

Oracle ZFS Storage Appliance Installation Guide



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Preface

The *Oracle ZFS Storage Appliance Installation Guide* contains installation, cabling and initial configuration documentation for the Oracle ZFS Storage Appliance.

This documentation is also available while using the appliance Browser User Interface (BUI), accessible via the Help button. The appliance documentation may be updated using the System Upgrade procedure documented in the System Service Manual.

Who Should Use This Book

This guide is for users and system administrators who install and use the Oracle ZFS Storage Appliance.

Related Documentation

Refer to the following documentation for administration information, hardware overviews, service procedures and software update notes.

- [Administration Guide, Analytics Guide and Service Manual \(http://www.oracle.com/technetwork/documentation/\)](http://www.oracle.com/technetwork/documentation/)

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CHAPTER 1

Introduction

Overview



Introduction

The Oracle ZFS Storage Appliance family of products provides efficient file and block data services to clients over a network, and a rich set of data services that can be applied to the data stored on the system.

Controllers

- [ZS3-2](#)
- [ZS3-4](#)
- [7120](#)
- [7320](#)
- [7420](#)

Expansion Storage

- [Disk Shelves](#)

Protocols

Oracle ZFS Storage appliances include support for a variety of industry-standard client protocols, including:

- SMB
- NFS
- HTTP and HTTPS
- WebDAV
- iSCSI
- FC
- SRP
- iSER
- FTP
- SFTP

Key Features

Oracle ZFS Storage systems also include new technologies to deliver the best storage price/performance and unprecedented observability of your workloads in production, including:

- Analytics, a system for dynamically observing the behavior of your system in real-time and viewing data graphically
- The ZFS Hybrid Storage Pool, composed of optional Flash-memory devices for acceleration of reads and writes, low-power, high-capacity disks, and DRAM memory, all managed transparently as a single data hierarchy

Data Services

To manage the data that you export using these protocols, you can configure your Oracle ZFS Storage system using the built-in collection of advanced data services, including:

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- RAID-Z (RAID-5 and RAID-6), mirrored, and striped disk configurations
- Unlimited read-only and read-write snapshots, with snapshot schedules
- Data deduplication
- Built-in data compression
- Remote replication of data for disaster recovery
- Active-active clustering for high availability

- Thin provisioning of iSCSI LUNs
- Virus scanning and quarantine
- NDMP backup and restore

Availability

To maximize the availability of your data in production, Oracle ZFS Storage appliances include a complete end-to-end architecture for data integrity, including redundancies at every level of the stack. Key features include:

- Predictive self-healing and diagnosis of all system hardware failures: CPUs, DRAM, I/O cards, disks, fans, power supplies
- ZFS end-to-end data checksums of all data and metadata, protecting data throughout the stack
- RAID-6 (double- and triple-parity) and optional RAID-6 across disk shelves
- Active-active clustering for high availability
- Link aggregations and IP multipathing for network failure protection
- I/O Multipathing between the controller and disk shelves
- Integrated software restart of all system software services
- Phone-Home of telemetry for all software and hardware issues
- Lights-out Management of each system for remote power control and console access

Browser User Interface (BUI)



The browser user interface

The BUI is the graphical tool for administration of the appliance. The BUI provides an intuitive environment for administration tasks, visualizing concepts, and analyzing performance data.

The management software is designed to be fully featured and functional on a variety of web browsers.

Direct your browser to the system using either the *IP address* or *host name* you assigned to the NET-0 port during initial configuration as follows: `https://ipaddress:215` or `https://hostname:215`. The login screen appears.

The online help linked in the top right of the BUI is context-sensitive. For every top-level and second-level screen in the BUI, the associated help page appears when you click the Help button.

Command Line Interface (CLI)

The CLI is designed to mirror the capabilities of the BUI, while also providing a powerful scripting environment for performing repetitive tasks. The following sections describe details of the CLI. When navigating through the CLI, there are two principles to be aware of:

- Tab completion is used extensively: if you are not sure what to type in any given context, pressing the Tab key will provide you with possible options. Throughout the documentation, pressing Tab is presented as the word "tab" in bold italics.
- Help is always available: the help command provides context-specific help. Help on a particular topic is available by specifying the topic as an argument to help, for example **help commands**. Available topics are displayed by tab-completing the help command, or by typing help topics.

You can combine these two principles, as follows:

```
dory:> help tab
builtins  commands  general  help      properties  script
```

ZS3-2

ZS3-2 Hardware Overview

This section describes the internal and external components of the Oracle ZFS Storage ZS3-2 controller. Use this information when preparing to service replaceable components. Refer to the following topics for procedural instructions:

- Controller Tasks - replace system controller components
- Disk Shelf Tasks - replace disk shelf components

Controller Overview

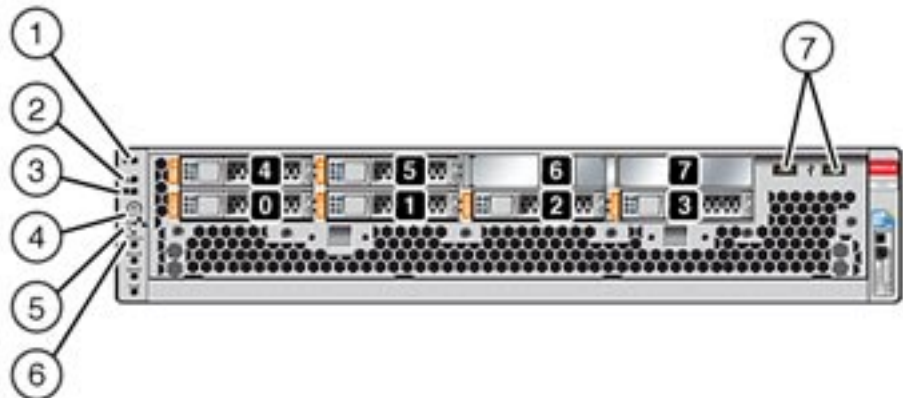
The ZS3-2 controller is an enterprise-class, rackmount x64 system powered by the Intel Xeon processor. It provides high performance and room for growth with expandable PCIe slots and 16 DIMM slots in a compact 2U footprint.

CPU	Memory	Readzilla	Boot Drive	PCIe Slots	HBA
2x8-core, 2.1GHz	256GB 16x16GB	1-4 1.6TB SAS-2 SSDs	2x2.5-inch 900GB SAS-2	2 dedicated; 4 open PCIe Options)	4-port (4x4 SAS-2) 6Gb/s external

Refer to <http://www.oracle.com/us/products/servers-storage/storage/nas/overview/index.html> (<http://www.oracle.com/us/products/servers-storage/storage/nas/overview/index.html>) for the most recent component specification.

Front Panel

The ZS3-2 controller drive slots and front panel components are shown in the following figure.



Drive slots 0 and 1 have two mirrored 900GB SAS-2 boot drives. Up to four 1.6TB flash read-optimized (Readzilla) solid state drives (SSDs) fill slots 2 through 5, in order. Slots 6 and 7 are empty and must contain drive fillers.

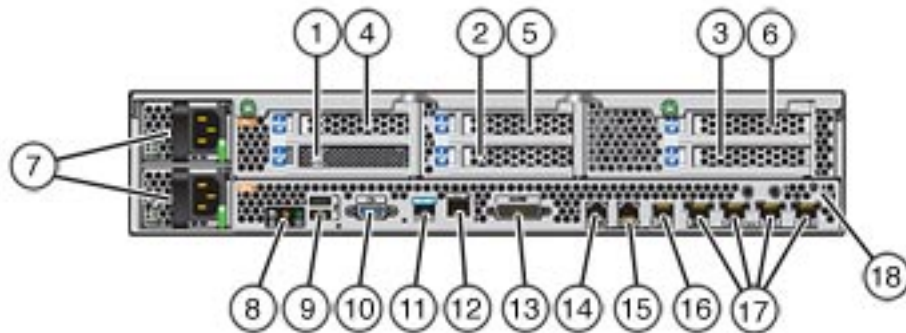
Figure Legend

1 Locator LED/button (white)	5 Service Processor OK LED (green)
2 Service Action Required LED (amber)	6 Fan/CPU/Memory Service Required LED
3 Power OK LED (green)	7 USB 2.0 ports
4 Power button	

Note: The LEDs below the Fan/CPU/Memory Service Required LED are not currently used.

Rear Panel

The ZS3-2 controller PCIe slots and rear panel components are shown in the following figure.

**Figure Legend**

1 SAS-2 HBA (slot 1)	7 AC power supplies PS1 (top), PS0 (bottom)	13 Alarm port, DB-15 connector
2 4x4 SAS-2 HBA (slot 2)	8 System status LEDs	14-16 Cluster I/O ports
3 PCIe slot 3	9 USB 2.0 ports	17 10-Gbit Ethernet ports
4 PCIe slot 4	10 SP 15-pin VGA video port	18 Chassis ground post
5 PCIe slot 5	11 Serial management port	
6 PCIe slot 6	12 Network management port	

Note: The three Cluster I/O ports (0, 1, and GigE) are reserved for cluster interconnection only.

Serial Management Connector

The serial management connector (SER MGT) is an RJ-45 port and provides a terminal connection to the service processor (SP) console.



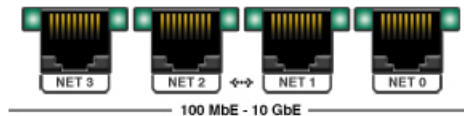
Network Management Connector

The network management connector (NET MGT) is an RJ-45 port and provides an alternate terminal interface to the SP console.



Ethernet Ports

The ZS3-2 has four RJ-45 10-Gigabit Ethernet (10GbE) network connectors, labeled NET 3, NET 2, NET 1, and NET 0 (left to right) on the rear panel. The ports operate at 100 Mbits/sec, 1000 Mbits/sec, or 10-Gbits/sec. Use these ports to connect the appliance to the network.



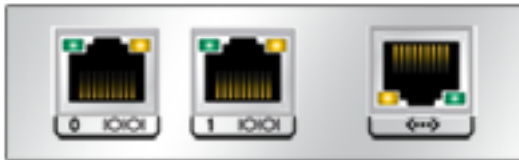
The LEDs located above each NET port are Link/Activity (left) and Speed (right) indicators for each port as described in this table:

Connection Type	EEE Terminology	Speed LED Color	Transfer Rate
Fast Ethernet	100BASE-TX	Off	100 Mbits/sec
Gigabit Ethernet	1000BASE-T	Amber	1000 Mbits/sec

Connection Type	EEE Terminology	Speed LED Color	Transfer Rate
10 Gigabit Ethernet	10GBASE-T	Green	10000 Mbits/sec

Cluster I/O Ports

Two cluster serial ports (0 and 1) and one Ethernet port provide communication between two controllers to form a cluster configuration. For information about how to connect cables to form a cluster, see the Cluster configuration topic.

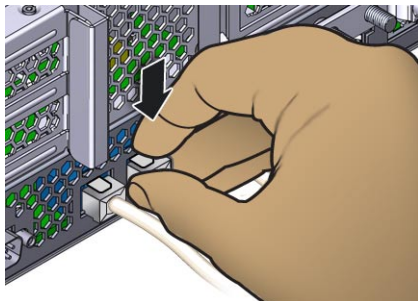


Removing RJ-45 Cables from Cluster Serial Ports

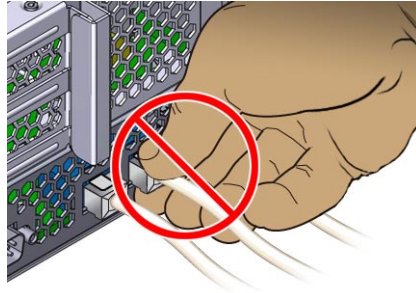
CAUTION: When disconnecting an RJ-45 cable from a cluster serial port (0 and 1), use extreme care not to damage the internal RJ-45 receptacle. To properly remove an RJ-45 cable from a cluster serial port, do the following:

1. Using your index finger, press down fully on the RJ-45 release tab.

Be sure the tab is fully disengaged from the port.



- Using your thumb and middle finger, apply a slight downward pressure while pulling the plug out of the port. **Do not** pull the plug upward or pinch the release tab with your fingers



below the plug.

Physical Specifications

The ZS3-2 controller 2U chassis dimensions are as follows:

Dimension	Measurement	Dimension	Measurement
Height	3.44 in./87.4 mm	Depth	20.25 in./514 mm
Width	17.52 in./445 mm	Weight	41.23 lb/18.70 kg

Electrical Specifications

The ZS3-2 controller electrical specifications are listed below. The power dissipation numbers listed are the **maximum** rated power numbers for the power supply. The numbers are not a rating of the actual power consumption of the appliance.

Connectors

- Two C13 connectors which work on 110-220v outlets

Input

- Nominal frequencies: 50/60Hz (47 to 63 Hz range)
- Nominal voltage range: 100 to 120/200 to 240 VAC
- Maximum current AC RMS: 6.8 A @ 100-120 V / 3.4 A @ 200-240 V
- AC operating range: 90-264 VAC

Output

- 3.3 VDC STBY: 3.0A
- +12 VDC: 86.7A

Power Dissipation

- Max power consumption: 890 W max
- Max heat output: 3026 BTU/hr
- Volt-Ampere rating: 908 VA @ 240 VAC, 0.98PF.

Acoustic Noise Emissions

In compliance with the requirements defined in ISO 7779, the workplace-dependent noise level of this product is less than 70 db (A).

Internal Components

The ZS3-2 chassis has the following field replaceable units (FRUs). FRUs are not customer-serviceable and must be replaced by trained Oracle service technicians.

- **PCIe Risers** - There are three risers per system, each attached to the rear of the motherboard. Each riser supports two PCIe cards (which are customer replaceable units (CRUs)).
- **Motherboard** - The motherboard includes CPU modules, slots for 16 DIMMs, memory control subsystems, and the service processor (SP) subsystem. The SP subsystem controls the host power and monitors host system events (power and environmental). The SP controller draws power from the host 3.3V standby supply rail, which is available whenever the system is receiving AC input power, even when the system is turned off.
- **Power Distribution Board** - The power distribution board distributes main 12V power from the power supplies to the rest of the controller. It is directly connected to the connector break out board and to the motherboard through a bus bar and ribbon cable. It also supports a top cover interlock *kill* switch. The power supplies connect directly to the power distribution board.
- **Storage Drive Backplane** - The storage drive backplane includes the connectors for the storage drives, as well as the interconnect for the I/O board, power and locator buttons, and system/component status LEDs. The system has an 8-disk backplane. Each drive has an LED indicator for Power/Activity, Fault, and Locate.

Storage, Power, and Fan Components

The ZS3-2 controller's internal storage, power, and cooling components are described in the following figure and legend. A component identified as a field replaceable unit (FRU) must be replaced by trained Oracle service technicians.

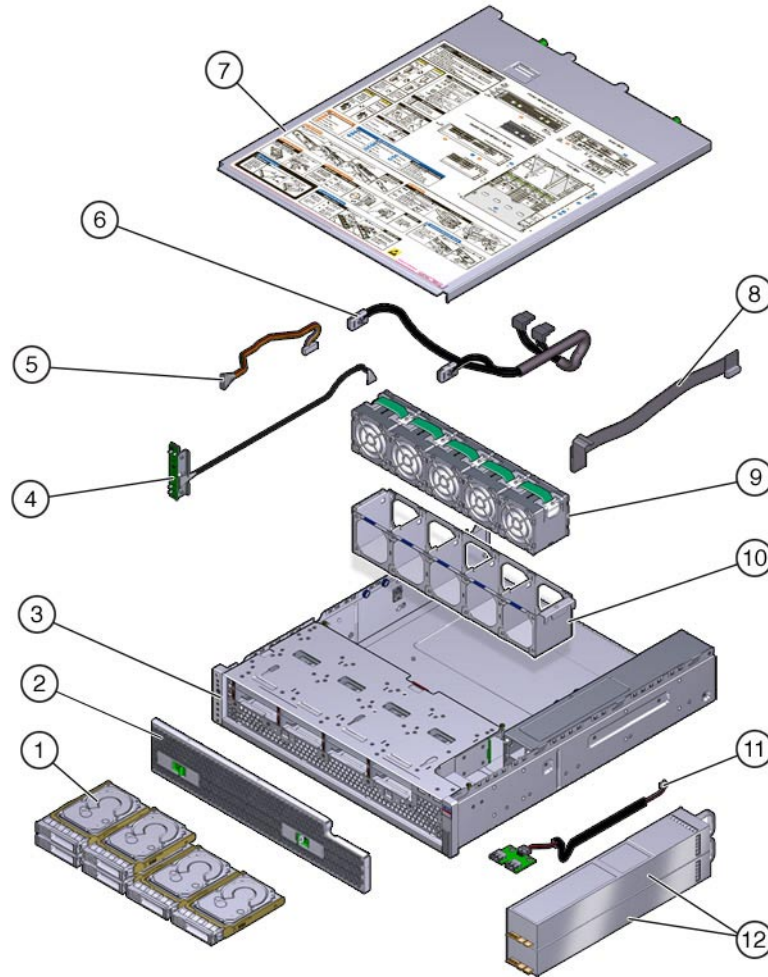


Figure Legend

1 Drives	5 Drive power cable (FRU)	9 Fan modules
2 Air Filter	6 Drive signal cable (FRU)	10 Fan tray
3 Chassis (FRU)	7 Top cover	11 USB board (FRU)
4 LED board (FRU)	8 PDB signal cable (FRU)	12 Power supplies

Internal Cables

The ZS3-2 controller contains the following field-replaceable unit (FRU) internal cables. FRUs are not customer-serviceable, and must be replaced by trained Oracle service technicians.

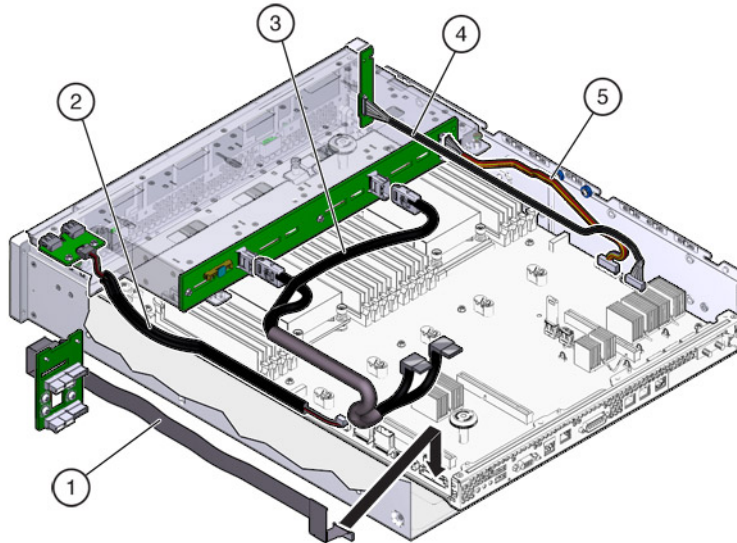


Figure Legend

1 PDB signal cable 3 Drive signal cable 5 Drive power cable

2 USB board cable 4 LED board cable

Motherboard, Memory, and PCIe Cards

The ZS3-2 controller motherboard, memory, and PCIe components are described in the following figure and legend.

Note: Field replaceable components (FRUs) are not customer-serviceable, and must be replaced by trained Oracle service technicians.

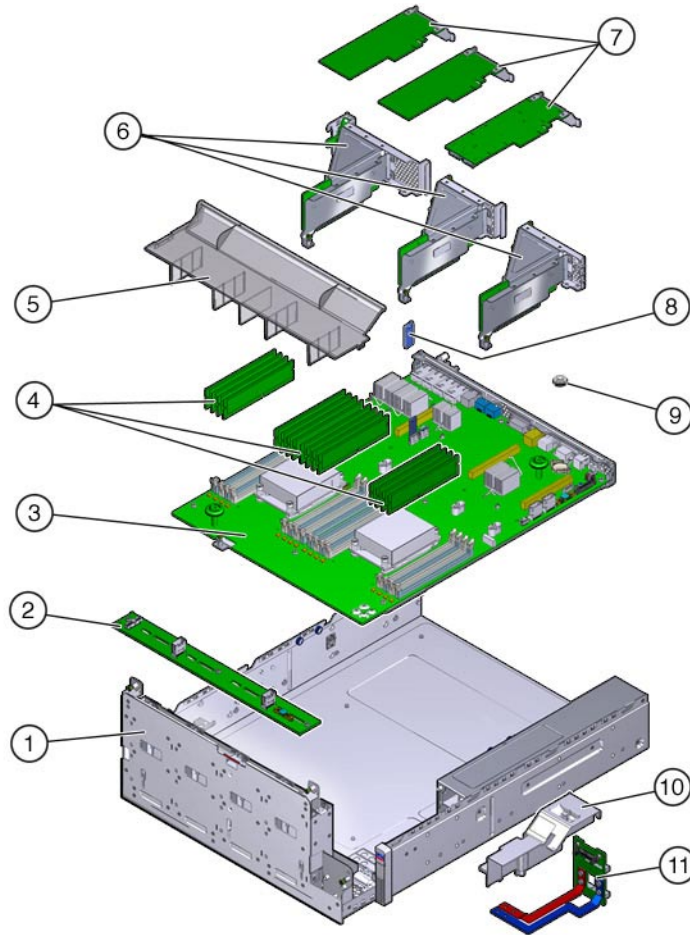
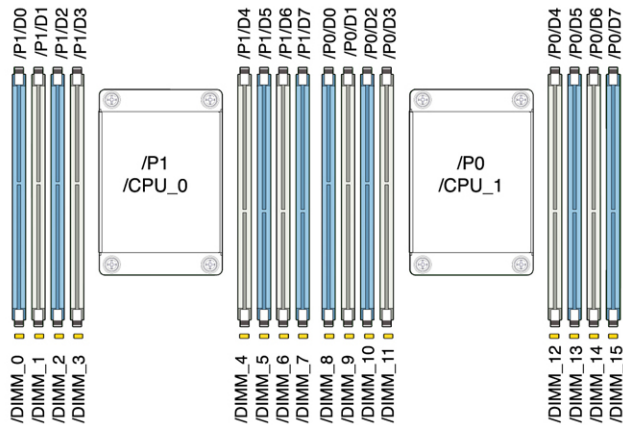


Figure Legend

1 Drive cage (FRU)	5 Airduct	9 Battery
2 Drive backplane (FRU)	6 PCIe Risers (FRU)	10 PDB duct
3 Motherboard (FRU)	7 PCIe cards	11 Power distribution board (FRU)
4 DIMMs	8 USB flash drive	

CPU and Memory

The ZS3-2 controller motherboard has 16 slots in two groups that hold industry-standard DDR3 low voltage (LV) DIMMS.



Note: All sockets must be occupied by a DDR3 DIMM or a filler. All DDR3 DIMMs must be identical.

Capacity	CPU 0	CPU 1
256GB	D0, D2, D5, D7 (blue)	D0, D2, D5, D7 (blue)
	D1, D3, D4, D6 (white)	D1, D3, D4, D6 (white)

The ZS3-2 controller replaceable memory components and part numbers are listed below.

Component	Description	FRU/CRU	Part Number
CPU	Intel E5-2658, 2.1G, 8-core	FRU	7019701
Memory	DIMM, 16GB,DDR3,1600,2Rx4,1.35V	CRU	7041603

NIC/HBA Options

The following table describes the NIC/HBA options for the ZS3-2 controller. See [PCIe Options](#) for slot allocations.

Mktg Part Number	Description
SG-SAS6-INT-Z	8-port 6Gb/s SAS-2 internal HBA
SG-XPCIE2FC-QF8-Z	2-port 8Gb FC HBA

Mktg Part Number	Description
7103791	4-port (4x4 SAS-2) 6Gb/s external HBA
X1109A-Z	2-port 10GbE SFP+ NIC
X4242A	2-port Infiniband CX2 HCA
7101674	2-port 16Gb FC/FCoE Universal HBA
7100477	4-port 1Gb Copper Ethernet UTP
7100488	2-port 10Gb Ethernet Copper Base-T
X2129A	XCVR 850NM, 1/10Gbps, SFP, short reach
X5562A-Z	10GbE/1GbE SFP+ Transceiver, long reach

PCIe Riser Configuration

The three risers are labeled Riser 1, Riser 2, and Riser 3. Though similar, the risers are not interchangeable. Riser 1 installs at the left rear of the chassis, Riser 2 at the center rear, and Riser 3 at the right rear of the chassis. Each riser can accommodate two PCIe cards:

- Riser 1 contains slots 1 and 4
- Riser 2 contains slots 2 and 5
- Riser 3 contains slots 3 and 6

PCIe Options

The following table describes the supported PCIe configuration options for the ZS3-2 controller. Slots 1 and 2 are reserved for internal- and external HBAs, as shown in the following table. When adding PCIe cards, populate from higher order slots (6) first toward lower order slots. **Note:** Any empty PCIe slots must have a filler panel installed.

Slot	Mfg Part Number	Description	Max	Note
1	7047852	8-port 6Gb/s SAS-2 internal HBA	1	Base configuration
2	7067091	4-port (4x4 SAS-2) 6Gb/s external HBA	2	Base configuration
3	7067091	4-port (4x4 SAS-2) 6Gb/s external HBA	2	Second 4x4-port SAS-2 external HBA
3	7070195	4-port 1GbE copper NIC UTP	3	Optional recommended front-end
3	371-4325-02	2-port 8Gb FC HBA	4	Optional FC target or initiator (backup)

Slot	Mfg Part Number	Description	Max	Note
3	7023303	2-port 16Gb universal FC/FCoE HBA	2	Optional FC target or initiator (backup)
3	375-3696-01	2-port InfiniBand CX2 HCA	2	Optional recommended front-end
3	7051223	2-port 10GbE optical NIC	2	Optional recommended front-end
3	7070006	2-port 10GbE copper NIC	2	Optional recommended front-end
4-6	7070195	4-port 1GbE copper NIC UTP	3	Optional recommended front-end
4-6	371-4325-02	2-port 8Gb FC HBA	4	Optional FC target or initiator (backup)
4-6	7023303	2-port 16Gb universal FC/FCoE HBA	2	Optional FC target or initiator (backup)
4-6	375-3696-01	2-port InfiniBand CX2 HCA	2	Optional recommended front-end
4-6	7051223	2-port 10GbE optical NIC	2	Optional recommended front-end
4-6	7070006	2-port 10GbE copper NIC	2	Optional recommended front-end

Optional Cable Management Arm

The following figure identifies the components of the second-generation cable management arm (CMA). See the CMA installation instructions.

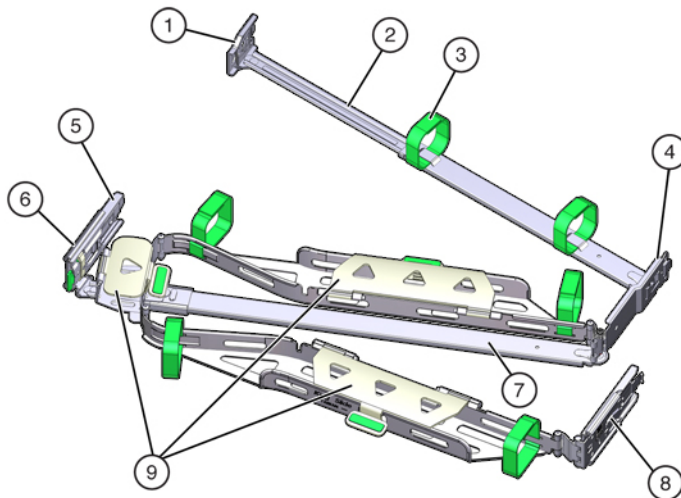


Figure Legend	
1 Connector A	6 Connector D
2 Front slide bar	7 Slide-rail latching bracket (used with connector D)
3 Velcro straps (6)	8 Rear slide bar
4 Connector B	9 Cable covers
5 Connector C	

Attached Storage

The ZS3-2 controller connects to external storage through a 4-port (4x4 SAS-2) 6Gb/s HBA. You can attach from one to eight HDD-only or SSD/HDD Logzilla-capable disk shelves to the controller. You can also attach mixed disk shelf types (DE2 and Sun Disk Shelf) in the same chain. For more information, see [Connecting to Attached Storage](#).

ZS3-4

ZS3-4 Hardware Overview

Use the information on this page as a preparation reference for servicing replaceable components of the Oracle ZFS Storage ZS3-4 controller. Refer to the following topics for procedural instructions:

- Controller Tasks - replace system controller components
- Disk Shelf Tasks - replace disk shelf components

Controller Overview

The ZS3-4 controller can be configured as a single controller or two controllers to create a high-availability cluster configuration. The following table describes the configuration options:

Mktg Part Number	CPU	Memory	Readzilla SAS-2	Boot Drive SAS-2	HBA SAS-2	Software Version (min)
7105725	4x10-core, 2.40GHz	1TB (16GB DIMMs)	Four 1.6TB	Two 900GB	4X4-port	2013.1.0

Refer to the <http://www.oracle.com/us/products/servers-storage/storage/unified-storage/index.html> (<http://www.oracle.com/us/products/servers-storage/storage/unified-storage/index.html>) for the most recent component specification.

Chassis Dimensions

The ZS3-4 controller chassis fits in a standard equipment rack, and occupies three rack units (3RU) in height. The chassis dimensions are as follows:

Dimension	Measurement	Dimension	Measurement
Height	13.3 cm/5.25 in	Depth	70.6 cm/27.8 in
Width	43.7 cm/17.19 in	Weight	16.36 kg/96 lbs

Front Panel

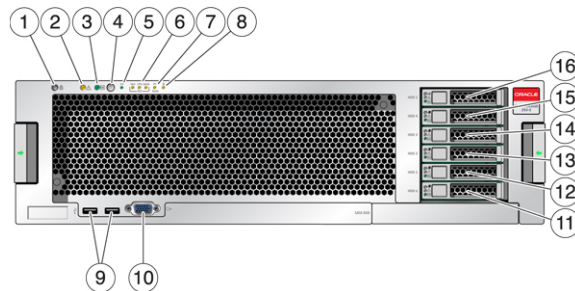


Figure Legend

1 Locator LED and button (white)	9 USB 2.0 Connectors
2 Service Required LED (amber)	10 DB-15 video connector
3 Power/OK LED (green)	11 Boot drive 0
4 Power button	12 Boot drive 1 (required)
5 Service Processor (SP) OK LED (green)	13 Solid state drive 2 (optional)
6 Fan/CPU/Memory Service Required LED	14 Solid state drive 3 (optional)
7 Power Supply (PS) Service Required LED	15 Solid state drive 4 (optional)
8 Over Temperature Warning LED	16 Solid state drive 5 (optional)

System Drives

The ZS3-4 controller has two 900GB SAS-2 system boot drives in slots 0 and 1, configured as a mirrored pair. Up to four 1.6TB SAS-2 Readzilla SSDs can fill slots 2 through 5, in order.



Figure Legend

1 Locate (white) 2 Service action required (amber) 3 OK/Activity (green)

Rear Panel

The following graphic shows the rear panel. Base configuration HBAs are not depicted in this illustration.

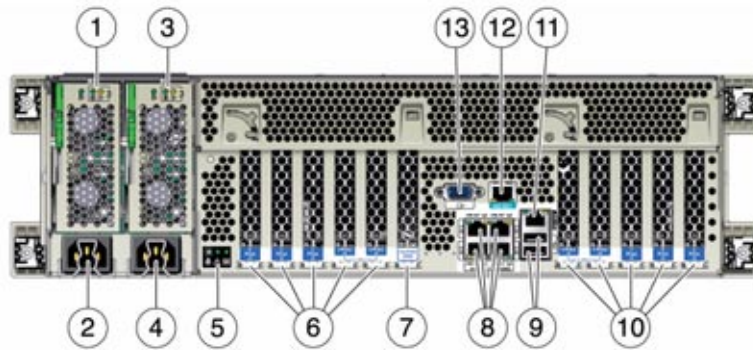


Figure Legend

1 Power supply unit 0 status LEDs OK: green Power Supply Fail: amber AC OK: green	8 Network (NET) 10/100/1000 ports: NET0-NET3
2 Power supply unit 0 AC inlet	9 USB 2.0 ports
3 Power supply unit 1 status LEDs OK: green Power Supply Fail: amber AC OK: green	10 PCIe slots 5-9
4 Power supply unit 1 AC inlet	11 Network management (NET MGT) port
5 System status LEDs Power: green Attention: amber Locate: white	12 Serial management (SER MGT) port
6 PCIe slots 0-4	13 DB-15 video connector

Electrical Specifications

The following list shows the electrical specifications for the controller.

Note: The power dissipation numbers listed are the maximum rated power numbers for the power supply. The numbers are not a rating of the actual power consumption of the appliance.

Input

- Nominal frequencies: 50/60Hz
- AC operating range: 200-240 VAC
- Maximum current AC RMS: 12A @ 200 VAC

Power Dissipation

- Max power consumption: 1800 W
- Max heat output: 6143 BTU/hr
- Volt-Ampere rating: 1837 VA @ 240 VAC, 0.98 P.F.

Internal Boards

The ZS3-4 controller chassis contains the following field-replaceable units (FRUs). FRUs are not customer-serviceable, and should only be replaced by trained Oracle service technicians.

- **Motherboard** - The motherboard includes CPU modules, slots for eight DIMM risers, memory control subsystems, and the service processor (SP) subsystem. The SP subsystem controls the host power and monitors host system events (power and environmental). The SP controller draws power from the host's 3.3V standby supply rail, which is available whenever the system is receiving AC input power, even when the system is turned off.
- **Power Distribution Board** - The power distribution board distributes main 12V power from the power supplies to the rest of the system. It is directly connected to the Vertical PDB card, and to the motherboard through a bus bar and ribbon cable. It also supports a top cover interlock ("kill") switch. In the controller, the power supplies connect to the power supply backplane which connects to the power distribution board.
- **Vertical PDB Card** - The vertical power distribution board, or Paddle Card serves as the interconnect between the power distribution board and the fan power boards, hard drive backplane, and I/O board.
- **Power Supply Backplane Card** - This board connects the power distribution board to power supplies 0 and 1.
- **Fan Power Boards** - The two fan power boards are FRUs and carry power to the controller fan modules. In addition, they contain fan module status LEDs and transfer I2C data for the fan modules.

- Drive Backplane** - The six-drive backplane includes the connectors for the drives, as well as the interconnect for the I/O board, Power and Locator buttons, and system/component status LEDs. Each drive has an LED indicator for Power/Activity, Fault, and Locate.

Components

The components of the ZS3-4 controller are shown in the following figure and identified in the legend.

