

# Oracle Solaris

## 11.4

Oracle Solaris is the trusted business platform that you depend on. Oracle Solaris 11 gives you consistent compatibility, is simple to use and is designed to always be secure.

### INTRODUCTION

Oracle Solaris is designed to deliver a consistent platform to run your enterprise applications. It is the trusted solution for running both modern and legacy applications on the newest system hardware while providing the latest innovations. Our administrative interfaces are simple to use and protect your business from error prone mistakes that could cost you critical downtime. All our technologies have been engineered for security and compliance from day one; allowing you to protect your business with a comprehensive defense in depth strategy that's easy to apply.

### CONSISTENT

We've been designing the OS for over two decades, always making sure we've engineered in features to meet the latest market trends while maintaining backward compatibility. Our [Application Binary Guarantee](#) gives you the ability to run your newest and legacy applications on modern infrastructure.

#### Binary Compatibility Guarantee

Oracle Solaris is designed and tested to protect your investment on-premises and in the cloud. The Oracle Solaris Binary Application Guarantee reflects Oracle's confidence in the compatibility of applications from one release of Oracle Solaris to the next, so you can rest assured your applications will continue to run. The Oracle Solaris Source Code Guarantee assures developers that what they develop for Oracle SPARC will also compile and run on x86, and vice versa. The Oracle Solaris [Application Binary Guarantee](#) is the key to application portability since any Oracle Solaris application running on an on-premises system is guaranteed to run on the latest version of Oracle Solaris and in the cloud without an application recompile. This assures seamless application portability between dev/test and production environments, as well as portability from on-premises to cloud and back. This level of investment protection is unique in the industry.

#### Move with Ease

Oracle Solaris Unified Archives allow you to take an archive of an existing install and easily move it to the cloud or to another system. Unified Archives can be used to move between Global, Native or Kernel Zones, providing a P2V, V2V, and V2P mechanism. This capability also makes it easy to move from dev/test to production environments in the cloud. In addition, compliance tools can be used to assess images before you archive them. Once those images are deployed to your on-premises or

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### Key Features

Consistent. Simple. Secure.

- Strongest [binary compatibility guarantee](#) in the industry
- Simple system and application lifecycle management
- REST-based administration and deployment
- Efficient enterprise virtualization
- Advanced data management
- Simplified analysis with Observability Tools
- Remote administration
- Optimized for Oracle Database and Java
- Built-in security provides in-depth defense against malware
- Integrated compliance monitoring, reporting and security tools

cloud environments, they will inherit the same compliance level. Unified Archives also provide the capability to remove the operating system portions of the archive, making the archive size much smaller and, quicker and easier to move to cloud environments. And when installing to a zone for example, it will simply add the missing operating system files from a local IPS repository.

A rich selection of DevOps tools are available on Oracle Solaris, such as Puppet, Chef, and Ansible. This allows users to easily connect Oracle Solaris instances into their favorite corporate-approved tools. These tools are built to manage both enterprise datacenters as well as virtual instances in a public cloud. In addition, Oracle Solaris delivers REST-based configuration and monitoring. This allows you to monitor and manage many elements of Oracle Solaris. And because these elements are exposed through REST interfaces, you can use a wide selection of tools to securely connect to Oracle Solaris instances.

Oracle is the bridge between traditional IT and the public cloud. Oracle offers a clear and simple path forward for enterprise customers that want to move to public cloud in the future. And for enterprise customers that want to move to the cloud today, Oracle offers a complete public cloud solution. Workloads can be moved back and forth from on-premises to private cloud to public cloud as the business needs require.

### **An Assured Platform**

Oracle Solaris and integrated third-party source code follow the Oracle Software Security Assurance Process, a program that encompasses every phase of the product development lifecycle. Oracle Software Security Assurance is Oracle's methodology for building security into the design, build, testing, and maintenance of its products. Oracle's goal is to ensure that Oracle's products, as well as the customer systems that leverage those products, remain as secure as possible.

### **SIMPLE**

Oracle Solaris simplifies the system life-cycle, application life-cycle, and cloud capabilities, enabling you to adapt to business needs quickly and run your datacenter with the utmost confidence and efficiency.

