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Introduction

This guide provides hardware overviews and installation instructions for the Oracle ZFS Storage Appliance.

For component overviews, refer to the following sections:
- “ZS4-4 Hardware Overview” on page 7
- “ZS3-4 Hardware Overview” on page 20
- “ZS3-2 Hardware Overview” on page 33
- “7120 Hardware Overview” on page 50
- “7320 Hardware Overview” on page 61
- “7420 Hardware Overview” on page 73
- “Disk Shelf Overview” on page 87

ZS4-4 Hardware Overview

This section describes the internal and external components of the Oracle ZFS Storage ZS4-4 controller. Use this information when preparing to service replaceable components.

Refer to the following sections in the “Oracle ZFS Storage Appliance Customer Service Manual” for procedural instructions:
- Controller Tasks - Replace system controller components
- Disk Shelf Tasks - Replace disk shelf components

Controller Overview

The ZS4-4 controller can be configured as a single controller or two controllers to create a high-availability cluster configuration. The following table describes the base configuration.

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>Four Intel Xeon 15-core, 2.8 GHz</td>
</tr>
<tr>
<td>Memory</td>
<td>1.5TB 16GB DDR3 LV RDIMM</td>
</tr>
<tr>
<td>Boot Disks</td>
<td>Two 2.5-inch 900GB SAS-2 HDDs</td>
</tr>
</tbody>
</table>
ZS4-4 Hardware Overview

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read Flash</td>
<td>Up to four optional 2.5-inch 1.6TB SAS-2 SSDs</td>
</tr>
<tr>
<td>HBAs</td>
<td>Two 4x4-port SAS-2 (base configuration)</td>
</tr>
<tr>
<td>PCIe slots</td>
<td>11 (4 base configuration, 7 expansion slots)</td>
</tr>
</tbody>
</table>

Refer to the Oracle ZFS Storage ZS4-4 data sheet at [http://www.oracle.com/goto/zs4-4](http://www.oracle.com/goto/zs4-4) for the most recent component specification and physical, electrical, and environmental specifications.

**Front Panel**

The ZS4-4 controller drive slots and front panel components are shown in the following figure.

**FIGURE 1**  ZS4-4 Controller Front Panel
**Figure Legend**

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Locator LED/button (white)</td>
</tr>
<tr>
<td>2</td>
<td>Service action required LED (amber)</td>
</tr>
<tr>
<td>3</td>
<td>Power/OK LED (green)</td>
</tr>
<tr>
<td>4</td>
<td>Power button</td>
</tr>
<tr>
<td>5</td>
<td>Service Processor (SP) OK (green)/Fault (amber) LED</td>
</tr>
<tr>
<td>6</td>
<td>Fan/CPU/Memory Service action required LED (amber)</td>
</tr>
<tr>
<td>7</td>
<td>Power Supply (PS) Service action required LED (amber)</td>
</tr>
<tr>
<td>8</td>
<td>Over temperature warning LED (amber)</td>
</tr>
<tr>
<td>9</td>
<td>USB 2.0 connectors (2)</td>
</tr>
<tr>
<td>10</td>
<td>DB-15 video port</td>
</tr>
<tr>
<td>11</td>
<td>Boot drive 0 (required)</td>
</tr>
<tr>
<td>12</td>
<td>Boot drive 1 (required)</td>
</tr>
<tr>
<td>13</td>
<td>Solid state drive 2 (optional)</td>
</tr>
<tr>
<td>14</td>
<td>Solid state drive 3 (optional)</td>
</tr>
<tr>
<td>15</td>
<td>Solid state drive 4 (optional)</td>
</tr>
<tr>
<td>16</td>
<td>Solid state drive 5 (optional)</td>
</tr>
</tbody>
</table>

The ZS4-4 controller has two 2.5-inch 900GB SAS-2 system boot drives in slots 0 and 1, configured as a mirrored pair. Up to four 1.6TB SAS-2 Read flash SSDs can fill slots 2 through 5, in that order. A filler panel must be installed in empty drive slots. The system drive LEDs are shown in the following figure.

**FIGURE 2** System Drive LEDs

![System Drive LEDs](image)

**TABLE 2** System Drive LEDs

<table>
<thead>
<tr>
<th>Figure Legend</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Locate (white)</td>
<td>2 Service action required (amber)</td>
</tr>
<tr>
<td>3 OK/Activity (green)</td>
<td></td>
</tr>
</tbody>
</table>

**Rear Panel**

The ZS4-4 rear panel is shown in the following figure. Base configuration PCIe cards are not depicted in this illustration.
FIGURE 3  ZS4-4 Controller Rear Panel

<table>
<thead>
<tr>
<th>Figure Legend</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power supply unit (PSU) 0 indicator panel</td>
</tr>
<tr>
<td>2</td>
<td>PSU 0 AC inlet</td>
</tr>
<tr>
<td>3</td>
<td>PSU 1 indicator panel</td>
</tr>
<tr>
<td>4</td>
<td>PSU 1 AC inlet</td>
</tr>
<tr>
<td>5</td>
<td>System status indicator panel</td>
</tr>
<tr>
<td>6</td>
<td>PCIe card slots 1-6</td>
</tr>
</tbody>
</table>

**Ethernet Ports**

The ZS4-4 has four RJ-45 10-Gigabit Ethernet (10GbE) network connectors on the rear panel, labeled NET 0, NET 1, NET 2, and NET 3 (bottom left to top right), as shown in the following figure. Use these ports to connect the appliance to the network.

The LEDs located above the NET ports, labeled 2, 0, 3, 1 (left to right) are Link/Activity indicators.
**FIGURE 4** Ethernet Ports

<table>
<thead>
<tr>
<th>LED</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF (1)</td>
<td>No Link</td>
</tr>
<tr>
<td>ON (0)</td>
<td>Link and no activity</td>
</tr>
<tr>
<td>Blink</td>
<td>Link and activity</td>
</tr>
</tbody>
</table>

*Note* - Speed is not indicated for the NET ports.

**Network Management Port**

The network management connector (NET MGT), shown in the following figure, is an RJ-45 port and provides an alternate terminal interface to the service processor (SP) console.

**FIGURE 5** Network Management Port
Serial Management Port

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

FIGURE 6  Serial Management Port

4x4 SAS-2 HBA

The 4x4 SAS-2 HBA provides connectivity to external DE2-24 and Sun Disk Shelves. The HBA ports are numbered 3-0, top to bottom, as shown in the following figure.

FIGURE 7  4x4 SAS-2 HBA Port Numbers
See “PCIe Slot Order” on page 13 for 4x4 SAS-2 HBA slot placement of the HBAs.

**PCle I/O Slot Numbering**

The ZS4-4 base configuration contains the following PCIe cards:
- One 8-port SAS-2 internal HBA (slot 2)
- Two 4-port (4x4) SAS-2 external HBAs (slot 6 and slot 7)
- One cluster interface card (slot 4)

The following figure shows the PCIe I/O slot numbers.

**FIGURE 8** PCIe I/O Slot Numbers

Additional client-facing cards can be installed in the remaining PCIe slots. See “PCIe Slot Order” on page 13.

**PCle Slot Order**

Install optional PCIe cards in the following order:

1. Install additional 4x4 SAS-2 HBAs in slot 9, then slot 3.
2. Install InfiniBand CX3 HCAs into the first available client-option slot starting with slot 11, then slot 8, slot 5, slot 1, slot 10, slot 3, slot 9.
3. Install 16Gb FC HBAs into the first available client-option slot starting with slot 11, then slot 8, slot 5, slot 1, slot 10, slot 3, slot 9.
4. Install 10Gb Ethernet Optical NICs into the first available client-option slot starting with slot 11, then slot 8, slot 5, slot 1, slot 10, slot 3, slot 9.
5. Install 10Gb Ethernet Copper NICs into the first available client-option slot starting with slot 11, then slot 8, slot 5, slot 1, slot 10, slot 3, slot 9.

**PCIe Base and Optional Configurations**

The following table describes the PCIe base and optional slot assignments for ZS4-4 standalone and cluster configurations. PCIe slot numbering begins with slot 1.

See the legend for a description of the interconnect types and option codes shown in the Type column.

<table>
<thead>
<tr>
<th>Slot</th>
<th>Description</th>
<th>Max</th>
<th>Type</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2-port InfiniBand CX3 HCA</td>
<td>4</td>
<td>A</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>1</td>
<td>2-port 10Gb Ethernet Optical NIC</td>
<td>4</td>
<td>C</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>1</td>
<td>2-port 10Gb Ethernet Copper NIC</td>
<td>4</td>
<td>D</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>1</td>
<td>16GB Dual Universal FC HBA</td>
<td>4</td>
<td>B</td>
<td>Optional FC target or initiator (Backup)</td>
</tr>
<tr>
<td>2</td>
<td>8-port SAS-2 Internal HBA</td>
<td>1</td>
<td>F</td>
<td>Base configuration</td>
</tr>
<tr>
<td>3</td>
<td>4-port (4x4) SAS-2 External HBA</td>
<td>4</td>
<td>E</td>
<td>Optional back-end</td>
</tr>
<tr>
<td>3</td>
<td>2-port InfiniBand CX3 HCA</td>
<td>4</td>
<td>A</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>3</td>
<td>2-port 10Gb Ethernet Optical NIC</td>
<td>4</td>
<td>C</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>3</td>
<td>2-port 10Gb Ethernet Copper NIC</td>
<td>4</td>
<td>D</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>3</td>
<td>16GB Dual Universal FC HBA</td>
<td>4</td>
<td>B</td>
<td>Optional FC target or initiator (Backup)</td>
</tr>
<tr>
<td>4</td>
<td>Cluster Interface (second generation)</td>
<td>1</td>
<td>G</td>
<td>Base configuration</td>
</tr>
<tr>
<td>5</td>
<td>2-port InfiniBand CX3 HCA</td>
<td>4</td>
<td>A</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>5</td>
<td>2-port 10Gb Ethernet Optical NIC</td>
<td>4</td>
<td>C</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>5</td>
<td>2-port 10Gb Ethernet Copper NIC</td>
<td>4</td>
<td>D</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>5</td>
<td>16GB Dual Universal FC HBA</td>
<td>4</td>
<td>B</td>
<td>Optional FC target or initiator (Backup)</td>
</tr>
<tr>
<td>6</td>
<td>4-port (4x4) SAS-2 External HBA</td>
<td>4</td>
<td>E</td>
<td>Base configuration</td>
</tr>
<tr>
<td>7</td>
<td>4-port (4x4) SAS-2 External HBA</td>
<td>4</td>
<td>E</td>
<td>Base configuration</td>
</tr>
<tr>
<td>8</td>
<td>2-port InfiniBand CX3 HCA</td>
<td>4</td>
<td>A</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>8</td>
<td>2-port 10Gb Ethernet Optical NIC</td>
<td>4</td>
<td>C</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>8</td>
<td>2-port 10Gb Ethernet Copper NIC</td>
<td>4</td>
<td>D</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>8</td>
<td>16GB Dual Universal FC HBA</td>
<td>4</td>
<td>B</td>
<td>Optional FC target or initiator (Backup)</td>
</tr>
<tr>
<td>9</td>
<td>4-port (4x4) SAS-2 External HBA</td>
<td>4</td>
<td>E</td>
<td>Base configuration</td>
</tr>
<tr>
<td>9</td>
<td>2-port InfiniBand CX3 HCA</td>
<td>4</td>
<td>A</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>9</td>
<td>2-port 10Gb Ethernet Optical NIC</td>
<td>4</td>
<td>C</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>9</td>
<td>2-port 10Gb Ethernet Copper NIC</td>
<td>4</td>
<td>D</td>
<td>Optional recommended front-end</td>
</tr>
</tbody>
</table>
### Internal Components