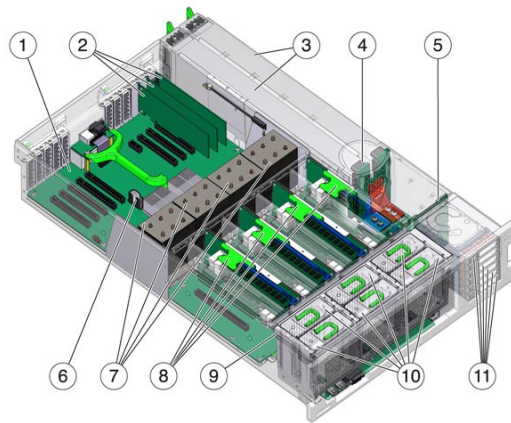
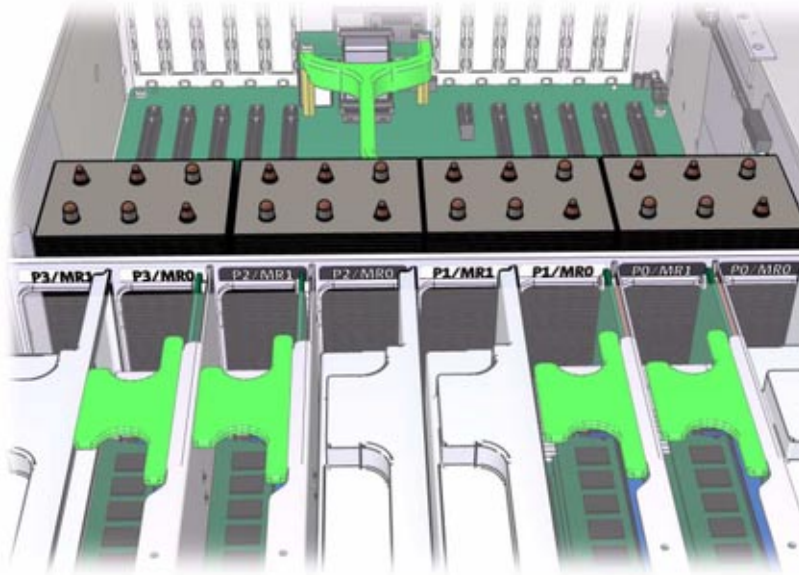


Figure Legend

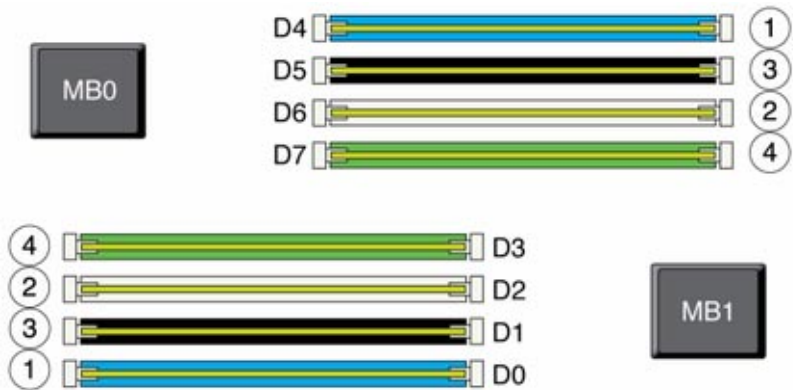
1 Motherboard	7 CPUs and heatsinks
2 Low-profile PCIe cards	8 Memory risers
3 Power supplies	9 Fan board
4 Power supply backplane	10 Fan modules
5 Drive backplane	11 Boot drives and SSDs
6 System lithium battery	

CPU and Memory

The ZS3-4 controller supports 16GB DDR3 DIMMs installed on all eight risers, accommodating 1TB of memory.



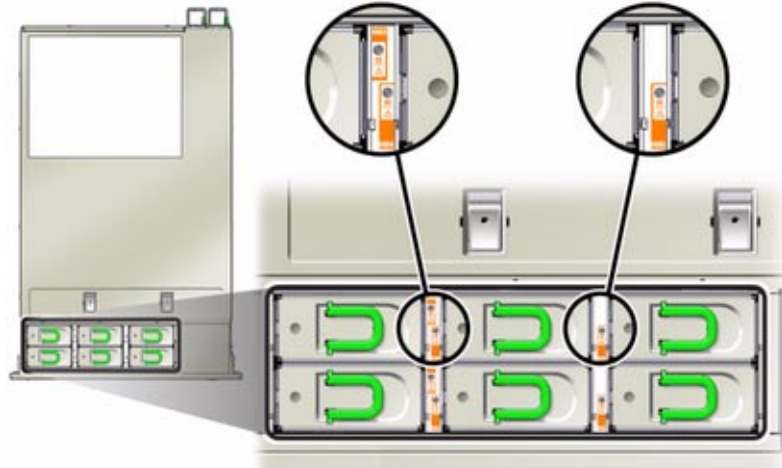
Refer to the service label on the cover for DIMM placement information. On every memory riser, slots D0, D2, D4, and D6 must be populated; optionally, slots D1, D3, D5, and D7 may be populated as a group on **all** installed memory risers. All DIMMs in the system **must be identical**.



DIMM names in appliance logs and the Maintenance > Hardware view are displayed with the full name, such as /SYS/MB/P0/D7.

Fan Modules

The Fan Modules and Fan Module LEDs of the controller are shown in the following figure. The following LEDs are lit when a fan module fault is detected:



- Front and rear Service Action Required LEDs
- Fan Module Service Action Required (TOP) LED on the front of the server
- Fan Fault LED on or adjacent to the faulty fan module

The system Overtemp LED might light if a fan fault causes an increase in system operating temperature.

NIC/HBA Options

This table describes NIC/HBA PCIe card options for ZS3-4 standalone and cluster configurations.

Mktg Part Number	Description
SG-SAS6-INT-Z	8-port 6Gb/s SAS-2 internal HBA
SG-XPCIE2FC-QF8-Z	2-port, 8Gb FC HBA
7103791	4-port (4x4 SAS-2) 6Gb/s external HBA
7100477	4-port 1Gb Ethernet Copper UTP

Mktg Part Number	Description
7100488	2-port 10Gb Ethernet Copper Base-T
X4242A	2-port Infiniband CX2 HCA
X1109A-Z	2-port 10GbE SFP+ NIC
X2129A	Transceiver 850NM, 1/10GPS, Short Reach, SFP
X5562A-Z	Transceiver 10GbE/1GbE, Long Reach, SFP

Connectors

The serial management connector (SER MGT) is an RJ-45 connector and provides a terminal connection to the SP console.



The network management connector (NET MGT) is an RJ-45 connector and provides a LAN interface to the SP console.



There are four RJ-45 Gigabit Ethernet connectors (NET0, NET1, NET2, NET3) located on the motherboard that operate at 10/100/1000 Mbit/sec. These network interfaces must be configured before use.

PCIe Options

This table describes the PCIe base configuration and optional slot assignments for ZS3-4 standalone and cluster configurations.

Slot	Mfg Part Number	Description	Max	Note
0	7047852	8-port 6Gb/s SAS-2 internal HBA	1	Base configuration

Slot	Mfg Part Number	Description	Max	Note
1	7067091	4-port (4x4 SAS-2) 6Gb/s SAS-2 external HBA	4	Base configuration
2	7067091	4-port (4x4 SAS-2) 6Gb/s SAS-2 external HBA	4	Additional optional back-end
2	7070006	2-port 10GbE copper NIC	4	Optional recommended front-end
2	375-3696-01	2-port Infiniband CX2 HCA	4	Optional recommended front-end
2	7070195	4-port 1GbE copper NIC UTP	4	Optional recommended front-end
2	7051223	2-port 10GbE optical NIC	6	Optional recommended front-end
2	371-4325-02	2-port 8Gb FC HBA	4	Optional FC target or initiator (backup)
3	7070006	2-port 10GbE copper NIC	4	Optional recommended front-end
3	375-3696-01	2-port Infiniband CX2 HCA	4	Optional recommended front-end
3	7070195	4-port 1GbE copper NIC UTP	4	Optional recommended front-end
3	7051223	2-port 10GbE optical NIC	6	Optional recommended front-end
3	371-4325-02	2-port 8Gb FC HBA	4	Optional FC target or initiator (backup)
4	7070006	2-port 10GbE copper NIC	4	Optional recommended front-end
4	375-3696-01	2-port Infiniband CX2 HCA	4	Optional recommended front-end
4	7070195	4-port 1GbE copper NIC UTP	4	Optional recommended front-end
4	7051223	2-port 10GbE optical NIC	6	Optional recommended front-end
4	371-4325-02	2-port 8Gb FC HBA	4	Optional FC target or initiator (backup)
C	511-1496-05	Cluster Controller 200	1	Cluster base configuration

Slot	Mfg Part Number	Description	Max	Note
5	7070006	2-port 10GbE copper NIC	4	Optional recommended front-end
5	375-3696-01	2-port Infiniband CX2 HCA	4	Optional recommended front-end
5	7070195	4-port 1GbE UTP Ethernet	4	Optional recommended front-end
5	7051223	2-port 10GbE optical NIC	6	Optional recommended front-end
5	371-4325-02	2-port 8Gb FC HBA	4	Optional FC target or initiator (backup)
6	7070006	2-port 10GbE copper NIC	4	Optional recommended front-end
6	375-3696-01	2-port Infiniband CX2 HCA	4	Optional recommended front-end
6	7070195	4-port 1GbE copper NIC UTP	4	Optional recommended front-end
6	7051223	2-port 10GbE optical NIC	6	Optional recommended front-end
6	371-4325-02	2-port 8Gb FC HBA	4	Optional FC target or initiator (backup)
7	7067091	4-port (4x4 SAS-2) 6Gb/s external HBA	4	Additional optional back-end
7	371-4325-02	2-port 8Gb FC HBA	4	Optional recommended front-end
7	375-3696-01	2-port Infiniband CX2 HCA	4	Optional recommended front-end
7	7051223	2-port 10Gb Optical Ethernet	6	Optional recommended front-end
7	7070195	4-port 1GbE copper NIC UTP	4	Optional recommended front-end
7	371-4325-02	2-port 8Gb FC HBA	4	Optional FC target or initiator (backup)
8	7067091	4-port (4x4 SAS-2) 6Gb/s external HBA	4	Base configuration

Slot	Mfg Part Number	Description	Max	Note
9	371-4325-02	2-port 8Gb FC HBA	4	Optional FC target or initiator (backup)
9	7070006	2-port 10Gb copper Ethernet	4	Optional recommended front-end
9	7070195	4-port 1GbE copper NIC UTP	4	Optional recommended front-end
9	7051223	2-port 10GbE optical NIC	6	Optional recommended front-end

Attached Storage

The ZS3-4 single and cluster controller configurations allow one to six chains of 1 to 6 [disk shelves](#). Any combination of disk-only and Logzilla-capable shelves may be combined within the chain in any order. The cabling configurations are unchanged.

See [Disk Shelf Overview](#) for component specifications and diagrams.

7120

7120 Hardware Overview

Use the information in this section as a reference when preparing to service replaceable components of the Sun ZFS Storage 7120.

Refer to the following for procedural instructions:

- Controller Tasks - replace system controller components
- Disk Shelf Tasks - replace disk shelf components

Chassis Overview

The Sun ZFS Storage 7120 is an enterprise-class two-socket rackmount x64 system powered by the Intel Xeon processor. It packs high performance and room for growth with four PCIe slots and 18 DIMM slots into a compact 2U footprint. Refer to <http://www.oracle.com/us/products/servers-storage/storage/nas/overview/index.html> (<http://www.oracle.com/us/products/servers-storage/storage/nas/overview/index.html>) for the most recent component specification.

Refer to the *Implementing Fibre Channel SAN Boot with Oracle's Sun ZFS Storage Appliance* whitepaper at <http://www.oracle.com/technetwork/articles/servers-storage-admin/fbsanboot-365291.html> (<http://www.oracle.com/technetwork/articles/servers-storage-admin/fbsanboot-365291.html>) for details on FC SAN boot solutions using the Sun ZFS Storage 7120.

The 7120 is a standalone controller that consists of an internal SAS-2 HBA providing disk shelf expansion, write flash acceleration, and 11 x 300GB 15K, 600GB 15K, 1TB 7.2K, 2TB 7.2K, or 3TB 7.2K hard drive storage. The SAS-2 storage fabric supports a greater number of targets, greater bandwidth, higher reliability, and bigger scale.

The 2U chassis form factor dimensions are as follows:

Dimension	Measurement	Dimension	Measurement
Height	87.6 mm/3.45 in	Depth	765.25 mm/30.13 in
Width	436.8 mm/17.2 in	Weight	29.54 kg/65 lb

Front Panel

The following figure and legend show the front panel and the drive locations. The Logzilla 3.5" SSD belongs in slot 3 and is not supported in controllers configured with the internal Sun Aura flash HBA Logzilla.

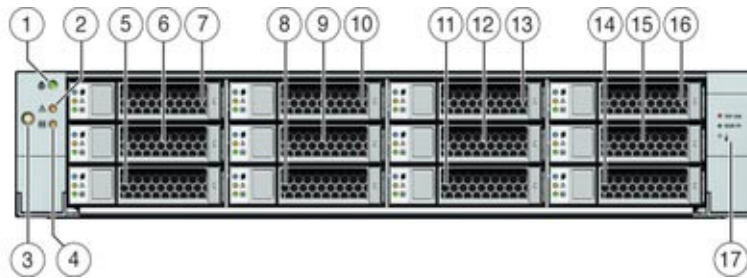


Figure Legend

1 Locator LED/button (white)	7 HDD 2	13 HDD 8
2 Service Action Required LED (amber)	8 HDD or SSD 3	14 HDD 9
3 Power button	9 HDD 4	15 HDD 10
4 Power/OK LED (green)	10 HDD 5	16 HDD 11
5 HDD 0	11 HDD 6	17 Drive map

Figure Legend

6 HDD 1

12 HDD 7

Rear Panel

The following figure and legend show the rear panel.

Note: Optional Sun Dual Port 40Gb/sec 4x Infiniband QDR HCAdapter PCIe cards (375-3606-01) may be located in slots 1, 2, or 3. 375-3606-01 HCA expansion cards are not supported in the 10Gb network configurations.

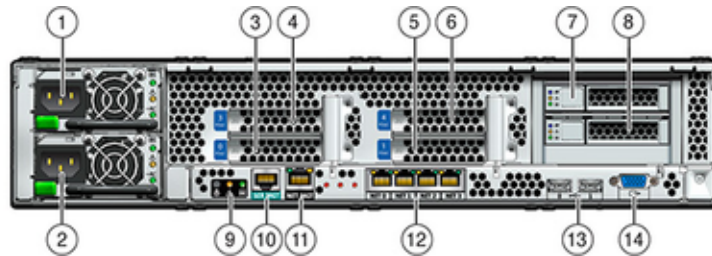


Figure Legend

1 Power Supply Unit 1

6 PCIe 4

11 Network Management port

2 Power Supply Unit 0

7 Boot HDD 1

12 Gbit Ethernet ports NET 0, 1, 2, 3

3 PCIe 0

8 Boot HDD 0

13 USB 2.0 ports (0, 1)

4 PCIe 3

9 Rear Panel System Status LEDs

14 HD15 Video port

5 PCIe 1

10 Serial Management port

The serial management connector (SER MGT) is an RJ-45 port and provides a terminal connection to the SP console.



The network management connector (NET MGT) is an RJ-45 port and provides an alternate terminal interface to the SP console.



There are four RJ-45 Gigabit Ethernet ports (NET0, NET1, NET2, NET3) located on the motherboard that operate at 10/100/1000 Mbit/sec. These network interfaces must be configured before use.

Electrical Specifications

The following list shows the electrical specifications for the 7120. Note that the power dissipation numbers listed are the **maximum** rated power numbers for the power supply. The numbers are not a rating of the actual power consumption of the appliance.

Connectors

- Two C13 connectors which work on 110-220v outlets

Input

- Nominal frequencies: 50/60Hz
- Nominal voltage range: 100-120/200-240 VAC
- Maximum current AC RMS: 13.8A @ 100 VAC
- AC operating range: 90-264 VAC

Output

- 3.3 VDC STBY: 3.0A
- +12 VDC: 86.7A

Power dissipation

- Max power consumption: 1235.3 W
- Max heat output: 4212 BTU/hr
- Volt-Ampere rating: 1261 VA @ 240 VAC, 0.98P.F.

Internal Components

The chassis has the following boards installed.

Note: Field-replaceable units (FRU) should only be replaced by trained Oracle service technicians.

- **PCIe Risers** - Each riser supports two PCIe cards that are customer-replaceable. There are two risers per system, each attached to the rear of the motherboard.

- **Motherboard** - The motherboard is a FRU and includes CPU modules, slots for 18 DIMMs, memory control subsystems, and the service processor (SP) subsystem. The SP subsystem controls the host power and monitors host system events (power and environmental). The SP controller draws power from the host 3.3V standby supply rail, which is available whenever the system is receiving AC input power, even when the system is turned off.
- **Power Distribution Board** - The power distribution board is a FRU and distributes main 12V power from the power supplies to the rest of the storage controller. It is directly connected to the connector break out board and to the motherboard through a bus bar and ribbon cable. It also supports a top cover interlock *kill* switch. The power supplies connect directly to the power distribution board.
- **Connector Break Out Board** - The connector break out board is FRU and serves as the interconnect between the power distribution board and the fan power boards, storage drive backplane, and I/O board. It also contains the top-cover interlock "kill" switch.
- **Fan Power Boards** - The two fan power boards are FRUs and carry power to the system fan modules. In addition, they contain fan module status LEDs and transfer I2C data for the fan modules.
- **Storage Drive Backplane** - The storage drive backplane is a FRU and includes the connectors for the storage drives, as well as the interconnect for the I/O board, power and locator buttons, and system/component status LEDs. The system has a 12-disk backplane. Each drive has an LED indicator for Power/Activity, Fault, and Locate.

I/O Components

The following figure and legend show the I/O components of the 7120 system.

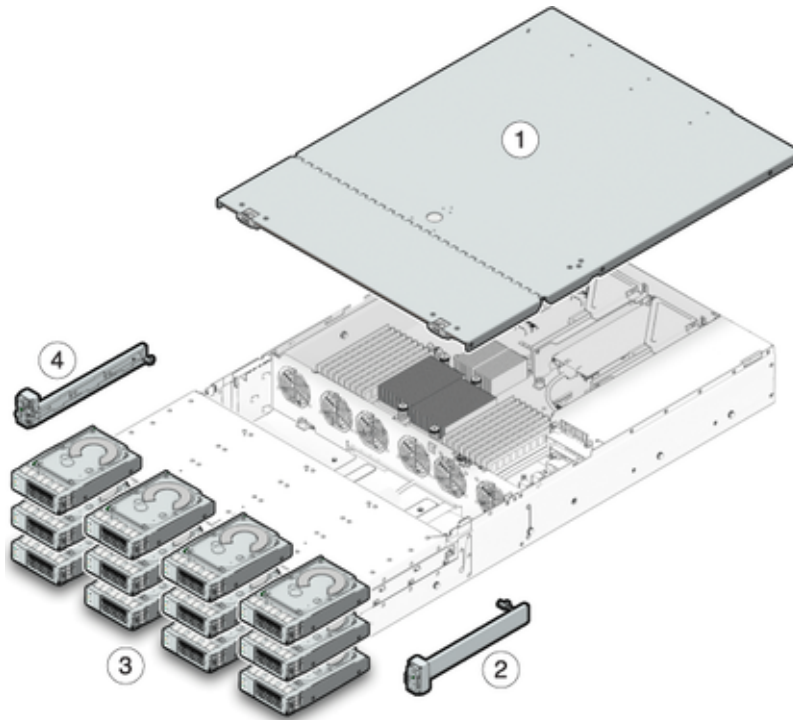


Figure Legend

1 Top Cover

3 Hard Disk Drives

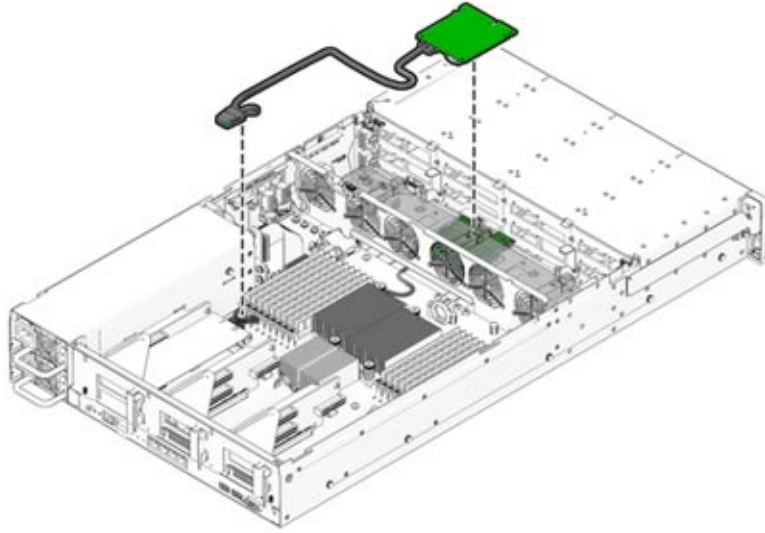
2 Right Control Panel Light Pipe Assembly

4 Left Control Panel Light Pipe Assembly

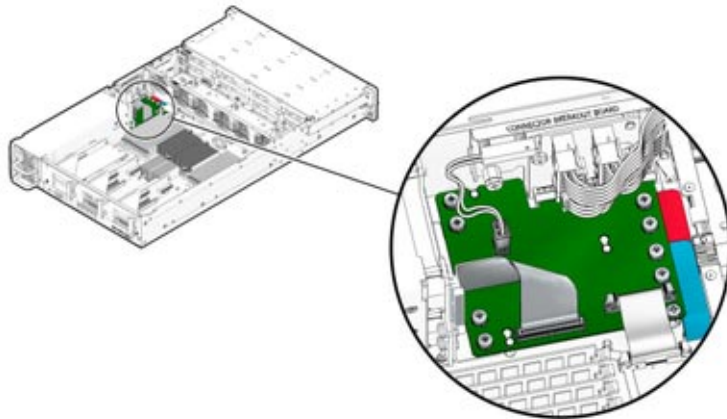
Cables

The following figure and legend show the storage controller internal cables.

Note: The rear boot drives are not depicted in this illustration.



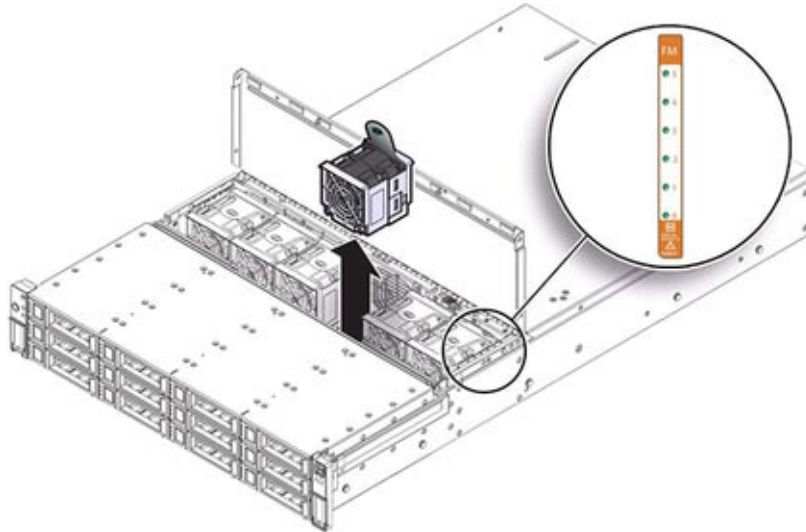
Cable	Connection
1 Storage Drive Data Cable	Connection between the HBA PCI-Express Card and the storage drive backplane.



Cable	Connection
2 Ribbon cable	Connection is between the power distribution board and the motherboard.

Power Distribution, Fan Module and Disk Components

The fan modules and LEDs are shown in the following illustration.



The following figure and legend show the power distribution and associated components.

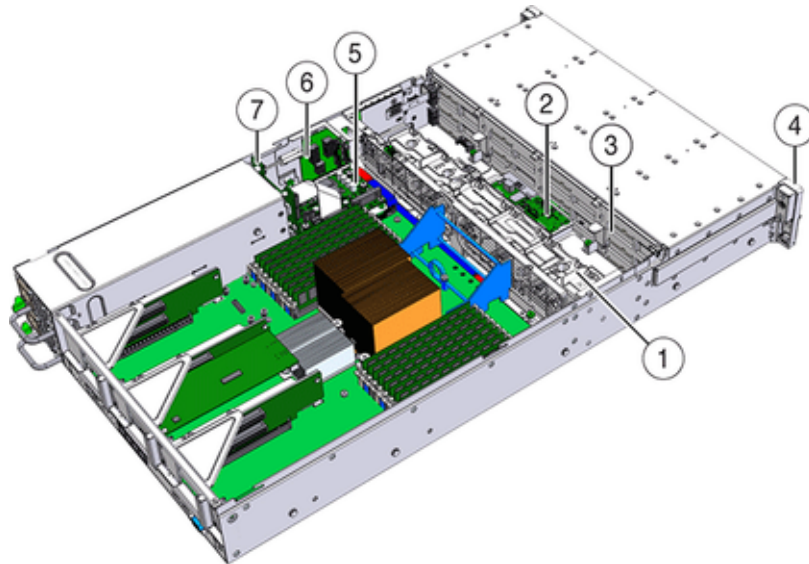


Figure Legend

1 Fan Board

5 Power Distribution Board

Figure Legend

2 SAS Expander Board **6** Connector Board

3 Disk Backplane **7** Power Supply Backplane

4 Front Control Panel
Light Pipe Assembly

Standalone Controller Configurations

The following table shows the configuration options for a 7120 controller. All PCIe cards are low-profile, and must be fitted with low-profile mounting brackets.

This table describes base configurations for the 7120 with Aura Logzilla.

Mktg Part Number	Description	Mfg Part Number
TA7120-12TB	S7120, 1xCPU, 24GB, 12TB	597-0754-01
TA7120-24TB	S7120, 1xCPU, 24GB, 24TB	597-0755-01

The following table describes base configurations for the 7120 with Logzilla 3.5" SSD.

Mktg Part Number	Description	Mfg Part Number
7101282	S7120, 1xCPU, 24GB, 3.3TB	7014523
7101284	S7120, 1xCPU, 24GB, 6.6TB	7014525

NIC/HBA Options

The following table describes NIC/HBA options for the 7120.

Mktg Part Number	Description	Mfg Part Number
SG-XPCIESAS-GEN2-Z	2-port External Sun Thebe SAS (x4) HBA, PCIe	594-5889-01
SG-XPCIE2FC-QF8-Z	2-port FC HBA, 8Gb, PCIe	594-5684-01
X4446A-Z	4-port PCI-E Quad GigE UTP	594-4024-01
X4237A-N	2-port 4X IB HCA PCIe	594-5862-02
X1109A-Z	2-port 10Gig SFP+ NIC, PCIe	594-6039-01

PCIe Options

The following table describes the supported PCIe configuration option summary for the 7120.

Slot	Type	Sun Part Number	Vendor Part Number	Description	Note
0	PCIe	540-7975-03	Sun Aura	Internal Flash HBA Logzilla	Base Configuration (OBSOLETE)
0	PCIe	375-3481-01	Intel EXPI9404PT	QP Copper NIC	Optional Recommended Front-end
0	PCIe	375-3617-01	Intel Niantic	DP Optical 10GE NIC	Optional Recommended Front-end
0	PCIe	371-4325-01	QLogic	8Gb DP FC HBA	Optional FC Target or Initiator (Bac
0	PCIe	375-3606-01	Mellanox MHJH29-XTC	InfiniBand HCA	Optional Recommended Front-end
1	PCIe	375-3617-01	Intel Niantic	DP Optical 10GE NIC	Optional Recommended Front-end
1	PCIe	375-3606-01	Mellanox MHJH29-XTC	InfiniBand HCA	Optional Recommended Front-end
1	PCIe	375-3481-01	Intel EXPI9404PT	QP Copper NIC	Optional Recommended Front-end
1	PCIe	371-4325-01	QLogic	8Gb DP FC HBA	Optional FC Target or Initiator (Bac
3	PCIe	375-3665-01	Sun Thebe (INT)	Internal SAS HBA	Base Configuration
4	PCIe	375-3481-01	Intel EXPI9404PT	QP Copper NIC	Optional Recommended Front-end
4	PCIe	371-4325-01	QLogic	8Gb DP FC HBA	Optional FC Target or Initiator (Bac
4	PCIe	375-3609-03	Sun Thebe (EXT)	8P 6Gb/s SAS HBA	Additional Optional Back-end

Attached Storage

The 7120 standalone configurations allow a single chain of 1 or 2 [disk shelves](#). Write-optimized (Logzilla) SSDs are not supported in the expansion storage for the 7120. The disk shelves must be fully populated with 24 HDDs. Half-populated shelf configurations are not supported.

7320

7320 Hardware Overview

Use the information in this section to prepare to service replaceable components of the 7320 system. After you have reviewed this section, refer to these procedural instructions:

- Controller Tasks - replace storage controller components
- Disk Shelf Tasks - replace disk shelf components

Chassis Overview

The Sun ZFS Storage 7320 consists of either a single storage controller or two storage controllers in a high availability cluster configuration. Both the single and clustered configuration supports one to six disk shelves.

The 7320 controller base configuration includes two CPUs, built-in 4 x 1Gb/s front-end GigE ports, redundant power supplies, NIC options for expanded front-end support, tape backup, InfiniBand, and dual port SAS HBA for storage expansion.

The CPUs are Intel Xeon 5600 series, 2.40GHz, 80W, with 4 core processors. The standard memory configuration is 96GB, 6 x 8GB DDR3-1333 low voltage (LV) DIMMs per CPU. Memory can be upgraded to 144GB using 9 x 8GB DDR3-1333 LV DIMMs per CPU (for a total of 18 x 8GB for two CPUs). Earlier versions of the 7320 controller included 24GB (base), 48GB, or 72GB memory options. The clustered configuration simply uses two servers and a cluster card in each server for a heartbeat connection between the servers.

All user-accessible storage is provided by one to six disk shelves that are external to the server(s). RAID functions are managed by software. Solid state 18GB SAS-1 drives (7320 SAS-2) are used for a high-performance write cache (known as LogZilla) or ZFS intent log (ZIL) devices, and are used in place of up to four of the 24 drives in a disk shelf. The remaining 20 drives are available for storage.

Refer to the <http://www.oracle.com/us/products/servers-storage/storage/unified-storage/index.html> (<http://www.oracle.com/us/products/servers-storage/storage/unified-storage/index.html>) for the most recent component specification.

The 7320 is a SAS-2 (Serial Attached SCSI 2.0) device that consists of an HBA, disk shelf, and disks (1TB and 2TB SAS-2). The SAS-2 storage fabric supports a greater number of targets, greater bandwidth, higher reliability, and bigger scale than the SAS-1 fabric.

Boards

The 7320 storage controller chassis has the following boards installed.

Note: Field-replaceable units (FRUs) should only be replaced by trained Oracle service technicians.

- **PCIe Risers** - The storage controller contains three PCIe risers that are customer-replaceable units (CRUs) and are attached to the rear of the motherboard. Each riser supports one PCIe card.
- **Motherboard** - The motherboard is a FRU and includes CPU modules, slots for 18 DIMMs, memory control subsystems, and the service processor (SP) subsystem. The SP subsystem controls the host power and monitors host system events (power and environmental). The SP controller draws power from the host 3.3V standby supply rail, which is available whenever the system is receiving AC input power, even when the appliance is turned off.

- **Power Distribution Board** - The power distribution board is a FRU and distributes main 12V power from the power supplies to the rest of the storage controller. It is directly connected to the paddle board and to the motherboard through a bus bar and ribbon cable. It also supports a top cover interlock *kill* switch.
- **Paddle Board** - The paddle board is a FRU and serves as the interconnect between the power distribution board and the fan power boards, hard drive backplane, and I/O board.
- **Fan Board** - The fan boards are FRUs and carry power to the storage controller fan modules. In addition, they contain fan module status LEDs and transfer I2C data for the fan modules.
- **Disk Backplane** - The hard drive backplane is a FRU and includes the connectors for the hard disk drives, as well as the interconnect for the I/O board, Power and Locator buttons, and system/component status LEDs. The storage controller has an eight-disk backplane. Each drive has an LED indicator for Power/Activity, Fault, and OK-to-Remove (not supported).

The following list contains the replaceable system boards for the 7320 storage controller.

Part Number	Description	FRU/CRU
F541-2883-01	X8 PCIe Riser Card 1U	CRU
F541-2885-01	X16 PCIe Riser Card 1U	CRU
F541-4081-01	RoHS Motherboard and Tray	FRU
F511-1489-01	DB, Power Distribution Board	FRU
F511-1548-01	PCB, 8 Disk 1U Backplane	FRU
F541-4275-02	PCBA, Connector Board, 1U	FRU

Cables

The following list contains the replaceable cables for the 7320 storage controller.

Part Number	Description	FRU/CRU
F530-4228-01	Cable, Mini SAS	FRU (internal)
F530-3927-01	FRU,CBL,PDB,MB,1U+2U,RIBBON	FRU (internal)
F530-4431-01	Cable, Fan data	FRU (internal)
F530-4417-01	FRU Cable, Fan paddle	FRU (internal)
F530-3880-01	Cable, Assembly, Ethernet, Shielded, RJ45-RJ45, 6m	CRU (external)
F530-3883-01	FRU,2M,4X Mini SAS Cable	CRU (external)

7320 I/O Components

The following figure and legend identify the I/O components of the storage controller.

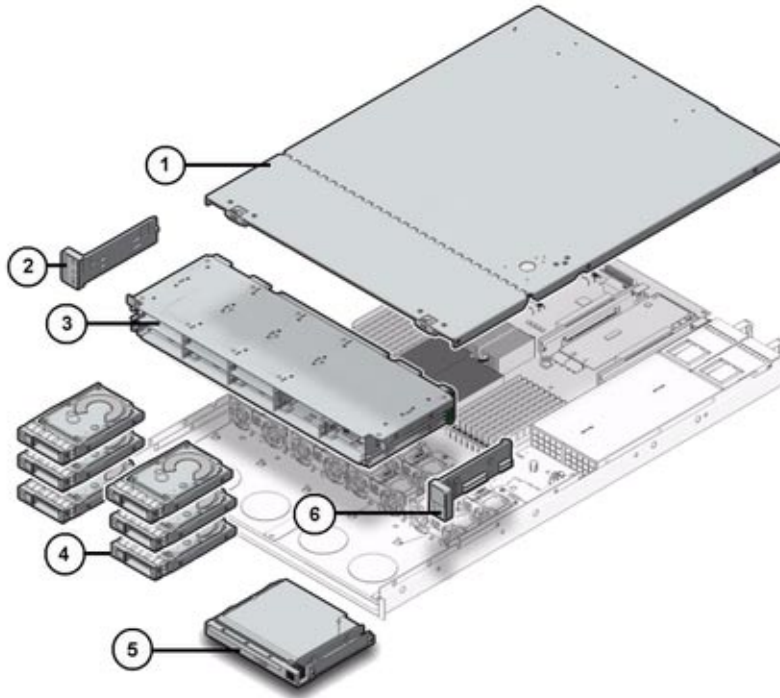


Figure Legend

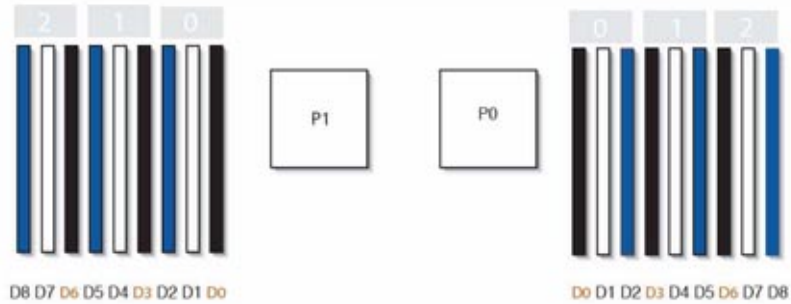
1 Top cover	2 Left Control Panel Light Pipe Assembly
3 Drive Cage	4 Solid State Drives
5 blank/USB Module	6 Right Control Panel Light Pipe Assembly

7320 CPU and Memory Components

The following list contains the replaceable CPU and memory components of the 7320.

Part Number	Description	FRU/CRU
F371-4966-01	DIMM, 8GB, DDR3, 2RX4, 13	CRU
F371-4885-01	Intel E5620, 2.40G	FRU

The storage controller motherboard has 18 slots in two groups that hold industry-standard DDR3 DIMM memory cards. All sockets must be occupied by either a filler or a DDR3 DIMM.



