC, administrators can assign limited administrative capabilities to normal users. **Centralized Administration of User Audit Events** The file, `/etc/security/audit_user`, which stores audit preselection classes for users and roles, is now supported in the name switch. You no longer need to set up the audit events for a user on each system to which the user has access.

Real-time Systems Enhancements

Feature Description
High-Resolution Timers The high-resolution timers (HRTs) bypass the traditional 10ms 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 multiprocessor system) and operate to any required degree of precision in timing events.
User-Level Priority Inheritance The real-time threads feature implements the POSIX interfaces (previously only dummied in) that let the high-priority thread “lend” its priority to the low-priority thread until it releases the lock.

Common Desktop Environment (CDE) Enhancements

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.
Hot Key Editor The Hot Key Editor enables users to predefine a series of commands to a particular function key, resulting in increased productivity and efficiency.
Java Media Framework (JMF) The 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 maximizes real-time video creation and broadcast functionality.
SPARC: PC Launcher 1.0 PC launcher 1.0 for SunPCi enables users to obtain seamless access and power to view, edit, and print many popular types of PC files or attachments instantly, by automatically launching the associated Windows application and file.

Feature Description
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.
Print Client Enhancements Print Client now enables users to easily configure their own set of printers and default printer without any intervention from an administrator.
SDTImage Enhancements The SDTImage screen snapshot feature now enables users to easily and quickly capture a screenshot image from the command line.
Smart Card Support CDE now supports authentication security technology for smart cards. Users can now use smart cards to authenticate their identity when they are logging in to CDE on a protected system, relogging in after a screen lock, or reauthenticating after the smart card is removed. CDE supports both external and internal smart card devices.
ToolTips ToolTips provides users with Balloon Help, a simple and short description of an icon function.
X11R6.4 Support The X Server is upgraded to the X11R6.4 industry standard, which includes key features that increase user productivity and mobility. These features are remote execution of X applications through web browser on any web-based desktop, Xinerama, Color Utilization Policy, EnergyStar support, and new APIs and documentation for the developer toolkits.
Extended Control Panel This feature provides a unified, consistent, and extensible launchpad for desktop customization, such as desktop controls for color, font, backdrop, and the Application Manager.

Web Services

Feature Description
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 by using Java runtime environment (JRE) 1.2 instead of the default Java virtual machine (JVM).

Feature Description
Netscape Communicator 4.7 The Solaris 8 release includes Netscape Communicator 4.7 and now installs it by default on your system.
Solaris Network Cache and Accelerator (NCA) The Solaris NCA increases web server performance by maintaining an in-kernel cache of web pages that are accessed during HTTP requests.
Apache Web Server The open source Apache web server is now released with Solaris. This server includes all the standard Apache modules, including proxy server support as well as the `mod_perl` module.

Printing

Feature Description
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.
Solaris Print Manager Solaris Print Manager is a Java based graphical user interface that enables you to manage local and remote printer access. You can use this tool in the following name service environments: NIS, NIS+, and NIS+ with Federated Naming Service (FNS) files.

Language Support

Feature Description
Universal Language Coverage The Solaris 8 operating environment now includes support for more than 90 locales, covering 37 languages on both the Solaris 8 Software CDs and the Solaris 8 Languages CD.

Feature Description
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 The Solaris 8 release 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 the Solaris 8 release 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 the People's Republic of 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 the Solaris 8 release 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

Feature Description
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, support improvements for non-English locales, and minor changes to improve overall performance and stability.

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: ■ Library Interfaces and Headers ■ Basic Library Functions ■ Networking Library Functions ■ Threads and Real-time Library Functions ■ Extended Library Functions ■ Curses Library Functions In addition, many of the man page suffixes have been changed to reflect the library that contains the function.

Audio Mixer

Feature Description
SPARC: Audio Mixer The audio mixer driver now enables multiple applications to simultaneously play and record audio. This new enhancement supersedes the previous capability, which only supported a single play application and a single record application. In addition, CDE 1.4 now includes a new GUI tool, `sdtaudiocontrol`, that supersedes `audiocontrol`. `sdtaudiocontrol` uses the features of the audio mixer, and provides more features.

