

SUN ZFS STORAGE APPLIANCE

DELIVERING BEST-IN-CLASS
PERFORMANCE, EFFICIENCY, AND
ORACLE INTEGRATION

KEY FEATURES

- Advanced, intuitive management tools
- Real-time analysis and diagnosis of performance
- Support for Oracle Hybrid Columnar Compression with Oracle Database delivers 10x to 50x compression ratios
- Active-active cluster option
- Data compression and inline deduplication
- Optimized storage hierarchy with Hybrid Storage Pools containing dynamic random access memory (DRAM), flash cache, and hard disk drives (HDDs)
- High-performance NAS storage appliance with extensive SAN storage capabilities (unified storage)
- Seamless multiprotocol integration and secure data sharing between Microsoft Windows, Linux, and UNIX environments

KEY BENEFITS

- Reduced complexity and simplified storage management
- High performance and high availability
- Reduced storage footprint, energy use, and cost with Oracle Hybrid Columnar Compression for Oracle Databases
- Storage efficiency with integrated software
- Scalability in multiple dimensions to adapt to your changing business needs by increasing compute power, storage capacity, or performance independently

Oracle's Sun ZFS Storage Appliance family automatically optimizes performance and capacity, minimizes downtime, and reduces deployment time, dramatically lowering storage ownership costs. Intelligent Hybrid Storage Pools, which are features of the Sun ZFS Storage Appliance, along with real-time analytics and easy-to-use administration, deliver economic advantages through agile storage deployment and management.

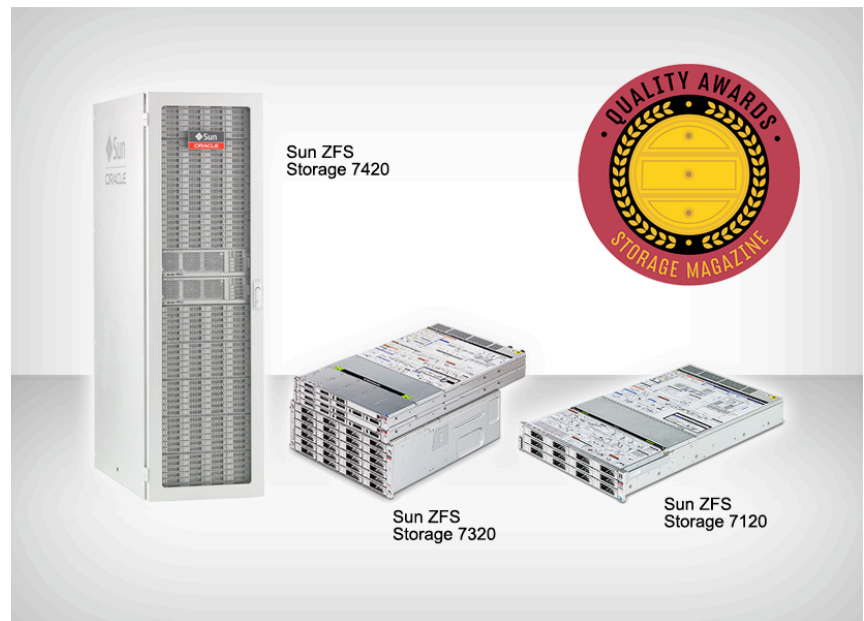


Figure 1: The Sun ZFS Storage Appliance family scales in multiple dimensions and each appliance is available with all data services.

Meeting Today's IT Challenges

Storage requirements are exploding for databases, virtualization, unstructured content, and data protection. One of the top requirements of today's storage applications is that they must provide both high performance and the ability to preserve and manage large volumes of file-based and/or block-based data. IT managers are being asked to continuously meet these growing storage capacity needs on flat or declining IT budgets—all while continuing to support high service levels for more and more users.

