

What's New in the Solaris™ 8 Operating Environment



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What's New in the Solaris™ 8 Operating Environment

The Solaris™ 8 Operating Environment has evolved to become the definitive .com OS. From the beginning, Solaris software has been built with the network in mind, and is now uniquely suited to the requirements of customers in the Internet age. The proven capabilities of the Solaris Operating Environment help existing data centers to become more agile, while at the same time allowing new Internet startups to bring data center predictability to their networks. It's our belief that only operating systems supporting these two customer evolution paths — simultaneously — are suited for .com computing. And that's why we feel that the Solaris 8 Operating Environment is the best UNIX® platform — and the .com OS for the Internet age.

The Solaris 8 platform is based on four main pillars that provide both agility and predictability: product, architecture, services, and community. The product pillar is the set of features that is part of the operating environment. The architecture is a description of how Solaris 8 software is constructed and how it fits with other network infrastructure. The services include comprehensive customer support, including professional services, consulting services, and other product-enabled services. And finally, the community is the grouping of customers and developers interested in the Solaris platform and its evolution. This document focuses on the first pillar, the new features that are part of the Solaris 8 product.

The product features of the Solaris 8 Operating Environment are categorized by availability, scalability, universality, and trustworthiness. These are the attributes that are so essential in a .com operating environment.

Many features in the Solaris 8 Operating Environment are new, while many others represent improvements and updates to proven, time-trusted functionality. Not all the features described are available in the first release of Solaris 8 software, but will become available through Solaris software's regularly scheduled updates throughout the year.

New and Improved Features in the Solaris 8 Operating Environment

Data Center-Ready Features

- Sun™ Cluster updates as well as tighter integration with the Solaris Operating Environment
- Solaris Resource Manager™ and Solaris™ Bandwidth Manager software updates
- Dynamic Reconfiguration: Improved to support networking (multipathing/load balancing)
- Live Upgrade: Upgrades installed online through a simple reboot
- Hot Patching for Diagnostics: Kernel patching done by Sun™ Enterprise Services
- Real Time: Faster bounded response times and addition of network events
- Failed Device Lockout: Failed or failing devices automatically taken offline during reboot

.com Agility Features

- IPv6: Next-generation Internet Protocol (IP) with virtually no limits on addresses
- IPSec: IP security to prevent identity spoofing and build virtual private networks
- Mobile IP: Manages mobile devices with IP addresses to prevent data loss
- Java™ Virtual Machine (JVM™) Scalability Improvements: Performance improves linearly as CPUs are added
- Removable Media: Jazz, Zip, DVD, etc
- Solaris Software Companion CD: Contains popular open software (utilities, developer tools, etc.)
- iPlanet™ Software CD: Developer-licensed applications server, Web server, directory server, certificate server
- Oracle Software CD: Developer-licensed Oracle 8i enterprise database with migration toolkit for SQL on Windows NT to Oracle on the Solaris 8 Operating Environment

System Administration Features

- Reconfiguration Coordination Manager: Automated Dynamic Reconfiguration management
- Solaris™ Administration Pack: Now available from the Web
- Solaris™ Web Start: Simplified installation and setup
- Web-Based Enterprise Management (WBEM): Standards-based system management
- Role-Based Access Control (RBAC): More granular security, reduces the need for a “super user”

Details on all product features plus descriptions follow.

Availability

Sun Cluster

Sun Cluster software provides new and updated agents for the Solaris Operating Environment. It integrates cluster functions into the Solaris kernel, and provides Java browser-based monitoring of cluster activities. Sun Cluster offers expanded support for servers, storage, and applications, offering a scalable cluster solution with integrated, four-node failover capabilities.

Solaris Resource Manager

The Solaris Resource Manager and Solaris Bandwidth Manager products are currently co-packaged, and in the future will be integrated together into one product. The merged product will offer management of resources and network bandwidth to better use system resources. It will also make use of a common graphical user interface. Customers installing these products are able to balance compute loads across both system and network resources to achieve superior levels of availability and quality of service.