Software Developer Environment

Feature Description
SPARC: 64–bit Kodak Color Management System (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.

Feature Description
Always Ready Power Management With the Solaris 8 operating environment, a device driver that uses the new device Power Management™ interfaces will be power-managed automatically.
New `cpustat` and `cputrack` Commands The new `cpustat` and `cputrack` commands capture system-wide and per-process CPU statistics respectively, to monitor the performance of a system or a process.
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 for automating complex system administration tasks.
Role-Based Access Control (RBAC) for Developers The addition of RBAC to the Solaris operating environment gives developers the opportunity to deliver fine-grained security in new and modified applications. Developers can now create privileged functions that check for authorizations instead of checking for specific IDs such as superuser.
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.
Dynamic String Token Support Greater flexibility in establishing instruction set-specific, and system-specific dependencies is provided with the new `$ISALIST`, `$OSNAME`, and `$OSREL` dynamic string tokens.
Function Update: `strftime()` The `%u` conversion specification for the `strftime()` function has been changed.
Alternate Libthread An alternate threads implementation provides a model in which user-level threads are associated one-to-one with lightweight processes (LWPs). This implementation is simpler than the standard implementation and might be beneficial to some multithreaded applications.
SPARC: Audio Mixer Driver The audio mixer driver now allows multiple applications to play and record audio simultaneously.
Updated DDI Interfaces for Cluster-Aware Device Drivers A documentation overview introduces the concept of device classes and the necessary interface modifications and additions for device driver writers.

Feature Description
8–bit Visual Support The 8-bit visual shared library enables device drivers with only 24-bit hardware to display 8-bit visual applications.

Hardware Enhancements

Feature Description
Advanced Configuration and Power Interface (ACPI) ACPI is a new, more flexible way to configure and control IA hardware. ACPI obsoletes Plug and Play BIOS and the Intel Multi-Processor Specification (MPSPEC). If ACPI is available on your IA based system, the Solaris 8 operating environment automatically uses it to configure the hardware.
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.
Universal Serial Bus (USB) Support for Keyboards and Mouse Devices Solaris *Intel Platform Edition* now provides USB support for keyboards and mouse devices.
X Server Video Driver Enhancement Solaris *Intel Platform Edition* now provides support for more video devices.

SCSI Drivers

Feature Description
IA: Device Driver Enhancement: `cadp` The Solaris `cadp` driver now supports Adaptec Ultra2 adapters.

Feature Description
IA: Device Driver Enhancement: `ncrs` The Solaris `ncrs` device driver now supports the SCSI hot-plugging functionality and Ultra2 devices, in addition to general functionality and performance improvements.
IA: Device Driver Enhancement: `symhisl` The `symhisl` device driver, which supports the adapters SYM22910 and SYM21002, is now included in Solaris *Intel Platform Edition*.

APPENDIX **B**

Features in the Solaris 7 Software Release

Appendix B summarizes features in the Solaris 7 operating environment.

Note – This appendix includes only features that were in the initial Solaris 7 software release.

Features that were added in the Solaris 7 Update releases are documented in Appendix A.

Solaris 64–bit Operating Environment

Feature Description
SPARC: 64-bit Operating Environment
The 64-bit Solaris operating environment is a complete 32-bit and 64-bit application and development environment that is supported by a 64-bit operating system. This environment 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, this environment supports a 64-bit virtual address space and removes other existing 32-bit system limitations. (This feature is for the Solaris operating environment *SPARC Platform Edition* only.)

Web Browser

Feature Description
Netscape Communicator
Solaris 7 software now ships with Netscape Communicator.

