

# Oracle Solaris ZFS: Scalable Data Management



Oracle Solaris ZFS is a general-purpose file system that is designed from the ground up to provide simplified, secure, and scalable data management—from the desktop to the data center.

## KEY BENEFITS

- Storage complexity can be decreased by using ZFS redundancy.
- Storage footprints can be reduced by 10x through ZFS compression.
- ZFS data encryption keeps critical data safe.
- ZFS data encryption performance is 4x–18x faster than x86 and 11x–60x faster than IBM Power systems.

## KEY FEATURES

Oracle Solaris ZFS provides a better, safer way to manage your data through the following features:

- Simplified data management with no separate volume manager
- Ensured data integrity with 256-bit checksums
- Reduced storage, power, and cooling costs with ZFS compression
- Integrated data services: encryption, compression, deduplication, snapshots, and cloning
- Flexible data sharing protocols, including FC, NFS, SMB, and iSCSI
- Support for OpenStack Cinder (block storage) and Swift (object storage)
- Seamless integration with Oracle Solaris virtualization features

## The Future-Proof File System

Oracle Solaris ZFS is a dramatic advancement in simplified data administration that provides a welcome integration of file system and volume management capabilities and an innovative approach to data integrity.

Oracle Solaris ZFS uses a pool storage model in which storage devices are aggregated into a storage pool. File systems within the storage pool use all the storage in the pool. Physical storage devices can be added to storage pools dynamically, without interrupting services, to provide new levels of flexibility, availability, and performance.

ZFS has no practical limits on the number of files, directories, and file systems or on the amount of physical storage that can be addressed. In addition, file system performance can be increased by putting application data on faster solid-state drives (SSDs).

ZFS also provides a green and fast solution that can require less power, cooling, and maintenance.

## Simplified Administration

ZFS administration is extremely easy because the elegant design of ZFS eliminates the need for traditional volumes and the associated problems of partitioning, provisioning, and stranding storage. ZFS does this by enabling file systems to draw from a common storage pool, using only as much space as is actually needed.

ZFS is the default file system in Oracle Solaris 11 and, as such, it underpins installation, virtualization, security, and system cloning and recovery. For example, it provides the following benefits:

- ZFS boot environments can be preserved and also rolled back in the case of an update failure.
- Cloud application environments can be replicated in development, test, and production environments.
- A replicated cloud development or test environment can easily be deployed to the production environment and rolled back, if necessary.

ZFS is also the foundation of Oracle ZFS Storage Appliance, which means you get simplicity and reliability across your Oracle Solaris servers and storage.

## ZFS Data Security

Oracle Solaris ZFS increases data security by enabling you to do the following:

- Secure critical business or client data by using ZFS encryption at peak performance.
- Lock down multi-tenant data by using ZFS read-only file systems.
- Build immutable systems for mission-critical applications.
- Delegate reduced permissions to cloud tenants for ZFS snapshot and cloning, making it easy for application owners to deploy and configure Oracle Solaris ZFS file systems in a cloud environment quickly, while still protecting overall multi-tenant security and integrity.

## Reduced Cost and Complexity

Oracle Solaris ZFS can reduce costs in multiple ways:

- Efficiently reduces the storage footprint through integrated compression.
- Eliminates licensing costs for additional software, such as a volume manager, that is no longer needed.
- Enables all administration tasks to be performed online, resulting in significantly reduced administration.
- Eliminates the need for a separate maintenance contract, which greatly simplifies support issues. There is a single point of contact and one maintenance contract for all software layers between the application and storage resources.
- Provides data redundancy features that reduce costs without expensive hardware RAID arrays and enable efficient cloud storage without “whitebox sprawl.”

## Rock-Solid Data Integrity

Oracle Solaris ZFS combines copy-on-write technology that employs end-to-end checksums. Data is always written to a new block on disk before changing the pointers to the data and committing the write. Copy-on-write also enables you to take consistent backups or roll data back to a known point in time.

Oracle Solaris ZFS constantly reads and checks data to help ensure that it is correct, and if it detects an error in a mirrored pool, ZFS can automatically repair the corrupt data. This relentless vigilance prevents costly and time-consuming data loss (even undetectable silent data corruption).

## Integrated Data Services

Oracle Solaris ZFS provides data encryption, deduplication, compression, snapshot capability, and cloning of file systems. This means that you can easily determine the characteristics of your data based on your needs, without any additional costs. Then, you can make ZFS data available to clients over FC, NFS, iSCSI, and SMB protocols.

## Enterprise OpenStack Integration

Starting with Oracle Solaris 11.2, Oracle Solaris includes a full OpenStack distribution. OpenStack is a popular open source project that provides cloud infrastructure management. You can use OpenStack's Cinder (block storage) or Swift (object storage)

interfaces to build your cloud storage on ZFS, taking advantage of its great features for cloud storage simplicity, security, and scalability.

With no-compromise virtualization, lifecycle management, and security in addition to integrated ZFS features, updating the cloud all the way down to the firmware, including all virtualized environments, is accomplished through a single click and provides full fail-safe rollback capability.

## Scalable Performance

The architecture of ZFS optimizes and simplifies code paths from the application to the hardware, producing sustained throughput at exceptional speeds. New block allocation algorithms accelerate write operations, consolidating what would traditionally be many small random writes into a single, more efficient sequential operation.

## Compatibility

Applications do not need to be changed or modified to take advantage of the industry-changing capabilities of Oracle Solaris ZFS. It employs familiar POSIX interfaces, and the existing storage infrastructure—device drivers, storage fabric, and devices—works without requiring changes. For applications that prefer to operate directly on block devices, Oracle Solaris ZFS provides a volume emulator, which delivers all of the benefits of transactional integrity and checksums.

Oracle Solaris ZFS is supported on both the Oracle Solaris 10 and Oracle Solaris 11 releases and the feature set is almost identical. You can consolidate your business infrastructure on all ZFS file systems in the control and logical domains or in Oracle Solaris global and non-global zones. In addition, you can easily migrate UFS and other legacy file system data to Oracle Solaris ZFS using shadow migration.

## Conclusion

By offering simple administration, data security and integrity, and integrated data services, Oracle Solaris ZFS simplifies storage and data management for demanding applications and cloud infrastructure today—and well into the future.

## More Information

For more information about Oracle Solaris 11.3, visit [oracle.com/solaris](http://oracle.com/solaris).

## CONTACT US

For more information about Oracle Solaris ZFS and scalable data management, visit [oracle.com](http://oracle.com) or call +1.800.ORACLE1 to speak to an Oracle representative.

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