### **System and Application Lifecycle**

Oracle Solaris delivers a complete and integrated set of technologies for managing the software lifecycle of the platform. With support for secure end-to-end provisioning with the Automated Installer, failsafe software update with the Image Packaging System and ZFS Boot Environments, rapid application deployment using Unified Archives, and a comprehensive compliance framework, Oracle Solaris helps to increase productivity, reduce human error and greatly reduce IT cost.

**Constraint Packages:** Maintaining the installed software continues to be easy with the Oracle Solaris packaging mechanism. Oracle has advocated the use of constraint packages so that the system is not updated when least expected and will remain on a particular release stream.

**Fault Diagnosis:** First fault diagnosis is important especially when the fault has already been fixed. The stack diagnosis facility, part of the core operating system self-healing process, automatically examines software faults on the system and matches them with known issues to suggest the corrective course of action. Additionally, network fault issues work with the Oracle Solaris fault management framework. Oracle Solaris provides a number of RAD modules (Unified Archives, networking, packaging), and the kernel supports online modification in order to diagnose faults which need the system state to be preserved.

### **Key Business Benefits**

- Protect your investment and run your latest and legacy applications on one platform.
- Reduce costs
- Adapt to business needs quickly
- Reduce planned and unplanned downtime
- Run your datacenter with confidence
- Mitigate risk and prove compliance easily

### **Related Products**

- Oracle recommends the use of the following products alongside Oracle Solaris:
- Oracle Solaris Cluster HA
- Oracle Enterprise Manager – Ops Center Management Suite
- Oracle Enterprise Manager – Compliance
- Oracle Key Vault

### **Related Services**

Oracle offers the following support options for Oracle Solaris:

- Oracle Premier Support for Systems
- Oracle Premier Support for Operating Systems
- Oracle Solaris Premier Subscription for Non-Oracle Hardware

**Service Management Facility (SMF):** The SMF Goal Services capability provides a single point of monitoring for business function availability for Oracle Solaris Zones (kernel or native) and LDOMs; FMA alerts are raised when the goal service for a system instance is unavailable. SMF Stencils and the support for SMF nested properties provide a mechanism to easily model textual configuration files for 3rd party software in SMF. When combined with the SMF profile layers, this provides a mechanism for per site/node/enterprise customization at install time. You can also use your favorite REST-based tools to control and edit the configuration data.

**REST-based Configuration and Monitoring:** REST based configuration and monitoring of Oracle Solaris is available for the following subsystems: SMF, Networking, Automated Installer, Package Management, Compliance Reporting, User Management, Zones, ZFS and system performance monitoring statistics coming from the StatsStore and used by the Web Dashboard.

**Simple Analysis:** The Oracle Solaris StatsStore provides powerful and actionable data that helps you identify trends and isolate potential issues. It has typically been challenging to get actionable data and metrics from systems, but with the StatsStore you can easily retrieve and analyze the stats you are looking for. You can also go back in time and look at historical trends and data gathered last night, week or even month. You can feed the metrics gathered through the StatsStore to a monitoring tool of your choice, through a command line script or REST interface. This greatly extends the types of stats that you can gather on the application and OS running on the server. In addition, every virtual environment (Zones, LDOMs, VMs) has its own StatsStore, so you can safely grant access to this data without information about another VM or its contents leaking out. The StatsStore comes with a very easy to use intuitive Web Dashboard. The Web Dashboard has a landing page that shows all the main resources and their historical status and allows you to click and drill down on each and any resource to get more detailed information through Sheets. The system ships with some standard Sheets for the OS and some applications, but the Sheets are also customizable and can be changed and added to fit your specific monitoring and business needs.

## Enterprise Virtualization

Oracle Solaris delivers built-in virtualization, which provides a highly efficient and scalable solution, that sits at the core of the platform. And with Kernel Zones, Oracle Solaris provides a flexible, cost efficient, cloud-ready solution perfect for the data center.