Sun ZFS Storage Appliance

The Sun ZFS Storage Appliance family is Oracle's preferred NAS storage system with unified storage capability for enterprise tier 1 environments. It delivers significant cost savings as a result of innovations that include fully-integrated enterprise-class data services; industry-leading performance; and Oracle Hybrid Columnar Compression, a feature of Oracle Databases. These systems feature a common, easy-to-use user interface that requires no training. In addition, they provide a comprehensive and intuitive analytics environment, which is unmatched by any other company, to help isolate and resolve issues to minimize business impact. An advanced Hybrid Storage Pool design automatically optimizes performance over storage tiers and helps lower power and cooling requirements, enabling the Sun ZFS Storage Appliance to deliver breakthrough performance while radically simplifying the way storage is managed.

Storage That Is Easy to Deploy, Analyze, and Optimize

Provisioning and management are dramatically simplified in the Sun ZFS Storage Appliance through the browser user interface that takes the guesswork out of system installation, configuration, and tuning.

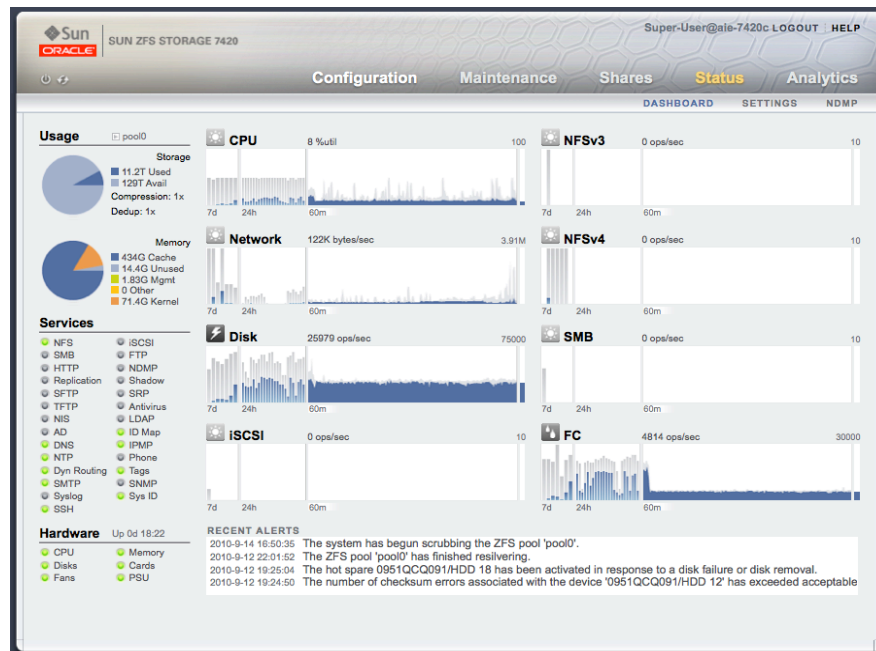


Figure 2: Real-time analytics increase storage optimization and reduce down time.

Administrators have all of the tools they need to quickly identify and diagnose system performance issues and debug live storage and networking problems before they affect the application infrastructure. Real-time analysis and monitoring functionality is provided by the award-winning DTrace Analytics software, a feature of the Sun ZFS Storage Appliance. DTrace Analytics uses built-in instrumentation to provide in-depth analysis of key storage subsystems. In addition, the Sun ZFS Storage Appliance family includes the comprehensive self-healing capabilities of Oracle Fault Management Architecture, which automatically and silently detects and diagnoses underlying system problems and automatically responds by taking faulty components offline.