7320 Power Distribution and Fan Module Components

The following figure and legend identify the Power Distribution/Fan Module components of the storage controller.

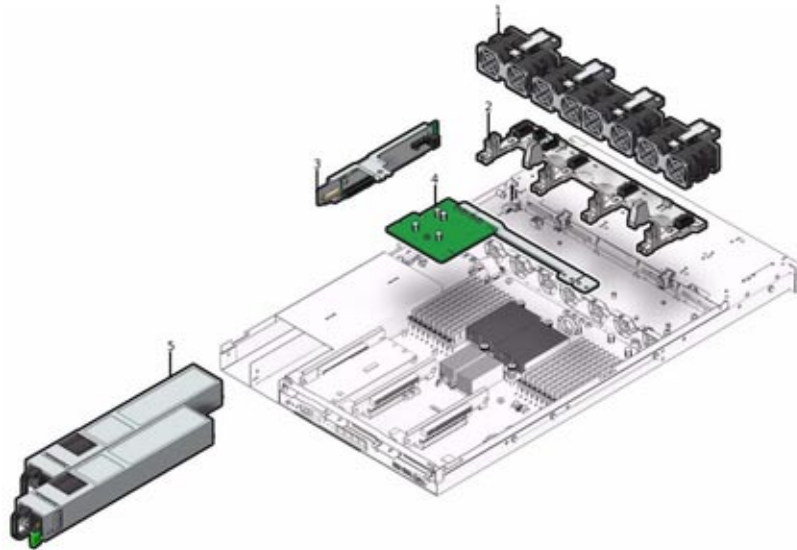


Figure Legend

1 Fan Modules	4 Power Distribution/Bus Bar Assembly
2 Fan Board	5 Power Supplies

Figure Legend

3 Paddle Board

Electrical Specifications

The following list shows the electrical specifications for the 7320.

Note: The power dissipation numbers listed are the maximum rated power numbers for the power supply. The numbers are not a rating of the actual power consumption of the appliance.

Connectors

- Two C13 connectors which work on 110-220v outlets

Input

- Nominal frequencies: 50/60Hz
- Nominal voltage range: 100-120/200-240 V AC
- Maximum current AC RMS: 9.0 amps Max
- AC operating range: 90-264 V AC

Output

- 3.3 VDC STBY: 3.6A
- +12 VDC: 62.3A

Power dissipation

- Max power consumption: 873 W
- Max heat output: 2977 BTU/hr
- Volt-Ampere rating: 891 VA @ 240 VAC, 0.98P.F.

7320 Front Panel

The following figure and legend identify the front panel LEDs.

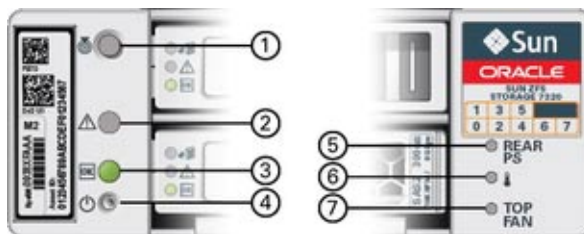


Figure Legend

- 1** Locate Button/LED

- 2** Service Required LED (amber)

- 3** Power/OK LED (green)

- 4** Power Button

- 5** Rear Power Supply

- 6** System Overtemperature LED

- 7** Top Fan

The following figure and legend identify the 7320 front panel drive locations. Two mirrored hard disk drives (HDDs) that store the operating system reside in slots 0 and 1. Up to four solid state drives (ReadZilla SSDs), which store the read cache, fill slots 2 through 5, in order. Slots 6 and 7 are empty and must contain drive fillers.



Disk Drive Locations

HDD1	HDD3	HDD5		
HDD0	HDD2	HDD4	HDD6	HDD7

7320 Replaceable Components

The following list contains all of the replaceable power distribution, disk, and fan module components of the 7320. Note that power supplies, disks, and fan modules are hot-pluggable on the storage controller.

Part Number	Description	FRU/CRU
F300-2233-02	RoHS 760W Power Supply	CRU
F541-2075-04	Buss Bar Power, 1U	FRU
F542-0184-01	DR, 3Gb SATA	CRU
F542-0330-01	2.5" 512GB ReadZilla SSD	CRU

Part Number	Description	FRU/CRU
F541-276-01	ASSY,FAN Module	CRU
F541-4274-02	Fan Board (1U)	FRU

7320 PCIe Cards and Risers

Following is the complete list of replaceable PCIe cards for the 7320 system.

Part Number	Description	FRU/CRU
F371-4325-01	8Gb FC HBA (PCIe)	CRU
F375-3609-02	PCA, SAS 6GBS 8 Port (PCIe)	CRU
F375-3606-03	Dual Port (x4) IB HCA (PCIe)	CRU
F375-3696-01	Dual Port CX2 4XQDR (PCIe)	CRU
F375-3617-01	2X10GbE SFP+, X8 (PCIe)	CRU
F375-3481-01	NIC Card Quad Port 1GigE Cu (PCIe)	CRU
F511-1496-04	Sun Fishworks Cluster Controller 200 (PCIe)	FRU

7320 Rear Panel

Following is an illustration of the 7320 storage controller rear panel. The Sun 375-3609 belongs in slot 2, cannot be installed in any other slots, and a second is not offered as an option.

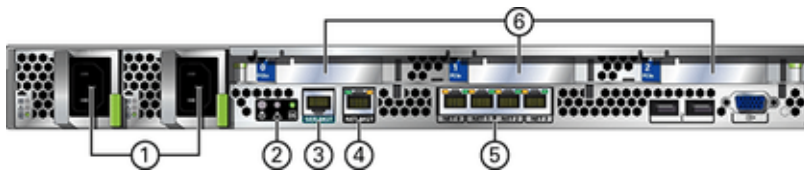


Figure Legend

1 Power supplies	4 Network management port
2 SC summary status LEDs	5 Ethernet ports
3 Serial management port	6 PCIe slots

7320 Single and Cluster Controller Configurations

The single controller base configuration is 96GB RAM, 2x2.4GHz Quad-Core processors, one external SAS HBA, and four 10/100/1000 Ethernet ports.

The following table describes base configurations for the 7320.

Mktg Part Number	Description	Mfg Part Number
TA7320-24A	S7320, 2xCPU, 24GB, Single	597-1060-01
7104054	S7320, 2xCPU, 96GB, Single	7045900
TA7320-24A-HA	S7320, 2xCPU, 24GB, Cluster	597-1061-01
7104055	S7320, 2xCPU, 96GB, Cluster	7045903

Following are the PCIe configuration options for a single controller. All PCIe cards are low profile and must be fitted with low-profile mounting brackets.

Slot	Type	Part Number	Vendor Part	Description	Note
0	PCIe	375-3617-01	Intel Niantic	DP Optical 10GE NIC	Optional Recommended Front-end
0	PCIe	375-3696-01	Mellanox	InfiniBand HCA	Optional Recommended Front-end
0	PCIe	375-3606-03	MHJH29-XTC	InfiniBand HCA	Optional Recommended Front-end
0	PCIe	375-3481-01	Intel EXPI9404PT	QP Copper NIC	Optional Recommended Front-end
0	PCIe	371-4325-01	QLogic	8Gb DP FC HBA	Optional FC Target or Initiator (Backup)
1	PCIe	375-3617-01	Intel Niantic	DP Optical 10GE NIC	Optional Recommended Front-end
1	PCIe	375-3696-01	Mellanox	InfiniBand HCA	Optional Recommended Front-end
1	PCIe	375-3606-03	MHJH29-XTC	InfiniBand HCA	Optional Recommended Front-end
1	PCIe	375-3481-01	Intel EXPI9404PT	QP Copper NIC	Optional Recommended Front-end
1	PCIe	371-4325-01	QLogic	8Gb DP FC HBA	Optional FC Target or Initiator (Backup)
2	PCIe	375-3609-03	Sun Thebe	External SAS HBA	Base Configuration

7320 Cluster Configurations

The 7320 cluster base configuration is 96GB RAM, 2x2.4GHz Quad-Core processors, one external SAS HBA, and four 10/100/1000 Ethernet ports, and a Cluster card. The Sun Storage 7420C Cluster Upgrade Kit (XOPT 594-4680-01) contains two cluster cards with cables for converting two 7320 or two 7420 controllers to a cluster.

The following options are available for clustered storage controllers.

Note: When you cluster a 7320, you must identically configure the cards in both of the clustered storage controllers, and you must identically configure all optional NIC/HBA cards used in the clustered storage controllers in both chassis.

Slot	Type	Part Number	Vendor Part	Description	Note
0	PCIe	375-3617-01	Intel Niantic	DP Optical 10GE NIC	Optional Recommended Front-end
0	PCIe	375-3696-01	Mellanox	InfiniBand HCA	Optional Recommended Front-end
0	PCIe	375-3606-03	MHJH29-XTC	InfiniBand HCA	Optional Recommended Front-end
0	PCIe	375-3481-01	Intel EXPI9404PT	QP Copper NIC	Optional Recommended Front-end
0	PCIe	371-4325-01	QLogic	8Gb DP FC HBA	Optional FC Target or Initiator (Backup)
1	PCIe	542-0298-01	Sun	Fishworks Cluster Card 2	Cluster Base Configuration
2	PCIe	375-3609-03	Sun Thebe	External SAS HBA	Cluster Base Configuration

7320 Connector Pinouts

The serial management connector (SERIAL MGT) is an RJ-45 connector and is a terminal connection to the SP console.



The network management connector (NET MGT) is an RJ-45 connector on the motherboard and provides an alternate terminal interface to the SP console.



There are four RJ-45 Gigabit Ethernet connectors (NET0, NET1, NET2, NET3) located on the motherboard that operate at 10/100/1000 Mbit/sec. These network interfaces must be configured before use.

Attached Storage

The 7320 single and cluster controller configurations allow a single chain of one to six [disk shelves](#). Any combination of disk-only and Logzilla-capable shelves may be combined within the chain in any order. The cabling configurations are unchanged. Half-populated shelf configurations are not supported.

See Also

- Controller Details
- [Disk Shelf Overview](#)
- Disk Shelf Maintenance Procedures

7420

7420 Hardware Overview

Use the information on this page as a preparation reference for servicing replaceable components of 7420 controllers.

Refer to the following for procedural instructions:

- Controller Tasks - replace system controller components
- Disk Shelf Tasks - replace disk shelf components

Appliance Overview

The Sun ZFS Storage 7420 Appliance consists of a standalone storage controller, or two storage controllers in a high-availability cluster configuration, and one to 36 disk shelves. The following table describes the 7420 configuration options:

Note: 7420 M2 controllers cannot be clustered with 7420 controllers.

Product ID	Mktg Part Number	CPU	DIMMs	Readzilla	Boot Drive	Mfg Part Number
7420 M2	7107089	4x8-core, 2.0GHz	8GB, 16GB	1.6TB SAS	900GB SAS	7075466
7420 M2	7107090	4x10-core, 2.40GHz	8GB, 16GB	1.6TB SAS	900GB SAS	7075470
7420	7100566	4x8-core, 2.0GHz	8GB, 16GB	512GB SATA	500GB SATA	7014572
7420	7100568	4x10-core, 2.40GHz	8GB, 16GB	512GB SATA	500GB SATA	7014573

You can identify your configuration by looking at the product id on the BUI Maintenance screen or by using the CLI configuration version show command. You can also check the physical label on the boot drive, as shown in the [boot drive illustration below](#).

Refer to <http://oracle.com/ZFSStorage> (<http://oracle.com/ZFSStorage>) for the most recent component specification.

Chassis

The 3U chassis form factor dimensions are as follows:

Dimension	Measurement	Dimension	Measurement
Height	13.3 cm/5.25 in	Depth	70.6 cm/27.8 in
Width	43.7 cm/17.19 in	Weight	16.36 kg/96 lbs

Front Panel

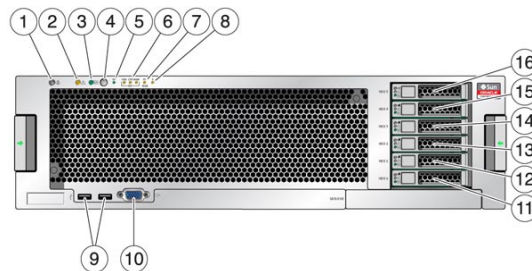


Figure Legend

1 Locator LED and button (white)	7 Power Supply (PS) Service Required LED	13 SSD 2 (optional)
2 Service Required LED (amber)	8 Over Temperature Warning LED	14 SSD 3 (optional)
3 Power/OK LED (green)	9 USB 2.0 Connectors	15 SSD 4 (optional)
4 Power button	10 DB-15 video connector	16 SSD 5 (optional)
5 Service Processor (SP) OK LED (green)	11 Boot drive 0 (mirrored)	
6 Fan/CPU/Memory Service Required LED	12 Boot drive 1 (mirrored)	

System Drives

The 7420 M2 has two 900GB SAS-2 system boot drives in slots 0 and 1, configured as a mirrored pair. Up to four 1.6TB SAS-2 Readzilla SSDs may fill slots 2 through 5, in order. In a 7420 M2 cluster, the number of solid state drives (SSDs) installed in each controller can vary.

7420 controllers have two 500GB SATA system boot drives in slots 0 and 1, configured as a mirrored pair. Zero, two, three, or four 512GB SSDs, may optionally fill slots 2 through 5, in order. In a 7420 cluster, the number of SSDs installed in both controllers must match.

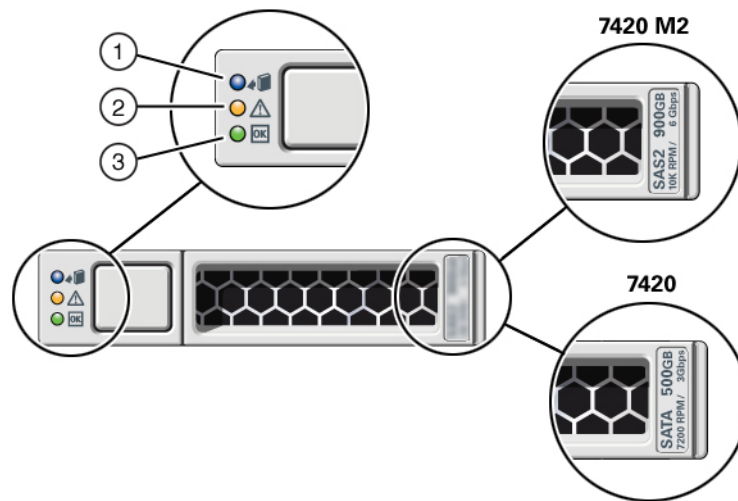


Figure Legend

1 Locate (white) 2 Service action required (amber) 3 OK/Activity (green)

Rear Panel

The following graphic shows the rear panel of the controller. Base configuration HBAs are not depicted in this illustration.

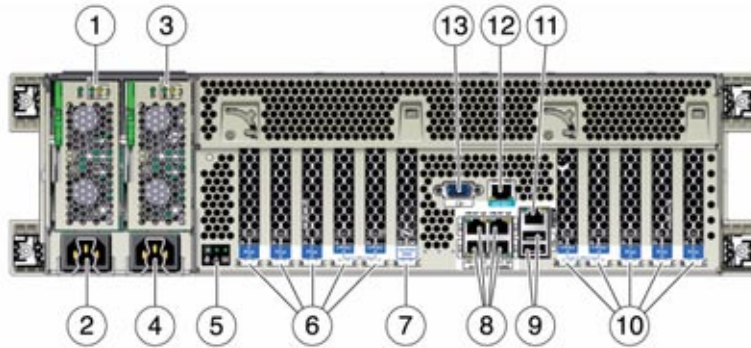


Figure Legend

1 Power supply unit 0 status LEDs OK: green Power Supply Fail: amber AC OK: green	8 Network (NET) 10/100/1000 ports: NET0-NET3
2 Power supply unit 0 AC inlet	9 USB 2.0 ports
3 Power supply unit 1 status LEDs OK: green Power Supply Fail: amber AC OK: green	10 PCIe slots 5-9
4 Power supply unit 1 AC inlet	11 Network management (NET MGT) port
5 System status LEDs Power: green Attention: amber Locate: white	12 Serial management (SER MGT) port
6 PCIe slots 0-4	13 DB-15 video connector
7 Cluster card slot	

Connectors

The serial management connector (SER MGT) is an RJ-45 connector and provides a terminal connection to the SP console.



The network management connector (NET MGT) is an RJ-45 connector and provides a LAN interface to the SP console.



There are four RJ-45 Gigabit Ethernet connectors (NET0, NET1, NET2, NET3) located on the motherboard that operate at 10/100/1000 Mbit/sec. These network interfaces must be configured before use.

Electrical Specifications

The following list shows the electrical specifications for 7420 controllers.

Note: The power dissipation numbers listed are the maximum rated for the power supply and are not a rating of the actual power consumption of the appliance.

Input

- Nominal frequencies: 50/60Hz
- AC operating range: 100-127 VAC for 2 CPUs and 200-240 VAC for 2 or 4 CPUs
- Maximum current AC RMS: 12A @ 100 VAC / 12A @ 200 VAC

Power Dissipation

- Max power consumption: 1800 W
- Max heat output: 6143 BTU/hr
- Volt-Ampere rating: 1837 VA @ 240 VAC, 0.98 P.F.

Internal Boards

The 7420 controller chassis has the following boards installed. Field-replaceable units (FRUs) should only be replaced by trained Oracle service technicians.

- **Motherboard** - The motherboard is a FRU and includes CPU modules, slots for eight DIMM risers, memory control subsystems, and the service processor (SP) subsystem. The SP subsystem controls the host power and monitors host system events (power and environmental). The SP controller draws power from the host's 3.3V standby supply rail, which is available whenever the system is receiving AC input power, even when the system is turned off.
- **Power Distribution Board** - The power distribution board is a FRU and distributes main 12V power from the power supplies to the rest of the system. It is directly connected to the Vertical PDB card, and to the motherboard through a bus bar and ribbon cable. It also supports a top cover interlock ("kill") switch. In the storage controller, the power supplies connect to the power supply backplane which connects to the power distribution board.
- **Vertical PDB Card** - The vertical power distribution board, or Paddle Card is a FRU and serves as the interconnect between the power distribution board and the fan power boards, hard drive backplane, and I/O board.
- **Power Supply Backplane Card** - This board connects the power distribution board to power supplies 0 and 1.

- **Fan Power Boards** - The two fan power boards are FRUs and carry power to the storage controller fan modules. In addition, they contain fan module status LEDs and transfer I2C data for the fan modules.
- **Drive Backplane** - The six-drive backplane is a FRU and includes the connectors for the drives, as well as the interconnect for the I/O board, Power and Locator buttons, and system/component status LEDs. Each drive has an LED indicator for Power/Activity, Fault, and Locate.

Components

The controller components are shown in the following figure and identified in the table.

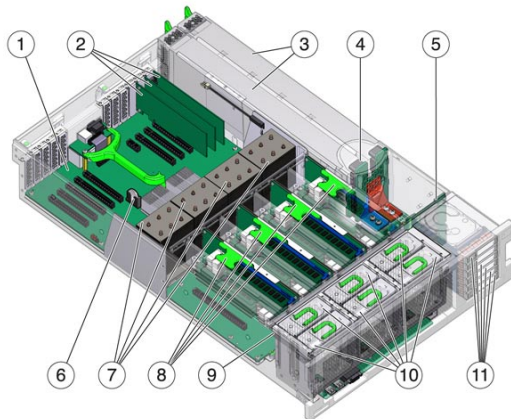


Figure Legend

1 Motherboard	7 CPUs and heatsinks
2 Low-profile PCIe cards	8 Memory risers
3 Power supplies	9 Fan board
4 Power supply backplane	10 Fan modules
5 Drive backplane	11 Boot drives and SSDs
6 System lithium battery	

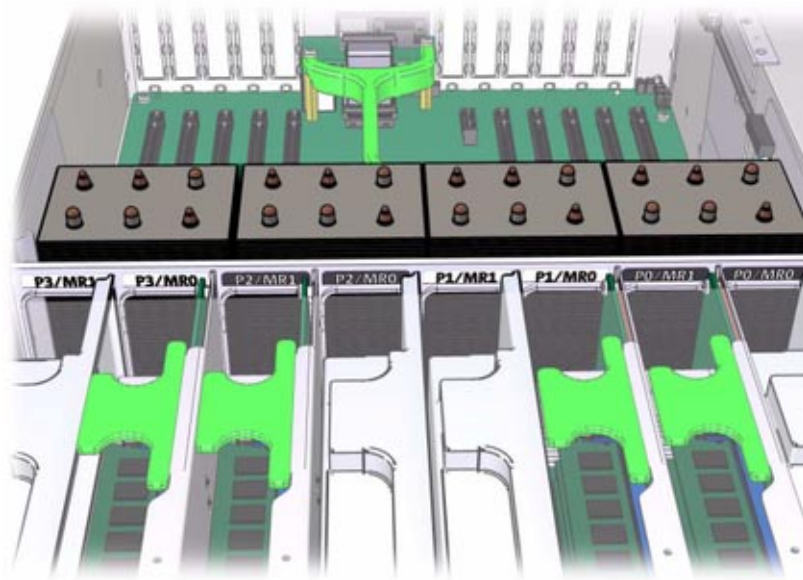
CPU and Memory

The 7420 controller supports the following configurations:

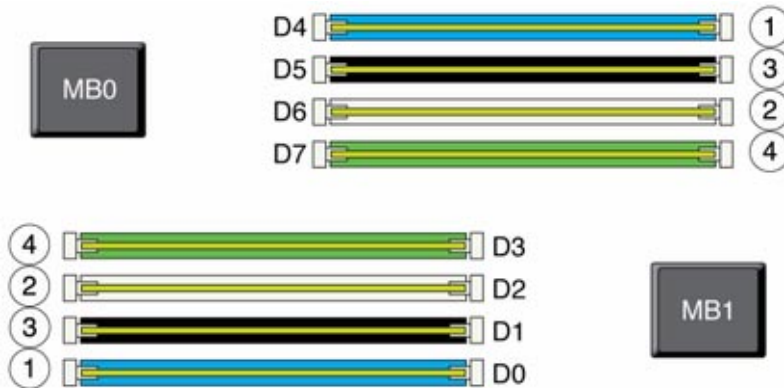
- Two, four, or eight 8GB DDR3 DIMMs installed on each riser, accommodating 128GB, 256GB, or 512GB of memory for 2.0Ghz CPUs.
- Four or eight 8GB DDR3 DIMMs installed on each riser, accommodating 256GB or 512GB of memory for 2.0GHz and 2.4GHz CPUs.
- Four or eight 16GB DDR3 DIMMs installed on each riser, accommodating 512GB or 1TB of memory for 2.4GHz CPUs.

Note: For proper cooling, memory risers corresponding to unpopulated CPU sockets must have fillers installed.

Previous 7420 controller configurations support two or four (1.86GHz or 2.00GHz) CPUs, with two memory risers required by each CPU. Four or eight 4GB or 8GB DDR3 DIMMs are installed on each riser, accommodating up to 256GB of memory for two CPUs, or up to 512GB for four CPUs.



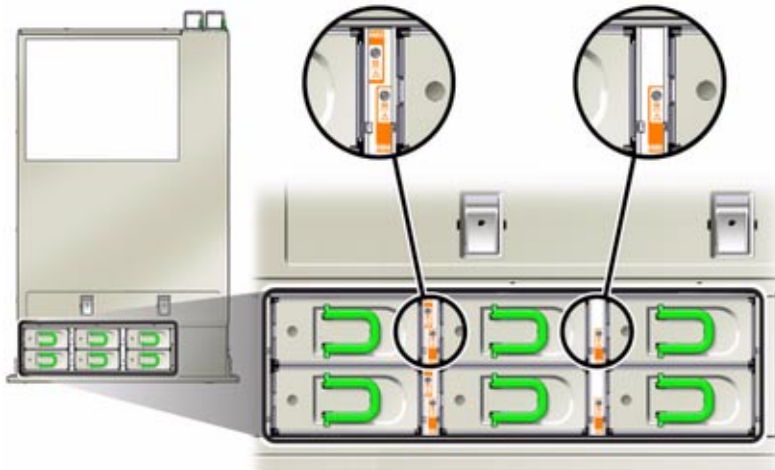
Refer to the service label on the cover for DIMM placement information. On every memory riser, slots D0, D2, D4, and D6 must be populated; optionally, slots D1, D3, D5, and D7 may be populated as a group on **all** installed memory risers. All DIMMs in the system **must be identical**.



DIMM names in appliance logs and the Maintenance > Hardware view are displayed with the full name, such as /SYS/MB/P0/D7.

Fan Modules

The Fan Modules and Fan Module LEDs of the storage controller are shown in the following figure. The following LEDs are lit when a fan module fault is detected:



- Front and rear Service Action Required LEDs
- Fan Module Service Action Required (TOP) LED on the front of the server
- Fan Fault LED on or adjacent to the faulty fan module

The system Overtemp LED might light if a fan fault causes an increase in system operating temperature.

NIC/HBA Options

This table describes NIC/HBA PCIe card options for standalone and cluster configurations.

Mktg Part Number	Description	Mfg Part Number
SGX-SAS6-INT-Z	8-port 6Gb/s SAS-2 internal HBA	7054001
SG-XPCIE2FC-QF8-Z	2-port 8Gb FC HBA	371-4325-02
SG-XPCIESAS-GEN2-Z	2-port SAS (x4) external HBA	F375-3609-03
7105394	2-port SAS (x4) external HBA for EU countries	7059331
X4446A-Z-N	4-port GigE UTP	7054739
X4242A	2-port CX2 4xQDR, HCA	594-6776-01
X1109A-Z	2-port 10GbE SFP+ NIC	7051223
X2129A	XCVRm 850NM, 1/10GPS, Short Reach, SFP	7015839
X5562A-Z	10GbE/1GbE SFP+ Transceiver, LR	594-6689-01

PCIe Options

The 7420 controller has ten PCIe slots. This table describes base and optional PCIe card slots for standalone and cluster configurations.

Note: The 7420 M2 reserves slot 0 for a SAS-2 internal HBA, and slots 1 and 8 for two SAS-2 external HBAs.

Slot	Mfg Part Number	Description	Max	Note
0	7054001	8-port 6Gb/s SAS-2 internal HBA	1	Slot 0 of the 7420 M2 is reserved for the SAS-2 internal HBA
0	371-4325-02	8Gb 2-port FC HBA	6	Optional FC target or initiator (Backup) for the 7420 controller
0	7051223	2-port optical 10GbE NIC	6	Optional recommended front-end for the 7420 controller
0	7054739	4-port copper NIC	6	Optional recommended front-end for the 7420 controller
1	F375-3609-03 (7059331 for EU countries)	2-port SAS external HBA	6	Base configuration (2 minimum)
2	F375-3609-03 (7059331 for EU countries)	2-port SAS external HBA	6	Additional optional back-end
2	7054739	4-port copper NIC	6	Optional recommended front-end

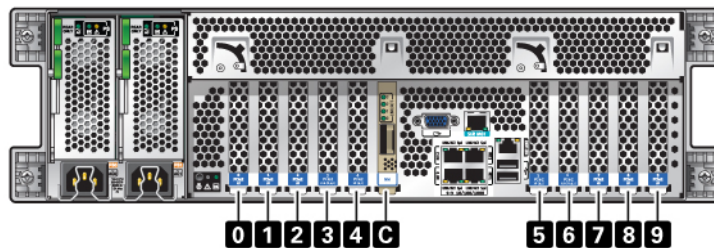
Slot	Mfg Part Number	Description	Max	Note
2	371-4325-02	8Gb DP FC HBA	6	Optional FC target or initiator (Backup)
2	375-3606-03	CX1 Infiniband HCA	4	Optional recommended front-end
2	7051223	2-port optical 10GE NIC	6	Optional recommended front-end
2	375-3696-01	CX2 Infiniband HCA	4	Optional recommended front-end
3	F375-3609-03 (7059331 for EU countries)	2-port SAS external HBA	6	Additional optional back-end
3	7054739	4-port copper NIC	6	Optional recommended front-end
3	371-4325-02	8Gb 2-port FC HBA	6	Optional FC target or initiator (Backup)
3	375-3606-03	CX1 Infiniband HCA	4	Optional recommended front-end
3	7051223	2-port optical 10GE NIC	6	Optional recommended front-end
3	375-3696-01	CX2 Infiniband HCA	4	Optional recommended front-end
4	7054739	4-port copper NIC	6	Optional recommended front-end
4	375-3606-03	CX1 Infiniband HCA	4	Optional recommended front-end
4	7051223	2-port optical 10GE NIC	6	Optional recommended front-end
4	371-4325-02	8Gb 2-port FC HBA	6	Optional FC target or initiator (Backup)
4	375-3696-01	CX2 Infiniband HCA	4	Optional recommended front-end
C	7056175	Cluster Controller 200	1	Cluster base configuration
5	7054739	4-port copper NIC	6	Optional recommended front-end
5	375-3606-03	CX1 Infiniband HCA	4	Optional recommended front-end
5	7051223	2-port optical 10GE NIC	6	Optional recommended front-end
5	371-4325-02	8Gb 2-port FC HBA	6	Optional FC target or initiator (Backup)
5	375-3696-01	CX2 Infiniband HCA	4	Optional recommended front-end
6	F375-3609-03 (7059331 for EU countries)	2-port SAS external HBA	6	Additional optional back-end
6	7054739	4-port copper NIC	6	Optional recommended front-end
6	371-4325-02	8Gb 2-port FC HBA	6	Optional FC target or initiator (Backup)
6	375-3606-03	CX1 Infiniband HCA	4	Optional recommended front-end
6	7051223	2-port optical 10GE NIC	6	Optional recommended front-end

Slot	Mfg Part Number	Description	Max	Note
6	375-3696-01	CX2 Infiniband HCA	4	Optional recommended front-end
7	F375-3609-03 (7059331 for EU countries)	DP SAS external HBA	6	Additional optional back-end
7	7054739	4-port copper NIC	6	Optional recommended front-end
7	371-4325-02	8Gb 2-port FC HBA	6	Optional FC target or initiator (Backup)
7	375-3606-03	CX1 Infiniband HCA	4	Optional recommended front-end
7	7051223	2-port optical 10GE NIC	6	Optional recommended front-end
7	375-3696-01	CX2 Infiniband HCA	4	Optional recommended front-end
8	F375-3609-03 (7059331 for EU countries)	2-port SAS external HBA	6	Base configuration (2 minimum)
9	371-4325-02	8Gb 2-port FC HBA	6	Optional FC target or initiator (Backup)
9	7051223	2-port optical 10GbE NIC	6	Optional recommended front-end
9	7054739	4-port copper NIC	6	Optional recommended front-end

PCIe Slot Order

When installing additional PCIe cards to your base 7420 configuration, cards must be added in a specific order.

Note: The 7420 M2 reserves slot 0 for a SAS-2 internal HBA, and slots 1 and 8 for two SAS-2 external HBAs (see [PCIe Options](#)).



Install optional PCIe cards in the following order:

PCIe Card	Slot Order
1. SAS-2 external HBA	Slot 2, 7, 3, 6
2. 8Gb FC HBA	Slot 9
Additional FC HBAs are installed last	
3. Infiniband HCAs	Slot 7, 2, 6, 3, 5, 4
4. 10Gb Ethernet	Slot 7, 2, 6, 3, 5, 4, 0 (not available for 7420 M2), 9
5. Quad 1Gb Ethernet	Slot 7, 2, 6, 3, 5, 4, 0 (not available for 7420 M2), 9
6. Remaining 8Gb FC HBAs	Slot 7, 2, 6, 3, 5, 4, 0 (not available for 7420 M2)

Attached Storage

Primary storage for 7420 controllers is provided by one to six chains of attached storage. Each chain consists of up to six HDD-only or SSD-capable [disk shelves](#), combined in any order.

See [Disk Shelf Overview](#) for component specifications and diagrams.

Shelf

Disk Shelf Overview

Oracle disk shelves are high-availability serial attached SCSI (SAS) devices that provide expanded storage. The main components are hot-swappable, including drives, I/O Modules (IOMs) or SAS Interface Module (SIM) boards for connecting to controllers and other disk shelves, and dual load-sharing power supply with fan modules. This provides a fault-tolerant environment with no single point of failure. Component status is indicated with lights on the disk shelf, and in the Maintenance > Hardware screen of the BUI.

Refer to Disk Shelf Tasks for procedural information about replacing disk shelf components.

Oracle Storage Drive Enclosure DE2-24P



The Oracle Storage Drive Enclosure DE2-24P is a 2U chassis that supports 24 2.5" SAS-2 drives. The high-performance HDDs provide reliable storage, and the SSDs provide accelerated write operations. This disk shelf features dual, redundant I/O Modules (IOMs), and dual power supply with fan modules.

Oracle Storage Drive Enclosure DE2-24C



The Oracle Storage Drive Enclosure DE2-24C is a 4U chassis that supports 24 3.5" SAS-2 drives. The SSDs provide accelerated write operations, and the high-capacity HDDs provide reliable storage. This disk shelf features dual, redundant I/O Modules (IOMs), and dual power supply with fan modules.

Sun Disk Shelf 24x3.5" SAS-2



The Sun Disk Shelf is a 4U chassis that supports 24 3.5" SAS-2 drives. The SSDs provide accelerated write operations, and the high-capacity HDDs provide reliable storage. This disk shelf features dual, redundant SAS Interface Module (SIM) boards, and dual power supply with fan modules.

SAS-2

The SAS-2 (Serial Attached SCSI 2.0) storage fabric supports a greater number of targets, greater bandwidth, higher reliability and bigger scale. The scale and reliability improvements are achieved with SAS-2 disks you can daisy-chain to as many as 36 shelves for certain systems, for a total of 864 disks. In addition, the high-performance SAS-2 HBA is designed for the Sun ZFS Storage 7000 series with a standard chip set to support a high-density of target devices, capable of attachment to 1024 targets.

With this fabric, you are encouraged to apply entire shelves to pools, so you can gain the benefits of No Single Point of Failure configurations, and striping across the maximum possible number of devices.

The following shelves implement SAS-2 disks:

- Oracle Storage Drive Enclosure DE2-24P
- Oracle Storage Drive Enclosure DE2-24C
- Sun Disk Shelf

Front Panel

The front panel consists of the drives and indicator lights.

Drive Locations

The following figures show the location of the drives.

Oracle Storage Drive Enclosure DE2-24P



Up to four Logzilla SSDs are supported per disk shelf.

Logzilla SSDs should be populated in order of slots 20, 21, 22, and 23.

Oracle Storage Drive Enclosure DE2-24C and Sun Disk Shelf



Up to four Logzilla SSDs are supported per disk shelf.

Logzilla SSDs should be populated in order of slots 20, 21, 22, and 23. (The Oracle Storage Drive Enclosure DE2-24C is shown and represents both models.)

Front Panel Indicators

The following figures show the front panel indicators.

