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Unix: What's New in Solaris 9?

White Paper

Abstract

This document focuses on the new features found in Solaris 9 that are relevant to system administration.

New System Administration Features in Solaris 9

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.

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.

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.

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.

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(TM) programming language.

Configuration for setup of the iPlanet Directory Server has been simplified by using idsconfig.

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.

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.

IP Security Architecture for IPv6

The IPsec security framework has been enhanced in the Solaris 9 release to enable secure IPv6 datagrams between machines. For the Solaris 9 release, only the use of manual keys is supported when using IPsec for IPv6.

Note -

The IPsec security framework for IPv4 was introduced in the Solaris 8 release. The Internet Key Exchange (IKE) Protocol is available for IPv4.

Enhanced inetd **Command**

The inetd networking command has been enhanced to support the monitoring and filtering of incoming requests for network services. The server can be configured to log the client host name of incoming requests and thus enhance network security.

Solaris FTP Client

The Solaris FTP client has been enhanced to include support for the following:

- Using passive mode to connect to a remote host from behind a firewall
- Restarting a failed transfer from the beginning of the transfer or from a certain offset
- Setting the TCP window size to enhance the performance of file transfers
- Detecting that the remote system is another UNIX system and setting the default transfer mode appropriately for optimized performance

Trivial File Transfer Protocols (TFTP) Enhancements

The Solaris TFTP client and server have been enhanced to support TFTP option extensions, negotiations of the blocksize, timeout interval, and transfer size.

Support for IPv6 Over ATM

Support for using IPv6 over Asynchronous Transfer Mode (ATM) networks as specified by RFC 2492 has been introduced in the Solaris 9 release.

Enhanced snoop **Packet Capture**

The snoop packet capture and display tool has been enhanced to decode and filter both AppleTalk and SCTP packets.

Sun Internet FTP Server

Sun Internet FTP Server(TM), 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.

Sun RPC Library Extensions

The RPC library extensions project extends the Sun ONC+(TM) 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.

IP Network Multipathing DLPI Link-Up and Link-Down Notification Support

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.

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.

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(TM) 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.

Unified diff **Format**

The diff and sccs-sccsdiff commands have been updated to include support for the GNU-style unified diff format in which context lines are only printed once in the listing of differences.

Generic Log Rotation Facility

A generic log rotation facility is available in the Solaris 9 release. System administrators can use this facility to maintain and rotate system and application log files.

Patch Manager

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.

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.

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.)

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(TM) 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.

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.

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.

Web Start Flash Archive Retrieval Using FTP

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.

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

Longer Package Names

The pkgmk utility can now be used to create packages with names up to 32 characters in length.

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.

Solaris Web Start Wizards SDK 3.0.1

Solaris Web Start Wizards(TM) SDK simplifies the installation, setup, and administration of native Solaris, Java(TM), 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.

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.

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.

Improved Multithreading Library

This release includes an improved and faster multithreading library, which was available as the alternate libthread in previous Solaris software releases.

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.

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.

The Secure Shell server, sshd, supports the monitoring and filtering of incoming requests for network services. The server can be configured to log the client host name of incoming requests and thus enhance network security.

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 - In the Solaris 9 release, an encryption module that supports Kerberos encrypted communications is available in the Solaris operating environment. Previously, an encryption module was available only on the Solaris Encryption Kit CD-ROM or through a web download.
- 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.

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.

Encryption Modules for IPsec and Kerberos

Encryption with a maximum key length of 128 bits is included in the Solaris 9 release. Prior to the Solaris 9 release, encryption modules were available only on the Solaris Encryption Kit CD-ROM or through a web download. A number of these algorithms are now in the Solaris 9 operating environment. These algorithms include 56-bit DES privacy support for Kerberos as well as 56-bit DES and 3-key Triple-DES support for IPsec.

Note -

Also with the Solaris 9 release, support for greater than 128-bit encryption with IPsec is available on the Solaris Encryption Kit CD-ROM or through a web download. IPsec supports the 128-bit, 192-bit or 256-bit Advanced Encryption Standard (AES), and 32-bit to 448-bit Blowfish (in 8-bit increments).

IP Security Architecture for IPv6

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Note -

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Internet Key Exchange (IKE) Protocol is available for IPv4.

Xserver Connection Security Options

New options enable system administrators to allow only encrypted connections to the Solaris X server.

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.

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.

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.

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

Sun StorEdge Traffic Manager

The Sun StorEdge(TM) Traffic Manager feature supports multiple paths for I/O devices such as Fibre Channel-accessible storage. This feature balances the workload across

multiple devices and increases reliability by redirecting requests from a failed interface card or storage device to an operational card or device.

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.

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.

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