Reliability, Availability, and Serviceability (RAS)
for the Solaris™ 8 Operating Environment

Computer downtime can cost your company thousands, or even millions of dollars in lost revenues and productivity. To dramatically reduce downtime, the Solaris™ Operating Environment provides data center-class reliability, availability, and serviceability (RAS) — at a fraction of a mainframe's cost.

THE SOLARIS OPERATING ENVIRONMENT

The Solaris 8 Operating Environment is the established OS leader for availability, scalability, and security in the Internet age. In Solaris 8 software, Sun delivers a trustworthy, universal platform to meet the needs of .com businesses — from small startups to large Fortune 1000 enterprises.

It's no surprise that the Solaris Operating Environment is the leading UNIX® environment today. Solaris software was originally designed with the Internet in mind. TCP/IP, the central Internet protocol, has been at the core of Solaris networking for more than 15 years. Through its time-tested design — a small, stable kernel, modular and extensible components, and well-defined interfaces — Solaris software delivers rock-solid stability and predictability for business-critical applications. And the Solaris 8 Operating Environment provides complete compatibility with prior versions, so you can be confident that your current applications will continue to run.

RELIABILITY, AVAILABILITY, AND SERVICEABILITY (RAS)

The Solaris Operating Environment, combined with Solaris enterprise software products, delivers a wide array of features to help you accomplish three important RAS goals:

- Minimize planned downtime
- Minimize unplanned downtime
- Rapid recovery after a failure
- Manageability to enable Internet agility

MINIMIZING PLANNED DOWNTIME

SOLARIS LIVE UPGRADE

Solaris Live Upgrade enables you to upgrade from the Solaris 2.6 Operating Environment — or later versions — without taking the system offline. System administrators can configure the system on a new disk without shutting down or rebooting, thereby reducing planned downtime.

DYNAMIC UPDATE TO KERNEL

The Solaris 8 Operating Environment enables system administrators to change the kernel while it is running. This dramatically improves system availability while at the same time reducing both planned and unplanned downtime. For transient problems that are difficult to resolve, the Hot Diagnostics feature of Dynamic Update to Kernel lets you to apply tailored diagnostic tests to the kernel without bringing the system down. Administrators equipped with this diagnostic information can confidently apply critical kernel fixes that will take effect without requiring a system reboot.

NEW TUNING AND MONITORING TOOLS

New tools such as *prstat* and Sun™ Management Center (formerly known as Sun Enterprise SyMON™ software) allow for fine-grained system tuning and monitoring. With a sharp eye on system resource allocation and management, enterprises can minimize costly downtime and ensure the agility necessary in the Internet age.

REMOTE SERVICEABILITY

The Solaris 8 remote serviceability feature enables collaboration between Sun and its customers, improving end-to-end availability while helping to avoid outages. It assists in mapping patches to specific customer problems down to a specific host.

SERVICEABILITY

- Diagnose problems and perform maintenance tasks remotely in the same manner as on-site administrators

- Dynamic reconfiguration, PCI and SCSI hot-plugging, and dynamic multipathing enhance availability

- Reconfiguration management provides notification of new system resources, or impending removal of existing resources – without service interruption

- Upgrade OS software without taking the system offline; includes dynamic updates to the kernel

- Dynamically repair a system without bringing it down

IMPROVED DIAGNOSTICS

- Improved core dump diagnostics enables administrators to identify sources of failure more quickly and improve service

- Trace IP packet routes to quickly diagnose and correct transient network problems

- Conduct heartbeat tests to determine system or application availability; especially useful for dealing with remote locations

MANAGEABILITY

- System monitoring features enable better management decisions through comprehensive event and performance monitoring, capacity planning, and hardware failure prediction

- Improved logging of kernel events and errors increases uptime and improves serviceability

Sun Alert customers no longer have to search through problem reports, and Sun proactively makes availability recommendations. You can be confident that configurations and patches are up to date, which significantly reduces the possibility of planned and unplanned downtime.

MINIMIZING UNPLANNED DOWNTIME

The reliability and predictability of data center-class systems is necessary — even in the most agile .com environment. The Solaris 8 Operating Environment, the latest release of the proven Solaris Operating Environment, includes a number of new features that are designed to help keep your network up and running.

