Oracle ZFS Storage Appliance Cabling Guide, Release OS8.8.x

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Getting Started with Cabling

Oracle ZFS Storage Appliance cabling comprises connections to the controller service processor (SP) network cabling, cabling between disk shelves and controllers, and cabling for cluster configuration. To access initial setup and configuration, you make a network or serial connection to Oracle Integrated Lights Out Manager (ILOM), located in the SP. All disk shelf and controller cabling must be completed before you can begin power-on and initial configuration.

The cabling configuration for your appliance depends on the number and type of controllers and disk shelves, as well as the number of host bus adapters (HBAs) in your system. Disk shelves attach to other disk shelves with daisy-chained serial attached SCSI (SAS) cables. Controllers attach to each disk shelf chain with a longer SAS cable connected via HBAs located in specified PCIe slots of the controllers. The cabling methodology designed for the appliance includes bottom-to-top cabling for easier growth with optimum safety, strategic slot placement for optimum load distribution and performance, and interface redundancy for clustered controllers, ensuring no single point of failure (NSPF).

Disk shelves can be added to established standalone or clustered configurations without powering down the appliance or loss of service to clients. For more information, see Adding a New Disk Shelf in *Oracle ZFS Storage Appliance Customer Service Manual, Release OS8.8.x*. After connecting the disk shelves, verify that you have redundant paths to each disk shelf.

To get started with cabling, use the following sections:

- Cabinet and Cabling Guidelines
- New Appliance Cabling Workflow
- Connecting System Cables
- Connecting Cluster Cables
- Controller Cluster I/O Ports
- Cabling Disk Shelves Together
- Cabling Controllers to Disk Shelves in a Base Cabinet
- Cabling Controllers in a Base Cabinet to Disk Shelves in an Expansion Cabinet
- Changing the Cabling for Oracle ILOM

> **Caution:**
>
> Improper orientation of mini-SAS HD cables during installation can damage the HBA connector and cause the HBA to malfunction. These cables are used with 4X4 port SAS-2 HBAs and 4X4 port SAS-3 HBAs. Position the release tab downward for horizontally mounted HBAs or to the right for vertically mounted HBAs. Mini-SAS HD active optical cables (AOCs) should be oriented similarly to copper cables. For detailed information, see Cabling Disk Shelves Together and Cabling Controllers to Disk Shelves in a Base Cabinet.

To view cabling diagrams for standalone and clustered controllers, use the following sections:

Oracle Storage Drive Enclosure DE3-24 Disk Shelves to 4X4 Port SAS-3 HBAs

- Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS9-2 Controllers
- Cabling Oracle Storage Drive Enclosure DE3-12C Disk Shelves to Oracle ZFS Storage ZS9-2 Controllers
- Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS7-2 Controllers
- Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS5-4 Controllers
- Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS5-2 Controllers
- Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS4-4 Controllers
- Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS3-2 Controllers

Oracle Storage Drive Enclosure DE2-24 Disk Shelves to 4X4 Port SAS-2 HBAs

- Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Oracle ZFS Storage ZS5-4 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Oracle ZFS Storage ZS5-2 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Oracle ZFS Storage ZS4-4/ZS3-4 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Oracle ZFS Storage ZS3-2 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Sun ZFS Storage 7420 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Sun ZFS Storage 7320 Controllers

Oracle Storage Drive Enclosure DE2-24 Disk Shelves to 2X4 Port SAS-2 HBAs

- Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Sun ZFS Storage 7420 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Sun ZFS Storage 7320 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Sun ZFS Storage 7120 Controllers

Sun Disk Shelves

- Cabling Sun Disk Shelves to Sun ZFS Storage 7420 Controllers
- Cabling Sun Disk Shelves to Sun ZFS Storage 7320 Controllers
- Cabling Sun Disk Shelves to Sun ZFS Storage 7120 Controllers

Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves

- Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS9-2 High-end (HE) Controllers
- Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS9-2 Mid-range (MR) Controllers
- Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS7-2 High-end (HE) Controllers
- Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS7-2 Mid-range (MR) Controllers
- Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS5-4 Controllers
- Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS5-2 Controllers
- Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS4-4 Controllers
- Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS3-2 Controllers

Mixed Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves

- Cabling Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves to Oracle ZFS Storage ZS3-4 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves to Oracle ZFS Storage ZS3-2 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves to Sun ZFS Storage 7420 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves to Sun ZFS Storage 7320 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves to Sun ZFS Storage 7120 Controllers

Oracle ZFS Storage Appliance Racked System ZS9-2

- Oracle ZFS Storage Appliance Racked System ZS9-2 High-end (HE) Configurations
- Oracle ZFS Storage Appliance Racked System ZS9-2 Mid-range (MR) Configurations

Oracle ZFS Storage Appliance Racked System ZS7-2

- Oracle ZFS Storage Appliance Racked System ZS7-2 High-end (HE) Configurations
- Oracle ZFS Storage Appliance Racked System ZS7-2 Mid-range (MR) Configurations

Oracle ZFS Storage Appliance Racked System ZS5-4

- Capacity Configurations for Oracle ZFS Storage Appliance Racked System ZS5-4
- Performance Configurations for Oracle ZFS Storage Appliance Racked System ZS5-4

Oracle ZFS Storage Appliance Racked System ZS5-2

- Capacity Configurations for Oracle ZFS Storage Appliance Racked System ZS5-2
- Performance Configurations for Oracle ZFS Storage Appliance Racked System ZS5-2

Oracle ZFS Storage Appliance Racked System ZS4-4

- Overview of Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configurations
- Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configurations

Cabinet and Cabling Guidelines

This section contains guidelines for properly placing and connecting the Oracle disk shelves.

Cabinet Configuration

- For safety reasons, mount the heaviest equipment, typically disk shelves, at the bottom of the cabinet. Refer to the appropriate Oracle Safety and Compliance Guide for rack-mounting guidelines.
- To best prepare for cabling controllers to disk shelves, now and in the future, mount controllers in the middle of the cabinet. This also allows for optimal air circulation, whether in a floor- or ceiling-cooled environment.
- Do not remove cabinet panels to run cables between cabinets.

Load Distribution

- Balance the number of disk shelves across the disk chains in your system.
- Balance the number of disk chains across the number of HBAs in your system. For example, attaching two chains across two separate HBAs will have better performance than attaching two chains to a single HBA.
- Do not mix disks with different rotational speeds within a single disk shelf.
- To maximize performance, use the maximum number of disk chains supported by the controller's SAS HBAs. For example, four SAS HBAs with eight chains and eight disk shelves will have better performance than two SAS HBAs with four chains and eight disk shelves.
- To maximize performance, do not attach more than four Oracle Storage Drive Enclosure DE2-24C, DE2-24P, or DE3-24C disk shelves to a single chain or eight Oracle Storage Drive Enclosure DE3-12C disk shelves to a single chain, and do not attach more than three Oracle Storage Drive Enclosure DE3-24P disk shelves to a single chain. This only applies to systems that are performance critical. The maximum of 6 Oracle Storage Drive Enclosure DE3-24/DE2-24 disk shelves or 12 Oracle Storage Drive Enclosure DE3-12C disk shelves per chain is available for cases where capacity is preferred over performance.

HBA Support for Disk Shelves

Disk shelves may require adding or replacing HBAs in your configuration. For HBA maintenance procedures for each controller, see *Oracle ZFS Storage Appliance Customer Service Manual, Release OS8.8.x*.

- A SAS-2 HBA always operates at SAS-2 interface speeds, whether it is directly attached to Oracle Storage Drive Enclosure DE2-24 or DE3-24 disk shelves, or whether the disk chain includes all Oracle Storage Drive Enclosure DE2-24, all Oracle Storage Drive Enclosure DE3-24, or an intermix of Oracle Storage Drive Enclosure DE2-24 and DE3-24 disk shelves.
- A SAS-3 HBA always operates at SAS-2 interface speeds if directly attached to an Oracle Storage Drive Enclosure DE2-24 disk shelf.

- A SAS-3 HBA always operates at SAS-3 interface speeds if directly attached to an Oracle Storage Drive Enclosure DE3-24/DE3-12 disk shelf, or when the disk chain comprises all Oracle Storage Drive Enclosure DE3-24/DE3-12 disk shelves.
- Aggregate bandwidth should be based on SAS-2 interface speeds when mixing Oracle Storage Drive Enclosure DE2-24 and DE3-24 disk shelves in a disk chain connected to a SAS-3 HBA.

Cable Lengths

- Active optical cables (AOCs) are required for attaching Oracle ZFS Storage ZS7-2 controllers to Oracle Storage Drive Enclosure DE3-24 disk shelves, or attaching Oracle ZFS Storage ZS9-2 controllers to Oracle Storage Drive Enclosure DE3-24 or Oracle Storage Drive Enclosure DE3-12C disk shelves. Other controllers and/or disk shelves in the future might use AOC cabling. AOCs are available in the following lengths: 3 meters, 6 meters, and 20 meters. The maximum AOC length between a controller and disk shelves that span further than two adjacent cabinets is 20 meters.
- Oracle Storage Drive Enclosure DE2-24 disk shelves with specific drive types (see Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS9-2 High-end (HE) Controllers) are supported by Oracle ZFS Storage ZS9-2 controllers and require connections with copper SAS cables. Oracle Storage Drive Enclosure DE2-24 disk shelf connection to Oracle ZFS Storage ZS7-2 controllers is supported in software release OS8.8.4 and later. Available copper cable lengths between the Oracle ZFS Storage ZS9-2 or ZS7-2 controller and the Oracle Storage Drive Enclosure DE2-24 disk shelf are 3 meters and 6 meters.
- The maximum copper cable length between a controller and disk shelves is 6 meters.
- The maximum copper or AOC cable length between Oracle Storage Drive Enclosure DE3-24 or Oracle Storage Drive Enclosure DE3-12C disk shelves in a single chain that spans two adjacent cabinets is 6 meters copper or 20 meters AOC; only one pair of 6-meter or 20-meter cables is allowed per chain.
- The maximum copper cable length between Oracle Storage Drive Enclosure DE2-24 disk shelves that span across adjacent cabinets is 3 meters.
- The maximum copper cable length between Sun Disk Shelves that span across adjacent cabinets is 3 meters.

For further guidelines for cabling together disk shelves, see Cabling Disk Shelves Together.

Cable Bend Radius

Do not bend SAS cables less than the following minimum radius:

SAS Cable Type	SAS Cable Length	Minimum Bend Radius
Copper	1 meter	26 mm
Copper	3 meters	28 mm
Copper	6 meters	35 mm
Active Optic Cable	All lengths	25 mm

All-Flash Disk Shelves

Oracle Storage Drive Enclosure all-flash disk shelves contain only SSDs, and utilize all-flash pools (AFP). To maximize performance, observe the following guidelines:

- To maximize performance, connect a maximum of two all-flash disk shelves in a single chain.

- Spread disk chains across as many SAS-3 HBAs as allowed by the system.
- To maximize performance, segregate all-flash disk chains from non-all-flash disk chains. For example, do not mix all-flash Oracle Storage Drive Enclosure DE3-24P disk shelves in a chain with Oracle Storage Drive Enclosure DE3-24C/DE3-12C disk shelves.
- Only connect all-flash disk shelves to a SAS-3 HBA in the controller, and use SAS-3 qualified cabling (do not use SAS-2 cabling).

Disk Shelf Installation and Upgrade Considerations

- **Installing a new system** - To maximize performance, avoid intermixing Oracle Storage Drive Enclosure DE3-24/DE3-12 and Oracle Storage Drive Enclosure DE2-24 disk shelves when installing a new system. Exclusively use a SAS-3 HBA, Oracle Storage Drive Enclosure DE3-24/DE3-12 disk shelves, and associated SAS-3 cabling to take advantage of the high performance SAS-3 fabric.
- **Upgrading a system** - When upgrading a system, choose the mixture of disk shelves according to your storage needs:
  - **Upgrading an obsolete component** - Replace the obsolete component and its associated components, which could be the SAS HBA, or disk shelf, and respective cabling. When possible for your system, add SAS-3 fabric components.
  - **Segregating the upgrade for increased performance** - If a controller has empty HBA slots, add SAS-3 HBAs (if supported by the controller model), DE3-24 disk shelves, and associated cabling.
  - **Maximizing performance** - Upgrade all components, possibly including controllers, to support an all DE3-24 disk shelf configuration with SAS-3 HBAs in the controller, and appropriate cabling.

Maximizing Performance with Intermixed DEx-24/DE3-12 Disk Shelves

To maximize performance when mixing Oracle Storage Drive Enclosure DE3-24/DE3-12 and DE2-24 disk shelves, observe the following guidelines:

- A disk chain should ideally contain only Oracle Storage Drive Enclosure DE3-24/DE3-12 or DE2-24 disk shelves. Note that Oracle Storage Drive Enclosure DE3-12C disk shelves are not supported in chains with Oracle Storage Drive Enclosure DE2-24 disk shelves.
- Attach SAS-3 HBAs to Oracle Storage Drive Enclosure DE3-24/DE3-12 disk shelves, and attach SAS-2 HBAs to Oracle Storage Drive Enclosure DE2-24 disk shelves. Note that Oracle Storage Drive Enclosure DE3-12C disk shelves are not supported in chains with Oracle Storage Drive Enclosure DE2-24 disk shelves.

Cabling for Intermixed Oracle Storage Drive Enclosure DEx-24/DE3-12 Disk Shelves

- **Disk Chain Cables** - Oracle Storage Drive Enclosure DE2-24 and DE3-24 disk shelves require different cable connectors. Select the correct cables according to the disk shelves being connected:
  - Oracle Storage Drive Enclosure DE2-24 to DE2-24 disk shelf: SFF-8088 connectors on both cable ends
  - Oracle Storage Drive Enclosure DE3-24/DE3-12 to DE3-24/DE3-12 disk shelf: SFF-8644 connectors on both cable ends

Note that Oracle Storage Drive Enclosure DE3-12C disk shelves are not supported in chains with Oracle Storage Drive Enclosure DE2-24 disk shelves.

  - Oracle Storage Drive Enclosure DE2-24 to DE3-24 disk shelf: SFF-8088 connector on Oracle Storage Drive Enclosure DE2-24 cable end, SFF-8644 connector on Oracle Storage Drive Enclosure DE3-24 cable end

- **HBA Cables** - The different disk shelf types require different cables for connecting to a SAS-3 or SAS-2 HBA. Select the correct cables according to the disk shelves being connected:
  - SAS-3/SAS-2 HBA to Oracle Storage Drive Enclosure DE3-24 disk shelf: SFF-8644 connectors on both cable ends
  - SAS-3 HBA to Oracle Storage Drive Enclosure DE3-12C disk shelf: SFF-8644 connectors on both cable ends
  - SAS-3/SAS-2 HBA to Oracle Storage Drive Enclosure DE2-24 disk shelf: SFF-8644 connectors on HBA cable end, and SFF-8088 connector on disk shelf end

Intermixing Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves

- For controllers that support using Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves together, the controller must use 4X4 port SAS-2 HBAs, which are supported as of software release 2013.1.0.
- Do not use Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves in the same disk chain.

Supported Disk Shelf Combinations and HBAs

Disk shelves are supported by specific HBAs in the controller, and can be combined in certain configurations within an Oracle ZFS Storage Appliance system. Use the following table to determine the HBA type required by each disk shelf model.

Table 1-1 Required HBA per Disk Shelf Model

Disk Shelf Model	Required HBA
Oracle Storage Drive Enclosure DE3-24P All-Flash	SAS-3 4x4 port HBA
Oracle Storage Drive Enclosure DE3-24 Disk Shelf	SAS-3 4x4 port HBA or SAS-2 4x4 port HBA
Oracle Storage Drive Enclosure DE3-12C Disk Shelf	Oracle ZFS Storage ZS9-2 controllers: SAS-3 4x4 port HBA
Oracle Storage Drive Enclosure DE2-24 Disk Shelf	SAS-3 4x4 port HBA, SAS-2 4x4 port HBA or SAS-2 2x4 port HBA
Sun Disk Shelf	SAS-2 4x4 port HBA or SAS-2 2x4 port HBA
Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelf together	SAS-2 4x4 port HBA SAS-2 2x4 port HBA for only Sun ZFS Storage 7120

The following table describes the disk shelf models that can be used together for each controller configuration, starting with software release OS8.7.0. Oracle Storage Drive Enclosure DE2-24 disk shelf connection to Oracle ZFS Storage ZS9-2 controllers is supported for specific drive types (see Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS9-2 High-end (HE) Controllers).

Oracle Storage Drive Enclosure DE2-24 disk shelf connection to Oracle ZFS Storage ZS7-2 controllers is supported in software release OS8.8.4 and later. See Cabinet and Cabling Guidelines for disk shelf intermixing guidelines and all-flash disk shelf usage. To understand which controllers support which HBA types, see Maximum Disk Shelves per Controller Configuration.

Table 1-2 Supported Disk Shelves per Controller Configuration

Controller Configuration	DE3-24P All-Flash Disk Shelves	All DE3-24 Disk Shelves (except All-Flash)	DE3-12C Disk Shelves	All DE2 Disk Shelves	DE3 and DE2 Disk Shelves	DE2 and Sun Disk Shelves
Oracle ZFS Storage ZS9-2 with SAS-3 4x4 port HBAs	Yes	Yes	Yes	Yes	Yes	No
Oracle ZFS Storage ZS7-2 with SAS-3 4x4 port HBAs	Yes	Yes	No	Yes	Yes	No
Oracle ZFS Storage ZS5-4 with SAS-3 4x4 port HBAs	Yes	Yes	No	Yes	Yes	No
Oracle ZFS Storage ZS5-4 with SAS-2 4x4 port HBAs	No	Yes	No	Yes	Yes	No
Oracle ZFS Storage ZS5-2 with SAS-3 4x4 port HBAs	Yes	Yes	No	Yes	Yes	No
Oracle ZFS Storage ZS5-2 with SAS-2 4x4 port HBAs	No	Yes	No	Yes	Yes	No
Oracle ZFS Storage ZS4-4 with SAS-3 4x4 port HBAs	Yes	Yes	No	Yes	Yes	No
Oracle ZFS Storage ZS4-4 with SAS-2 4x4 port HBAs	No	Yes	No	Yes	Yes	No
Oracle ZFS Storage ZS3-4 with SAS-2 4x4 port HBAs	No	Yes	No	Yes	Yes	Yes
Oracle ZFS Storage ZS3-2 with SAS-3 4x4 port HBAs	No	Yes	No	Yes	Yes	No

Table 1-2 (Cont.) Supported Disk Shelves per Controller Configuration

Controller Configuration	DE3-24P All-Flash Disk Shelves	All DE3-24 Disk Shelves (except All-Flash)	DE3-12C Disk Shelves	All DE2 Disk Shelves	DE3 and DE2 Disk Shelves	DE2 and Sun Disk Shelves
Oracle ZFS Storage ZS3-2 with SAS-2 4x4 port HBAs	No	Yes	No	Yes	Yes	Yes
Sun ZFS Storage 7420 with SAS-2 4x4 port HBAs	No	No	No	Yes	No	Yes
Sun ZFS Storage 7420 with SAS-2 2x4 port HBAs	No	No	No	Yes	No	No
Sun ZFS Storage 7320 with SAS-2 4x4 port HBAs	No	No	No	Yes	No	Yes
Sun ZFS Storage 7320 with SAS-2 2x4 port HBAs	No	No	No	Yes	No	No
Sun ZFS Storage 7120 with SAS-2 2x4 port HBAs	No	No	No	Yes	No	Yes

Maximum Disk Shelves per Controller Configuration

When determining how many disk shelves an Oracle controller configuration supports, it is important to remember that each disk shelf chain can support up to six disk shelves, and some controller configurations are limited to a specific number of total disk shelves. The following table details the number of supported disk shelf chains per HBA type.

Table 1-3 Supported Disk Shelf Chains per HBA

HBA Type	Number of Disk Shelf Chains per HBA
SAS-3 4x4 port	2
SAS-2 4x4 port	2
SAS-2 2x4 port	1

As of software release OS8.7.0, 4x4 port SAS-3 HBAs and 4x4 port SAS-2 HBAs can be used together in the same system. Controllers cannot simultaneously use 2x4 port SAS-2 HBAs and 4x4 port SAS-2 HBAs. Sun Disk Shelves are not supported in any system that includes a SAS-3 HBA, or a combination of SAS-3 and SAS-2 HBAs.

The following table shows the maximum number of HBAs per controller, and the maximum number of drive bays supported per controller configuration (including drive bays with filler panels). Both standalone and clustered controllers support the same maximum number of drive bays. For information on disk compatibility, see the Oracle Systems Handbook.

Table 1-4 Maximum Drive Bays per Controller Configuration

Controller	Max. Drive Bays	Max. 2x4 Port SAS-2 HBA	Max. 4x4 Port SAS-2 HBA	Max. 4x4 Port SAS-3 HBA	Guidelines
Oracle ZFS Storage ZS9-2 high-end model	1,152 (48 DE3-24 or 96 DE3-12C)	NA	NA	4	Disk shelves can include 24x HDD/SSD, or combine 20x HDD/SSD plus 4x write-optimized and/or read-optimized flash accelerators (SSDs). Oracle Storage Drive Enclosure DE3-12C disk shelves can include 12x HDD, or combine 10x HDD plus 2x write-optimized and/or read-optimized flash accelerators (SSDs). Total number of chains is eight. Any combination of disk-only and write- or read-optimized shelves may be combined within the chain in any order.
Oracle ZFS Storage ZS9-2 mid-range model	576 (24 DE3-24 or 48 DE3-12C)	NA	NA	2	Disk shelves can include 24x HDD/SSD, or combine 20x HDD/SSD plus 4x write-optimized and/or read-optimized flash accelerators (SSDs). Oracle Storage Drive Enclosure DE3-12C disk shelves can include 12x HDD, or combine 10x HDD plus 2x write-optimized and/or read-optimized flash accelerators (SSDs). Total number of chains is four. Any combination of disk-only and write- or read-optimized shelves may be combined within the chain in any order.
Oracle ZFS Storage ZS7-2 high-end model	1,152	NA	NA	4	Disk shelves can include 24x HDD/SSD, or combine 20x HDD/SSD plus 4x write-optimized and/or read-optimized flash accelerators (SSDs). Total number of chains is eight. Any combination of disk-only and write- or read-optimized shelves may be combined within the chain in any order.

Table 1-4 (Cont.) Maximum Drive Bays per Controller Configuration

Controller	Max. Drive Bays	Max. 2x4 Port SAS-2 HBA	Max. 4x4 Port SAS-2 HBA	Max. 4x4 Port SAS-3 HBA	Guidelines
Oracle ZFS Storage ZS7-2 mid-range model	576	NA	NA	2	Disk shelves can include 24x HDD/SSD, or combine 20x HDD/SSD plus 4x write-optimized and/or read-optimized flash accelerators (SSDs). Total number of chains is four. Any combination of disk-only and write- or read-optimized shelves may be combined within the chain in any order.
Oracle ZFS Storage ZS5-4	1,152	NA	4	4	Disk shelves can include 24x HDD/SSD, or combine 20x HDD/SSD plus 4x write-optimized and/or read-optimized flash accelerators (SSDs). Total number of chains is eight. Any combination of disk-only and write- or read-optimized shelves may be combined within the chain in any order.
Oracle ZFS Storage ZS5-2	384	NA	2	2	Disk shelves can include 24x HDD/SSD, or combine 20x HDD/SSD plus 4x write-optimized and/or read-optimized flash accelerators (SSDs). Total number of chains is four. Any combination of disk-only and write- or read-optimized shelves may be combined within the chain in any order.
Oracle ZFS Storage ZS4-4	864	NA	4	4	Disk shelves can include 24x HDD/SSD, or combine 20x HDD/SSD plus 4x write-optimized and/or read-optimized flash accelerators (SSDs). Total number of chains is eight. Any combination of disk-only and write-optimized shelves can be combined within the chain in any order.

Table 1-4 (Cont.) Maximum Drive Bays per Controller Configuration

Controller	Max. Drive Bays	Max. 2x4 Port SAS-2 HBA	Max. 4x4 Port SAS-2 HBA	Max. 4x4 Port SAS-3 HBA	Guidelines
Oracle ZFS Storage ZS3-4	864	NA	4	NA	Disk shelves can include 24x HDD, or combine 20x HDD plus 4x write-optimized flash accelerators (SSDs). Total number of chains is eight. Any combination of disk-only and write-optimized shelves can be combined within the chain in any order. You can also connect mixed disk shelf types (Oracle Storage Drive Enclosure DE2 and legacy Sun Disk Shelves) to the same controllers, but each chain must contain only the same disk shelf type. Directly connecting different disk shelf types is not supported.
Oracle ZFS Storage ZS3-2	384	NA	2	2	Disk shelves can include 24x HDD, or combine 20x HDD plus 4x write-optimized flash accelerators (SSDs). Total number of chains is four. Any combination of disk-only and write-optimized shelves can be combined within the chain in any order. You can also connect mixed disk shelf types (Oracle Storage Drive Enclosure DE2 and legacy Sun Disk Shelves) to the same controllers, but each chain must contain only the same disk shelf type. Directly connecting different disk shelf types is not supported.

Table 1-4 (Cont.) Maximum Drive Bays per Controller Configuration

Controller	Max. Drive Bays	Max. 2x4 Port SAS-2 HBA	Max. 4x4 Port SAS-2 HBA	Max. 4x4 Port SAS-3 HBA	Guidelines
Sun ZFS Storage 7420	864	6	6	NA	Disk shelves can include 24x HDD, or combine 20x HDD plus 4x write-optimized flash accelerators (SSDs). Total number of chains is six with 2X4 port SAS-2 HBAs, and 12 with 4X4 port SAS-2 HBAs. Any combination of disk-only and write-optimized shelves can be combined within the chain in any order. You can also connect mixed disk shelf types (Oracle Storage Drive Enclosure DE2 and legacy Sun Disk Shelves) to the same controllers, but each chain must contain only the same disk shelf type. Directly connecting different disk shelf types is not supported.
Sun ZFS Storage 7320	144	1	1	NA	Any combination of disk-only and write-optimized shelves may be combined within the chain in any order. The cabling configurations are unchanged. You can also connect mixed disk shelf types (Oracle Storage Drive Enclosure DE2 and legacy Sun Disk Shelves) to the same controllers, but each chain must contain only the same disk shelf type. Directly connecting different disk shelf types is not supported.
Sun ZFS Storage 7120	48	1	NA	NA	Write-optimized SSDs are not supported in the expansion storage for the Sun ZFS Storage 7120. The disk shelves must be fully populated with 24 HDDs. You can also connect mixed disk shelf types (Oracle Storage Drive Enclosure DE2 and legacy Sun Disk Shelves) to the same controllers.

New Appliance Cabling Workflow

When installing a new Oracle ZFS Storage Appliance, this is the installation, cabling, and powering on sequence. To further configure the disk shelves, see Configuring Storage in *Oracle ZFS Storage Appliance Administration Guide, Release OS8.8.x*.

Installing, Cabling, and Powering On a New Appliance

1. Plan for disk shelf and controller placement as described in Cabinet and Cabling Guidelines.
2. Install disk shelves into the rack as described in Installation Overview in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. Do not apply power.
3. Install controllers into the rack as described in Installation Overview in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. Do not apply power.
4. Connect the system cables as described in Connecting System Cables.
5. If clustered controllers, connect the cluster cables as described in Connecting Cluster Cables.
6. Cable disk shelves to controllers as described in this guide. Locate your controller and disk shelf types, as well as the number of controller HBAs, in Getting Started with Cabling.
7. Apply power to disk shelves and controllers, configure the system, and perform the initial configuration as described in Powering On the Appliance in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*, and Configuring the Appliance for the First Time in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

Connecting System Cables

Use the following procedure to make a physical serial or network connection to Oracle Integrated Lights Out Manager (ILOM).

Use a serial SP connection for system configuration and initial configuration, which enables you to monitor progress, especially during system reboots. Afterward remove the serial connection if you do not need it for CLI access. Instead, make a network service processor (SP) connection, which allows for better collection of platform data.

> **Caution:**
>
> Failure to configure Oracle ILOM connectivity after initial setup may lead to longer than necessary hardware fault diagnosis and resolution times. For more information about Oracle ILOM, see Changing the Cabling for Oracle ILOM.

Before You Begin

Ensure the storage controllers and disk shelves are installed, but not cabled together.

If making a serial connection to the SP (recommended), ensure that you have configured the administrative client as described in Configuring the System in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

To make a network connection to the SP, your network must have a DHCP server.

> **Caution:**
>
> Do not connect the power cables until instructed to do so in Powering On the Appliance in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

1. To prepare for system configuration, perform one of the following SP connections:
   - For a serial SP connection (recommended), attach a serial cable from the SER MGT port on the rear panel of the controller to the serial port on the administrative client. Use a DB9 to RJ45 adapter if necessary.
   - For a network SP connection, attach an Ethernet cable from the NET MGT port on the rear panel of the controller to your Ethernet switch.

   If clustered controllers, repeat for the second controller.
2. Connect an Ethernet cable from the NET-0 port on the rear panel of the controller to your Ethernet switch.

   If clustered controllers, repeat for the second controller.

Connecting Cluster Cables

The controller cluster interface card provides redundant links through I/O ports that enable two controllers to communicate with each other. For details about the cluster interface card, see Controller Cluster I/O Ports.

Cluster cabling must be done before powering on either controller, and all cluster interface card links must be established before configuration can proceed.

Ethernet cables for connecting clustered controllers are supplied. If you supply your own Ethernet cables, ensure the cables are straight-through and the correct length, Category 6A for Oracle ZFS Storage ZS9-2 controllers, Category 5 or better for all other controllers.

The following sections describe how to connect cluster cables for different controllers.

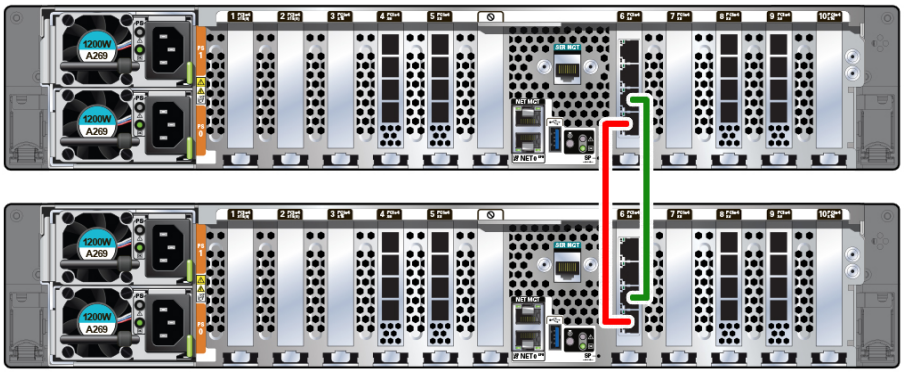
Connecting Cluster Cables for Oracle ZFS Storage ZS9-2 Controllers

Oracle ZFS Storage ZS9-2 controllers employ Ethernet-based clustering using two Ethernet ports in the Oracle Quad Port 10GBASE-T Ethernet Adapter. See Controller Cluster I/O Ports for details about the ZS9-2 controller cluster interface card.

Two Category 6A Ethernet cables with RJ-45 connectors are provided: one green and one red. Each cable is 2.5 meters in length.

- Connect either the green cable or the red cable from Ethernet port 0 of one controller to Ethernet port 0 of the other controller.
- Connect the other cable from Ethernet port 1 of one controller to Ethernet port 1 of the other controller.

The following figure shows cluster cabling between two Oracle ZFS Storage ZS9-2 controllers (high-end model shown).



Connecting Cluster Cables for Oracle ZFS Storage ZS7-2, ZS5-x, ZS4-4, ZS3-x, and Sun ZFS Storage 7x20 Controllers

Oracle ZFS Storage ZS7-2, ZS5-x, ZS4-4, ZS3-x, and Sun ZFS Storage 7x20 controllers employ serial-based clustering using two serial cluster links, and provide Ethernet connectivity via one link. The Ethernet link provides a higher-performance transport for non-heartbeat messages such as rejoin synchronization and provides a backup heartbeat.

The cables between the serial ports form a crossover pattern, 0 to 1 and 1 to 0. This crossover cabling enables the use of straight-through cables between two identical controllers.

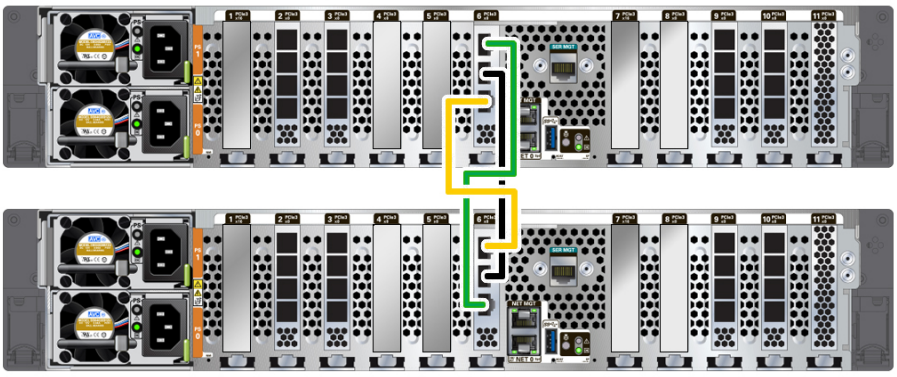
For details about the cluster interface cards, see Controller Cluster I/O Ports.

Oracle ZFS Storage ZS7-2 Cluster Cabling

Three Category 5 Ethernet cables are provided: one green, one yellow, and one black. Each cable is 2.5 meters in length.

- Connect either the green cable or the yellow cable from serial port 0 of one controller to serial port 1 of the other controller.
- Connect either the green cable or the yellow cable from serial port 1 of one controller to serial port 0 of the other controller.
- Connect the black cable between the Ethernet ports of each controller.

The following figure shows cluster cabling between two Oracle ZFS Storage ZS7-2 controllers (high-end model shown).