The ZS4-4 chassis contains both customer-replaceable units (CRUs) and field-replaceable units (FRUs) as shown in the following figure. FRUs must be replaced by trained Oracle service technicians.
**FIGURE 9**  ZS4-4 Internal Components (Exploded View)

<table>
<thead>
<tr>
<th>Figure</th>
<th>Legend</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power supplies (CRU)</td>
<td>8</td>
<td>Memory riser card (CRU)</td>
</tr>
<tr>
<td>2</td>
<td>Power supply backplane (FRU)</td>
<td>9</td>
<td>Motherboard (FRU)</td>
</tr>
<tr>
<td>3</td>
<td>SP card (FRU)</td>
<td>10</td>
<td>System drive (CRU)</td>
</tr>
<tr>
<td>4</td>
<td>HBA/PCIe cards (CRU)</td>
<td>11</td>
<td>Fan module (CRU)</td>
</tr>
</tbody>
</table>
CPU and Memory

The ZS4-4 controller has four Intel Xeon E7-8895 v2 15-core 2.8 GHz CPUs and eight memory riser cards as shown in the following figure. The memory configuration is 16GB DDR3 DIMMs to accommodate 1.5TB (ninety-six 16GB). All ZS4-4 DIMM risers are fully populated to accommodate this offering.

**FIGURE 10** ZS4-4 CPU and Memory
ZS4-4 Hardware Overview

<table>
<thead>
<tr>
<th>Figure Legend</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory riser card P3/MR1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Memory riser card P3/MR0</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Memory riser card P2/MR1</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Memory riser card P2/MR0</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Memory riser card P1/MR1</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Memory riser card P1/MR0</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Each memory riser card contains twelve DIMM slots, four DDR3 channels, and two memory buffer ASICs. Each each memory buffer has two channels (A and B) and links to three DIMM slots per channel. Each memory buffer is connected to the processor's built-in memory controller by an SMI-2 link.

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

For more information about memory layout and procedures for replacing DIMMs, see “ZS4-4 CRU Maintenance Procedures” in “Oracle ZFS Storage Appliance Customer Service Manual”.

Cooling Subsystem

The ZS4-4 internal components are cooled by air that is pulled in through the front of the controller and exhausted out the back of the controller. Cooling occurs in two areas of the chassis: the power supply area and the motherboard area.

The following figure shows the cooling zones and the approximate location of the temperature sensors. The accompanying legend table provides sensor NAC names and sensor motherboard designations.
FIGURE 11  ZS4-4 Cooling Subsystem

<table>
<thead>
<tr>
<th>Figure Legend</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0  Cooling zone 0</td>
<td>6  Temperature sensor TS_ZONE2 (U4505)</td>
</tr>
<tr>
<td>1  Cooling zone 1</td>
<td>7  Temperature sensor TS_OUT (U4506)</td>
</tr>
<tr>
<td>2  Cooling zone 2</td>
<td>8  Temperature sensor TS_TV_L_1 (U4002)</td>
</tr>
<tr>
<td>3  Cooling zone 3 (power supply backplane area)</td>
<td>9  Temperature sensor TS_TV_L_0 (U4302)</td>
</tr>
<tr>
<td>4  Temperature sensor TS_PS (U4603)</td>
<td>10 Temperature sensor TS_ZONE0_B (U4509)</td>
</tr>
<tr>
<td>5  Temperature sensor TS_ZONE1 (U4507)</td>
<td>11 Temperature sensor TS_ZONE0_A (U4508)</td>
</tr>
</tbody>
</table>
Attached Storage

The ZS4-4 single and cluster controller configurations allow up to 36 disk shelves (see “Disk Shelf Overview” on page 87), consisting of up to six chains of one to six disk shelves. Any combination of disk-only and Write flash disk shelves can be combined within the chain in any order. For cabling guidelines and more information, see the “Oracle ZFS Storage Appliance Cabling Guide, Release 2013.1.3.0 ”.

ZS3-4 Hardware Overview

Use the information in this section as a preparation reference for servicing replaceable components of the Oracle ZFS Storage ZS3-4 controller.

Refer to the following sections in the “Oracle ZFS Storage Appliance Customer Service Manual” 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:

<table>
<thead>
<tr>
<th>CPU</th>
<th>Memory</th>
<th>Readzilla SAS-2</th>
<th>Boot Drive SAS-2</th>
<th>HBA SAS-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>4x10-core, 2.40GHz</td>
<td>1TB (16GB DIMMs)</td>
<td>Four 1.6TB SSDs</td>
<td>Two 900GB HDDs</td>
<td>4-port (4X4) SAS-2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6Gb/s external</td>
</tr>
</tbody>
</table>

Refer to [http://oracle.com/zfsstorage](http://oracle.com/zfsstorage) 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:

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Measurement</th>
<th>Dimension</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>13.3 cm/5.25 in</td>
<td>Depth</td>
<td>70.6 cm/27.8 in</td>
</tr>
</tbody>
</table>
### ZS3-4 Hardware Overview

#### Dimension

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Measurement</th>
<th>Dimension</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>43.7 cm/17.19 in</td>
<td>Weight</td>
<td>16.36 kg/96 lbs</td>
</tr>
</tbody>
</table>

### ZS3-4 Front Panel

#### FIGURE 12  ZS3-4 Front Panel

**Figure Legend**

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

Rear Panel

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

FIGURE 14  ZS3-4 Rear Panel Components

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 |
Figure Legend

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

4x4 SAS-2 HBA

The 4x4 SAS-2 HBA, installed in the ZS3-4, provides connectivity to external DE2 and Sun Disk Shelves. The HBA ports are numbered 3-0, top to bottom:

**FIGURE 15** 4x4 SAS-2 HBA Port Numbers

![4x4 SAS-2 HBA Port Numbers](image)

See “PCIe Options” on page 29 for slot placement.

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.

**ZS3-4 Internal Components**

The components of the ZS3-4 controller are shown in the following figure and identified in the legend.
FIGURE 16  ZS3-4 Controller Internal Components

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

The following NIC/HBA PCIe options and transceivers are available for ZS3-4 standalone and cluster configurations.

- 8-port 6Gb/s SAS-2 internal HBA
- 2-port 8Gb FC HBA
- 4-port (4x4) SAS-2 6Gb/s external HBA
- 2-port 16Gb FC HBA
- 4-port 1Gb Ethernet Copper UTP
- 2-port 10Gb Ethernet Copper Base-T
- 2-port Infiniband CX2 HCA
- 2-port 10GbE SFP+ NIC
- Transceiver 850NM, 1/10GPS, Short Reach, SFP
- 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.

**FIGURE 20** Serial Management Port

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

**FIGURE 21** Ethernet Ports

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.

<table>
<thead>
<tr>
<th>Slot</th>
<th>Description</th>
<th>Max</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8-port SAS-2 internal HBA</td>
<td>1</td>
<td>Base configuration</td>
</tr>
<tr>
<td>1</td>
<td>4-port (4x4) SAS-2 external HBA</td>
<td>4</td>
<td>Base configuration</td>
</tr>
<tr>
<td>2</td>
<td>4-port (4x4) SAS-2 external HBA</td>
<td>4</td>
<td>Additional optional back-end</td>
</tr>
<tr>
<td>Slot</td>
<td>Description</td>
<td>Max</td>
<td>Note</td>
</tr>
<tr>
<td>------</td>
<td>--------------------------------------------------</td>
<td>-----</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>2</td>
<td>2-port 10Gb Ethernet Copper NIC</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>2</td>
<td>2-port Infiniband CX2 HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>2</td>
<td>4-port 1Gb Ethernet Copper UTP NIC</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>2</td>
<td>2-port 10Gb Ethernet Optical NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>2</td>
<td>2-port 8Gb FC HBA</td>
<td>4</td>
<td>Optional FC target or initiator (backup)</td>
</tr>
<tr>
<td>2</td>
<td>2-port 16Gb FC HBA</td>
<td>4</td>
<td>Optional FC target or initiator (backup)</td>
</tr>
<tr>
<td>3</td>
<td>2-port 10Gb Ethernet Copper NIC</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>3</td>
<td>2-port Infiniband CX2 HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>3</td>
<td>4-port 1Gb Ethernet Copper UTP NIC</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>3</td>
<td>2-port 10Gb Ethernet Optical NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>3</td>
<td>2-port 8Gb FC HBA</td>
<td>4</td>
<td>Optional FC target or initiator (backup)</td>
</tr>
<tr>
<td>3</td>
<td>2-port 16Gb FC HBA</td>
<td>4</td>
<td>Optional FC target or initiator (backup)</td>
</tr>
<tr>
<td>4</td>
<td>2-port 10Gb Ethernet Copper NIC</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>4</td>
<td>2-port Infiniband CX2 HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>4</td>
<td>4-port 1Gb Ethernet Copper UTP NIC</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>4</td>
<td>2-port 10Gb Ethernet Optical NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>4</td>
<td>2-port 8Gb FC HBA</td>
<td>4</td>
<td>Optional FC target or initiator (backup)</td>
</tr>
<tr>
<td>4</td>
<td>2-port 16Gb FC HBA</td>
<td>4</td>
<td>Optional FC target or initiator (backup)</td>
</tr>
<tr>
<td>C</td>
<td>Cluster Controller 200</td>
<td>1</td>
<td>Cluster base configuration</td>
</tr>
<tr>
<td>5</td>
<td>2-port 10Gb Ethernet Copper NIC</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>5</td>
<td>2-port Infiniband CX2 HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>5</td>
<td>4-port 1GbE UTP Ethernet</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>5</td>
<td>2-port 10Gb Ethernet Optical NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>Slot</td>
<td>Description</td>
<td>Max</td>
<td>Note</td>
</tr>
<tr>
<td>------</td>
<td>---------------------------------------</td>
<td>-----</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>5</td>
<td>2-port 8Gb FC HBA</td>
<td>4</td>
<td>Optional FC target or initiator (backup)</td>
</tr>
<tr>
<td>5</td>
<td>2-port 16Gb FC HBA</td>
<td>4</td>
<td>Optional FC target or initiator (backup)</td>
</tr>
<tr>
<td>6</td>
<td>2-port 10Gb Ethernet Copper NIC</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>6</td>
<td>2-port Infiniband CX2 HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>6</td>
<td>4-port 1Gb Ethernet Copper UTP NIC</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>6</td>
<td>2-port 10Gb Ethernet Optical NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>6</td>
<td>2-port 8Gb FC HBA</td>
<td>4</td>
<td>Optional FC target or initiator (backup)</td>
</tr>
<tr>
<td>6</td>
<td>2-port 16Gb FC HBA</td>
<td>4</td>
<td>Optional FC target or initiator (backup)</td>
</tr>
<tr>
<td>6</td>
<td>4-port (4x4) external HBA</td>
<td>4</td>
<td>Additional optional back-end</td>
</tr>
<tr>
<td>7</td>
<td>2-port 10Gb Ethernet Copper NIC</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>7</td>
<td>2-port 8Gb FC HBA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>7</td>
<td>2-port Infiniband CX2 HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>7</td>
<td>2-port 10Gb Ethernet Optical NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>7</td>
<td>4-port 1Gb Ethernet Copper UTP NIC</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>7</td>
<td>2-port 8Gb FC HBA</td>
<td>4</td>
<td>Optional FC target or initiator (backup)</td>
</tr>
<tr>
<td>7</td>
<td>2-port 16Gb FC HBA</td>
<td>4</td>
<td>Optional FC target or initiator (backup)</td>
</tr>
<tr>
<td>8</td>
<td>4-port (4x4) SAS-2 external HBA</td>
<td>4</td>
<td>Base configuration</td>
</tr>
<tr>
<td>9</td>
<td>2-port 8Gb FC HBA</td>
<td>4</td>
<td>Optional FC target or initiator (backup)</td>
</tr>
<tr>
<td>9</td>
<td>2-port 10Gb Ethernet Copper NIC</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>9</td>
<td>4-port 1Gb Ethernet Copper UTP NIC</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>9</td>
<td>2-port 10Gb Ethernet Optical NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>9</td>
<td>2-port 16Gb FC HBA</td>
<td>4</td>
<td>Optional FC target or initiator (backup)</td>
</tr>
</tbody>
</table>
PCle Slot Order