Oracle Storage Drive Enclosure DE2-24P

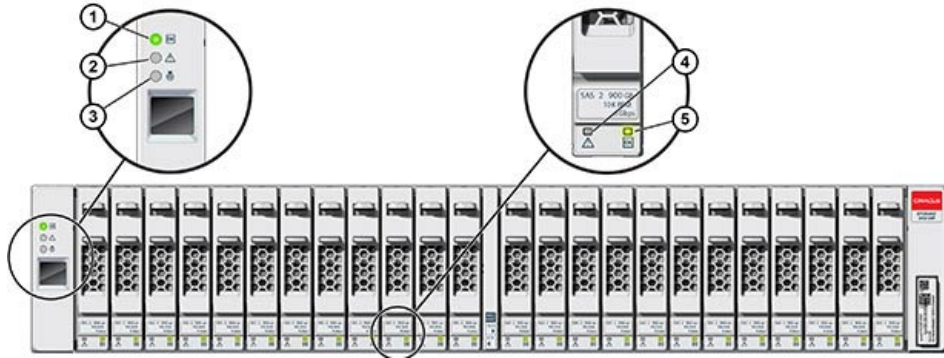


Figure Legend

- | | |
|--------------------------|------------------------------|
| 1 System power indicator | 4 Drive fault indicator |
| 2 Module fault indicator | 5 Power / Activity indicator |
| 3 Locate indicator | |

Oracle Storage Drive Enclosure DE2-24C

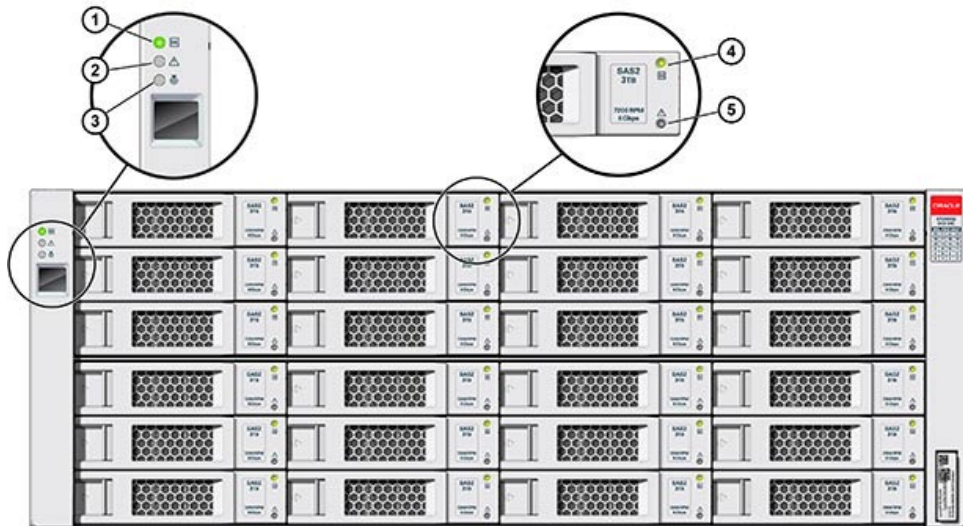


Figure Legend

- | | |
|--------------------------|------------------------------|
| 1 System power indicator | 4 Power / Activity indicator |
| 2 Module fault indicator | 5 Drive fault indicator |
| 3 Locate indicator | |
-

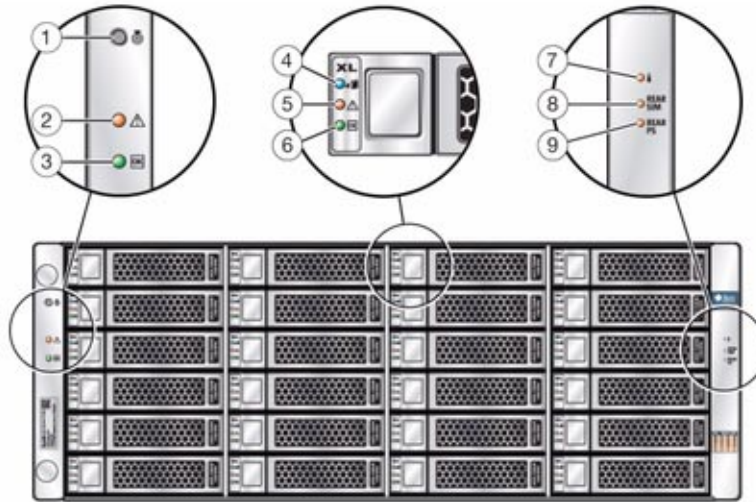
Sun Disk Shelf


Figure Legend

- | | | |
|-------------------------------|--------------------------------------|--------------------------------------|
| 1 Locate button and indicator | 4 Disk ready to be removed indicator | 7 Over temperature warning indicator |
| 2 System fault indicator | 5 Disk fault indicator | 8 SIM board fault indicator |
| 3 System power indicator | 6 Disk activity indicator | 9 Power supply fault indicator |
-

Oracle Storage Drive Enclosure DE2-24P

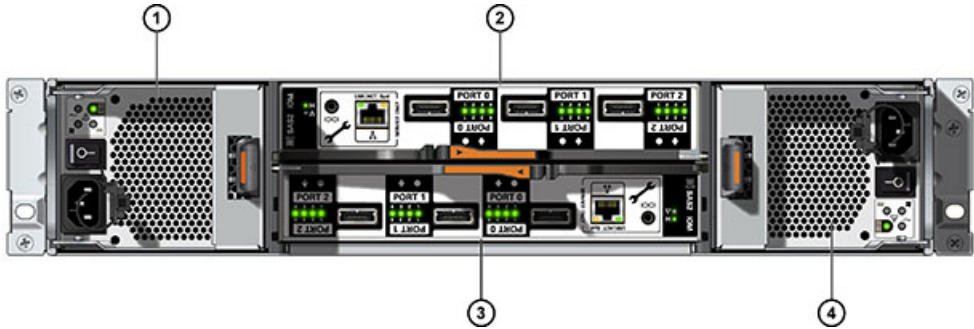


Figure Legend

- | | |
|----------------------------------|----------------------------------|
| 1 Power Supply with Fan Module 0 | 3 I/O Module 0 |
| 2 I/O Module 1 | 4 Power Supply with Fan Module 1 |

Oracle Storage Drive Enclosure DE2-24C

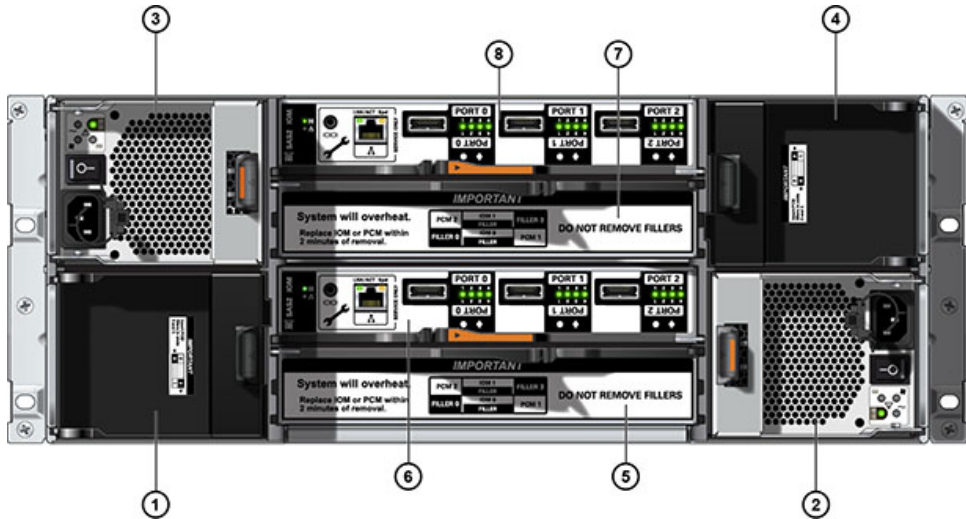


Figure Legend

- | | | |
|-------------------------------------|-------------------------------------|---------------------------|
| 1 Power Supply Filler Panel, Slot 0 | 4 Power Supply Filler Panel, Slot 3 | 7 I/O Module Filler Panel |
| 2 Power Supply with Fan Module 1 | 5 I/O Module Filler Panel | 8 I/O Module 1 |
| 3 Power Supply with Fan Module 2 | 6 I/O Module 0 | |

Note: It is especially important that power supplies and their filler panels are in the correct slots.

Sun Disk Shelf

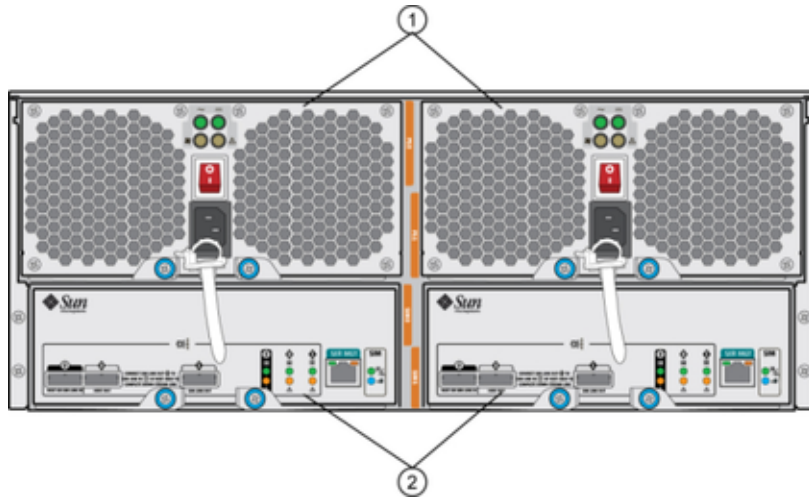


Figure Legend

1 Power supply modules with built-in fans. Power supply 0 is on the left and power supply 1 is on the right.

2 Removable SAS Interface Module (SIM) Boards. SIM 0 is on the left, and SIM 1 is on the right.

I/O Module Indicators

The following disk shelves have I/O Modules (IOMs):

- Oracle Storage Drive Enclosure DE2-24P
- Oracle Storage Drive Enclosure DE2-24C

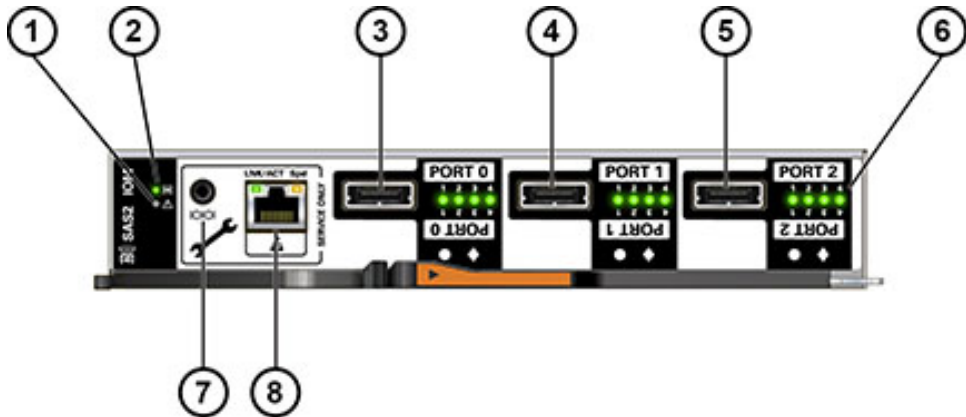


Figure Legend

1 Fault / Locate indicator	4 SAS-2 Port 1	7 For Oracle service only
2 Power / OK indicator	5 SAS-2 Port 2	8 For Oracle service only
3 SAS-2 Port 0	6 Host port activity indicators	

SIM Board Indicators

The following disk shelves have SIM boards:

- Sun Disk Shelf

The following figure shows the SIM board indicators for the Sun Disk Shelf.

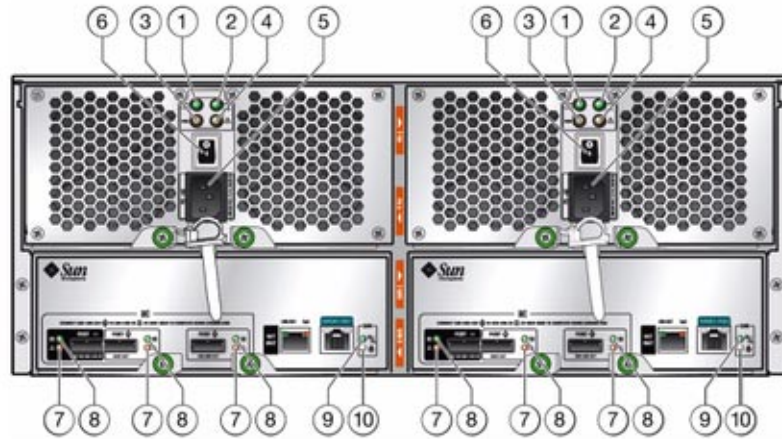


Figure Legend

1 AC power indicator	6 Power switch
2 DC power indicator	7 Port fault indicator
3 Fan fault indicator	8 Port OK indicator
4 Power supply fault indicator	9 SIM board OK indicator (green)/SIM board fault indicator (amber)
5 Universal power connector	10 SIM locator indicator

Power Supply Indicators

The following figure shows power supply with fan module indicators for these disk shelves:

- Oracle Storage Drive Enclosure DE2-24P
- Oracle Storage Drive Enclosure DE2-24C

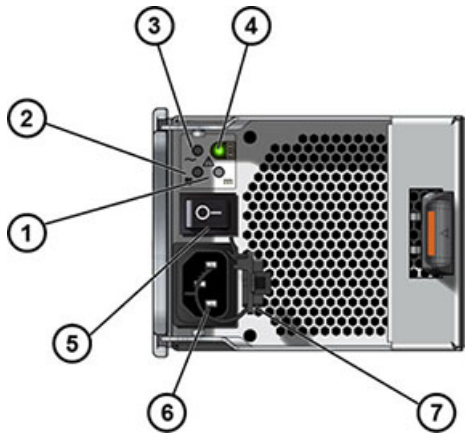


Figure Legend

1 DC power fail indicator	6 Universal power input connector
2 Fan fail indicator	7 Power cord tie wrap
3 AC power fail indicator	
4 Power supply status indicator	
5 Power on/off switch	

The following figure shows power supply with fan module indicators for these disk shelves:

- Sun Disk Shelf

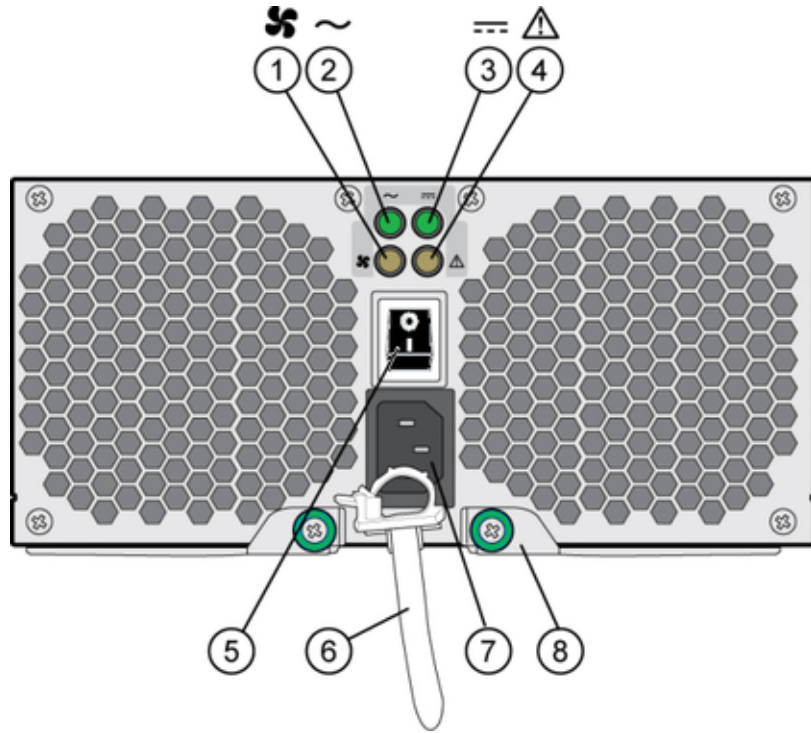


Figure Legend

1 Cooling fan status indicator	6 Power cord tie wrap
2 AC power status indicator	7 Universal power input connector
3 DC power status indicator	8 Right ejection arm and captive screw latch
4 Power supply status indicator	
5 Power on/off switch	

Disk Shelf Configurations

The following tables describe and provide part numbers for the supported expansion storage shelves.

Oracle Storage Drive Enclosure DE2-24P

Mktg Part Number	Description
7103910	Drive Enclosure DE2-24P Base Chassis

Mktg Part Number	Description
7103911	300GB 10Krpm, SAS-2, 2.5" HDD
7103912	900GB 10Krpm, SAS-2, 2.5" HDD
7103915	73GB SSD SAS-2, 2.5" Write Flash Accelerator
7103917	Filler Panel, Drive Enclosure DE2-24P

Oracle Storage Drive Enclosure DE2-24C

Mktg Part Number	Description
7103914	Drive Enclosure DE2-24C Base Chassis
7103913	3TB 7.2Krpm, SAS-2, 3.5" HDD
7103916	73GB SSD XATO SAS-2, 2.5" (2.5" to 3.5" Drive Adapter)
7103918	Filler Panel, Drive Enclosure DE2-24C

Sun Disk Shelf (DS2)

Mktg Part Number	Description
DS2-0BASE	Sun Disk Shelf (DS2) 24x3.5" SAS-2
DS2-HD2T	2TB 7.2Krpm, SAS-2, 3.5" HDD
7101765	3TB 7.2Krpm, SAS-2, 3.5" HDD
7101274	300GB 15Krpm, SAS-2, 3.5" HDD
7101276	600GB 15Krpm, SAS-2, 3.5" HDD
7101197	73GB SSD XATO, 3.5"
DS2-LOGFILLER	Sun Disk Shelf (DS2) 24x3.5", LOGFiller
DS2-4URK-19U	Disk Shelf Rail Kit

Installation

Installation



Installation

This section addresses how to physically install the system chassis into a rack, connect controllers in a high-availability cluster, and expand storage. The following topics are described.

- [Overview](#)
- [Controllers](#)
- [ZS3-2](#)
- [ZS3-4](#)
- [7x20 family](#)
- [Attached Storage](#)
- [Oracle Storage Disk Shelf DE2-24C](#)
- [Oracle Storage Disk Shelf DE2-24P](#)
- [Sun Disk Shelf](#)
- [Connecting to Attached Storage](#)
- [Powering on](#)
- [Initial configuration](#)

Overview

Precautions

Observe the following cautions when installing any Oracle ZFS Storage controller or cabinet.

- Always load equipment into a rack from the bottom up so that it will not become top-heavy and tip over. Deploy the anti-tip bar to prevent the rack from tipping during equipment installation.
- Ensure that the temperature in the rack does not exceed the controller's maximum ambient rated temperatures. Consider the total airflow requirements of all equipment installed in the rack to ensure that the equipment is operated within its specified temperature range.
- For best results, only qualified Oracle service personnel should perform cluster installation and configuration. Contact Oracle Service for assistance.

Prerequisites

Refer to the Quick Setup poster that shipped with the product or the following hardware service sections for an overview of your system controller or cabinet.

- [ZS3-2 Overview](#) - view component diagrams and specifications
- [ZS3-4 Overview](#) - view component diagrams and specifications
- [7120 Overview](#) - view component diagrams and specifications
- [7320 Overview](#) - view component diagrams and specifications, and cluster options
- [7420 Overview](#) - view component diagrams, specifications, and cluster options

For controller installation, check that your rack is compatible with the slide rail and cable management assembly options as follows:

- The structure is a four-post rack with mounting at both front and back. Two-post racks are *not* compatible.
- The horizontal opening and unit vertical pitch conforms to ANSI/EIA 310-D-1992 or IEC 60927 standards.
- The distance between the front and back mounting planes is between 24 in and 36 in (610 mm to 915 mm).
- The distance to the front cabinet door, providing clearance depth in front of the front mounting plane, is at least 1 in (25.4 mm).
- The distance to the back cabinet door, providing clearance depth behind the front mounting plane, is at least 31.5 in (800 mm) with the cable management assembly, or 27.5 in (700 mm) without the cable management assembly.

- The distance between structural supports and cable troughs, providing clearance width between the front and back mounting planes, is at least 18 in (456 mm).

For cabinet installation, you will need a total distance of at least 15 ft/4.5 m for safe maneuvering when you roll the cabinet off the shipping pallet.

Controller, Cabinet, and Disk Shelf Installation Tasks

The following sections provide controller and disk shelf installation procedures.

- [ZS3-2 controller installation tasks](#)
- [ZS3-4 controller installation tasks](#)
- [7x20 controller installation tasks](#)
- [Disk shelf installation tasks](#)

ZS3-2 Controllers

ZS3-2 Controller Installation Tasks

This section provides steps for installing the Oracle ZFS Storage ZS3-2 controllers into a rack using the rail assembly in the rack mount kit. Note that if your rack mount kit shipped with installation instructions, use those instructions instead.

Observe the following cautions:

- Always load equipment into a rack from the bottom up so that it will not become top-heavy and tip over. Deploy the anti-tip bar to prevent the rack from tipping during equipment installation.
- Ensure that the temperature in the rack will not exceed the controller's maximum ambient rated temperatures. Consider the total airflow requirements of all equipment installed in the rack to ensure that the equipment is operated within its specified temperature range.
- Always use the width spacer alignment tool when installing rails into racks that use cage nuts and mounting screws. Failure to use the spacer can cause the glides and sliders to jam and damage the rail.

Prerequisites

Refer to the Quick Setup poster that shipped with the product or the following sections for an overview of your controller.

- [ZS3-2 Overview](#) - view component diagrams and specifications

Tools and Equipment Needed

To install the system, you need the following tools:

- No. 2 Phillips screwdriver
- ESD mat and grounding strap
- Pencil, stylus, or other pointed device, for pushing front panel buttons

You also need a system console device, such as one of the following:

- Sun workstation
- ASCII terminal
- Terminal server
- Patch panel connected to a terminal server

Tasks

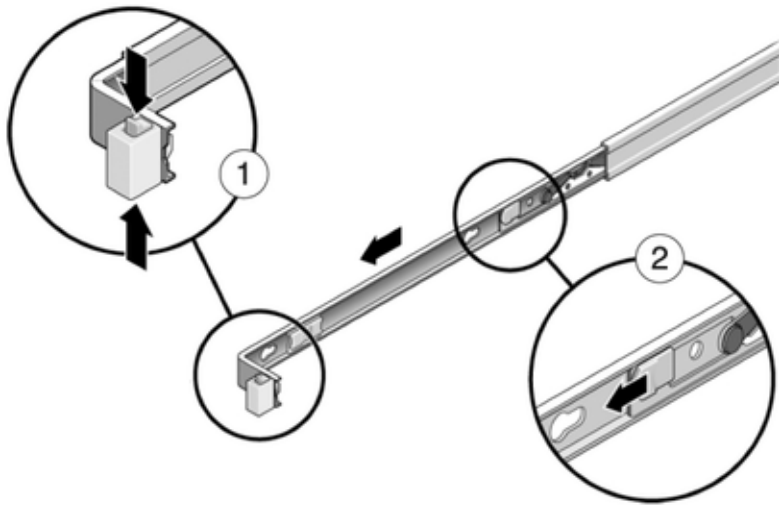
ZS3-2 Controllers Tasks

▼ **Installing the Mounting Brackets and Slide Rail Assemblies**

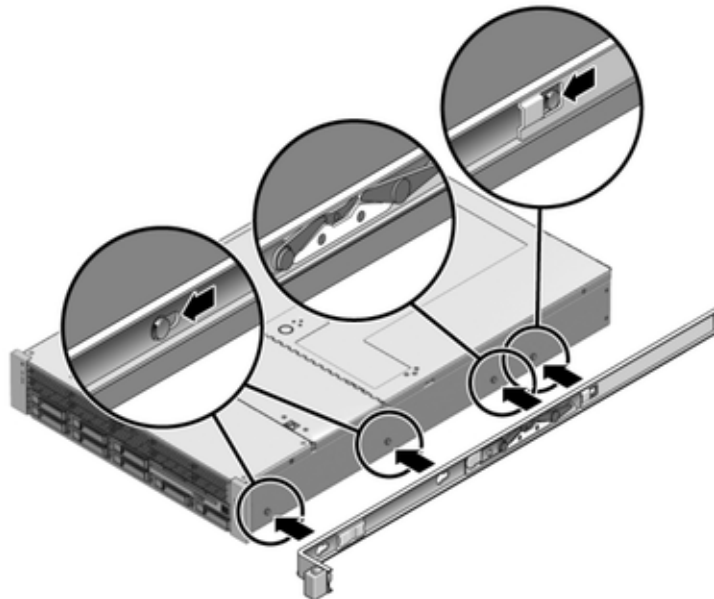
If the mounting brackets are shipped inside the slide rails, you must remove them before beginning this procedure, as follows.

- 1 Unpack the slide rails and locate the slide rail lock at the front of the assembly.**
- 2 Squeeze and hold the tabs at top and bottom of the lock (1) while you pull the mounting bracket out to the stop.**

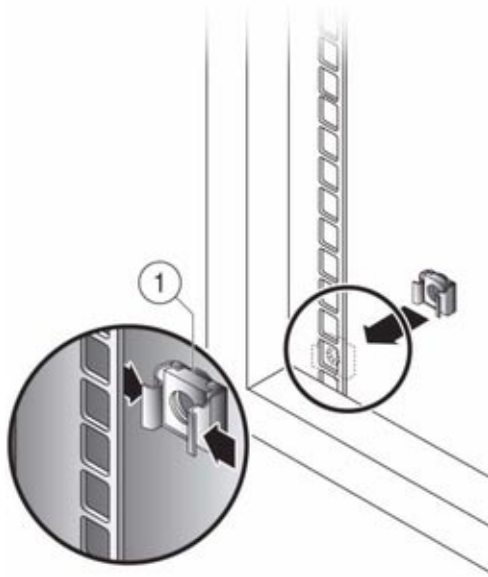
- 3 Push the mounting bracket release button toward the front of the mounting bracket (2) while withdrawing the bracket from the assembly.



- 4 Attach a mounting bracket to each side of the controller.

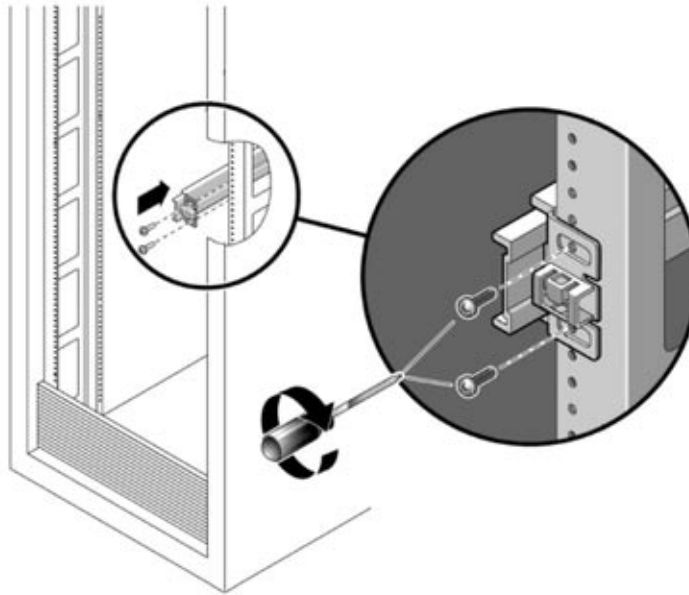


- 5 If you are using a universal 19-inch cabinet, snap an M6 square cage nut into the top and bottom holes of the location where you will be installing the rail plate as shown.



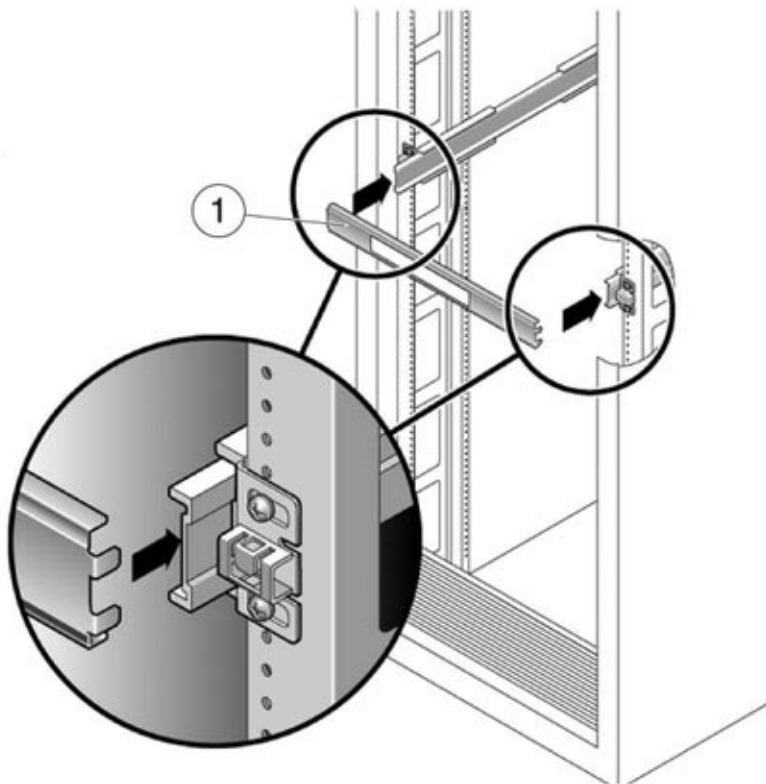
- 6 Position a slide rail assembly in your rack so that the brackets at each end of the slide rail assembly are on the outside of the front and back rack posts. The following graphic illustrates

the rail assembly brackets.



- 7 Attach each slide rail assembly to the rack posts, but do not tighten the screws completely.

- 8 From the front of the rack, set the proper width of the rails with the width spacer alignment tool (1).



- 9 Tighten the screws on the brackets. (30 lb. torque)
- 10 Remove the spacer and confirm that the rails are attached tightly to the rack.
- 11 Stabilize the rack, using all anti-tilt mechanisms, to prevent it from tipping during installation. See your rack documentation for detailed instructions.

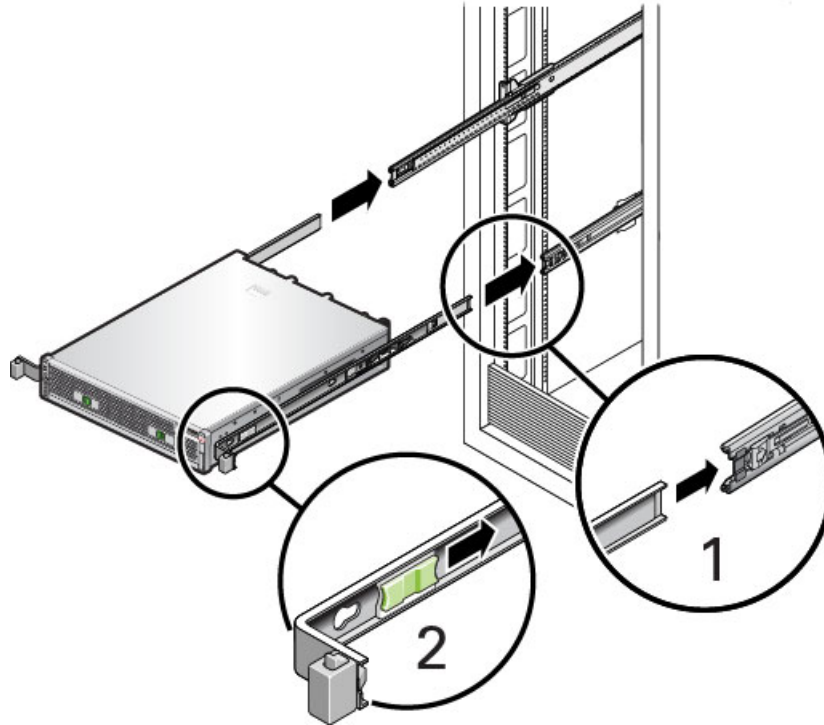
▼ Installing the Controller into the Rack

Caution: This procedure requires a minimum of two people because of the weight of the chassis. Attempting this procedure alone could result in equipment damage or personal injury. Always load equipment into rack from the bottom up.

- 1 Pull the slide rails (mounted in the slide-rail assembly) toward you until the slide rails stop (approximately 12 inches, (30 cm) out of the rack).

- 2 **Raise the chassis so that the back ends of the mounting brackets are aligned with the slide rail and insert the chassis into the slide rails, pushing the chassis slowly, until the mounting brackets meet the slide rail stops (~12 in or 30 cm). You will hear an audible click.**

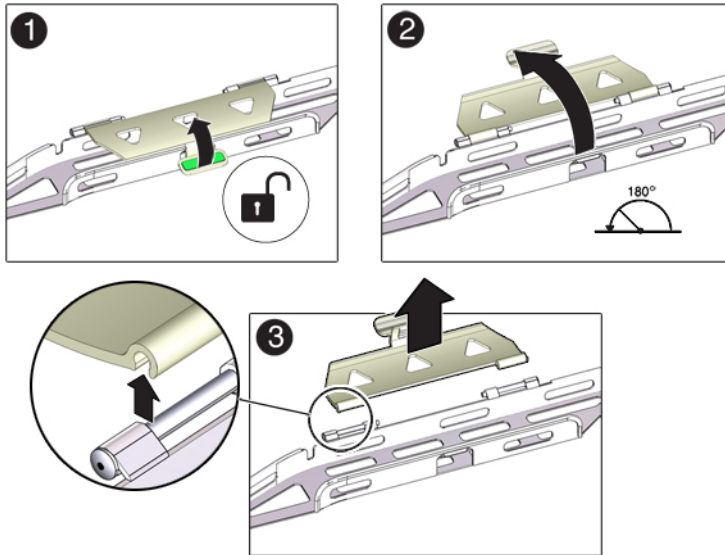
The following graphic illustrates the chassis insertion and slide rail locks usage.



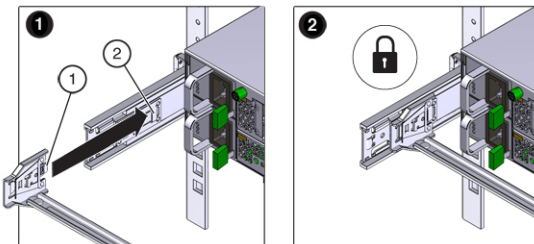
▼ Installing the Cable Management Arm

- 1 **Unpack the CMA and identify its components. See [CMA components](#).**
- 2 **If the CMA has flat cable covers (for a 1U chassis), install the 2U round cable covers provided in the accessory kit.**
- 3 **To replace the flat cable covers:**
 - Remove each flat cable cover by lifting up on the cable cover handle (1) and open it 180 degrees to the horizontal position (2). Apply upward pressure to the outside edge of each hinge connector until the hinge connector comes off the hinge (3).

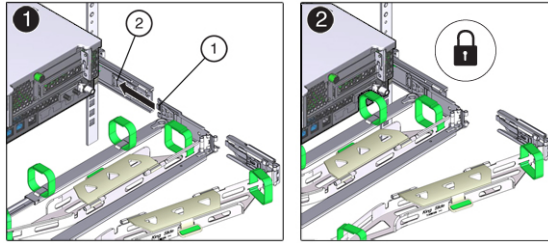
- Position each round cable cover horizontally over the hinges, and align the hinge connectors with the hinges. Using your thumb, apply downward pressure on each hinge connector to snap the hinge connector into place. Swing the cable covers down and press down on the cable cover handle to lock them into the closed position.



- 4 Ensure that the six Velcro straps are threaded into the CMA.
- 5 To prevent the rack from tipping, ensure all anti-tilt devices on the rack are extended.
- 6 Extend the storage controller approximately 13 cm (5 inches) out of the front of the rack.
- 7 At the back of the rack, insert the CMA's connector A into the front slot on the left slide-rail until it locks into place with an audible click (frames 1 and 2). The connector A tab (1) goes into the slide-rail's front slot (2). Gently tug on the left side of the front slide bar to verify that connector A is properly seated.