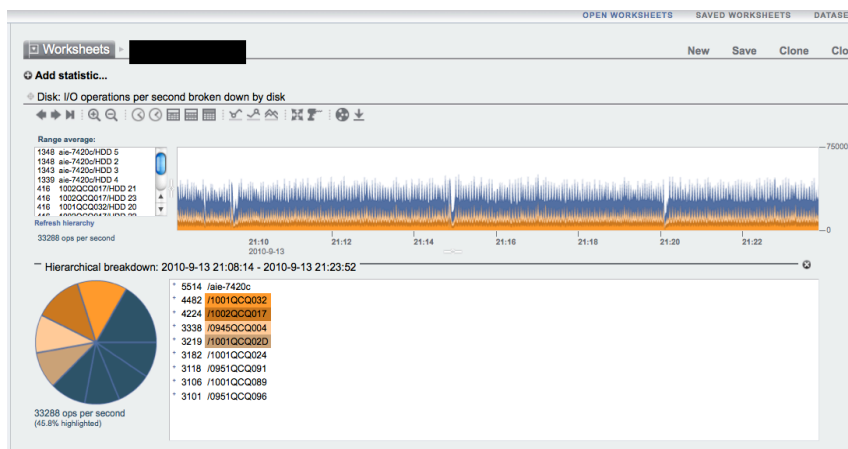


Figure 3: DTrace Analytics is intuitive and comprehensive for seamless optimization.

Performance and Scalability to Meet Business Needs

To deliver high performance, the Sun ZFS Storage Appliance file system, Oracle Solaris ZFS, seamlessly optimizes performance. It is designed to recognize I/O patterns automatically and place data on the best storage media using Hybrid Storage Pools.

For example, Oracle Solaris ZFS transparently executes writes to low-latency solid-state drive (SSD) media so that writes can be acknowledged quickly, allowing the application to continue processing.

Then, Oracle Solaris ZFS automatically flushes the data to hard disk drives as a background task. Another type of SSD media acts as a cache to reduce read latency, and Oracle Solaris ZFS also transparently manages the process of copying frequently-accessed data into this cache to seamlessly satisfy read requests from clients.

Oracle Hybrid Columnar Compression for Oracle Database

Enterprises with existing NAS-based Oracle Databases with in-database archives for OLTP, data warehousing, or mixed workloads can achieve 10x to 50x reductions in their data volumes by using Oracle Hybrid Columnar Compression on the Sun ZFS Storage Appliance. Unique to Oracle storage, this capability helps customers achieve 3x to 5x reductions in their storage footprints by replacing their existing storage with the Sun ZFS Storage Appliance.

Scalability in Multiple Dimensions

Unlike traditional storage architectures, the Sun ZFS Storage Appliance supports scalability in multiple dimensions with the ability to scale I/O throughput, processor performance, and total storage capacity to meet application needs. As application requirements change, IT managers can choose to:

- Increase resources by adding more DRAM, cache, or I/O ports.
- Expand total capacity by adding enterprise-class disk shelf units.
- Increase performance by adding additional flash.

Easy on Your Budget

The Sun ZFS Storage Appliance family offers configurations that deliver higher performance at costs lower than traditional storage solutions by using cost-effective components and providing a rich set of base software features. The configurations offer economic value by reducing energy consumption and data center space requirements through the use of 7,200 RPM drives and flash. Configurations with 15,000 RPM drives are offered for customers who want to maximize performance for specific high I/O use cases involving uncached, random data.

A Range of Configurations

To meet a variety of customer needs for capacity, price, and performance, the Sun ZFS Storage Appliance is available in three configurations, including dual cluster configurations that offer maximum availability. Each configuration comes bundled with the same software including data protocols, compression, and DTrace Analytics software, for system troubleshooting and performance optimization.

Sun ZFS Storage 7120

This easy-to-install storage appliance is ideal for small enterprises, departments, and remote offices of large corporations. It delivers 3.3 TB to 177 TB of raw capacity and provides customers with easy-to-use enterprise data management functionality at an entry-level cost.

Sun ZFS Storage 7320

The Sun ZFS Storage 7320 redefines midrange storage for enterprises, with simplified management, performance, efficiency, and seamless expansion to meet growth needs. It provides a high-availability, entry-level cluster option with scalability up to 432 TB raw capacity, and supports Hybrid Storage Pools that can be configured with up to 4 TB of read-optimized cache and optional write-optimized cache for enhanced application performance.