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

**Note** - Slot 0 is always populated with a SAS-2 internal HBA. Slots 1 and 8 are reserved for 4x4 SAS-2 external HBAs.

Install optional PCIe cards in the following order:

<table>
<thead>
<tr>
<th>PCIe Card</th>
<th>Slot Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 4-port (4x4) SAS-2 external HBA</td>
<td>Slot 2, 7</td>
</tr>
<tr>
<td>2. 8Gb FC HBA</td>
<td>Slot 9</td>
</tr>
<tr>
<td>3. Infiniband HCAs</td>
<td>Slot 3, 6, 4, 5, 2, 7</td>
</tr>
<tr>
<td>4. 2-port 10Gb Ethernet NIC</td>
<td>Slot 3, 6, 4, 5, 2, 7, 9</td>
</tr>
<tr>
<td>5. 4-port 1Gb Ethernet NIC</td>
<td>Slot 3, 6, 4, 5, 2, 7, 9</td>
</tr>
<tr>
<td>6. 16Gb FC HBA</td>
<td>Slot 3, 6, 4, 5, 2, 7, 9</td>
</tr>
<tr>
<td>7. Remaining 8Gb FC HBAs</td>
<td>Slot 3, 6, 4, 5, 2, 7 (slot 9, see step 2)</td>
</tr>
</tbody>
</table>

Additional FC HBAs are installed last.

**Note** - If you are adding a 2-port 10Gb Ethernet Optical NIC and 2-port 10Gb Ethernet Copper NIC, the 10Gb Ethernet Optical NIC has slot priority.
Attached Storage

The ZS3-4 single and cluster controller configurations allow up to 36 disk shelves, consisting of up to six chains of one to six disk shelves. Any combination of disk-only and Logzilla-capable shelves may be combined within the chain in any order. You can also attach mixed disk shelf types (DE2 family and legacy Sun Disk Shelves) behind the same controllers, but each chain must contain only the same disk shelf type. Directly connecting different disk shelf types is not supported. For more information, see “Connecting to Attached Storage” in “Oracle ZFS Storage Appliance Cabling Guide, Release 2013.1.3.0”.

See “Disk Shelf Overview” on page 87 for component specifications and diagrams.

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 sections in the “Oracle ZFS Storage Appliance Customer Service Manual” 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 x86 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.

<table>
<thead>
<tr>
<th>CPU</th>
<th>Memory</th>
<th>Readzilla</th>
<th>Boot Drive</th>
<th>PCIe Slots</th>
<th>HBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2x8-core, 2.1GHz</td>
<td>256GB</td>
<td>1-4 1.6TB SAS-2 SSDs</td>
<td>Two 2.5-inch 900GB SAS-2 HDDs</td>
<td>Two dedicated; four available</td>
<td>4-port (4x4) SAS-2 6Gb/s external</td>
</tr>
<tr>
<td></td>
<td>16x16GB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>512GB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16x32GB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Refer to http://oracle.com/zfsstorage 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)  
2. Service Action Required LED (amber)  
3. Power OK LED (green)  
4. Power button  
5. Service Processor OK LED (green)  
6. Fan/CPU/Memory Service Required LED  
7. USB 2.0 ports

**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 24  ZS3-2 Controller Rear Panel

Figure Legend

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

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

4x4 SAS-2 HBA

The 4x4 SAS-2 HBA, installed in PCIe slot 2 of the ZS3-2, provides connectivity to external DE2 and Sun Disk Shelves. The HBA ports are numbered 0-3, left to right, as shown below:
For controllers with an additional 4x4 SAS-2 HBA, see “PCIe Options” on page 47 for slot placement.

Serial Management Port

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

Network Management Port

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

<table>
<thead>
<tr>
<th>Connection Type</th>
<th>EEE Terminology</th>
<th>Speed LED Color</th>
<th>Transfer Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast Ethernet</td>
<td>100BASE-TX</td>
<td>Off</td>
<td>100 Mbits/sec</td>
</tr>
<tr>
<td>Gigabit Ethernet</td>
<td>1000BASE-T</td>
<td>Amber</td>
<td>1000 Mbits/sec</td>
</tr>
<tr>
<td>10 Gigabit Ethernet</td>
<td>10GBASE-T</td>
<td>Green</td>
<td>10000 Mbits/sec</td>
</tr>
</tbody>
</table>

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 “Cabling ZS3-2 Clusters” in “Oracle ZFS Storage Appliance Administration Guide”.

Introduction
Disconnecting an RJ-45 Cable

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 disconnect an RJ-45 cable from a cluster serial port, use the following procedure.

▼ Disconnecting an RJ-45 Cable

1. **Using your index finger, press down fully on the RJ-45 release tab. Be sure the tab is fully disengaged from the port.**

2. **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, as shown below.**
**Physical Specifications**

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

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Measurement</th>
<th>Dimension</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>3.44 in./87.4 mm</td>
<td>Depth</td>
<td>20.25 in./514 mm</td>
</tr>
<tr>
<td>Width</td>
<td>17.52 in./445 mm</td>
<td>Weight</td>
<td>41.23 lb/18.70 kg</td>
</tr>
</tbody>
</table>

**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, 0.98P.F.

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.
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 31 ZS3-2 Controller Internal Cables
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 32  ZS3-2 Controller Internal Components
CPU and Memory

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

FIGURE 33 ZS3-2 Controller Memory Slots

<table>
<thead>
<tr>
<th>Capacity</th>
<th>CPU 0</th>
<th>CPU 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>256GB</td>
<td>D0, D2, D5, D7 (blue)</td>
<td>D0, D2, D5, D7 (blue)</td>
</tr>
</tbody>
</table>

Note - All sockets must be occupied by identical DDR3 DIMMs.
Disconnecting an RJ-45 Cable

<table>
<thead>
<tr>
<th>Capacity</th>
<th>CPU 0</th>
<th>CPU 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>D1, D3, D4, D6 (white)</td>
<td>D1, D3, D4, D6 (white)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
<th>FRU/CRU</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>Intel E5-2658, 2.1G, 8-core</td>
<td>FRU</td>
</tr>
<tr>
<td>Memory</td>
<td>DIMM, 16GB, DDR3, 1600, 2Rx4, 1.35V</td>
<td>CRU</td>
</tr>
<tr>
<td>Memory</td>
<td>DIMM, 32GB, DDR3, 1066, 4Rx4, 1.35V</td>
<td>CRU</td>
</tr>
</tbody>
</table>

**NIC/HBA Options**

The following NIC/HBA options and transceivers are available for the ZS3-2 controller. See “PCIe Options” on page 47 for slot allocations.

- 8-port 6Gb/s SAS-2 internal HBA
- 2-port 8Gb FC HBA
- 4-port (4x4) SAS-2 6Gb/s external HBA
- 2-port 16Gb FC HBA
- 2-port 10GbE SFP+ NIC
- 2-port Infiniband CX2 HCA
- 4-port 1Gb Ethernet Copper UTP NIC
- 2-port 10Gb Ethernet Copper Base-T NIC
- XCVR 850NM, 1/10GPS, SFP, short reach
- 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.

<table>
<thead>
<tr>
<th>Slot</th>
<th>Description</th>
<th>Max</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8-port SAS-2 internal HBA</td>
<td>1</td>
<td>Base configuration</td>
</tr>
<tr>
<td>2</td>
<td>4-port (4x4) SAS-2 external HBA</td>
<td>2</td>
<td>Base configuration</td>
</tr>
<tr>
<td>3</td>
<td>4-port (4x4) SAS-2 external HBA</td>
<td>2</td>
<td>Second 4x4-port SAS-2 external HBA</td>
</tr>
<tr>
<td>3</td>
<td>4-port 1Gb Ethernet Copper UTP NIC</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>3</td>
<td>2-port 8Gb FC HBA</td>
<td>4</td>
<td>Optional FC target or initiator (backup)</td>
</tr>
<tr>
<td>3</td>
<td>2-port 16Gb FC HBA</td>
<td>4</td>
<td>Optional FC target or initiator (backup)</td>
</tr>
<tr>
<td>3</td>
<td>2-port InfiniBand CX3 HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>3</td>
<td>2-port InfiniBand CX2 HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>3</td>
<td>2-port 10Gb Ethernet Optical NIC</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>3</td>
<td>2-port 10Gb Ethernet Copper Base-T NIC</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>4-6</td>
<td>4-port 1Gb Ethernet Copper UTP NIC</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>4-6</td>
<td>2-port 8Gb FC HBA</td>
<td>4</td>
<td>Optional FC target or initiator (backup)</td>
</tr>
<tr>
<td>4-6</td>
<td>2-port 16Gb FC HBA</td>
<td>4</td>
<td>Optional FC target or initiator (backup)</td>
</tr>
<tr>
<td>4-6</td>
<td>2-port InfiniBand CX2 HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>4-6</td>
<td>2-port 10Gb Ethernet Optical NIC</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>4-6</td>
<td>2-port 10Gb Ethernet Copper Base-T NIC</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
</tbody>
</table>
**PCle Slot Order**

Install optional PCIe cards in the following order:

1. Install optional second 4x4 SAS-2 HBA in slot 3.

For the remainder of PCIe option cards, always start installing in slot 6 and then work down to slot 3 in this order:

2. Install Infiniband CX3 or CX2 HCA in slot 6 and continue until all Infiniband options are installed and or,

3. Install 10Gb Ethernet Optical NICs and or,

4. Install 10Gb Ethernet Copper NICs and or,

5. Install 8Gb FC HBAs or 16Gb FCs HBA and or,

6. Install 1Gb Ethernet Copper NICs.

**Optional Cable Management Arm**

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

The ZS3-2 controller connects to external storage through a 4-port (4x4) SAS-2 HBA. You can attach from one to 16 HDD-only or SSD/HDD Logzilla-capable disk shelves to the controller. You can also attach mixed disk shelf types (DE2 family and legacy Sun Disk Shelves) behind the same controllers, but each chain must contain only the same disk shelf type. Directly
connecting different disk shelf types is not supported. For more information, see “Connecting to Attached Storage” in “Oracle ZFS Storage Appliance Cabling Guide”.