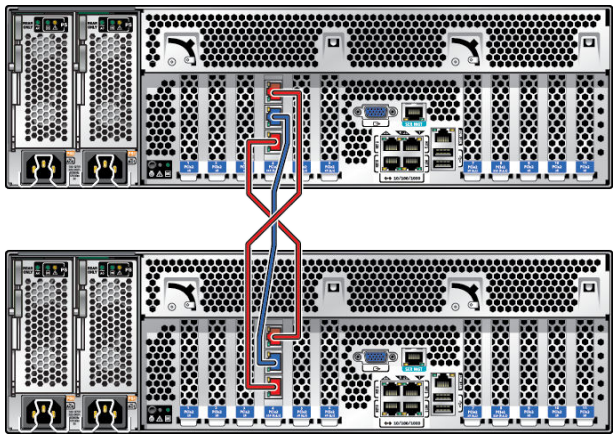


Oracle ZFS Storage ZS5-x Cluster Cabling

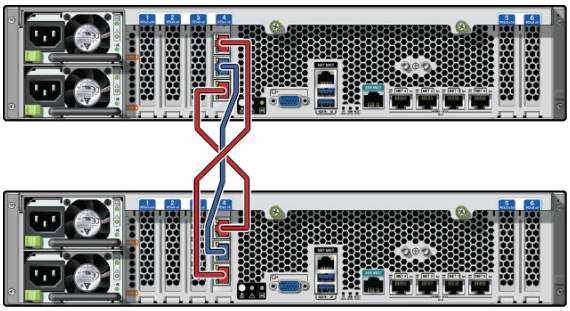
Three Category 5 Ethernet cables are provided. Each cable is 2.5 meters in length.

- Connect one cable from serial port 0 of one controller to serial port 1 of the other controller.
- Connect the second cable from serial port 1 of one controller to serial port 0 of the other controller.
- Connect the third cable between the Ethernet ports of each controller.

The following figure shows cluster cabling between two Oracle ZFS Storage ZS5-4 controllers.



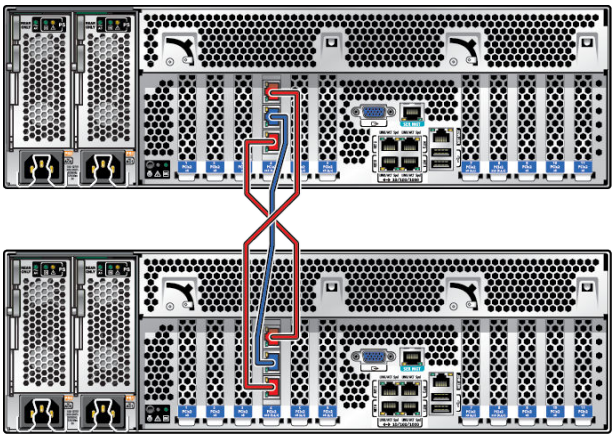
The following figure shows cluster cabling between two Oracle ZFS Storage ZS5-2 controllers.



Oracle ZFS Storage ZS4-4 Cluster Cabling

Three Category 5 Ethernet cables are provided. Each cable is 1 meter in length. Connect the cables in the same way as described for Oracle ZFS Storage ZS5-x controllers.

The following figure shows cluster cabling between two Oracle ZFS Storage ZS4-4 controllers.



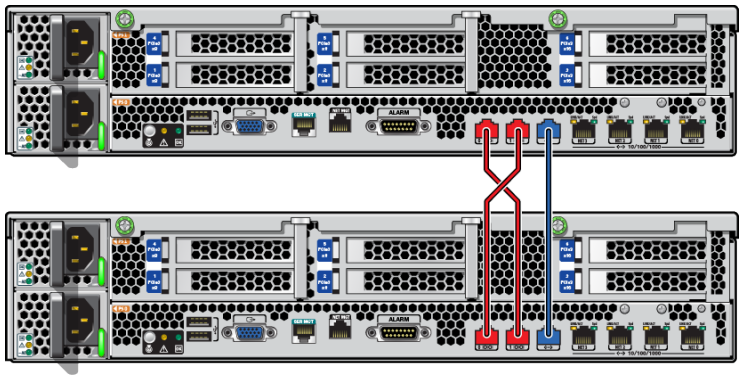
Oracle ZFS Storage ZS3-4 and Sun ZFS Storage 7420 Cluster Cabling

The cluster card for Oracle ZFS Storage ZS3-4 and Sun ZFS Storage 7420 is installed in the Cluster slot, as described in the hardware overview for each controller in Oracle ZFS Storage Appliance Customer Service Manual, Release OS8.8.x.

Oracle ZFS Storage ZS3-2 Cluster Cabling

Three Category 5 Ethernet cables are provided. Each cable is 1 meter in length. Connect the cables in the same way as described for Oracle ZFS Storage ZS5-x controllers. For details about the cluster ports, seeController Cluster I/O Ports.

The following figure shows cluster cabling between two Oracle ZFS Storage ZS3-2 controllers.



Controller Cluster I/O Ports

Controller cluster interface cards provide redundant links through I/O ports that enable two controllers to communicate with each other. For the location of these cluster interface cards, see the hardware overview for the appropriate controller.

Oracle ZFS Storage ZS9-2 controllers employ Ethernet-based clustering using two Ethernet ports in the Oracle Quad Port 10GBASE-T Ethernet Adapter. All other controller cluster interface cards employ serial-based clustering using two serial cluster links, and provide Ethernet connectivity via one link.

For all controllers, the LEDs for the cluster ports have the following meanings. Note that for serial cluster ports, only one of the LEDs (the link status LED) is used. For Ethernet ports, both LEDs are used. See the following figures.

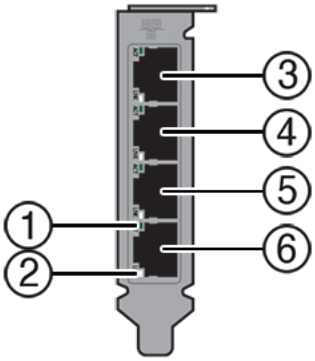
Activity LED

- Flashing green: Data activity

Link Status LED

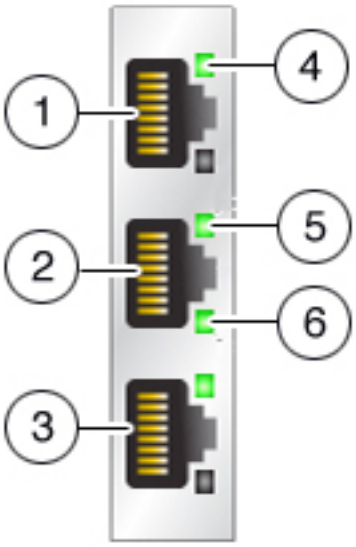
- Solid green: Normal connection
- Solid yellow or off: Degraded connection

The following diagram illustrates the cluster Ethernet ports for Oracle ZFS Storage ZS9-2 controllers.



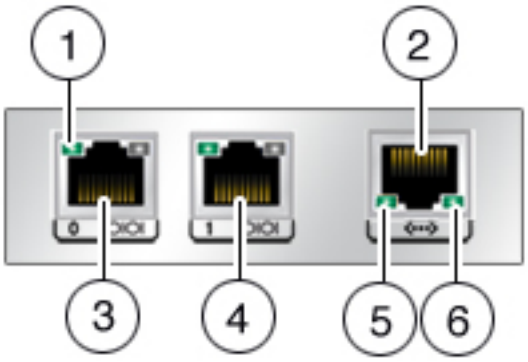
1 Ethernet Activity LED	**2** Ethernet Link Status LED	**3** Port 3 (Ethernet I/O)
4 Port 2 (Ethernet I/O)	**5** Port 1 (Cluster link)	**6** Port 0 (Cluster link)

The following diagram illustrates the cluster serial and Ethernet ports for Oracle ZFS Storage ZS7-2, ZS5-4, ZS5-2, ZS4-4, ZS3-4, and Sun ZFS Storage 7x20 controllers.



1 Serial 1	**2** Ethernet	**3** Serial 0
4 Serial Link Status LED	**5** Ethernet Link Status LED	**6** Ethernet Activity LED

The following diagram illustrates the cluster serial and Ethernet ports for Oracle ZFS Storage ZS3-2 controllers.



1 Serial Link Status LED	**2** Ethernet	**3** Serial 0
4 Serial 1	**5** Ethernet Link Status LED	**6** Ethernet Activity LED

Cabling Disk Shelves Together

Use the following procedure to cable disk shelves together using copper SAS cables. Active optical cables (AOCs) are allowed for Oracle Storage Drive Enclosure DE3-24/DE3-12 disk shelves in special circumstances as indicated here.

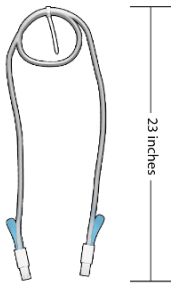
- For Oracle Storage Drive Enclosure DE3-24/DE3-12 disk shelves within the same cabinet, use 1-meter (3.28-foot) SAS-3 cables; for Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves within the same cabinet use 2-meter (6.56-foot) SAS-2 cables.
- For Oracle Storage Drive Enclosure DE3-24/DE3-12 disk shelf cabling extending between adjacent cabinets, use 3-meter (9.84-foot) SAS-3 cables.
- For Oracle Storage Drive Enclosure DE3-24/DE3-12 disk shelf cabling extending between two adjacent cabinets, use 6-meter (19.68-foot) copper, or 6-meter AOC, or 20-meter (65.62-foot) AOC SAS-3 cables; only one pair of 6-meter or 20-meter SAS-3 cables is allowed per chain.
- For Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelf cabling extending between adjacent cabinets, use 3-meter (9.84-foot) SAS-2 cables.

1. Locate the appropriate cabling diagram for your system in Getting Started with Cabling.
2. Starting in the middle of a disk shelf cable, make the appropriate number of loose 12.7-centimeter (5-inch) diameter loops, and attach a cable tie to secure them as shown in the following illustration.

   Use these guidelines for creating the loops:

   - 1-meter cable length - 2 loops
   - 2-meter cable length - 3 loops
   - 3-meter cable length - 4 loops

   The length between the cable tie and the cable ends should be approximately 0.58 meters (23 inches).

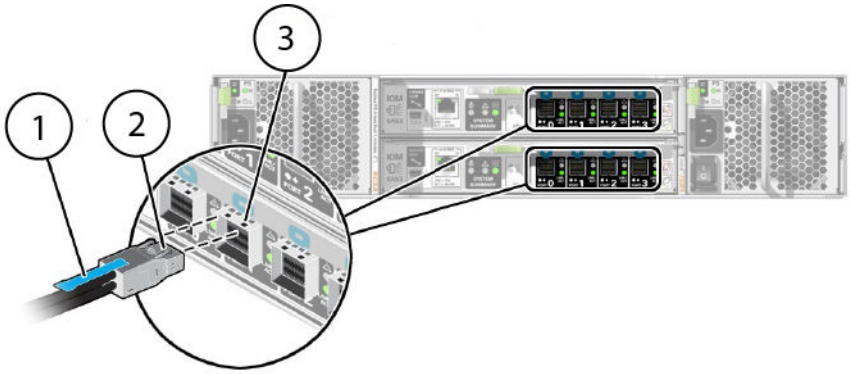


3. Facing the rear of the rack and starting with the uppermost disk shelf, hold the cable loops to the side of the rack, choosing the side closest to the disk shelf cabling ports.

   The cable tie should face the rear of the rack to maximize the cable length.
4. Extend the upper end of the cable to the rack rail above the uppermost disk shelf, and ensure that the cable leaves enough clearance to remove the power supply.
5. Connect that cable end to the appropriate port in the uppermost disk shelf.

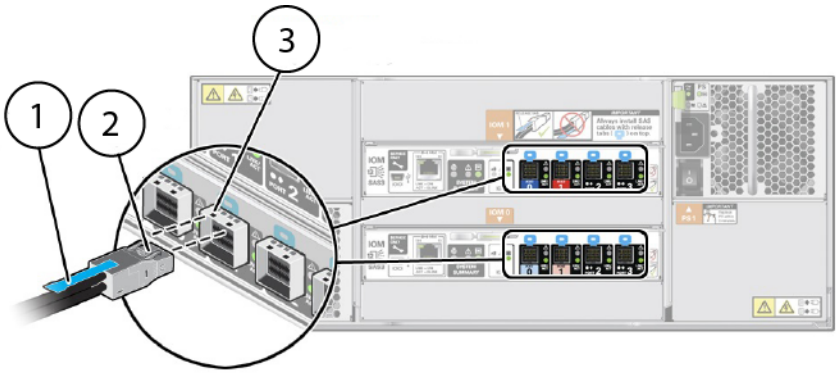
Refer to the appropriate cabling diagram to identify the disk shelf port. When attaching a cable to an Oracle Storage Drive Enclosure DEx-24 disk shelf, position the blue release tab correctly for the disk shelf type and I/O Module, and ensure that the cable connector latches engage in the port.

Attaching a Mini-SAS HD Cable to an Oracle Storage Drive Enclosure DE3-24P Disk Shelf



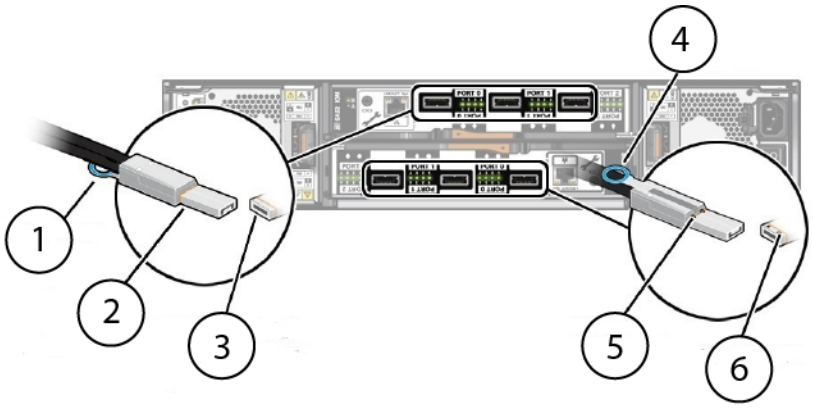
1 Blue release tab
2 Cable connector latches
3 IOM 0/IOM 1 port latch receiver holes

Attaching a Mini-SAS HD Cable to an Oracle Storage Drive Enclosure DE3-24C Disk Shelf



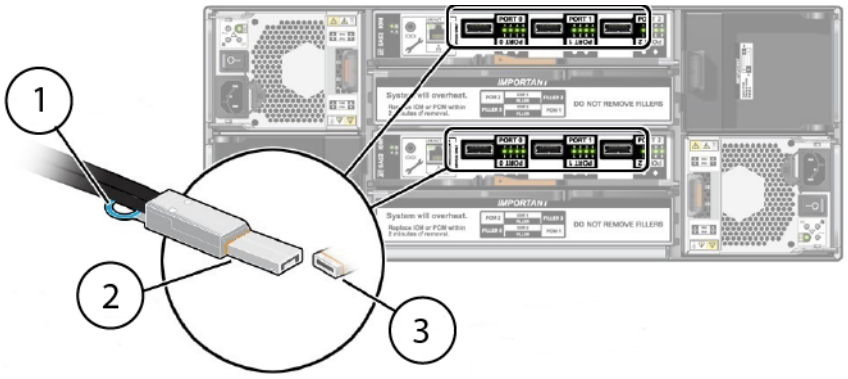
1 Blue release tab
2 Cable connector latches
3 IOM 0/IOM 1 port latch receiver holes

Attaching a Mini-SAS Cable to an Oracle Storage Drive Enclosure DE2-24P Disk Shelf



1 Blue release tab	**4** Blue release tab
2 Cable connector latches (underneath)	**5** Cable connector latches
3 IOM 1 port latch receiver holes (underneath)	**6** IOM 0 port latch receiver holes

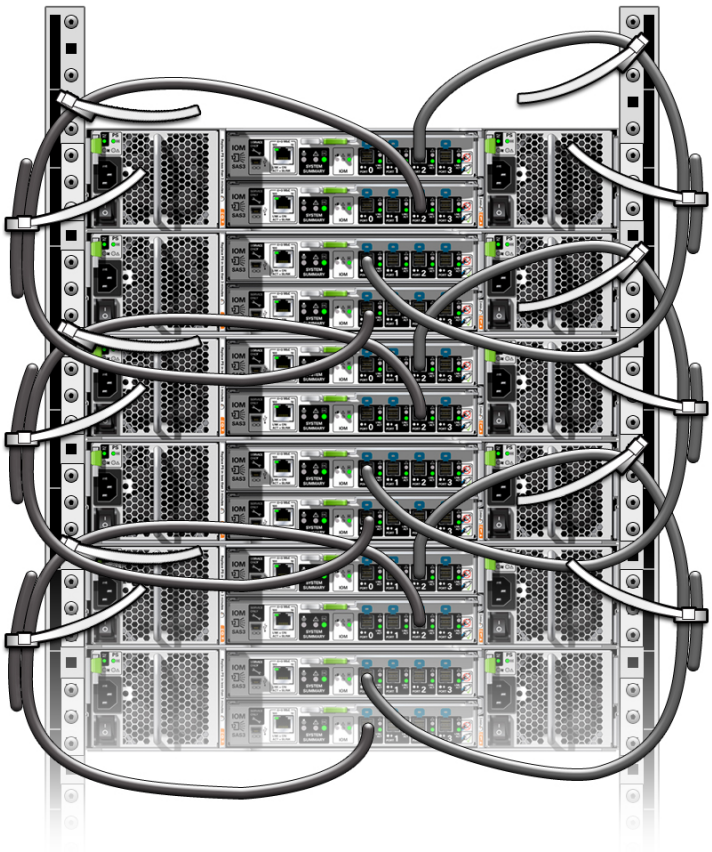
Attaching a Mini-SAS Cable to an Oracle Storage Drive Enclosure DE2-24C Disk Shelf



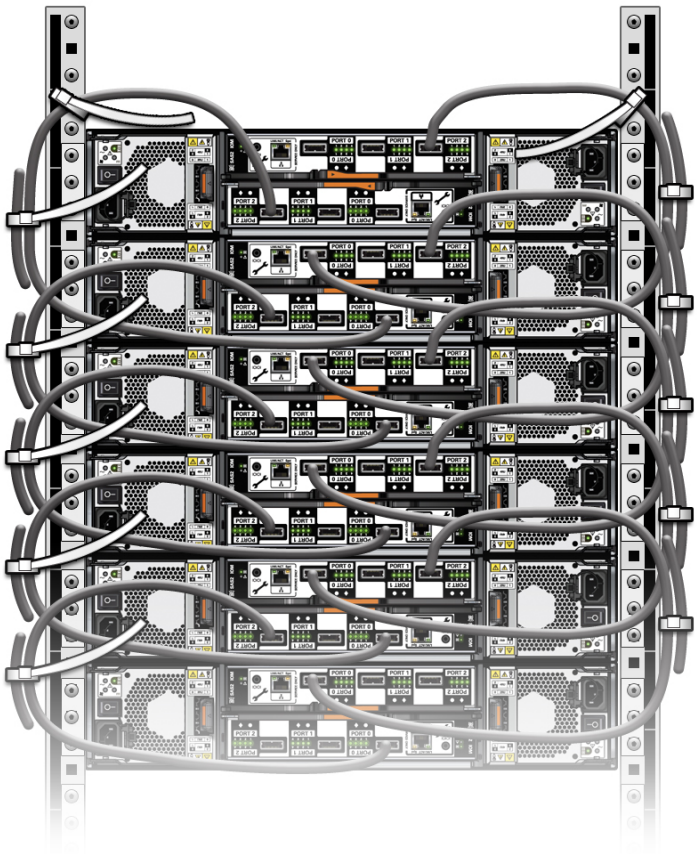
1 Blue release tab
2 Cable connector latches (underneath)
3 IOM 0/IOM 1 port latch receiver holes (underneath)

6. Slide the coiled cable between the vertical rack rail and the rack side panel, ensuring that the cable tie is still facing the rear of the rack.
7. Verify clearance for power supply removal, and then connect the other end of the cable to the appropriate port in the appropriate disk shelf.
8. Use another cable tie to secure the upper end of the cable to a rack rail mounting hole that is slightly above the uppermost disk shelf.

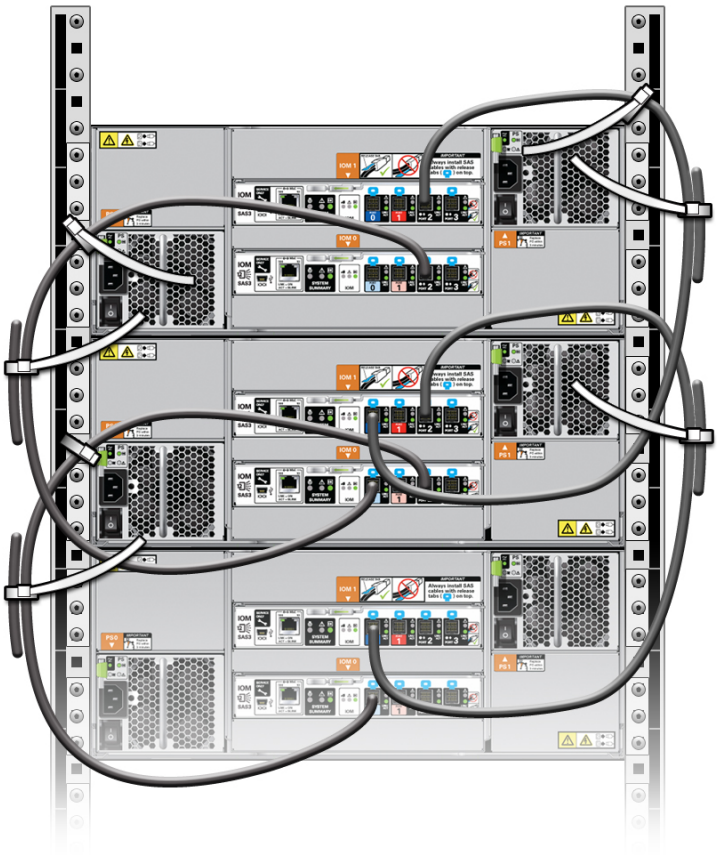
Cabling 2U Disk Shelves Together (Oracle Storage Drive Enclosure DE3-24P shown)



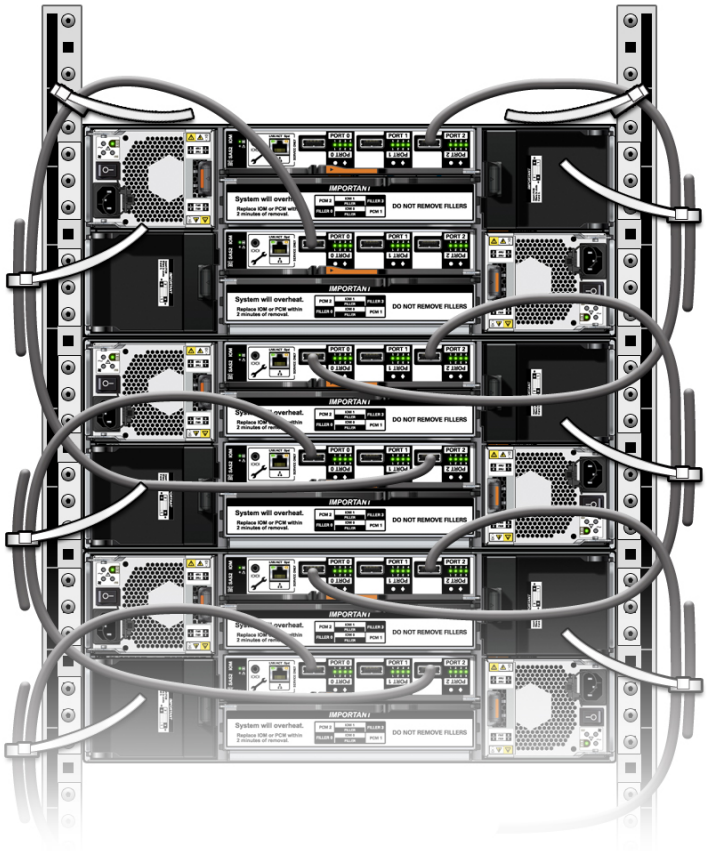
Cabling 2U Disk Shelves Together (Oracle Storage Drive Enclosure DE2-24P shown)



Cabling 4U Disk Shelves Together (Oracle Storage Drive Enclosure DE3-24C shown)



Cabling 4U Disk Shelves Together (Oracle Storage Drive Enclosure DE2-24C shown)



9. Repeat this process for the remaining disk shelves in the chain, substituting the correct disk shelves.

   Keep approximately 20.32 centimeters (8 inches) between cable tie-offs on a side.

10. Trim the cable tie excess.
11. Repeat this procedure for any additional disk shelf chains.
12. To connect the controllers to the disk shelf chains, see the appropriate procedure:
    - Cabling Controllers to Disk Shelves in a Base Cabinet
    - Cabling Controllers in a Base Cabinet to Disk Shelves in an Expansion Cabinet

Cabling Controllers to Disk Shelves in a Base Cabinet

Use the following procedure to cable controllers to disk shelves in a base cabinet. There can be multiple disk shelf chains within the base cabinet, and they can be located both above and below the controllers. After cabling together the disk shelves to form chains, each chain has a top and bottom end that is attached to different HBAs in the controller(s). While your configuration may vary, the following procedure details connecting a single controller to multiple disk chains.

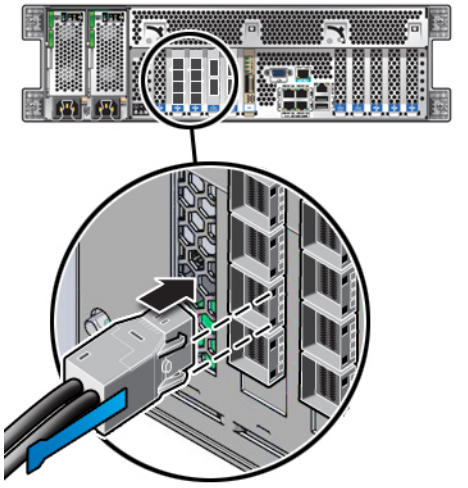
> **Note:**
>
> Use active optical cables (AOCs) to connect Oracle Storage Drive Enclosure DE3-24 disk shelves to the Oracle ZFS Storage ZS9-2 or ZS7-2 controller.

1. Locate the appropriate cabling diagram for your system in Getting Started with Cabling.
2. Loosely loop the cable that will connect the controller to the disk shelf chain.

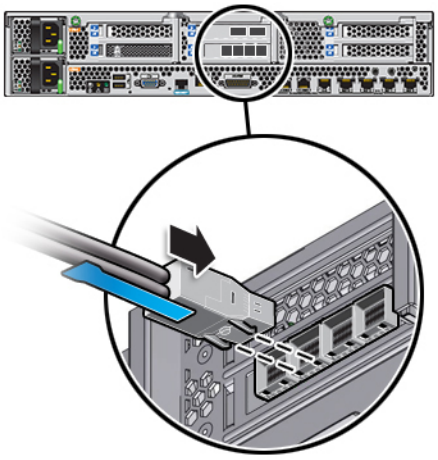
   The maximum cable length between a controller and a disk shelf is six meters (19.69 feet).
3. Facing the rear of the rack, hold the cable loops to the side of the rack, choosing the side closest to the appropriate controller HBA port.
4. Connect one end of the cable to the appropriate controller HBA port.

   Ensure the cable is connected to the correct HBA port. Controller models can differ in regard to vertically or horizontally oriented HBAs, which affects the port order, as well as the orientation of the cable's blue release tab. Position the release tab to the right for vertical HBAs, and downward for horizontal HBAs. Also ensure that the cable connector latches engage in the port.

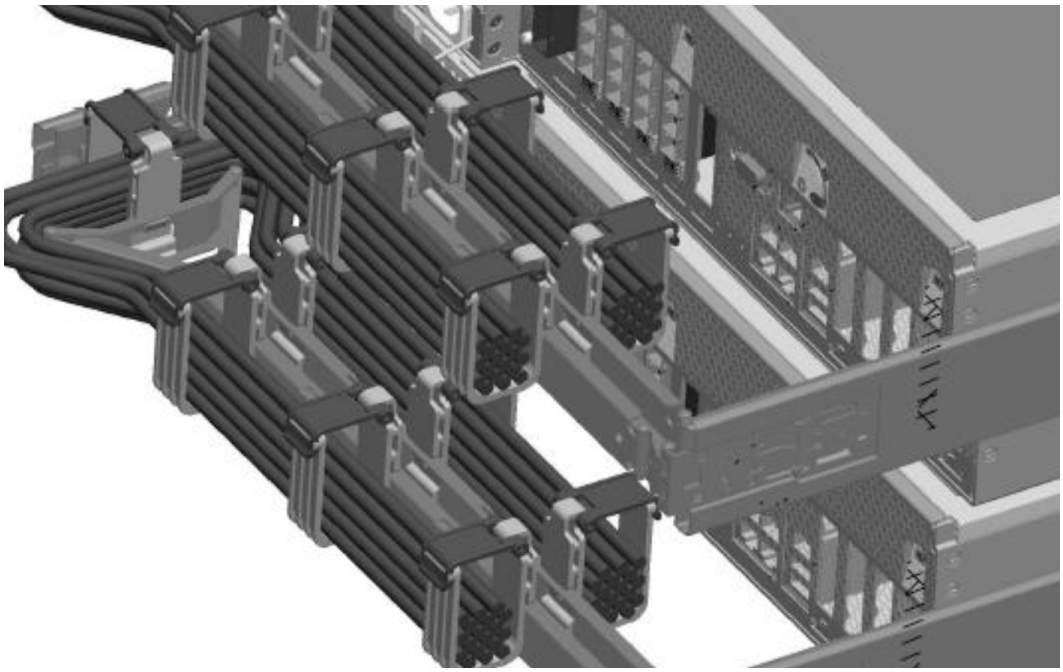
   Attaching a Mini-SAS Cable to a Vertically Oriented HBA



   Attaching a Mini-SAS Cable to a Horizontally Oriented HBA



5. If the controller has a cable management arm (CMA), route the cable through the CMA, ensuring that there is ample slack for servicing the controller as shown in the following illustration with clustered controllers.



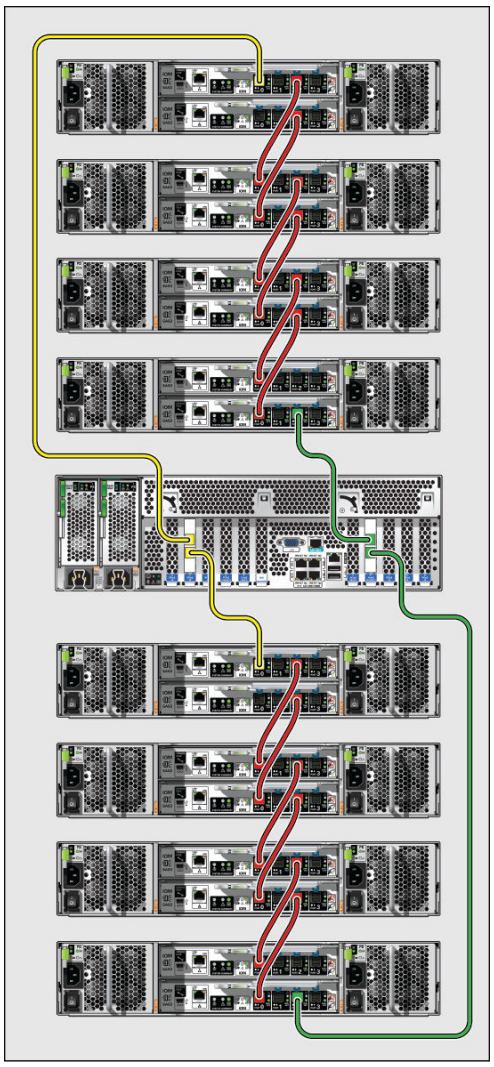
> **Note:**
>
> Do not route more than 12 copper SAS cables through the CMA. In mixed Oracle Storage Drive Enclosure DE3-24 and Oracle Storage Drive Enclosure DE2-24 disk shelf configurations, up to 4 copper SAS cables can be routed through the CMA. All SAS active optical cables (AOCs) must be routed through the CMA.

6. Hold the other end of the cable near the disk shelf port to which it will connect.

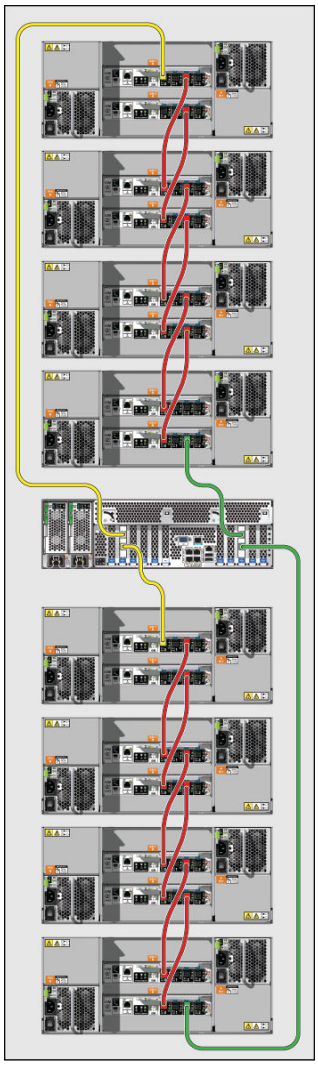
7. Allowing ample slack for servicing components and for placing excessive cable to the side of the controller, create a 12.7-centimeter (5-inch) diameter coil with any excess cable. Secure the coil with a cable tie. If there is not excessive cable, use a cable tie to secure the cable to the side of the rack, still allowing ample slack for servicing components.
8. Verify clearance for component removal, and then connect the other end of the cable into the appropriate port in the appropriate disk shelf.

   Ensure the cable is connected to the correct disk shelf port. Some I/O Modules are oriented upside down in some disk shelf models, which affects the port order.

