

The Solaris™ 9 Operating Environment

Increase service levels. Decrease costs. Reduce risks.

Sun™ ONE
Open Net Environment



Key feature highlights

Integration of the Sun ONE Directory Server and the J2EE™ technology-based Sun ONE Application Server in the Solaris 9 Operating Environment provides the foundation for Network Identity Management.

Delivers the performance and stability to meet production database and file system requirements — with no incremental costs.

Provisioning and change management provides secure installation and deployment of software stacks.

Solaris Containers, combined with Dynamic System Domains, enable customers to get higher utilization of their system resources.

Provides out-of-the-box security solutions and a fully integrated suite of security services to deliver the level of security required for Services on Demand.

Champions the RAS lifestyle into every step of software development process.

Configuration services and Patch Manager, combined with SunPlex™ systems, deliver high service levels.

Enables applications to run faster without recompiling and recoding.

Compatibility with previous versions and built-in Linux compatibility offer investment protection.

Today's explosive levels of growth — in terms of bandwidth, networks, and digital devices — are driving an even greater shift towards a services model of computing. The Services on Demand approach moves the burden of a computing infrastructure from end users and their PCs to the organizations that provide the services. Since its inception in 1982, Sun has been driven by a singular vision — The Network Is The Computer™ — and has helped businesses harness the transforming power of the network in order to create, deploy, and deliver reliable Services on Demand.

As the foundation for the Sun™ Open Net Environment (Sun ONE) — Sun's vision, architecture, platform, and expertise for delivering Services on Demand — the Solaris™ 9 Operating Environment provides an integrated yet open architecture for building and deploying Services on Demand. The Solaris 9 Operating Environment (OE) offers new levels of performance in scalability, availability, manageability, and security, and delivers a complete and highly refined environment designed to enable customers to increase service levels while decreasing costs and reducing IT risks.



The Solaris 9 OE Is Scalable

Companies offering Web-based services can no longer predict how many customers might visit their sites. Today's companies need the ability to grow to support millions of new customers overnight.

The Solaris 9 Operating Environment is the third major release of the complete 64-bit computing environment tuned for Sun's powerful line of highly scalable 64-bit servers. The multithreaded, fully preemptible kernel delivers much faster performance for core system functions and enterprise applications. And with the new increased performance and scalability of the Solaris 9 Operating Environment, customers can immediately see an improvement in the price/performance ratio of their servers, and thus, increase the return on their investments.

The Solaris 9 Operating Environment offers the capabilities to scale and support massive systems and applications:

- One million simultaneous processes on a single system

The best gets better. The Solaris 9 Operating Environment provides a foundation for Network Identity Management through integration of the Sun ONE Directory Server and the Java 2 Platform, Enterprise Edition (J2EE) technology-based Sun ONE Application Server.

- Up to 128 CPUs in a single system and 848 CPUs in a clustered environment
- Support for up to 576 GB of memory
- More than four billion network connections
- Up to 252 TB file systems with Sun StorEdge™ QFS
- IPv6, enabling a 128-bit IP address space
- A 64-bit Java™ virtual machine

In addition, Solaris 9 software introduces a group of new features designed to increase system performance and scalability.

Solaris 9 Threads Model

By automatically utilizing an enhanced multi-threading library, applications on the Solaris 9 platform demonstrate greater scalability and an overall performance increase of up to 4 times. There are no changes to the interfaces and no need to recode applications.

Solaris 9 Memory Optimizer

[Multiple Page Size Support](#)

Applications can use multiple page sizes ranging from 8 KB to 4 MB for different memory segments. This increases performance by enhancing resource efficiency and reducing overhead. The binary is left untouched, and page sizes are dynamically changed as an application executes.

[Advanced Page Coloring](#)

The Solaris 9 Operating Environment includes enhancements to the algorithm that control virtual/physical pages and how they are reached. As a result, system performance is increased for particularly heavy user loads.

[Memory Placement Optimization](#)

Solaris 9 software is designed to optimize memory management in the way that best suits the particular servers on which it is running.

[UNIX® File System \(UFS\) Enhancements](#)

[UFS Concurrent Direct I/O](#)

For databases created on a UFS file system, UFS Concurrent Direct I/O provides near raw device performance, leading to an 87% improvement in TPC-C measurements on OLTP workloads.

[mkfs](#)

Enhancements to the mkfs command have dramatically reduced the time it takes to create a UNIX file system; you can now create a UNIX file system 96 times faster.

[64-bit Java Virtual Machine](#)

With Java 2 Platform, Standard Edition (J2SE™) 1.4 software, users benefit from full 64-bit support in the Java HotSpot™ virtual machine (VM). This feature, combined with the Java HotSpot Server VM code optimizer, has significantly improved Java Servlet performance.