Network Management and System Administration

Feature Description
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. After 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 that is required to reboot a system if it crashes, or after an unclean halt.
UFS Mount Option: `-o noatime` To ignore access time updates on files, you can specify the `-o noatime` option when you mount a UFS file system. This option reduces disk activity on file systems where access times are unimportant (for example, a Usenet news spool).
Lightweight Directory Access Protocol (LDAP) The Lightweight Directory Access Protocol (LDAP) is an open-standard, platform-independent, access protocol based on the X.500 informational model. LDAP is designed to run over TCP/IP and uses simple string encodings. LDAP applications are client-server applications. The client library that is included in this release enables developers to write LDAP applications and enables users to run LDAP-enabled applications.
SPARC: Dynamic Reconfiguration Dynamic reconfiguration enables the service provider to add, or remove and replace, hot-pluggable system boards in a running system, eliminating the time lost in rebooting. (This feature is provided for certain SPARC systems only.)

Feature Description
New Commands: `pgrep` **and** `pkill` The `pgrep` command checks the active processes on the system and displays the process IDs of the processes with attributes that 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.
Updated Version: `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.
New Utility: `traceroute` Solaris 7 software includes the popular `traceroute` utility. The `traceroute` utility is used to trace the route an IP packet follows to an Internet host. This utility 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

Feature Description
TCP with SACK TCP selective acknowledgment (TCP SACK) provides the support that is described in RFC 2018 to solve problems that are related to congestion and multiple packet drops. In particular, TCP with SACK addresses problems in applications that use TCP large windows (RFC 1323) over satellite links or transcontinental links.

Network Security

Feature Description
RPC Modification: `RPCSEC_GSS` Command RPC has been modified, based on the GSS-API. This modification increases security integrity and confidentiality, and NFS services are no longer restricted to a specific or a single security mechanism.
NIS+ Extended Diffie-Hellman Network Information Service+ 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 version 8.1.2. This upgrade provides a new configuration file that enhances network security through the use of access control lists (ACLs).

Installation

Feature Description
SPARC: Installing a 64-bit Operating Environment The Solaris 7 installation programs have a new check box for selection of 64-bit support. This feature is selected by default when you install on UltraSPARC™ platforms.
Installing AnswerBook Collections With Solaris Web Start The Solaris 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.
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

Feature Description
Man Pages in AnswerBook2 Format Man pages are available in AnswerBook2 (SGML), rather than AnswerBook™ format. This feature provides improvements in navigation and links to man pages directly from other AnswerBook2 documents.
Run AnswerBook2 from 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 by using the `ab2cd` script. You can then view the documentation from the CD.
Use CGI-Based Web Servers The AnswerBook2 server can run on top of an existing web server, such as Sun WebServer™, rather than requiring that an additional web server run on the system solely for AnswerBook2 support.
Control Display of Style Sheet Errors An environment variable, *AB2_DEBUG*, can be set on the AnswerBook2 server. This variable controls whether style sheet errors are displayed to the user with a red "BUG."

Language Support

Feature Description
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 type and display text from different writing scripts such as Japanese, Thai, and Russian. Users can also 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 preprocessing 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.

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 change, 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 Middle Eastern regions.

Standards

Feature Description
UNIX 98 Branding Solaris 7 software is branded UNIX 98.

Software Developer Environment

Feature Description
SPARC: 64-bit Developer Environment 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. **Display Enhancements to the `man` Utility** 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`) that were provided for developers in 32-bit versions are available in 64-bit versions for 64-bit Solaris software.

Feature Description
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 that are 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 that use WebNFS. Because it implements the NFS protocol directly, the SDK requires no NFS support on the host system.
Function-Call Tracing: `truss` Utility The `truss` utility traces the system calls, signals, and machine faults of a process. This utility has been enhanced with a new option to enable entry and exit tracing of user-level function calls that are executed by the traced process.
Improved Device Configuration Library The `libdevinfo` library, which is 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 and Imaging

Feature Description
XIL Foundation Imaging Library The XIL™ foundation imaging library is suitable for libraries or applications that require 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 that represent a left-eye/right-eye view. This support provides an image display with depth perception.
The XIL Developer's Kit is now separate from Solaris and is available free of charge.

Desktop

Feature Description
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 that was developed on the Solaris 7 operating environment provides advanced and standard support for Hebrew, Arabic, and Thai customers.

Printing

Feature Description
Enhanced Font Management 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.

Intel Platform Edition Hardware Support

Feature Description
SCSI Disk Driver `sd` Command The `sd` SCSI disk target driver, that was 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*).