Oracle FS1-2 Flash Storage System

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FLASH STORAGE SYSTEMS

The Oracle FS1-2 flash storage system, Oracle's premier preferred SAN storage solution, delivers enterprise-grade storage capabilities that are optimized for flash media and coengineered with Oracle software. Using the Quality of Service Plus (QoS Plus) feature, the Oracle FS1-2 flash storage system places data across flash and disk storage to maximize performance, efficiency, and cost based on usage profiles and business priorities. The Oracle FS1-2 flash storage system takes application-engineered storage to a new level by providing out-of-the-box tuned storage provisioning profiles for Oracle Database and key applications, including Microsoft SharePoint and Exchange, and VMware support including VAAI. With the Oracle FS1-2 flash storage system, you can consolidate storage while achieving predictable performance for multiple diverse workloads in enterprise computing or multitenant environments.

KEY FEATURES

- Co-engineered with Oracle Database, Oracle Applications, and Oracle VM

- One-click provisioning of Oracle Database and key Oracle Applications

- Enterprise-grade SAN storage hardware and software with no single point of failure

- QoS Plus tunes data placement and access priority based on business value

- Optimized for flash and expandable with disk drives

- VMware support including vSphere, VASA and all VAAI block primitives

QoS Plus

QoS Plus is a policy-based virtualization feature incorporating business priority I/O queue management fused with sub LUN automatic tiering into one simple management framework. Built on Oracle's patented storage quality-of-service technology, QoS Plus collects detailed information on your storage usage profile, evaluates data granules for movement to different storage tiers, then automatically migrates data to the most cost-effective media (flash or disk) from a $/IOP and $/GB standpoint based on the usage profile **and** the importance of that data to the business. QoS Plus performs data collection, evaluation, and movement based on the most efficient data granularity in the storage industry—up to 1,600 times more granular than competitive systems, making it the most efficient auto-tiering system in the market.

Coengineered with Oracle Database and Oracle Applications

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- All inside-the-box software included at no extra cost

- Maximized return on Oracle software investments
- Enterprise-grade storage availability for mission-critical applications
- Simultaneously optimize efficiency, performance, and cost according to business value
- Horizontal and vertical scalability for optimized flash $/TB and $/IOP
- Faster deployment—less time spent setting up and optimizing key applications

The Oracle FS1-2 flash storage system is coengineered with Oracle Database and Oracle Applications, leveraging unique features such as the Hybrid Columnar Compression feature of Oracle Database, and one-click best practices provisioning for key Oracle Applications and Oracle Database. Hybrid Columnar Compression compresses data by up to 50x and speeds queries up to 5x when compared to competitive storage systems. Hybrid Columnar Compression is supported only on Oracle storage systems such as the Oracle FS1-2 flash storage system.

Application Profiles

The Oracle FS1-2 flash storage system comes with predefined application profiles that provide tuned and tested out-of-the-box storage optimization for Oracle Database and key enterprise applications, including non-Oracle applications such as Microsoft Exchange. With one-click provisioning you can optimize flash performance and manage Oracle Applications with a minimum of administration. The Oracle FS1-2 flash storage system database storage profiles can disaggregate database components such as index files, database tables, archive logs, redo logs, control files, and temp files so provisioning automatically optimizes Oracle Database performance without requiring detailed knowledge of the database components. New application profiles can be added to Oracle FS1-2, existing ones can be modified, and all profiles can be exported to other Oracle FS1-2 systems to standardize storage provisioning across global data centers.

Storage Domains

Storage domain software enables multiple, virtual storage systems within a single Oracle FS1-2 flash storage system. Each storage domain is a "data container" that isolates data from other storage domains, providing independence in multitenant environments for private or public cloud deployments, regulatory compliance requirements, or chargeback models. With storage domains, you can custom-tailor QoS settings for multiple unique environments, with all storage domains still residing on a single physical Oracle FS1-2 flash storage system for reduced power, cooling, and management administration expense.

Enterprise Grade

The Oracle FS1-2 flash storage system is designed with enterprise-grade hardware and software features to provide maximum uptime, data availability, and application access. These features deliver ~one second controller failover capability, warm start technology for upgrades and error containment, and no single point of failure (SPOF). Additional enterprise-grade data integrity capabilities include pre-emptive copying of data away from potentially failing media, monitoring of SSD usage patterns and wear levels, T10 Protection Information (T10-PI) for data integrity verification, and complete copy services—all included with the Oracle FS1-2 system price. Oracle FS1-2 flash storage systems ship fully tested and racked from the factory to accelerate deployments and support remote real-time diagnostic telemetry, and they are available with optional Oracle Business Critical Service for Systems to maximize system and data availability (see below for details).

Integrated with Oracle's Red Stack Management for Improved

IT Staff Productivity

The Oracle MaxMan feature of the Oracle FS1-2 flash storage system enables the management of multiple Oracle FS1-2 flash storage systems and/or Oracle's Pillar Axiom systems from a single console. Oracle FS1-2 provides management plug-ins for Oracle Enterprise Manager and the Storage Connect feature of Oracle VM for single-pane-of-glass monitoring and management.