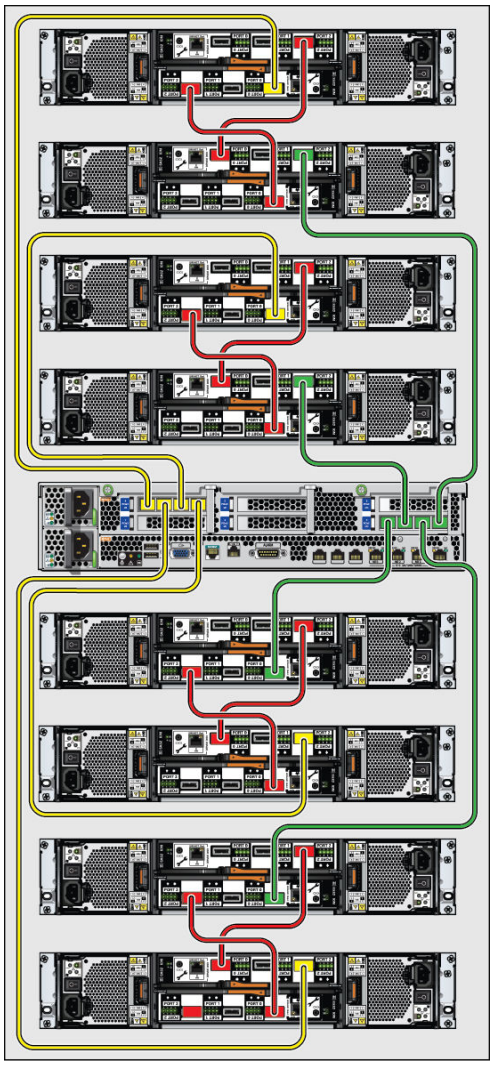
Cabling Controllers to Disk Shelves in a Base Cabinet (Oracle ZFS Storage ZS5-4 to Oracle Storage Drive Enclosure DE3-24P shown)



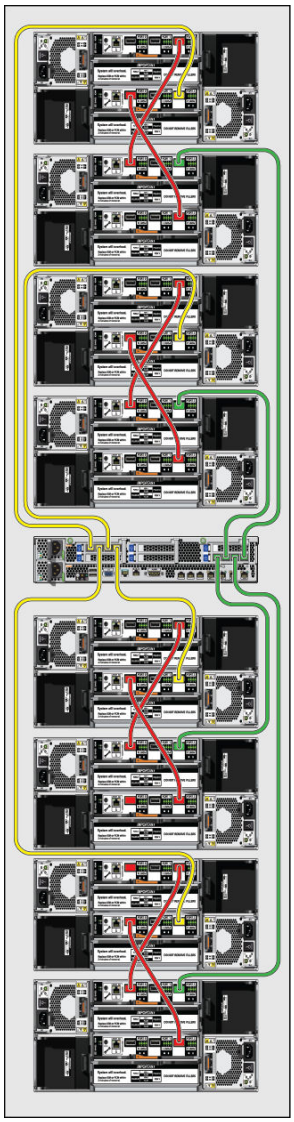
Cabling Controllers to Disk Shelves in a Base Cabinet (Oracle ZFS Storage ZS5-4 to Oracle Storage Drive Enclosure DE3-24C shown)



Cabling Controllers to Disk Shelves in a Base Cabinet (Oracle ZFS Storage ZS3-2 to Oracle Storage Drive Enclosure DE2-24P shown)



Cabling Controllers to Disk Shelves in a Base Cabinet (Oracle ZFS Storage ZS3-2 to Oracle Storage Drive Enclosure DE2-24C shown)



9. If there is a cable coil, slide the coil between the vertical rack rail and the rack side panel, ensuring that the cable tie is facing the rear of the rack. Using the cable tie, secure the coil to the rack rail.
10. Repeat steps 2 through 9 to connect the second cable for the disk chain.
11. Trim the cable tie excess.
12. Repeat this procedure for any remaining disk shelf chains.

    Keep approximately 20.32 centimeters (8 inches) between cable tie-offs on a side.

Cabling Controllers in a Base Cabinet to Disk Shelves in an Expansion Cabinet

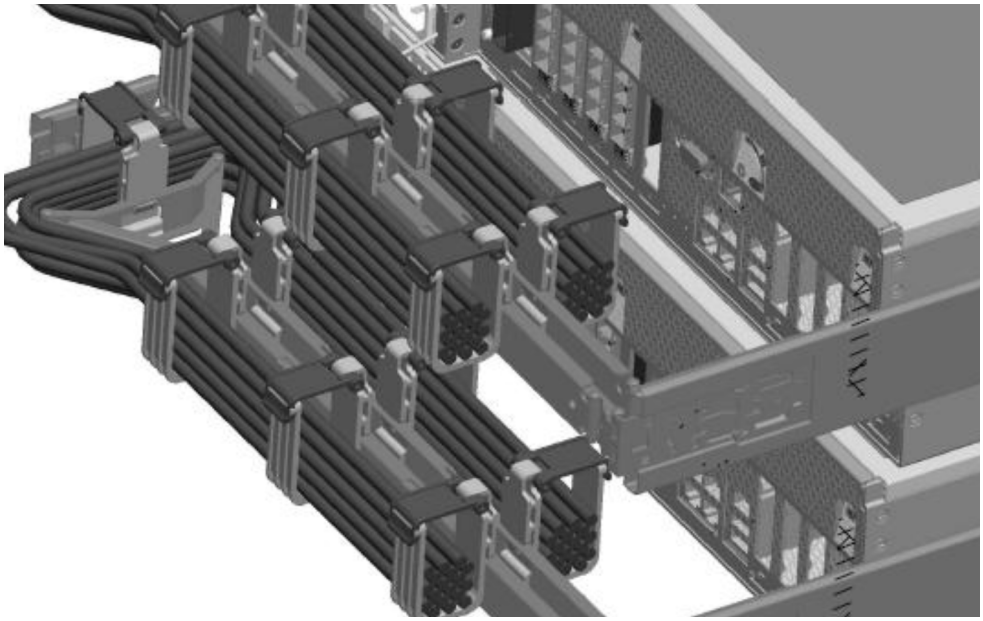
Use the following procedure to connect controllers in a base cabinet to disk shelves in an expansion cabinet with a 6-meter cable.

1. Locate the appropriate cabling diagram for your system in Getting Started with Cabling.

2. In the base cabinet, connect one end of the cable into the appropriate HBA port in the appropriate controller.

   Ensure the cable is connected to the correct HBA port. Controller models can differ in regard to vertically oriented or horizontally oriented HBAs, which affects the port order.

3. If the controller has a cable management arm (CMA), route the cable through the CMA, ensuring that there is ample slack for servicing the controller as shown in the following illustration with clustered controllers. If not using a CMA, secure the cable to the rack rail with a cable tie, allowing ample slack for servicing the controller, and so the cable is not bent near its connector.



> **Note:**
>
> Do not route more than 12 copper SAS cables through the CMA. In mixed Oracle Storage Drive Enclosure DE3-24 and Oracle Storage Drive Enclosure DE2-24 disk shelf configurations, up to 4 copper SAS cables can be routed through the CMA. All SAS active optical cables (AOCs) must be routed through the CMA.

4. Route the remaining cable so it exits either the top or bottom of the base cabinet and into the corresponding top or bottom entrance of the expansion cabinet.

   a. Determine the rack exit port (top or bottom). Use a cable tie to attach the cable to the rack hole closest to the rack exit.

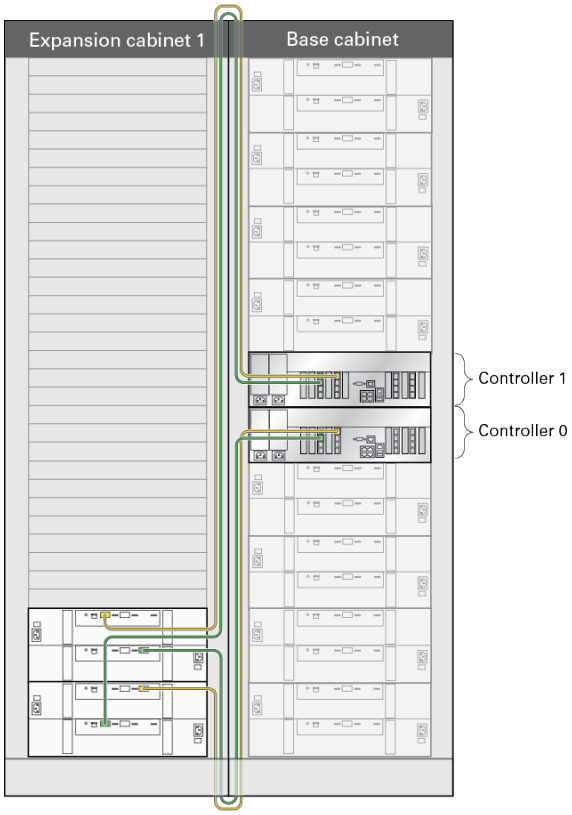
   b. Route the cable into the expansion rack through the appropriate rack cut out. Using a cabling tie, attach the cable to the closest rack hole.

5. Routing the cable vertically along the rack rail, use another cable tie to secure the cable close to the disk shelf to which it will be attached.

6. Verify clearance for power supply removal, and then connect the other end of the cable, now in the expansion cabinet, to the appropriate port in the appropriate disk shelf.

   Ensure the cable is connected to the correct disk shelf port. Some I/O Modules are oriented upside down in some disk shelf models, which affects the port order.

   Cabling Controllers in a Base Cabinet to Disk Shelves in an Expansion Cabinet (Oracle ZFS Storage ZS4-4 to Oracle Storage Drive Enclosure DE2-24C shown)



> **Note:**
>
> The illustration above only shows the 6-meter cables connecting from the base cabinet to the expansion cabinet. To cable the rest of the disk shelves, locate the appropriate cabling diagram in the Getting Started with Cabling.

7. If there is excessive cable, secure it to the rack rail.
   a. Create a 12.7-centimeter (5-inch) diameter coil with the excess, allowing ample slack for servicing components and for placing the coil to the side of the disk shelf.
   b. Secure the coil with a cable tie.
   c. Slide the coil between the vertical rack rail and the rack side panel, ensuring that the cable tie is facing the rear of the rack.
   d. Using the cable tie, secure the coil to the rack rail.
8. Trim the cable tie excess.
9. Repeat steps 2 through 8 to connect the second cable for the disk chain.

10. Repeat this process for any remaining disk shelf chains.

    Keep approximately 20.32 centimeters (8 inches) between cable tie-offs on a side.

11. Repeat the entire procedure for any additional expansion cabinets.

Changing the Cabling for Oracle ILOM

After configuring the system and performing initial configuration, retain a connection to Oracle Integrated Lights Out Manager (ILOM), located in the controller service processor (SP), for troubleshooting problems that do not otherwise appear in the appliance software.

The following procedure describes how to remove the serial SP connection used for initial configuration and make a network SP connection, which allows for better collection of platform data. Do not remove the serial SP connection if you need it for CLI access.

> **Caution:**
>
> Failure to configure Oracle ILOM connectivity after initial setup may lead to longer than necessary hardware fault diagnosis and resolution times.

1. Remove the serial cable attached to the SER MGT port on the rear panel of the controller and to the administrative client.
2. Attach an Ethernet cable from the NET MGT port on the rear panel of the controller to your Ethernet switch.

   If clustered controllers, repeat for the second controller.

Related Topics

- Identifying the Oracle ILOM Firmware Version (BUI) in *Oracle ZFS Storage Appliance Customer Service Manual, Release OS8.8.x*
- Identifying the Oracle ILOM Firmware Version (CLI) in *Oracle ZFS Storage Appliance Customer Service Manual, Release OS8.8.x*
- Logging in to Oracle ILOM Using a Local Serial Connection in *Oracle ZFS Storage Appliance Customer Service Manual, Release OS8.8.x*
- Logging in to Oracle ILOM Remotely Using a Web Interface in *Oracle ZFS Storage Appliance Customer Service Manual, Release OS8.8.x*
- Logging in to Oracle ILOM Remotely Using a Command Line Interface in *Oracle ZFS Storage Appliance Customer Service Manual, Release OS8.8.x*
- Viewing and Clearing CPU Faults from Oracle ILOM in *Oracle ZFS Storage Appliance Customer Service Manual, Release OS8.8.x*

2

Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to 4X4 Port SAS-3 HBAs

This section contains guidelines for properly cabling standalone and clustered controllers to 4X4 port SAS-3 HBAs.

To review these guidelines, see the following topics:

- Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS9-2 Controllers
- Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS7-2 Controllers
- Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS5-4 Controllers
- Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS5-2 Controllers
- Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS4-4 Controllers
- Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS3-2 Controllers

Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS9-2 Controllers

This section contains guidelines for properly cabling Oracle ZFS Storage ZS9-2 controllers to Oracle Storage Drive Enclosure DE3-24 disk shelves.

- Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS9-2 High-end (HE) Controllers
- Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS9-2 Mid-range (MR) Controllers

Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS9-2 High-end (HE) Controllers

This section contains guidelines for properly cabling standalone and clustered Oracle ZFS Storage ZS9-2 HE controllers to Oracle Storage Drive Enclosure DE3-24 disk shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

- Oracle ZFS Storage ZS9-2 HE Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (4 HBAs)

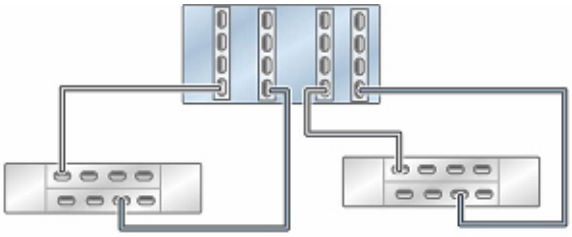
- Oracle ZFS Storage ZS9-2 HE Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (4 HBAs)

Oracle ZFS Storage ZS9-2 HE Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (4 HBAs)

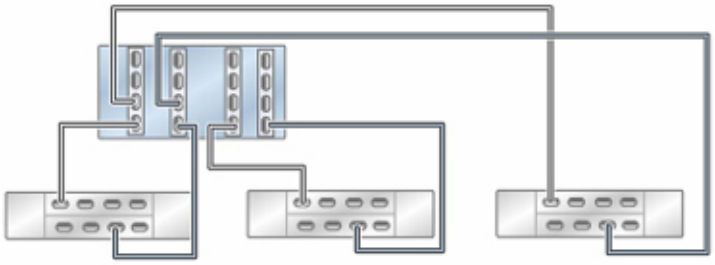
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS9-2 HE standalone controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

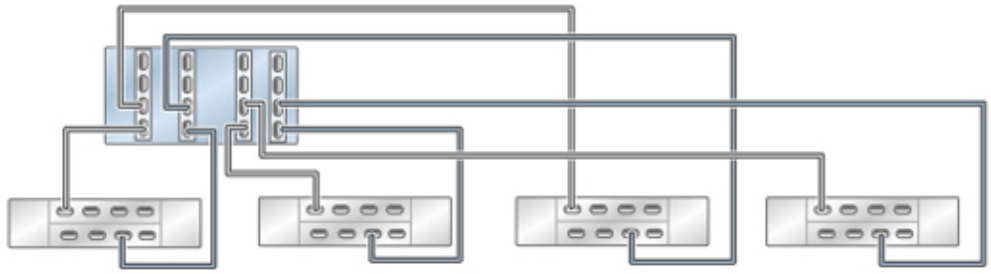
Standalone Oracle ZFS Storage ZS9-2 HE controller with four HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



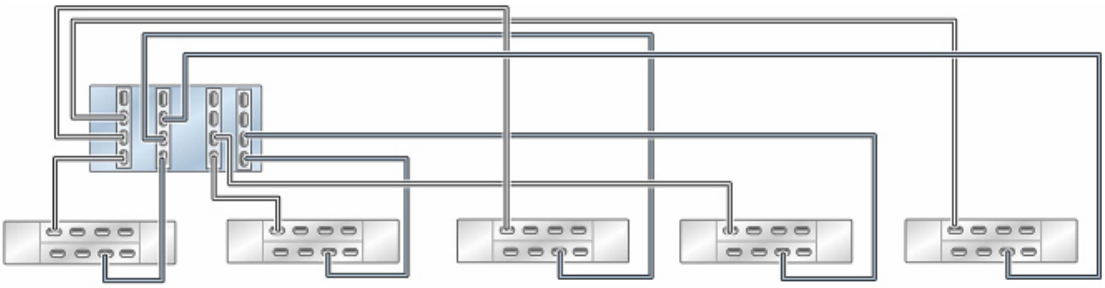
Standalone Oracle ZFS Storage ZS9-2 HE controller with four HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



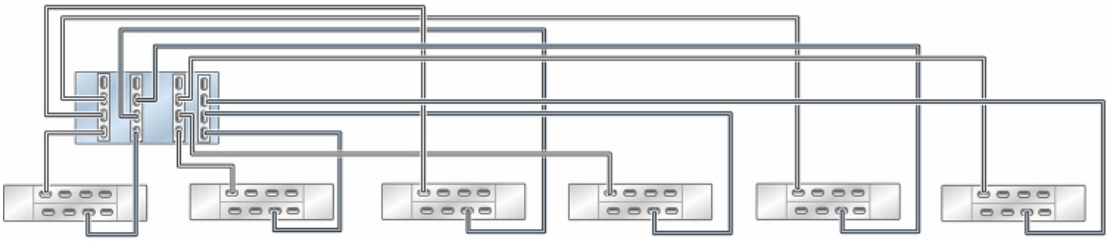
Standalone Oracle ZFS Storage ZS9-2 HE controller with four HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



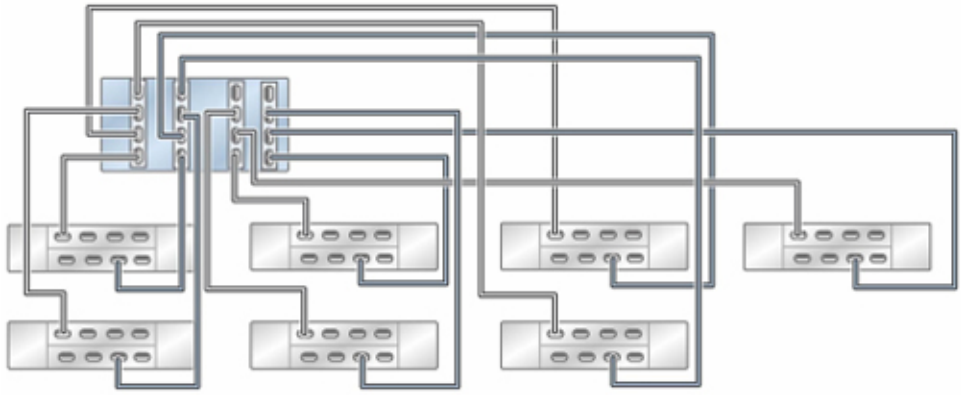
Standalone Oracle ZFS Storage ZS9-2 HE controller with four HBAs connected to five Oracle Storage Drive Enclosure DE3-24 disk shelves in five chains



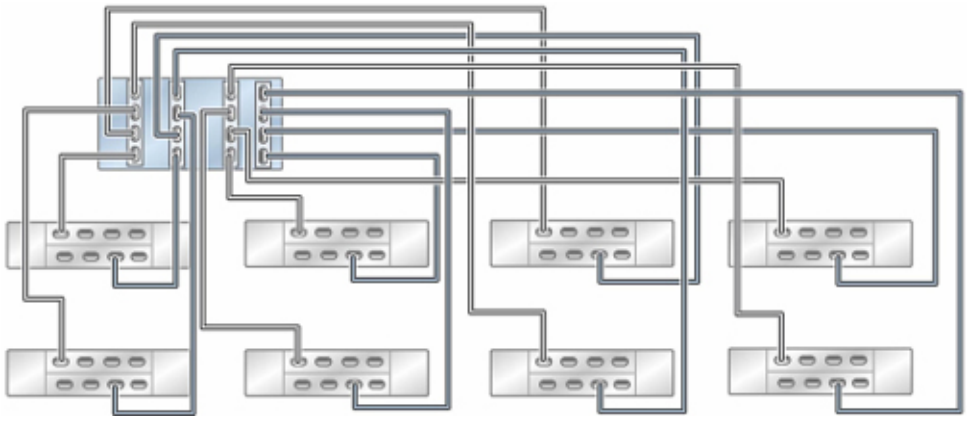
Standalone Oracle ZFS Storage ZS9-2 HE controller with four HBAs connected to six Oracle Storage Drive Enclosure DE3-24 disk shelves in six chains



Standalone Oracle ZFS Storage ZS9-2 HE controller with four HBAs connected to seven Oracle Storage Drive Enclosure DE3-24 disk shelves in seven chains



Standalone Oracle ZFS Storage ZS9-2 HE controller with four HBAs connected to eight Oracle Storage Drive Enclosure DE3-24 disk shelves in eight chains



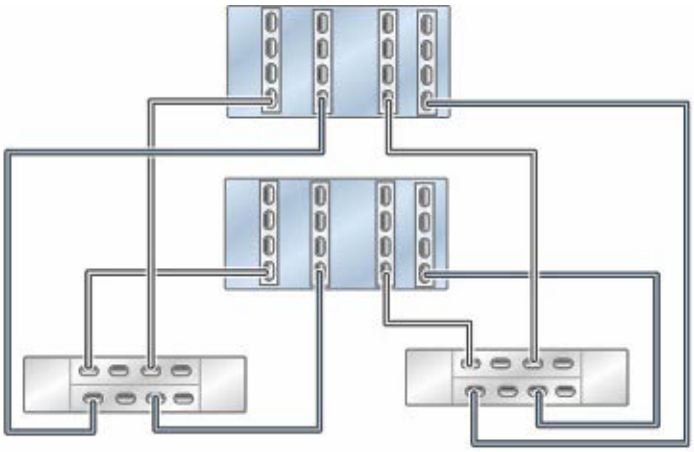
Multiple disk shelves in a single chain

Oracle ZFS Storage ZS9-2 HE Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (4 HBAs)

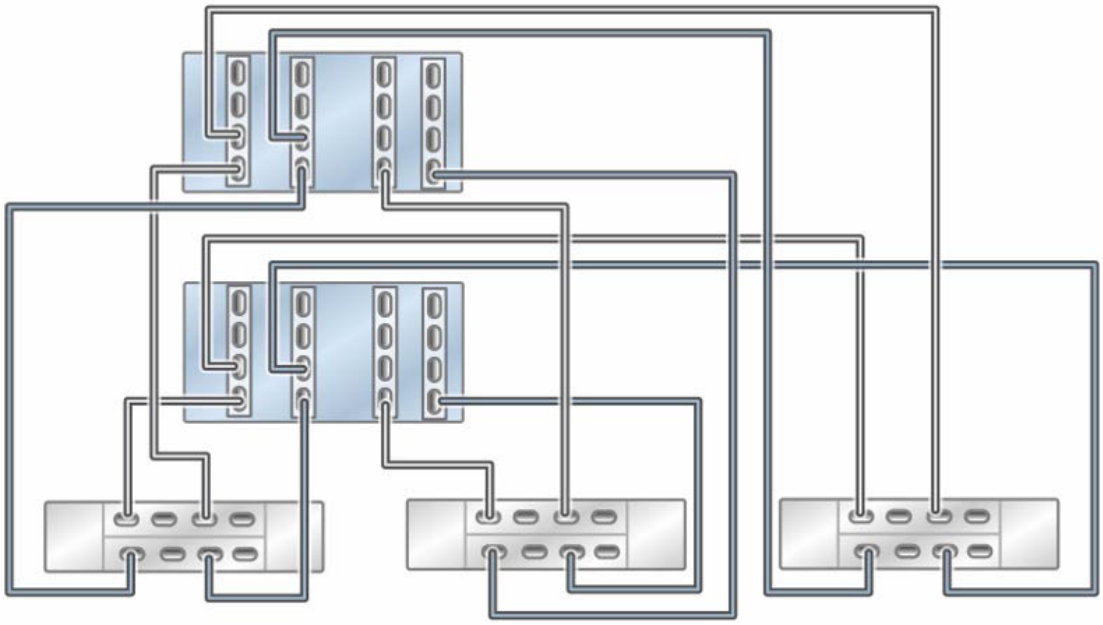
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS9-2 HE clustered controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

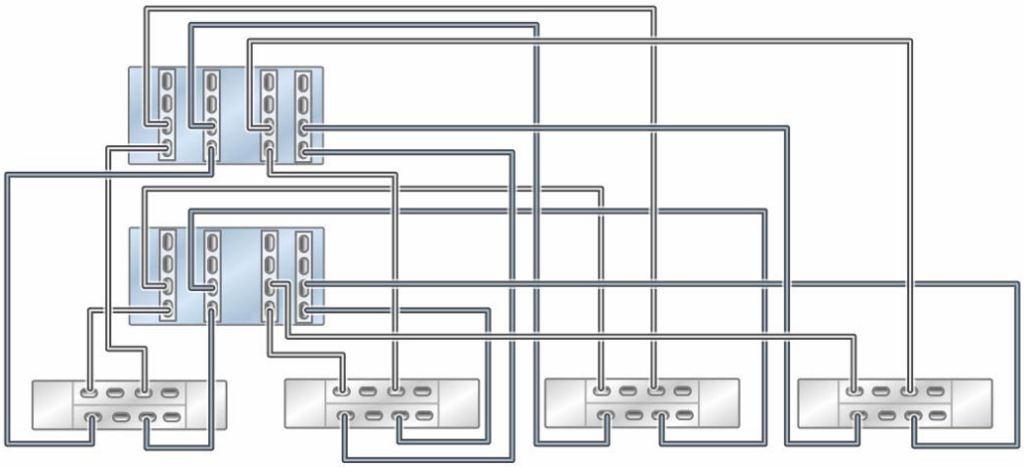
Clustered Oracle ZFS Storage ZS9-2 HE controllers with four HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



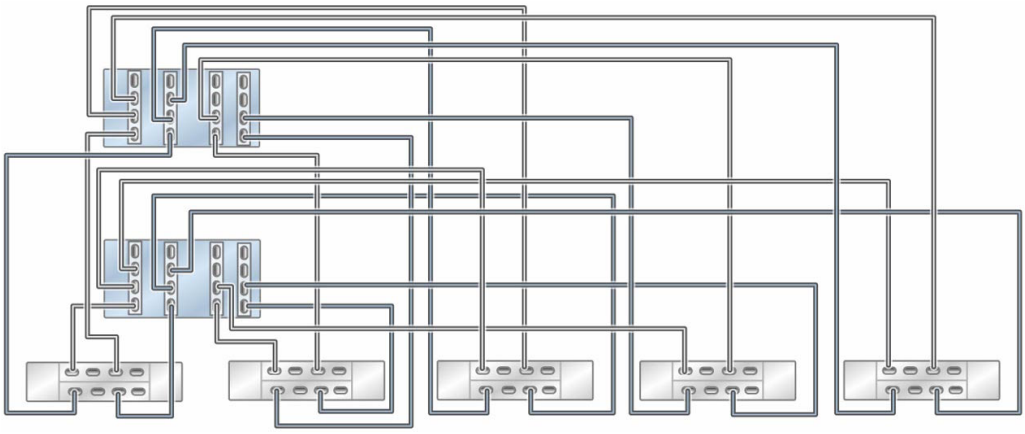
Clustered Oracle ZFS Storage ZS9-2 HE controllers with four HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



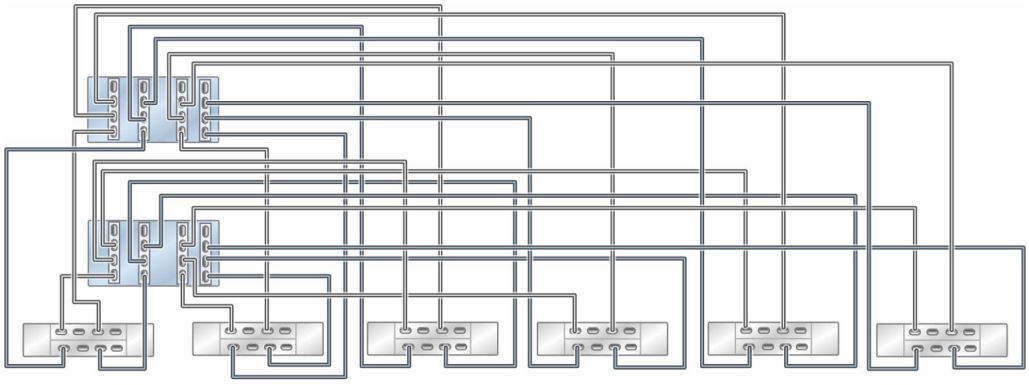
Clustered Oracle ZFS Storage ZS9-2 HE controllers with four HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



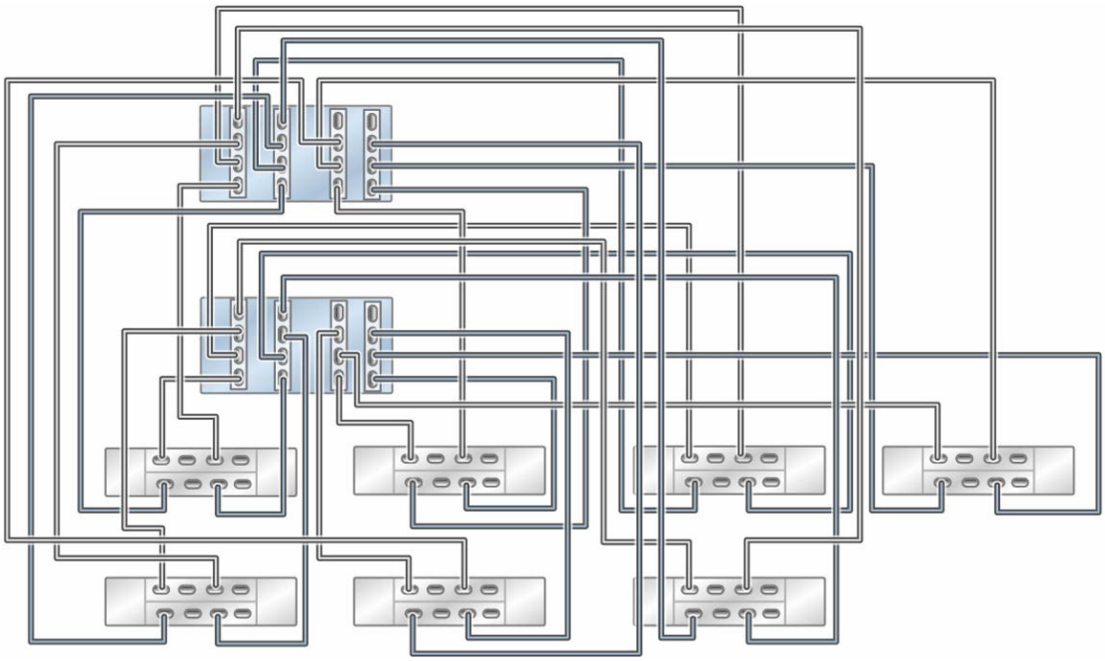
Clustered Oracle ZFS Storage ZS9-2 HE controllers with four HBAs connected to five Oracle Storage Drive Enclosure DE3-24 disk shelves in five chains



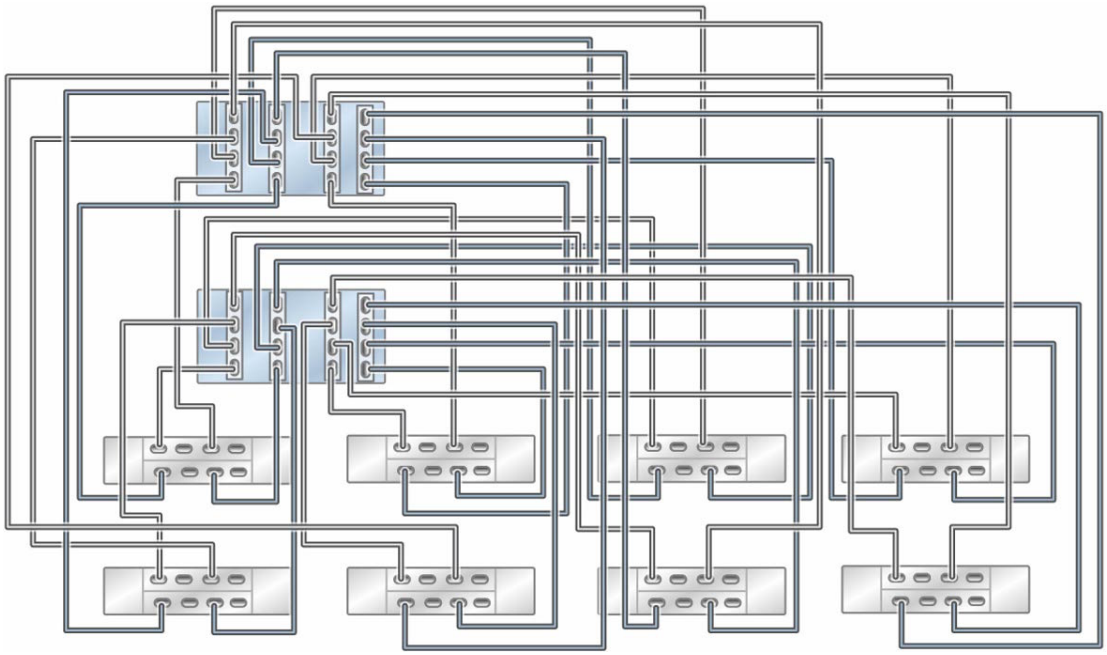
Clustered Oracle ZFS Storage ZS9-2 HE controllers with four HBAs connected to six Oracle Storage Drive Enclosure DE3-24 disk shelves in six chains



Clustered Oracle ZFS Storage ZS9-2 HE controllers with four HBAs connected to seven Oracle Storage Drive Enclosure DE3-24 disk shelves in seven chains



Clustered Oracle ZFS Storage ZS9-2 HE controllers with four HBAs connected to eight Oracle Storage Drive Enclosure DE3-24 disk shelves in eight chains



Multiple disk shelves in a single chain

Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS9-2 Mid-range (MR) Controllers