Sun ZFS Storage 7420

The Sun ZFS Storage 7420 is ideal for data-intensive business applications and for virtualized environments that require multiple data services and heterogeneous file sharing. Available in single or cluster configurations, it can expand to more than 1.7 PB of raw capacity for extreme scalability.

Cluster Configurations

For customers who require maximum protection against downtime, Oracle's Sun ZFS Storage 7320 and 7420 appliances also support a two-node cluster configuration with no single points of failure. These cluster configurations feature active-active architecture that enables high performance and high availability to maximize business productivity.

Sun ZFS Storage Appliance Software	
Included Features	Details
File system	Oracle Solaris ZFS (128-bit addressability)
File-level protocol	NFS v2/v3/v4, CIFS, HTTP, WebDAV, FTP/SFTP/FTPS
Block-level protocol	ISCSI, Fibre Channel, iSER, SRP, IP over InfiniBand, RDMA over InfiniBand
Data compression	Four levels of data compression available
Oracle Hybrid Columnar Compression	3x to 5x reduction in storage footprint for customers with existing NAS-based Oracle Databases with in-database archives for OLTP, data warehousing or mixed workloads
Data deduplication	Inline, block-level deduplication
Monitoring	DTrace Analytics (for system tuning and debugging); dashboard monitoring for key system performance metrics; plug-in for Oracle Enterprise Manager 10g Grid Controller 1.0
Automated serviceability	"Phone Home" capability with automatic case creation, configurable alerts
RAID	Striping, mirroring, triple-mirroring single-parity RAID, double-parity RAID, triple-parity RAID, wide stripes
Remote management	HTTPS, SSH, SNMP v1/v2c, IPMI
Snapshots	Read only, restore, Microsoft Volume Shadow Copy Support (VSS)
Directory services	NIS, AD, LDAP
Data security	Checksum data and metadata, antivirus quarantine
Network services	NTP, DHCP, SMTP
Backup	NDMP v3/v4, ZFS NDMP
Local replication	Replication within same Sun ZFS Storage Appliance configuration (single or cluster)
Separately Licensed Features	Details
Clones	Writable snapshots
Remote replication	Replication from one Sun ZFS Storage Appliance product to another. 1:N, N:1, manual, scheduled, continuous

Sun ZFS Storage Appliance Configurations						
	Key Requirement	Maximum Storage Capacity	Space (Rack Units)	Write Optimized Flash	Read Optimized Flash	Cluster Option
Sun ZFS Storage 7120	Low-priced entry-level system with all software features	177 TB	2U/controller, 4U/disk shelf	73 GB	N	N
Sun ZFS Storage 7320	Entry-level cluster option for high availability	432 TB	1U/controller, 4U/disk shelf	Up to 1.2 TB	Up to 2 TB per controller	Y
Sun ZFS Storage 7420	Best price/performance	1.73 PB	3U/controller, 4U/disk shelf	Up to 7.0 TB	Up to 2 TB per controller	Y