Solaris 8 Admin Pack

The Solaris 8 Admin Pack takes key features that were originally part of the Solaris™ Easy Access Server product and makes them available from the Sun Download Center either as an electronic download or as a CD that customers order. This new packaging prepares Solaris to deliver system management features as services in the future. The new systems administration portal, accessible from www.BigAdmin.com, will help to build a community of system administrators who will benefit from these services. Key features now available include:

- Solaris AdminSuite™ 3.0.1
- Solaris™ Administration Wizards 1.0.1
- Solaris Management Console™ 1.0.2
- Sun Enterprise Authentication Mechanism™ 1.0.1
- Solaris™ PPP 3.0.1
- AnswerBook2™ Server 1.4.2

Diagnostic and Availability

Dynamic Reconfiguration

Dynamic Reconfiguration (DR) provides operating system services that support hardware features for delivering increased system management and availability. It allows systems administrators to add, change, and remove system components without shutting down the system. Many mid-range to high-end SPARC™ systems support a long list of hardware boards that can be changed without shutting down the system, including: memory and CPU boards, I/O controllers, network interface cards (NICs), disk drives, and other SCSI devices.

In many cases, DR also supports multiple paths to one I/O controller or NIC. For such cases, Solaris software also supports dynamic load balancing and dynamic switching of paths.

Automated Dynamic Reconfiguration

Automated Dynamic Reconfiguration — also known as Reconfiguration Coordination Manager (RCM) — provides a scripting interface for DR events so that application programs such as database and system management tools can take predetermined actions when hardware configuration or operating system events occur. For example, additional CPUs and interface cards can be reconfigured for a database server backend when the response time falls below defined acceptable levels without operator intervention.

Network Multipathing

Systems that use the Internet Protocol (IP) can be configured to dynamically manage multiple links to the same network and perform load balancing on outgoing traffic (incoming load balancing is managed by network switches).

Live Upgrades

Upgrading to the Solaris 8 Operating Environment is greatly eased by a new facility that enables systems administrators to build a new upgraded operating environment image while the system is still running a full applications service load. This is achieved by installing Solaris software on a free disk partition along with any applications using the Solaris Live Upgrade utility. A simple reboot is all that is needed to switch to the upgraded operating environment revision. Should it be necessary to revert back to the previous revision, a second reboot will bring back the original revision.

Hot Patching for Diagnostics

If it became necessary for Sun's engineers to work with a customer to diagnose or correct an operating environment bug, technology in the Solaris 8 Operating Environment enables them to patch most areas of the system without rebooting. These dynamically applied patches re-vector crucial kernel code to the patched code without interrupting the operation of applications. This greatly reduces the downtime to diagnose, test, analyze, and correct operating environment problems.

Improved Crash Dump Analysis

The modular debugger is a new utility that greatly eases the complex task of analyzing system crash dump tapes. This diagnostic tool can be easily extended using the programming and scripting interfaces.

Improved Program Analysis

System tuning and monitoring is improved with the new `prstat` utility, an analysis tool similar to the popular open software called `top`.

Better Examination of Core Files

Many of the system (`proc`) tools have been enhanced to make it easier to analyze application crash (`core`) files. Process `core` files as well as live processes can be examined. The `proc` tools are utilities that can manipulate features of the `/proc` file system.

Bus Performance Monitoring

A new system monitoring tool, `busstat`, provides access to bus-related performance counters on supported SPARC platforms. These performance counters enable measurement of hardware clock cycle bus statistics, including DMA and cache coherency transactions on multiprocessor systems.

Better Management of Core Files

A new system configuration command, `coreadm`, has been added to greatly improve system-wide management of application crash (`core`) files. The `coreadm` command provides flexible core file naming conventions, improved management of core file locations, and better core file retention characteristics.

Improved Device Configuration

A new system configuration command, `devfsadm`, provides an improved mechanism for managing the special device files in the `/dev` and `/devices` directories, including support for Dynamic Reconfiguration events.

Improved System Error Messages

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

Macro-Level Debugging

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. This feature helps show system programmers the series of events leading up to a point of failure.

Remote Console Messaging

System events and messages normally written to the local system console can now be directed to a network-connected remote console.

TCP/IP Network Diagnostics

Network system administrators now have a greater ability to observe TCP/IP network events and errors. The Solaris TCP/IP protocol stack provides internal tracing capabilities by logging TCP communications when a connection is terminated by a reset (RST) packet. When an RST is transmitted or received, information on as many as 10 packets (transmitted or received immediately before the reset on that connection) is logged along with the connection information.