The Solaris 9 OE Is Available

With businesses operating around the clock and around the globe, organizations no longer know when their customers might demand their services. The reliability of the Solaris 9 Operating Environment increases users' confidence that their long-running and resource-intensive applications will execute without interruption.

The Solaris 9 Operating Environment is designed with a small, compact kernel that limits the exposure to errors that can crash a system. It is also designed with a clear distinction between the kernel, shared libraries, and applications to further limit the impact of application failure. To deliver mainframe reliability with Internet agility, the Solaris 9 Operating Environment raises the bar for reliability, availability, and serviceability (RAS) by strengthening the following characteristics in every aspect of the development process.

Robust

[Dynamic System Domains](#)

The Solaris 9 Operating Environment provides failure containment and high-level control over system resource allocations in electronically isolated partitions. Partition boundaries can be adjusted on the fly to rapidly adapt to changing workloads, or on a scheduled basis to enable resource shift between applications. This helps improve service levels economically.

[Solaris Containers](#)

Solaris Containers isolate software applications or services using flexible, software-defined boundaries. If a fault occurs in a user-level process, the container boundary would then prevent propagation of the failure to other containers.

[Kernel and User Mode Separation](#)

With the kernel occupying a protected address space, and the user-level libraries and applications occupying separate user address spaces, it is extremely difficult for a user error to cause a system failure. This significantly enhances system availability.

[Kernel and Device Driver Hardening](#)

Kernel and device drivers are further hardened by identifying and eliminating panics and kernel memory leaks. The new device driver testing framework enables developers to stress drivers and simulate hardware failures to further validate that the drivers can handle unforeseeable circumstances.

Recoverable

[File System Journaling](#)

By reducing file system check times during reboot, the Solaris 9 Operating Environment increase recoverability.

[NFS Failover](#)

With NFS Failover, client systems can retry network file access on an alternate server when the primary server fails.

[Network Multipathing](#)

The Network Multipathing feature allows multiple network connections to provide load spreading and failover.

[Sun StorEdge Traffic Manager](#)

The Solaris 9 Operating Environment supports multiple paths for I/O devices, such as SCSI and Fiber Channel-accessible storage, for load balancing and failover.

Manageable

[Dynamic Reconfiguration](#)

Dynamic Reconfiguration enables system configurations to be changed without rebooting, minimizing planned and unplanned downtime.

[Solaris Live Upgrade](#)

The Solaris Operating Environment can be upgraded while the system is still running, significantly reducing the usual service outage time associated with standard upgrades.

Observable

[Modular Debugger Framework](#)

The Modular Debugger Framework is an extensible utility that enables low-level debugging and editing of the live OE.

[Kernel Analysis Tools](#)

The Solaris 9 Operating Environment provides a comprehensive set of “on-the-fly” kernel analysis tools. *kstat*, *lockstat*, *prstat*, and *cpustat* provide statistics and parameters for the kernel, file locks, process status, and CPU utilization respectively. *truss* can be used to wrap an application so that all of its system calls can be observed externally.

Availability With Sun Cluster 3.0

Sun Cluster software, available separately, provides continuous access to services via Global Network and File Services. Data, networks, and devices are available to all domains in the Sun-Plex systems as well as to applications running on any domain.

The Solaris 9 OE Is Manageable

As IT infrastructures grow increasingly larger and more complex, IT organizations must optimize for efficiency. Deploying and redeploying servers is a daily event. To stay ahead, businesses today must manage IT growth, while at

the same time reducing complexity and management costs. The Solaris 9 Operating Environment provides a rich set of management facilities that can simplify the process of securely installing and deploying the software stack, resulting in lower cost of operation.

Solaris Containers and Resource Management

Solaris Containers will create an execution environment within a single instance of the Solaris Operating Environment, and provide full resource containment, fault isolation, and security isolation. This common approach simplifies service provisioning and makes it easier to consolidate applications onto fewer servers without concern about resource constraints, fault propagation, or security.

The first implementation of Solaris Container is Solaris 9 Resource Manager software, which is integrated into the Solaris 9 Operating Environment. It consists of a set of resource management and network quality-of-service features. Solaris 9 Resource Manager enables administrators to allocate system and network resources to multiple users, groups, or applications to provide more predictable service levels. Customers can set and enforce policies that control and monitor how resources are used, and generate extended accounting information for billing or chargeback purposes. Solaris 9 Resource Manager software redefines the traditional single application system model and offers a better solution by enabling server consolidation to reduce service costs while delivering more predictable service levels.

Data Management

In the Solaris 9 platform, new features are introduced to help manage the data that gives a company its competitive advantage.

[Solaris Volume Manager](#)

The Solaris Volume Manager storage management tool, which now includes a GUI, is integrated into the Solaris 9 Operating Environment. It allows users to manage large numbers of disks into logical volumes.