**Zone Migration and Evacuation:** Oracle Solaris supports zone migration between systems using shared storage, including support for NFS shared storage and ability to pre-define destination systems for each zone. This is done by issuing the `zoneadm migrate` command. For a running kernel zone this is done while the zone is running or performing live migration, including Live Migration of SRIOV networks, which can also be made highly available with failover. For a native zone this is done when the zone is shut down and in an installed state. In addition, you can migrate your zones to their pre-specified destinations and move them back, all with a single command.

**Live Zone Reconfiguration:** Live zone reconfiguration allows you to add ZFS datasets either permanently or temporarily, to a running Oracle Solaris Zone without the need to reboot the zone. You can also add and remove networks, cpu-shares, and file systems. Zones configured to use local storage can be moved onto shared storage, moved between different shared storage locations, or moved back to local storage to fit your changing needs.

**Zone Dependency:** Zones provide a mechanism to describe the required boot order for zones configured on a system. This is done by describing every zone as an SMF service and describing the dependency between those services. This also allows for easy monitoring, restart, and notification of zone states.

**Other key virtualization features:** Kernel zones can access multiple VLANs and leverage Oracle SPARC Silicon Secured Memory to improve the security and reliability, through real time checking of access to data in memory. Oracle Solaris 10 Zones can run on Oracle Solaris 11, allowing you to upgrade your system and migrate your workloads when convenient.

## **Data Management**

ZFS, the default file system in Oracle Solaris, offers a dramatic advance in data management with an innovative approach to data integrity, near-zero administration, and integrated file system and volume management capabilities.

**Fast File Copy:** ZFS file systems support very fast file copy using reflink(2), this is especially beneficial if you have very large files.

**ZFS Replication:** ZFS replication using send streams for backup and archive utilizes RAW streams. This means that the ZFS send streams can be sent as they appear on disk, saving time and network bandwidth. Also, if a large replication gets interrupted, it is possible to resume where the send left off. This greatly reduces CPU on the source and destination systems by sending the data compressed while in transit. Resumable send streams provide the ability to recover from network interruptions or errors without having to resend whole snapshots or collections. Read and write flow limits can be set per dataset allowing ZFS I/O to be optimized for multiple tenants or applications in the same storage pool.

**ZFS Asynchronous Dataset Destroy:** ZFS asynchronous dataset destroy improves the administrative and automation experience when deleting very large datasets. You simply run the command and ZFS will asynchronously do the delete in the background while you can go on with the next task. Also, the ability to change the ZFS pool allows better integration with SAN based cloning and storage virtualization.

**Planned Grace-less Recovery:** Planned grace-less recovery (PGR) delivers reduced downtime on NFS clients on server reboots.

## **Oracle on Oracle**

Oracle Solaris is optimized to complement the complete Oracle hardware and software stack. Joint innovations, co-engineered projects, and specific optimizations make Oracle Solaris the best platform for your database, middleware, and application deployments. Oracle Solaris is optimized for Oracle Database and Java applications to deliver faster performance and startup times. And with the combination of Oracle Solaris and Oracle SPARC you can ensure your infrastructure is secure by leveraging SPARC Silicon Secured Memory, which delivers hardware enforced anti-malware protection.

## **SECURE**

Oracle Solaris is engineered for security at every level. It allows you to mitigate risk and prove on-premises and cloud compliance easily, so you can spend time innovating while reducing risk. Oracle Solaris combines the power of industry standard security features, unique security and anti-malware capabilities, and compliance management tools for low risk application deployments and cloud infrastructure. Oracle hardware systems and Oracle SPARC Software in Silicon provide the anti-malware trust anchors, accelerate cryptography, and protection from memory attacks.

## **In-Depth Defense Against Malware**

Oracle Solaris includes built-in defense technologies that prevent attackers from establishing a foothold in your datacenter. If they can't breach your system, they can't establish command and control, making it significantly harder to get access to your data.

**Immutable Lifecycle:** Oracle Solaris delivers an immutable life-cycle, allowing administrators to easily build and control immutable environments. This allows administrators to tightly control exactly what is installed and running on a system and prevent administrator mistakes. From development, to test, to production, Oracle Solaris gives you the flexibility to progressively lock down the environment as needed and when needed. Administrations also have the ability to easily control and change immutability over the lifetime of an application. In addition, with trusted services, certain services can gain the specific trust-level needed to make changes to the immutable environment. If any changes need to be made to the immutable system, those changes happen in an alternate boot environment and are logged for later audit.