Solaris 8 reliability, availability, and serviceability (RAS) minimizes downtime and ensures rapid failure recovery.


SYSTEM MONITORING

The Solaris 8 Operating Environment provides comprehensive event and performance monitoring, capacity planning, and hardware failure prediction. With access to this level of information, administrators are equipped with all the tools necessary to make key network management decisions.

DYNAMIC RECONFIGURATION

Dynamic reconfiguration allows a system running the Solaris 8 Operating Environment to continue running even when important system hardware fails. A network administrator can replace the faulty hardware while the system is in operation; the system will dynamically reconfigure itself to utilize other resources until the hardware is brought back online. PCI /SCSI hot-plug support and network dynamic multipathing also support this feature.

IP MULTIPATHING

The IP multipathing (IPMP) feature in the Solaris 8 Operating Environment offers continuous application availability by providing the ability to load balance failures when multiple network interface cards are attached to a system. This capability also enables the connection of up to four network interface cards, increasing available bandwidth to the system.
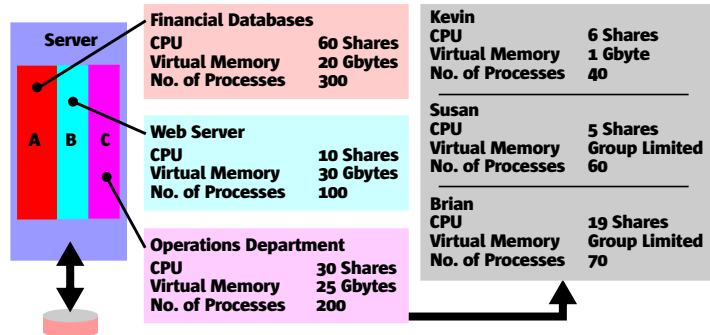
RECONFIGURATION COORDINATION MANAGER

To ensure maximum uptime, the Reconfiguration Coordination Manager intelligently communicates with components of a Solaris 8 system. Applications are notified of new system resources or impending removal of existing system resources, and can expand or reduce dynamically with no service interruption. Dynamic reconfiguration operations can be automated with this information. The Reconfiguration Coordination Manager also provides lockout auto recovery (LAR), ensuring that defective hardware components or those showing signs of imminent failure are locked out of the system at runtime or boot time.

KERNEL HARDENING

The Solaris 8 Operating Environment provides kernel hardening, which identifies and eliminates network panic responses where other actions are possible. Kernel memory leaks are eliminated and system downtime is minimized.

DEVICE CONFIGURATION LIBRARY

The *libdevinfo* library, used to obtain device configuration information, is more robust and reliable in the Solaris 8 Operating Environment. This improvement reduces unplanned downtime by allowing applications to retrieve more stable and consistent device configuration data.

SOLARIS ENTERPRISE SOFTWARE

Sun offers a number of enterprise software products that complement and extend the RAS features of the Solaris Operating Environment.

• Resource Management

  Solaris Resource Manager™ software improves the reliability of all your network applications by balancing system performance and ensuring that mission-critical applications have access to needed resources.

Server		
A	B	C

Financial Databases
CPU	60 Shares
Virtual Memory	20 Gbytes
No. of Processes	300

Web Server
CPU	10 Shares
Virtual Memory	30 Gbytes
No. of Processes	100

Operations Department
CPU	30 Shares
Virtual Memory	25 Gbytes
No. of Processes	200

Kevin
CPU	6 Shares
Virtual Memory	1 Gbyte
No. of Processes	40

Susan
CPU	5 Shares
Virtual Memory	Group Limited
No. of Processes	60

Brian
CPU	19 Shares
Virtual Memory	Group Limited
No. of Processes	70

With Solaris Resource Manager, multiple applications and departments are effectively hosted on one server.

- Bandwidth Management

  With Solaris™ Bandwidth Manager software, you can prioritize network traffic, preventing a small number of applications or users from consuming all available bandwidth. It helps you to maintain high-quality service to everyone in your enterprise.

