Solaris 10 5/09 What's New

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Preface

Solaris 10 5/09 What's New summarizes all features in the Solaris™ 10 Operating System (OS) that are new or have been enhanced in the Solaris 10 5/09 OS.

Note – This Solaris release supports systems that use the SPARC® and x86 families of processor architectures: UltraSPARC®, SPARC64, AMD64, Pentium, and Xeon EM64T. The supported systems appear in the *Solaris OS: Hardware Compatibility Lists* at `http://www.sun.com/bigadmin/hcl`. This document cites any implementation differences between the platform types.

In this document these x86 related terms mean the following:

- "x86" refers to the larger family of 64-bit and 32-bit x86 compatible products.
- "x64" points out specific 64-bit information about AMD64 or EM64T systems.
- "32-bit x86" points out specific 32-bit information about x86 based systems.

For supported systems, see the *Solaris OS: Hardware Compatibility Lists*.

Who Should Use This Book

This book provides introductory descriptions of the new Solaris 10 features for users, developers, and system administrators who install and use the Solaris 10 Operating System.

Optional Feature Licensing

Certain optional features and products that are described in this document might require individual licensing for use. Refer to the Software License Agreement.

Related Books

For further information about the features that are summarized in this book, refer to the following Solaris 10 documentation at `http://docs.sun.com/app/docs/prod/solaris.10`.

Related Third-Party Web Site References

Third-party URLs are referenced in this document and provide additional, related information.

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Documentation, Support, and Training

The Sun web site provides information about the following additional resources:

- Documentation (`http://www.sun.com/documentation/`)
- Support (`http://www.sun.com/support/`)
- Training (`http://www.sun.com/training/`)

Typographic Conventions

The following table describes the typographic conventions that are used in this book.

TABLE P–1 Typographic Conventions

Typeface	Meaning	Example
`AaBbCc123`	The names of commands, files, and directories, and onscreen computer output	Edit your `.login` file. Use `ls -a` to list all files. `machine_name% you have mail.`
`AaBbCc123`	What you type, contrasted with onscreen computer output	`machine_name%` **`su`** `Password:`
aabbcc123	Placeholder: replace with a real name or value	The command to remove a file is `rm` *filename*.
AaBbCc123	Book titles, new terms, and terms to be emphasized	Read Chapter 6 in the *User's Guide*. A *cache* is a copy that is stored locally. Do *not* save the file. **Note:** Some emphasized items appear bold online.

Shell Prompts in Command Examples

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

TABLE P–2 Shell Prompts

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

◆ ◆ ◆ CHAPTER 1

What's New in the Solaris 10 5/09 Release

This document summarizes all features in the Solaris 10 Operating System (OS) that are new or have been enhanced in the current release, the Solaris 10 5/09 release.

For a summary of all features in the Solaris 10 OS that were introduced or enhanced since the Solaris 9 OS was originally distributed in May 2002, see *Solaris 10 5/09 What's New*.

System Resources Enhancements

The following system resources features and enhancements have been added to the Solaris 10 5/09 release.

Support Added for Using ZFS Clones When Cloning a Zone

If the source and the target zonepaths reside on ZFS and both are in the same pool, a snapshot of the source zonepath is taken and the `zoneadm` clone uses ZFS to clone the zone.

You can specify to copy a ZFS zonepath instead of specifying to clone the ZFS. If neither the source nor the target zonepath is on ZFS, or if one is on ZFS and the other is not on ZFS, the clone process uses the existing copy technique.

In all cases, the system copies the data from a source zonepath to a target zonepath if using a ZFS clone is not possible.

For more information, see the following:

- `zoneadm`(1M) man page
- *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*

`zoneadm attach -b` Option

Use the `-b` option to specify official or Interim Diagnostics Relief (IDR) patches, to be backed out of a zone during the attach. This option applies only to zone brands that use SVr4 packaging.

For more information, see the following:

- `zoneadm`(1M) man page
- *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*

System Administration Enhancements

The following system administration features and enhancements have been added to the Solaris 10 5/09 release.