Soft Disk Partitions

The soft disk partitions feature increases the number of file systems per device from eight to thousands. Partitions can also be created on top of previously defined logical volumes, giving administrators additional flexibility in configuring and managing the volumes.

UFS Snapshot

With UFS snapshot, the Solaris 9 Operating Environment provides an online backup mechanism by creating a point-in-time image of the file systems. It helps eliminate downtime or offline time previously required to guarantee a consistent backup.

System Management

Administration

The Solaris 9 Operating Environment provides a wide range of administration tools that assist both user and system administration tasks. It provides command-line tools and GUIs for managing users, resources, and disk storage.

Solaris Patch Manager offers the most comprehensive patch management features for the Solaris Operating Environment. Administrators now can analyze the patch state of a system and automatically download the recommended patches. They are provided with the install order necessary to accommodate patch dependencies, and can use the tools on local and remote systems. All patches delivered via Solaris Patch Manager are digitally signed, helping ensure that the patches are from Sun and have not been altered in transmission.

Monitoring and Management

Sun Management Center provides a powerful, easy-to-use single management point for all Sun servers and storage, independent of geographic location. System administrators can perform remote system configuration, performance monitoring, and isolate hardware and software faults through a single interface. Sun Management Center easily integrates with enterprise management frameworks, and provides a central facility for managing events and alarms, automated responses, and diagnostics.

Solaris Provisioning Services

Solaris Web Start

Solaris Web Start software simplifies the installation, setup, and administration of applications written for both Solaris and Java technology-based environments with point-and-click ease of use.

Solaris Flash and Solaris Live Upgrade

Solaris Flash makes it easy to provision large numbers of servers having similar configurations. It enables administrators to create a single reference installation of the entire system software stack and replicate the installation on a numbers of servers. Solaris Flash reduces installation time and configuration complexity, and simplifies the process of redeployment to support different service levels as customer demands change.

Solaris Live Upgrade is integrated to work with Solaris Flash technology. This functionality provides a mechanism to install a Solaris Flash archive on an inactive boot environment while the active boot environment is fully functional. A simple reboot will migrate the system to the updated environment when the process is finished. This significantly reduces the installation time.

Solaris JumpStart™ Software

With Solaris JumpStart software, the Solaris Operating Environment and applications placed on a central server can be used to remotely set up a Solaris system anywhere on the network.

Secure WAN Boot

Sun's new secure WAN boot technology provides mechanisms that enable system administrators to boot and install new or upgrade systems over a wide area network. It further enhances system scalability by enabling administrators to remotely install multiple duplicate systems, such as Web servers or application servers, over geographically dispersed areas.

Sun Management Center Change Manager

Available separately, Sun Management Center Change Manager extends Solaris platform functionality by offering Sun's most advanced provisioning capabilities. It delivers a fast and easy way to install, upgrade, and audit the software on your systems.

Change Manager enables today's business to quickly and easily provision software stacks to their servers by providing automated tools for installation or upgrade of hundreds of servers at a time — while the systems continue to operate. This can save IT costs and minimize disruptions of services. Sun Management Center Change Manager has an easy-to-use Web browser interface as well as a command-line interface (CLI) for experienced system administrators.

User Management

Sun ONE Directory Server (formerly iPlanet™ Directory Server) is integrated into the Solaris 9 Operating Environment. It creates an LDAP-based environment that can scale to millions of users. An NIS+ to LDAP transition kit is available to help ease migration from NIS+ to LDAP. Also, the secure LDAP client has been enhanced to support various encryption mechanisms, including DIGEST-MD5 and SSL, enabling secure password management through Sun ONE Directory Server.

The Solaris 9 OE Is Secure

The Solaris Operating Environment has been built to securely interconnect with other systems and be more secure from the viruses and worms that plague software designed without security and networking in mind. These aspects of network and platform security are critical — whether building an enterprise network or providing services to millions of users over the Internet. The Solaris 9 Operating Environment includes a number of new security features.

Network Security

The network security provided by the Solaris 9 Operating Environment helps ensure secure authentication over the network, secure remote access, secure network connections that can't be snooped, and protection from network based attacks.

Solaris Secure Shell

Solaris Secure Shell software allows for strong authentication of both the client and server machines as well as user IDs, and provides a secure method for system access including a lightweight VPN.

IPSec With Internet Key Exchange (IKE)

IPSec increases security between both servers and communication channels so that only authorized parties can communicate with them. IKE is used to set up and manage larger numbers of secure networks. These modules have been approved for export at 128-bit encryption.

SunScreen™ 3.2. Software

SunScreen 3.2 software is a high-speed, stateful packet-filtering firewall that offers advanced features that protect a single system or an entire network of servers, and is now included with the Solaris 9 Operating Environment at no extra charge.