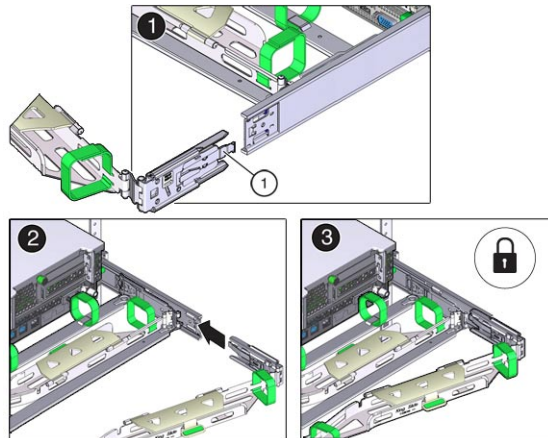


- 8 Support the CMA and do not allow it to hang under its own weight until it is secured at all four attachment points.
- 9 Insert the CMA's connector B into the front slot on the right slide-rail until it locks into place with an audible click (frames 1 and 2). The connector B tab (1) goes into the slide-rail front slot (2). Gently tug on the right side of the front slide bar to verify that connector B is properly seated.



- 10 To install the CMA's connector C into the right slide-rail, perform the following steps:

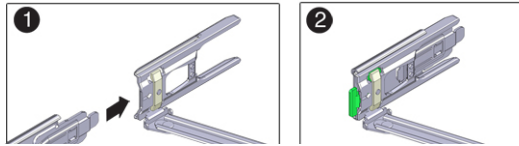
- Align connector C with the slide-rail so that the locking spring (1) is positioned inside (server side) of the right slide-rail (frame 1).



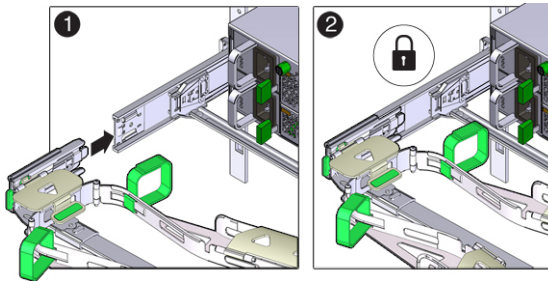
- Insert connector C into the right side-rail until it locks into place with an audible click (frames 2 and 3).

- Gently tug on the right side of the CMA's rear slide bar to verify that connector C is properly seated.

- 11 To prepare the CMA's connector D for installation, remove the tape that secures the slide-rail latching bracket to connector D and ensure that the latching bracket is properly aligned with connector D (frames 1 and 2).

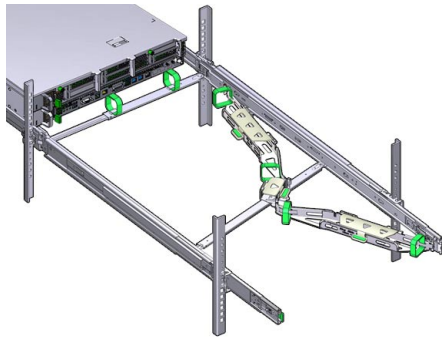


- 12 While holding the slide-rail latching bracket in place, insert connector D and its associated slide-rail latching bracket into the left slide-rail until connector D locks into place with an audible click (frames 1 and 2). When inserting connector D into the slide-rail, the preferred and easier method is to install connector D and the latching bracket as one assembly into the slide-rail.

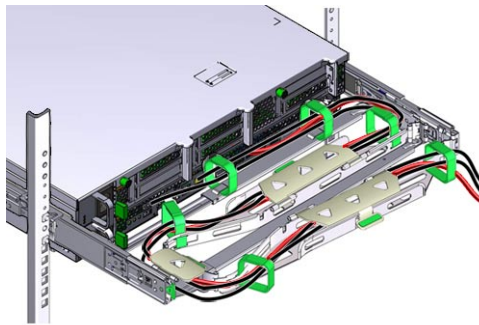


- 13 Gently tug on the left side of the CMA's rear slide bar to verify that connector D is properly seated.
- 14 Gently tug on the four CMA connection points to ensure that the CMA connectors are fully seated before you allow the CMA to hang by its own weight.

- 15 Verify that the slide-rails and the CMA are operating properly before routing cables through the CMA: a) Ensure all rack anti-tilt devices are extended to prevent the rack from tipping. b) Extend the server from the front of the rack until the CMA is fully extended.



- 16 Return the storage controller to the rack. As you push the storage controller into the rack, verify that the CMA retracts without binding.
- 17 Open the CMA cable covers, route server cables through the CMA's cable troughs, close the cable covers, and secure the cables with the six Velcro straps. Route the cables through the cable troughs in this order: a) Route the cables through the front-most cable trough, b) then through the small cable trough, c) then through the rear-most cable trough.



- 18 When securing the cables with the Velcro straps located on the front slide bar, ensure that the Velcro straps do not wrap around the bottom of the slide bar; otherwise, expansion and contraction of the slide bar might be hindered when the server is extended from the rack and returned to the rack.
- 19 Ensure that the secured cables do not extend above the top or below the bottom of the server to which they are attached; otherwise, the cables might snag on other equipment installed in the rack when the server is extended from the rack or returned to the rack.

- 20 If necessary, bundle the cables with additional Velcro straps to ensure that they stay clear of other equipment. If you need to install additional Velcro straps, wrap the straps around the cables only, not around any of the CMA components; otherwise, expansion and contraction of the CMA slide bars might be hindered when the server is extended from the rack and returned to the rack.

▼ **Verify Operation of Slide-Rails and CMA**

- 1 Ensure all rack anti-tilt devices are extended to prevent the rack from tipping forward when the storage controller is extended from the rack.
- 2 Slowly pull the storage controller out of the rack until the slide-rails reach their stops.
- 3 Inspect the attached cables for any binding or kinks.
- 4 Verify that the CMA extends fully with the slide-rails.
- 5 Push the storage controller back into the rack and verify that the CMA retracts without binding.
- 6 Adjust the cable straps and the CMA, as required.

▼ **Removing the CMA**

- 1 Ensure all rack anti-tilt devices are extended to prevent the rack from tipping forward when the storage controller is extended from the rack.
- 2 To make it easier to remove the CMA, extend the storage controller approximately 13 cm (5 inches) out of the front of the rack.
- 3 **To remove the cables from the CMA, do the following:**
 - Disconnect all cables from the rear of the storage controller.
 - If applicable, remove any additional Velcro straps that were installed to bundle the cables.
 - Unwrap the six Velcro straps that are securing the cables.
 - Open the three cable covers to the fully opened position.
 - Remove the cables from the CMA and set them aside.
- 4 **To disconnect connector D, perform the following steps:**
 - Press the green release tab on the slide-rail latching bracket toward the left and slide the connector D out of the left slide-rail. Support the CMA until the rest of the connectors are disconnected. Do not allow the CMA to hang under its own weight.

- Use your right hand to support the CMA and use your left thumb to push in (toward the left) on the connector D latching bracket release tab labeled PUSH, and pull the latching bracket out of the left slide-rail and put it aside.

5 To disconnect connector C, perform the following steps:

- Place your left arm under the CMA to support it.

- Use your right thumb to push in (toward the right) on the connector C release tab labeled PUSH, and pull connector C out of the right slide-rail.

6 To disconnect connector B, perform the following steps:

- Place your right arm under the CMA to support it and grasp the rear end of connector B with your right hand.

- Use your left thumb to pull the connector B release lever to the left away from the right slide-rail and use your right hand to pull the connector out of the slide-rail.

7 To disconnect connector A, perform the following steps:

- Place your left arm under the CMA to support it and grasp the rear end of connector A with your left hand.

- Use your right thumb to pull the connector A release lever to the right away from the left slide-rail, and use your left hand to pull the connector out of the slide-rail.

8 Remove the CMA from the rack and place it on a flat surface.

9 Go to the front of the rack and push the storage controller back into the rack.

ZS3-4 Controllers

ZS3-4 Controller Installation Tasks

This section provides steps for installing the Oracle ZFS Storage ZS3-4 controller into a rack using the rail assembly in the rack mount kit. Note that if your rack mount kit shipped with installation instructions, use those instructions instead.

Observe the following cautions:

- Always load equipment into a rack from the bottom up so that it will not become top-heavy and tip over. Deploy the anti-tip bar to prevent the rack from tipping during equipment installation.

- Ensure that the temperature in the rack will not exceed the controller's maximum ambient rated temperatures. Consider the total airflow requirements of all equipment installed in the rack to ensure that the equipment is operated within its specified temperature range.

Prerequisites

Refer to the Quick Setup poster that shipped with the product or the following section for an overview of your controller.

- [ZS3-4 Overview](#) - view component diagrams and specifications

Tools and Equipment Needed

To install the system, you need the following tools:

- No. 2 Phillips screwdriver
- ESD mat and grounding strap
- Pencil, stylus, or other pointed device, for pushing front panel buttons

You also need a system console device, such as one of the following:

- Sun workstation
- ASCII terminal
- Terminal server
- Patch panel connected to a terminal server

Tasks

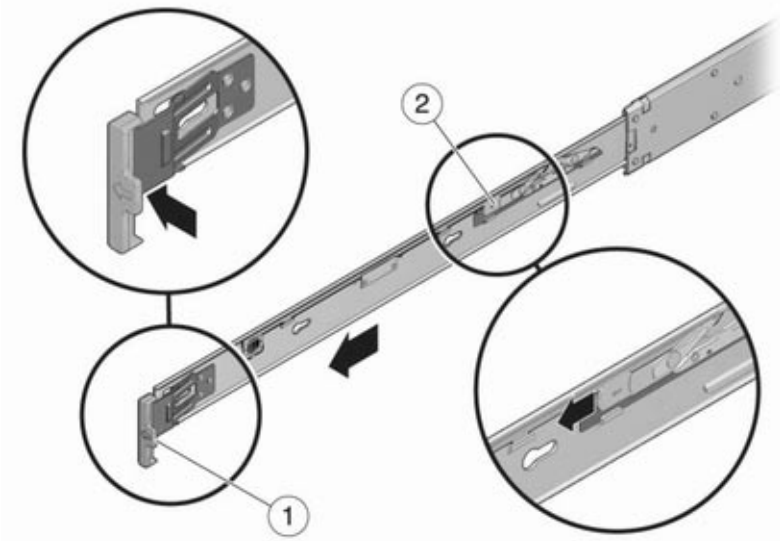
ZS3-4 Controllers Tasks

▼ Installing Mounting Brackets on the Controller Chassis

If the mounting brackets are shipped inside the slide rails, you must remove them before beginning this procedure, as follows.

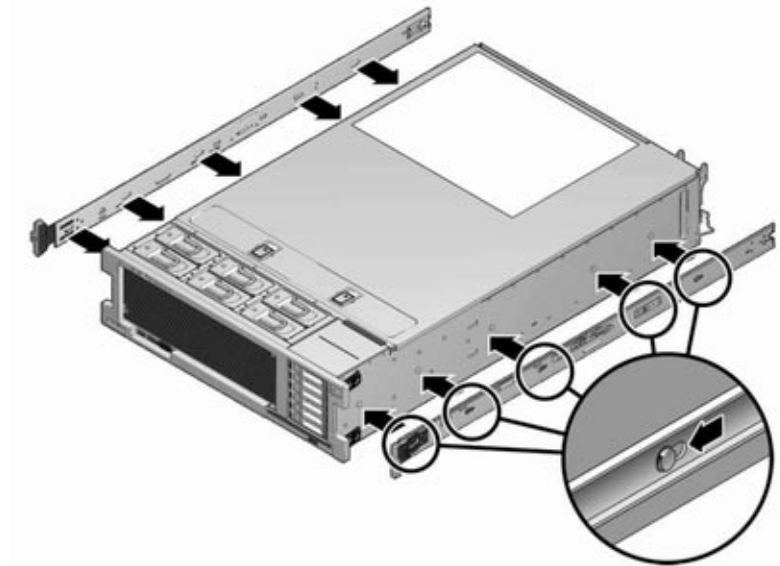
- Unpack the slide rails and locate the slide rail lock at the front of the assembly.
- Squeeze and hold the tabs at top and bottom of the lock (1) while you pull the mounting bracket out to the stop.
- Push the mounting bracket release button toward the front of the mounting bracket (2) while withdrawing the bracket from the assembly.

The following graphic illustrates the procedure for disassembling the rail kit.



- 1 Position a mounting bracket against the chassis so that the slide rail lock is at the front of the chassis, and the keyed openings on the mounting bracket are aligned with the locating pins on the side of the chassis.

The following graphic illustrates how to attach the mounting brackets.

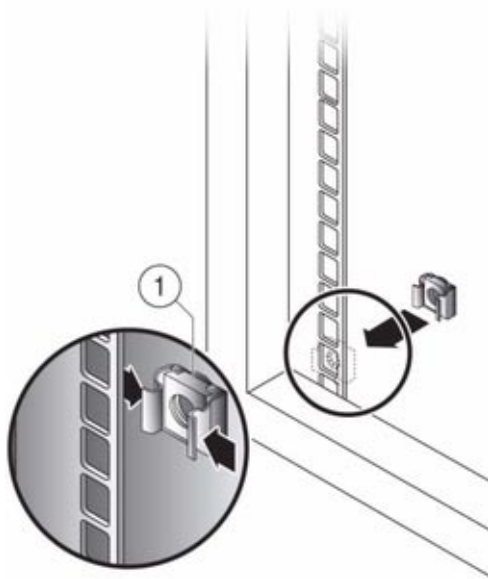


- 2 With the heads of the four chassis locating pins protruding through the four keyed openings in the mounting bracket, pull the mounting-bracket toward the front of the chassis until the mounting-bracket clip locks into place with an audible click.
- 3 Verify that all mounting pins are securely fastened to the chassis.
- 4 Repeat to install the remaining mounting bracket on the other side of the chassis.

▼ Installing the Controller Chassis into the Rack Slide Rails

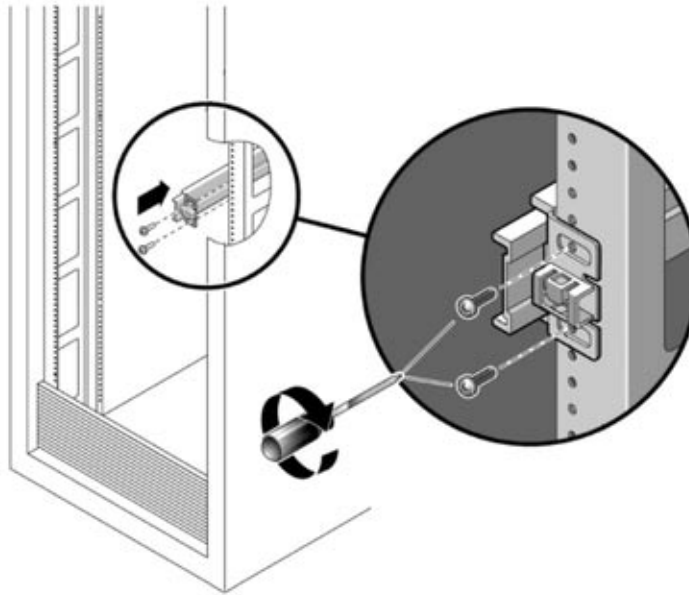
This procedure requires a minimum of two people because of the weight of the chassis. Attempting this procedure alone could result in equipment damage or personal injury. Always load equipment into rack from the bottom up.

- 1 If you are using a universal 19-inch cabinet, snap an M6 square cage nut into the top and bottom holes of the location where you will be installing the rail plate as shown.



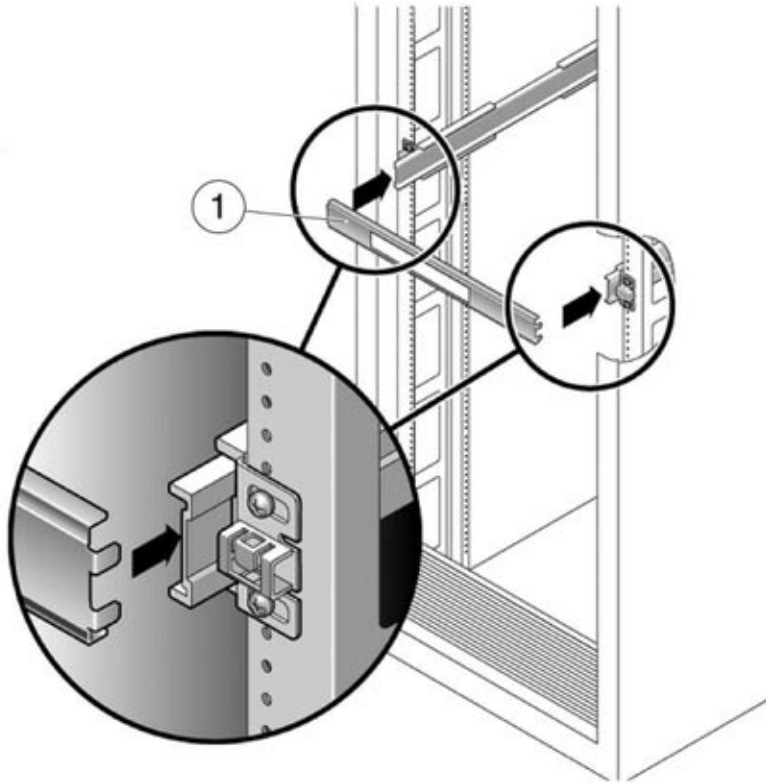
- 2 Position a slide rail assembly in your rack so that the brackets at each end of the slide rail assembly are on the outside of the front and back rack posts. The following graphic illustrates

the rail assembly brackets.



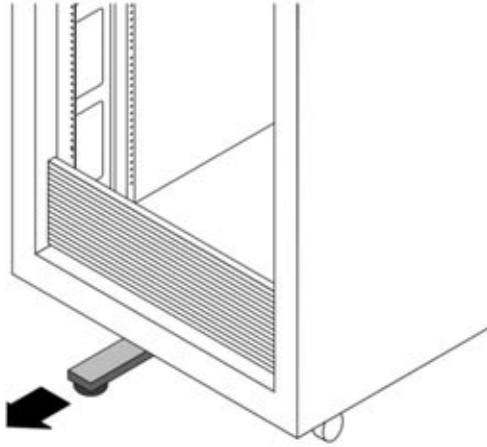
- 3 Attach each slide rail assembly to the rack posts, but do not tighten the screws completely.

- 4 From the front of the rack, set the proper width of the rails with the rail-width spacer (1).



- 5 Tighten the screws on the brackets.
- 6 Remove the spacer and confirm that the rails are attached tightly to the rack.

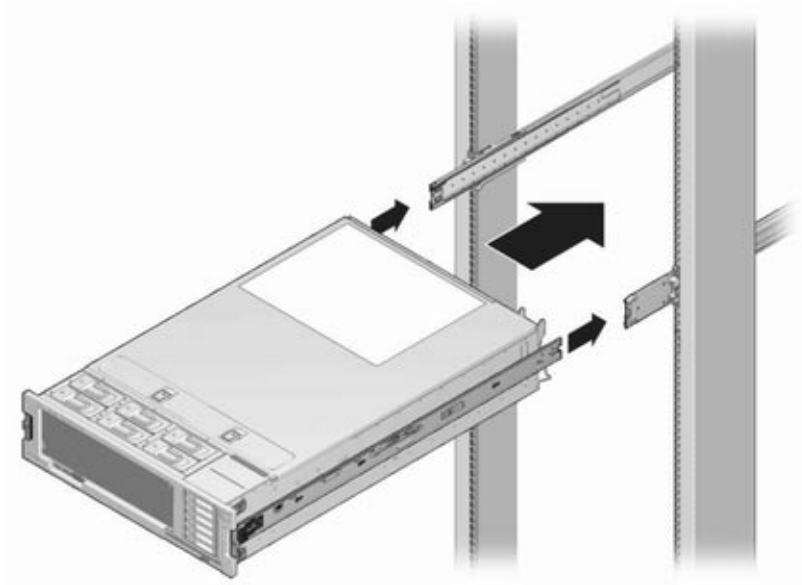
- 7 If your rack includes an anti-tip foot, extend it from the bottom of the rack.



- 8 Lower the rack stabilization feet if you have not already done so.
- 9 Push the slide rails into the slide rail assemblies in the rack as far as possible.

- 10 **Raise the chassis so that the back ends of the mounting brackets are aligned with the slide rail and insert the chassis into the slide rails, pushing the chassis slowly, until the mounting brackets meet the slide rail stops (~12 in or 30 cm). You will hear an audible click.**

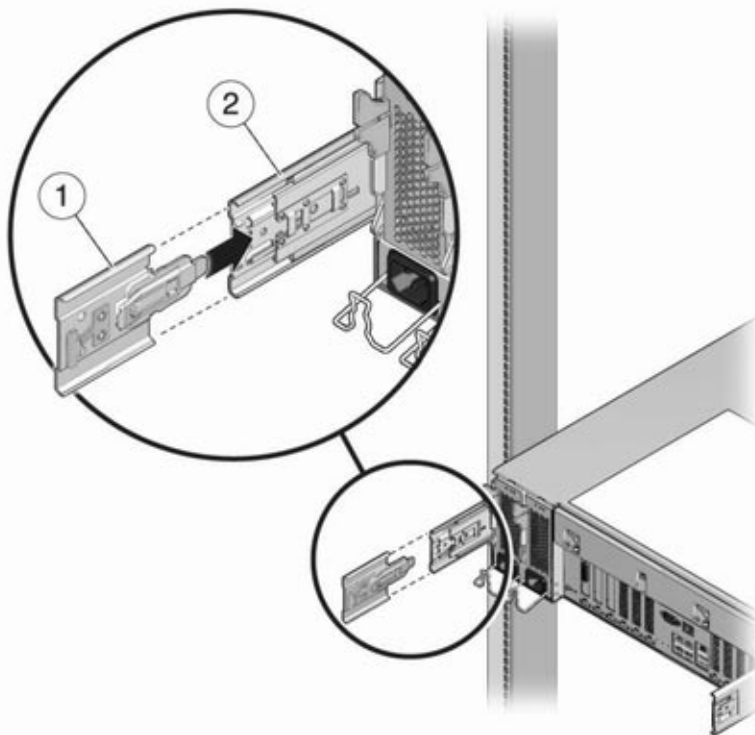
The following graphic illustrates chassis insertion.



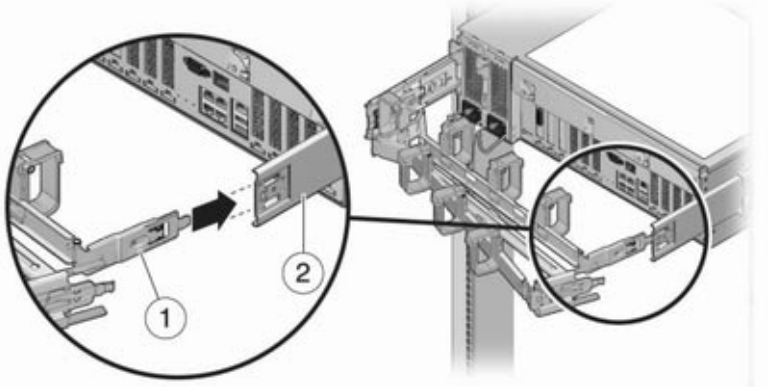
▼ **Installing the Cable Management Assembly**

This procedure is completed from the back of the equipment rack.

- 1 Attach the cable management assembly (CMA) rail extension to the left slide rail until the extension locks into place.

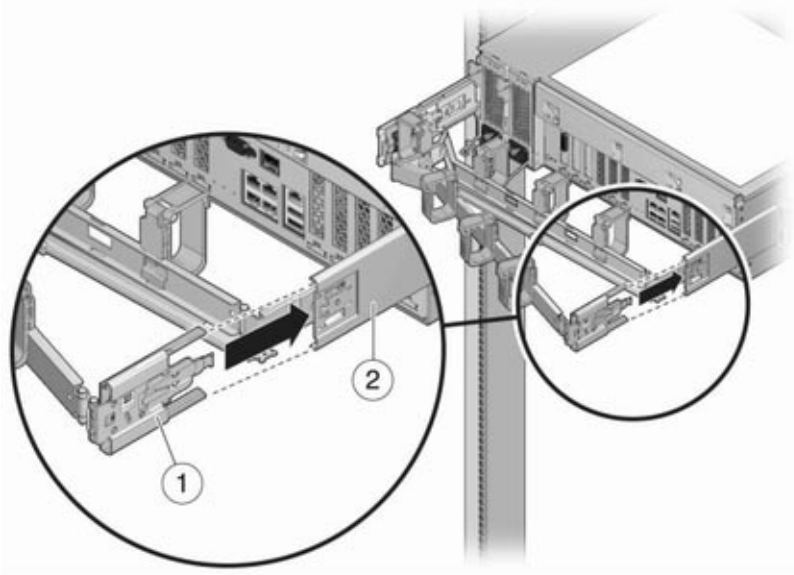


- 2 Insert the CMA mounting bracket connector into the right slide rail until the connector locks

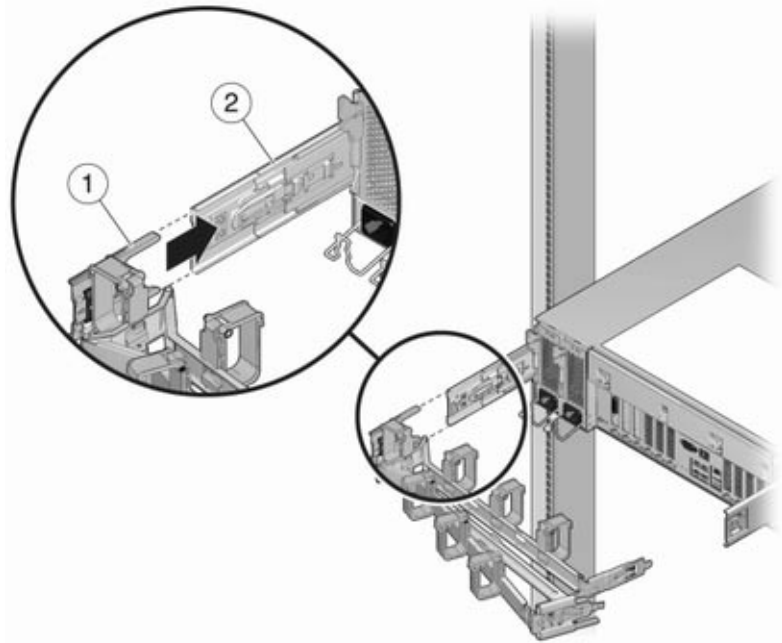


into place.

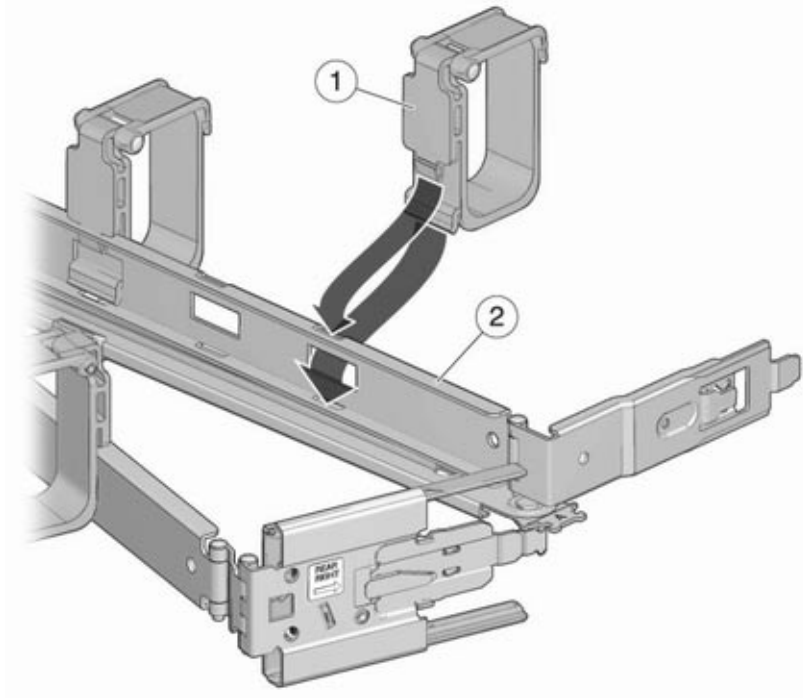
- 3 Insert the right CMA slide rail connector (1) into the right slide rail assembly (2) until the connector locks into place.



- 4 Insert the left CMA slide rail connector (1) into the rail extension on the left slide rail assembly (2) until the connector locks into place.



- 5 After you install and route the cables through the assembly, attach the hook and loop straps (1) to secure the cables. Then attach the right and left outer latches to support the assembly.



7x20 Controllers

7x20 Controller Installation Tasks

This section provides enumerated steps for installing the Sun ZFS Storage 7120, 7320 or 7420 controllers into a rack using the rail assembly in the rack mount kit. Note that if your rack mount kit shipped with installation instructions, use those instructions instead.

Observe the following cautions:

- Always load equipment into a rack from the bottom up so that it will not become top-heavy and tip over. Deploy the anti-tip bar to prevent the rack from tipping during equipment installation.
- Ensure that the temperature in the rack will not exceed the controller's maximum ambient rated temperatures. Consider the total airflow requirements of all equipment installed in the rack to ensure that the equipment is operated within its specified temperature range.

Prerequisites

Refer to the Quick Setup poster that shipped with the product or the following sections for an overview of your controller.

- [7120 Overview](#) - view component diagrams and specifications
- [7320 Overview](#) - view component diagrams and specifications
- [7420 Overview](#) - view component diagrams and specifications

Tools and Equipment Needed

To install the system, you need the following tools:

- No. 2 Phillips screwdriver
- ESD mat and grounding strap
- Pencil, stylus, or other pointed device, for pushing front panel buttons

You also need a system console device, such as one of the following:

- Sun workstation
- ASCII terminal
- Terminal server
- Patch panel connected to a terminal server

Tasks

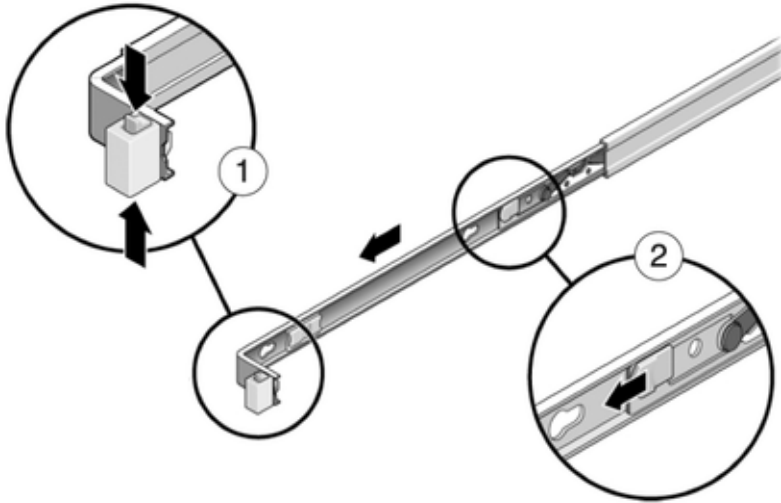
7x20 Controllers Tasks

▼ Installing Mounting Brackets on the Controller Chassis

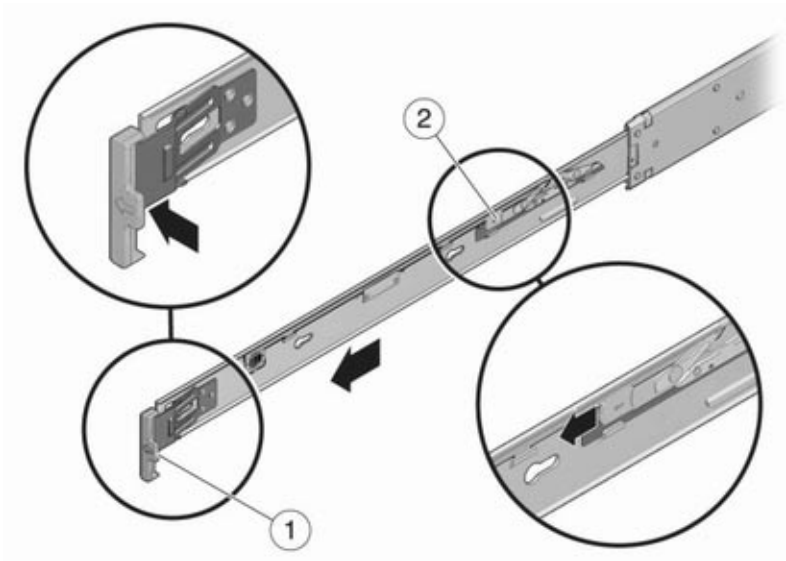
If the mounting brackets are shipped inside the slide rails, you must remove them before beginning this procedure, as follows.

- Unpack the slide rails and locate the slide rail lock at the front of the assembly.
- Squeeze and hold the tabs at top and bottom of the lock (1) while you pull the mounting bracket out to the stop.
- Push the mounting bracket release button toward the front of the mounting bracket (2) while withdrawing the bracket from the assembly.

The following graphic illustrates the procedure for disassembling the 7120/7320 rail kit.

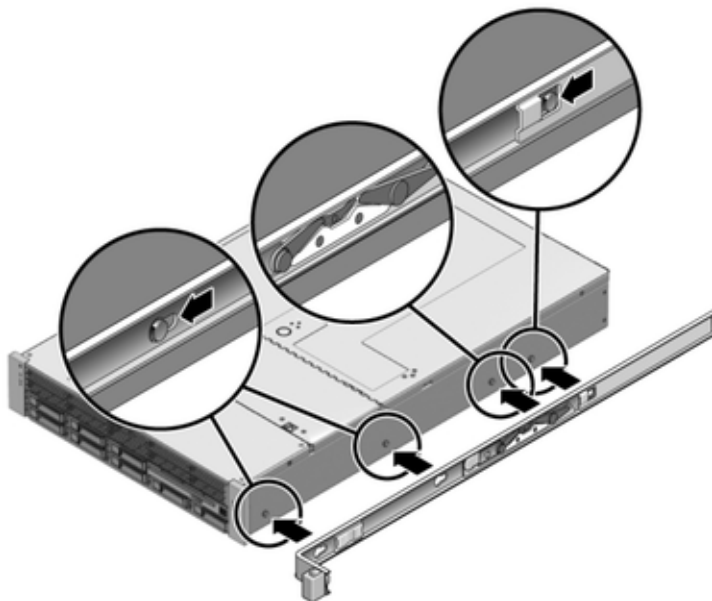


The following graphic illustrates the procedure for disassembling the 7420 rail kit.

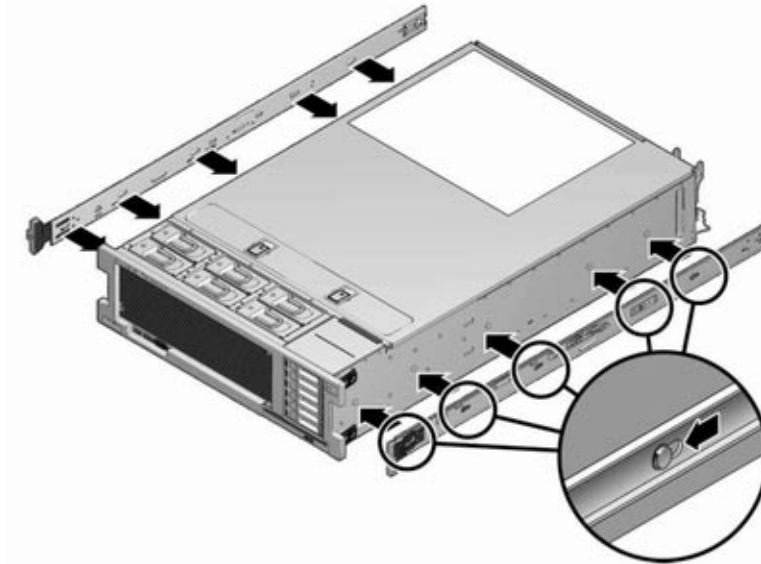


- 1 Position a mounting bracket against the chassis so that the slide rail lock is at the front of the chassis, and the keyed openings on the mounting bracket are aligned with the locating pins on the side of the chassis.