7120 Hardware Overview

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

Refer to the following for procedural instructions in the “Oracle ZFS Storage Appliance Customer Service Manual”:
- 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://oracle.com/zfsstorage 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 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:

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Measurement</th>
<th>Dimension</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>87.6 mm/3.45 in</td>
<td>Depth</td>
<td>765.25 mm/30.13 in</td>
</tr>
<tr>
<td>Width</td>
<td>436.8 mm/17.2 in</td>
<td>Weight</td>
<td>29.54 kg/65 lb</td>
</tr>
</tbody>
</table>
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 35** 7120 Controller Front Panel

![Front Panel Diagram]

<table>
<thead>
<tr>
<th>Figure Legend</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Locator LED/button (white)</td>
<td>7 HDD 2</td>
<td>13 HDD 8</td>
</tr>
<tr>
<td>2 Service Action Required LED (amber)</td>
<td>8 HDD or SSD 3</td>
<td>14 HDD 9</td>
</tr>
<tr>
<td>3 Power button</td>
<td>9 HDD 4</td>
<td>15 HDD 10</td>
</tr>
<tr>
<td>4 Power/OK LED (green)</td>
<td>10 HDD 5</td>
<td>16 HDD 11</td>
</tr>
<tr>
<td>5 HDD 0</td>
<td>11 HDD 6</td>
<td>17 Drive map</td>
</tr>
<tr>
<td>6 HDD 1</td>
<td>12 HDD 7</td>
<td></td>
</tr>
</tbody>
</table>

Rear Panel

The following figure and legend show the rear panel.

**Note** - Optional Sun Dual Port 40Gb/sec 4x Infiniband QDR HCA adapter 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.
The serial management connector (SER MGT) is an RJ-45 port and provides a terminal connection to the SP console.

**FIGURE 37  Serial Management Port**

![Serial Management Port](image)

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 39  7120 Controller I/O Components

Figure Legend

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Top Cover</td>
</tr>
<tr>
<td>2</td>
<td>Right Control Panel Light Pipe Assembly</td>
</tr>
<tr>
<td>3</td>
<td>Hard Disk Drives</td>
</tr>
<tr>
<td>4</td>
<td>Left Control Panel Light Pipe Assembly</td>
</tr>
</tbody>
</table>

Cables

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

Note - The rear boot drives are not depicted in this illustration.
FIGURE 40  7120 Controller Internal Cables

<table>
<thead>
<tr>
<th>Cable</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Storage Drive Data Cable</td>
<td>Connection between the HBA PCI-Express Card and the storage drive backplane.</td>
</tr>
</tbody>
</table>
FIGURE 41  7120 Controller PDB Ribbon Cable

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

CPU and Memory

The 7120 motherboard has 18 slots in two groups that hold industry-standard DDR3 DIMMs. The standard memory configuration is 48GB, 6x8GB DDR-1333 low voltage (LV) DIMMS.

Following are the replaceable CPU and memory components of the 7120 system.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>FRU/CRU</th>
</tr>
</thead>
<tbody>
<tr>
<td>F371-4966-01</td>
<td>DIMM, 8GB, DDR3, 2RX4, 13</td>
<td>CRU</td>
</tr>
<tr>
<td>F371-4885-01</td>
<td>Intel E5620, 2.40G</td>
<td>FRU</td>
</tr>
</tbody>
</table>

All sockets must be occupied by either a filler or a DDR3 DIMM. All DDR3 DIMMs must be identical. DIMMs are pre-installed in P0 slots D1, D2, D4, D5, D7, and D8.
7120 Hardware Overview

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.
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.

<table>
<thead>
<tr>
<th>Mktg Part Number</th>
<th>Description</th>
<th>Mfg Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>TA7120-12TB</td>
<td>S7120, 1xCPU, 24GB, 12TB</td>
<td>597-0754-01</td>
</tr>
<tr>
<td>TA7120-24TB</td>
<td>S7120, 1xCPU, 24GB, 24TB</td>
<td>597-0755-01</td>
</tr>
</tbody>
</table>

The following table describes base configurations for the 7120 with Logzilla 3.5" SSD.
NIC/HBA Options

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

<table>
<thead>
<tr>
<th>Mktg Part Number</th>
<th>Description</th>
<th>Mfg Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>SG-XPCIESASGEN2-Z</td>
<td>2-port External Sun Thebe SAS (x4) HBA, PCIe</td>
<td>594-5889-01</td>
</tr>
<tr>
<td>SG-XPCIE2FCQF8-Z</td>
<td>2-port FC HBA, 8Gb, PCIe</td>
<td>594-5684-01</td>
</tr>
<tr>
<td>X4446AZ</td>
<td>4-port PCI-E Quad GigE UTP</td>
<td>594-4024-01</td>
</tr>
<tr>
<td>X4237AN</td>
<td>2-port 4X IB HCA PCIe</td>
<td>594-5862-02</td>
</tr>
<tr>
<td>X1109AZ</td>
<td>2-port 10Gig SFP+ NIC, PCIe</td>
<td>594-6039-01</td>
</tr>
</tbody>
</table>

PCIe Options

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

<table>
<thead>
<tr>
<th>Slot</th>
<th>Type</th>
<th>Sun Part Number</th>
<th>Vendor Part Number</th>
<th>Description</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>PCIe</td>
<td>540-7975-03</td>
<td>Sun Aura</td>
<td>Internal Flash HBA Logzilla</td>
<td>Base Configuration (OBSOLETE)</td>
</tr>
<tr>
<td>0</td>
<td>PCIe</td>
<td>375-3481-01</td>
<td>Intel EXP9404PT</td>
<td>QP Copper NIC</td>
<td>Optional Recommended Front-end</td>
</tr>
<tr>
<td>0</td>
<td>PCIe</td>
<td>375-3617-01</td>
<td>Intel Niantic</td>
<td>DP Optical 10GE NIC</td>
<td>Optional Recommended Front-end</td>
</tr>
<tr>
<td>0</td>
<td>PCIe</td>
<td>371-4325-01</td>
<td>QLogic</td>
<td>8Gb DP FC HBA</td>
<td>Optional FC Target or Initiator (Backup)</td>
</tr>
<tr>
<td>0</td>
<td>PCIe</td>
<td>375-3606-01</td>
<td>Mellanox MHJH29-XTC</td>
<td>InfiniBand HCA</td>
<td>Optional Recommended Front-end</td>
</tr>
<tr>
<td>1</td>
<td>PCIe</td>
<td>375-3617-01</td>
<td>Intel Niantic</td>
<td>DP Optical 10GE NIC</td>
<td>Optional Recommended Front-end</td>
</tr>
<tr>
<td>1</td>
<td>PCIe</td>
<td>375-3606-01</td>
<td>Mellanox MHJH29-XTC</td>
<td>InfiniBand HCA</td>
<td>Optional Recommended Front-end</td>
</tr>
</tbody>
</table>
### Slot Information

<table>
<thead>
<tr>
<th>Slot</th>
<th>Type</th>
<th>Sun Part Number</th>
<th>Vendor Part Number</th>
<th>Description</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PCIe</td>
<td>375-3481-01</td>
<td>Intel EXPI9404PT</td>
<td>QP Copper NIC</td>
<td>Optional Recommended Front-end</td>
</tr>
<tr>
<td>1</td>
<td>PCIe</td>
<td>371-4325-01</td>
<td>QLogic</td>
<td>8Gb DP FC HBA</td>
<td>Optional FC Target or Initiator (Backup)</td>
</tr>
<tr>
<td>3</td>
<td>PCIe</td>
<td>375-3665-01</td>
<td>Sun Thebe (INT)</td>
<td>Internal SAS HBA</td>
<td>Base Configuration</td>
</tr>
<tr>
<td>4</td>
<td>PCIe</td>
<td>375-3481-01</td>
<td>Intel EXPI9404PT</td>
<td>QP Copper NIC</td>
<td>Optional Recommended Front-end</td>
</tr>
<tr>
<td>4</td>
<td>PCIe</td>
<td>371-4325-01</td>
<td>QLogic</td>
<td>8Gb DP FC HBA</td>
<td>Optional FC Target or Initiator (Backup)</td>
</tr>
<tr>
<td>4</td>
<td>PCIe</td>
<td>375-3609-03</td>
<td>Sun Thebe (EXT)</td>
<td>8P 6Gb/s SAS HBA</td>
<td>Additional Optional Backend</td>
</tr>
</tbody>
</table>

### 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 Hardware Overview

Use the information in this section as a reference when preparing to install replaceable components of the Sun ZFS Storage 7320.

Refer to the following for procedural instructions in the “Oracle ZFS Storage Appliance Customer Service Manual”:
- Controller Tasks - replace system 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://oracle.com/zfsstorage](http://oracle.com/zfsstorage) 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.

- **PCle 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.

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

Cables

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

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

7320 I/O Components

The following figure and legend identify the I/O components of the storage controller.
FIGURE 45  7320 Controller I/O Components

Figure Legend

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td>Top cover</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>Left Control Panel Light Pipe Assembly</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>Drive Cage</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>Solid State Drives</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>blank/USB Module</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>Right Control Panel Light Pipe Assembly</td>
</tr>
</tbody>
</table>

7320 CPU and Memory Components

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

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>FRU/CRU</th>
</tr>
</thead>
<tbody>
<tr>
<td>F371-4966-01</td>
<td>DIMM, 8GB, DDR3, 2RX4, 13</td>
<td>CRU</td>
</tr>
<tr>
<td>F371-4885-01</td>
<td>Intel E5620, 2.40G</td>
<td>FRU</td>
</tr>
</tbody>
</table>
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.

**FIGURE 46  7320 Memory Slots**

---

**7320 Power Distribution and Fan Module Components**

The following figure and legend identify the Power Distribution/Fan Module components of the storage controller.
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 VAC
- Maximum current AC RMS: 9.0 amps Max
- AC operating range: 90-264 VAC

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 48** 7320 Controller Front Panel

<table>
<thead>
<tr>
<th>Figure Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Locate Button/LED</td>
</tr>
<tr>
<td>2 Service Required LED (amber)</td>
</tr>
</tbody>
</table>
Figure Legend

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.