IP Packet Routing Observability

The Solaris 8 Operating Environment includes the popular `traceroute` utility. This utility enables network administrators to trace the route an IP packet follows to an Internet host, and is especially useful for determining routing misconfiguration and path failures.

System Crash Dump Utility

The system crash dump utility includes the following:

- The `dumpadm` command enables system administrators to configure how crash dumps of the operating environment are taken. Dump data is 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.

Enhanced Process Tracing

The `truss` utility traces the system calls, signals, and machine faults of a process. It has been enhanced with a new option to enable entry and exit tracing of user-level function calls executed by the traced process.

Installation and Management

Solaris™ Web Start

The Solaris 8 Operating Environment includes two applications designed to simplify installation and management. Solaris™ Web Start — Java technology-powered software — installs operating environment and other software using a Web-browser interface. It includes an upgrade capability and the “Kiosk”, enabling users to easily review documentation, Web pages, and other content — all while the installation is in progress.

Installing a System Over the Network

Network installs can now use DHCP protocols to acquire boot parameters and network configuration information needed to boot a system over the network.

New DHCP Manager

DHCP Manager, written in the Java language, provides a graphical interface for configuring and managing the Solaris DHCP server and databases. It enables the system administrator to use a single tool to perform all DHCP management duties, including:

- Set up and management of DHCP servers
- Management of client configuration options and macros
- Management of networks and IP addresses under DHCP management

Solaris™ WBEM Services

Solaris™ WBEM Services software is an implementation of the Web-Based Enterprise Management initiative on the Solaris 8 Operating Environment. WBEM makes it easier for developers to create management applications that manage Solaris software systems and administer the Solaris Operating Environment.

Solaris Product Registry

The Solaris product registry is a tool to manage software that was previously installed using Solaris Web Start or the Solaris *package add* command. It enables systems administrators to:

- Install additional software products
- Uninstall software
- View a list of installed and registered software
- Browse for and launch a software installer

Extensions to Runtime Link Auditing

The link editor options `-p` and `-P` provide an additional means of invoking runtime link auditing libraries. Other runtime link auditing interfaces `la_activity()` and `la_objsearch()` have been added.

Perl 5

The popular programming language, Perl 5.005_03, is included in the Solaris 8 Operating Environment. Perl is commonly used for CGI scripting as well as automating complex system administration tasks. It is included as a standard Solaris Operating Environment utility.

Support for Multiple Architectures

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

LDAP

The Lightweight Directory Access Protocol (LDAP) is an open-standard, platform-independent, access protocol based on the X.500 informational model. It is designed to run over TCP/IP and use simple string encodings. Support has been added to the Solaris naming service switch (`nsswitch`) to search in the LDAP directory for names in addition to NIS and NIS+.

Easier Access to Process IDs

Two new commands have been added to help users manage the process IDs of system processes:

- The `pgrep` command looks at the active processes on the system and displays the process IDs whose attributes match the specified criteria on the command line
- The `pkill` command works the same way as the `pgrep` command, except that each matching process ID is signaled by `kill (2)` instead of the process ID

Networking

Support for Domain Name System in System Identification Utilities

The Domain Name System (DNS) has been added to the list of name services that can be configured through the system identification utilities. It greatly increases the ease of network and system object management.

IPv6

IPv6 is a new version of the Internet Protocol (IP). It uses 128-bit address fields, extending the number of available IP addresses to meet the huge increase in Internet devices in the future. IPv6 is implemented alongside the IPv4 protocol, and greatly increases the functionality and compatibility of the Solaris Operating Environment in tomorrow's networks.

Support for IPv6 in System Identification Utilities

With the Solaris 8 Operating Environment, systems can now be configured to use the IPv6 protocol in addition to IPv4 at install time.

IPv6 NFS/RPC Compliant

The IPv6 NFS/RPC-compliant feature adds IPv6 support to NFS and RPC in a seamless manner. There are no changes to existing commands related to NFS. Most RPC applications will also run over IPv6 without any change. Some advanced RPC applications with transport knowledge might require updates. A utility — the IPv6 Socket Scrubber — is available to help check for any IPv4 dependencies that may be present within application code.