- Clustering

  Sun™ Cluster software connects up to four servers as if they were one system. Future releases will support up to eight servers, with a single system image and scalable service capabilities. Clustering improves availability by allowing applications and services to transparently move from one system in the cluster to another in the unlikely event a failure occurs.

Cluster solutions ensure high availability and scalability of network services.
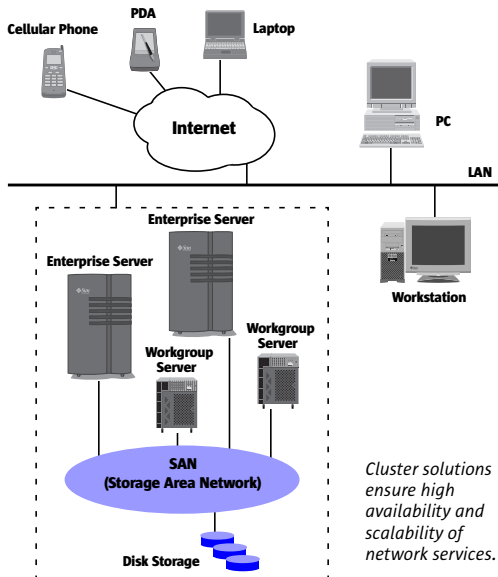
RAPID RECOVERY

IMPROVED CORE DUMP DIAGNOSTICS
In an agile .com organization, even a core dump presents an opportunity to improve service. The Solaris 8 Operating Environment expands access to core dumps and provides improved tools for analysis. Dumped core files are stored in a logical tree with a location specified by the user. Solaris software includes the ability to make dumps configurable and compress dump data when writing to a dump device. Additional enhancements make the core dump process more robust so administrators can determine sources of failure more quickly.

Solaris Bandwidth Manager
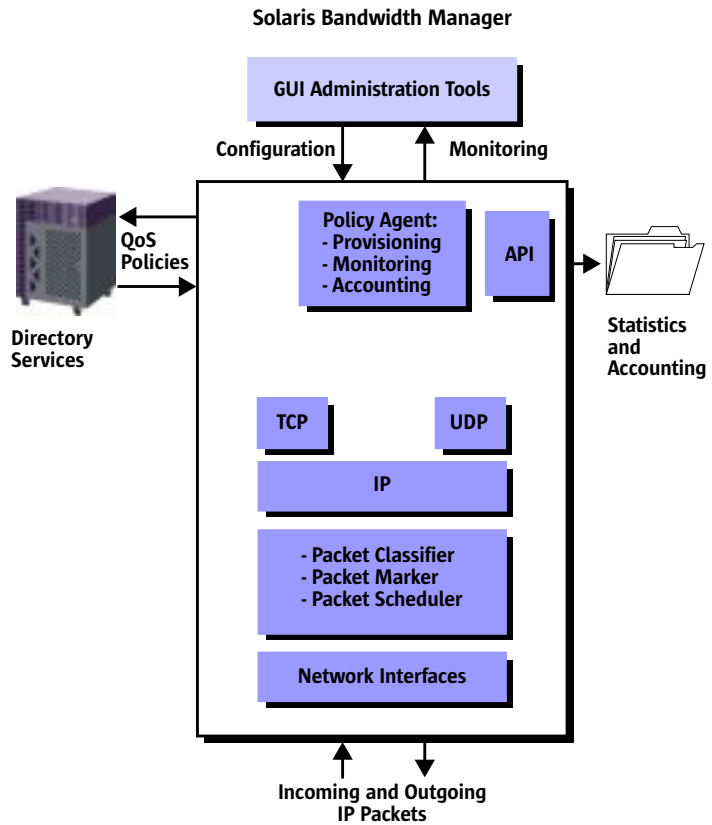
SOLARIS REAL TIME
With the Solaris 8 Operating Environment, you can conduct a heartbeat test to determine whether the system is down or if an application is responding to user requests. This feature is especially useful for remote offices/sites needing to verify system response time or determine system availability.