**FIGURE 49** 7320 Front Panel Drive Locations

<table>
<thead>
<tr>
<th>Disk Drive Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDD1</td>
</tr>
<tr>
<td>HDD0</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>FRU/CRU</th>
</tr>
</thead>
<tbody>
<tr>
<td>F300-2233-02</td>
<td>RoHS 760W Power Supply</td>
<td>CRU</td>
</tr>
<tr>
<td>F541-2075-04</td>
<td>Buss Bar Power, 1U</td>
<td>FRU</td>
</tr>
<tr>
<td>F542-0184-01</td>
<td>DR, 3Gb SATA</td>
<td>CRU</td>
</tr>
<tr>
<td>F542-0330-01</td>
<td>2.5'' 512GB ReadZilla SSD</td>
<td>CRU</td>
</tr>
<tr>
<td>F541-276-01</td>
<td>ASSY, FAN Module</td>
<td>CRU</td>
</tr>
</tbody>
</table>
### 7320 Hardware Overview

#### Introduction

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>FRU/CRU</th>
</tr>
</thead>
<tbody>
<tr>
<td>F541-4274-02</td>
<td>Fan Board (1U)</td>
<td>FRU</td>
</tr>
</tbody>
</table>

#### 7320 PCIe Cards and Risers

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

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>FRU/CRU</th>
</tr>
</thead>
<tbody>
<tr>
<td>F371-4325-01</td>
<td>8Gb FC HBA (PCIe)</td>
<td>CRU</td>
</tr>
<tr>
<td>F375-3609-02</td>
<td>PCA, SAS 6GBS 8 Port (PCIe)</td>
<td>CRU</td>
</tr>
<tr>
<td>F375-3606-03</td>
<td>Dual Port (x4) IB HCA (PCIe)</td>
<td>CRU</td>
</tr>
<tr>
<td>F375-3696-01</td>
<td>Dual Port CX2 4XQDR (PCIe)</td>
<td>CRU</td>
</tr>
<tr>
<td>F375-3617-01</td>
<td>2X10Gbe SFP+, X8 (PCIe)</td>
<td>CRU</td>
</tr>
<tr>
<td>F375-3481-01</td>
<td>NIC Card Quad Port 1GigE Cu (PCIe)</td>
<td>CRU</td>
</tr>
<tr>
<td>F511-1496-04</td>
<td>Sun Fishworks Cluster Controller 200 (PCIe)</td>
<td>FRU</td>
</tr>
</tbody>
</table>

#### 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 50** 7320 Controller Rear Panel

**Figure Legend**

1. Power supplies
2. SC summary status LEDs
3. Network management port
4. Ethernet ports
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.

<table>
<thead>
<tr>
<th>Mktg Part Number</th>
<th>Description</th>
<th>Mfg Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>TA7320-24A</td>
<td>S7320, 2xCPU, 24GB, Single</td>
<td>597-1060-01</td>
</tr>
<tr>
<td>7104054</td>
<td>S7320, 2xCPU, 96GB, Single</td>
<td>7045900</td>
</tr>
<tr>
<td>TA7320-24A-HA</td>
<td>S7320, 2xCPU, 24GB, Cluster</td>
<td>597-1061-01</td>
</tr>
<tr>
<td>7104055</td>
<td>S7320, 2xCPU, 96GB, Cluster</td>
<td>7045903</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Slot</th>
<th>Type</th>
<th>Part Number</th>
<th>Vendor Part</th>
<th>Description</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>PCIe</td>
<td>375-3617-01</td>
<td>Intel Niantic</td>
<td>DP Optical 10GE NIC</td>
<td>Optional Recommended Front-end</td>
</tr>
<tr>
<td>0</td>
<td>PCIe</td>
<td>375-3696-01</td>
<td>Mellanox</td>
<td>InfiniBand HCA</td>
<td>Optional Recommended Front-end</td>
</tr>
<tr>
<td>0</td>
<td>PCIe</td>
<td>375-3606-03</td>
<td>MHJH29-XTC</td>
<td>InfiniBand HCA</td>
<td>Optional Recommended Front-end</td>
</tr>
<tr>
<td>0</td>
<td>PCIe</td>
<td>375-3481-01</td>
<td>Intel EXP19404FT</td>
<td>QP Copper NIC</td>
<td>Optional Recommended Front-end</td>
</tr>
<tr>
<td>0</td>
<td>PCIe</td>
<td>371-4325-01</td>
<td>QLogic</td>
<td>8Gb DP FC HBA</td>
<td>Optional FC Target or Initiator (Backup)</td>
</tr>
<tr>
<td>1</td>
<td>PCIe</td>
<td>375-3617-01</td>
<td>Intel Niantic</td>
<td>DP Optical 10GE NIC</td>
<td>Optional Recommended Front-end</td>
</tr>
<tr>
<td>1</td>
<td>PCIe</td>
<td>375-3696-01</td>
<td>Mellanox</td>
<td>InfiniBand HCA</td>
<td>Optional Recommended Front-end</td>
</tr>
</tbody>
</table>
## 7320 Hardware Overview

### Slot Overview

<table>
<thead>
<tr>
<th>Slot</th>
<th>Type</th>
<th>Part Number</th>
<th>Vendor Part</th>
<th>Description</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PCIe</td>
<td>375-3606-03</td>
<td>MHJH29-XTC</td>
<td>InfiniBand HCA</td>
<td>Optional Recommended Front-end</td>
</tr>
<tr>
<td>1</td>
<td>PCIe</td>
<td>375-3481-01</td>
<td>Intel EXP19404PT</td>
<td>QP Copper NIC</td>
<td>Optional Recommended Front-end</td>
</tr>
<tr>
<td>1</td>
<td>PCIe</td>
<td>371-4325-01</td>
<td>QLogic</td>
<td>8Gb DP FC HBA</td>
<td>Optional FC Target or Initiator (Backup)</td>
</tr>
<tr>
<td>2</td>
<td>PCIe</td>
<td>375-3609-03</td>
<td>Sun Thebe</td>
<td>External SAS HBA</td>
<td>Base Configuration</td>
</tr>
</tbody>
</table>

### 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.

<table>
<thead>
<tr>
<th>Slot</th>
<th>Type</th>
<th>Part Number</th>
<th>Vendor Part</th>
<th>Description</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>PCIe</td>
<td>375-3617-01</td>
<td>Intel Niantic</td>
<td>DP Optical 10GE NIC</td>
<td>Optional Recommended Front-end</td>
</tr>
<tr>
<td>0</td>
<td>PCIe</td>
<td>375-3696-01</td>
<td>Mellanox</td>
<td>InfiniBand HCA</td>
<td>Optional Recommended Front-end</td>
</tr>
<tr>
<td>0</td>
<td>PCIe</td>
<td>375-3606-03</td>
<td>MHJH29-XTC</td>
<td>InfiniBand HCA</td>
<td>Optional Recommended Front-end</td>
</tr>
<tr>
<td>0</td>
<td>PCIe</td>
<td>375-3481-01</td>
<td>Intel EXP19404PT</td>
<td>QP Copper NIC</td>
<td>Optional Recommended Front-end</td>
</tr>
<tr>
<td>0</td>
<td>PCIe</td>
<td>371-4325-01</td>
<td>QLogic</td>
<td>8Gb DP FC HBA</td>
<td>Optional FC Target or Initiator (Backup)</td>
</tr>
<tr>
<td>1</td>
<td>PCIe</td>
<td>542-0298-01</td>
<td>Sun</td>
<td>Fishworks Cluster Card 2</td>
<td>Cluster Base Configuration</td>
</tr>
</tbody>
</table>
7320 Hardware Overview

<table>
<thead>
<tr>
<th>Slot</th>
<th>Type</th>
<th>Part Number</th>
<th>Vendor Part</th>
<th>Description</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>PCIe</td>
<td>375-3609-03</td>
<td>Sun Thebe</td>
<td>External SAS HBA</td>
<td>Cluster Base Configuration</td>
</tr>
</tbody>
</table>

**7320 Connector Pinouts**

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

*FIGURE 51*  Serial Management Port

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

*FIGURE 52*  Network Management Port

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.
7420 Hardware Overview

Use the information in this section as a reference when preparing to install replaceable components of the Sun ZFS Storage 7420.

Refer to the following for procedural instructions in the “Oracle ZFS Storage Appliance Customer Service Manual”:
- 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.

<table>
<thead>
<tr>
<th>Product ID</th>
<th>Mktg Part Number</th>
<th>CPU</th>
<th>DIMMs</th>
<th>Readzilla</th>
<th>Boot Drive</th>
<th>Mfg Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>7420 M2</td>
<td>7107089</td>
<td>4x8-core, 2.0GHz</td>
<td>8GB, 16GB</td>
<td>1.6TB SAS</td>
<td>900GB SAS</td>
<td>7075466</td>
</tr>
<tr>
<td>7420 M2</td>
<td>7107090</td>
<td>4x10-core, 2.4GHz</td>
<td>8GB, 16GB</td>
<td>1.6TB SAS</td>
<td>900GB SAS</td>
<td>7075470</td>
</tr>
<tr>
<td>7420</td>
<td>7100566</td>
<td>4x8-core, 2.0GHz</td>
<td>8GB, 16GB</td>
<td>512GB SATA</td>
<td>500GB SATA</td>
<td>7014572</td>
</tr>
<tr>
<td>7420</td>
<td>7100568</td>
<td>4x10-core, 2.4GHz</td>
<td>8GB, 16GB</td>
<td>512GB SATA</td>
<td>500GB SATA</td>
<td>7014573</td>
</tr>
</tbody>
</table>

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 section “System Drives” on page 75.

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:
### Front Panel

**Figure 53** 7420 Front Panel

<table>
<thead>
<tr>
<th>Figure Legend</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Locator LED and button (white)</td>
</tr>
<tr>
<td>2</td>
<td>Service Required LED (amber)</td>
</tr>
<tr>
<td>3</td>
<td>Power/OK LED (green)</td>
</tr>
<tr>
<td>4</td>
<td>Power button</td>
</tr>
<tr>
<td>5</td>
<td>Service Processor (SP) OK LED (green)</td>
</tr>
<tr>
<td>6</td>
<td>Fan/CPU/Memory Service Required LED</td>
</tr>
<tr>
<td>7</td>
<td>Power Supply (PS) Service Required LED</td>
</tr>
<tr>
<td>8</td>
<td>Over Temperature Warning LED</td>
</tr>
<tr>
<td>9</td>
<td>USB 2.0 Connectors</td>
</tr>
<tr>
<td>10</td>
<td>DB-15 video connector</td>
</tr>
<tr>
<td>11</td>
<td>Boot drive 0 (mirrored)</td>
</tr>
<tr>
<td>12</td>
<td>Boot drive 1 (mirrored)</td>
</tr>
<tr>
<td>13</td>
<td>SSD 2 (optional)</td>
</tr>
<tr>
<td>14</td>
<td>SSD 3 (optional)</td>
</tr>
<tr>
<td>15</td>
<td>SSD 4 (optional)</td>
</tr>
<tr>
<td>16</td>
<td>SSD 5 (optional)</td>
</tr>
</tbody>
</table>
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 54** SAS-2 and SATA Boot Drive LEDs

<table>
<thead>
<tr>
<th>Figure Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Locate (white)</td>
</tr>
</tbody>
</table>
Rear Panel

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

FIGURE 55 7420 Controller Rear Panel

---

**Figure Legend**

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

---

**Connectors**

The serial management connector (SER MGT) is an RJ-45 connector and provides a terminal connection to the SP console.
FIGURE 56 Serial Management Port

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

FIGURE 57 Network Management Port

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.
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.