IEEE 1394 Support

The IEEE 1394 interface is sometimes called “firewire”, and is used predominately by the consumer electronics industry. It supports dynamic device driver loading when the device is connected to the bus. Additional support is planned for video cameras and has been tested using a variety of devices, including disk drives.

Mobile IPv4

Sun plans to implement the server side of the new mobile IPv4 protocol in the June, 2000 timeframe. Mobile IP enables portable systems to have their IP traffic proxied to their current connection point without loss of data.

NIS/NIS+ over IPv6 Transports

NIS/NIS+ over IPv6 transports enables users to store IPv6 addresses in the NIS and NIS+ naming services databases.

WebNFS™ Software Development Kit

The WebNFS™ Software Development Kit provides remote file access for Java applications using WebNFS technology. Since it implements the NFS protocol directly, it requires no NFS support on the host system.

Sendmail 8.9.3

New options and utilities improve the storage and security functionality of Sendmail. This version includes facilities that prevent certain types of denial-of-service attacks; hooks that enable restriction of spam (unsolicited, bulk e-mail); virtual hosting that allows e-mail to be received using different domain names; and an improved configuration hierarchy that makes building your own Sendmail configuration file much easier. It also includes the local mail transfer protocol, RFC2033, for requeuing of mail to recipients who did not receive a message (rather than resending it to all of the recipients if an error occurs).

Service Location Protocol (SLP)

SLP is an Internet Engineering Task Force (IETF) standards-track protocol for discovering shared resources (such as printers, file servers, netcams, etc.) in an enterprise network. The Solaris 8 Operating Environment contains a full implementation of SLP that includes APIs for allowing developers to write SLP-enabled applications and provides system administrators a framework for network extensibility.

Network Time Protocol

Network Time Protocol (NTP) is upgraded from version 3.4y to 3-5.93e and includes several new features. These features include an ability to turn off authentication mode and query only.

LAN Protocol Enhancements

The Class II logical link control driver (LLC2) interfaces network software (NetBIOS, SNA, etc.) running under the Solaris Operating Environment to a physical LAN controlled by one of the supported communications adapters. This version of the LLC2 driver adds additional support for the standards and includes support for both connectionless and connection-oriented logical link control operations for Ethernet, Token Ring, and FDDI adapters when accessed through the appropriate Solaris MAC layer driver.

Security Enhancements

IPSec for IPv4

The IP Security Architecture (IPSec) provides protection for IP datagrams. The protection includes confidentiality, strong integrity of the data, partial sequence integrity (replay protection), and data authentication. It protects against IP spoofing (where the real IP address of a system is hidden) and is a core technology for building virtual private networks over the Internet.

IPSec for IPv6

In a future release of the Solaris 8 Operating Environment, Sun will add IPSec protocol support for the new IPv6 protocol stack.

Secure Path Name Changes

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 SPARC-V9 objects.

Smart Card Interfaces

Smart card support is provided in Solaris 8 software for user authentication at login using CDE and at other times when challenged by an application. A basic public-key infrastructure is provided to manage user access.

The Solaris smart card feature implements the OCF 1.1 standard and supports two external card readers from Sun. Three smart card formats are supported: Payflex, Java technology-based iButton, and Cyberflex cards.

Default Security Tightened

Many system files and directories in the Solaris 8 release have different default ownership and stricter permissions than in previous releases — to provide even more stringent security measures.

Role-Based Access Control

UNIX systems typically assign special permissions and rights to one category of user called “super-user”. There are security and administrative risks associated with releasing the super-user access to a wide community. Role-based access control (RBAC) allows greater granularity of the super-user permissions to be assigned using roles, execution profiles, and authorizations. The systems administrator assigns an execution profile containing authorizations directly to users or to groups of users that perform a similar role.

Centralized Administration for User Audit Events

The `/etc/security/audit_user` file, which stores audit preselection classes for users and roles, is now supported in the name service switch. It is no longer necessary to set up the audit events for a user on each system to which the user has access.

Single Sign-on Authentication

Single sign-on authentication provides the Kerberos client-side infrastructure, an addition to the pluggable authentication module (PAM) framework, and utility programs that can be used to secure RPC-based applications, such as NFS service. Kerberos provides strong user- or server-level authentication, integrity, and privacy support. Kerberos clients can be used in conjunction with Sun Enterprise Authentication Mechanism software to create a complete, single sign-on solution.