Sun ZFS Storage Appliance Specifications			
	Sun ZFS Storage 7120	Sun ZFS Storage 7320	Sun ZFS Storage 7420
Architecture			
Processor	1x 4-core 2.4 GHz Intel® Xeon® Processor	2x 4-core 2.4 GHz Intel® Xeon® Processor, per controller	4x 8-core 2.0 GHz or 10-core 2.4GHz Intel® Xeon® Processors per controller
Main memory	48 GB	Up to 144 GB per controller	Up to 1 TB per controller
Base Configurations			
Configuration options	<ul style="list-style-type: none"> • 3.3 TB to 177 TB using either high-speed (15,000 RPM) or high-capacity (7,200 RPM) SAS-2 disks • Controller contains 11 HDDs and one SSD cache, supports up to two additional disk shelves with 24 disks each (300 GB, 600 GB, 2 TB, or 3 TB) 	<ul style="list-style-type: none"> • 6 TB to 432 TB using either high-speed (15,000 RPM) or high-capacity (7,200 RPM) SAS-2 disks • Supports up to six disk shelves with 20 or 24 disks each (300 GB, 600 GB, 2 TB, or 3 TB) and up to four optional write-optimized SSDs per shelf 	<ul style="list-style-type: none"> • 6 TB to 1.73 PB using either high-speed (15,000 RPM) or high-capacity (7,200 RPM) SAS-2 disks • Supports up to 24 disk shelves with 20 or 24 disks each (300 GB, 600 GB, 2 TB, or 3 TB) and up to four optional write-optimized SSDs per shelf
Standard and Optional Interfaces			
Integrated network	Four 10/100/1000 Base-T Ethernet ports		
Optional network connectivity	Quad Gigabit Ethernet UTP; Dual 10 GigE, QDR InfiniBand HCA, 8 Gb FC HBA		
Optional tape backup HBA	Dual channel 8 Gb FC HBA		
Maximum Ports Per Controller			
1GbE/10GbE/IB/FC	12/2/2/4 (single only)	12/4/4/4 (Single)	28/12/8/12 (single or cluster)
		8/2/2/2 (Cluster)	
Environmental			
Non-operating temperature/humidity (standalone, non-rack system)	-40°C to 70°C (-40°F to 158°F), up to 93% relative humidity, non condensing		
Altitude (operating)	Up to 3,000 m, temperature is derated by 1C per 300 m of elevation above 900 m		
Power consumption	1,200 w (full controller)	760 w (full controller)	1,485 w (full controller)

Regulations (Meets or Exceeds the Following Requirements)			
Safety	UL 60950-1 2nd Ed, EN60950-1:2006 2nd Ed, CB Scheme with all country differences	UL 60950-1 2nd Ed, EN60950-1:2006 2nd Ed, CB Scheme with all country differences	IEC 60950, UL/CSA 60950, EN60950, CB Scheme with all country differences
RFI/EMI	FCC CFR 47 Part 15 Class A, EN 55022 Class A, EN 61000-3-2, EN 61000-3-3, EN 300-386		
Immunity	EN55024:1998+A1:2001:+A2:2003		
Physical Dimensions			
Height	87.12 mm (3.43 in.)	43.43 mm (1.71 in.)	129.85 mm (5.1 in)
Width	425.45 mm (16.75 in.)	425.5 mm (16.75 in.)	436.5 mm (17.2 in.)
Depth	762.0 mm (30.0 in.)	685.8 mm (30.0 in.)	732 mm (28.8 in.)
Weight	29.54 kg (65 lbs.)	16.36 kg (36 lbs)	38.5 kg (85 lbs) max

Disk Shelf Options

Supported Disk Shelf configurations:

- (20) 300GB SAS-2 hard disk drives and (0, 1, 2, 3 or 4) SSD drives (73GB/18GB)
- (20) 600GB SAS-2 hard disk drives and (0, 1, 2, 3 or 4) SSD drives (73GB/18GB)
- (20) 1TB SAS-2 hard disk drives and (0, 1, 2, 3 or 4) SSD drives (73GB/18GB)
- (20) 2TB SAS-2 hard disk drives and (0, 1, 2, 3 or 4) SSD drives (73GB/18GB)
- (20) 3TB SAS-2 hard disk drives and (0, 1, 2, 3 or 4) SSD drives (73GB/18GB)
- (24) 300GB SAS-2 hard disk drives
- (24) 600GB SAS-2 hard disk drives
- (24) 1TB SAS-2 hard disk drives
- (24) 2TB SAS-2 hard disk drives
- (24) 3TB SAS-2 hard disk drives

Contact Us

For more information about Sun ZFS Storage Appliance, please visit oracle.com or call +1.800.ORACLE1 to speak to an Oracle representative.



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Hardware and Software, Engineered to Work Together