**Tamper Evident Software:** Administrators can rest assured that their Oracle Solaris systems are protected from the firmware to the applications. Only trusted software is installed. If software is not signed, it will not install. And during runtime, the installed image can also be very easily verified and fixed if needed.

**Application Sandboxing:** Oracle Solaris allows you to isolate applications and deploy securely. This allows administrators to secure applications from each other and easily isolate data within VMs. The Application Sandbox Management tool provides the ability to constrain both privileged and unprivileged applications, even within a single virtualized environment. In addition, Oracle SPARC Silicon Secured Memory automatically protects key applications and the system kernel.

## Safe Images & Updates

**Image Packaging System, Automated Installer & 1-Step Updates:** The Oracle Solaris Image Packaging System and Automated Installer make it very simple to consistently roll out the same, validated, compliant operating system image and makes it equally simple to validate this on a running system. In addition, Oracle Solaris delivers single step updates to pre-tested, verified and trusted versions so you can run your business with confidence. Oracle Solaris provides monthly Support Repository Updates (SRUs) which are tested and validated, so customers can easily move from one version to the next with a single command. This, along with other patching technologies such as Boot Environments and 1-step rollback, allows you to minimize downtime. Also, Oracle Solaris supports secure Wanboot and secure UEFI boot, providing a verified and secure boot path.

## Compliance and Security Tools

Oracle Solaris delivers an integrated deployment workflow, which helps you stay secure and compliant from the beginning. In addition, Oracle Solaris provides a robust and extensive compliance framework.

**Compliance Reporting:** Oracle Solaris systems can run periodic assessments of the system security posture with the ability to have compliance results either pushed or pulled to a central location over a secure transport. The ability to graph historical compliance assessment status at the security benchmark and individual check layer is provided via compliance integration with the Oracle Solaris Web Dashboard. With multinode compliance you can centrally gather a compliance assessment for multiple instances which can be very beneficial for the development and deployment of applications where you want to ensure the entire set of instances are compliant and ready to roll out without needing to individually check each instance.

**Secure Audit Trail:** Maintaining a secure and useful audit trail of administrative change is important to the security and stability of production systems. Oracle Solaris delivers a mature and extensive audit framework, including the ability to automatically audit any Oracle Solaris or 3rd party program that



uses privilege during its execution. And a higher-level reporting tool, admhist, allows administrators to quickly get an overview of system configuration changes and privileged command execution. The ability to audit user change to individual files either locally or over NFS and SMB is also provided. The Oracle Solaris audit framework provides reports detailing access to sensitive data, including data that is required to be protected and logged by PCI-DSS and HIPPA security standards.

**Enterprise Health Check:** Enterprise Health Check identifies potential configuration issues and ensures your systems are setup in a compliant manner.

### Protect your Data

**Cryptographic Platform:** The combination of Oracle Solaris and Oracle SPARC delivers a cryptographic platform that automatically accelerates Java, Oracle Database, OpenSSL, and many other custom applications. Your data is protected at rest and in motion across both Oracle SPARC and x86-based systems. Since the cryptography is hardware-based, the overhead is near-zero.

**Optimized Java Security:** In addition, Java is optimized to use Oracle Solaris and Oracle SPARC encryption. Java libraries directly call crypto accelerators when using AES, RSA and SHA. And TLS security protocol leverages Oracle SPARC security optimizations when called by Java.

**Fully Encrypted VMs:** With Oracle Solaris and SPARC, your data is protected throughout the VM lifecycle. Live VMs in transit are fully encrypted delivering no service loss and no performance loss.

## CONCLUSION

Oracle Solaris is the trusted business platform that you depend on. Oracle Solaris 11 gives you continuous compatibility, is simple to use and is designed to always be secure.

You can find out more at our [Oracle Technology Network](#) page or [download](#) and try it today.

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## Integrated Cloud Applications & Platform Services

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