Kerberos v5 Server

In the Solaris 9 Operating Environment, Kerberos delivers improved single sign-on for both applications and systems.

Platform Security

The platform security features in the Solaris 9 Operating Environment support server and cluster hardening through:

- Pluggable authentication modules (PAM): flexible security standards
- Secure LDAP client
- Role-based access control (RBAC)
- Kernel Pseudo Random Number Generator
- Nonexecutable program stacks
- Modular software packaging
- Extended auditing

Compatibility

Compatibility is one of the hallmarks of the Solaris Operating Environment, and is key to enabling customers to move up the hardware product line without having to port or recompile their applications. Solaris software supports a public application binary interface (ABI) that guarantees that conforming applications will run on all Sun servers without modification.

SolCAT: Solaris Compatibility Assurance Toolkit

The Solaris Compatibility Assurance Toolkit (SolCAT) is a collection of tools and services, including the Sun Guarantee Test Suite and the Certification Test Suite, to help customers and ISVs easily and seamlessly assure that their applications will run on the latest version of Solaris software.

Linux Compatibility

In today's world of heterogeneous computing, compatibility leads to efficiency. Combining the Linux community with thousands of Solaris software developers and nearly three million Java and XML software developers, Sun provides customers with unified access to the broadest array of innovation in the industry on which to provide services. In the Solaris 9 Operating Environment, more Linux applications, tools, and APIs are made available.

API Compatibility

Common libraries and build environments, such as libxml, glib, and GTK+, are integrated in the Solaris Operating Environment to streamline source code development across Linux and Solaris environments.

Application Compatibility

Common Linux applications, such as Samba, Apache, Linux (GNU) commands, etc., are included in the Solaris 9 Operating Environment. The Solaris Software Companion CD has an even more comprehensive set of free software.

The Solaris™ 9 Operating Environment

Modern Desktop

On the horizon is GNOME 2.0, an advanced new user desktop environment. Sun has been making significant contributions to the GNOME open source project and teaming with other industry players to make GNOME the leading desktop environment for UNIX and GNU-Linux based systems.

Sun ONE Integration

The Solaris 9 Operating Environment is the foundation of the Sun Open Net Environment — an open, integratable product stack designed to enable the infrastructure for Services on Demand. Key Sun ONE applications are being integrated in the Solaris 9 Operating Environment or provided with the media kit.

- Sun ONE Application Server, Platform Edition¹
- Sun ONE Directory Server¹
- Sun ONE Integration Server¹
- Sun ONE Message Queue¹
- Sun ONE Portal Server¹
- Sun ONE Web Server¹

1. Formerly iPlanet Application Server, iPlanet Directory Server, iPlanet Integration Server, iPlanet Message Queue for Java, iPlanet Portal Server, and iPlanet Web Server.

About Sun ONE

The Sun Open Net Environment (Sun ONE) is Sun's vision, architecture, platform, and expertise for delivering Services on Demand today and in the future. Based on open standards such as Java and XML technology, Sun ONE provides a highly scalable and robust framework for building and deploying a variety of Services on Demand — from traditional Web-based applications to future context-aware Web services. By simplifying the way Web services are created, assembled, and deployed, the Sun ONE platform can enhance productivity, speed time to market, and increase business opportunities for enterprises worldwide.

Standards

Interface Standards: X/Open® UNIX 98

Graphic Standards: X11, PostScript™, Display PostScript™, OpenGL®

Desktop Standards: CDE (Common Desktop Environment), GNOME, Motif

Object Standards: Java IDL

Connectivity Standards: ONC™, ONC+™, NFS, WebNFS™, SMB technologies

Internet Standards: HTTP, FTP, Telnet, DNS, NTP, IMAP4, DHCP, SNMP, IPv6, IPSec, Kerberos, SASL, OCF

Protocols: LDAP v3 IETF, RFCs 1323, 1510, 1652, 1869, 1870, 1891-1894, 1985, 1996, 2018, 2136, 2045, 2078

Web Services Standards: XML Registries – Java API for XML (JAXR); ebXML; UDDI

XML Messaging: Java API for XML Messaging (JAXM) – SOAP, ebXML, TR&P, SOAP-RP; Java API for XML-based RPC (JAX-RPC) – SOAP, WSD

XML Processing: Java API for XML Processing (JAXP): XSLT, SAX2, DOM2, Schema, XSLTc

System Requirements

SPARC® 32- and 64-bit platforms

Disk Space: 600 MB for desktop systems; 1 GB for servers

Memory: 64 MB minimum

For More Information

To learn more about the Solaris 9 Operating Environment, visit sun.com/solaris.

For additional technical and development information, please visit the BigAdmin™ portal at sun.com/bigadmin.

For more information on Sun ONE, please visit sun.com/sunone.