SMF Services for IPsec

IP security (IPsec) is now managed by the following Solaris Management Facility (SMF) services:

- `svc:/network/ipsec/policy:default` – The `policy` service checks for the `/etc/inet/ipsecinit.conf` file and feeds the data into the IPsec Security Policy Database (SPD). The `policy` service must be started and its file, `/etc/inet/ipsecinit.conf`, must exist for boot-time IPsec policy configuration.
- `svc:/network/ipsec/ike:default` – The `ike` service controls the Internet Key Exchange (IKE) daemon in `iked`(1M). This service controls `ike` in a manner similar to other daemon-controlled services like `ssh` or `sendmail`.
- `svc:/network/ipsec/manual-key:default` – The `manual-key` service checks for the `/etc/inet/secret/ipseckeys` file and feeds the keys into the IPsec Security Association Database (SADB). Prior to SMF, the mere existence of the `/etc/inet/secret/ipseckeys` file was sufficient, but now the service should also be enabled to load manual IPsec keys.
- `svc:/network/ipsec/ipsecalgs:default` – The `ipsecalgs` service is enabled by default and maps Solaris Cryptographic Framework algorithms to their use in IPsec. Changes enabled with `ipsecalgs`(1M) subsequently refresh the `ipsecalgs` service.

The SMF management brings all the SMF features to IPsec, for example, interface consistency, capability of restarting, and fault-tracking.

Security Enhancements

The following security features and enhancements have been added to the Solaris 10 5/09 release.

NAT-Traversal for IPsec Key Management Developers

The Solaris 10 5/09 release contains a public API for User Datagram Protocol (UDP) sockets that act as IPsec Network Address Translator (NAT) Traversal endpoints.

The UDP_NAT_T_ENDPOINT socket option, when enabled, has UDP traffic prefixed with a zero security parameters index (SPI) value of four bytes on outbound traffic and strips zero SPIs on inbound traffic. Inbound traffic bound for such a socket with a nonzero SPI is automatically

transferred to IPsec's Encapsulating Security Payload (ESP) for ESP-in-UDP decapsulation. ESP-in-UDP encapsulation is determined by a property in the IPsec Security Association (SA).

This feature enables IPsec key management software developers to create key management protocols that can transit NAT devices. The Solaris IKE daemon in `iked`(1M) uses this facility and such sockets are displayed using the `pfiles`(1M) command.

Stronger Algorithms for IPsec

The Solaris 10 5/09 release introduces the following algorithms for IPsec and IKE:

- Three larger Diffie-Hellman integer-modulus groups including 2048-bit, 3072-bit, and 4096-bit – The larger Diffie-Hellman groups are available in IKE Phase 1 and Phase 2. The groups are specified by group number 14 for 2048-bit, 15 for 3072-bit, and 16 for 4096-bit, per RFC 3526.
- SHA-2 series of hashes including sha256, sha384, and sha512– SHA-2 using HMAC is available for IPsec's Authentication Header (AH) and ESP, and for IKE during its interactions. SHA-2 is used in IPsec per RFC 4868, with truncated ICV lengths of 16 bytes for SHA256, 24 bytes for SHA384, and 32 bytes for SHA512.

Note – SHA-2 is not available for certificates generated with `ikecert`(1M).

SunSSH With OpenSSL PKCS#11 Engine Support

This feature enables the SunSSH server and client to use Solaris Cryptographic Framework through the OpenSSL PKCS#11 engine. SunSSH uses cryptographic framework for hardware crypto acceleration of symmetric crypto algorithms which is important to the data transfer speed. This feature is aimed at UltraSPARC® T2 processor platforms with `n2cp`(7D) crypto driver.

UltraSPARC T1 processor platforms are not affected by this feature since the `ncp`(7D) driver does not support symmetric crypto algorithms. Platforms without any hardware crypto plugins are not affected by this feature, regardless of the value set for the UseOpenSSLEngine option. The default value of the UseOpenSSLEngine option is set to on and the server and client SSH configuration files need not be updated.

SunSSH should be used with Sun Crypto Accelerator 6000 board software version 1.1 with the following patches installed:

- 128365-02 for SPARC-based systems
- 128366-02 for x86-based systems

Note – No patch is available for the Sun Crypto Accelerator 6000 board software version 1.0. To workaround this issue, remove the AES counter modes from the Ciphers option keyword on both the server and the client side.