FIGURE 59  Memory Risers

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:
FIGURE 61 Fan Modules and LEDs

- 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.

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

<table>
<thead>
<tr>
<th>Slot</th>
<th>Mfg Part Number</th>
<th>Description</th>
<th>Max</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7054001</td>
<td>8-port 6Gb/s SAS-2 internal HBA</td>
<td>1</td>
<td>Slot 0 of the 7420 M2 is reserved for the SAS-2 internal HBA</td>
</tr>
<tr>
<td>0</td>
<td>371-4325-02</td>
<td>8Gb 2-port FC HBA</td>
<td>6</td>
<td>Optional FC target or initiator (Backup) for the 7420 controller</td>
</tr>
<tr>
<td>0</td>
<td>7051223</td>
<td>2-port optical 10GbE NIC</td>
<td>6</td>
<td>Optional recommended front-end for the 7420 controller</td>
</tr>
<tr>
<td>0</td>
<td>7054739</td>
<td>4-port copper NIC</td>
<td>6</td>
<td>Optional recommended front-end for the 7420 controller</td>
</tr>
<tr>
<td>1</td>
<td>F375-3609-03</td>
<td>2-port SAS external HBA</td>
<td>6</td>
<td>Base configuration (2 minimum)</td>
</tr>
<tr>
<td>2</td>
<td>F375-3609-03</td>
<td>2-port SAS external HBA</td>
<td>6</td>
<td>Additional optional back-end</td>
</tr>
<tr>
<td>2</td>
<td>7054739</td>
<td>4-port copper NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>2</td>
<td>371-4325-02</td>
<td>8Gb DP FC HBA</td>
<td>6</td>
<td>Optional FC target or initiator (Backup)</td>
</tr>
<tr>
<td>2</td>
<td>375-3606-03</td>
<td>CX1 Infiniband HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>2</td>
<td>7051223</td>
<td>2-port optical 10GE NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>Slot</td>
<td>Mfg Part Number</td>
<td>Description</td>
<td>Max</td>
<td>Note</td>
</tr>
<tr>
<td>------</td>
<td>----------------</td>
<td>------------------------------</td>
<td>-----</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>2</td>
<td>375-3696-01</td>
<td>CX2 Infiniband HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>3</td>
<td>F375-3609-03</td>
<td>2-port SAS external HBA</td>
<td>6</td>
<td>Additional optional back-end</td>
</tr>
<tr>
<td></td>
<td>(7059331 for EU countries)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>7054739</td>
<td>4-port copper NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>3</td>
<td>371-4325-02</td>
<td>8Gb 2-port FC HBA</td>
<td>6</td>
<td>Optional FC target or initiator (Backup)</td>
</tr>
<tr>
<td>3</td>
<td>375-3606-03</td>
<td>CX1 Infiniband HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>3</td>
<td>7051223</td>
<td>2-port optical 10GE NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>3</td>
<td>375-3696-01</td>
<td>CX2 Infiniband HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>4</td>
<td>7054739</td>
<td>4-port copper NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>4</td>
<td>375-3606-03</td>
<td>CX1 Infiniband HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>4</td>
<td>7051223</td>
<td>2-port optical 10GE NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>4</td>
<td>371-4325-02</td>
<td>8Gb 2-port FC HBA</td>
<td>6</td>
<td>Optional FC target or initiator (Backup)</td>
</tr>
<tr>
<td>4</td>
<td>375-3696-01</td>
<td>CX2 Infiniband HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>C</td>
<td>7056175</td>
<td>Cluster Controller 200</td>
<td>1</td>
<td>Cluster base configuration</td>
</tr>
<tr>
<td>5</td>
<td>7054739</td>
<td>4-port copper NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>5</td>
<td>375-3606-03</td>
<td>CX1 Infiniband HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>5</td>
<td>7051223</td>
<td>2-port optical 10GE NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>5</td>
<td>371-4325-02</td>
<td>8Gb 2-port FC HBA</td>
<td>6</td>
<td>Optional FC target or initiator (Backup)</td>
</tr>
<tr>
<td>Slot</td>
<td>Mfg Part Number</td>
<td>Description</td>
<td>Max</td>
<td>Note</td>
</tr>
<tr>
<td>------</td>
<td>----------------</td>
<td>----------------------------------</td>
<td>-----</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>5</td>
<td>375-3696-01</td>
<td>CX2 Infiniband HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>6</td>
<td>F375-3609-03</td>
<td>2-port SAS external HBA</td>
<td>6</td>
<td>Additional optional back-end</td>
</tr>
<tr>
<td></td>
<td>(7059331 for EU countries)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>7054739</td>
<td>4-port copper NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>6</td>
<td>371-4325-02</td>
<td>8Gb 2-port FC HBA</td>
<td>6</td>
<td>Optional FC target or initiator (Backup)</td>
</tr>
<tr>
<td>6</td>
<td>375-3606-03</td>
<td>CX1 Infiniband HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>6</td>
<td>7051223</td>
<td>2-port optical 10GE NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>6</td>
<td>375-3696-01</td>
<td>CX2 Infiniband HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>7</td>
<td>F375-3609-03</td>
<td>DP SAS external HBA</td>
<td>6</td>
<td>Additional optional back-end</td>
</tr>
<tr>
<td></td>
<td>(7059331 for EU countries)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7054739</td>
<td>4-port copper NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>7</td>
<td>371-4325-02</td>
<td>8Gb 2-port FC HBA</td>
<td>6</td>
<td>Optional FC target or initiator (Backup)</td>
</tr>
<tr>
<td>7</td>
<td>375-3606-03</td>
<td>CX1 Infiniband HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>7</td>
<td>7051223</td>
<td>2-port optical 10GE NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>7</td>
<td>375-3696-01</td>
<td>CX2 Infiniband HCA</td>
<td>4</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>8</td>
<td>F375-3609-03</td>
<td>2-port SAS external HBA</td>
<td>6</td>
<td>Base configuration (2 minimum)</td>
</tr>
<tr>
<td></td>
<td>(7059331 for EU countries)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>371-4325-02</td>
<td>8Gb 2-port FC HBA</td>
<td>6</td>
<td>Optional FC target or initiator (Backup)</td>
</tr>
<tr>
<td>9</td>
<td>7051223</td>
<td>2-port optical 10GbE NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
<tr>
<td>9</td>
<td>7054739</td>
<td>4-port copper NIC</td>
<td>6</td>
<td>Optional recommended front-end</td>
</tr>
</tbody>
</table>
**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” on page 83).

---

**FIGURE 62** 7420 Controller PCIe Slots

---

Install optional PCIe cards in the following order:

<table>
<thead>
<tr>
<th>PCIe Card</th>
<th>Slot Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. SAS-2 external HBA</td>
<td>Slot 2, 7, 3, 6</td>
</tr>
<tr>
<td>2. 8Gb FC HBA</td>
<td>Slot 9</td>
</tr>
<tr>
<td>3. Infiniband HCAs</td>
<td>Slot 7, 2, 6, 3, 5, 4</td>
</tr>
<tr>
<td>4. 10Gb Ethernet</td>
<td>Slot 7, 2, 6, 3, 5, 4, 0 (not available for 7420 M2), 9</td>
</tr>
<tr>
<td>5. Quad 1Gb Ethernet</td>
<td>Slot 7, 2, 6, 3, 5, 4, 0 (not available for 7420 M2), 9</td>
</tr>
<tr>
<td>6. Remaining 8Gb FC HBAs</td>
<td>Slot 7, 2, 6, 3, 5, 4, 0 (not available for 7420 M2)</td>
</tr>
</tbody>
</table>

**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” on page 87 for component specifications and diagrams.

**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.


**FIGURE 63** 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.
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.

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.

FIGURE 66   Oracle Storage Drive Enclosure DE2-24P Drive Locations

Up to four Logzilla SSDs are supported per disk shelf.

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

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

FIGURE 69  Oracle Storage Drive Enclosure DE2-24C Status Indicators
FIGURE 70  Sun Disk Shelf Status Indicators

<table>
<thead>
<tr>
<th>Figure Legend</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Locate button and indicator</td>
</tr>
<tr>
<td>2</td>
<td>System fault indicator</td>
</tr>
<tr>
<td>3</td>
<td>System power indicator</td>
</tr>
<tr>
<td>4</td>
<td>Disk ready to be removed indicator</td>
</tr>
<tr>
<td>5</td>
<td>Disk fault indicator</td>
</tr>
<tr>
<td>6</td>
<td>Disk activity indicator</td>
</tr>
<tr>
<td>7</td>
<td>Over temperature warning indicator</td>
</tr>
<tr>
<td>8</td>
<td>SIM board fault indicator</td>
</tr>
<tr>
<td>9</td>
<td>Power supply fault indicator</td>
</tr>
</tbody>
</table>

**Back Panel**

The back panel consists of the power supplies, fans, I/O Modules (IOMs) or SAS Interface Modules (SIMs), and indicator lights.
FIGURE 71  Oracle Storage Drive Enclosure DE2-24P Back Panel

![Diagram of DE2-24P Back Panel]

**Figure Legend**
1 Power Supply with Fan Module 0
2 I/O Module 1
3 I/O Module 0
4 Power Supply with Fan Module 1

FIGURE 72  Oracle Storage Drive Enclosure DE2-24C Back Panel

![Diagram of DE2-24C Back Panel]
Note - It is especially important that power supplies and their filler panels are in the correct slots.

FIGURE 73  Sun Disk Shelf Back Panel

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 74 DE2 Drive Enclosure I/O Module Indicators

<table>
<thead>
<tr>
<th>Figure Legend</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Fault / Locate indicator</td>
<td>4</td>
<td>SAS-2 Port 1</td>
<td>7 For Oracle service only</td>
</tr>
<tr>
<td>2 Power / OK indicator</td>
<td>5</td>
<td>SAS-2 Port 2</td>
<td>8 For Oracle service only</td>
</tr>
<tr>
<td>3 SAS-2 Port 0</td>
<td>6</td>
<td>Host port activity indicators</td>
<td></td>
</tr>
</tbody>
</table>

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 75  Sun Disk Shelf SIM Board Indicators

![Image of SIM Board Indicators]

**Figure Legend**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AC power indicator</td>
</tr>
<tr>
<td>2</td>
<td>DC power indicator</td>
</tr>
<tr>
<td>3</td>
<td>Fan fault indicator</td>
</tr>
<tr>
<td>4</td>
<td>Power supply fault indicator</td>
</tr>
<tr>
<td>5</td>
<td>Universal power connector</td>
</tr>
<tr>
<td>6</td>
<td>Power switch</td>
</tr>
<tr>
<td>7</td>
<td>Port fault indicator</td>
</tr>
<tr>
<td>8</td>
<td>Port OK indicator</td>
</tr>
<tr>
<td>9</td>
<td>SIM board OK indicator (green)/SIM board fault indicator (amber)</td>
</tr>
<tr>
<td>10</td>
<td>SIM locator indicator</td>
</tr>
</tbody>
</table>

**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 76  DE2 Drive Enclosure Power Supply Indicators

The following figure shows power supply with fan module indicators for these disk shelves:
- Sun Disk Shelf
FIGURE 77  Sun Disk Shelf Power Supply and Fan Module Indicators

<table>
<thead>
<tr>
<th>Figure Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
</tbody>
</table>

Disk Shelf Configurations

The following sections describe disk shelf configurations.