Netscape™ Certificate Management Server

A developer license is provided for the Netscape™ Certificate Management Server (CMS). The CMS provides an improved management infrastructure for public keys used for authentication and is particularly recommended for developers.

Real Time

High-Granularity Timers

High-resolution, arbitrary, real-time timers have been added to improve the bounded interval response time for real-time event traps. These hardware timers don't rely on the system clock for dispatch, but instead deal directly with the hardware timer source. As a result, timer resolution is as fine grained as the platform is capable of providing, currently up to one nano-second resolution.

Thread Priority Inheritance

Improvements have been made to event latency by assuring that any blocking thread — of a lower priority than the real-time process — has its priority increased to quickly complete and release the blocked resource.

Network Priorities

In today's real-time applications, the network is rapidly becoming an essential element. The Solaris 8 Operating Environment improves the bounded interval response time for network events by ensuring that STREAMs processing allows for prioritizing network traffic based on its priority, in much the same fashion as the scheduler in the kernel does for process dispatching.

File System

Universal Disk Format (UDF) File System

The UDF file system, the industry-standard format for storing information on optical media technology, is supported in the Solaris 8 software release. The UDF file system can be used to exchange data on the following components when they contain a UDF file system:

- CD-ROMs
- Disks and diskettes
- DVD-ROM on supported platforms

NFS Server Logging

NFS server logging allows an NFS server to provide a record of file operations performed on its file systems. This feature is particularly useful for sites that make anonymous FTP archives available via NFS and WebNFS protocols, yet need the logging features of typical FTP servers.

File System Logging

UNIX File System (UFS) logging is the process of storing transactions (changes that make up a complete file or directory operation) in a log before they are applied to the file system. Once a transaction is stored, the complete transaction can be applied or reapplied to the file system later.

UFS logging offers two advantages. It prevents file systems from becoming inconsistent, therefore eliminating the need to run `fsck`. And, because `fsck` can be bypassed, UFS logging reduces the time required to reboot a system when it is stopped other than via an orderly shutdown.

Optional Last-Time-Accessed Attribute

UFS writes in the file headers the last time it was accessed. There are occasions when this time-expensive event is not necessary or desired, such as on a read-only file system, news server, etc. There is an option to mount a file system without including the time-last-accessed attribute being modified. Another new option allows this attribute to be deferred until such time as a write occurs. Specifying these options generally improves file access times and boosts overall performance.

Solstice DiskSuite™

Solaris 8 software ships with Sun's premier logical volume management software, Solstice DiskSuite™ software. It provides enhanced data availability, improved reliability and integrity, as well as significantly greater file system capacity.

WebNFS JavaBeans™ Component

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

Performance and Scalability

Alternative Libthread Model

The scalability of any given multiprocessor system depends largely on the hardware as well as the operating system's ability to tune itself to the requirements of the application. Having the right tools and controls is essential for getting the best performance from the hardware. The Solaris 8 Operating Environment includes new facilities to control the way system administrators are able to adjust the dynamics of the kernel according to the needs of the application. For example, one facility is an alternative threading model that has proven very useful in increasing the performance of servers running the Oracle database.

Kernel Threading Granularity

Significant additional work has been applied to the way in which the threading of the kernel is architected. Improvements have been made to reduce the quantity of exclusion locks contained within the TCP code. These changes contribute to the improved multiprocessor scalability of Solaris software.

InterDomain Networks

InterDomain Networks (IDNs) enable the system administrator to set up high-speed network connections between dynamic system domains without special hardware. Only certain SPARC servers support system domains and IDNs.

New Hardware Architectures

Support for new hardware architectures has been added to the Solaris 8 Operating Environment in preparation for future capabilities. These include providing the knowledge of physical hardware configuration and the potential latencies they exhibit to the operating system, and allowing programmatic interfaces to exploit the configuration parameters for optimal performance. For example, ccNUMA has the inherent design of nonuniformity of memory access based on spatial relationships between CPU sets and memory boards. Using Solaris platform APIs, an application can specify that the memory and CPU sets are co-located when the application is executed.