T10 Protection Information

The Oracle FS1-2 flash storage system uses T10-PI for data integrity checking. T10-PI protects against silent data corruption ensuring that incorrect or incomplete data cannot overwrite good data.

Modular Enterprise Storage

The Oracle FS1-2 flash storage system supports enterprise-grade deployments for your mission-critical applications and data with a modular approach that enables you to scale throughput, media types, and capacity independently. This architecture enhances the resiliency of the Oracle FS1-2 flash storage system by simplifying management, upgrades, reconfigurations, disaster recovery, and business continuance while minimizing the impact on your enterprise.

Oracle FS1-2 Controllers

The Oracle FS1-2 controllers provide high performance and redundancy with dual active/active control units, fans, power, and nonvolatile mirrored cache—all requirements for enterprise-grade storage. One Oracle FS1-2 flash storage system can support as many as 30 drive enclosures, enabling storage capacity scaling with no need to purchase another system and without introducing additional management points, extra software licenses, or costly downtime.

Oracle's Storage Drive Enclosures

Oracle's storage drive enclosures can be configured with a range of SSD flash drives and disk drives to meet complete business needs. Drive enclosure media options for SSDs range from 2.8 to 30.4 TBs of capacity. For HDDs 1.2TB performance disk drives and 8 TB capacity disk drives are available. A single Oracle FS1-2 flash storage system supports any combination of these drives and uses QoS Plus to optimize both $/IOPS and $/TB. By scaling out either SSD or disk drive enclosures, a single Oracle FS1-2 flash storage system can support up to 912 TB of flash or 5.76 PB of disk-based storage.

Oracle FS Pilot

Oracle FS Pilot is the primary management interface for Oracle FS Series. Oracle FS Pilot is fully redundant for high availability.

Oracle MaxRep Replication Engine

For the Oracle FS1-2 flash storage system, the optional Oracle MaxRep Replication

Engine supports both high-performance synchronous and asynchronous replication to local and remote locations, including many-to-one, one-to-many, and multihop replication. Multiple recovery point objectives (RPOs) and recovery time objectives (RTOs) are supported. Application-consistent recovery options restore applications to a consistent point. Oracle MaxRep Replication Engine supports both the Oracle FS1-2 flash storage system as well as Oracle's legacy Pillar Axiom 600 storage system to enable replication between the two storage systems.

Warranty

The Oracle FS1-2 flash storage system comes with a one-year warranty. Visit Oracle Hardware Warranty Support for more information about Oracle's hardware warranty.

Oracle Premier Support

With Oracle Premier Support, you receive complete, integrated support to maximize the return on your Oracle investment—from software updates and operational best practices to proactive support tools and rapid problem resolution. For more information, visit oracle.com/support.

Oracle Business Critical Service for Systems

For mission-critical support, Oracle Business Critical Service for Systems is a valuable choice. Oracle Business Critical Service for Systems provides 24/7 fault monitoring and event detection, rapid response and hardware replacement SLAs, priority handling of IT service requests, and quarterly reviews and patch installation. This premium service ensures high availability for all critical servers and storage within your data center and reduces the risk and cost of downtime. For more information, visit oracle.com/acs.

ORACLE FS1-2 CONTROLLER SPECIFICATIONS

Cache and I/O ports—Oracle FS1-2 Controller (High-Availability Pair)

	Base Controller	Performance Controller
CPU	4 Intel E5-2620 CPUs (24 cores, 2.0 GHz)	
Cache	64 GB RAM cache/16 GB NV-DIMM	384 GB RAM cache/32 GB NV-DIMM
Maximum cache hold-up time (after power failure)	Infinite hold-up time (using Oracle FS1-2 energy storage modules with super capacitors and Oracle-designed flash-backed DIMM modules)	
Host ports	4 to 12 ports (2 to 6 HBAs) –16 Gbit FC	
Storage ports	Standard 4 ports (two 6 Gbit 4-lane SAS-2 HBAs) Optional factory-installed 8 ports (four 6 Gbit 4-lane SAS-2 HBAs)	Standard 12 ports (six 6 Gbit 4-lane SAS-2 HBAs)

ORACLE'S STORAGE DRIVE ENCLOSURE SPECIFICATIONS

Maximum disk configurations	*SSD capacity: 912 TB maximum* *Disk drive capacity: 5,760 TB maximum* *Maximum of 30 drive enclosures*

Drive Enclosure Types

Oracle Storage Drive Enclosure DE2-24P	2U rack size with twenty-four 2.5" drive bays
Oracle Storage Drive Enclosure DE2-24C	4U rack size with twenty-four 3.5" drive bays