This section contains guidelines for properly cabling standalone and clustered Oracle ZFS Storage ZS9-2 MR controllers to Oracle Storage Drive Enclosure DE3-24 disk shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

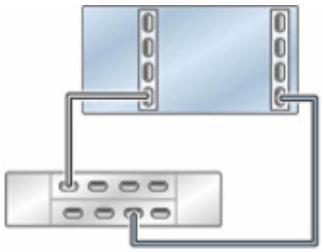
- Oracle ZFS Storage ZS9-2 MR Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)
- Oracle ZFS Storage ZS9-2 MR Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)

Oracle ZFS Storage ZS9-2 MR Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)

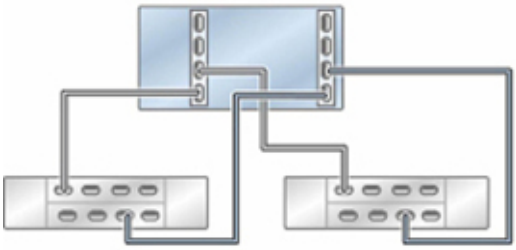
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS9-2 MR standalone controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

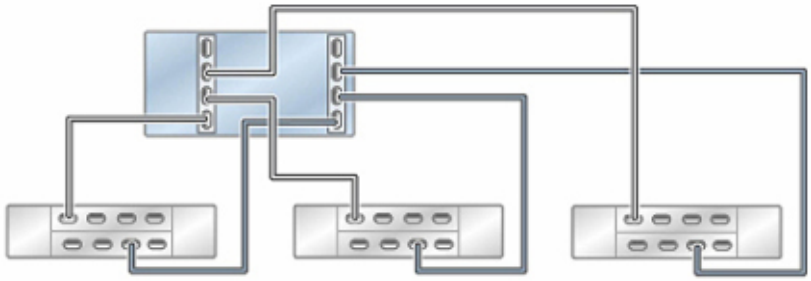
Standalone Oracle ZFS Storage ZS9-2 MR controller with two HBAs connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



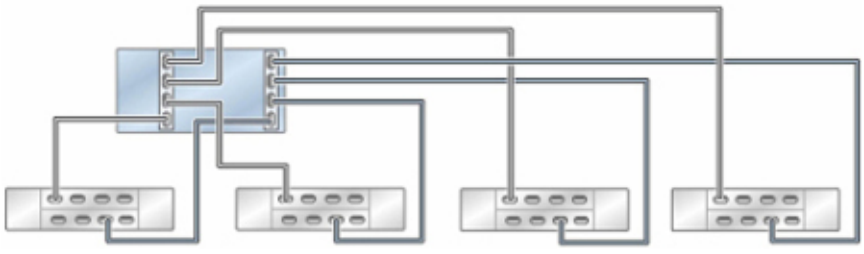
Standalone Oracle ZFS Storage ZS9-2 MR controller with two HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



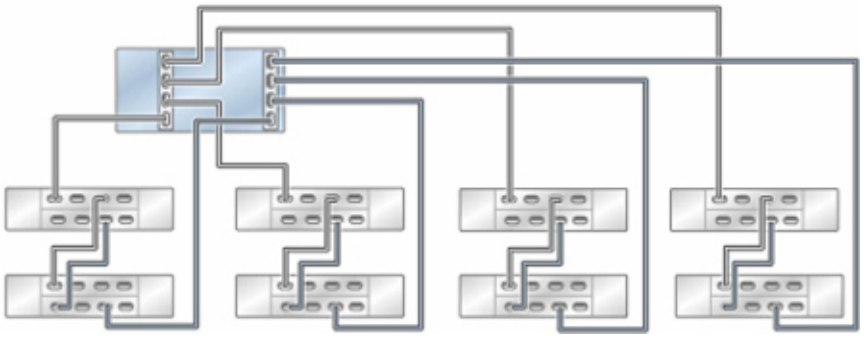
Standalone Oracle ZFS Storage ZS9-2 MR controller with two HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



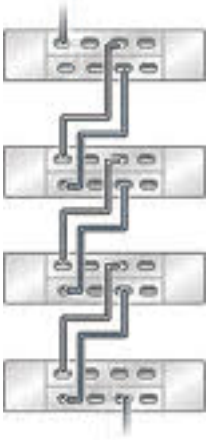
Standalone Oracle ZFS Storage ZS9-2 MR controller with two HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Standalone Oracle ZFS Storage ZS9-2 MR controller with two HBAs connected to eight Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Multiple disk shelves in a single chain

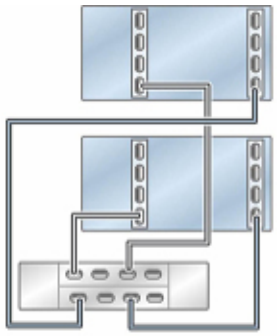


Oracle ZFS Storage ZS9-2 MR Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)

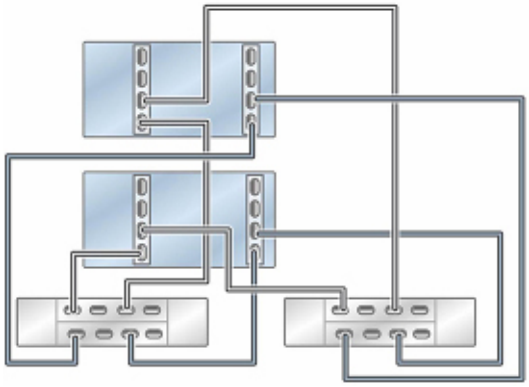
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS9-2 MR clustered controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

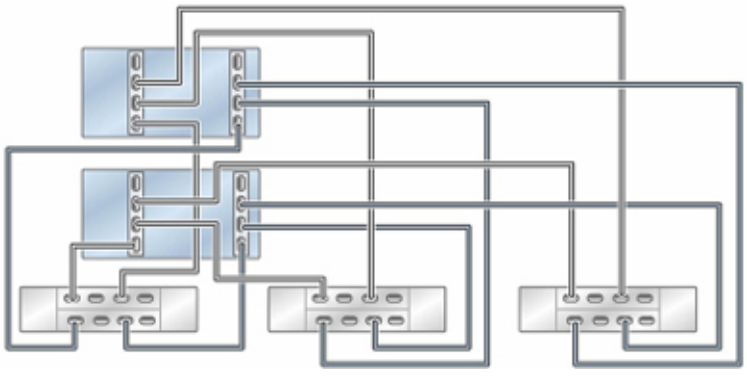
Clustered Oracle ZFS Storage ZS9-2 MR controllers with two HBAs connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



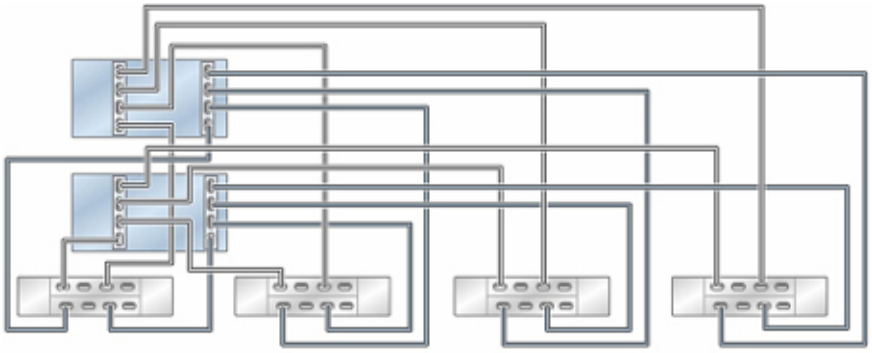
Clustered Oracle ZFS Storage ZS9-2 MR controllers with two HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



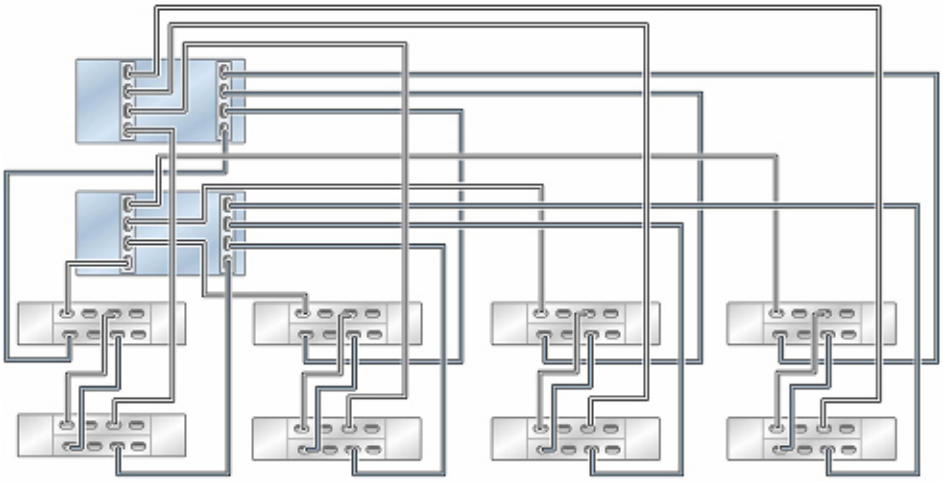
Clustered Oracle ZFS Storage ZS9-2 MR controllers with two HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



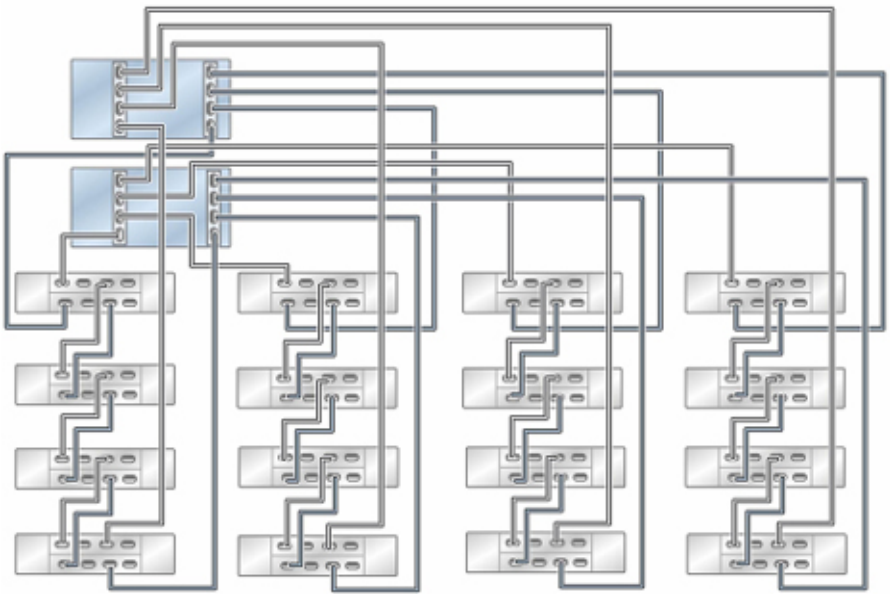
Clustered Oracle ZFS Storage ZS9-2 MR controllers with two HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Clustered Oracle ZFS Storage ZS9-2 MR controllers with two HBAs connected to eight Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Clustered Oracle ZFS Storage ZS9-2 MR controllers with two HBAs connected to sixteen Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Multiple disk shelves in a single chain

Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS7-2 Controllers

This section contains guidelines for properly cabling Oracle ZFS Storage ZS7-2 controllers to Oracle Storage Drive Enclosure DE3-24 disk shelves.

- Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS7-2 High-end (HE) Controllers
- Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS7-2 Mid-range (MR) Controllers

Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS7-2 High-end (HE) Controllers

This section contains guidelines for properly cabling standalone and clustered Oracle ZFS Storage ZS7-2 HE controllers to Oracle Storage Drive Enclosure DE3-24 disk shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

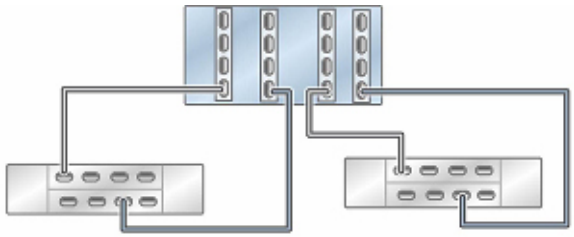
- Oracle ZFS Storage ZS7-2 HE Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (4 HBAs)
- Oracle ZFS Storage ZS7-2 HE Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (4 HBAs)

Oracle ZFS Storage ZS7-2 HE Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (4 HBAs)

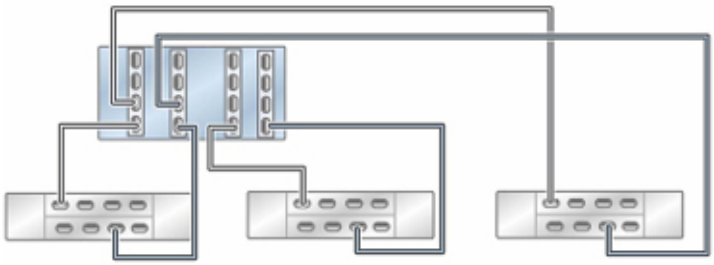
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS7-2 HE standalone controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

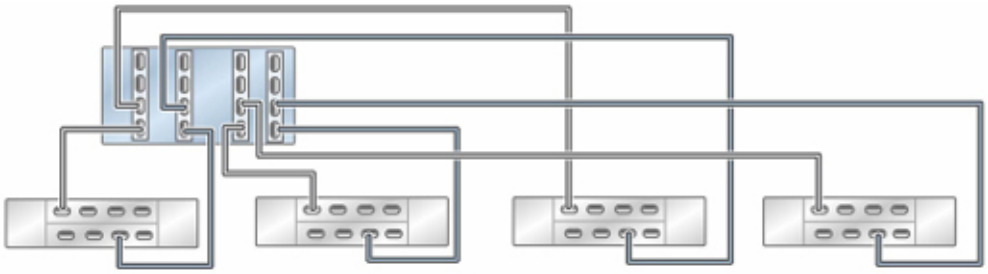
Standalone Oracle ZFS Storage ZS7-2 HE controller with four HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



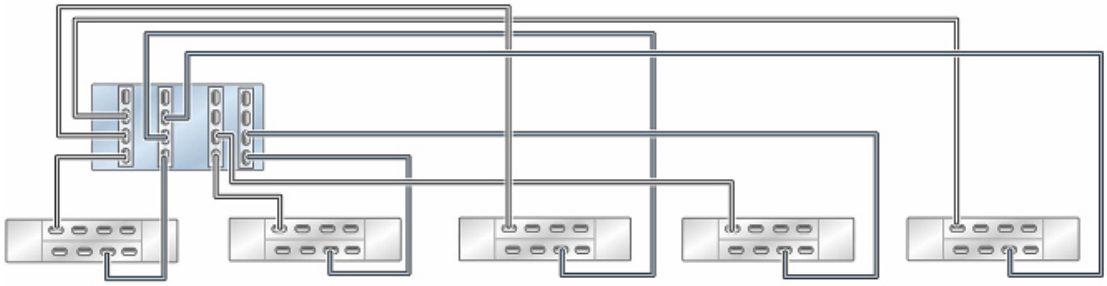
Standalone Oracle ZFS Storage ZS7-2 HE controller with four HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



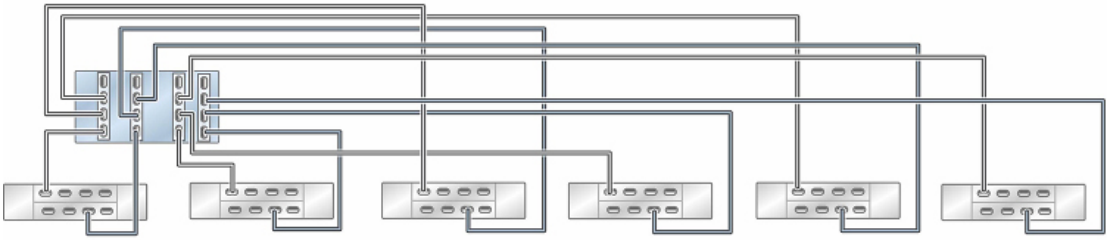
Standalone Oracle ZFS Storage ZS7-2 HE controller with four HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



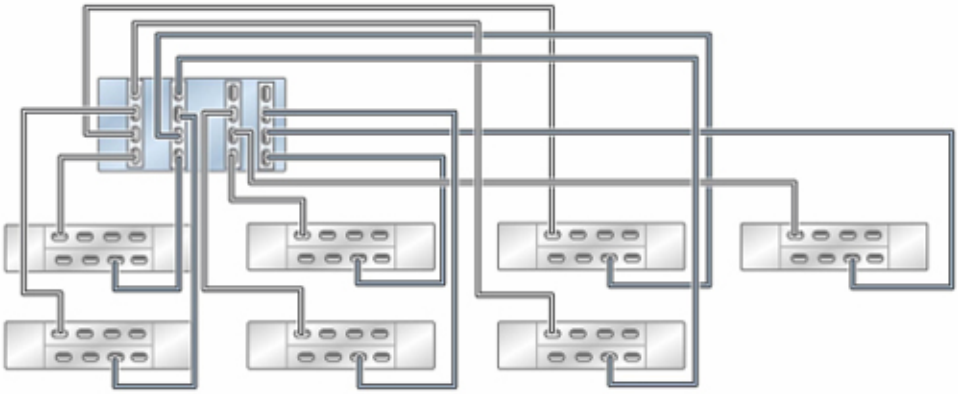
Standalone Oracle ZFS Storage ZS7-2 HE controller with four HBAs connected to five Oracle Storage Drive Enclosure DE3-24 disk shelves in five chains



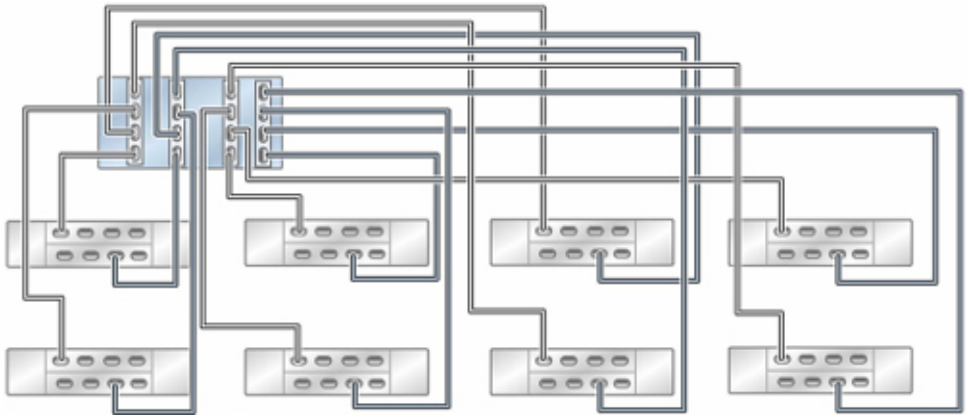
Standalone Oracle ZFS Storage ZS7-2 HE controller with four HBAs connected to six Oracle Storage Drive Enclosure DE3-24 disk shelves in six chains



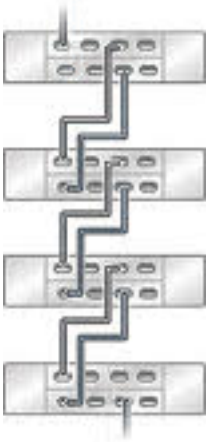
Standalone Oracle ZFS Storage ZS7-2 HE controller with four HBAs connected to seven Oracle Storage Drive Enclosure DE3-24 disk shelves in seven chains



Standalone Oracle ZFS Storage ZS7-2 HE controller with four HBAs connected to eight Oracle Storage Drive Enclosure DE3-24 disk shelves in eight chains



Multiple disk shelves in a single chain

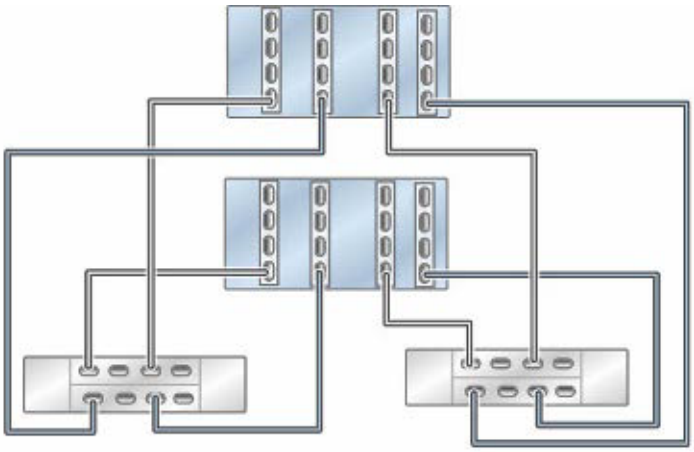


Oracle ZFS Storage ZS7-2 HE Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (4 HBAs)

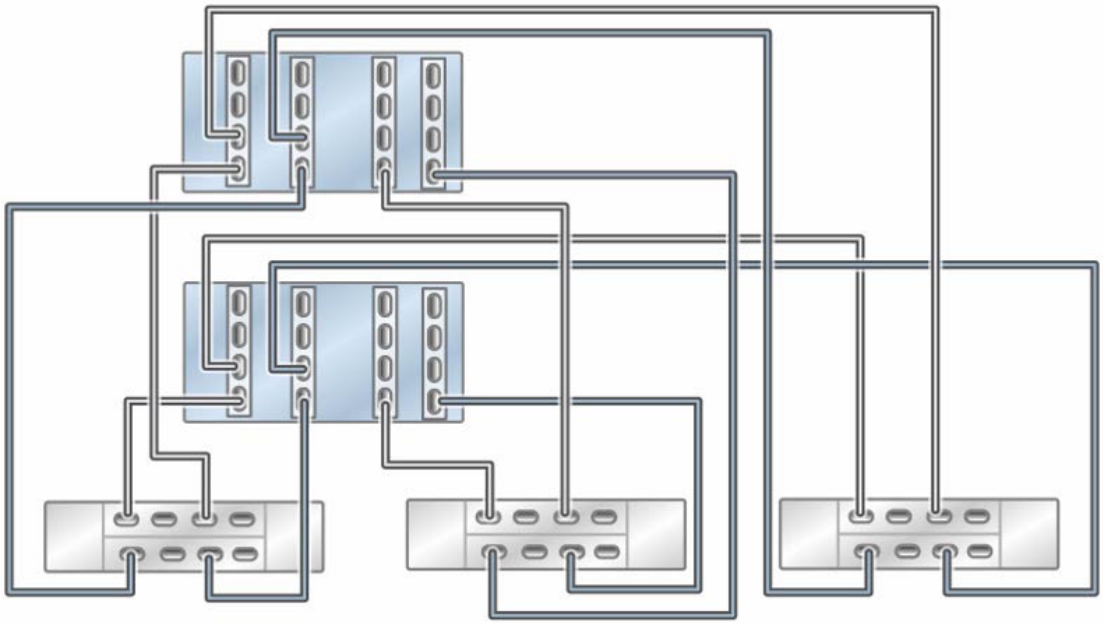
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS7-2 HE clustered controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

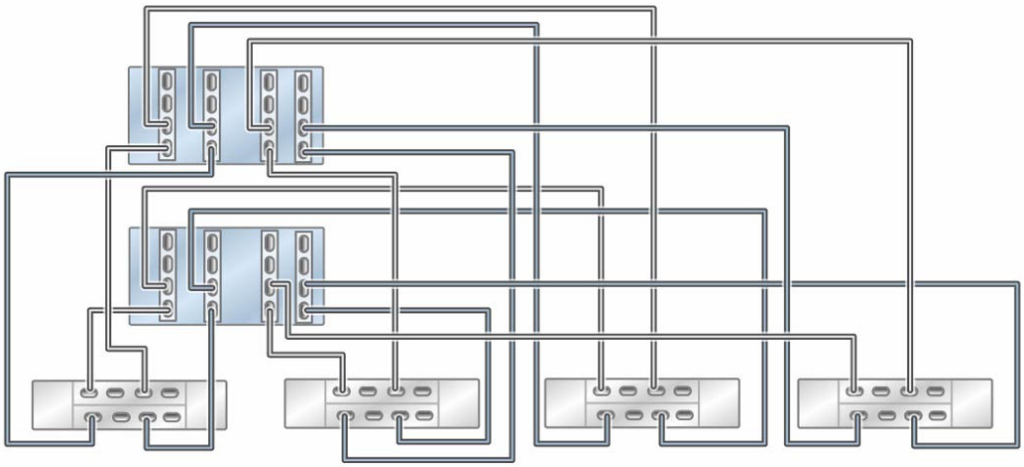
Clustered Oracle ZFS Storage ZS7-2 HE controllers with four HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



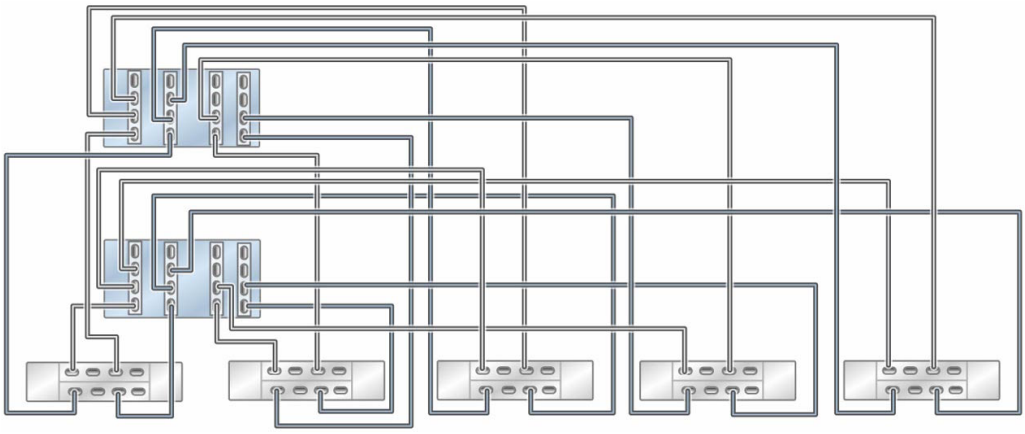
Clustered Oracle ZFS Storage ZS7-2 HE controllers with four HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



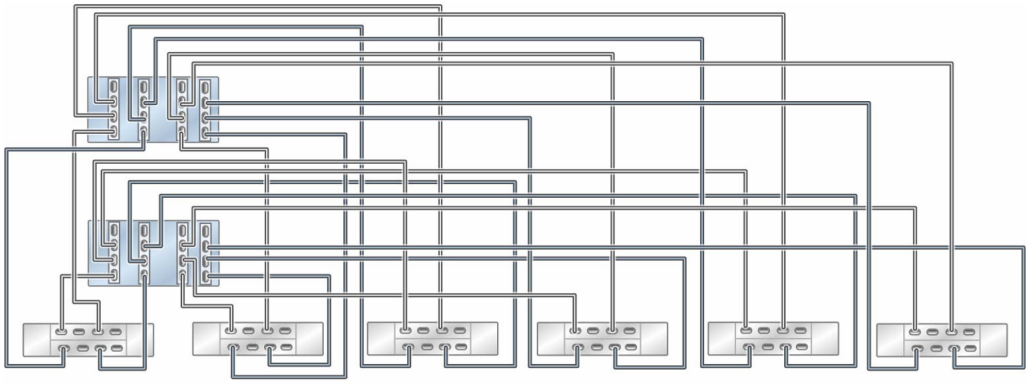
Clustered Oracel ZFS Storage ZS7-2 HE controllers with four HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



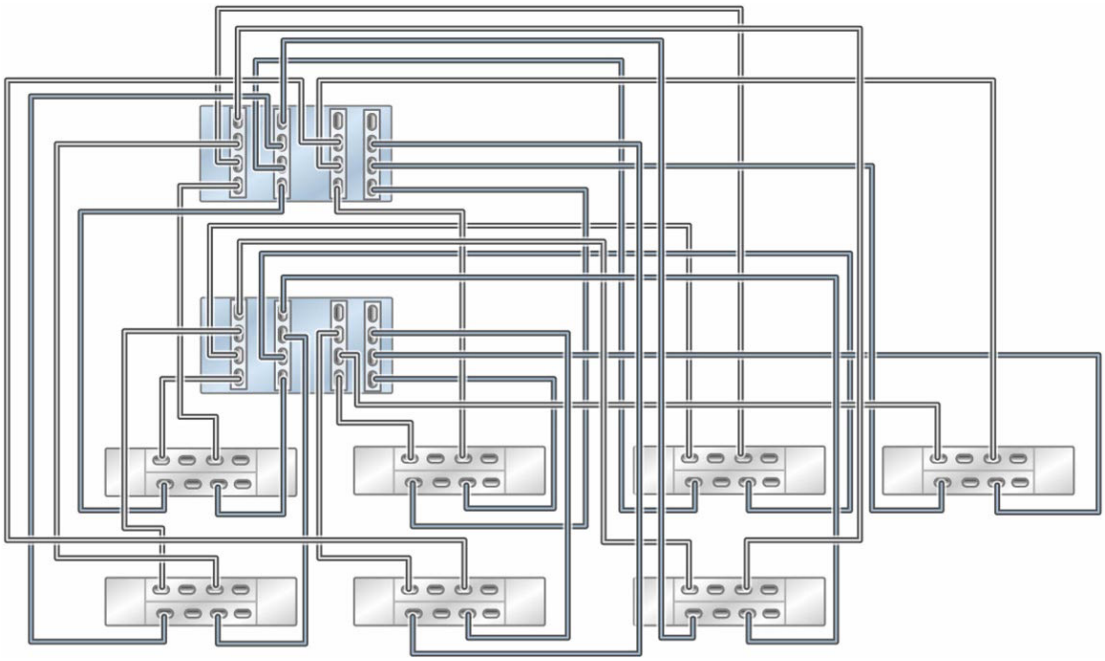
Clustered Oracle ZFS Storage ZS7-2 HE controllers with four HBAs connected to five Oracle Storage Drive Enclosure DE3-24 disk shelves in five chains



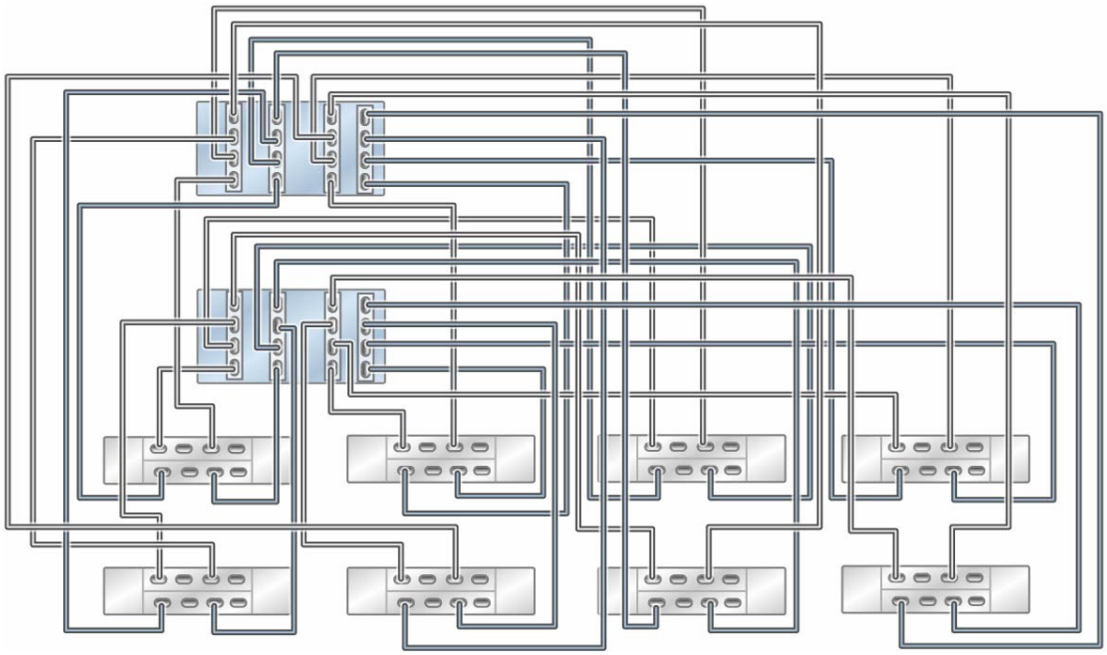
Clustered Oracle ZFS Storage ZS7-2 HE controllers with four HBAs connected to six Oracle Storage Drive Enclosure DE3-24 disk shelves in six chains



Clustered Oracle ZFS Storage ZS7-2 HE controllers with four HBAs connected to seven Oracle Storage Drive Enclosure DE3-24 disk shelves in seven chains



Clustered Oracle ZFS Storage ZS7-2 HE controllers with four HBAs connected to eight Oracle Storage Drive Enclosure DE3-24 disk shelves in eight chains



Multiple disk shelves in a single chain

Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS7-2 Mid-range (MR) Controllers

This section contains guidelines for properly cabling standalone and clustered Oracle ZFS Storage ZS7-2 MR controllers to Oracle Storage Drive Enclosure DE3-24 disk shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

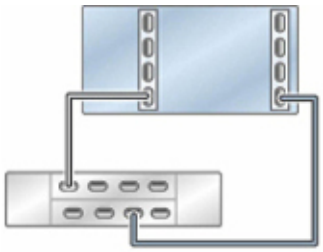
- Oracle ZFS Storage ZS7-2 MR Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)
- Oracle ZFS Storage ZS7-2 MR Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)

Oracle ZFS Storage ZS7-2 MR Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)

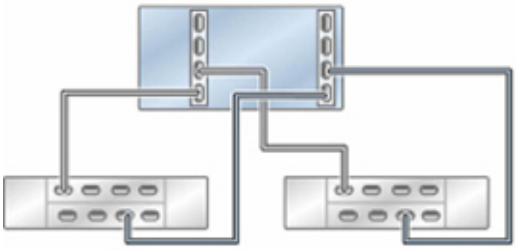
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS7-2 MR standalone controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