For more information, see the `ssh_config(4)` and `sshd_config(4)`

Device Management Enhancements

The following device management feature has been added to the Solaris 10 5/09 release.

x86: T-State Support for Intel Based Processors

This feature provides the basic CPU Advanced Configuration and Power Interface (ACPI) T-state support. T-state support enables the CPU driver to receive _TPC change notifications as a manner of controlling the processor speed. This is frequently done on some systems as a passive cooling mechanism along with the existing CPU ACPI P-States.

For more information, see `http://opensolaris.org/os/community/pm/`.

System Performance Enhancements

The following system performance features and enhancements have been added to the Solaris 10 5/09 release.

Large Segment Offload Support for Intel PCI Express 10Gb NIC Driver

This feature introduces Large Segment Offload (LSO) support for the `ixgbe` driver and some `ixgbe` driver bug fixes. LSO is an important feature for NIC, especially for 10-Gb NIC. LSO can offload the segmentation job on Layer 4 to the NIC driver. LSO improves transmit performance by decreasing CPU overhead. This feature is enabled by default.

Solaris Power Aware Dispatcher and Deep C-State Support

This feature includes the following enhancements:

- Event driven CPU power management – On systems that support Dynamic Voltage and Frequency Scaling (DVFS) by Solaris, the kernel scheduler or dispatcher will schedule threads across the system's CPUs in a manner that coalesces load, and frees up other CPUs to be deeply power managed. CPU power state changes are triggered when the dispatcher recognizes that the utilization across a group of power manageable CPUs has changed in a significant way. This eliminates the need to periodically poll CPU utilizations across the system, and enables the system to save more power when CPUs are not used, while driving performance when CPUs are used. Event driven CPU power management is enabled by default on systems that support DVFS. This feature can be disabled, or the legacy polling-based CPU power management can be used through the `cpupm` keyword in `power.conf(4)`.
- Support for Deep Idle CPU Power Management or deep C-state support on Intel Nehalem-based systems – The project also adds Solaris support for Deep C-states on Intel Nehalem-based systems. This support enables unused CPU resources to be dynamically placed in a state where they consume a fraction of the power consumed in their normal operating state. This feature also provides Solaris support for the power saving feature, as well as the policy implementation that decides when idle CPUs should request deep idle mode. This feature will be enabled by default where supported, and can be disabled through the `cpu-deep-idle` keyword in `power.conf`(4).
- Observability for Intel's Turbo Mode feature – Intel Nehalem-based systems have the ability to raise the operating frequency of a subset of the available cores when there is enough thermal headroom to do so. This ability temporarily boosts performance, but it is controlled by the hardware and transparent to software. Starting with the Solaris 10 5/09 release, a new `kstat` module observes when the system is entering the turbo mode and at which frequency it operates.

Developer Tools Enhancements

The following developer tools features and enhancements have been added to the Solaris 10 5/09 release.

SunVTS 7.0 Patch Set 5

SunVTS™ 7.0 Patch Set 5 has the following enhancements:

- Infrastructure enhancements:
  - Ability to specify device specific options in a test
  - Creation of generic or host-specific sessions for testing
  - Loop function on a particular test pass
  - Terminal user interface (UI) support for the creation or loading of generic and host-specific sessions

- CPU Diagnostics Enhancements:
  - System test, `systest`, performs processor-level isolation in the event of a failure
  - CPU test, `cputest`, is a multiprocess test. A single test binary can test all the CPUs in the system simultaneously.
- Memory Diagnostics Enhancements:
  - `physmem`-based `ramtest` has the option to read address length in Kbytes, Mbytes, and Gbytes
  - Improved l3 buffer test with added memory, march-test algorithms
- IO Diagnostics Enhancements:
  - New `hlgraphicstest` test is added for testing graphics cards
  - Users can specify back-to-back loopback option for the `nxge` interface in the network test
  - `Cddvdtest` is enhanced to support different drive speeds
  - Disktest is enhanced to support the following features:
    - Tuned to stress USB storage devices
    - Perform disk performance testing
    - Not perform write testing on the root disk
    - Test Solid State Devices (SSD) with test level, wear-leveling mechanism
    - Supports read-and-write buffer cache test