The following graphic illustrates how to attach the 7120/7320 mounting brackets.



The following graphic illustrates how to attach the 7420 mounting brackets.

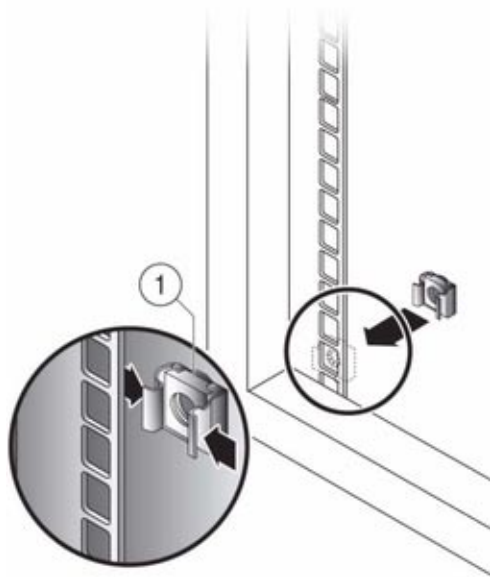


- 2 With the heads of the four chassis locating pins protruding through the four keyed openings in the mounting bracket, pull the mounting-bracket toward the front of the chassis until the mounting-bracket clip locks into place with an audible click.
- 3 Verify that all mounting pins are securely fastened to the chassis.
- 4 Repeat to install the remaining mounting bracket on the other side of the chassis.

▼ Installing the Controller Chassis into the Rack Slide Rails

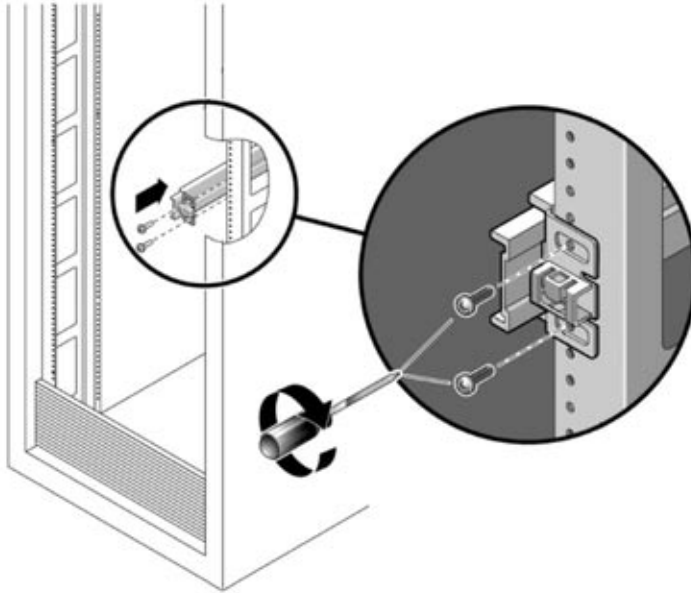
This procedure requires a minimum of two people because of the weight of the chassis. Attempting this procedure alone could result in equipment damage or personal injury. Always load equipment into rack from the bottom up.

- 1 If you are using a universal 19-inch cabinet, snap an M6 square cage nut into the top and bottom holes of the location where you will be installing the rail plate as shown.



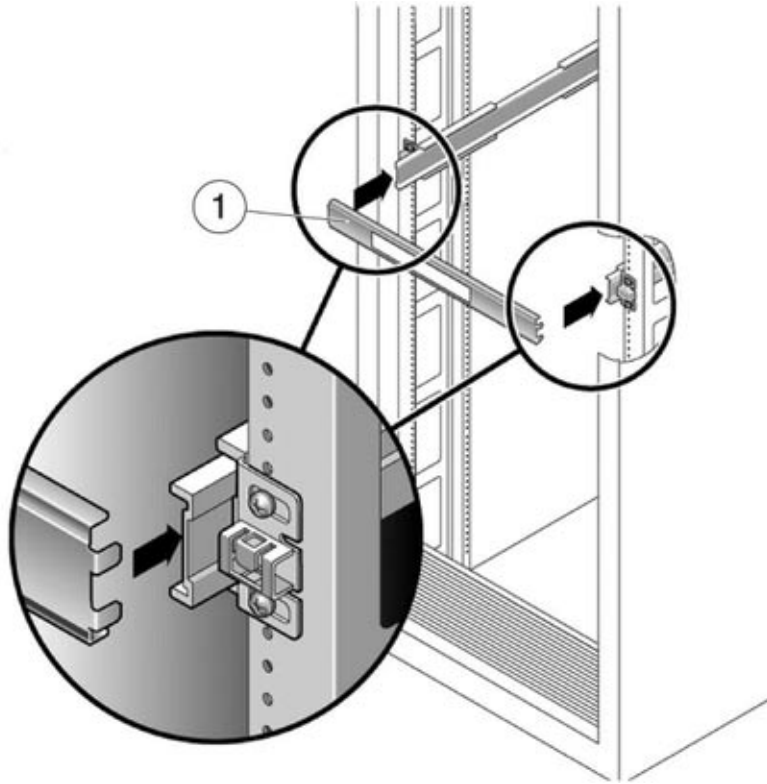
- 2 Position a slide rail assembly in your rack so that the brackets at each end of the slide rail assembly are on the outside of the front and back rack posts. The following graphic illustrates

the rail assembly brackets.



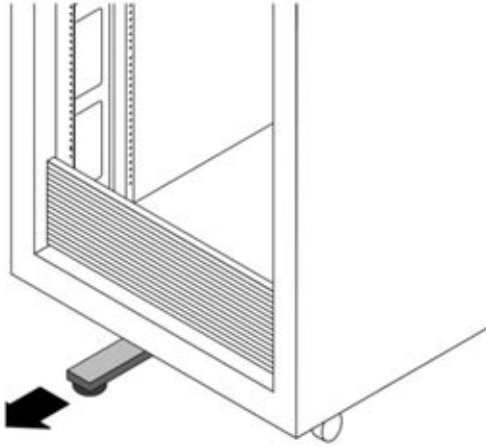
- 3 Attach each slide rail assembly to the rack posts, but do not tighten the screws completely.

- 4 From the front of the rack, set the proper width of the rails with the rail-width spacer (1).



- 5 Tighten the screws on the brackets.
- 6 Remove the spacer and confirm that the rails are attached tightly to the rack.

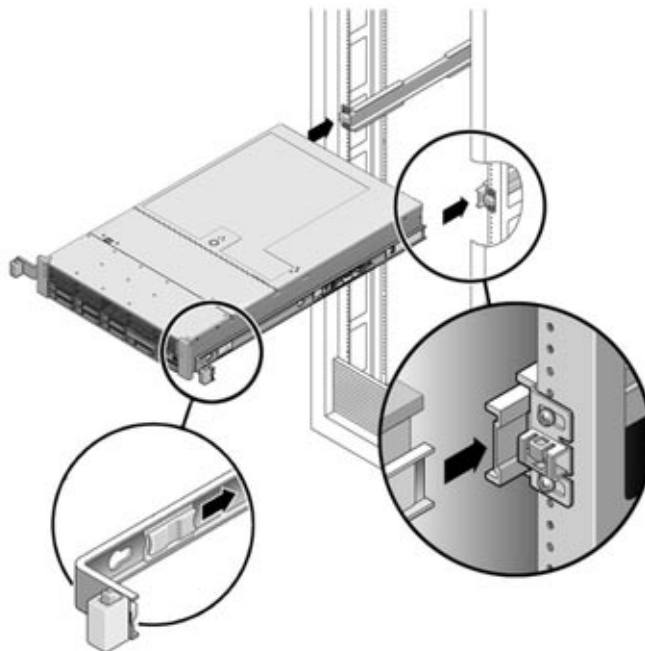
- 7 If your rack includes an anti-tip foot, extend it from the bottom of the rack.



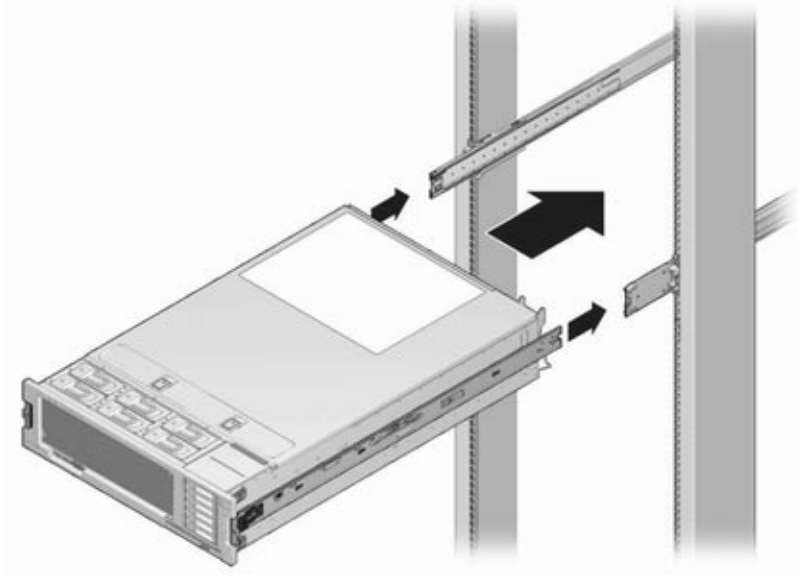
- 8 Lower the rack stabilization feet if you have not already done so.
- 9 Push the slide rails into the slide rail assemblies in the rack as far as possible.

- 10 **Raise the chassis so that the back ends of the mounting brackets are aligned with the slide rail and insert the chassis into the slide rails, pushing the chassis slowly, until the mounting brackets meet the slide rail stops (~12 in or 30 cm). You will hear an audible click.**

The following graphic illustrates the 7120/7320 chassis insertion and slide rail locks usage.



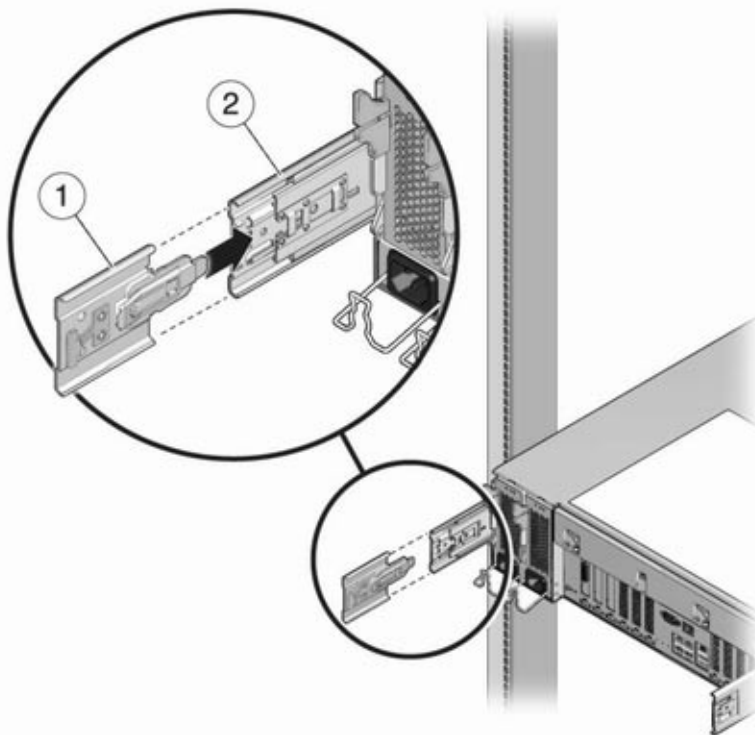
The following graphic illustrates 7420 chassis insertion.



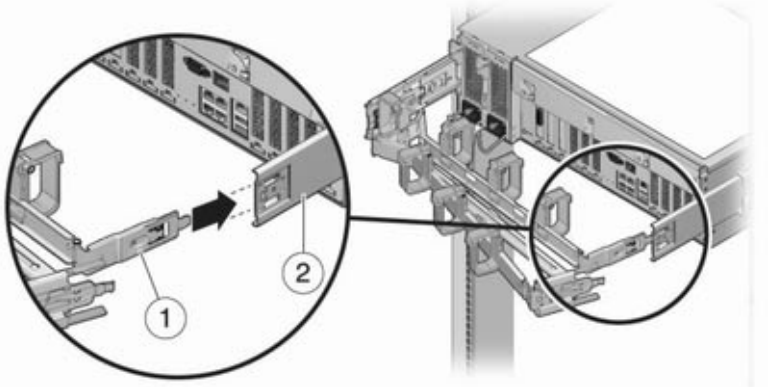
▼ Installing the Cable Management Assembly

This procedure is completed from the back of the equipment rack.

- 1 Attach the cable management assembly (CMA) rail extension to the left slide rail until the extension locks into place.

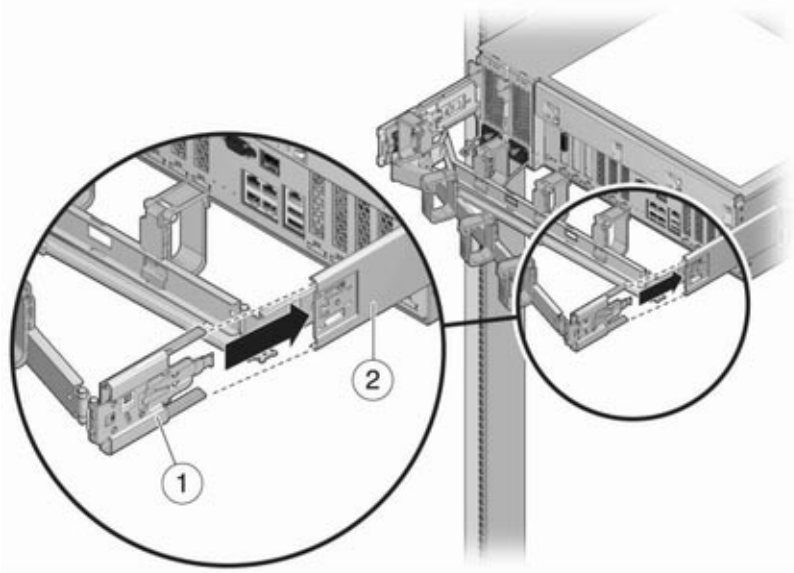


- 2 Insert the CMA mounting bracket connector into the right slide rail until the connector locks

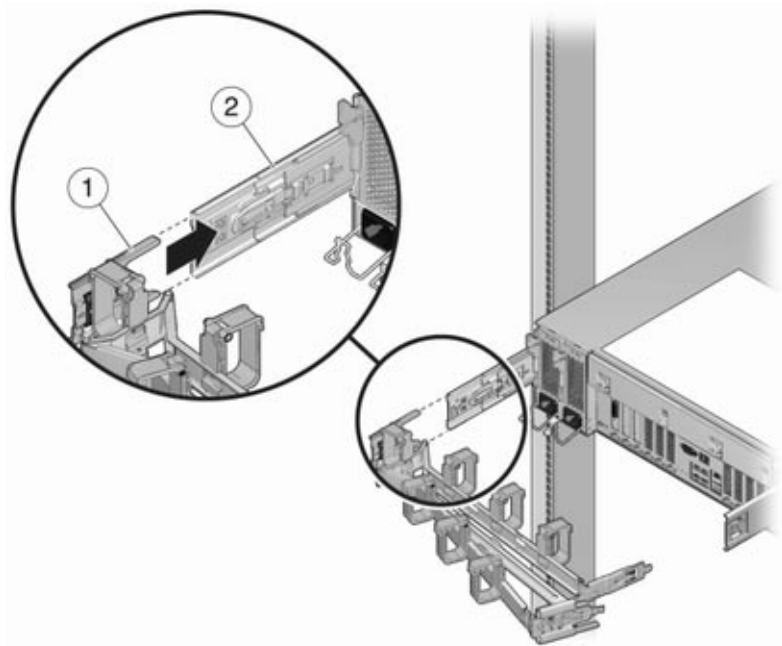


into place.

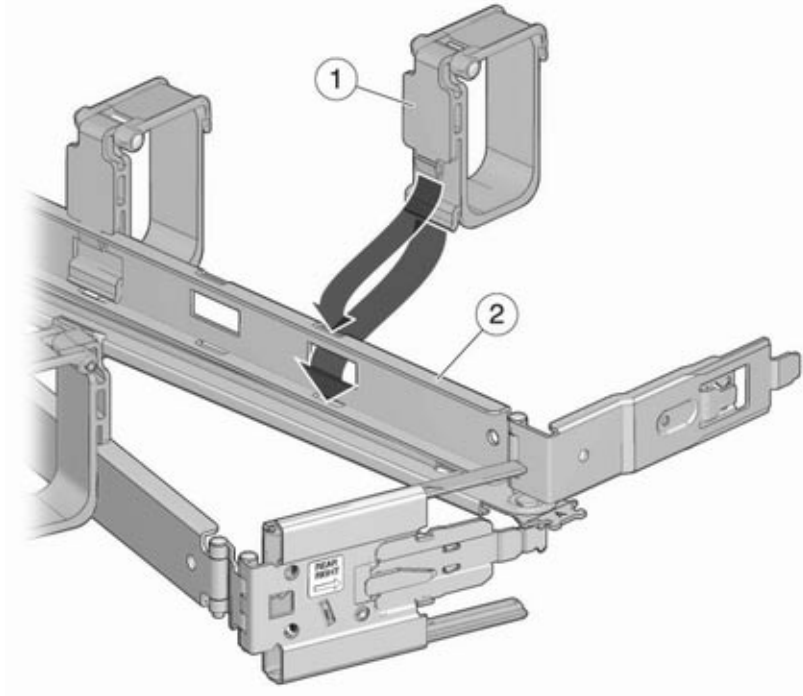
- 3 Insert the right CMA slide rail connector (1) into the right slide rail assembly (2) until the connector locks into place.



- 4 Insert the left CMA slide rail connector (1) into the rail extension on the left slide rail assembly (2) until the connector locks into place.



- 5 After you install and route the cables through the assembly, attach the hook and loop straps (1) to secure the cables. Then attach the right and left outer latches to support the assembly.



DE2 24C

Precautions

Observe the following cautions when installing the Oracle Storage Drive Enclosure DE2-24C into a rack using the supplied rail kit. Note that if your rail kit shipped with installation instructions, use those instructions instead.

- Always load equipment into a rack from the bottom up so that it will not become top-heavy and tip over. Deploy the anti-tip bar to prevent the rack from tipping during equipment installation.
- Ensure that the temperature in the rack does not exceed the controller's maximum ambient rated temperatures. Consider the total airflow requirements of all equipment installed in the rack to ensure that the equipment is operated within its specified temperature range.
- Do not remove a component if you do not have an immediate replacement. The disk shelf must not be operated without all components in place.

- Do not lift the disk shelf by the handles on the power supply with fan modules; they are not designed to take the weight.

Prerequisites

Refer to the following section for an overview of your disk shelf.

- [Disk Shelf Overview](#) - view component diagrams and specifications

Tools and Equipment Needed

To install the shelf, you need the following tools:

- Phillips head No. 2 screwdriver that is a minimum of 4 inches long.
- A mechanical lift is highly recommended because the chassis can weigh approximately 110 lbs (50 kg). At least three people are required: two to install the shelf and one spotter to engage the rails.
If a mechanical lift is not available, remove the power supply with fan modules to reduce the weight, see Disk Shelf Maintenance Procedures for instructions.

Use one of the following racks for the disk shelf:

- Sun Rack II 1042/1242 cabinet
- Any 19-inch wide, 4-post, EIA-compatible rack or cabinet with a front-to-back depth between vertical cabinet rails of 61 cm to 91 cm (24 in. to 36 in.). The cabinet can have threaded or unthreaded cabinet rails. Threaded cabinets must be M6 or 10-32 cabinets. Cabinets must be able to support the weight of all equipment contained within them.

Position the rack where the shelf is to be installed adjacent to the rack where the controller is installed, if separate. Stabilize the cabinet and lock the casters. To facilitate access, remove doors from cabinets.

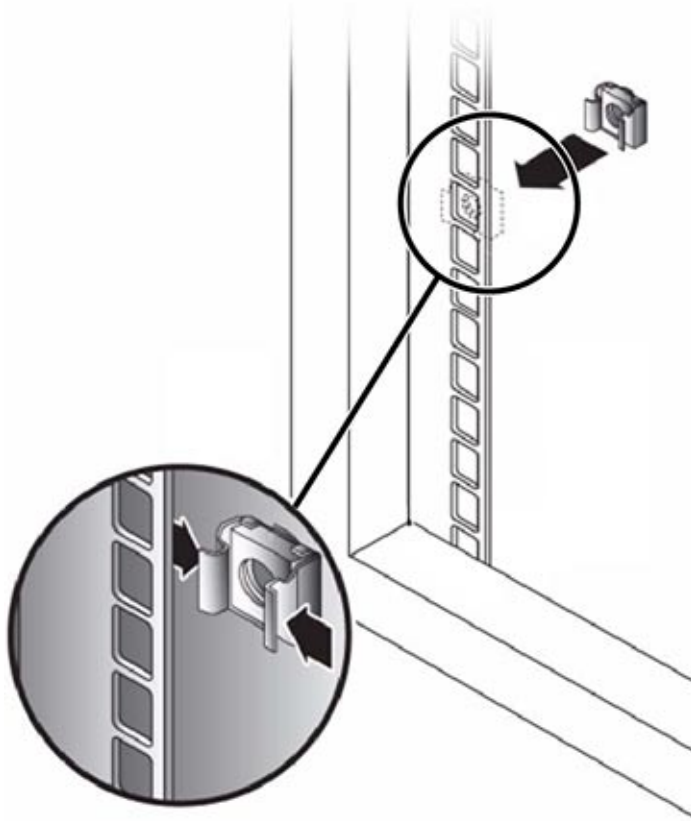
Tasks

DE2 24C Tasks

▼ Installing the Disk Shelf into the Rack Slide Rails

- 1 The Oracle Storage Drive Enclosure DE2-24C requires four standard mounting units (4RU) of vertical space in the cabinet. Starting at the bottom of the cabinet, locate the appropriate rack unit (RU) height. Install disk shelves below controllers to prevent the rack from tipping.

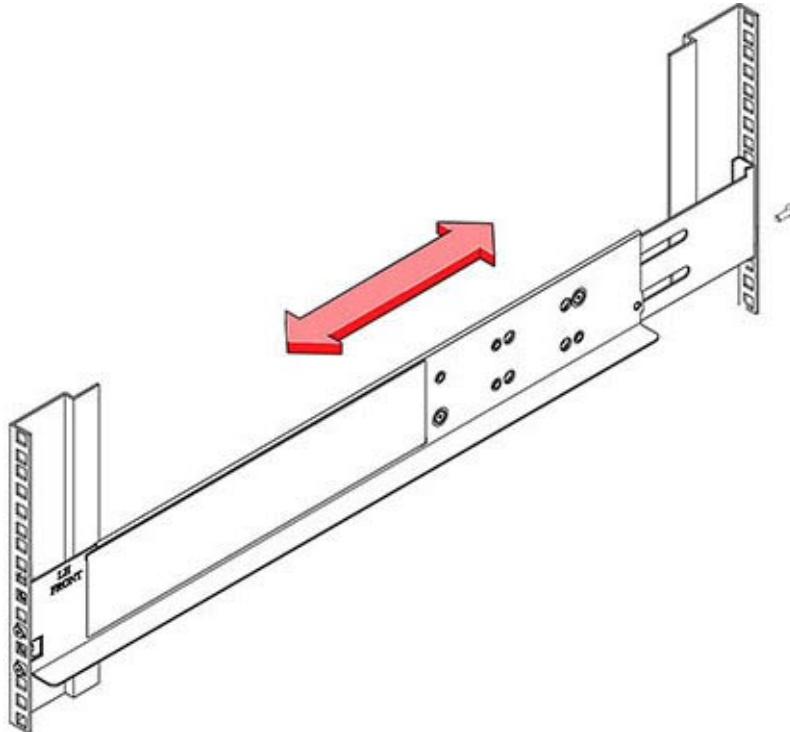
- 2 If using an unthreaded universal 19-inch or Sun Rack II cabinet, snap one supplied cage nut into the 8th rack hole, counting upward, in each front rail of the 4RU space.



- 3 Prepare the screws in each rail end:
 - **Square-hole unthreaded cabinet:** No preparation.
 - **Round-hole unthreaded cabinet:** Remove the screws from each rail end and discard. Locate the screws for round-hole cabinets and place aside.
 - **Threaded cabinet:** Remove screws and replace them in the opposite direction (from the inside of the rail flange) so they act as location pins. Also remove the clip nut from each front rail end and discard.
- 4 Position the front of the rails inside the cabinet, with the rail flange inside of the cabinet flange, and the rail label facing the inside of the cabinet.
 - **Square-hole unthreaded cabinet:** The screw heads fit inside the rack holes.

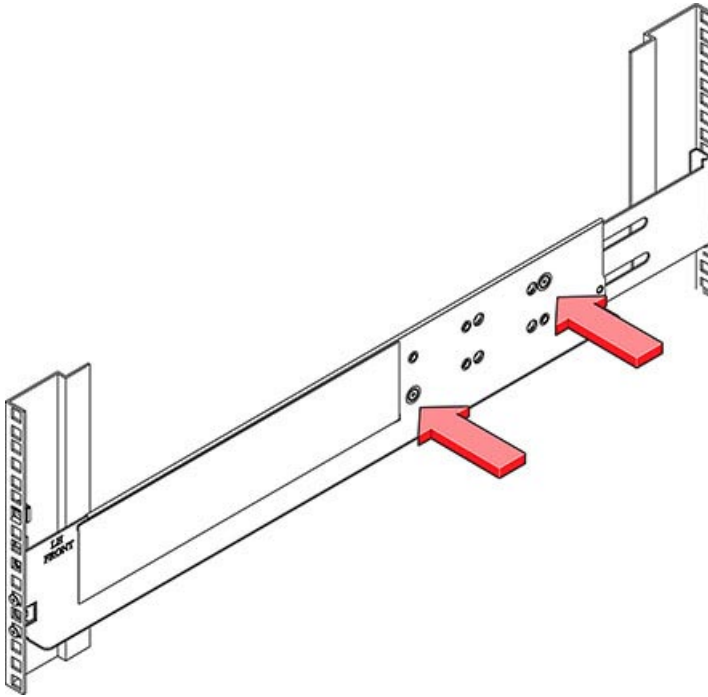
- **Round-hole unthreaded cabinet:** Install two screws through the rack and into the front of each rail. Do **not** install into the cage nut in the rack, or the clip nut on the rail.
- **Threaded cabinet:** The location pins fit inside the rack holes.

5 Adjust the rail lengths to fit.

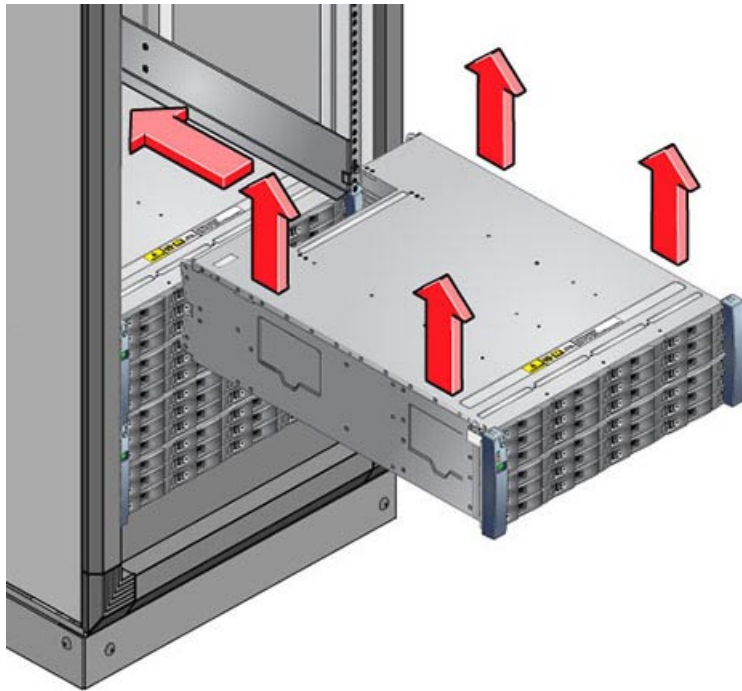


6 Install one screw through the rack and into the rear of each rail.

7 Tighten the two locking screws in the rails.

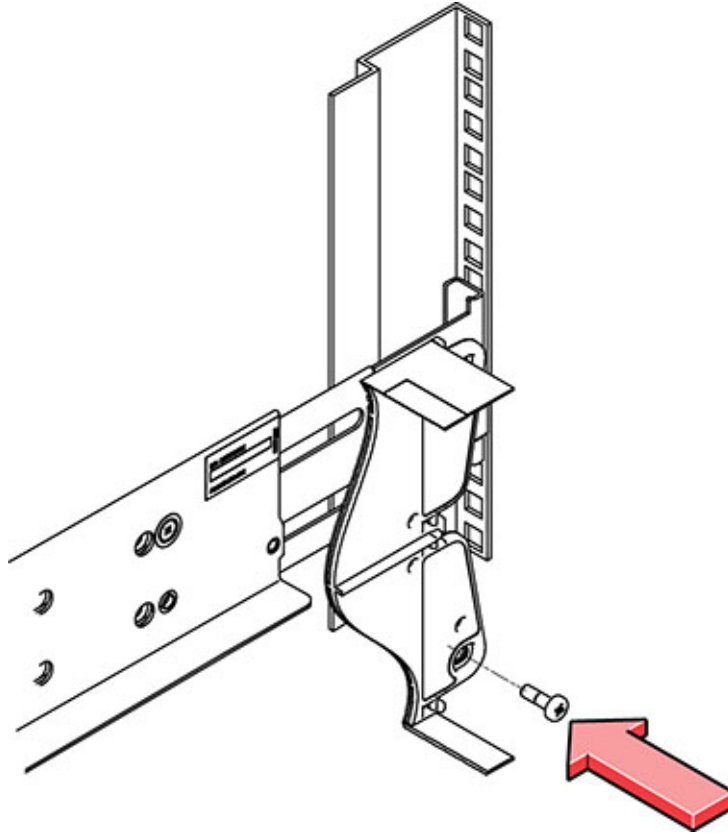


- 8 Using a mechanical lift or two people, one at each side of the disk shelf, carefully lift and rest the shelf on the bottom ledge of the left and right rails. Do not lift using the power supply handles.



- 9 Carefully slide the shelf into the cabinet. Ensure that the shelf is fully seated within the rails. If removing the shelf to reset it, support it at all times.
- 10 Remove the front side caps, install two screws into each front side, and replace the caps.

- 11 Install one long patchlock screw per rail to secure the rear of the shelf to the rear of the rack.



- 12 Connect and supply power to the disk shelf as described in the next section.

▼ Powering On the Disk Shelf

Ensure you have met the following electrical safety measures before applying power to the disk shelf:

- Provide a suitable power source with electrical overload protection to meet the power supply input voltage range of 100-240 VAC, 50-60 Hz. The disk shelves are compatible with 100-120 VAC or 200-240 VAC sources. The power source must not be overloaded by the total number of disk shelves in the cabinet. At full load, each DE2-24 draws 1,140W, and each Sun Disk Shelf draws 912W.
- The power source must provide a reliable earth connection for each disk shelf and the cabinet.
- Ensure that the power source is easily accessible because the power cord is the main disconnect device for the disk shelf.

- 1 Plug a power cord into each power supply with fan module.
- 2 Plug the other end of the power cords into the external power source for the cabinet.
Note: To guarantee redundancy, power cords must be connected to two separate and independent power sources.



- 3 Supply power to the external power source.
- 4 Place the power supply on/off switches to the "I" on position.
- 5 Turn on the cabinet circuit breakers, if applicable.
- 6 After the disk shelf powers on, which could take several minutes, ensure that the system power indicator on the front of the disk shelf is lit a steady green, and that each power supply with fan module status indicator on the rear is lit a steady green. If not, power off the disk shelf as described in the next section and reseal the faulted module. If the module status indicator is not a steady green after module reinsertion, contact Oracle Customer Service.



- 7 Perform the software setup tasks as described in the storage controller installation guide.

▼ Powering Off the Disk Shelf

Most disk shelf components are hot-swappable; you do not need to remove power when replacing them. Do not remove a component if you do not have an immediate replacement. The disk shelf must not be operated without all components in place.

Powering off or removing all SAS chains from a disk shelf will cause the controller(s) to panic to prevent data loss, unless the shelf is part of an NSPF (no single point of failure) data pool. To avoid this, shut down the controller(s) before decommissioning the shelf. For details on NSPF profiles, see Profile Configuration.

- 1 **Stop all input and output to and from the disk shelf.**
- 2 **Wait approximately two minutes until all disk activity indicators have stopped flashing.**
- 3 **Place the power supply on/off switches to the "O" off position.**
- 4 **Disconnect the power cords from the external power source for the cabinet.**

Note: All power cords must be disconnected to completely remove power from the disk shelf.

See Also

- [Cabling Diagrams](#)

DE2 24P

Precautions

Observe the following cautions when installing the Oracle Storage Drive Enclosure DE2-24P into a rack using the supplied rail kit. Note that if your rail kit shipped with installation instructions, use those instructions instead.

- Always load equipment into a rack from the bottom up so that it will not become top-heavy and tip over. Deploy the anti-tip bar to prevent the rack from tipping during equipment installation.
- Ensure that the temperature in the rack does not exceed the controller's maximum ambient rated temperatures. Consider the total airflow requirements of all equipment installed in the rack to ensure that the equipment is operated within its specified temperature range.
- Do not remove a component if you do not have an immediate replacement. The disk shelf must not be operated without all components in place.
- Do not lift the disk shelf by the handles on the power supply with fan modules; they are not designed to take the weight.

Prerequisites

Refer to the following section for an overview of your disk shelf.

- [Disk Shelf Overview](#) - view component diagrams and specifications

Tools and Equipment Needed

To install the shelf, you need the following tools:

- Phillips head No. 2 screwdriver that is a minimum of 4 inches long.
- T20 Torx driver if using a threaded cabinet.
- A mechanical lift is highly recommended because the chassis can weigh approximately 51 lbs (23 kg). At least three people are required: two to install the shelf and one spotter to engage the rails.
- Flashlight for the spotter to ensure the shelf is engaged in the rails.

Use one of the following racks for the disk shelf:

- Sun Rack II 1042/1242 cabinet
- Any 19-inch wide, 4-post, EIA-compatible rack or cabinet with a front-to-back depth between vertical cabinet rails of 61 cm to 91 cm (24 in. to 36 in.). The cabinet can have threaded or unthreaded cabinet rails. Threaded cabinets must be M6 or 10-32 cabinets. Cabinets must be able to support the weight of all equipment contained within them.

Position the rack where the shelf is to be installed adjacent to the rack where the controller is installed, if separate. Stabilize the cabinet and lock the casters. To facilitate access, remove doors from cabinets.