File System Performance

The way in which the UNIX file system (UFS) handles large numbers of files has been significantly improved. By adding a cache and other logic, the speed with which the file system name space is searched and new objects added/deleted has been dramatically increased. The largest benefit will be experienced by those applications that open large numbers of files at one time, such as computer aided design (CAD) packages and databases that use the file system rather than raw disk partitions.

Web Server Performance

Solaris Network Cache Accelerator (SNCA) is provided in the Solaris 8 Operating Environment. When coupled with the Apache Web Server (also provided), or later with the iPlanet Web Server, it greatly improves performance of servers used primarily for Web page serving.

Alternative Faster I/O Polling

Alternative I/O polling 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. It can provide significant performance boosts to databases and large applications such as CAD.

Fast Boot Time

Several changes have been made to the way elements of the boot sequence for systems supported by the Solaris 8 Operating Environment are treated. The most dramatic improvement is for large servers that have many disks connected. Speed improvements in the range of 40 percent have been noted on high-end servers.

Due to other changes in the Intel Architecture platform-dependent code, many IA32 systems will boot much faster than with older releases of Solaris software. Speed improvements of around 30 percent have been noted for mid-range Intel servers.

Java™ 2 SDK, Standard Edition

The Java 2 SDK, Standard Edition, formerly known as JDK™ 1.1 software, is an implementation of the Java™ 2 Platform, Standard Edition (J2SE™) that has been substantially enhanced for the Solaris Operating Environment. It features:

- Substantially increased scalability and performance
- Improved class libraries, including the new Java 2 Platform APIs
- An enhanced memory subsystem
- A high-performance, scalable Java virtual machine (JVM)
- Fast Java thread synchronization

TCP Performance

TCP selective acknowledgment (TCP SACK) provides the support described in RFC 2018 to solve the problems related to congestion and multiple packet drops, especially in applications using TCP large windows (RFC 1323) over satellite links or transcontinental links.

Desktop

Personal Digital Assistant (PDA)

PDA Synchronization (PDASync) is a Java technology-based application that enables users to easily synchronize Solaris CDE desktop calendar, mail, address book, and memos with their PDAs.

X11R6.4 Support

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

- Web-enabled X application access on any browser-based desktop, providing users with access to corporate X applications through the Internet and intranet
- Xinerama provides one logical screen image that can extend to multiple physical devices. This enables users to display an image across multiple monitors in a continuous and seamless manner
- Minimized colormap flashing

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.

Java™ Plug-In

Java™ Plug-In for the Solaris Operating Environment is an add-on product for Netscape Navigator™ that enables Java applets and JavaBeans components to run on Web pages using the Java 2 Runtime Environment instead of the default Java virtual machine (JVM) included with Netscape Navigator.

Netscape Communicator 4.7

Netscape Communicator 4.7 is the default browser included with the Solaris 8 Operating Environment.

Print Naming Enhancement

The name given to a network printer must be globally recognized by those that need to use it. The Solaris 8 Operating Environment allows the naming service switch (nsswitch) services to be used for obtaining printer names and resolving the maps that locate the printer's server and print queue.

Solaris™ Print Manager

Solaris™ Print Manager is a Java technology-based graphical user interface that enables you to manage local and remote printer access. This tool greatly enhances printer name discovery, and can be used in the following name service environments: NIS, NIS+, NIS+ with Federated Naming Service (FNS), and files.

Printer Management for Users

The Solaris print client enables users to easily configure their own set of printers and default printer without special system administration privileges or any intervention from the system administrator.

Universal Language Coverage

Improved Language Installation and Setup

The storage requirements for installing several different languages on one system have been reduced significantly. The redesign of the installation interface improves the way languages are selected and grouped.

Expanded Unicode Support

The Solaris 8 Operating Environment broadens support for Unicode with the addition of new Unicode (UTF-8) locales for both Simplified Chinese and Traditional Chinese.

Customer-extensible Codeset Conversion

Developers can easily create and add their own user-defined codeset conversions by using the *geniconvtbl* utility in the Solaris 8 Operating Environment. Modification to existing Solaris codeset conversions is also supported.

Universal Language Coverage

The Solaris Operating Environment includes support for 123 locales, covering 37 languages. Locales include a combination of date/time formats and languages spoken.

New Locales Added

Two new locales have been added to the Solaris 8 Operating Environment 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.