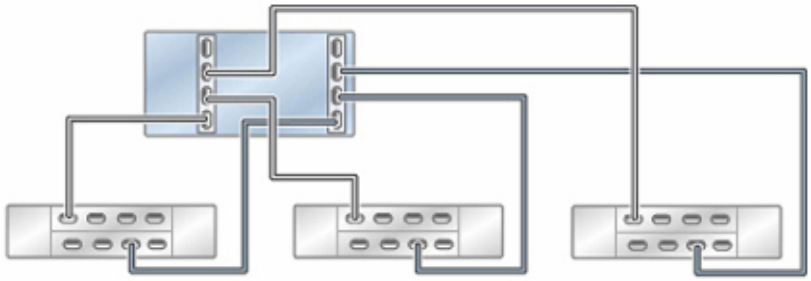
Standalone Oracle ZFS Storage ZS7-2 MR controller with two HBAs connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



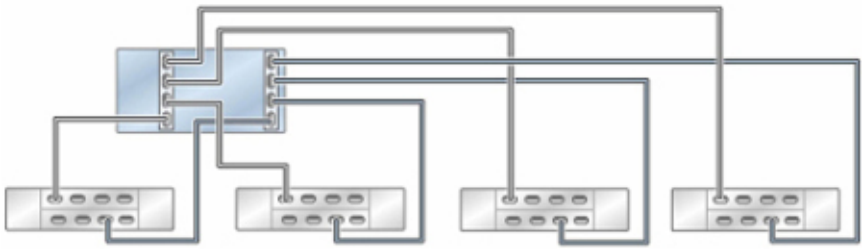
Standalone Oracle ZFS Storage ZS7-2 MR controller with two HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



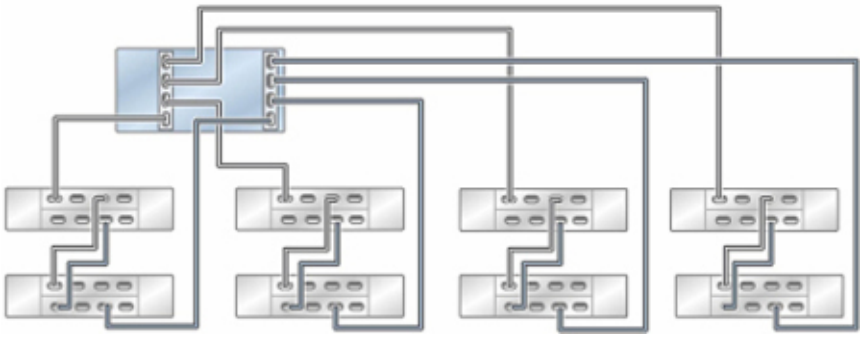
Standalone Oracle ZFS Storage ZS7-2 MR controller with two HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



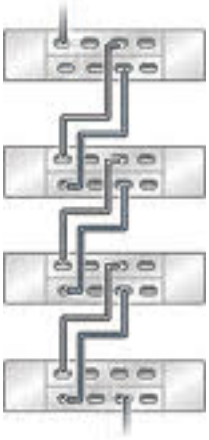
Standalone Oracle ZFS Storage ZS7-2 MR controller with two HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Standalone Oracle ZFS Storage ZS7-2 MR controller with two HBAs connected to eight Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Multiple disk shelves in a single chain

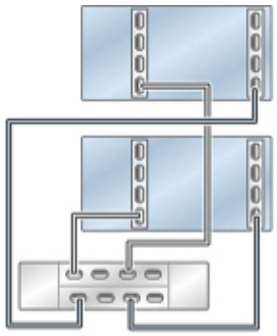


Oracle ZFS Storage ZS7-2 MR Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)

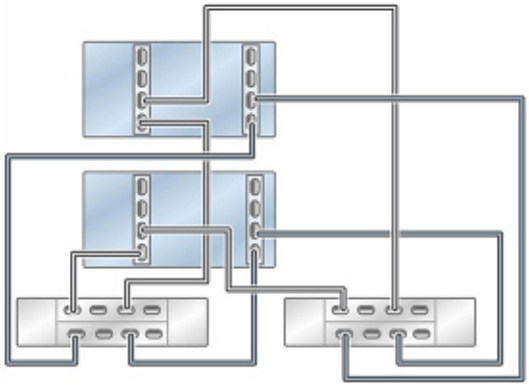
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS7-2 MR clustered controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

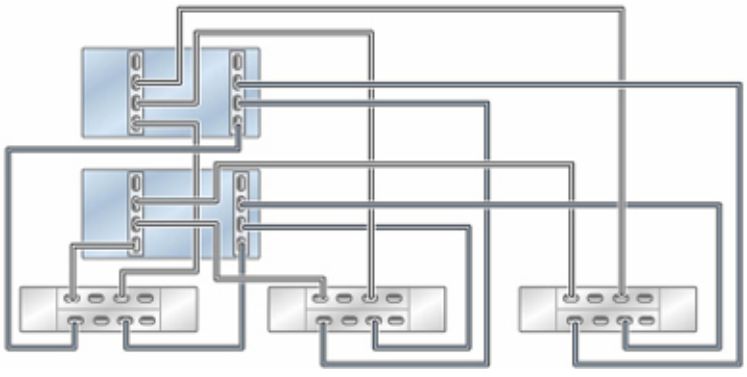
Clustered Oracle ZFS Storage ZS7-2 MR controllers with two HBAs connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



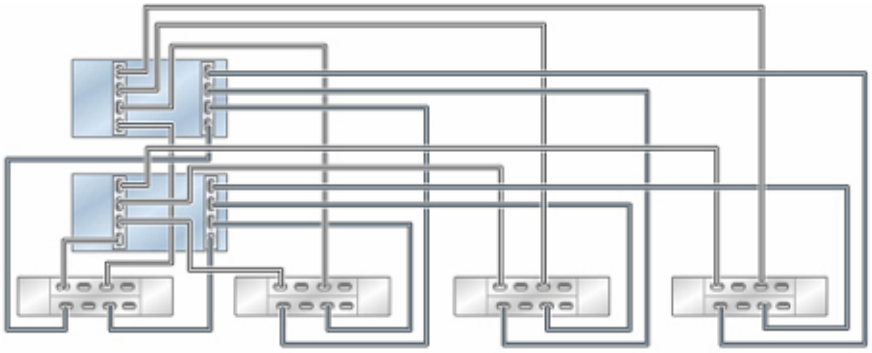
Clustered Oracle ZFS Storage ZS7-2 MR controllers with two HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



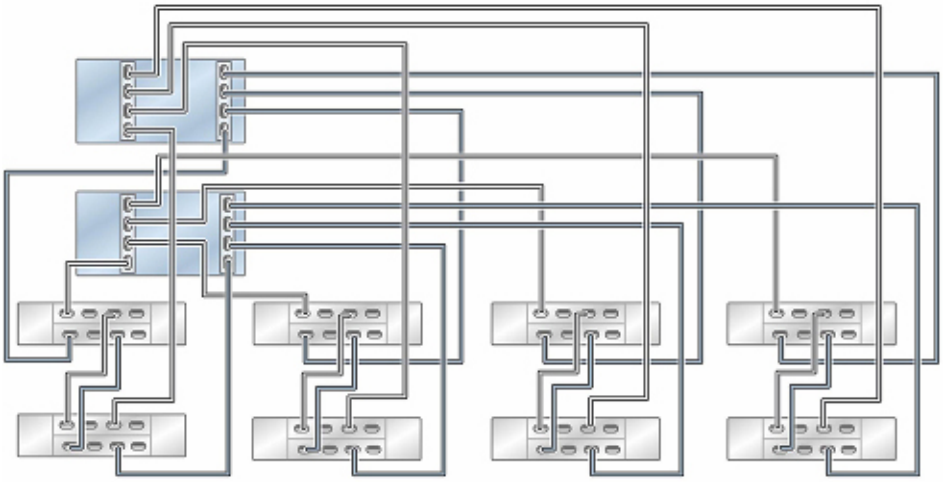
Clustered Oracle ZFS Storage ZS7-2 MR controllers with two HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



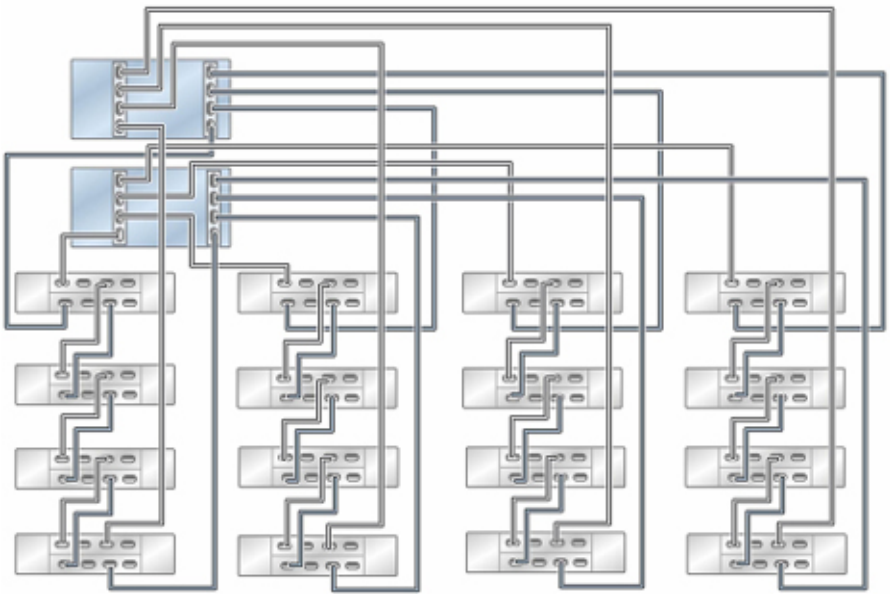
Clustered Oracle ZFS Storage ZS7-2 MR controllers with two HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Clustered Oracle ZFS Storage ZS7-2 MR controllers with two HBAs connected to eight Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Clustered Oracle ZFS Storage ZS7-2 MR controllers with two HBAs connected to sixteen Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Multiple disk shelves in a single chain

Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS5-4 Controllers

This section contains guidelines for properly cabling standalone and clustered Oracle ZFS Storage ZS5-4 controllers to Oracle Storage Drive Enclosure DE3-24 disk shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

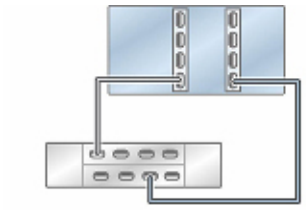
- Oracle ZFS Storage ZS5-4 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)
- Oracle ZFS Storage ZS5-4 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (3 HBAs)
- Oracle ZFS Storage ZS5-4 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (4 HBAs)
- Oracle ZFS Storage ZS5-4 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)
- Oracle ZFS Storage ZS5-4 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (3 HBAs)
- Oracle ZFS Storage ZS5-4 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (4 HBAs)

Oracle ZFS Storage ZS5-4 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)

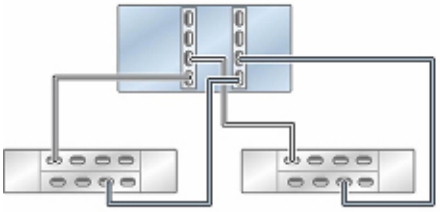
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-4 standalone controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

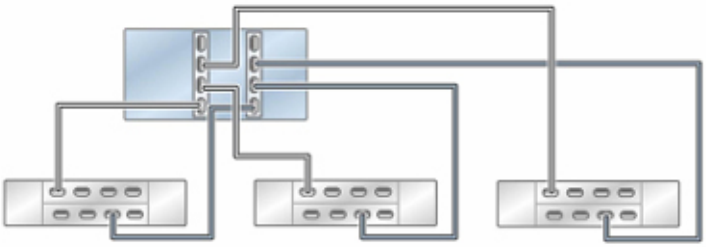
Standalone Oracle ZFS Storage ZS5-4 controller with two HBAs connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



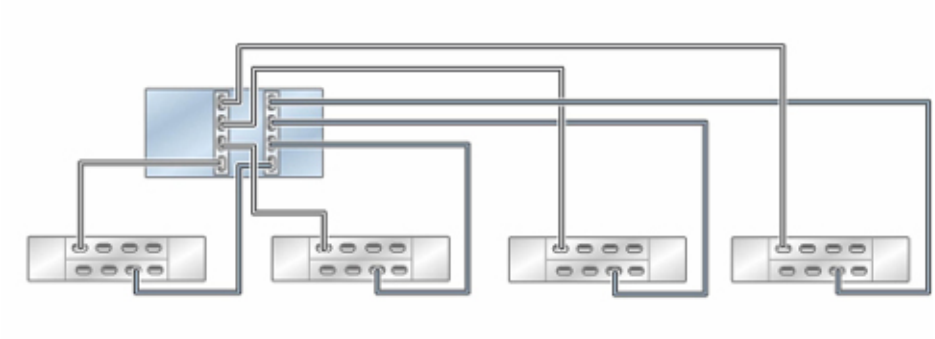
Standalone Oracle ZFS Storage ZS5-4 controller with two HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



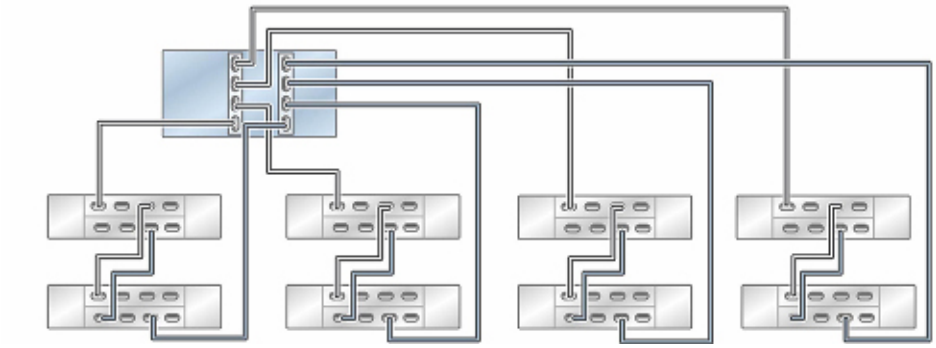
Standalone Oracle ZFS Storage ZS5-4 controller with two HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



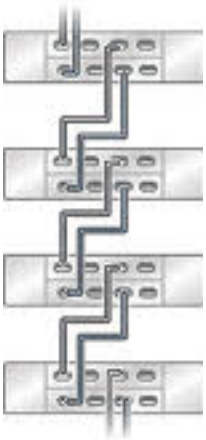
Standalone Oracle ZFS Storage ZS5-4 controller with two HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Standalone Oracle ZFS Storage ZS5-4 controller with two HBAs connected to eight Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Multiple disk shelves in a single chain



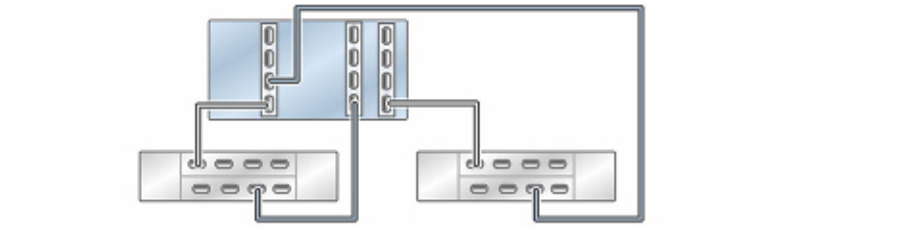
Oracle ZFS Storage ZS5-4 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (3 HBAs)

The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-4 standalone controllers with three HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

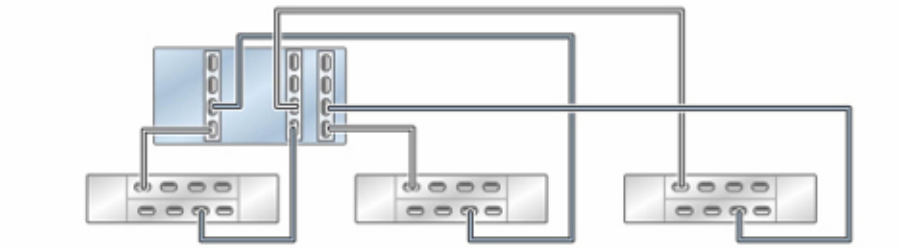
Note:

For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

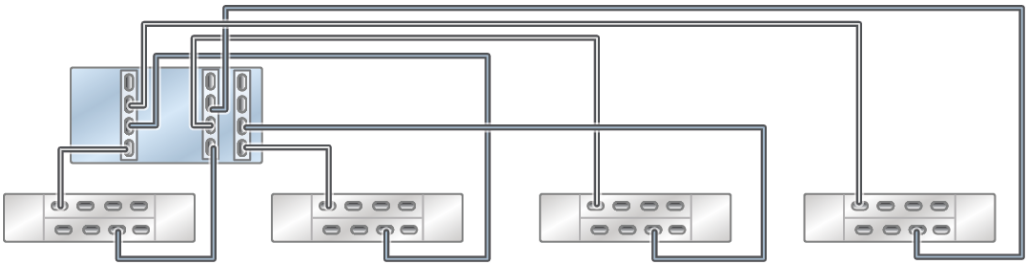
Standalone Oracle ZFS Storage ZS5-4 controller with three HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



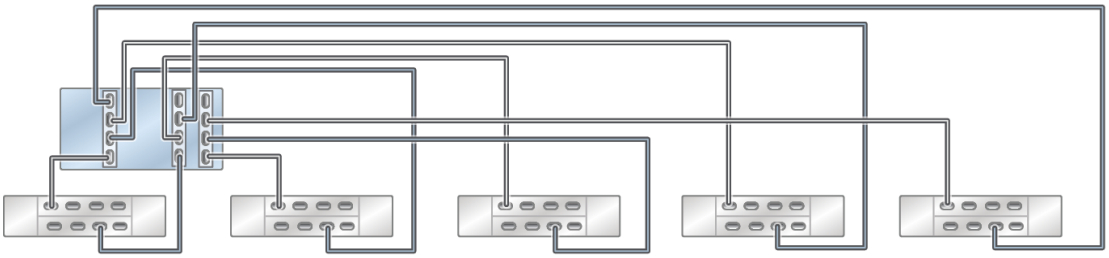
Standalone Oracle ZFS Storage ZS5-4 controller with three HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



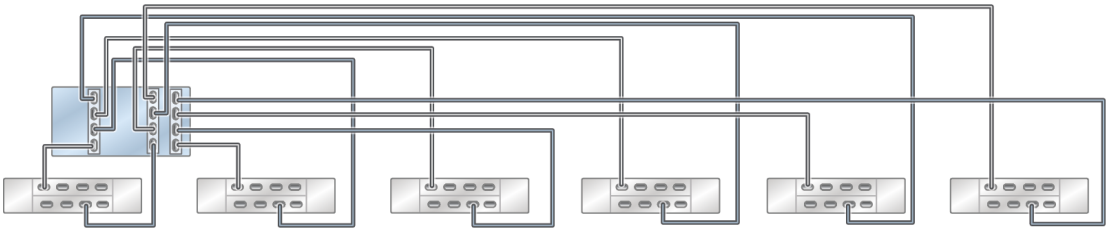
Standalone Oracle ZFS Storage ZS5-4 controller with three HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



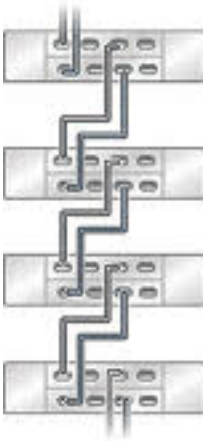
Standalone Oracle ZFS Storage ZS5-4 controller with three HBAs connected to five Oracle Storage Drive Enclosure DE3-24 disk shelves in five chains



Standalone Oracle ZFS Storage ZS5-4 controller with three HBAs connected to six Oracle Storage Drive Enclosure DE3-24 disk shelves in six chains



Multiple disk shelves in a single chain

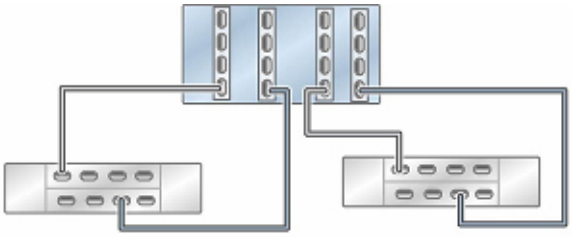


Oracle ZFS Storage ZS5-4 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (4 HBAs)

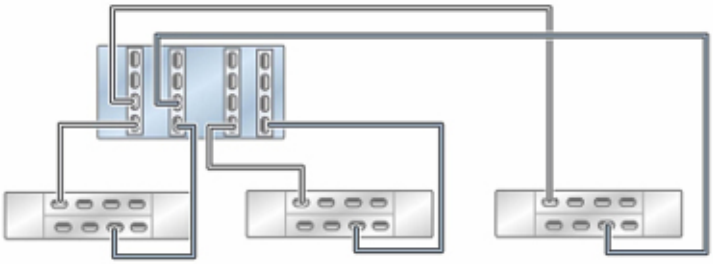
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-4 standalone controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

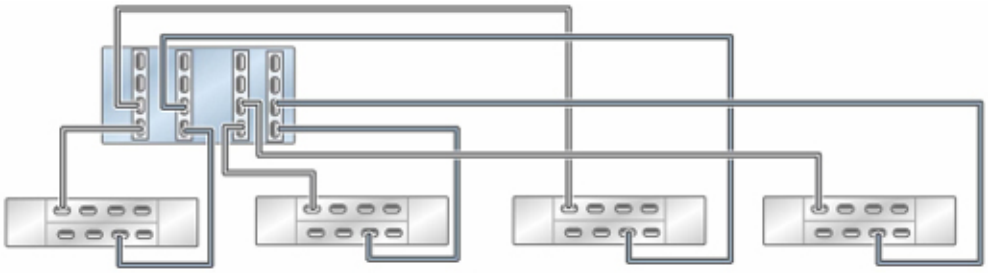
Standalone Oracle ZFS Storage ZS5-4 controller with four HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



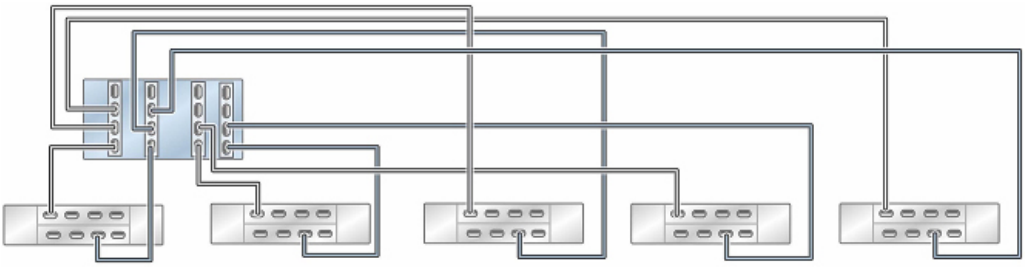
Standalone Oracle ZFS Storage ZS5-4 controller with four HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



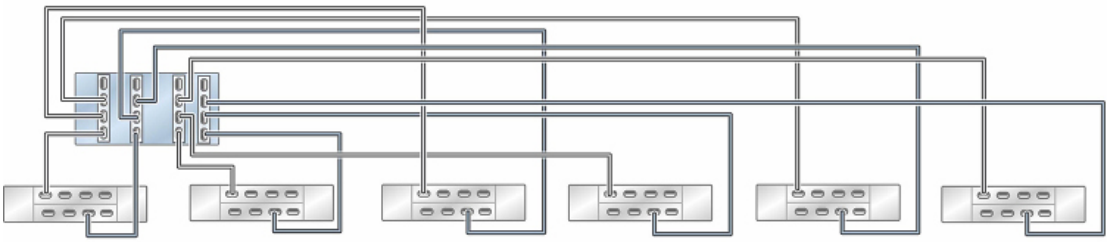
Standalone Oracle ZFS Storage ZS5-4 controller with four HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



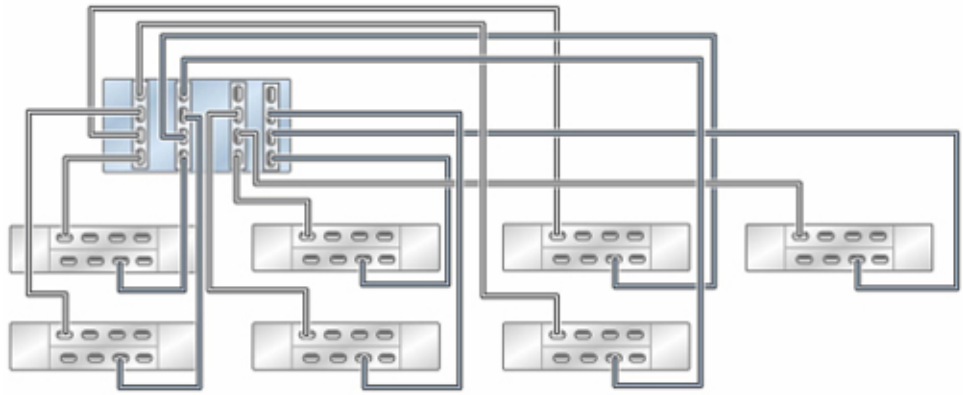
Standalone Oracle ZFS Storage ZS5-4 controller with four HBAs connected to five Oracle Storage Drive Enclosure DE3-24 disk shelves in five chains



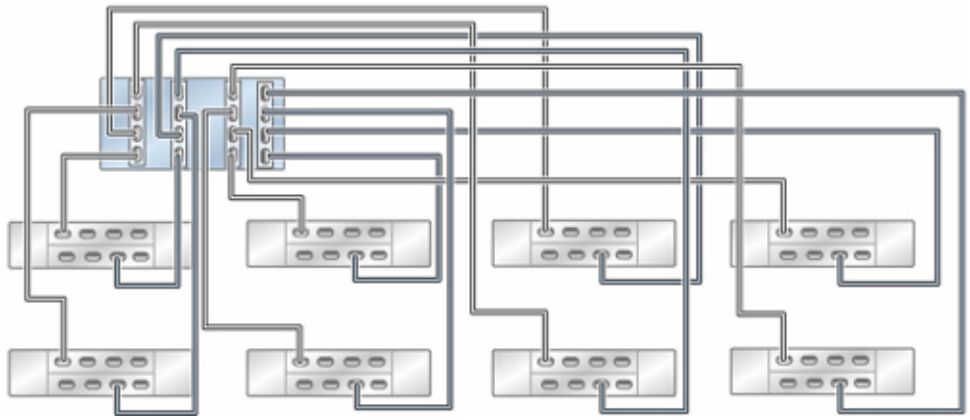
Standalone Oracle ZFS Storage ZS5-4 controller with four HBAs connected to six Oracle Storage Drive Enclosure DE3-24 disk shelves in six chains



Standalone Oracle ZFS Storage ZS5-4 controller with four HBAs connected to seven Oracle Storage Drive Enclosure DE3-24 disk shelves in seven chains



Standalone Oracle ZFS Storage ZS5-4 controller with four HBAs connected to eight Oracle Storage Drive Enclosure DE3-24 disk shelves in eight chains



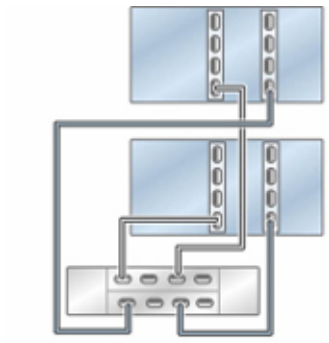
Multiple disk shelves in a single chain

Oracle ZFS Storage ZS5-4 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)

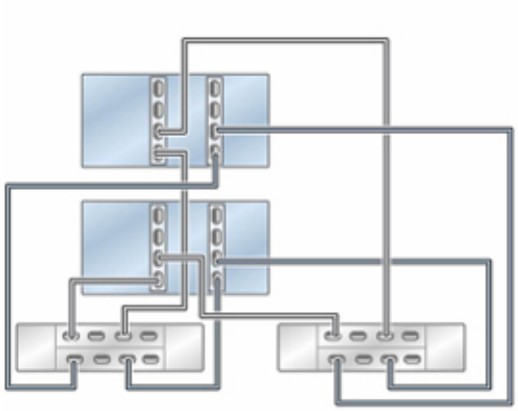
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-4 clustered controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

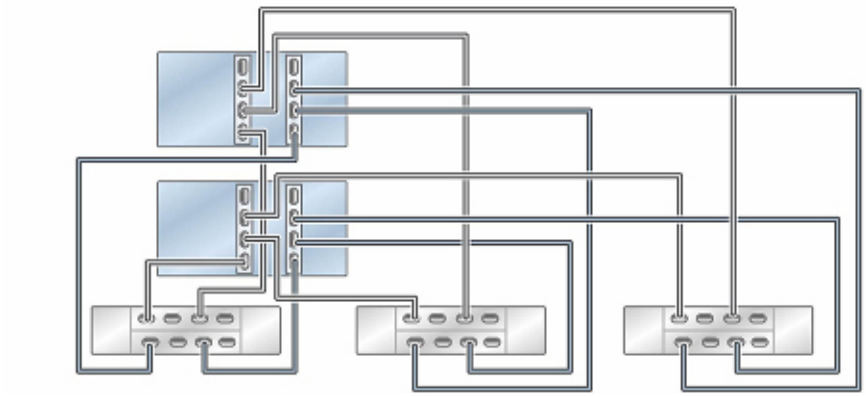
Clustered Oracle ZFS Storage ZS5-4 controllers with two HBAs connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



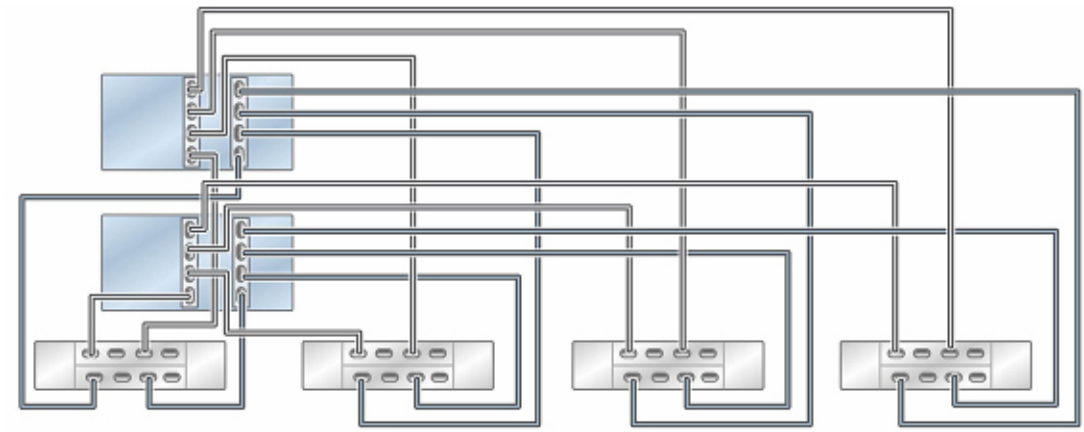
Clustered Oracle ZFS Storage ZS5-4 controllers with two HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



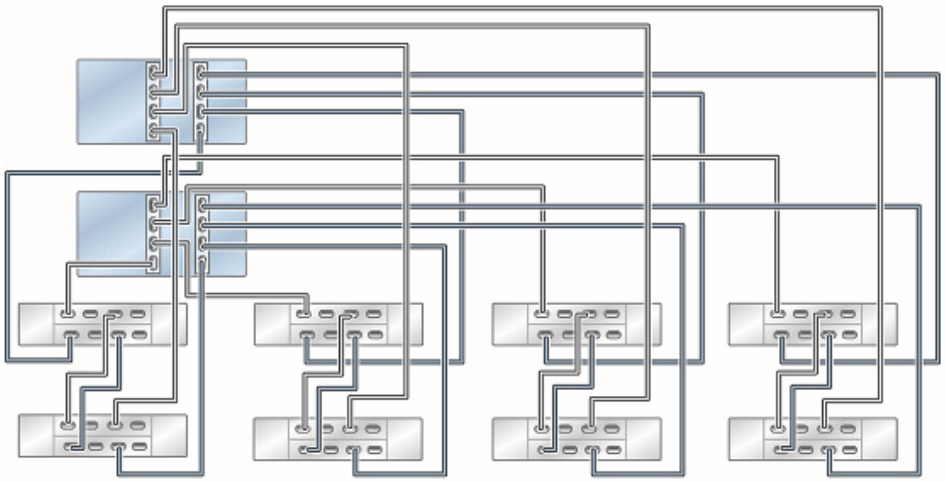
Clustered Oracle ZFS Storage ZS5-4 controllers with two HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



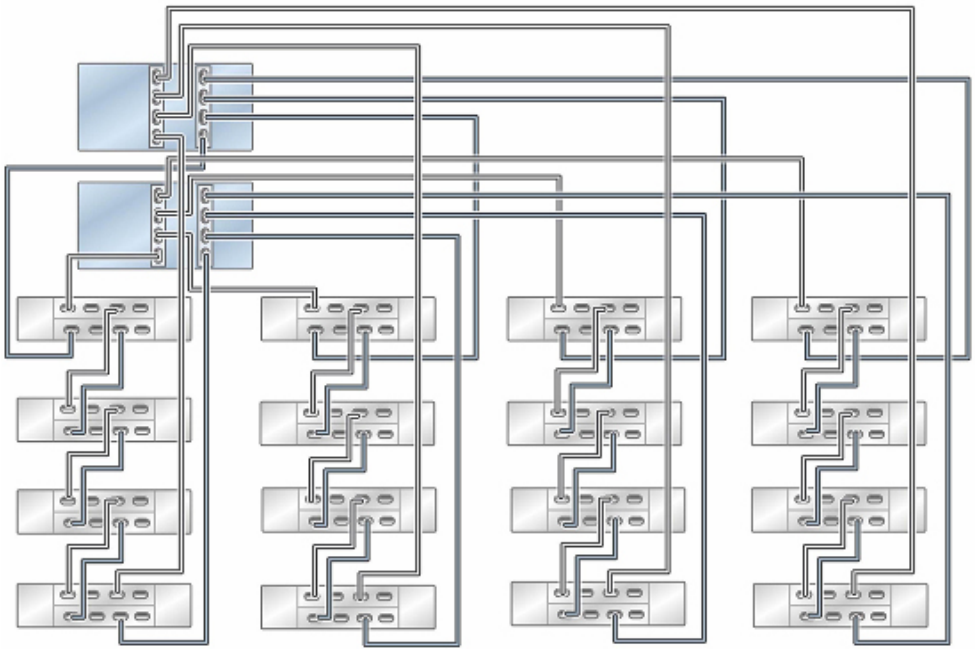
Clustered Oracle ZFS Storage ZS5-4 controllers with two HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Clustered Oracle ZFS Storage ZS5-4 controllers with two HBAs connected to eight Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Clustered Oracle ZFS Storage ZS5-4 controllers with two HBAs connected to sixteen Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