Oracle Storage Drive Enclosure DE2-24P

The Oracle Storage Drive Enclosure DE2-24P contains the following components:

- Drive Enclosure DE2-24P Base Chassis
- 300GB 10Krpm, SAS-2, 2.5" HDD
- 900GB 10Krpm, SAS-2, 2.5" HDD
- 73GB SSD SAS-2, 2.5" Write Flash Accelerator
- Filler Panel, Drive Enclosure DE2-24P
Oracle Storage Drive Enclosure DE2-24C

The Oracle Storage Drive Enclosure DE2-24C contains the following components:
- Drive Enclosure DE2-24C Base Chassis
- 3TB 7.2Krpm, SAS-2, 3.5" HDD
- 73GB SSD XATO SAS-2, 2.5" (2.5" to 3.5" Drive Adapter)
- Filler Panel, Drive Enclosure DE2-24C

Sun Disk Shelf (DS2)

The Sun Disk Shelf (DS2) contains the following components:
- Sun Disk Shelf (DS2) 24x3.5" SAS-2
- 2TB 7.2Krpm, SAS-2, 3.5" HDD
- 3TB 7.2Krpm, SAS-2, 3.5" HDD
- 300GB 15Krpm, SAS-2, 3.5" HDD
- 600GB 15Krpm, SAS-2, 3.5" HDD
- 73GB SSD XATO, 3.5"
- Sun Disk Shelf (DS2) 24x3.5", LOGFiller
- Disk Shelf Rail Kit
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” on page 101
- “ZS4-4 Controller” on page 103
- “ZS3-4 Controller Tasks” on page 113
- “ZS3-2 Controller Installation Tasks” on page 125
- “7x20 Controllers” on page 139
- “Oracle Storage Disk Shelf DE2-24C”
- “Oracle Storage Disk Shelf DE2-24P”
- “Sun Disk Shelf”
- “Connecting to Attached Storage”
- “Powering on”
- “Initial configuration”

Overview

Before beginning installation, read the Precautions and Prerequisites below.

Precautions

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

- For safety reasons, mount the heaviest equipment, typically disk shelves, at the bottom of the rack. Refer to the appropriate Oracle Safety and Compliance Guide for rack-mounting guidelines.
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.

- “ZS4-4 Hardware Overview” on page 7 - view component diagrams and specifications
- “ZS3-4 Overview” on page 20 - view component diagrams and specifications
- “ZS3-2 Overview” on page 33 - view component diagrams and specifications
- “7420 Overview” on page 73 - view component diagrams, specifications, and cluster options
- “7320 Overview” on page 61 - view component diagrams and specifications, and cluster options
- “7120 Overview” on page 50 - view component diagrams and specifications

For controller installation, plan for cabling to disk shelves by mounting controllers in the middle of the rack. Also 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.

- “ZS4-4 Controller” on page 103
- “ZS3-4 controller installation tasks”
- “ZS3-2 controller installation tasks”
- “7x20 controller installation tasks”
- “Disk shelf installation tasks”

ZS4-4 Controller

This section provides steps for installing the Oracle ZFS Storage ZS4-4 controller into a rack using the tool-less slide-rail assembly kit. Note that if your rack mount kit shipped with installation instructions, use those instructions instead.

Safety Information

- Before you install the controller, read the Safety Agency Compliance Statements section in the Oracle ZFS Storage ZS4-4 Safety and Compliance Guide.
- For safety reasons, mount the heaviest equipment, typically disk shelves, at the bottom of the rack. Refer to the Oracle ZFS Storage ZS4-4 Safety and Compliance Guide for rack-mounting guidelines.

Preparing for Installation

- For an overview of the ZS4-4 controller, refer to “ZS4-4 Hardware Overview” on page 7 or the Quick Setup poster that shipped with the product.
- Check the size of the mounting holes for your rack. The slide-rail assemblies support only racks with 9.5-mm square holes. All other racks, including those racks with 7.2-mm, M6, M5, or 10-32 mounting holes, are not supported.
- To best prepare for cabling controllers to disk shelves, now and in the future, mount controllers in the middle of the rack.

Tools and Equipment Needed

To install the system, you need the following tools:
Installing the Slide Rails onto the Controller

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

You also need a system console device, such as one of the following:
- Workstation
- ASCII terminal
- Terminal server
- Patch panel connected to a terminal server

▼ Installing the Slide Rails onto the Controller

**Note** - The slide-rail assemblies support only racks with 9.5-mm square holes. All other racks, including those racks with 7.2-mm, M6, M5, or 10-32 mounting holes, are not supported. Refer to your rack documentation for information about the size of its rail holes.

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

**Note** - The mounting brackets are identical and can be installed on either side of the chassis.
2. With the heads of the five chassis locating pins protruding through the five 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 the rear locating pin has engaged the mounting bracket clip.

4. To install the other mounting bracket on the other side of the chassis, repeat Steps 1 through 3.

### Installing the Slide Rails onto the Rack

If you plan to move the rack after the controller is installed, use mounting screws and cage nuts to secure the slide-rail assembly. Refer to the Rail Rackmount Kit Overview and Information card for instructions on inserting these cage nuts. This card is included with the rack kit.

1. Position a slide-rail assembly in your rack so that the slide-rail assembly front bracket is on the outside of the front rack post and the slide-rail assembly rear bracket is on the inside of the rear rack post.

2. Align the slide-rail assembly mounting pins with the front and rear rack post mounting holes. Then lock the assembly into place by pushing the assembly
toward the rear of the rack until the mounting pins engage the rack with an audible click.

**Note** - The slide assembly mounting pins accommodate 9.5-mm square mounting holes. No other mounting hole sizes are supported.
3. (Optional) If installing the assembly with cage nuts and mounting screws, insert the cage nuts into the front and rear rack posts in the desired positions. Then insert the mounting screws through the front and rear slide-rail brackets and rack posts.
4. Repeat Steps 2 and 3 for the other slide-rail assembly.

▼ Installing the Controller into the Rack Slide Rails

Caution - This procedure requires a minimum of two people, or a mechanical lift, because of the weight of the chassis. Attempting this procedure alone could result in equipment damage or personal injury. Always load the heaviest equipment (disk shelves) at the bottom of the rack.

1. If your rack includes an anti-tip foot, extend it from the bottom of the rack.
2. **Lower the rack stabilization feet if you have not already done so.**

3. **Push the slide rails into the slide-rail assemblies in the rack as far as possible.**

4. **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 (approximately 12 inches, or 30 cm).**

**Caution** - When inserting the controller into the slide rail, ensure that both the top and bottom mounting lips of the mounting brackets are inserted into the slide rail. The controller should slide forward and backward easily if correctly installed. If the unit does not slide easily, ensure that each mounting lip is inserted properly. If the mounting brackets are not inserted properly, the unit may fall when removing it from the rack, causing equipment damage and possibly personal injury.
5. Simultaneously push and hold the green slide-rail release buttons on each mounting bracket while you push the controller into the rack. Continue pushing until the slide-rail locks (on the front of the mounting brackets) engage the slide-rail assemblies with an audible click.
Installing the Cable Management Assembly

The cable management arm (CMA) is an optional assembly that you can use to route the controller cables in the rack. This procedure is completed from the back of the rack.

1. Insert the CMA mounting bracket connector (1) into the right slide rail (2) until the connector locks into place with an audible click.

2. Insert the right CMA slide-rail connector (1) into the right slide-rail assembly (2) until the connector locks into place with an audible click.
3. Insert the left CMA slide-rail connector into the left slide-rail assembly until the connector locks into place with an audible click.

4. Install and route cables to the controller, as required.

5. If required, attach the cable hook and loop straps to the CMA, and press them into place to secure the cables.

   **Note** - Cable hooks and loop straps are preinstalled on the CMA. Perform this step if you need to reinstall cable hooks and straps.

6. For best results, place three cable straps (1), evenly spaced, on the rear-facing side of the CMA arm (2), and three cable straps on the side of the CMA nearest the controller.
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:

- For safety reasons, mount the heaviest equipment, typically disk shelves, at the bottom of the rack. Refer to the Oracle ZFS Storage ZS3-4 Safety and Compliance Guide for rack-mounting guidelines.
- 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 “ZS3-4 Overview” on page 20 for an overview of your controller.

- Check the size of the mounting holes for your rack. The slide-rail assemblies support only racks with 9.5-mm square holes. All other racks, including those racks with 7.2-mm, M6, M5, or 10-32 mounting holes, are not supported.
- To best prepare for cabling controllers to disk shelves, now and in the future, mount controllers in the middle of the rack.

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
- Optional mechanical lift

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

- Workstation
- ASCII terminal
- Terminal server
- Patch panel connected to a terminal server

Installing the Slide Rails onto the Controller

**Note** - The slide-rail assemblies support only racks with 9.5-mm square holes. All other racks, including those racks with 7.2-mm, M6, M5, or 10-32 mounting holes, are not supported. Refer to your rack documentation for information about the size of its rail holes.

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.

**Note** - The mounting brackets are identical and can be installed on either side of the chassis.
2. With the heads of the five chassis locating pins protruding though the five 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 the rear locating pin has engaged the mounting bracket clip.

4. To install the other mounting bracket on the other side of the chassis, repeat steps 1 through 3.

▼ Installing the Slide Rails onto the Rack

If you plan to move the rack after the controller is installed, use mounting screws and cage nuts to secure the slide-rail assembly. Refer to the Rail Rackmount Kit Overview and Information card for instructions on inserting these cage nuts. This card is included with the rack kit.
1. Position a slide-rail assembly in your rack so that the slide-rail assembly front bracket is on the outside of the front rack post and the slide-rail assembly rear bracket is on the inside of the rear rack post.

2. Align the slide-rail assembly mounting pins with the front and rear rack post mounting holes. Then lock the assembly into place by pushing the assembly toward the rear of the rack until the mounting pins engage the rack with an audible click.

Note - The slide assembly mounting pins accommodate either 9.5-mm square mounting holes or M6 round mounting holes. No other mounting hole sizes are supported.
3. (Optional) If installing the assembly with cage nuts and mounting screws, insert the cage nuts into the front and rear rack posts in the desired positions. Then insert the mounting screws through the front and rear slide-rail brackets and rack posts.
4. Repeat Steps 2 and 3 for the remaining slide-rail assembly.

\[\textbf{V Installing the Controller into the Rack Slide Rails}\]

\[\text{Caution} - \text{This procedure requires a minimum of two people, or a mechanical lift, because of the weight of the chassis. Attempting this procedure alone could result in equipment damage or personal injury. Always load the heaviest equipment (disk shelves) at the bottom of the rack.}\]

1. If your rack includes an anti-tip foot, extend it from the bottom of the rack.
2. Lower the rack stabilization feet if you have not already done so.