Language Conversion Formats

Data interoperability with non-Solaris environments has been improved with the addition of the following new *iconv data conversion* utilities:

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

Documentation Server Improved

The AnswerBook2 Documentation Server has improved performance and reliability. The navigation icons have been replaced with text to maximize ease of use, and support for non-English locales has been enhanced.

Reference Manual Improvements

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

- Basic Library Functions
- Networking Library Functions
- Curses Library Functions
- Threads and Real-Time Library Functions
- Extended Library Functions
- Libraries and Headers

In addition, many of the man page suffixes have been changed to reflect the library that contains the function.

Audio Mixer Driver — SPARC Platform Only

The audio mixer driver now allows multiple applications to play and record audio simultaneously.

64-Bit Kodak Color Management System

The Kodak Color Management System™ (KCMS™) provides 32-bit and 64-bit versions of the libraries. Applications that currently use KCMS and are converted to the 64-bit operating environment can now retain color management services.

Intel Platform

Advanced Configuration and Power Interface (ACPI) — Intel Platform Edition Only

ACPI is a new, more flexible way to configure and control Intel Architecture hardware. ACPI obsoletes plug-and-play BIOS and the Intel Multi-Processor Specification (MP-SPEC). If ACPI is available on an Intel Architecture system, the Solaris 8 Operating Environment automatically uses it to configure the hardware.

Support for 32 Gbytes of Memory

With the release of the Pentium Pro chipset, Intel introduced a mode called Physical Address Extension (PAE) on its advanced processors. Systems equipped with hardware that supports PAE will be able to address the full 32 Gbytes of physical memory using the Solaris 8 Operating Environment Intel Platform Edition.

Multiple Boot Partition

Intel systems running the Solaris 8 Operating Environment may now designate a separate boot partition during installation, greatly enhancing the flexibility of Solaris software in multiple operating system configurations.

CD-ROM Boot

The CD-ROM boot feature enables the installer to boot a system directly from an installation CD (rather than via the Device Configuration Assistant diskette, as was the case in the past). This new facility takes advantage of the “El Torito” standard.

Large Disk Support

The previous Solaris limitation of not recognizing greater than eight Gbytes on large disks has been removed. By using improved BIOS interfaces to access the disk, the Solaris 8 Operating Environment now fully uses disks larger than eight Gbytes.

PCI Hot-Plug Support

This feature enables PCI adapters to be hot-plugged into a machine. Hot-plugging is the action of installing or removing a hardware board or device without removing the power or shutting down the operating system. It requires that the system hardware be designed to support hot-plugging and that the operating system provide facilities for managing these events. The Solaris 8 Operating Environment supports a range of hot-plugging events; new at this revision is PCI bus events.

Universal Serial Bus (USB) Support

USB interface support has been added to the Solaris platform along with device drivers for the keyboard and mouse. In a future release of the Solaris 8 Operating Environment, further device drivers will be released along with the APIs needed for developers to write their own device drivers for USB.

Intel Xeon CPU Enhancements

To maximize performance, the Solaris Operating Environment supports the Page Attribute Table (PAT) feature of the Intel IA32 processors (Xeon, Pentium II, and Pentium III).

Extended Memory

Extended memory (XMEM) support provides a mechanism that allows a single 32-bit process to efficiently allocate and manage more than four 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.

X Server Video Driver Enhancements

Support for the following video devices has been added:

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

Support for Adaptec Ultra2

The Solaris SCSI device driver (cadp) has been enhanced to provide support for the popular Adaptec Ultra2 adaptors.

Faster NCRS Device Driver

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

Support for LSI Logic SYM22910

Support for the LSI Logic SYM22910 and SYM21002 adaptors (via the symhisl device driver) is now included in the Solaris 8 Operating Environment.

Network Security

RPCSEC_GSS

RPC has been modified based on the GSS-API. This increases security integrity and confidentiality, and NES services are no longer tied to a specific or single security mechanism.

NIS+ Security Extended

NIS+ has enhanced security by increasing the authentication key length from 192 bits to 640 bits.

Domain Name System (DNS)

Berkeley Internet Name Daemon (BIND), the most popular DNS implementation, has been upgraded. Among the improvements it provides is a new configuration file that enhances network security through the use of access control lists (ACLs).



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