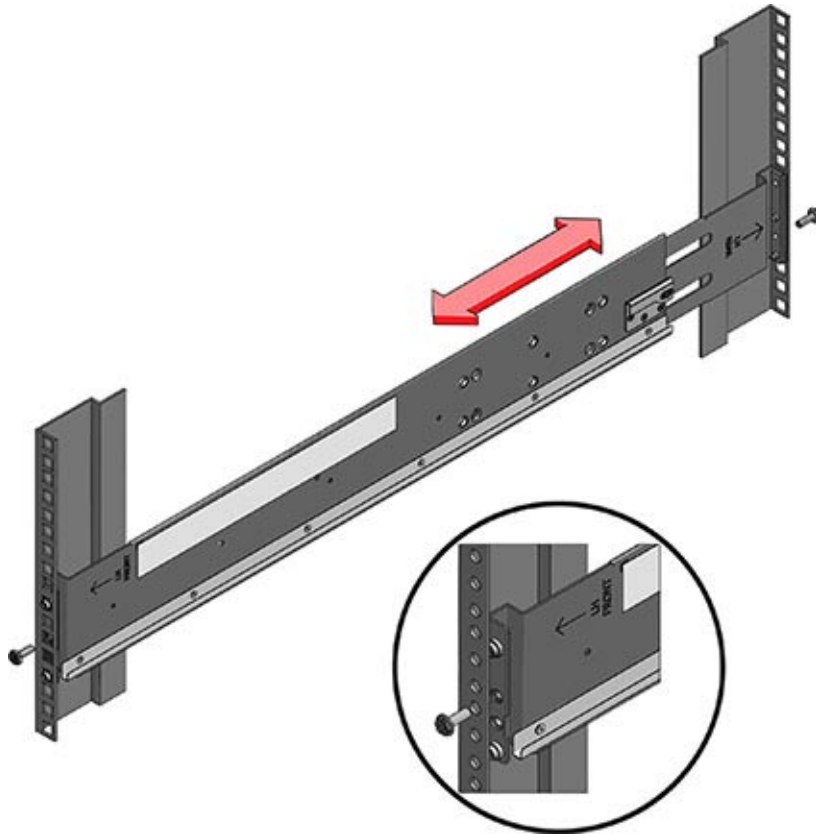
Tasks

DE2 24P Tasks

▼ Installing the Disk Shelf into the Rack Slide Rails

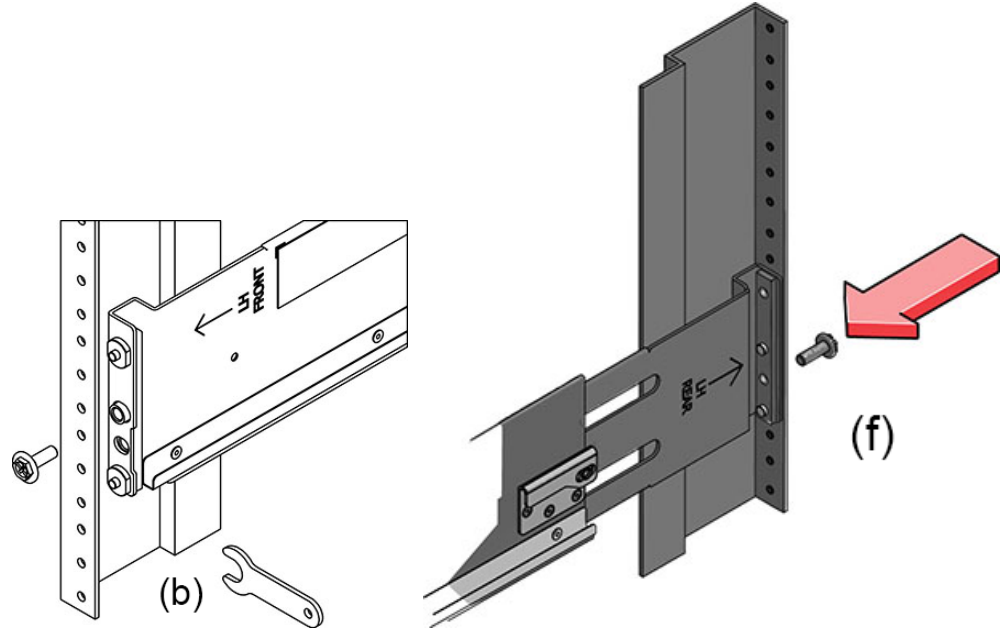
- 1 The Oracle Storage Drive Enclosure DE2-24P requires two standard mounting units (2RU) of vertical space in the cabinet. Starting at the bottom of the cabinet, locate the appropriate rack unit (RU) height, which is six rack holes. Install disk shelves below controllers to prevent rack from tipping.
- 2 If your rack is an unthreaded universal 19-inch or Sun Rack II cabinet: a) Position the front rail location pegs fully inside the appropriate holes in the front of the rack. The rail flange must be inside of the cabinet flange, and the rail label facing the inside of the cabinet. b) Insert and

tighten one screw through the front of the rack and into the top hole in the rails. c) Adjust the rail lengths to fit, and position the rear rail location pegs in the corresponding rear rack holes. d) Insert and tighten one screw through the back of the rack and into the back of the rails.

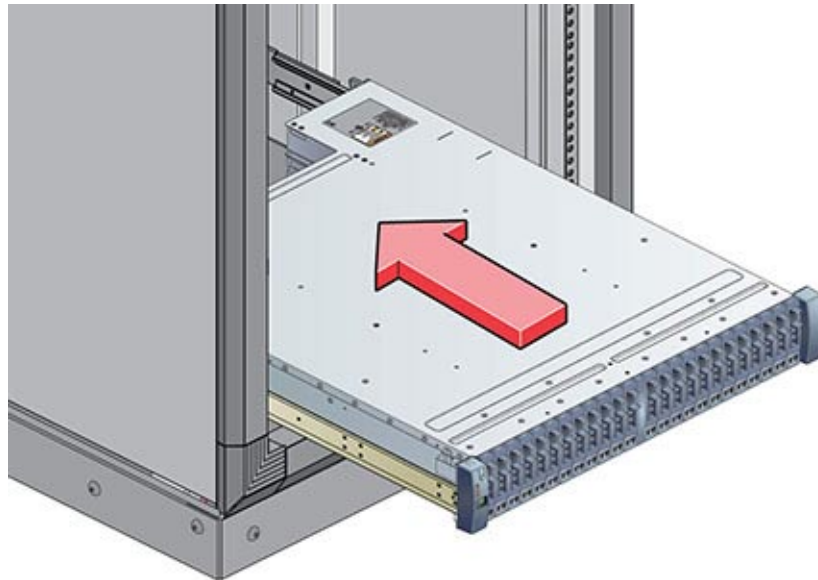


- 3 If your rack is a threaded universal 19-inch cabinet: a) Use the T20 Torx driver to remove the rail location pegs from the front and rear of the rails. b) Use the supplied wrench to insert two pins into each end of the rails, in the same location where the location pegs were removed. c) Position the front of the rails inside the cabinet, with the rail flange inside of the cabinet flange, and the rail label facing the inside of the cabinet. The pins should be fully located within the rack holes. d) Insert and tighten one screw through the front of the rack and into the top hole in the rails. e) Adjust the rail lengths to fit, and locate the rear pins inside the corresponding rear rack

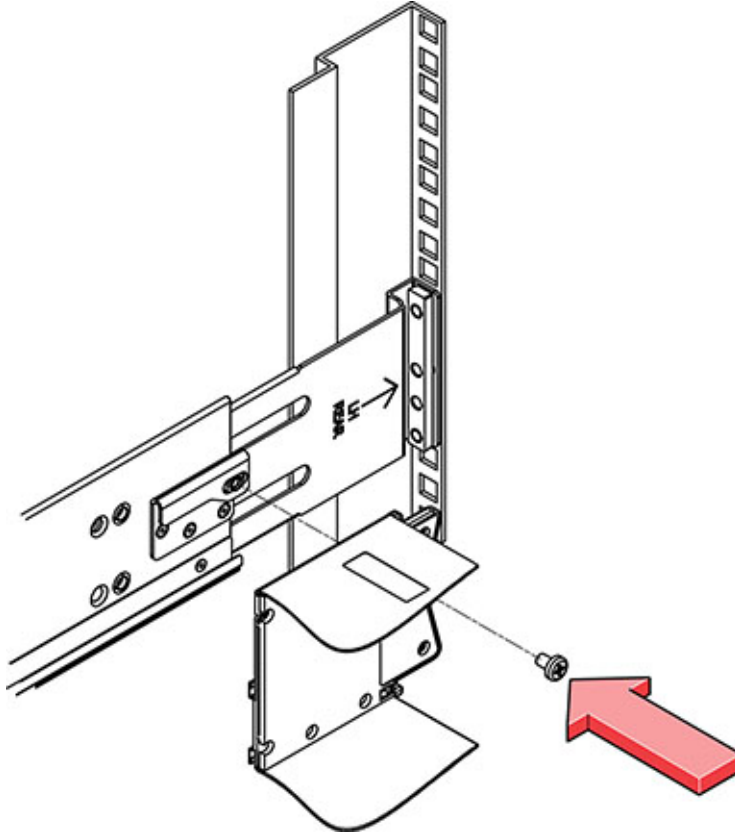
holes. f) Insert and tighten one screw through the back of the rack and into the back of the rails.



- 4 Using a mechanical lift or two people, one at each side of the disk shelf, carefully lift and rest the shelf on the bottom ledge of the left and right rails. Do not lift using the power supply with fan module handles.



- 5 Carefully slide the shelf into the rails until it is fully seated within the cabinet. The spotter, using a flashlight, should ensure that the shelf is fully seated within the rails. If removing the shelf to reseat it, support it at all times.
- 6 Install one long patchlock screw per rail to secure the rear of the shelf to the rear of the rack. If the screw cannot be inserted, the shelf might not be fully seated within the rails.



- 7 Remove the front side caps, install one screw into each front side, and replace the caps.
- 8 Connect and apply power to the disk shelf as described in the next section.

▼ Powering On the Disk Shelf

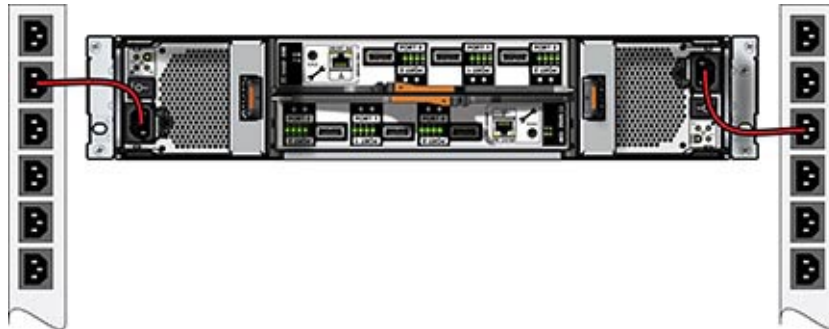
Ensure you have met the following electrical safety measures before applying power to the disk shelf:

- Provide a suitable power source with electrical overload protection to meet the power supply input voltage range of 100-240 VAC, 50-60 Hz. The power source must not be overloaded by the total number of disk shelves in the cabinet.
- The power source must provide a reliable earth connection for each disk shelf and the cabinet.
- Ensure that the power source is easily accessible because the power cord is the main disconnect device for the disk shelf.

1 Plug a power cord into each power supply with fan module.

2 Plug the other end of the power cords into the external power source for the cabinet.

Note: To guarantee redundancy, power cords must be connected to two separate and independent power sources.



3 Apply power to the external power source.

4 Place the power supply on/off switches to the "I" on position.

5 Turn on the cabinet circuit breakers, if applicable.

6 After the disk shelf powers on, which could take several minutes, ensure that the system power indicator on the front of the disk shelf is lit a steady green, and that each power supply with fan module status indicator on the rear is lit a steady green. If not, power off the disk shelf as described in the next section and reseal the faulted module. If the module status indicator is not a steady green after module reinsertion, contact Oracle Customer Service.



- 7 **Perform the software setup tasks as described in the storage controller installation guide.**

▼ **Powering Off the Disk Shelf**

Most disk shelf components are hot-swappable; you do not need to remove power when replacing them. Do not remove a component if you do not have an immediate replacement. The disk shelf must not be operated without all components in place.

Powering off or removing all SAS chains from a disk shelf will cause the controller(s) to panic to prevent data loss, unless the shelf is part of an NSPF (no single point of failure) data pool. To avoid this, shut down the controller(s) before decommissioning the shelf. For details on NSPF profiles, see Profile Configuration.

- 1 **Stop all input and output to and from the disk shelf.**
- 2 **Wait approximately two minutes until all disk activity indicators have stopped flashing.**
- 3 **Place the power supply on/off switches to the "O" off position.**
- 4 **Disconnect the power cords from the external power source for the cabinet. All power cords must be disconnected to completely remove power from the disk shelf.**

See Also

- [Cabling Diagrams](#)

Sun Disk Shelf

Precautions

Observe the following cautions when installing a Sun Disk Shelf into a rack using the rail assembly in the bolt-on rack mount kit. Note that if your rack mount kit shipped with installation instructions, use those instructions instead.

- Always load equipment into a rack from the bottom up so that it will not become top-heavy and tip over. Deploy the anti-tip bar to prevent the rack from tipping during equipment installation.
- Ensure that the temperature in the rack does not exceed the controller's maximum ambient rated temperatures. Consider the total airflow requirements of all equipment installed in the rack to ensure that the equipment is operated within its specified temperature range.

Prerequisites

Refer to the poster that shipped with the product or the following section for an overview of your disk shelf.

- [Disk Shelf Overview](#) - view component diagrams and specifications

Tools and Equipment Needed

To install the shelf, you need the following tools:

- You will need a No. 2 Phillips head screwdriver that is a minimum of 4 inches long.
- A mechanical lift is highly recommended because the chassis can weigh between 91-170 lbs. (42-77kg). At least three people are required: two to install the shelf or controller and one spotter to engage the rails.
- :If a mechanical lift is not available, remove the power supplies, SIM boards and hard disk drives to reduce the weight, see Disk Shelf Maintenance Procedures for instructions.

Use one of the following racks for the Sun Disk Shelf:

- Sun Rack 900/1000 cabinet
- Sun Fire cabinet
- Sun StorEdge Expansion cabinet
- Sun Rack II 1042/1242 cabinet
- Any 19-inch wide, 4-post, EIA-compatible rack or cabinet with a front-to-back depth between vertical cabinet rails of 61 cm to 91 cm (24 in. to 36 in.). The cabinet can have threaded or unthreaded cabinet rails.

Position the rack where the shelf is to be installed adjacent to the rack where the controller is installed, if separate. Stabilize the cabinet and lock the casters.

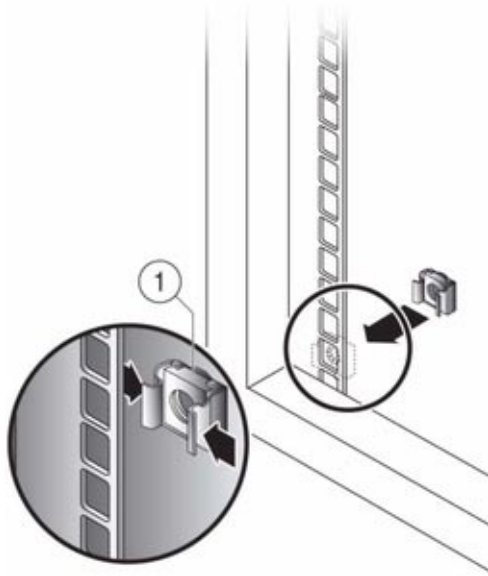
Tasks

Sun Disk Shelf Tasks

▼ Installing the Sun Disk Shelf into the Rack Slide Rails

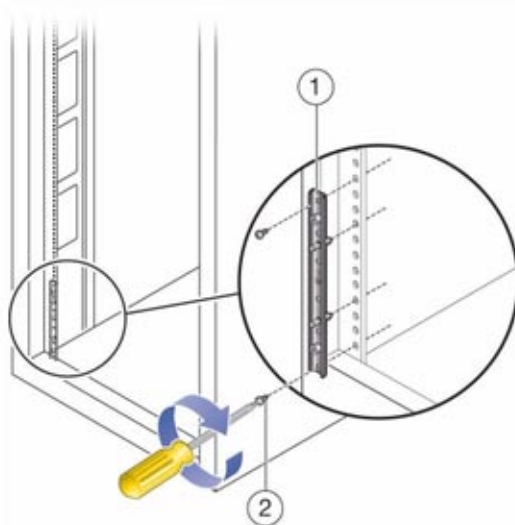
- 1 **Starting at the bottom of the cabinet, locate the appropriate rack unit (RU) height. Install Disk Shelves below controllers to prevent rack from tipping. The Sun Disk Shelf requires four standard mounting units (4RU) of vertical space in the cabinet.**

- 2 If you are using a universal 19-inch or Sun Rack II cabinet, snap an M6 square cage nut into the 4U location where you will be installing the system. Install in the top and bottom holes.



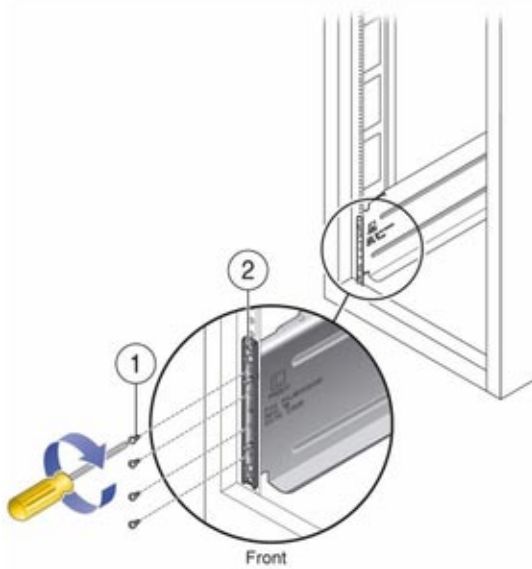
- 3 Install appropriate rail plates in four locations on the rack (2 front and 2 back) by aligning the two pins on the rail plate with holes on the cabinet rails.

- 4 Insert M6 screws in the top and bottom holes of each rail plate and tighten (8 total places).



- 5 Install each rail by first aligning the front pins of the rack adapter plates with corresponding holes in the front of the rail, then adjust the rail to fit the rack and insert the pins from the rear rack adapter plates into the corresponding holes of the rail.

- 6 Install four 8-32 screws into the four remaining front and rear holes of each rack rail (16 total).



- 7 Using a mechanical lift or two people, one at each side of the shelf or controller, carefully lift and rest the shelf on the bottom ledge of the left and right rails. The following graphic illustrates the chassis insertion.



- 8 Carefully slide the shelf into the cabinet until the front flanges of the shelf touch the vertical face of the rack.
- 9 Tighten the captive screws on each side of the front of the shelf to secure the shelf to the rack.
- 10 At the back of the disk shelf, slide a system locking clip onto each lower corner of the chassis.

See Also

- [Cabling Diagrams](#)

Cabling

Cabling



Connecting to Attached Storage

The cabling information in this section shows a subset of the supported configurations for Oracle ZFS Storage controllers. For the maximum number of disk shelves per controller, see the [Summary of Controller Configurations](#)

To cable the controller to the disk shelves, use the following guidelines:

- Connect each disk chain to two HBAs if available.
- Maximize the number of disk chains before adding disk shelves to an individual chain.
- Balance the number of disk shelves across the disk chains in your system.
- Disks with different capacities or rotation speeds cannot be mixed within a single disk shelf.
- To use mixed disk shelf types, the controller must have only 4X4 port SAS-2 HBAs.
- Do not use mixed disk shelves in the same chain, each must be on their own SAS fabric.

The following list provides links to cable diagrams for standalone and clustered controllers.

- Oracle DE2-24 Disk Shelf
- Connecting DE2 Disk Shelves to the [ZS3-2/7120/7320 | ZS3-2/7320 Clustered](#)
- Connecting DE2 Disk Shelves to the [ZS3-4/7420 | ZS3-4/7420 Clustered](#)
- Sun Disk Shelf

- Connecting Sun Disk Shelves to the [7120/7320 | 7320 Clustered](#)
- Connecting Sun Disk Shelves to the [7420 | 7420 Clustered](#)
- Mixed DE2-24 and Sun Disk Shelves
- Connecting mixed DE2-24 and Sun Disk Shelves to the [ZS3-2/7120/7320 | ZS3-2/7320 Clustered](#)
- Connecting mixed DE2-24 and Sun Disk Shelves to the [ZS3-4/7420 | ZS3-4/7420 Clustered](#)

Next Steps

After connecting attached storage, apply power and configure the appliance.

- [Powering on](#)
- [Initial configuration](#)

Storage expansion may require adding or replacing HBAs in your configuration. For information, see the following sections:

- [ZS3-2 Maintenance Procedures: PCIe Cards](#)
- [ZS3-4 Maintenance Procedures: PCIe Cards and Risers](#)
- [7x20 Maintenance Procedures: PCIe Cards and Risers](#)

Summary of Controller Configurations

Maximum Controller Configurations

The following table shows the maximum supported controller configurations.

NOTE: Controllers cannot use 2X4 port SAS-2 HBAs and 4X4 port SAS-2 HBAs at the same time. To use DE2 and Sun Disk Shelves together, the controller must use 4X4 port SAS-2 HBAs, which are only supported with release AK 2013.1.0 and later.

Controller	Max. Shelves	Max. 2X4 port SAS-2 HBA	Max. 4X4 port SAS-2 HBA
ZS3-2	8	NA	2
ZS3-4	36	NA	4
7120	2	1	NA
7320	6	1	1
7420	36	6	6

DE2 to ZS3-2/7120/7320 Standalone

Connecting ZS3-2/7120/7320 Standalone Controllers to Disk Shelves

The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-2/7120/7320 standalone controllers with one or two HBAs.

Note: For hardware port locations, see the PCIe Options section in the Hardware Maintenance Overview for your controller model.

Cable Diagrams

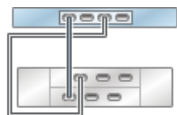


fig. 1 Standalone controller with one HBA and one disk shelf in a single chain.

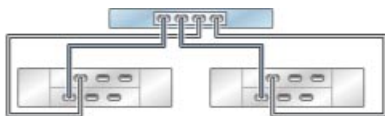


fig. 2 One HBA and two disk shelves in two chains.

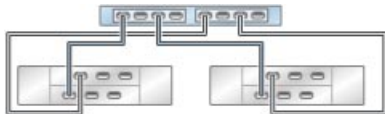


fig. 3 Two HBAs and two disk shelves in two chains.

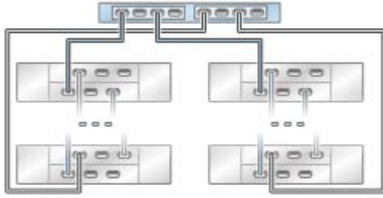


fig. 4 Two HBAs and multiple disk shelves in two chains.

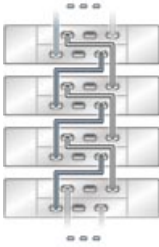


fig. 5 Four disk shelves in a single chain.

DE2 to ZS3-2/7320 Clustered

Connecting ZS3-2/7320 Clustered Controllers to Disk Shelves

The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-2/7320 clustered controllers with one HBA.

Note: For hardware port locations, see the PCIe Options section in the Hardware Maintenance Overview for your controller model.

Cable Diagrams

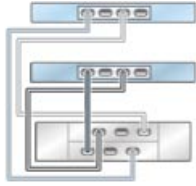


fig. 1 Clustered controllers with one HBA and one disk shelf in a single chain.

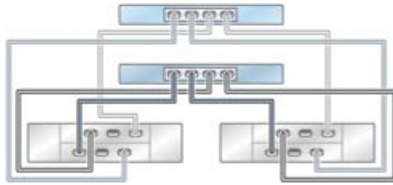


fig. 2 One HBA and two disk shelves in two chains.

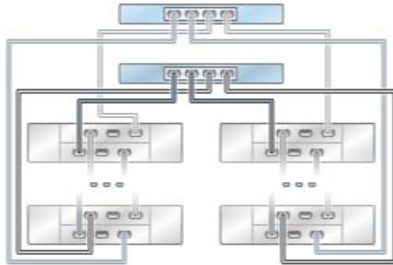


fig. 3 One HBA and multiple disk shelves in two chains.

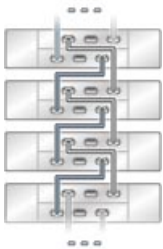


fig. 4 Four disk shelves in a single chain.

DE2 to ZS3-4/7420 Standalone

Connecting the ZS3-4/7420 Standalone Controller to Disk Shelves (3 HBAs)

The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-4/7420 standalone controllers with three HBAs.

Note: For hardware port locations, see the PCIe Options section in the Hardware Maintenance Overview for your controller model.

Cable Diagrams

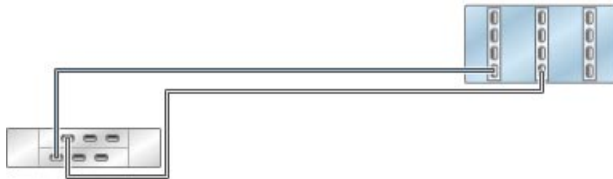


fig. 1 Standalone controller with three HBAs and one disk shelf in a single chain.

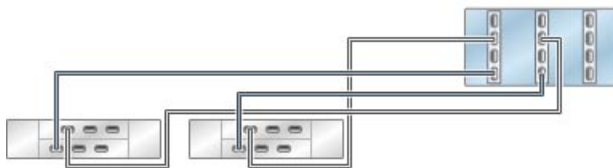


fig. 2 Three HBAs and two disk shelves in two chains.

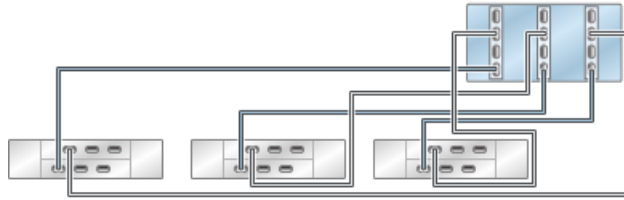


fig. 3 Three HBAs and three disk shelves in three chains.

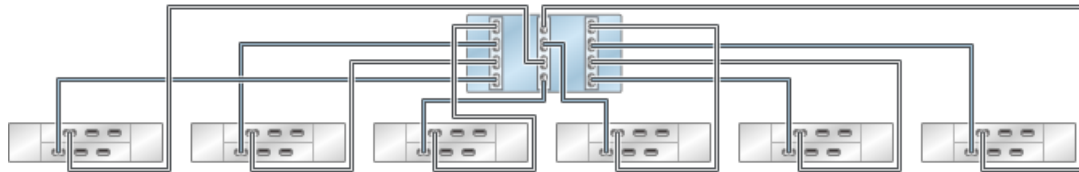


fig. 4 Three HBAs and six disk shelves in six chains.

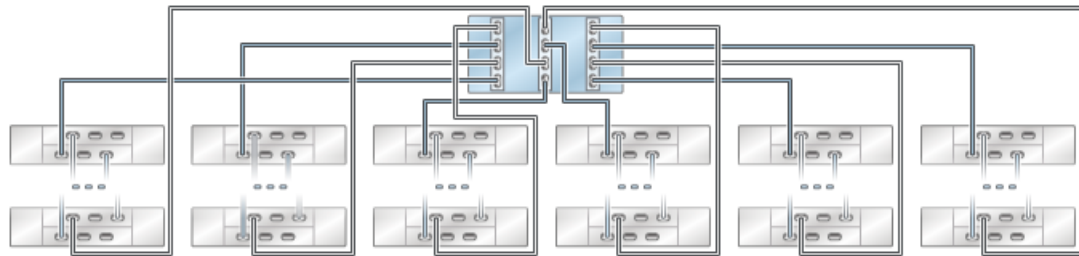


fig. 5 Three HBAs with multiple disk shelves in six chains.

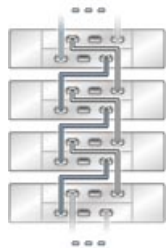


fig. 6 Four disk shelves in a single chain.

DE2 to ZS3-4/7420 Clustered

Connecting the ZS3-4/7420 Clustered Controller to Disk Shelves (3 HBAs)

The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-4/7420 clustered controllers with three HBAs.

Note: For hardware port locations, see the PCIe Options section in the Hardware Maintenance Overview for your controller model.

Cable Diagrams

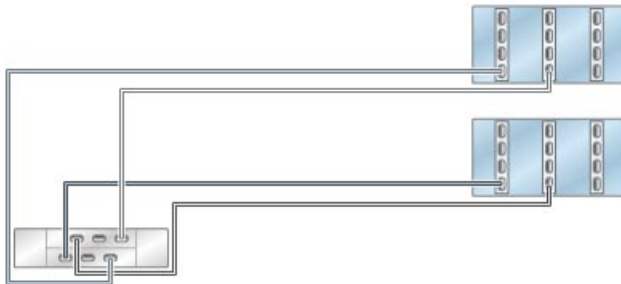


fig. 1 Clustered controllers with three HBAs and one disk shelf in a single chain.

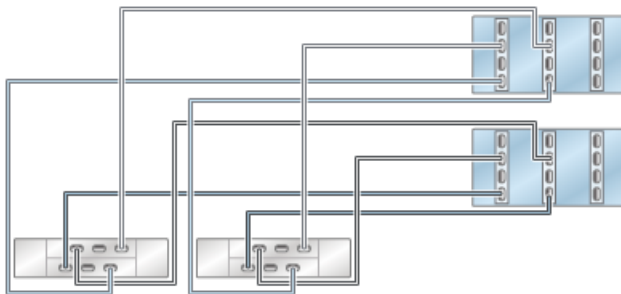


fig. 2 Three HBAs and two disk shelves in two chains.

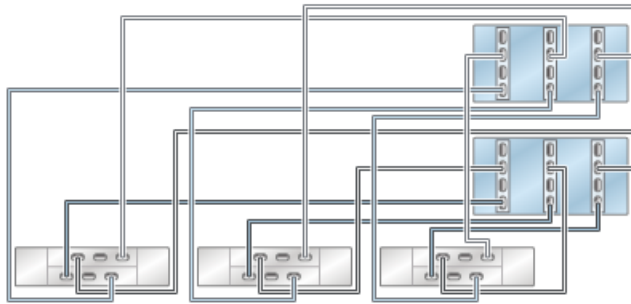


fig. 3 Three HBAs and three disk shelves in three chains.

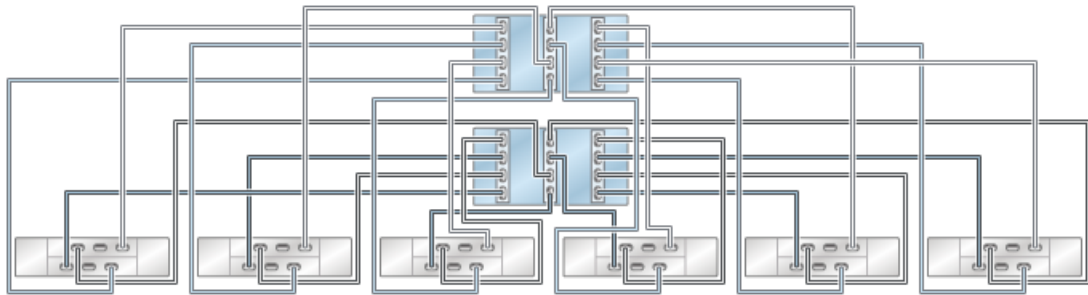


fig. 4 Three HBAs and six disk shelves in six chains.

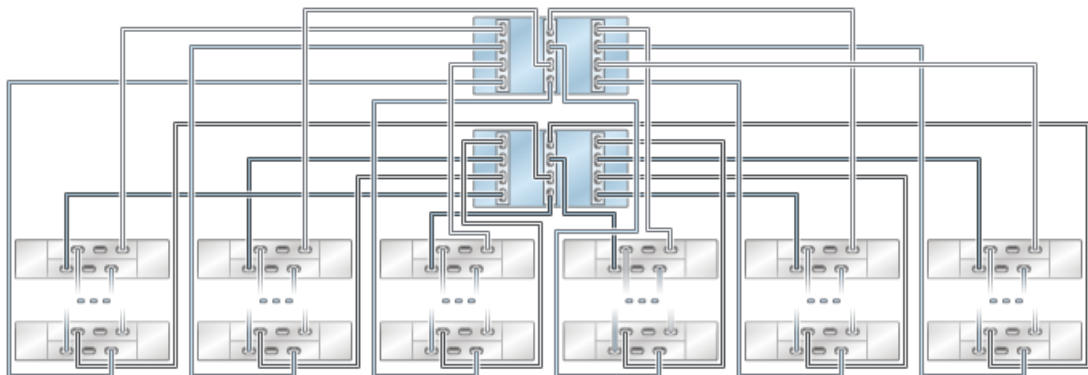


fig. 5 Three HBAs and multiple disk shelves in six chains.

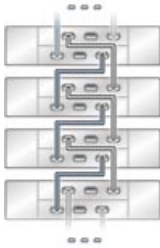


fig. 6 Four disk shelves in a single chain.

7120-7320 Cabling

Connecting 7120/7320 Standalone Controllers to Sun Disk Shelves

The following figures show a subset of the supported configurations for Oracle ZFS Storage 7120/7320 standalone controllers with one HBA.

Note: For hardware port locations, see the PCIe Options section in the Hardware Maintenance Overview for your controller model.

Cable Diagrams

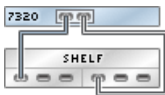


fig. 1 Standalone controller with one HBA and one disk shelf in a single chain.

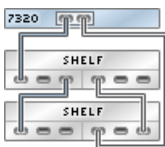


fig. 2 One HBA and two disk shelves in a single chain.

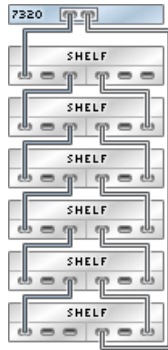


fig. 3 One HBA and six disk shelves in a single chain.

7320 Cluster Cabling

Connecting the 7320 Clustered Controller to Sun Disk Shelves

The following figures show a subset of the supported configurations for Oracle ZFS Storage 7320 clustered controllers with one HBA.

Note: For hardware port locations, see the PCIe Options section in the Hardware Maintenance Overview for your controller model.

Cable Diagrams

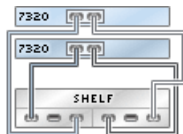


fig. 1 Clustered controllers with one HBA and one disk shelf in a single chain.

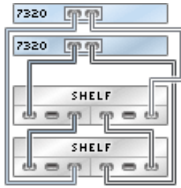


fig. 2 One HBA and two disk shelves in a single chain.

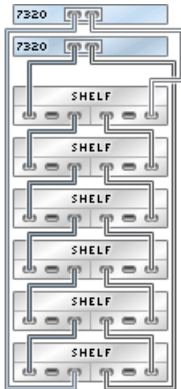


fig. 3 One HBA and six disk shelves in a single chain.

7420 Cabling

Connecting the 7420 Standalone Controller to Sun Disk Shelves (2 and 6 HBAs)

The following figures show a subset of the supported configurations for Oracle ZFS Storage 7420 standalone controllers with two and six HBAs.

Note: For hardware port locations, see the PCIe Options section in the Hardware Maintenance Overview for your controller model.

Cable Diagrams



fig. 1 Standalone controller with two HBAs and one disk shelf in a single chain.

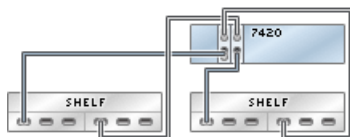


fig. 2 Two HBAs and two disk shelves in two chains.