Drive Enclosures

SSD Types/Usage	Drive Enclosure Layout	Total Capacity
SSD (2.5" SAS-2)	13 x 400 GB drives	5.2 TB
	7 x 400 GB drives	2.8 TB
	19 x 1.6 TB drives	30.4 TB
	13 x 1.6 TB drives	20.8 TB
	7 x 1.6 TB drives	11.2 TB
HDD Types/Usage	**Drive Enclosure Layout**	**Total Capacity**
Performance disk drive (2.5" SAS-2)	24 x 1.2 TB 10 K RPM drives	28.8 TB
Capacity disk drive (3.5" SAS-2)	24 x 8 TB 7,200 RPM drives	192 TB

ORACLE FS1-2 CONTROLLER AND ORACLE FS PILOT DIMENSIONS, POWER, AND ENVIRONMENTAL SPECIFICATIONS

Rack Options	Description
Racked	All components rackmounted, cabled, tested, and shipped as a complete system.
Not racked	All components rackmounted, cabled, and tested. Components then are removed from the rack and packaged individually for installation in a customer's own rack.

Power Specifications

	Base Controller	Performance Controller
Frequency	50 Hz – 60 Hz	50 Hz – 60 Hz
Rated line voltage	100 – 240 VAC	100 – 240 VAC
Rated input current	100 – 127 VAC 7.2 A 200 – 240 VAC 3.4 A	100 – 127 VAC 12.0 A 200 – 240 VAC 5.9 A

Maximum Power (Watts)	675 Watts	830 Watts

Dimensions/Weight—Oracle FS Pilot and Oracle FS1-2 Controller

	Oracle FS Pilot (per node)	Oracle FS1-2 Controller (per node)
Height	42.6 mm (1.7 in.)	87.4 mm (3.4 in.)
Width	436.5 mm (17.2 in.)	445.0 mm (17.5 in.)
Depth	737.0 mm (29 in.)	527.8 mm (20.8 in.) including PDU handles
Weight	18.0 kg (40.0 lb.)	18.5 kg (40.8 lb.)

Power Specifications - Pilot

Power - Watts	250 (2 CU's)	N/A
Rated input Current	100 – 127 VAC 7.2 Amps 200 – 240 VAC 4.3 Amps	N/A

Environmental Specifications—Operating

Temperature	5°C – 35°C
Relative humidity	10% – 90% noncondensing

Environmental Specifications—Nonoperating

Temperature	–40°C – 70°C
Relative Humidity	Up to 93% noncondensing

ORACLE'S STORAGE DRIVE ENCLOSURE DIMENSIONS, POWER, AND ENVIRONMENTAL SPECIFICATIONS

Dimensions	2U	4U
Height	3.5 in. (8.89 cm), 2U	6.89 in. (17.5 cm), 4U
Width	17.7 in. (45 cm)	19.0 in. (48.3 cm)
Depth	22 in. (55.5 cm)	24.8 in. (63.0 cm)
Weight (maximum with all drive bays populated)	52.9 lb. (24 kg)	101.4 lb. (46 kg)

Environmental Specifications—Power and Thermal

Power (Varies with drive type & activity)	Typical - Max 325 - 699 watts	Typical – Max. 379 - 889 watts
Typical BTU	1,108 BTU/hr	1,600 BTU/hr
Maximum BTU	2,385 BTU/hr	2,385 BTU/hr

Environmental Specifications—Operating

Temperature	5°C – 35°C
Relative humidity	10% – 85% noncondensing

Environmental Specifications—Nonoperating

Temperature	–40°C – 70°C
Relative humidity	5% – 95% noncondensing

ORACLE FS1-2 FLASH STORAGE SYSTEM REGULATIONS (MEETS OR EXCEEDS THE FOLLOWING REQUIREMENTS)

Regulations[1],[2],[3]	• *Product Safety: UL/CSA 60950-1, EN 60950-1, IEC 60950-1 CB Scheme with all country differences*
	• *EMC*
	    • *Emissions: FCC CFR 47 Part 15, ICES-003, EN55022, EN61000-3-11, EN61000-3-12*
	    • *Immunity: EN55024*
	• *Emissions and Immunity: EN300 386*

Certifications[2]	• *North America (NRTL)* • *European Union (EU)* • *International CB Scheme* • *BIS HSE Exemption (India)* • *BSMI (Taiwan)* • *RCM (Australia)* • *Customs Union* • *EAC (Customs Union)* • *CCC (PRC)* • *MSIP (Korea)* • *VCCI (Japan)*
European Union Directives	• *2006/95/EC Low Voltage Directive* • *2004/108/EC EMC Directive* • *2011/65/EU RoHS Directive* • *2012/19/EU WEEE Directive*

1. All standards and certifications referenced are to the latest official version. For additional detail, please contact your sales representative.

2. Other country regulations/certifications may apply.

3. In some cases, as applicable, regulatory and certification compliance were obtained at the component level only.

Integrated Cloud Applications & Platform Services

Oracle is committed to developing practices and products that help protect the environment