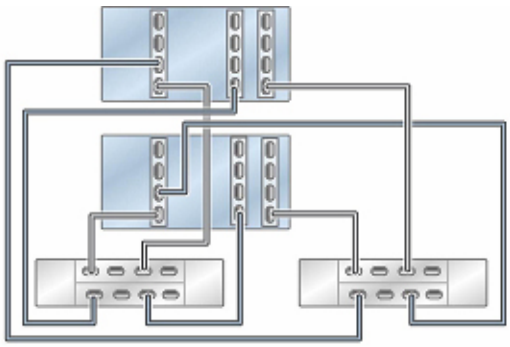
Multiple disk shelves in a single chain

Oracle ZFS Storage ZS5-4 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (3 HBAs)

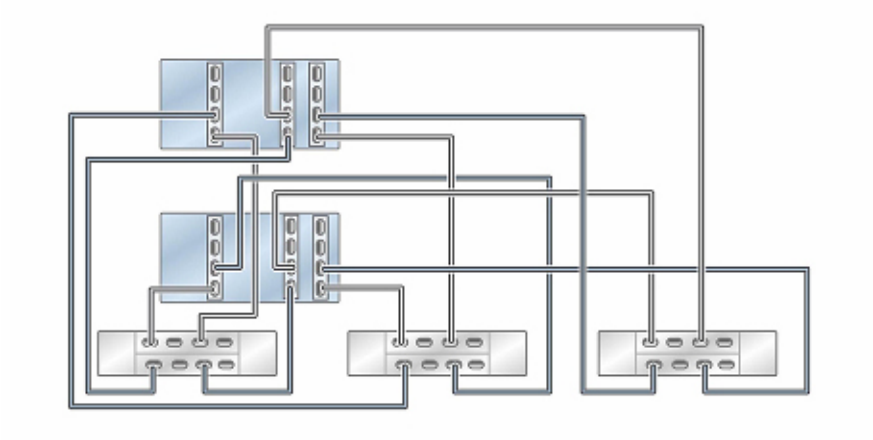
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-4 clustered controllers with three HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

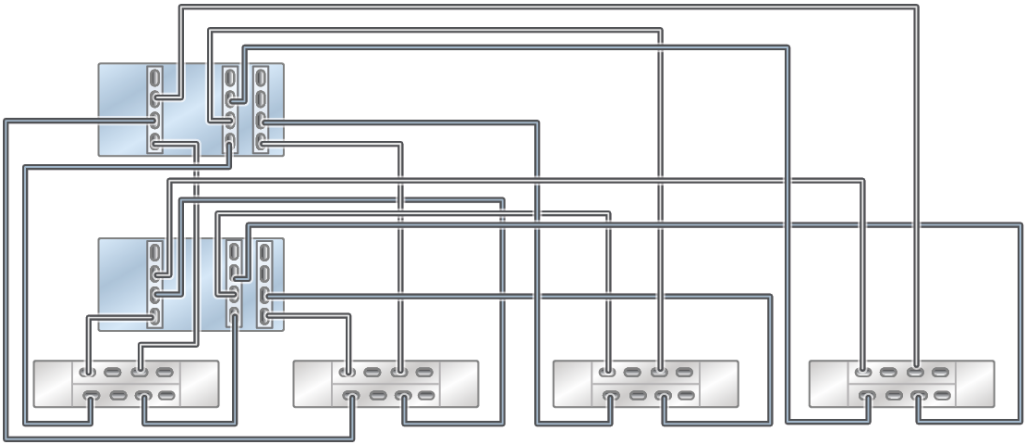
Clustered Oracle ZFS Storage ZS5-4 controllers with three HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



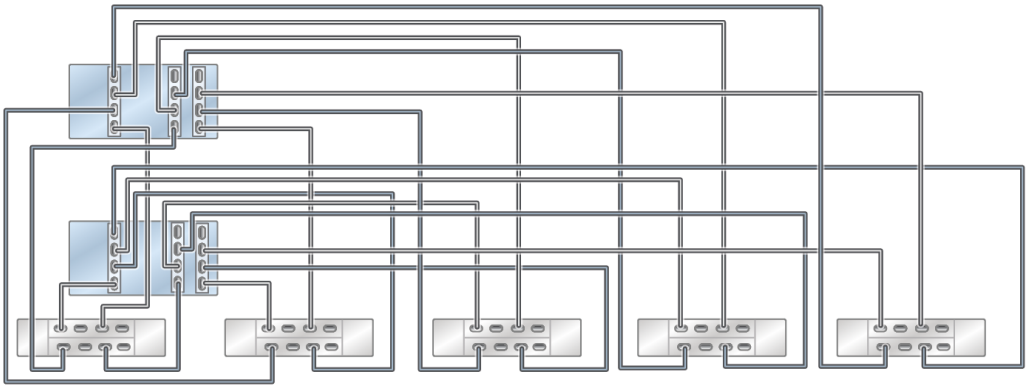
Clustered Oracle ZFS Storage ZS5-4 controllers with three HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



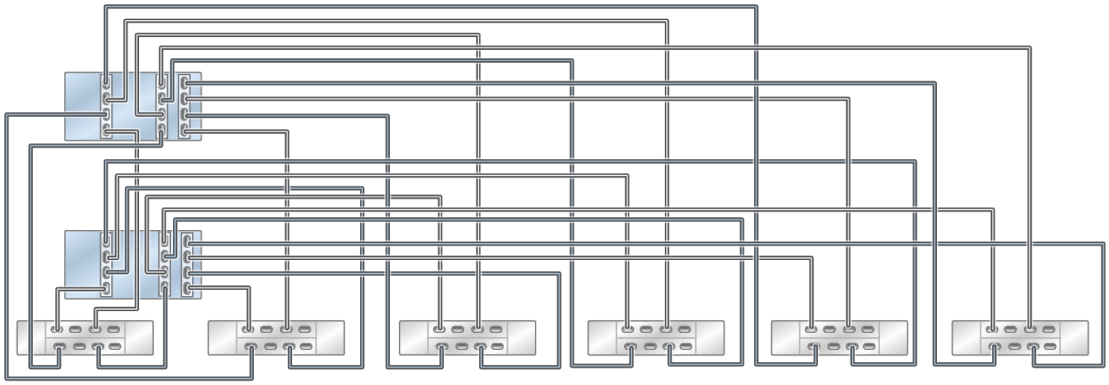
Clustered Oracle ZFS Storage ZS5-4 controllers with three HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



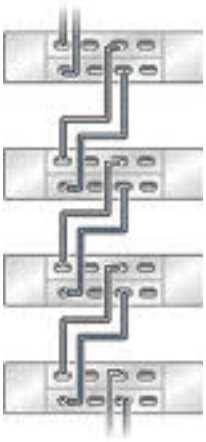
Clustered Oracle ZFS Storage ZS5-4 controllers with three HBAs connected to five Oracle Storage Drive Enclosure DE3-24 disk shelves in five chains



Clustered Oracle ZFS Storage ZS5-4 controllers with three HBAs connected to six Oracle Storage Drive Enclosure DE3-24 disk shelves in six chains



Multiple disk shelves in a single chain

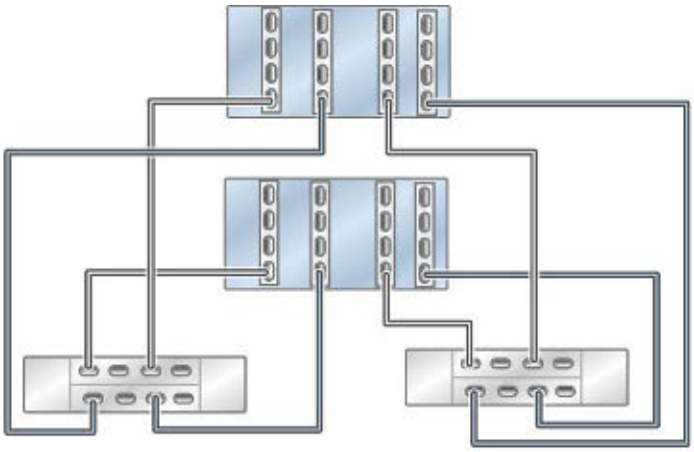


Oracle ZFS Storage ZS5-4 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (4 HBAs)

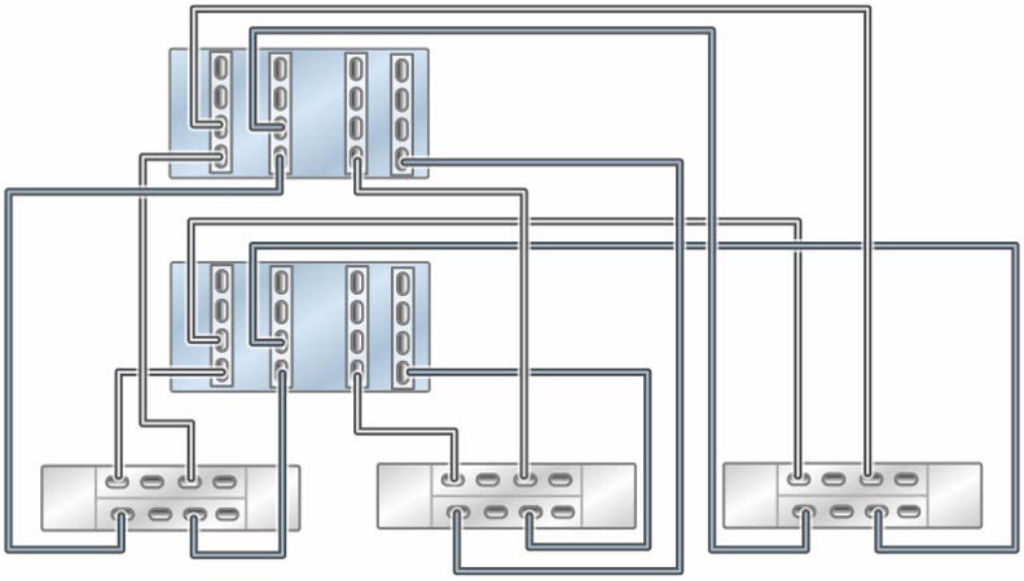
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-4 clustered controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

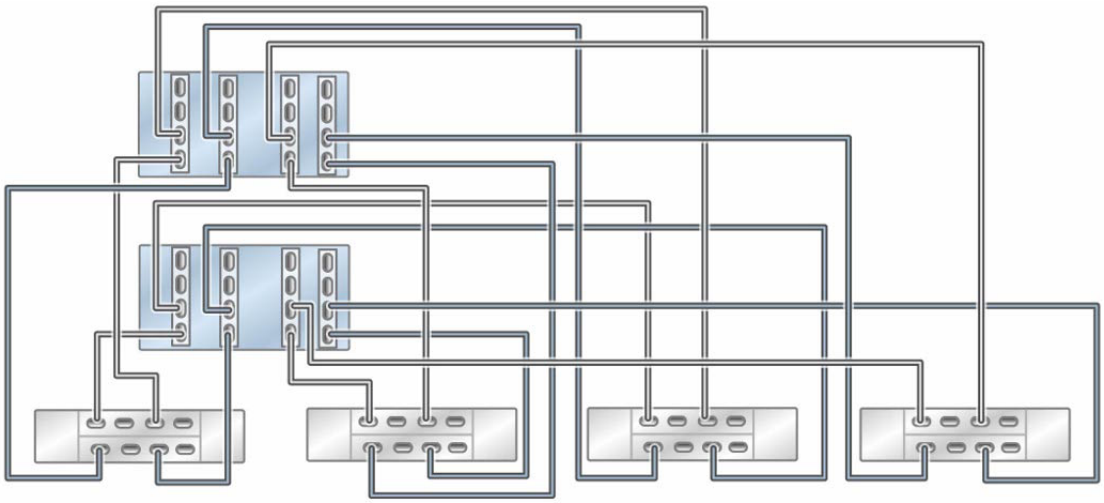
Clustered Oracle ZFS Storage ZS5-4 controllers with four HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



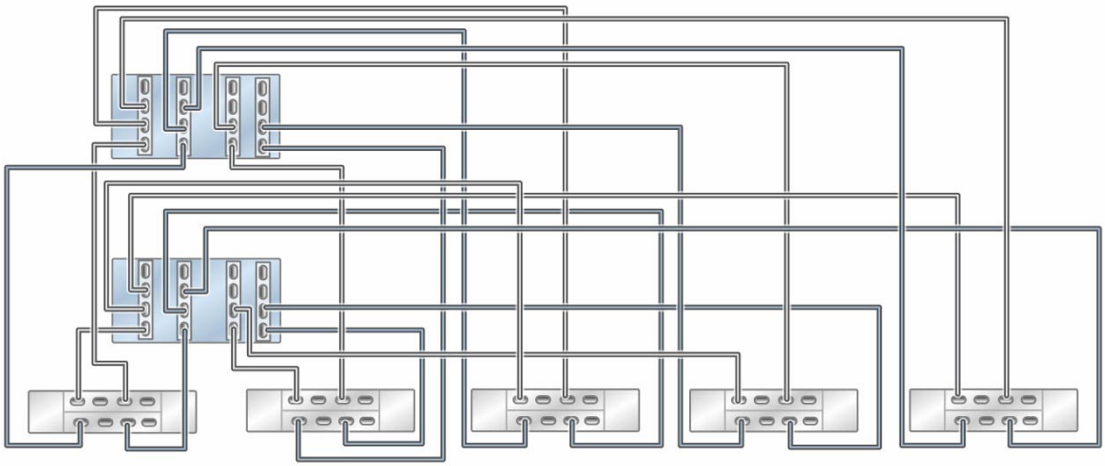
Clustered Oracle ZFS Storage ZS5-4 controllers with four HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



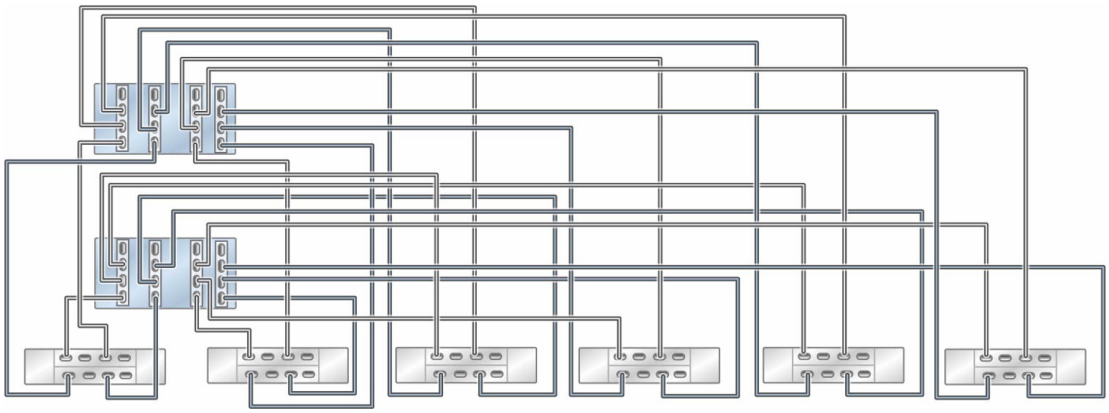
Clustered Oracle ZFS Storage ZS5-4 controllers with four HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



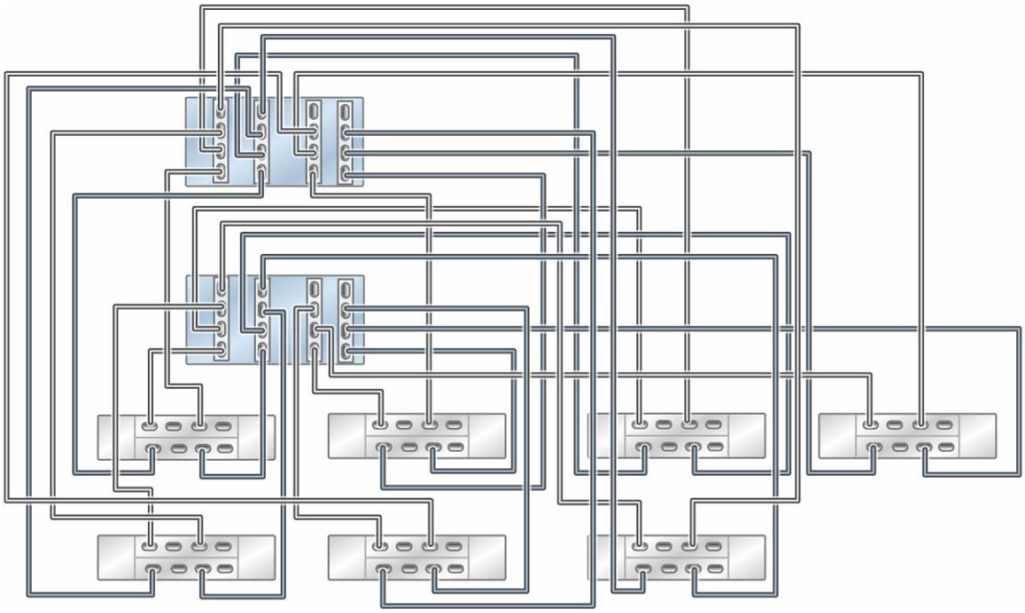
Clustered Oracle ZFS Storage ZS5-4 controllers with four HBAs connected to five Oracle Storage Drive Enclosure DE3-24 disk shelves in five chains



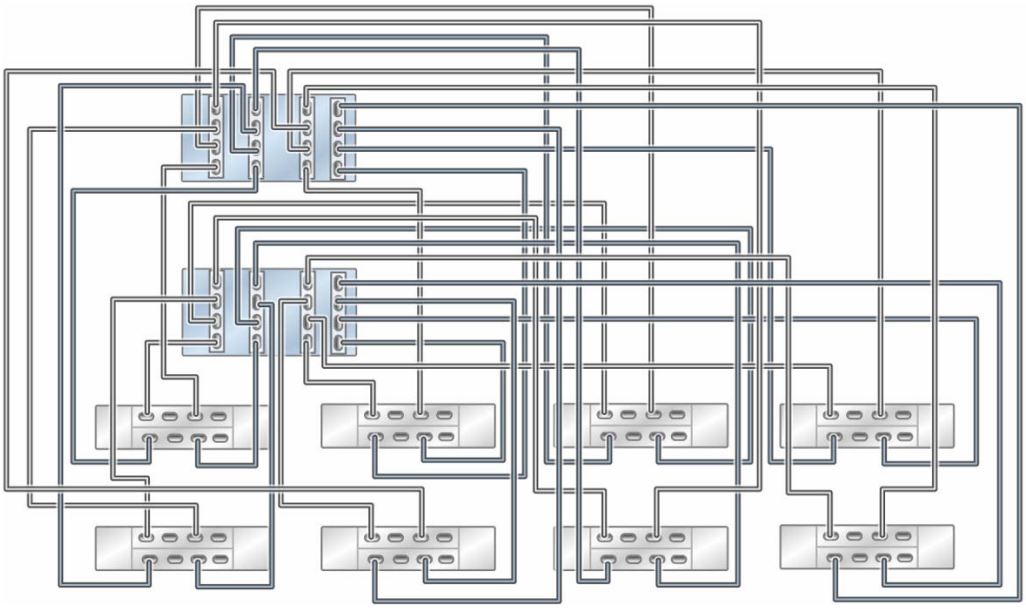
Clustered Oracle ZFS Storage ZS5-4 controllers with four HBAs connected to six Oracle Storage Drive Enclosure DE3-24 disk shelves in six chains



Clustered Oracle ZFS Storage ZS5-4 controllers with four HBAs connected to seven Oracle Storage Drive Enclosure DE3-24 disk shelves in seven chains



Clustered Oracle ZFS Storage ZS5-4 controllers with four HBAs connected to eight Oracle Storage Drive Enclosure DE3-24 disk shelves in eight chains



Multiple disk shelves in a single chain

Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS5-2 Controllers

This section contains guidelines for properly cabling standalone and clustered Oracle ZFS Storage ZS5-2 controllers to Oracle Storage Drive Enclosure DE3-24 disk shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

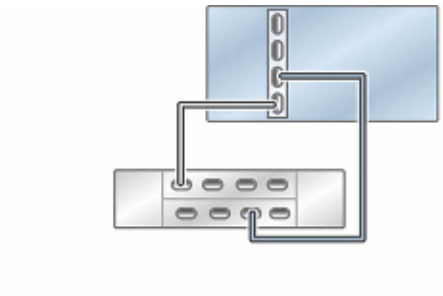
- Oracle ZFS Storage ZS5-2 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (1 HBA)
- Oracle ZFS Storage ZS5-2 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)
- Oracle ZFS Storage ZS5-2 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (1 HBA)
- Oracle ZFS Storage ZS5-2 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)

Oracle ZFS Storage ZS5-2 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (1 HBA)

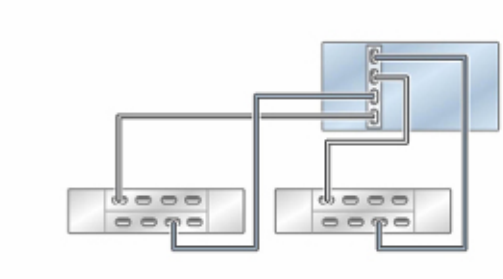
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-2 standalone controllers with one HBA. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

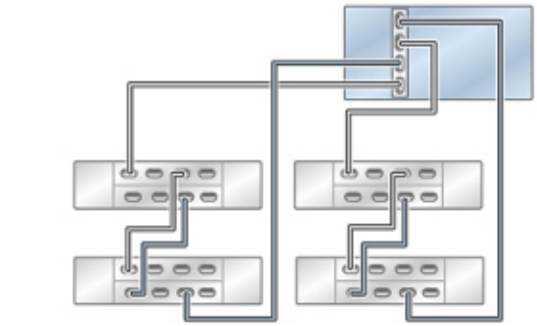
Standalone Oracle ZFS Storage ZS5-2 controller with one HBA connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



Standalone Oracle ZFS Storage ZS5-2 controller with one HBA connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



Standalone Oracle ZFS Storage ZS5-2 controller with one HBA connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



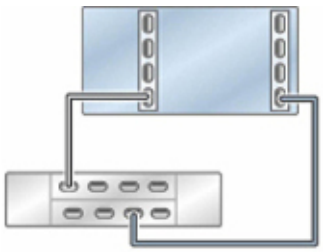
Multiple disk shelves in a single chain

Oracle ZFS Storage ZS5-2 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)

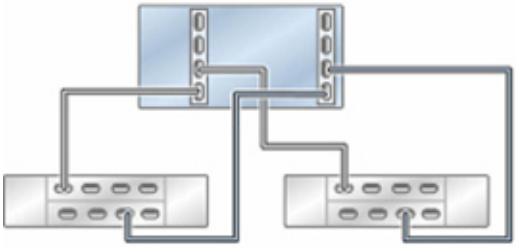
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-2 standalone controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

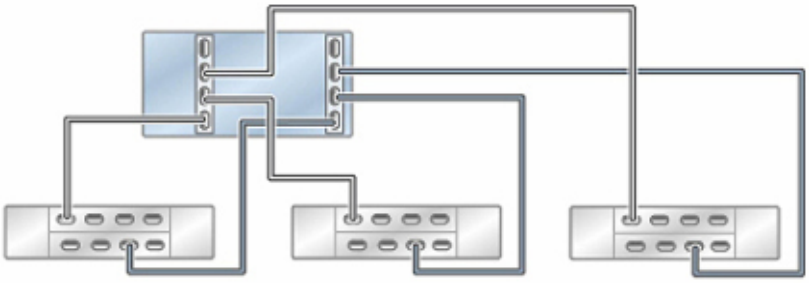
Standalone Oracle ZFS Storage ZS5-2 controller with two HBAs connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



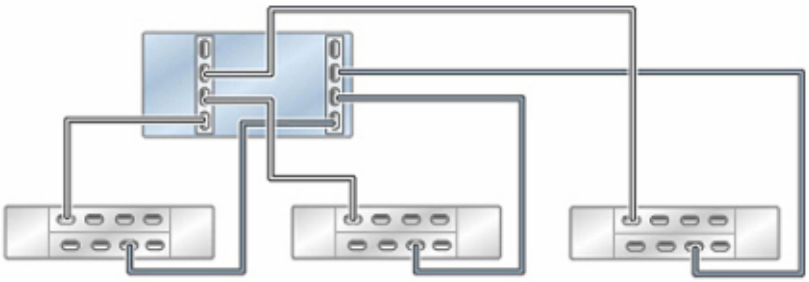
Standalone Oracle ZFS Storage ZS5-2 controller with two HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



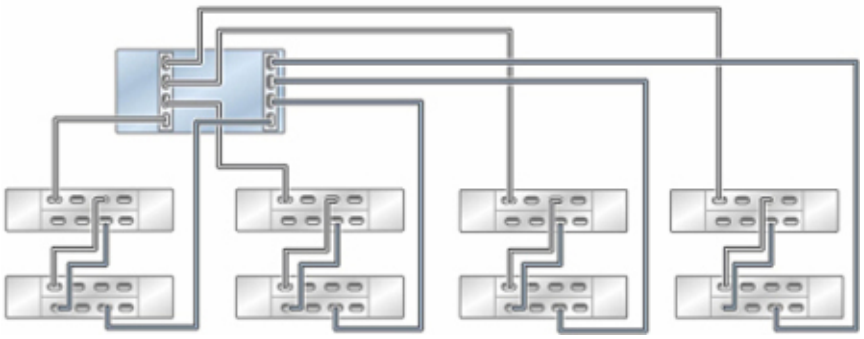
Standalone Oracle ZFS Storage ZS5-2 controller with two HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



Standalone Oracle ZFS Storage ZS5-2 controller with two HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Standalone Oracle ZFS Storage ZS5-2 controller with two HBAs connected to eight Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



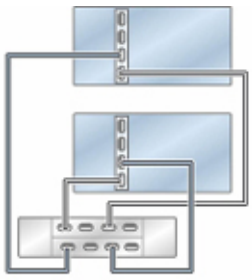
Multiple disk shelves in a single chain

Oracle ZFS Storage ZS5-2 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (1 HBA)

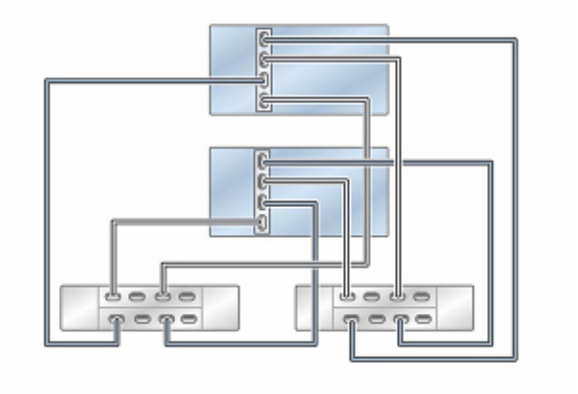
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-2 clustered controllers with one HBA. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

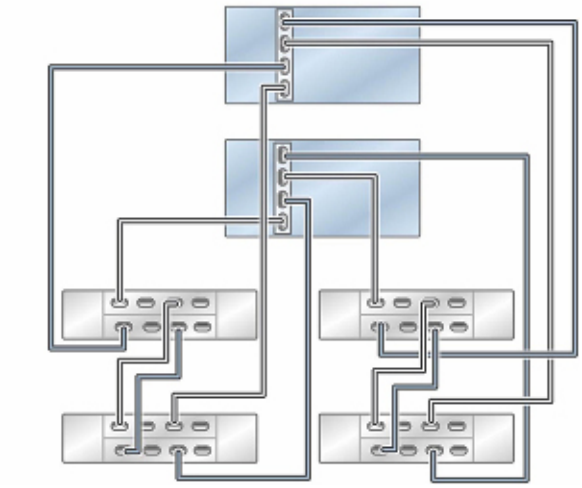
Clustered Oracle ZFS Storage ZS5-2 controllers with one HBA connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



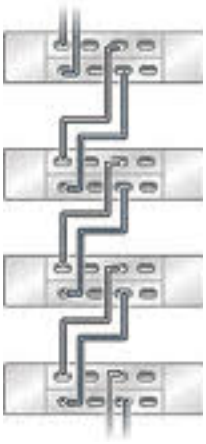
Clustered Oracle ZFS Storage ZS5-2 controllers with one HBA connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



Clustered Oracle ZFS Storage ZS5-2 controllers with one HBA connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



Multiple disk shelves in a single chain

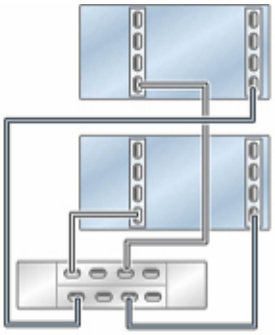


Oracle ZFS Storage ZS5-2 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)

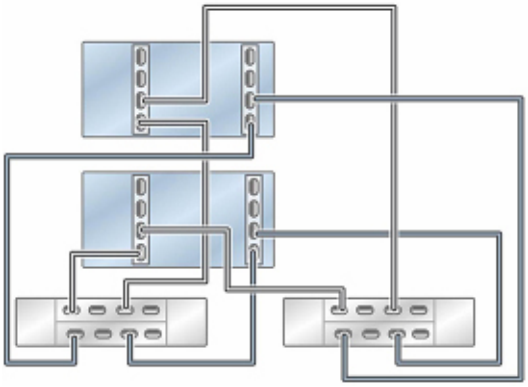
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-2 clustered controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x.