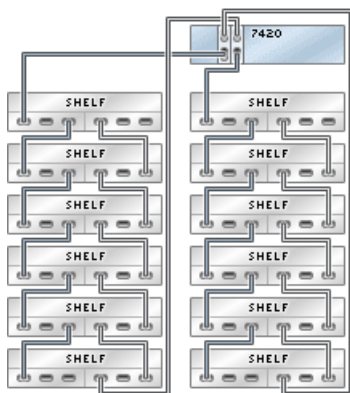


fig. 3 Two HBAs and 12 disk shelves in two chains.



fig. 4 Standalone controller with six HBAs and one disk shelf in a single chain.

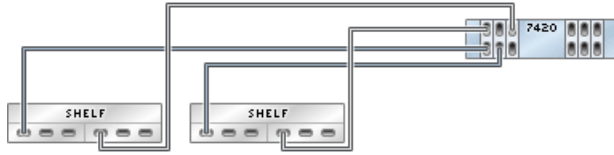


fig. 5 Six HBAs and two disk shelves in two chains.

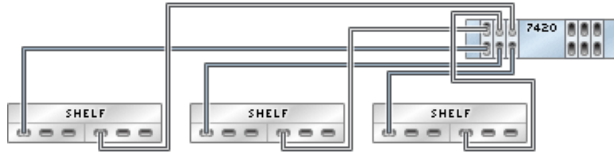


fig. 6 Six HBAs and three disk shelves in three chains.

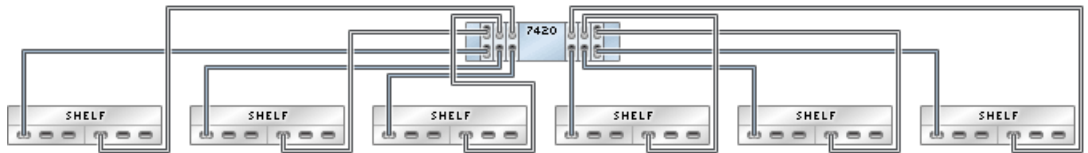


fig. 7 Six HBAs and six disk shelves in six chains.

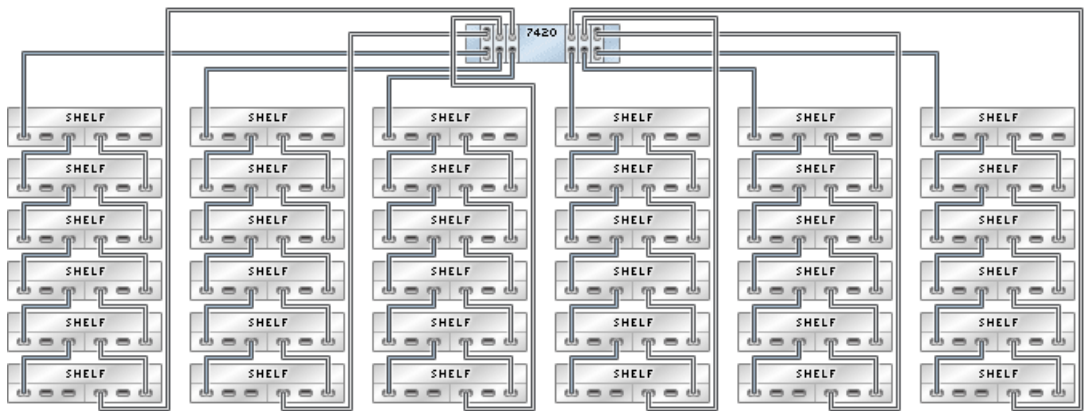


fig. 8 Six HBAs and 36 disk shelves in six chains.

7420 Cluster Cabling

Connecting the 7420 Clustered Controllers to Disk Shelves (2 and 6 HBAs)

The following figures show a subset of the supported configurations for Oracle ZFS Storage 7420 clustered controllers with two and six HBAs.

Note: For hardware port locations, see the PCIe Options section in the Hardware Maintenance Overview for your controller model.

Cable Diagrams

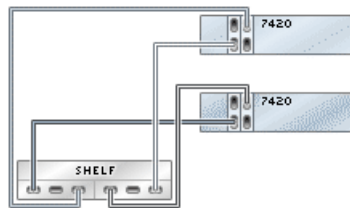


fig. 1 Clustered controllers with two HBAs and one disk shelf in a single chain.

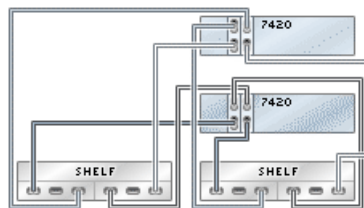


fig. 2 Two HBAs and two disk shelves in two chains.

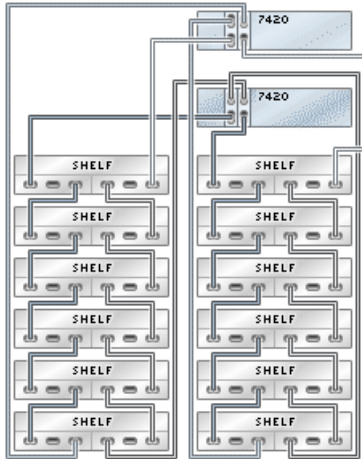


fig. 3 Two HBAs and 12 disk shelves in two chains.

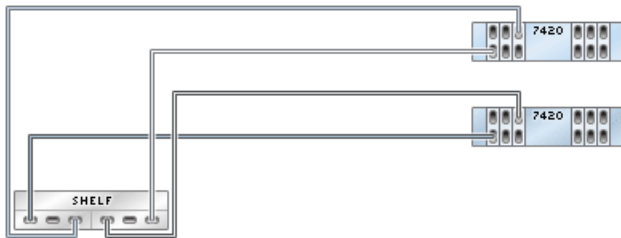


fig. 4 Clustered controllers with six HBAs and one disk shelf in a single chain.

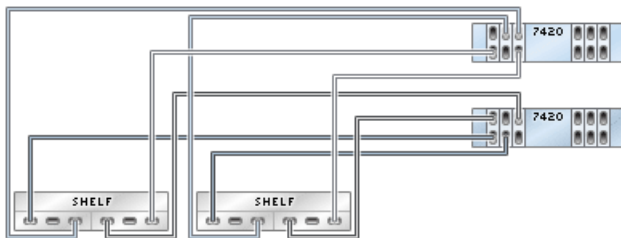


fig. 5 Six HBAs and two disk shelves in two chains.

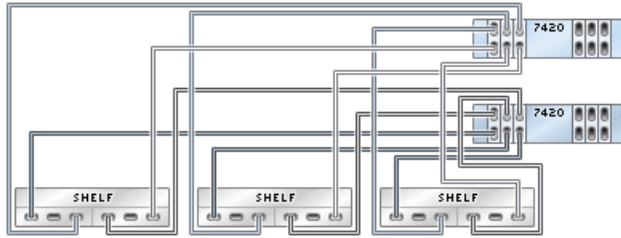


fig. 6 Six HBAs and three disk shelves in three chains.

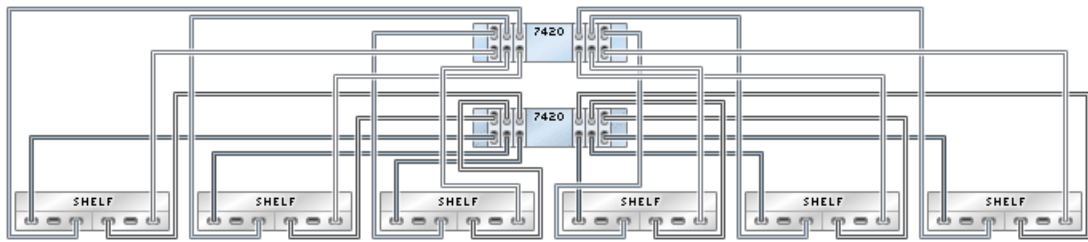


fig. 7 Six HBAs and six disk shelves in six chains.

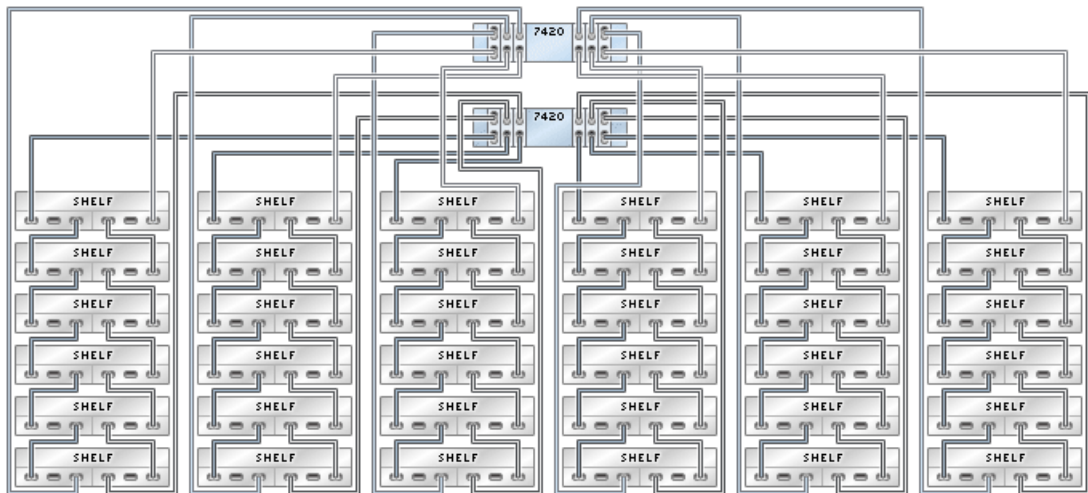


fig. 8 Six HBAs and 36 disk shelves in six chains.

ZS3-2/7120/7320 with DE2 and Sun Disk Shelves

Connecting ZS3-2/7120/7320 Standalone Controllers to Mixed Disk Shelves

The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-2/7120/7320 standalone controllers with one HBA. Using mixed disk shelves on a controller requires the following:

- The controller must use only 4X4 port SAS-2 HBAs
- Do not use mixed disk shelves in the same chain

Note: For hardware port locations, see the PCIe Options section in the Hardware Maintenance Overview for your controller model. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

Cable Diagrams

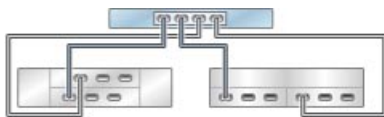


fig. 1 Standalone controller with one HBA and two disk shelves in two chains (DE2-24 on the left).

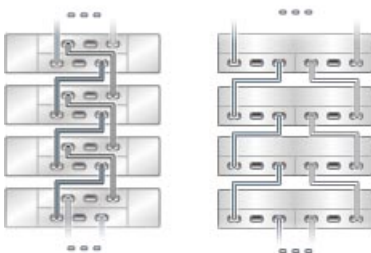


fig. 2 Eight disk shelves in two chains (DE2-24 on the left).

ZS3-2/7320 Clustered with DE2 and Sun Disk Shelves

Connecting ZS3-2/7320 Storage Clustered Controllers to Mixed Disk Shelves

The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-2/7320 clustered controllers with one HBA. Using mixed disk shelves on a controller, requires the following:

- The controller must use only 4X4 port SAS-2 HBAs
- Do not use mixed disk shelves in the same chain

Note: For hardware port locations, see the PCIe Options section in the Hardware Maintenance Overview for your controller model. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

Cable Diagrams

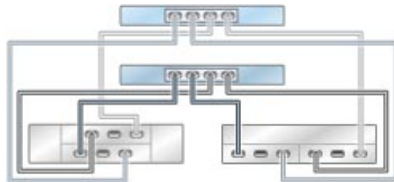


fig. 1 Clustered controllers with one HBA and two disk shelves in two chains (DE2-24 on the left).

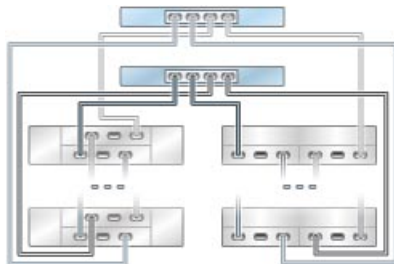


fig. 2 One HBA and multiple disk shelves in two chains (DE2-24 on the left).

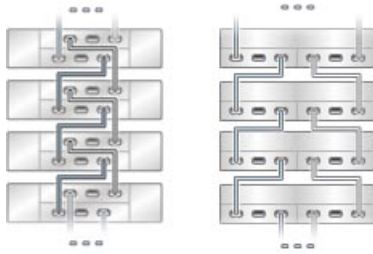


fig. 3 Eight disk shelves in two chains (DE2-24 on the left).

ZS3-4/7420 with DE2 and Sun Disk Shelves

Connecting ZS3-4/7420 Standalone Controllers to Mixed Disk Shelves

The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-4/7420 standalone controllers with two HBAs. Using mixed disk shelves on a controller, requires the following:

- The controller must use only 4X4 port SAS-2 HBAs
- Do not use mixed disk shelves in the same chain

Note: For hardware port locations, see the PCIe Options section in the Hardware Maintenance Overview for your controller model. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

Cable Diagrams

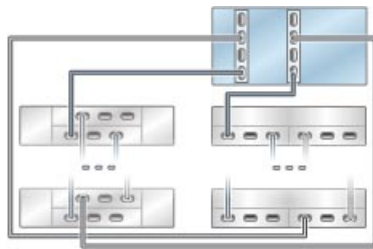


fig. 1 Clustered controllers with two HBAs and multiple mixed disk shelves in two chains (DE2-24 on the left).

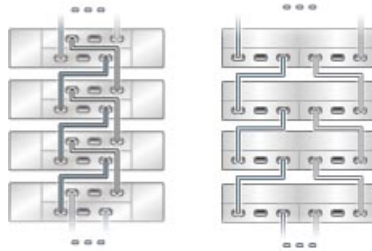


fig. 2 Eight disk shelves in two chains (DE2-24 on the left).

ZS3-4/7420 Clustered with DE2 and Sun Disk Shelves

Connecting ZS3-4/7420 Clustered Controllers to Mixed Disk Shelves

The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-4/7420 clustered controllers with two HBAs. Using mixed disk shelves on a controller, requires the following:

- The controller must use only 4X4 port SAS-2 HBAs
- Do not use mixed disk shelves in the same chain

Note: For hardware port locations, see the PCIe Options section in the Hardware Maintenance Overview for your controller model. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

Cable Diagrams

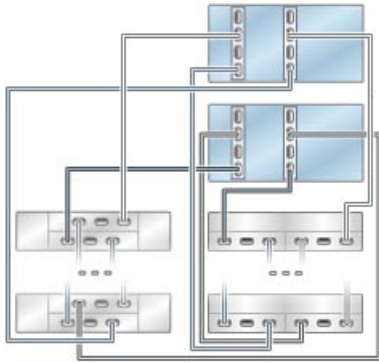


fig. 1 Clustered controllers with two HBAs and multiple mixed disk shelves in two chains (DE2-24 on the left).

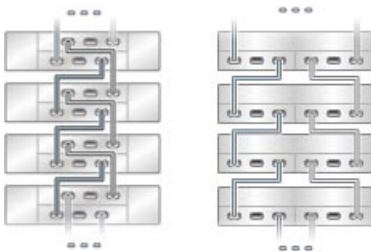


fig. 2 Eight disk shelves in two chains (DE2-24 on the left).

Powering On and Configuring the System

Power

Powering On and Configuring the Appliance

This section provides instructions for configuring the primary network interface using the pre-installed Oracle ZFS Storage command line interface (CLI). After you configure the primary interface, configure the remaining system parameters using the browser user interface (BUI) from any client on the same network.

Prerequisites

Refer to the [Installation](#) section for detailed instructions to install your system in the rack. Complete the system cabling according to the [Cabling Diagrams](#) section.

Gather the following information in preparation for configuring an Ethernet interface on the storage controller.

- IP address
- IP netmask
- Host name
- Domain Name Server (DNS) domain name
- DNS server IP address
- Default router IP address
- Password

If you will access the appliance through an administrative client, configure the administrative client with the following settings:

- 8N1: eight data bits, no parity, one stop bit
- 9600 baud
- Disable hardware flow control (CTS/RTS)

- Disable software flow control (XON/XOFF)

Refer to the Quick Setup poster that shipped with the product or the following sections for an overview of your system controller.

- [ZS3-2 Overview](#)
- [ZS3-4 Overview](#)
- [7120 Overview](#)
- [7320 Overview](#)
- [7420 Overview](#)

Connecting to ILOM

In rare cases, faults associated with uncorrectable CPU errors are not diagnosable or displayed in the controller. These faults will be preserved by and observable on the ILOM. Connect to the server ILOM (Service Processor) on the server platform to diagnose hardware faults that do not appear in the BUI.

In a cluster environment, an ILOM connection should be made to each controller.

The server ILOM provides options for (i) network and (ii) serial port connectivity. Network connection is the preferred choice, as the ILOM serial port does not always allow adequate means of platform data collection.

WARNING: Failure to configure ILOM connectivity may lead to longer than necessary hardware fault diagnosis and resolution times.

Tasks

The following procedures describe how to power on the appliance.

Power Tasks

▼ Powering On the Appliance

You can access the system by connecting an administrative client to the serial management port on the controller. Alternatively, if there is a Dynamic Host Configuration Protocol (DHCP) server on the network, you can access the system by connecting the network management port to your network.

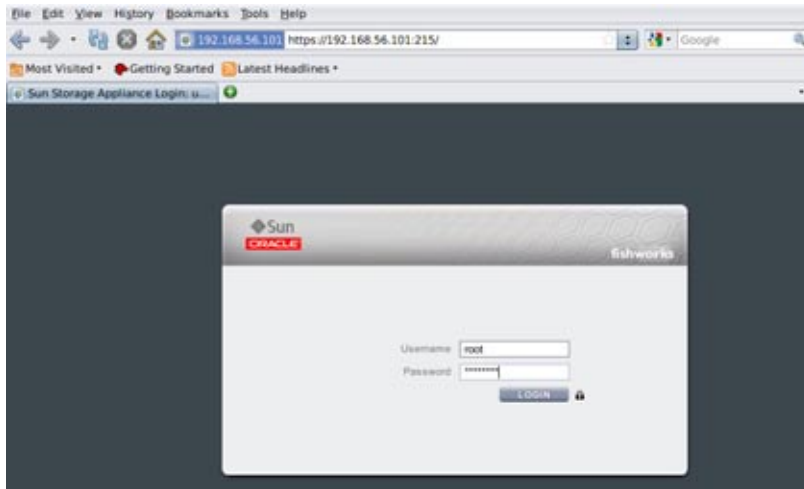
Note that if you are installing a cluster, configure only one controller initially. The software propagates the configuration to the peer controller during cluster initialization. After the cluster is initialized, you can administer the system from either storage controller. However, do not attempt initial configuration on both controllers independently. Refer to the Cluster documentation for more information.

- 1 To perform initial configuration using serial, connect a serial cable from the SER MGT port on the back panel of the controller to the serial port on the administrative client. Use a DB9 to RJ45 adapter if necessary.
- 2 To perform initial configuration using Ethernet, connect an Ethernet cable from the NET MGT port on the back panel of the controller to your network.
- 3 Connect an Ethernet cable from your network to the NET0 port on the back panel of the controller.
- 4 Power on any disk shelves attached to the storage system by plugging the two power cords into the universal power connectors, connecting the cords to the external power source and turning on the disk shelf power switches. Wait several minutes until the power indicators are lit a steady green.
- 5 Connect power cables to power supply 0 and power supply 1 on the storage controller(s) and wait until the Power/OK LED on the front panel next to the Power button lights and remains lit (approximately two minutes).
- 6 Open a terminal window or terminal emulator and issue the appropriate command, as follows:
- 7 For a serial port concentrator connect (for example, using telnet), and use root as the user name and replace *serial-concentrator portnumber* with the appropriate value, for example: `telnet serial-concentrator portnumber`
- 8 For a network connection, connect using SSH and use root as the user name and determine the IP address by accessing your DHCP server for the address assigned to the Service Processor MAC address (see the label on the storage controller), for example: `ssh root@192.168.128.256`
- 9 Type the password `changeme` when prompted.
- 10 At the command prompt, type `start /SP/console`.
- 11 Type `y` to confirm that you want to start the console.
- 12 Press any key to begin configuring the appliance. The shell interface configuration screen appears. NET-0 at the top of the screen should be underlined.
- 13 Verify the information on the screen, or enter values that do not appear.
- 14 Apply the values by pressing ESC-1 or the F1 key or by pressing Enter after confirming the password. The final shell configuration screen appears, confirming that your appliance is ready for further configuration using the BUI.

▼ Completing Configuration

Configure the remaining system parameters through the CLI after logging in, or through a browser running on any client on the same network as the initial interface. The management software is designed to be fully featured and functional on a variety of web browsers.

- 1 Direct your browser to the system using either the IP address or host name you assigned to the NETO port as follows: `https://ipaddress:215` or `https://hostname:215`. The login screen appears.



- 2 Type `root` into the Username field and the administrative password that you entered into the appliance shell kit interface and press the Enter key. The Welcome screen appears.
- 3 To begin configuring the system, click Start on the Welcome screen. You are guided through the Initial Configuration of the remaining network interfaces, DNS, time settings, directory service and storage.

Next Steps

- [Initial Configuration](#)

Initial

Initial Configuration

The initial configuration consists of six configuration steps.

1. Network
2. DNS
3. Time
4. Name Services (NIS, LDAP, Active Directory)
5. Storage
6. Registration & Support

Prerequisites

The initial configuration of the system is conducted after powering it on for the first time and establishing a connection, as documented in the [Installation](#) section.

Note that the option to perform initial configuration of a cluster is only available in the BUI. If electing this option, read the clustering documentation before beginning initial configuration for detailed additional steps that are required for successful cluster setup. Pay careful attention to the Clustering Considerations for Networking section. Alternatively, cluster-capable appliances may be initially configured for standalone operation using the following procedure, and re-configured for cluster operation at a later time.

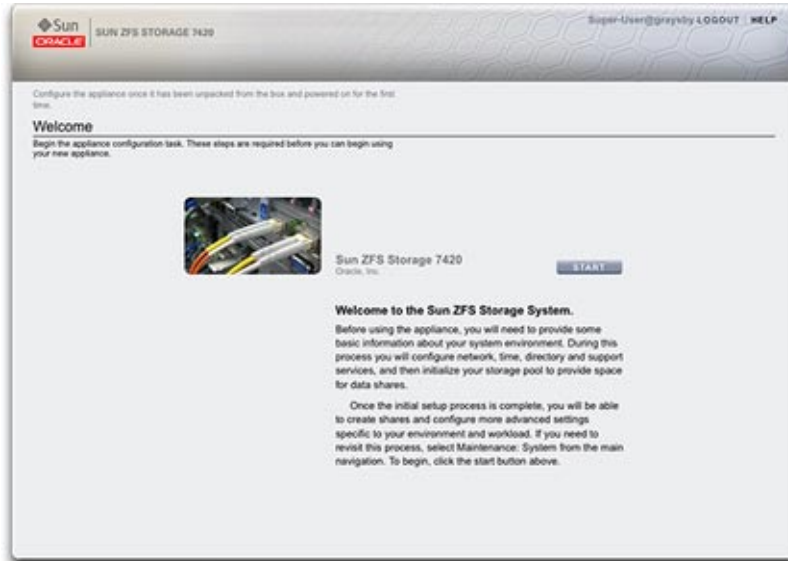
Summary

This procedure will configure networking connectivity, several client network services, and the layout of the storage pool for standalone operation. When completed, the appliance is ready for use - but will not have any shares configured for remote clients to access. To create shares or revisit settings, refer to the Shares and Configuration sections.

This procedure may be repeated at a later time by clicking the "INITIAL SETUP" button on the Maintenance > System screen or by entering the maintenance system setup context in the CLI.

BUI

The BUI initial configuration is the preferred method and provides a screen for each of the initial configuration steps.



Click Start to begin basic configuration of network, time directory and support services. Click Commit to save the configuration and go to the next screen. Arrows beneath the Commit button can be used to revisit previous steps, and change the configuration if desired.

Configuring Management Port

All standalone controllers should have at least one NIC port configured as a management interface. Select the Allow Admin option in the BUI to enable BUI connections on port 215 and CLI connections on ssh port 22.

All cluster installations should have at least one NIC port on each controller configured as a management interface as described above. In addition, the NIC instance number must be unique on each controller.

CLI

Alternatively, use the CLI to step through the initial configuration sections. Each step begins by printing its help, which can be reprinted by typing `help`. Use the `done` command to complete each step.

Performing Initial Configuration with the CLI

Login using the password you provided during [Installation](#):

```
caji console login: root
Password:
Last login: Sun Oct 19 02:55:31 on console
```

To setup your system, you will be taken through a series of steps; as the setup process advances to each step, the help message for that step will be displayed.

Press any key to begin initial configuration ...

In this example, the existing settings are checked (which were obtained from the DHCP server), and accepted by typing done. To customize them at this point, enter each context (datalinks, devices and interfaces) and type help to see available actions for that context. See the Network section for additional documentation. Pay careful attention to the Clustering Considerations for Networking section if you will configure clustering.

```
aksh: starting configuration with "net" ...
```

Configure Networking. Configure the appliance network interfaces. The first network interface has been configured for you, using the settings you provided at the serial console.

Subcommands that are valid in this context:

```

datalinks          => Manage datalinks
devices            => Manage devices
interfaces         => Manage interfaces
help [topic]       => Get context-sensitive help. If [topic] is specified,
                    it must be one of "builtins", "commands", "general",
                    "help" or "script".
show               => Show information pertinent to the current context
abort              => Abort this task (potentially resulting in a
                    misconfigured system)
done               => Finish operating on "net"
```

```
caji:maintenance system setup net> devices show
Devices:
```

DEVICE	UP	MAC	SPEED
igb0	true	0:14:4f:8d:59:aa	1000 Mbit/s
igb1	false	0:14:4f:8d:59:ab	0 Mbit/s
igb2	false	0:14:4f:8d:59:ac	0 Mbit/s
igb3	false	0:14:4f:8d:59:ad	0 Mbit/s

```
caji:maintenance system setup net> datalinks show
Datalinks:
```

DATALINK	CLASS	LINKS	LABEL
igb0	device	igb0	Untitled Datalink

```
caji:maintenance system setup net> interfaces show
Interfaces:
```

INTERFACE	STATE	CLASS	LINKS	ADDRS	LABEL
igb0	up	ip	igb0	192.168.2.80/22	Untitled Interface

```
caji:maintenance system setup net> done
```

Refer to the DNS section for additional documentation about DNS.

Configure DNS. Configure the Domain Name Service.

Subcommands that are valid in this context:

help [topic]	=> Get context-sensitive help. If [topic] is specified, it must be one of "builtins", "commands", "general", "help", "script" or "properties".
show	=> Show information pertinent to the current context
commit	=> Commit current state, including any changes
abort	=> Abort this task (potentially resulting in a misconfigured system)
done	=> Finish operating on "dns"
get [prop]	=> Get value for property [prop]. ("help properties" for valid properties.) If [prop] is not specified, returns values for all properties.
set [prop]	=> Set property [prop] to [value]. ("help properties" for valid properties.) For properties taking list values, [value] should be a comma-separated list of values.

```
caji:maintenance system setup dns> show
Properties:
```

```
<status> = online
domain = sun.com
servers = 192.168.1.4
```

```
caji:maintenance system setup dns> set domain=sf.fishworks.com
domain = sf.fishworks.com (uncommitted)
caji:maintenance system setup dns> set servers=192.168.1.5
servers = 192.168.1.5 (uncommitted)
caji:maintenance system setup dns> commit
caji:maintenance system setup dns> done
aksh: done with "dns", advancing configuration to "ntp" ...
```

Configure Network Time Protocol (NTP) to synchronize the appliance time clock. See the NTP section for additional documentation.

Configure Time. Configure the Network Time Protocol.

Subcommands that are valid in this context:

```

help [topic]      => Get context-sensitive help. If [topic] is specified,
                    it must be one of "builtins", "commands", "general",
                    "help", "script" or "properties".

show              => Show information pertinent to the current context

commit           => Commit current state, including any changes

abort            => Abort this task (potentially resulting in a
                    misconfigured system)

done             => Finish operating on "ntp"

enable           => Enable the ntp service

disable          => Disable the ntp service

get [prop]       => Get value for property [prop]. ("help properties"
                    for valid properties.) If [prop] is not specified,
                    returns values for all properties.

set [prop]       => Set property [prop] to [value]. ("help properties"
                    for valid properties.) For properties taking list
                    values, [value] should be a comma-separated list of
                    values.

```

```

caji:maintenance system setup ntp> set servers=0.pool.ntp.org
                    servers = 0.pool.ntp.org (uncommitted)
caji:maintenance system setup ntp> commit
caji:maintenance system setup ntp> done
aksh: done with "ntp", advancing configuration to "directory" ...

```

Refer to the NIS, LDAP and Active Directory sections for additional documentation.

Configure Name Services. Configure directory services for users and groups. You can configure and enable each directory service independently, and you can configure more than one directory service.

Subcommands that are valid in this context:

```

nis              => Configure NIS

ldap            => Configure LDAP

ad              => Configure Active Directory

help [topic]    => Get context-sensitive help. If [topic] is specified,
                    it must be one of "builtins", "commands", "general",
                    "help" or "script".

show            => Show information pertinent to the current context

abort           => Abort this task (potentially resulting in a
                    misconfigured system)

```

```

done                => Finish operating on "directory"

caji:maintenance system setup directory> nis
caji:maintenance system setup directory nis> show
Properties:
    <status> = online
    domain = sun.com
    broadcast = true
    ypservers =

caji:maintenance system setup directory nis> set domain=fishworks
    domain = fishworks (uncommitted)
caji:maintenance system setup directory nis> commit
caji:maintenance system setup directory nis> done
caji:maintenance system setup directory> done
aksh: done with "directory", advancing configuration to "support" ...

```

Configure storage pools that are characterized by their underlying data redundancy, and provide space that is shared across all filesystems and LUNs. See the Storage section for additional documentation.

Configure Storage.

Subcommands that are valid in this context:

```

help [topic]        => Get context-sensitive help. If [topic] is specified,
                    it must be one of "builtins", "commands", "general",
                    "help", "script" or "properties".

show                => Show information pertinent to the current context

commit              => Commit current state, including any changes

done                => Finish operating on "storage"

config <pool>       => Configure the storage pool

unconfig            => Unconfigure the storage pool

add                 => Add additional storage to the storage pool

import              => Search for existing or destroyed pools to import

scrub <start|stop> => Start or stop a scrub

get [prop]          => Get value for property [prop]. ("help properties"
                    for valid properties.) If [prop] is not specified,
                    returns values for all properties.

set pool=[pool]     => Change current pool

```

```

caji:maintenance system setup storage> show
Properties:
    pool = pool-0
    status = online
    profile = mirror

```

```

        log_profile = -
        cache_profile = -
caji:maintenance system setup storage> done
aksh: done with "storage", advancing configuration to "support" ...

```

Refer to (Phone Home) for additional documentation of remote support configuration.

Remote Support. Register your appliance and configure remote monitoring.

Subcommands that are valid in this context:

```

tags                => Configure service tags

scrk                => Configure phone home

help [topic]        => Get context-sensitive help. If [topic] is specified,
                    it must be one of "builtins", "commands", "general",
                    "help" or "script".

show                => Show information pertinent to the current context

abort               => Abort this task (potentially resulting in a
                    misconfigured system)

done                => Finish operating on "support"

```

```

caji:maintenance system setup support> done
aksh: initial configuration complete!

```

Update

Post-Installation Controller Update

Maintaining controller software in advance of putting your appliance into production enables you to reap the greatest benefits of recent software enhancements. In many cases, a simple software update will resolve an issue observed in testing or provide you with new enhancements that improve productivity. Update storage controllers to the latest software and associated firmware using the following process.

1. Ensure that any resilvering operations have completed by checking the Configuration > Storage screen.
2. Ensure that there are no active problems on the Maintenance > Problems screen.
3. Verify that hardware firmware updates are not in progress on the Maintenance > System screen.
4. Read the Release Notes associated with the software update and address any release-specific prerequisites.
5. Click the "Sign In" link at <http://support.oracle.com>. (<http://support.oracle.com>.)

The Oracle Single Sign-On screen appears.

6. Log in using your Oracle account credentials.
7. Download the desired software update.

The file is downloaded locally.

8. Unzip the downloaded file using an archive manager or by issuing the `unzip` command.

The file is expanded into the `All_Supported_Platforms` directory.

9. To upload and apply the update, use the Updating via the BUI or Updating via the CLI procedures in the Maintenance > System online help page.

Glossary

7120	Sun ZFS Storage 7120
7320	Sun ZFS Storage 7320
7420	Sun ZFS Storage 7420
Active Directory	Microsoft Active Directory server
Alerts	Configurable log, email or SNMP trap events
Analytics	appliance feature for graphing real-time and historic performance statistics
ARC	Adaptive Replacement Cache
BUI	Browser User Interface
CLI	Command Line Interface
Cluster	Multiple heads connected to shared storage
Controller	See "Storage Controller"
CPU	Central Processing Unit
CRU	Customer Replaceable Component
Dashboard	appliance summary display of system health and activity
Dataset	the in-memory and on-disk data for a statistic from Analytics
DIMM	dual in-line memory module
Disk Shelf	the expansion storage shelf that is connected to the head node or storage controller
DNS	Domain Name Service
DTrace	a comprehensive dynamic tracing framework for troubleshooting kernel and application problems on production systems in real-time
FC	Fibre Channel
FRU	Field Replaceable Component
FTP	File Transfer Protocol

GigE	Gigabit Ethernet
HBA	Host Bus Adapter
HCA	Host Channel Adapter
HDD	Hard Disk Drive
HTTP	HyperText Transfer Protocol
Hybrid Storage Pool	combines disk, flash, and DRAM into a single coherent and seamless data store.
Icons	icons visible in the BUI
IOM	I/O Module; similar to a SIM
iSCSI	Internet Small Computer System Interface
Kiosk	a restricted BUI mode where a user may only view one specific screen
L2ARC	Level 2 Adaptive Replacement Cache
LDAP	Lightweight Directory Access Protocol
LED	light-emitting diode
Logzilla	write IOPS accelerator
LUN	Logical Unit
Masthead	top section of BUI screen
Modal Dialog	a new screen element for a specific function
NFS	Network File System
NIC	Network Interface Card
NIS	Network Information Service
PCIe	Peripheral Component Interconnect Express
PCM	Power Cooling Module, consisting of a PSU and one or more fans
Pool	provide storage space that is shared across all filesystems and LUNs
Project	a collection of shares
PSU	Power Supply Unit, included with fans in a power cooling module (PCM)
QDR	quad data rate
Readzilla	read-optimized flash SSD for the L2ARC

Remote Replication	replicating shares to another appliance
Rollback	reverts all of the system software and all of the metadata settings of the system back to their state just prior to applying an update
SAS	Serial Attached SCSI
SAS-2	Serial Attached SCSI 2.0
SATA	Serial ATA
Schema	configurable properties for shares
Scripting	automating CLI tasks
Service	appliance service software
Share	ZFS filesystem shared using data protocols
SIM	SAS Interface Module
Snapshot	an image of a share
SSD	Solid State Drive
SSH	Secure Shell
Statistic	a metric visible from Analytics
Storage Controller	the head node of the appliance
Support Bundle	auto-generated files containing system configuration information and core files for use by remote support in debugging system failures
Title Bar	local navigation and function section of BUI screen
Updates	software or firmware updates
WebDAV	Web based Distributed Authoring and Versioning
ZFS	on-disk data storage subsystem