HOT RELIEF
The Solaris 8 Operating Environment enables you to dynamically repair your system without shutting it down, improving the health of Solaris 8 software with virtually no loss in system availability. Future plans include Hot Patch, a data center-class availability feature that provides the capabilities of the complete Sun patch management process. Hot Patch is scheduled for the first half of 2000.

TCP/IP TRACE SUPPORT UTILITY
By tracing the route an IP packet follows to an Internet host, the TCP/IP utility enables you to quickly diagnose and correct routing misconfigurations and routing path failures. When a reset (RST) packet is transmitted or received, information on as many as ten recently transmitted packets is logged with the connection information.

KERNEL DEBUGGING ENHANCEMENTS

The Solaris 8 Operating Environment includes enhancements to *kadb* (for live system debugging) and *adb* (for core dump analysis) to improve the troubleshooting process.

IMPROVED LOGGING OF KERNEL EVENTS AND ERRORS

More effective logging of kernel events and errors increases uptime and improves serviceability by providing both valuable warnings and additional system information to administrators.

REMOTE CONSOLE

The remote console capability enables a remote service technician to diagnose problems and perform maintenance much in the same manner as an on-site administrator. Console output can be diverted to another device (either a terminal or network device) for improved remote troubleshooting. Remote console includes the *consadm* command, which enables you to select a serial device as an auxiliary (or remote) console for troubleshooting remote system problems.

UFS LOGGING

UNIX file system (UFS) logging minimizes unplanned downtime by recording UFS updates in a log before the updates are applied to the file system. UFS logging eliminates inconsistencies and makes rebooting much faster.

MANAGEABILITY TO ENABLE INTERNET AGILITY

To accommodate your constantly changing .com business, the Solaris 8 Operating Environment incorporates enhanced system monitoring capabilities. Improved logging of kernel events, dynamic reconfiguration, and hot patching all contribute to increased uptime while enhancing serviceability.

SUN CLUSTER

The scalability and availability features of clustering have long been recognized for their effectiveness. However, the complexity of managing a cluster and enabling application failover have precluded cluster use in all but the most demanding environments. With the powerful usability features in Sun Cluster software, more enterprises will be able to deploy clustering technology — especially valuable to fast-growing .com businesses.

Sun Cluster delivers high availability — through automatic fault detection and recovery — and scalability, ensuring that your mission-critical applications and services are available when you need them. Leveraging and extending the reliability, scalability, and performance of the industry-leading Solaris Operating Environment, Sun Cluster provides mainframe-class reliability, availability, and scalability for e-commerce, ERP, data warehousing, and other mission-critical applications and services. Future versions of Sun Cluster will further enhance application availability through a clustered file system, scalable data services, and built-in load balancing.

SOLARIS MANAGEMENT CONSOLE™

With the Solaris Management Console™ software, developers can create administrative interfaces that have a common look and feel. A consistent interface dramatically reduces the amount of training needed to achieve proficiency.

DYNAMIC DOMAINS

By helping you extract the full capacity from your existing equipment and direct it where you need it most, Solaris software helps improve service levels economically.

Dynamic domains enable servers to be partitioned so that each partition runs its own copy of the operating system software in isolation. Boundaries can be adjusted while the server is running, helping to increase system uptime.

SOLARIS™ WEB START AND SOLARIS JUMPSTART™

Improved maintenance features in Solaris software make it simpler and more cost effective to manage far-flung enterprises. Solaris™ Web Start enables administrators using a Java™ technology-based Web browser anywhere on the network to perform software installations and configurations. And with Solaris JumpStart™ software, administrators can swiftly roll out exact copies of a Solaris software deployment across a distributed enterprise. In effect, one administrator performs the work of many, achieving a more uniform result.

AVAILABILITY

Future releases of the Solaris Operating Environment will include hot upgrades and automated distribution of patches to multiple servers. All other features are now shipping as part of the Solaris 8 Operating Environment.

OTHER PRODUCTS

Sun Cluster, Solaris Bandwidth Manager, and Solaris Resource Manager software are available separately, and offer additional functionality and capabilities to extend the superior power and performance the Solaris Operating Environment.

FOR MORE INFORMATION

To learn more about RAS and the Solaris Operating Environment, please visit our Web site at www.sun.com/solaris/.