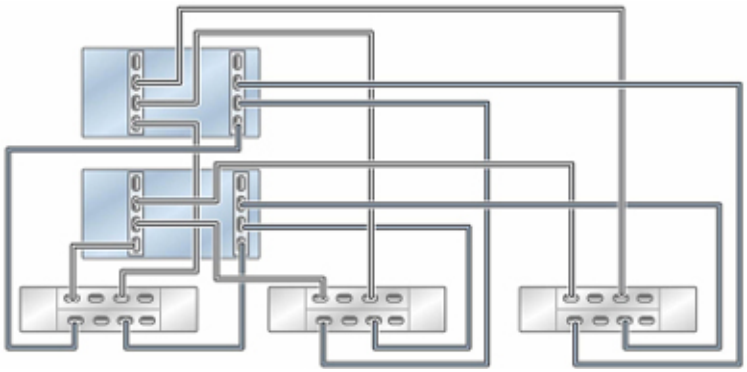
Clustered Oracle ZFS Storage ZS5-2 controllers with two HBAs connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



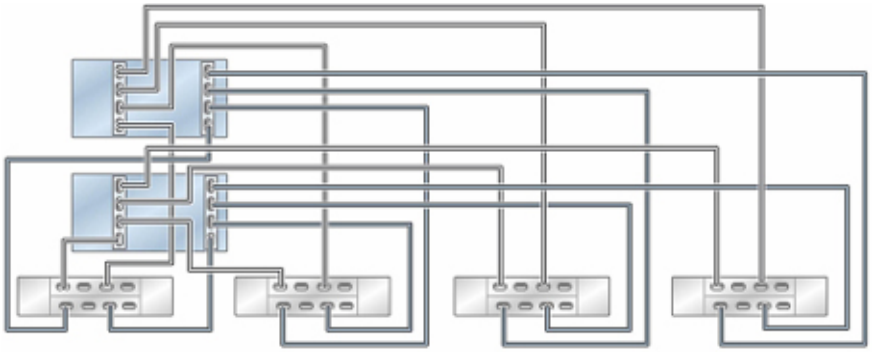
Clustered Oracle ZFS Storage ZS5-2 controllers with two HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



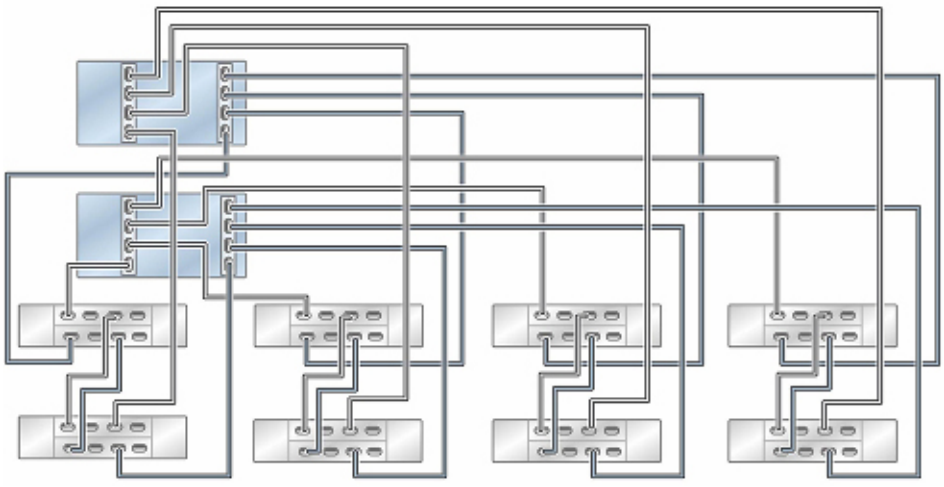
Clustered Oracle ZFS Storage ZS5-2 controllers with two HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



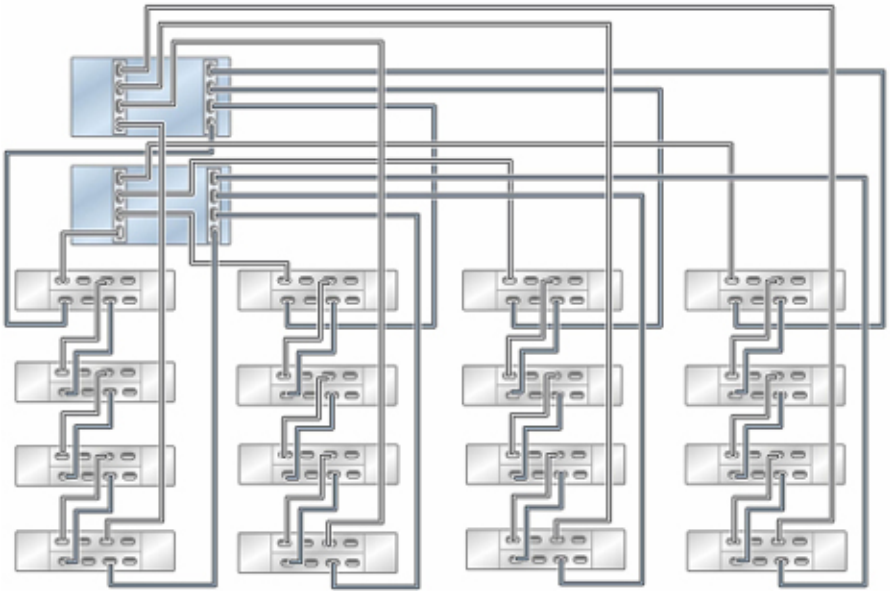
Clustered Oracle ZFS Storage ZS5-2 controllers with two HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Clustered Oracle ZFS Storage ZS5-2 controllers with two HBAs connected to eight Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Clustered Oracle ZFS Storage ZS5-2 controllers with two HBAs connected to sixteen Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Multiple disk shelves in a single chain

Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS4-4 Controllers

This section contains guidelines for properly cabling standalone and clustered Oracle ZFS Storage ZS4-4 controllers to Oracle Storage Drive Enclosure DE3-24 disk shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

- Oracle ZFS Storage ZS4-4 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)
- Oracle ZFS Storage ZS4-4 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (3 HBAs)
- Oracle ZFS Storage ZS4-4 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (4 HBAs)

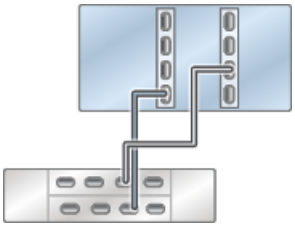
- Oracle ZFS Storage ZS4-4 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)
- Oracle ZFS Storage ZS4-4 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (3 HBAs)
- Oracle ZFS Storage ZS4-4 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (4 HBAs)

Oracle ZFS Storage ZS4-4 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)

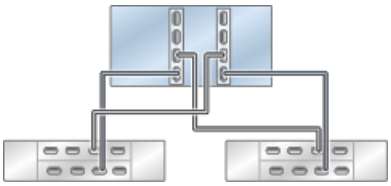
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS4-4 standalone controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

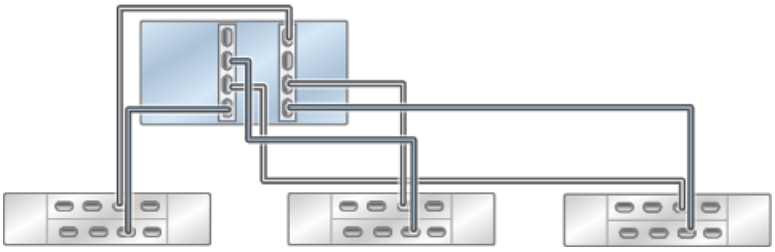
Standalone Oracle ZFS Storage ZS4-4 controller with two HBAs connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



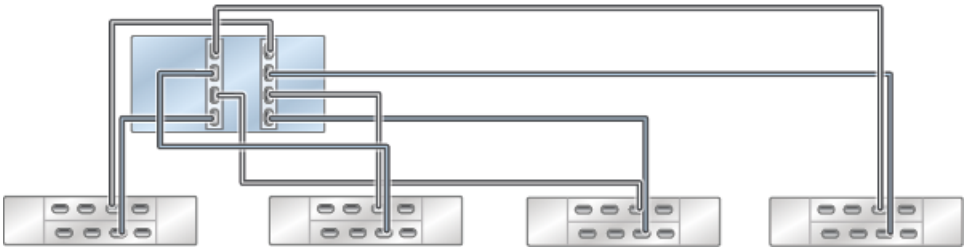
Standalone Oracle ZFS Storage ZS4-4 controller with two HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



Standalone Oracle ZFS Storage ZS4-4 controller with two HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



Standalone Oracle ZFS Storage ZS4-4 controller with two HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains

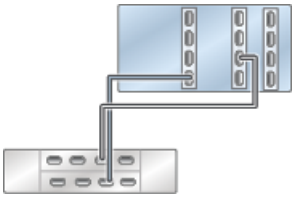


Oracle ZFS Storage ZS4-4 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (3 HBAs)

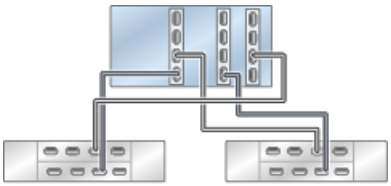
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS4-4 standalone controllers with three HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

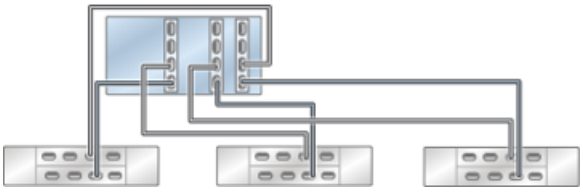
Standalone Oracle ZFS Storage ZS4-4 controller with three HBAs connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



Standalone Oracle ZFS Storage ZS4-4 controller with three HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



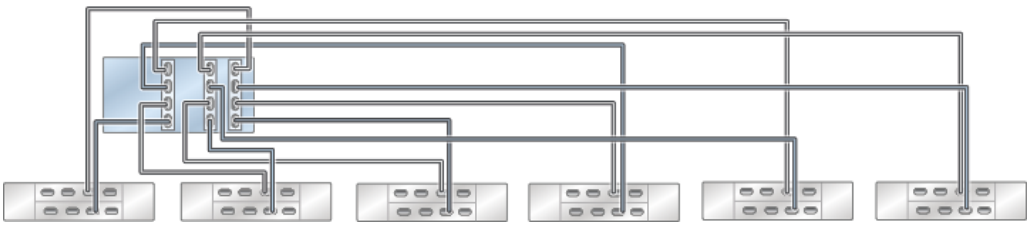
Standalone Oracle ZFS Storage ZS4-4 controller with three HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



Standalone Oracle ZFS Storage ZS4-4 controller with three HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains

Standalone Oracle ZFS Storage ZS4-4 controller with three HBAs connected to five Oracle Storage Drive Enclosure DE3-24 disk shelves in five chains

Standalone Oracle ZFS Storage ZS4-4 controller with three HBAs connected to six Oracle Storage Drive Enclosure DE3-24 disk shelves in six chains

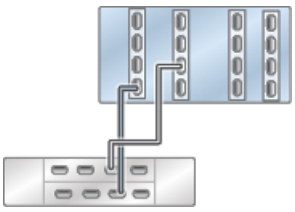


Oracle ZFS Storage ZS4-4 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (4 HBAs)

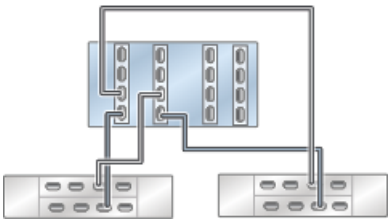
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS4-4 standalone controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

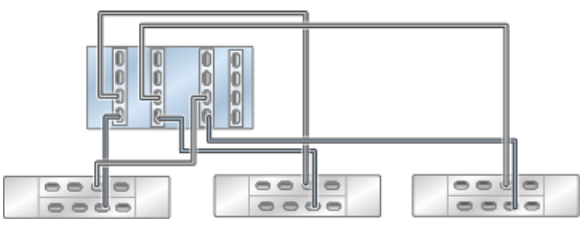
Standalone Oracle ZFS Storage ZS5-4 controller with four HBAs connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



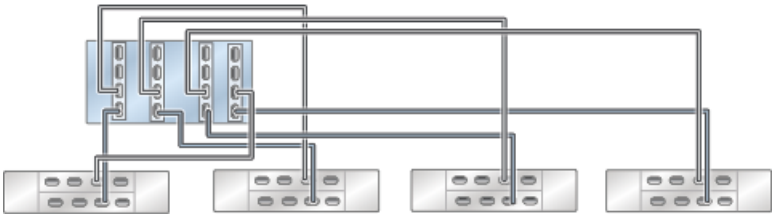
Standalone Oracle ZFS Storage ZS4-4 controller with four HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



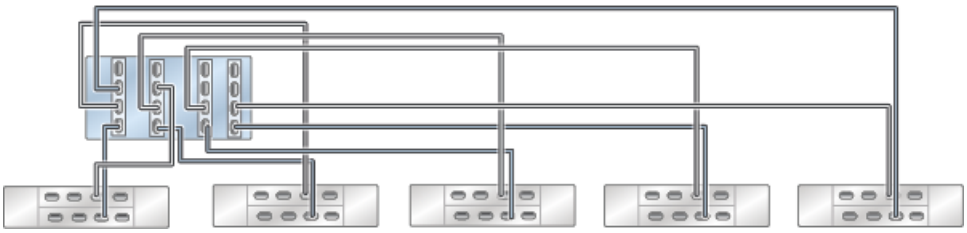
Standalone Oracle ZFS Storage ZS4-4 controller with four HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



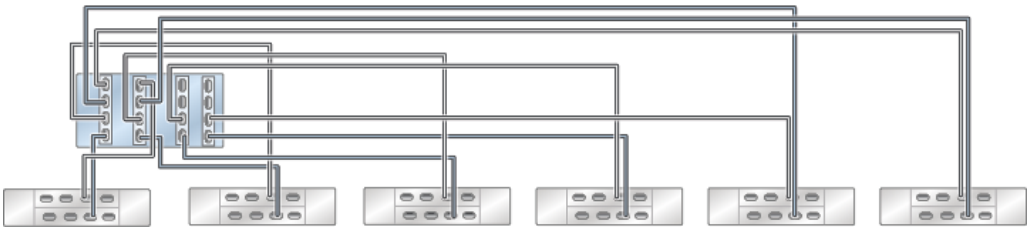
Standalone Oracle ZFS Storage ZS4-4 controller with four HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



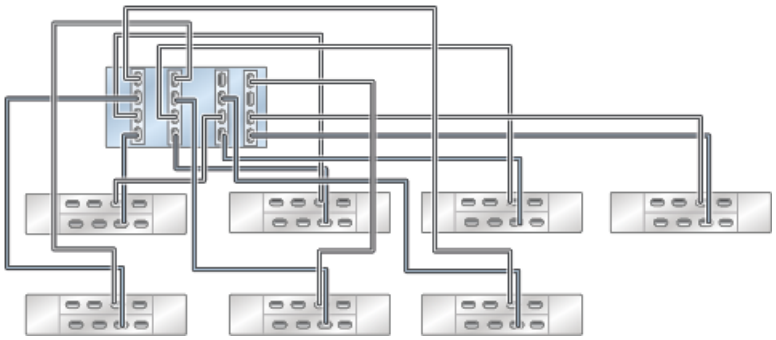
Standalone Oracle ZFS Storage ZS4-4 controller with four HBAs connected to five Oracle Storage Drive Enclosure DE3-24 disk shelves in five chains



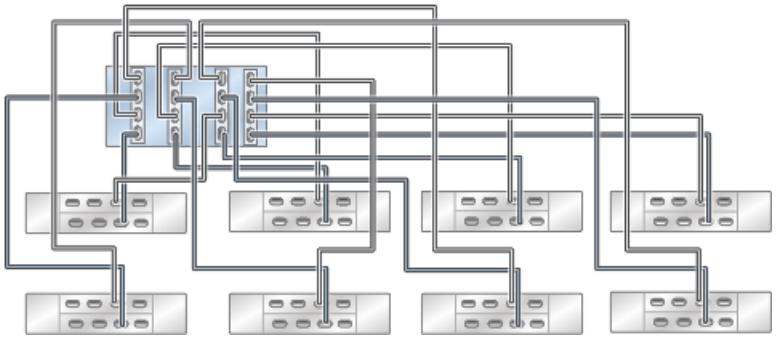
Standalone Oracle ZFS Storage ZS4-4 controller with four HBAs connected to six Oracle Storage Drive Enclosure DE3-24 disk shelves in six chains



Standalone Oracle ZFS Storage ZS4-4 controller with four HBAs connected to seven Oracle Storage Drive Enclosure DE3-24 disk shelves in seven chains



Standalone Oracle ZFS Storage ZS4-4 controller with four HBAs connected to eight Oracle Storage Drive Enclosure DE3-24 disk shelves in eight chains

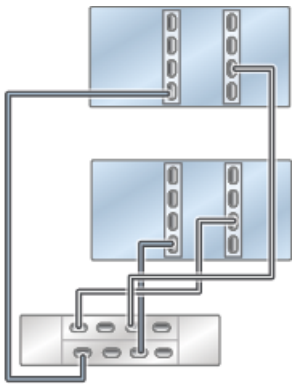


Oracle ZFS Storage ZS4-4 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)

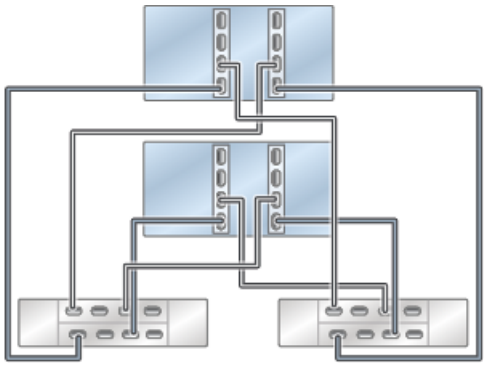
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS4-4 clustered controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

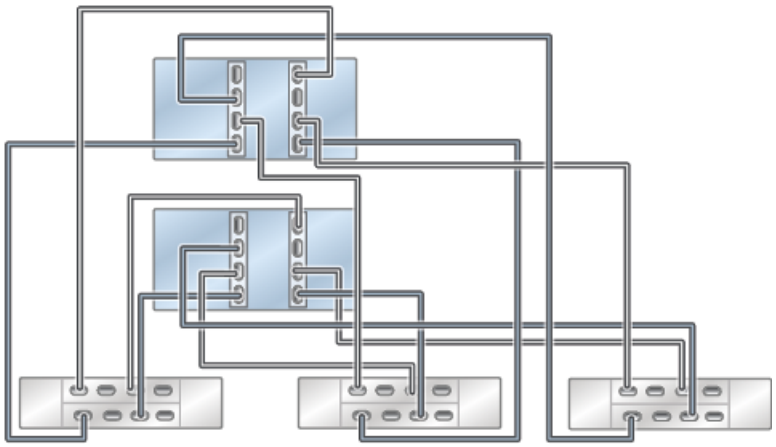
Clustered Oracle ZFS Storage ZS4-4 controllers with two HBAs connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



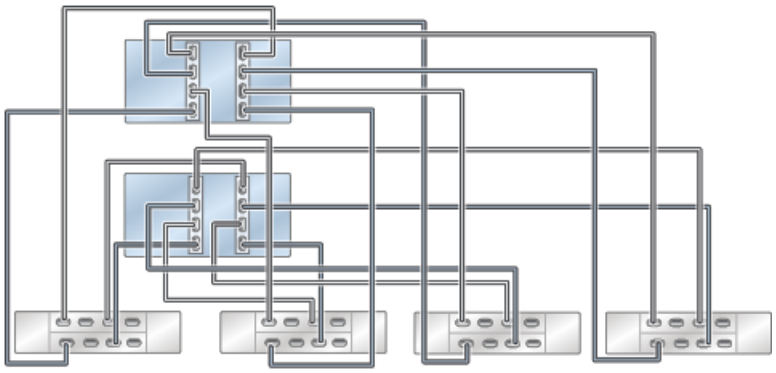
Clustered Oracle ZFS Storage ZS4-4 controllers with two HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



Clustered Oracle ZFS Storage ZS4-4 controllers with two HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



Clustered Oracle ZFS Storage ZS4-4 controllers with two HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains

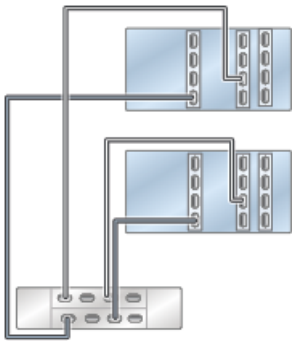


Oracle ZFS Storage ZS4-4 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (3 HBAs)

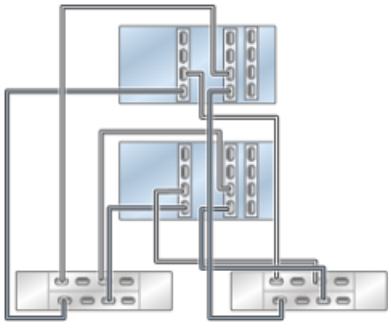
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS4-4 clustered controllers with three HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

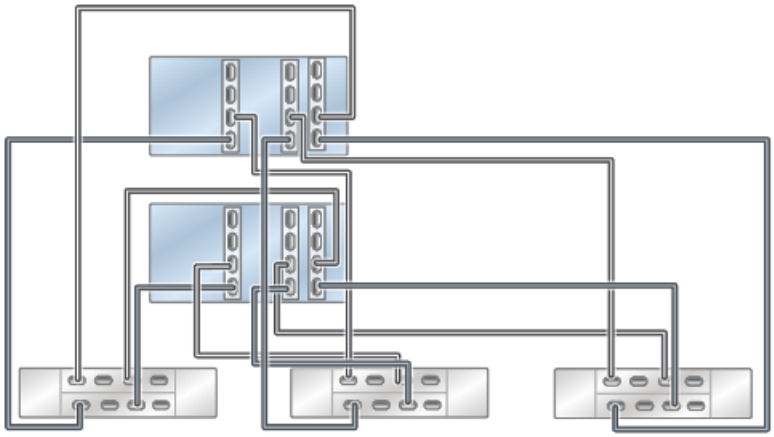
Clustered Oracle ZFS Storage ZS4-4 controllers with three HBAs connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



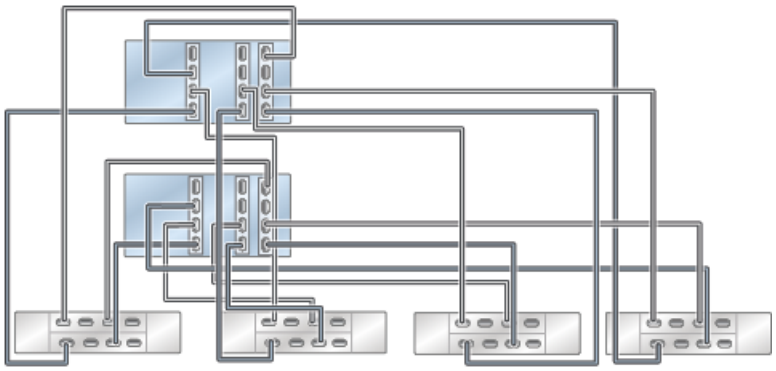
Clustered Oracle ZFS Storage ZS4-4 controllers with three HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



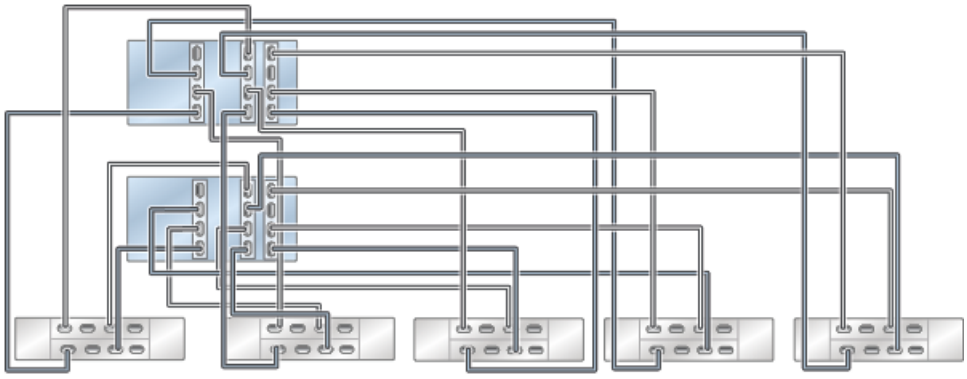
Clustered Oracle ZFS Storage ZS4-4 controllers with three HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



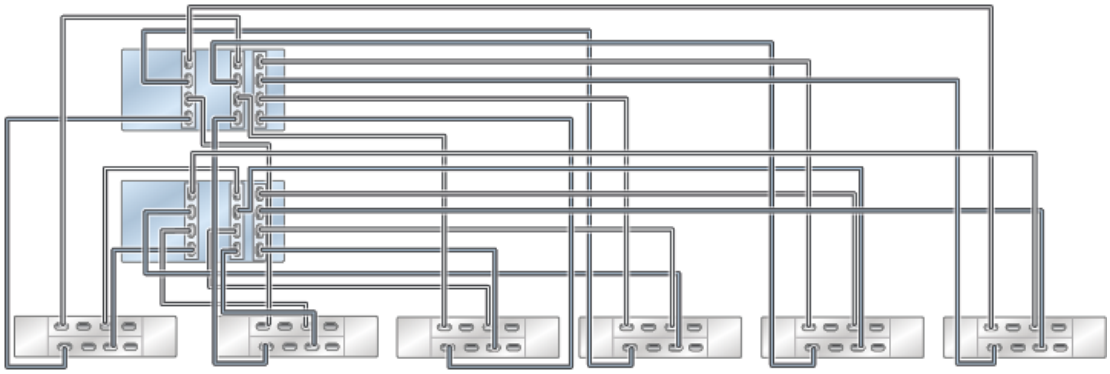
Clustered Oracle ZFS Storage ZS4-4 controllers with three HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Clustered Oracle ZFS Storage ZS4-4 controllers with three HBAs connected to five Oracle Storage Drive Enclosure DE3-24 disk shelves in five chains



Clustered Oracle ZFS Storage ZS4-4 controllers with three HBAs connected to six Oracle Storage Drive Enclosure DE3-24 disk shelves in six chains

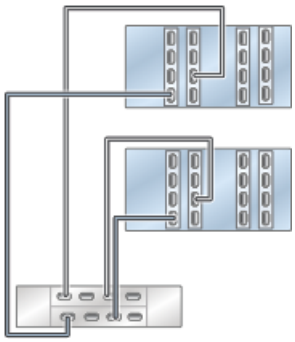


Oracle ZFS Storage ZS4-4 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (4 HBAs)

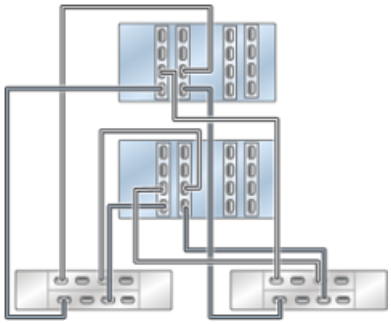
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS4-4 clustered controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

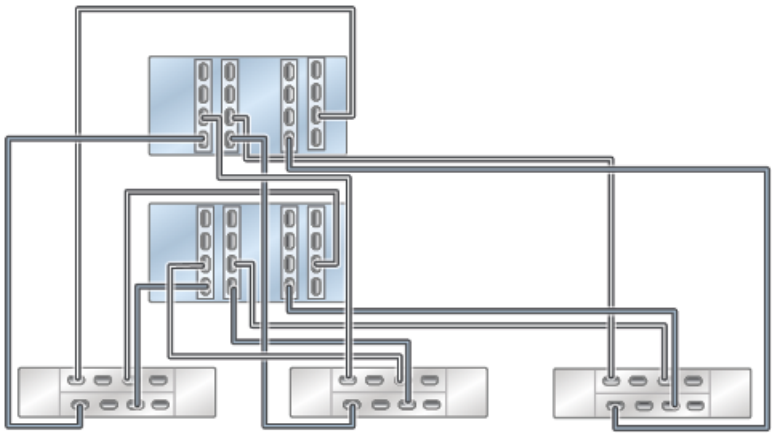
Clustered Oracle ZFS Storage ZS4-4 controllers with four HBAs connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



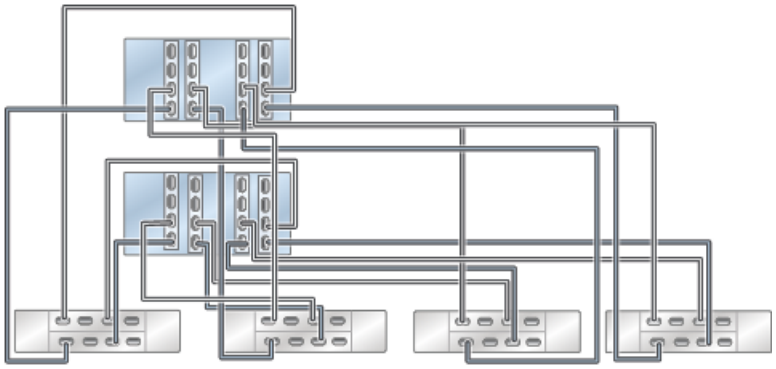
Clustered Oracle ZFS Storage ZS4-4 controllers with four HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



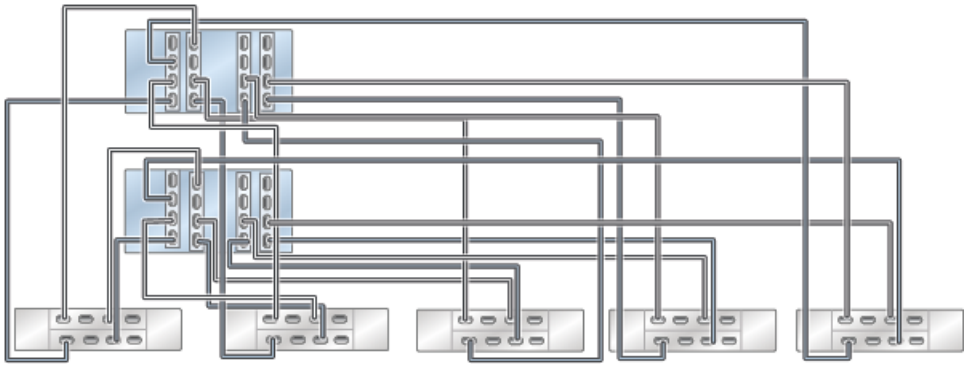
Clustered Oracle ZFS Storage ZS4-4 controllers with four HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



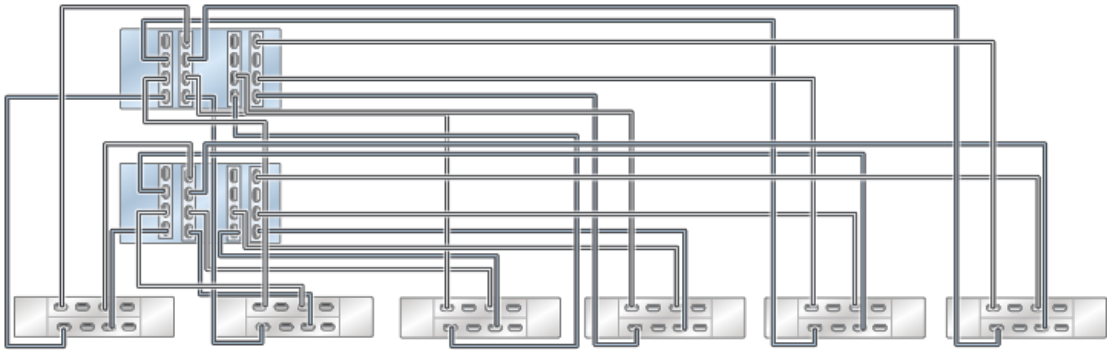
Clustered Oracle ZFS Storage ZS4-4 controllers with four HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



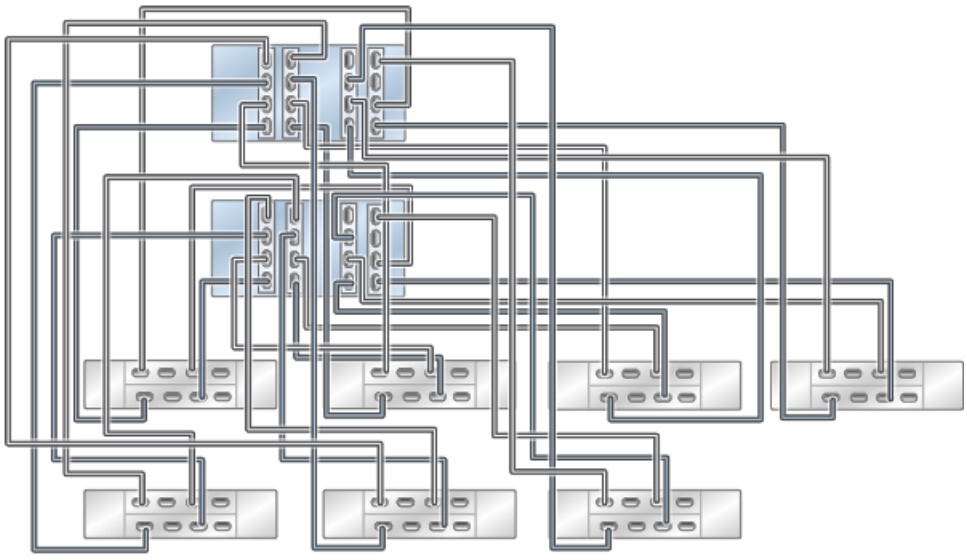
Clustered Oracle ZFS Storage ZS4-4 controllers with four HBAs connected to five Oracle Storage Drive Enclosure DE3-24 disk shelves in five chains



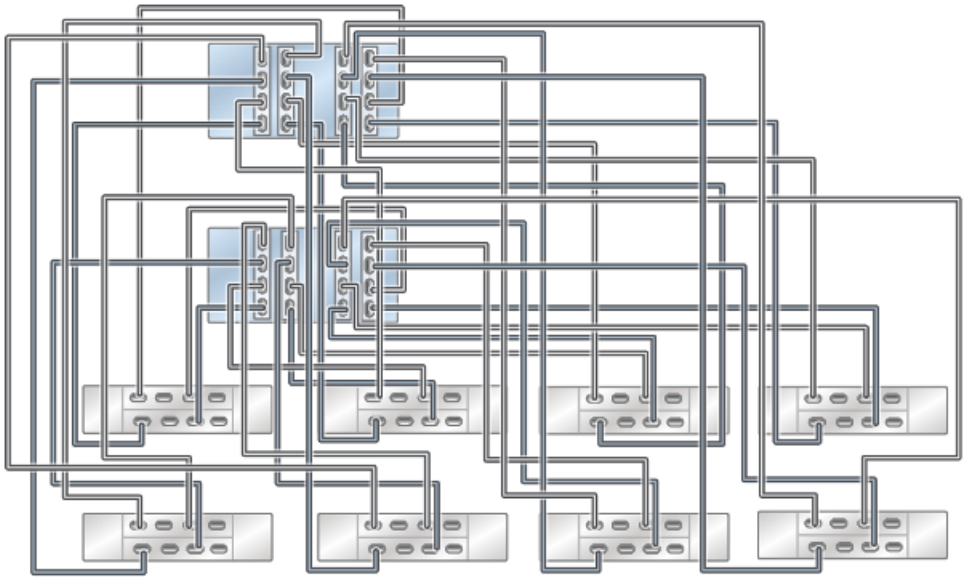
Clustered Oracle ZFS Storage ZS4-4 controllers with four HBAs connected to six Oracle Storage Drive Enclosure DE3-24 disk shelves in six chains



Clustered Oracle ZFS Storage ZS4-4 controllers with four HBAs connected to seven Oracle Storage Drive Enclosure DE3-24 disk shelves in seven chains



Clustered Oracle ZFS Storage ZS4-4 controllers with four HBAs connected to eight Oracle Storage Drive Enclosure DE3-24 disk shelves in eight chains



Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS3-2 Controllers

This section contains guidelines for properly cabling standalone and clustered Oracle ZFS Storage ZS3-2 controllers to Oracle Storage Drive Enclosure DE3-24 disk shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

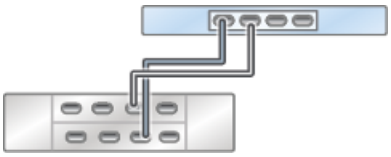
- Oracle ZFS Storage ZS3-2 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (1 HBA)
- Oracle ZFS Storage ZS3-2 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)
- Oracle ZFS Storage ZS3-2 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (1 HBA)
- Oracle ZFS Storage ZS3-2 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)

Oracle ZFS Storage ZS3-2 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (1 HBA)

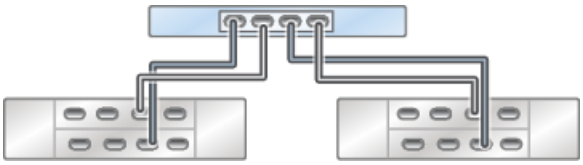
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-2 standalone controllers with one HBA. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

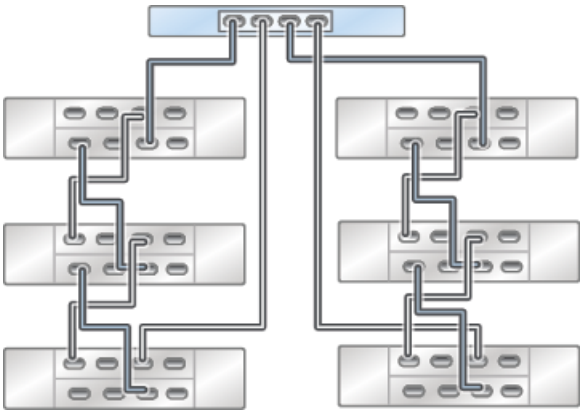
Standalone Oracle ZFS Storage ZS3-2 controller with one HBA connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