3. Push the slide rails into the slide-rail assemblies in the rack as far as possible.

4. 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 (approximately 12 inches, or 30 cm).

Caution - When inserting the controller into the slide rail, ensure that both the top and bottom mounting lips of the mounting brackets are inserted into the slide rail. The controller should slide forward and backward easily if correctly installed. If the unit does not slide easily, ensure that each mounting lip is inserted properly. If the mounting brackets are not inserted properly, the unit may fall when removing it from the rack, causing equipment damage and possibly personal injury.
5. Simultaneously push and hold the green slide-rail release buttons on each mounting bracket while you push the controller into the rack. Continue pushing until the slide-rail locks (on the front of the mounting brackets) engage the slide-rail assemblies with an audible click.
**Caution** - Verify that the controller is securely mounted in the rack and that the slide-rail locks are engaged with the mounting brackets before continuing or equipment damage and possibly personal injury could occur.

▼ **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.
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:

- For safety reasons, mount the heaviest equipment, typically disk shelves, at the bottom of the rack. Refer to the Oracle ZFS Storage ZS3-2 Safety and Compliance Guide for rack-mounting guidelines.

- 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 “ZS3-2 Overview” on page 33 for an overview of your controller.
- To best prepare for cabling controllers to disk shelves, now and in the future, mount controllers in the middle of the rack.

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:

- Workstation
- ASCII terminal
- Terminal server
- Patch panel connected to a terminal server

Installing the Mounting Brackets and Slide Rail Assemblies

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.

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

![Chassis Insertion and Slide Rail Locks Usage](image)

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 slide-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 controller 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 controller 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.**

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**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” on page 50 - view component diagrams and specifications
- “7320 Overview” on page 61 - 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:

- Workstation
- ASCII terminal
- Terminal server
- Patch panel connected to a terminal server

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.

2. The following graphic illustrates how to attach the 7120/7320 mounting brackets.
3. The following graphic illustrates how to attach the 7420 mounting brackets.
4. With the heads of the four chassis locating pins protruding though 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.

5. Verify that all mounting pins are securely fastened to the chassis.

6. 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.

11. The following graphic illustrates the 7120/7320 chassis insertion and slide rail locks usage.
12. 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.
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. For controllers that support using DE2-24 and Sun Disk Shelves together, the controller must use 4X4 port SAS-2 HBAs, which are only supported with release 2013.1.0 and later.

**TABLE 3**  Maximum Disk Shelves per Controller

<table>
<thead>
<tr>
<th>Controller</th>
<th>Max. Shelves</th>
<th>Max. 2x4 port SAS-2 HBA</th>
<th>Max. 4x4 port SAS-2 HBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZS4-4</td>
<td>36</td>
<td>N/A</td>
<td>4</td>
</tr>
<tr>
<td>ZS3-4</td>
<td>36</td>
<td>N/A</td>
<td>4</td>
</tr>
<tr>
<td>ZS3-2</td>
<td>16</td>
<td>N/A</td>
<td>2</td>
</tr>
<tr>
<td>7420</td>
<td>36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7320</td>
<td>6</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>7120</td>
<td>2</td>
<td>1</td>
<td>N/A</td>
</tr>
</tbody>
</table>
This section provides installation instructions for the Oracle Storage Drive Enclosure 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” in “Oracle ZFS Storage Appliance Customer Service Manual” 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.

▼ 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 reseat 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 707.8W, 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 reseat 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 “Data Profile Configuration” in “Oracle ZFS Storage Appliance Administration Guide”.

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.
This section provides installation instructions for the Oracle Storage Drive Enclosure 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” on page 87 - 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.

▼ 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 reseat the faulted module. If the module status indicator is not a steady green after module reinsertion, contact Oracle Customer Service.**
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 “Choose a Storage Profile” in “Oracle ZFS Storage Appliance Administration Guide”.

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.**
Sun Disk Shelf

This section provides installation instructions for the 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” on page 87 - 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” in “Oracle ZFS Storage Appliance Customer Service Manual” 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.

▼ 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.
Connecting to Attached Storage

Disk shelves can be added to standalone or clustered storage controllers without powering down the appliance or loss of service to clients. After connecting expansion storage, verify that you have redundant paths to each disk shelf.

Use the diagrams in the “Oracle ZFS Storage Appliance Cabling Guide” to connect one or more disk shelves.

To cable the controller to the disk shelves, follow the Cabling Guidelines. For the maximum number of disk shelves per controller, see “Maximum Controller Configurations” on page 155.

Next Steps

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

- “Powering On the Appliance” on page 180
- Broken Link (Target ID: GOVXW)

Storage expansion may require adding or replacing HBAs in your configuration. For information, see the following sections in “Hardware Maintenance” in “Oracle ZFS Storage Appliance Customer Service Manual”:
- “How to replace a ZS4-4 PCIe Card”
- “How to replace the ZS3-4 Controller PCIe Cards and Risers”
- “How to replace the ZS3-2 Controller PCIe Cards and Risers”
- “How to replace the 7x20 Controller PCIe Cards and Risers”
Powering On and Configuring the System

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 in the “Oracle ZFS Storage Appliance Cabling Guide”.

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.

- “ZS4-4 Hardware Overview” on page 7
- “ZS3-4 Overview” on page 20
- “ZS3-2 Overview” on page 33
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.

⚠️ **Caution** - Failure to configure ILOM connectivity may lead to longer than necessary hardware fault diagnosis and resolution times.

▼ 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 “Configuring Clustering” in “Oracle ZFS Storage Appliance Administration Guide” 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 as described in “Browser User Interface (BUI)” in “Oracle ZFS Storage Appliance Administration Guide”.
1. Direct your browser to the system using either the IP address or host name you assigned to the NET0 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”
Introduction

The appliance has a serial port for console access. This port can be used to:

- Begin the initial installation, before network interfaces have been configured.
- Administer the appliance from the CLI.
- Recover from administration configuration errors which have disabled the network interfaces.

Initial Installation

When the appliance is first powered on, the text similar to the following will be shown on the console:

SunOS Release 5.11 Version ak/generic@2013.06.05.1.0.1-1.6 64-bit
Copyright (c) 1983, 2013, Oracle and/or its affiliates. All rights reserved.

System configuration in progress.
Configuring version: ak/nas@2013.06.05.0.0,1-1.6

Creating active datasets ....... done.
Starting primordial svc.configd
SMF online in 2 seconds
Loading smf(5) service descriptions: 165/165
svccfg: Loaded 165 smf(5) service descriptions
Loading smf(5) service descriptions: 24/24
Applying profile install/akinstall.xml ... done.
Applying service layer generic ... done.
Applying service layer nas ... done.
Applying service layer SUNW,iwashiplus ... done.
Applying service profile generic ... done.
Enabling auditing of Solaris commands ... done.
Shutting down svc.configd ... done.
Configuring devices.
Configuring network devices.

Sun ZFS Storage 7120 Version ak/SUNW,iwashiplus@2013.06.05.0.0,1-1.6
Copyright (c) 2008, 2013, Oracle and/or its affiliates. All rights reserved.

Checking hardware configuration ... done.
Starting appliance configuration ............ done.
Press any key to begin configuring appliance: [*]

Press any key to continue to the initial configuration screen:

Sun ZFS Storage 7120 Configuration
Copyright (c) 2008, 2013, Oracle and/or its affiliates. All rights reserved.

NET-0 <=> NET-1 <X> NET-2 <X> NET-3 <X>

Host Name: caji
DNS Domain: us.oracle.com
IP Address: 192.168.1.10
IP Netmask: 255.255.254.0
Default Router: 192.168.1.1
DNS Server: 192.168.1.1
* Password: @@@@@@@
* Re-enter Password: @@@@@@@

Please enter the required (*) configuration data

ESC-1: Done   ESC-2: Help   ESC-3: Halt   ESC-4: Reboot   ESC-5: Info

For help, see http://www.oracle.com/goto/zfs7120

In the above example, most details were filled in by DHCP. All that is left is for the root user password to be entered. When complete, the final boot text is displayed:

Sun ZFS Storage 7120 Configuration
Copyright (c) 2008, 2013, Oracle and/or its affiliates. All rights reserved.

Your new appliance is now ready for configuration. To configure your appliance, use a web browser to visit the following link:

https://caji.us.oracle.com:215/

If your network administrator has not yet assigned the network name you chose for the appliance, you can also configure your appliance using the link:

https://192.168.1.10:215/

If you are unable to connect to the appliance through your web browser, you can begin text-mode configuration by logging in as "root" and entering the administrator password you specified on the previous screen. For help, see http://www.oracle.com/goto/zfs7120/ (http://www.oracle.com/goto/zfs7120/)
caji console login:

At this point you may log in using the username “root” and the password that was just set, to enter the appliance CLI. The URL for the appliance BUI is also displayed. There are more steps to configure before the initial installation is complete, but you can now choose to complete this either in the BUI or the CLI.

**Console Logins**

Enter a valid username and password at the console to login to the CLI. For example, if we had just completed the initial configuration step above, our CLI login would be:

```
caji console login: root
Password:
```

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 ...

**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 and 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 - The option to perform initial configuration of a cluster is only available in the BUI. If electing this option, read “Configuring Clustering” in “Oracle ZFS Storage Appliance Administration Guide” before beginning initial configuration for detailed additional steps that are required for successful cluster setup. Pay careful attention to the section “Clustering Considerations for Networking”. 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 “Working with Shares” in “Oracle ZFS Storage Appliance Administration Guide”.

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 “Network Configuration” in “Oracle ZFS Storage Appliance Administration Guide” for additional documentation. Pay careful attention to the section “Configuring Network Devices” if you 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:

<table>
<thead>
<tr>
<th>DEVICE UP</th>
<th>MAC</th>
<th>SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>igb0 true</td>
<td>0:14:4f:8d:59:aa</td>
<td>1000 Mbit/s</td>
</tr>
</tbody>
</table>
Refer to “Working with DNS” in “Oracle ZFS Storage Appliance Administration Guide” for additional documentation.

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.

```
cاجي:مانتينانس ميسيستم سيسTERM DNS> show
Properties:
<status> = online
domain = sun.com
servers = 192.168.1.4
```
Configure Network Time Protocol (NTP) to synchronize the appliance time clock. See “Working with NTP” in “Oracle ZFS Storage Appliance Administration Guide” 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.

Refer to “Working with Services” in “Oracle ZFS Storage Appliance Administration Guide” 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 “Storage Configuration” in “Oracle ZFS Storage Appliance Administration Guide” 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 “Working with Phone Home” in “Oracle ZFS Storage Appliance Administration Guide” for additional documentation about remote support configuration.

Remote Support. Register your appliance and configure remote monitoring.

Subcommands that are valid in this context:
tag                 => 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!
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 My Oracle Support (http://support.oracle.com).
7. Log in using your Oracle account credentials.
8. Download the desired software update.
9. The file is downloaded locally.
10. Unzip the downloaded file using an archive manager or by issuing the `unzip` command.
11. The file is expanded into the `All_Supported_Platforms` directory.
12. To upload and apply the update, see “System Updates” in “Oracle ZFS Storage Appliance Customer Service Manual” for updating software using the BUI or CLI.