x86: CPU Performance Counter Updates for Intel Processors

Modern microprocessors contain hardware performance counters that enable the measurement of many different hardware events related to CPU behavior. Hardware events include instruction and data cache misses as well as various internal states of the processor. Data from the performance counters can be used to analyze and tune the behavior of software on a particular type of processor. The Solaris 10 5/09 OS provides access to CPU Performance Counters (cpc) through the `libcpc`(3LIB) interface and through the `cputrack`(1) and `cpustat`(1M) utilities.

Driver Enhancements

The following driver features and enhancements have been added to the Solaris 10 5/09 release.

hermon Driver

This feature introduces a Solaris driver for the fourth generation of InifiniBand (IB) HCA chips from Mellanox, Ltd. The hermon driver provides IB support for SDR, DDR, and QDR chips for conventional HCAs, EMs, and NEMs for blade environments.

The hermon driver enables higher bandwidth and lower latency in IB transmissions, compared to previous generations of the IB product. The higher bandwidth and lower latency are most

important in high-performance computing (HPC) applications, though the increase in performance is advantageous in all environments.

In addition, the uDAPL library, a critical underpinning of the MPI library, is updated to work with this driver, providing optimal performance with MPI-based applications.

iSCSI Target

Starting with the Solaris 10 5/09 release, iSCSI Target is upgraded to provide new features and functionality.

This iSCSI Target update includes the following performance, scalability, interoperability, and reliability improvements:

- Improved TCP/IP timeout recovery
- iSCSI initiator invoked SCSI RESETs
- Code path and memory leak cleanup
- Improved interoperability with Target Port Group Tags (TPGT), unidirectional and bidirectional CHAP authentication, and RADIUS server support
- Improved Internet Storage Name Service (iSNS) support, including recovery from unavailable iSNS servers
- Updated SCSI-3 Persistent Reserve functionality that enables the use of the functionality in various clustering solutions on both Solaris and other operating systems

The Solaris iSCSI Target release now supports a wide variety of iSCSI initiators for the following operating systems:

- Solaris 10
- OpenSolaris
- Linux: Red Hat Enterprise Linux (RHEL), Suse, and Ubuntu
- VMWare ESX
- Microsoft Windows (XP, Vista, Server 2003, Server 2008, Windows Cluster Server)
- Mac OS X

x86: NetXen 10-GigE Device Driver

The `ntxn`(7D) is a new NIC driver that supports NetXen's PCI Express-based 10-Gigabit Ethernet network interface cards (NIC). Users can access the network through Solaris OS on platforms that have a NetXen NIC installed.

Intel ICH10 and Hartwell NIC Support in E1000g Driver

Starting with the Solaris 10 5/09 release, the ICH10 and Hartwell network interfaces are the default network interface cards (NIC) on some x64 and x86 machines. Users can access the network easily with these network interfaces.

`xge` Driver Can Enable Multiple Receive Rings and MSI-X

The `xge` driver enables multiple receive rings and MSI-X if the driver can allocate enough MSI-X vectors on platforms that support MSI-X.. The performance of the driver is enhanced by this feature. If the driver is unable to allocate enough MSI-X vectors, the driver continues to work as before in the legacy interrupt mode.

Language Support Enhancements

The following language support enhancement has been added to the Solaris 10 5/09 release.

New Locale Support for Kazakhstan and Ukraine

The Solaris 10 5/09 release now supports the Kazakhstan kk_KZ.UTF-8 and Ukraine uk_UA.UTF-8 locales.

Additional Software Enhancements

The following additional software feature has been added to the Solaris 10 5/09 release.

SPARC: Fp-scrubber Daemon

The Fp-scrubber is a user-level daemon that periodically runs nonintrusive tests to validate proper functioning of the floating-point unit (FPU) hardware. When an error is detected by the test, a fault management action is initiated by using the `fmd`(1M) command. The Fp-scrubber daemon supports only UltraSPARC III and UltraSPARC IV class of processors.