Standalone Oracle ZFS Storage ZS3-2 controller with one HBA connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



Standalone Oracle ZFS Storage ZS3-2 controller with one HBA connected to six Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains

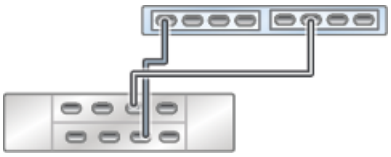


Oracle ZFS Storage ZS3-2 Standalone to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)

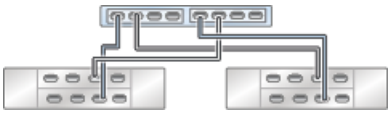
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-2 standalone controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

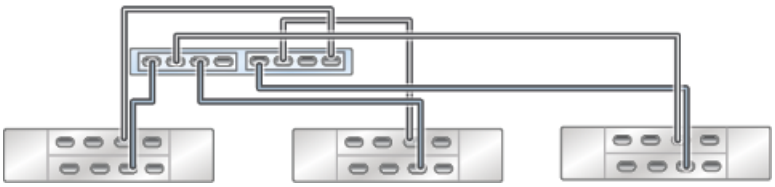
Standalone Oracle ZFS Storage ZS3-2 controller with two HBAs connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



Standalone Oracle ZFS Storage ZS3-2 controller with two HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains

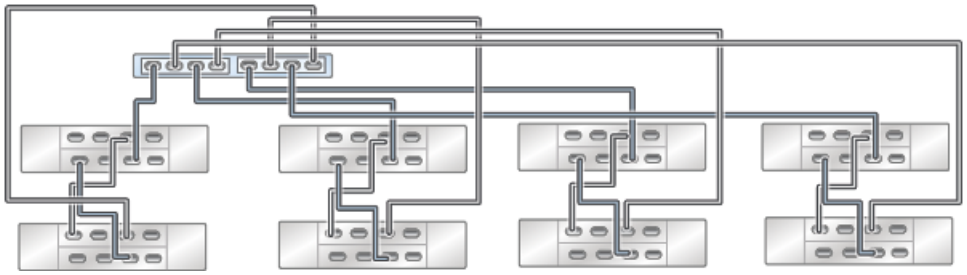


Standalone Oracle ZFS Storage ZS3-2 controller with two HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains

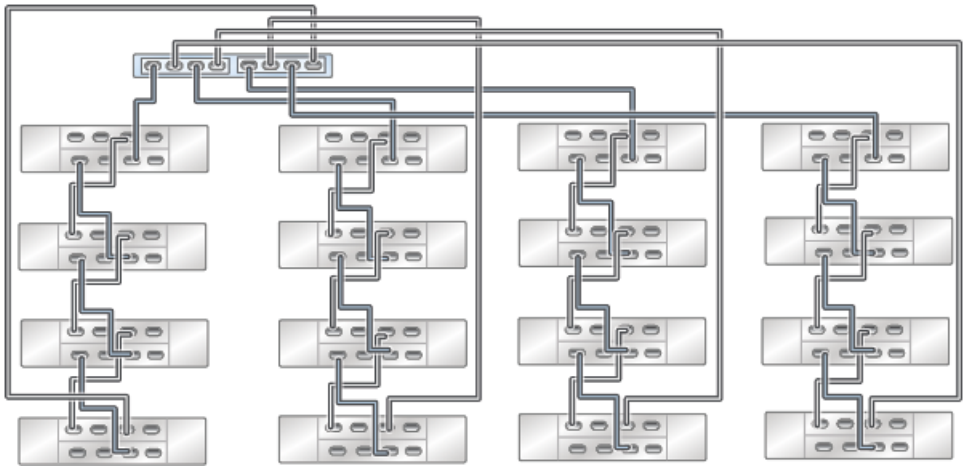


Standalone Oracle ZFS Storage ZS3-2 controller with two HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains

Standalone Oracle ZFS Storage ZS3-2 controller with two HBAs connected to eight Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Standalone Oracle ZFS Storage ZS3-2 controller with two HBAs connected to sixteen Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains

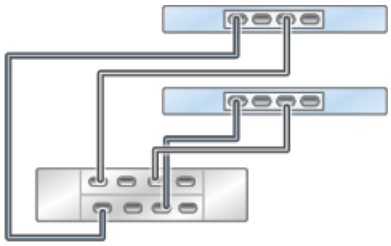


Oracle ZFS Storage ZS3-2 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (1 HBA)

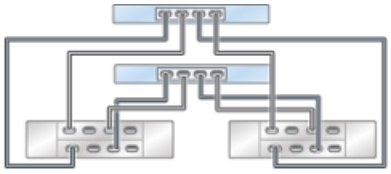
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-2 clustered controllers with one HBA. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

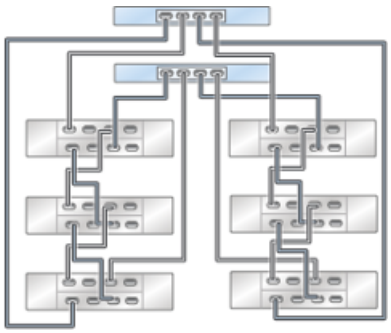
Clustered Oracle ZFS Storage ZS3-2 controllers with one HBA connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



Clustered Oracle ZFS Storage ZS3-2 controllers with one HBA connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



Clustered Oracle ZFS Storage ZS3-2 controllers with one HBA connected to six Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains

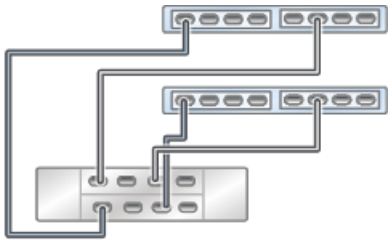


Oracle ZFS Storage ZS3-2 Clustered to Oracle Storage Drive Enclosure DE3-24 Disk Shelves (2 HBAs)

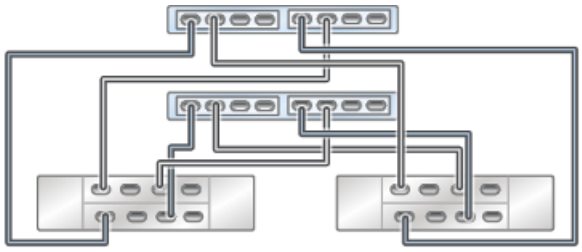
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-2 clustered controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

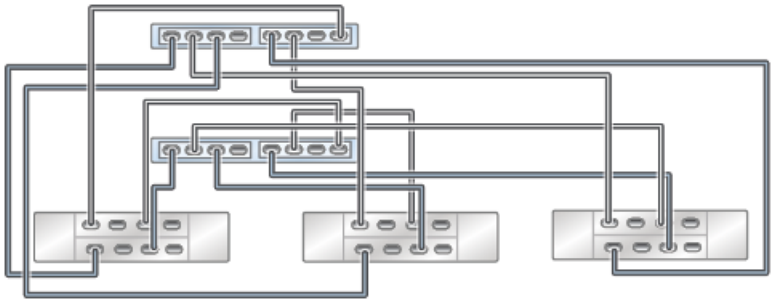
Clustered Oracle ZFS Storage ZS3-2 controllers with two HBAs connected to one Oracle Storage Drive Enclosure DE3-24 disk shelf in a single chain



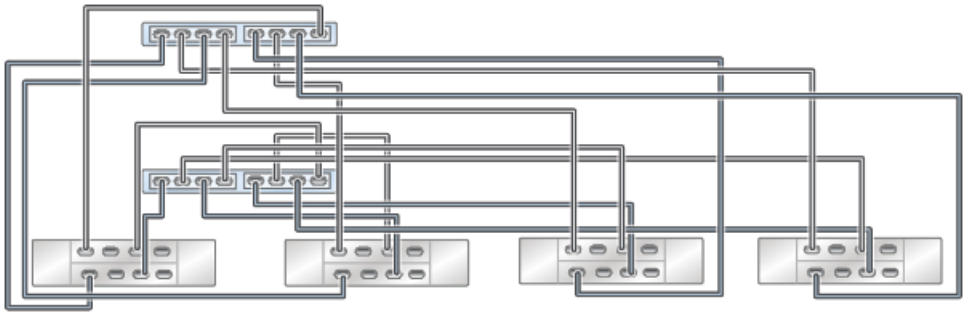
Clustered Oracle ZFS Storage ZS3-2 controllers with two HBAs connected to two Oracle Storage Drive Enclosure DE3-24 disk shelves in two chains



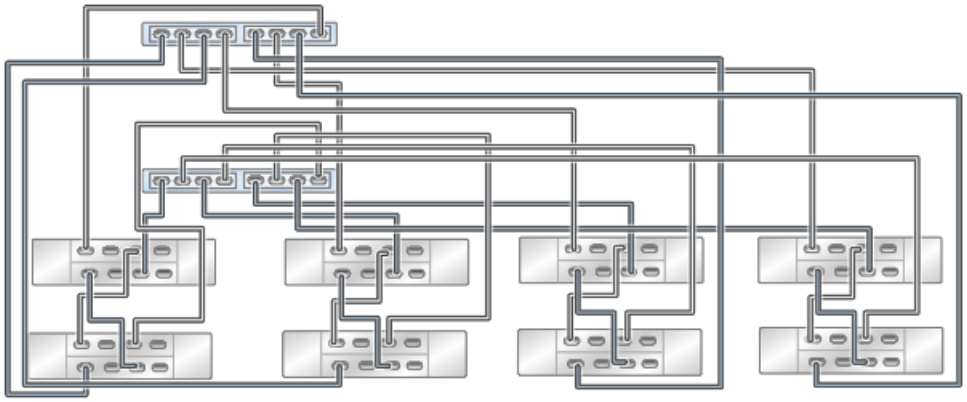
Clustered Oracle ZFS Storage ZS3-2 controllers with two HBAs connected to three Oracle Storage Drive Enclosure DE3-24 disk shelves in three chains



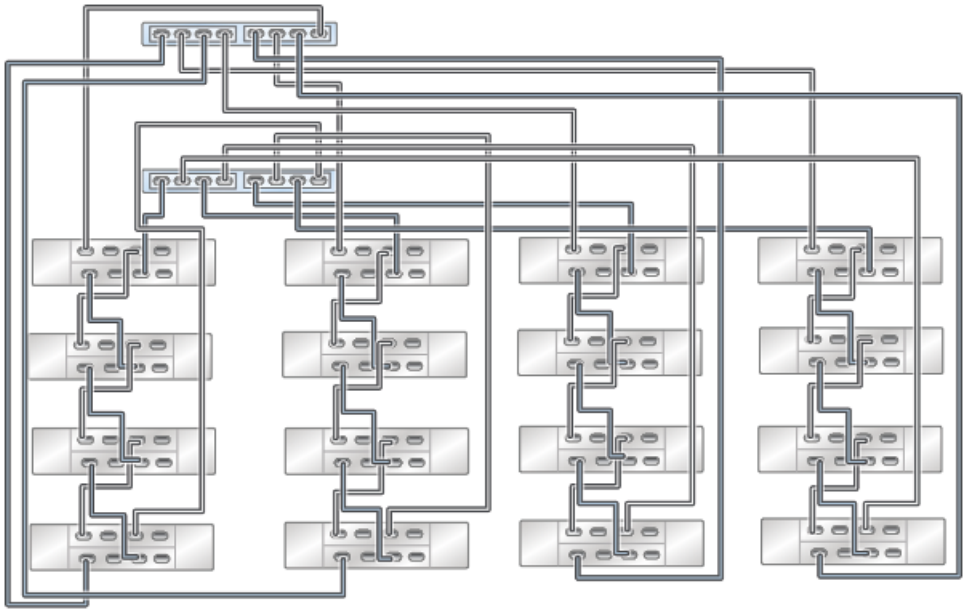
Clustered Oracle ZFS Storage ZS3-2 controllers with two HBAs connected to four Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Clustered Oracle ZFS Storage ZS3-2 controllers with two HBAs connected to eight Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



Clustered Oracle ZFS Storage ZS3-2 controllers with two HBAs connected to sixteen Oracle Storage Drive Enclosure DE3-24 disk shelves in four chains



3

Cabling Oracle Storage Drive Enclosure DE3-12C to Oracle ZFS Storage ZS9-2

This section contains information specific to Oracle Storage Drive Enclosure DE3-12C disk shelves, which are supported in Oracle ZFS Storage ZS9-2 racked and non-racked systems for both controller models: High-end (HE) and Mid-range (MR). Therefore, all cabling guidelines in this section apply to only Oracle ZFS Storage ZS9-2 controllers.

Disk shelves can be added to established standalone or clustered configurations without powering down the appliance or loss of service to clients. For more information, see Adding a New Disk Shelf in *Oracle ZFS Storage Appliance Customer Service Manual, Release OS8.8.x*.

This section also describes intermixing Oracle Storage Drive Enclosure DE3-12C with other disk shelves.

This section contains the following topics:

- Overview of Oracle Storage Drive Enclosure DE3-12C
- Upgrade Guidelines for Oracle Storage Drive Enclosure DE3-12C
- Cabling Guidelines for Adding an Oracle Storage Drive Enclosure DE3-12C
- Example Mixed Disk Shelf Configurations

Overview of Oracle Storage Drive Enclosure DE3-12C

Oracle Storage Drive Enclosure DE3-12C is a 2U chassis that supports 12 3.5" SAS-3 drives. Up to two read- or write-optimized SSD accelerators are supported per disk shelf, and log devices can be populated in slots 10 and 11. The high-performance HDDs provide reliable storage, and the SSDs provide accelerated read or write operations. This disk shelf features dual, redundant I/O Modules (IOMs), and dual power supplies with fan modules. Note that the I/O Module ports are labeled A, B, and C; port B (middle port) is not used nor supported. For more information, see Oracle Storage Drive Enclosure DE3-12C in *Oracle ZFS Storage Appliance Customer Service Manual, Release OS8.8.x*.

For information on the device types, slot numbers, and the number of devices that the disk shelf supports, see table "Oracle Storage Drive Enclosure DE3-12C Disk Shelf Configurations" in Disk Shelf Configurations in *Oracle ZFS Storage Appliance Customer Service Manual, Release OS8.8.x*.

Upgrade Guidelines for Oracle Storage Drive Enclosure DE3-12C

The following guidelines apply when upgrading a system by installing Oracle Storage Drive Enclosure DE3-12C disk shelves. Note that two Oracle Storage Drive Enclosure DE3-12C disk shelves can replace one Oracle Storage Drive Enclosure DE3-24C disk shelf.

- Within the same system, the following disk shelves can be intermixed with Oracle Storage Drive Enclosure DE3-12C:
  - Oracle Storage Drive Enclosure DE3-24C
  - Oracle Storage Drive Enclosure DE3-24P, including all-flash configurations
  - Oracle Storage Drive Enclosure DE2-24C
  - Oracle Storage Drive Enclosure DE2-24P
- Oracle Storage Drive Enclosure DE3-12C disk shelves and Oracle Storage Drive Enclosure DE2-24 disk shelves must be in separate SAS chains.
- One disk shelf chain supports a maximum of 12 Oracle Storage Drive Enclosure DE3-12C disk shelves, for a total of 144 drives.

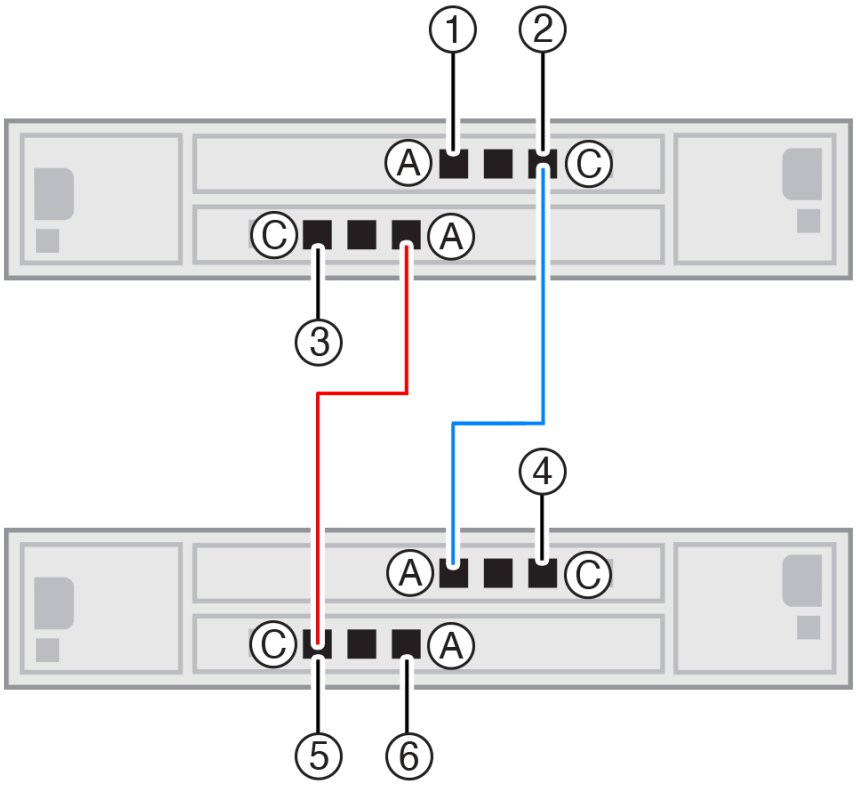
For more information on the maximum number of drive bays supported per Oracle ZFS Storage ZS9-2 model, as well as the maximum number of chains and other information, see Maximum Disk Shelves per Controller Configuration.

Cabling Guidelines for Adding an Oracle Storage Drive Enclosure DE3-12C

The Oracle Storage Drive Enclosure DE3-12C disk shelf can be directly connected to an Oracle ZFS Storage ZS9-2 controller, to other Oracle Storage Drive Enclosure DE3-12C disk shelves (singles, pairs, or multiples), and to Oracle Storage Drive Enclosure DE3-24 disk shelves. The disk shelf can also be connected to an Oracle ZFS Storage ZS9-2 controller in a system that includes Oracle Storage Drive Enclosure DE2-24 disk shelves in separate chains.

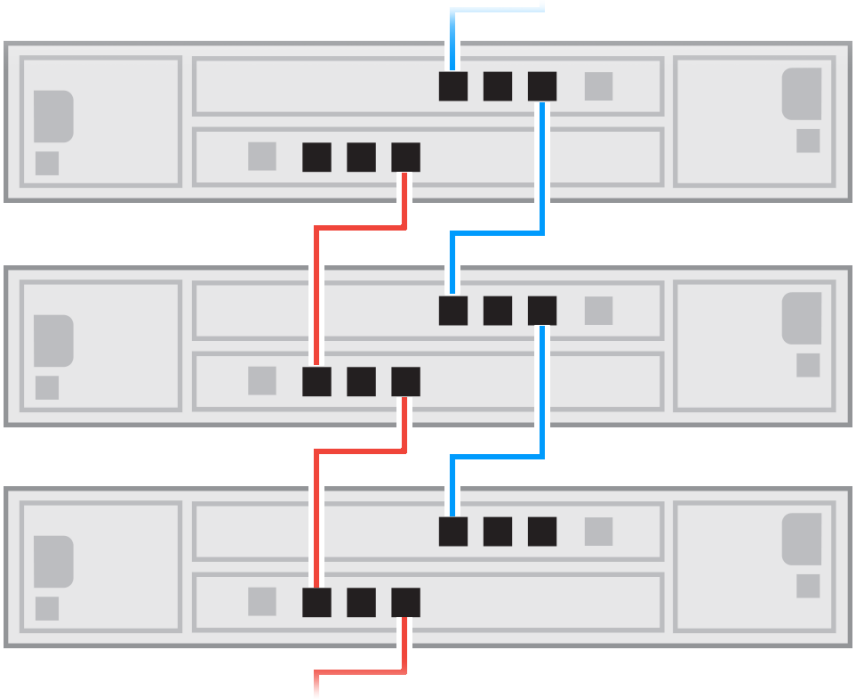
Because Oracle Storage Drive Enclosure DE3-12C disk shelves are similar to Oracle Storage Drive Enclosure DE3-24 disk shelves, they follow the same general guidelines described in Cabinet and Cabling Guidelines.

The following figure illustrates the possible cable connections for the I/O Module ports in a pair of Oracle Storage Drive Enclosure DE3-12C disk shelves. Note that port B (middle port) is not used nor supported. The cable colors distinguish separate cables and do not reflect the actual cable colors. For an overview of the Oracle Storage Drive Enclosure DE3-12C components, see Oracle Storage Drive Enclosure DE3-12C in *Oracle ZFS Storage Appliance Customer Service Manual, Release OS8.8.x*.

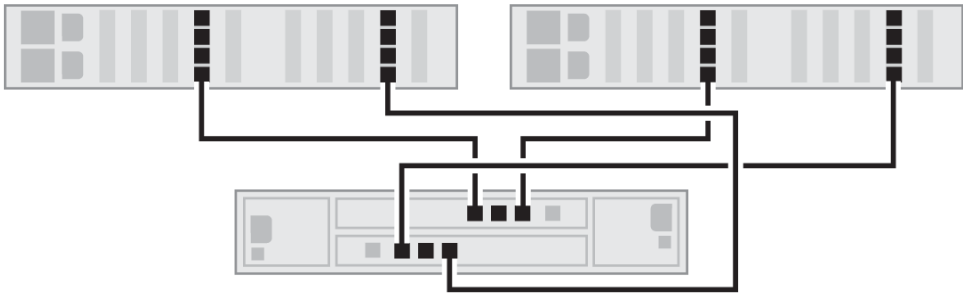


1 Top disk shelf in an Oracle Storage Drive Enclosure DE3-12C disk shelf pair: Port A connects to controller 0.	**2** Top disk shelf in an Oracle Storage Drive Enclosure DE3-12C disk shelf pair: Port C connects to port A in the peer disk shelf's upper I/O Module.	**3** Top disk shelf in an Oracle Storage Drive Enclosure DE3-12C disk shelf pair: Port C connects to controller 1.
4 Bottom disk shelf in an Oracle Storage Drive Enclosure DE3-12C disk shelf pair: Port C connects to controller 1 as a secondary path.	**5** Bottom disk shelf in an Oracle Storage Drive Enclosure DE3-12C disk shelf pair: Port C connects to port A in the peer disk shelf's lower I/O Module.	**6** Bottom disk shelf in an Oracle Storage Drive Enclosure DE3-12C disk shelf pair: Port A connects to controller 0 as a secondary path.

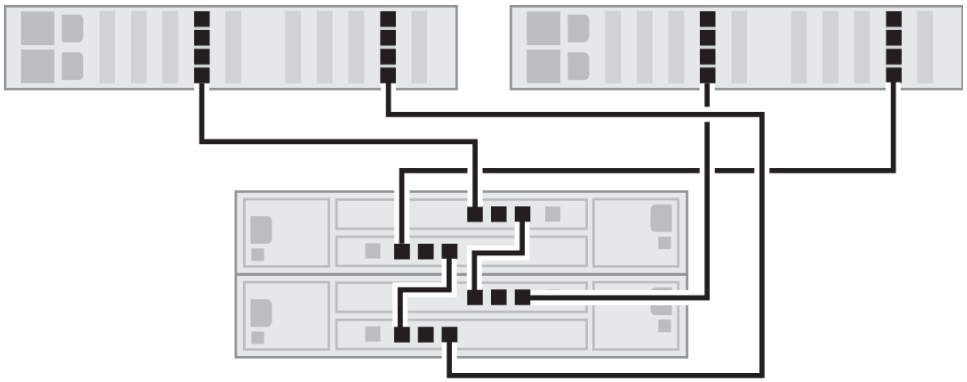
The following figure illustrates multiple Oracle Storage Drive Enclosure DE3-12C disk shelves in a single chain. The cable colors distinguish separate cable paths and do not reflect the actual cable colors.



The following figure shows clustered Oracle ZFS Storage ZS9-2 MR controllers with two HBAs each connected to one Oracle Storage Drive Enclosure DE3-12C disk shelf in a single chain.



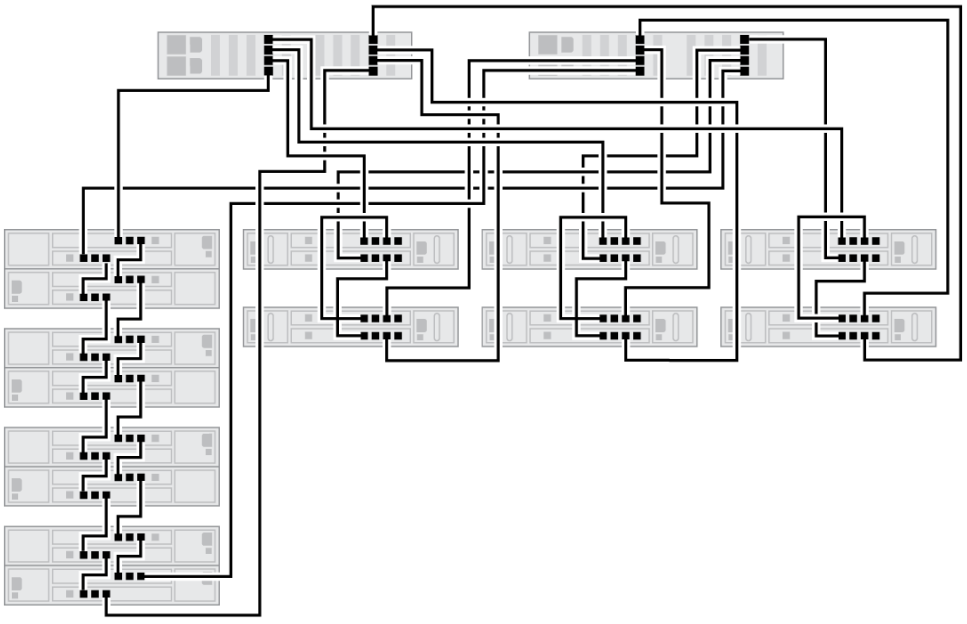
The following figure shows clustered Oracle ZFS Storage ZS9-2 MR controllers with two HBAs each connected to two Oracle Storage Drive Enclosure DE3-12C disk shelves as a pair in a single chain.



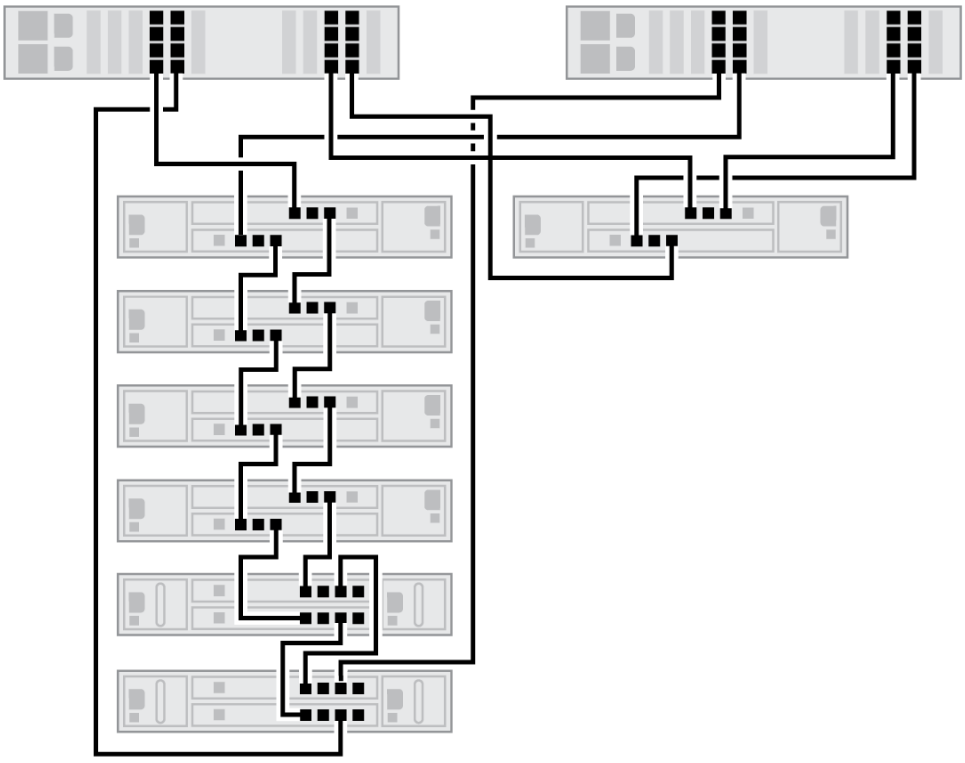
Example Mixed Disk Shelf Configurations

The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS9-2 controllers connected to Oracle Storage Drive Enclosure DE3-12C and other disk shelves. These serve as example configurations.

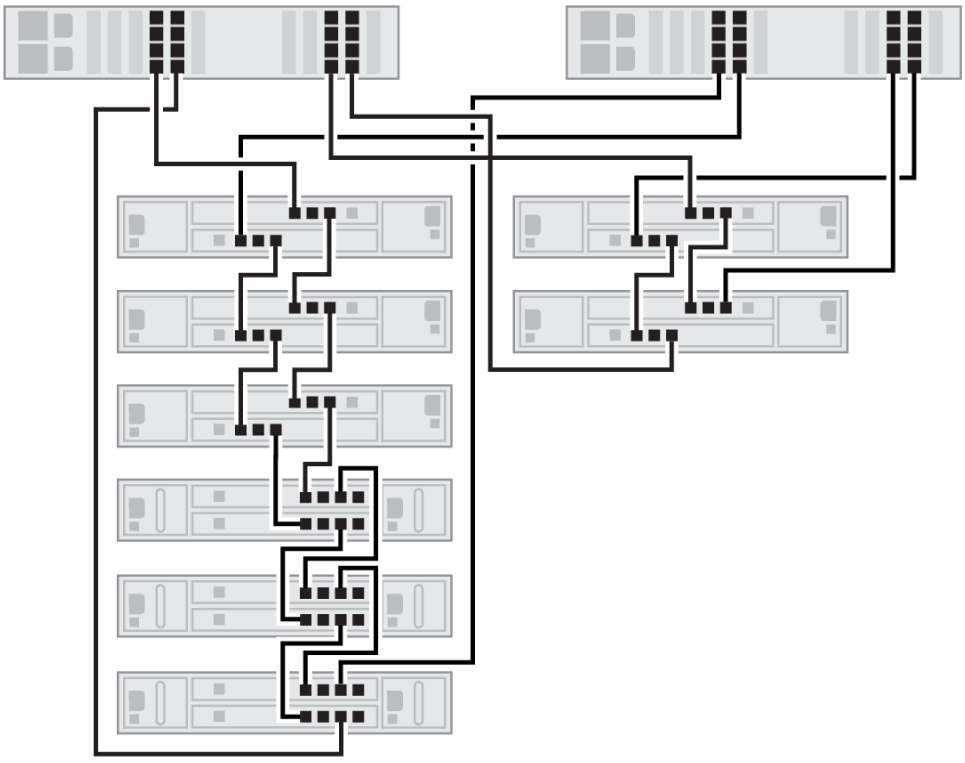
The following figure shows clustered Oracle ZFS Storage ZS9-2 MR controllers with two HBAs each connected to eight Oracle Storage Drive Enclosure DE3-12C disk shelves (first chain from the left) and six Oracle Storage Drive Enclosure DE3-24 disk shelves (two disk shelves per chain in the remaining three chains).



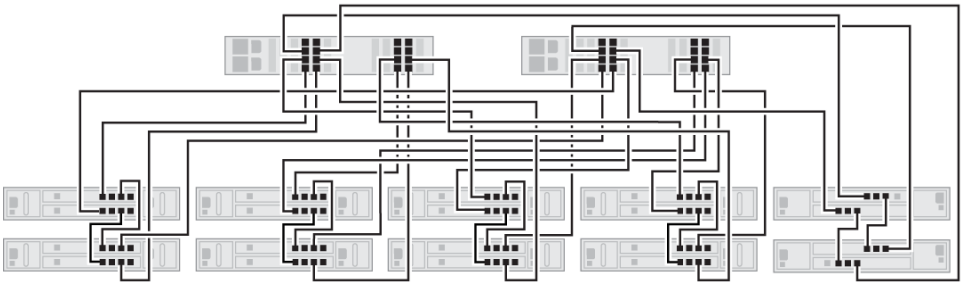
The following figure shows clustered Oracle ZFS Storage ZS9-2 HE controllers with four HBAs each connected to four Oracle Storage Drive Enclosure DE3-12C disk shelves (first chain from the left, top four disk shelves) and two Oracle Storage Drive Enclosure DE3-24 disk shelves (first chain from the left, bottom two disk shelves), and one Oracle Storage Drive Enclosure DE3-12C disk shelf (first chain from the right).



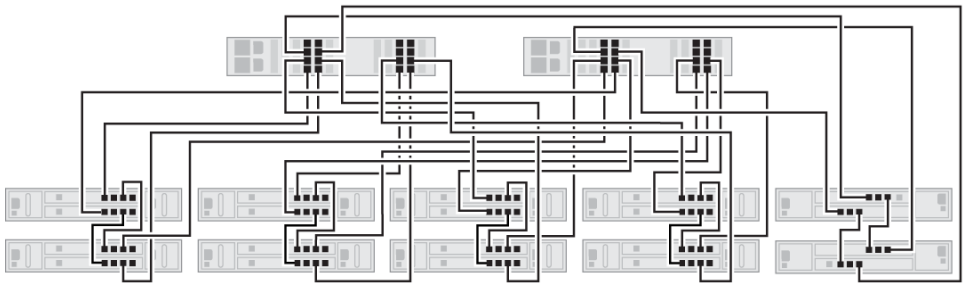
The following figure shows clustered Oracle ZFS Storage ZS9-2 HE controllers with four HBAs each connected to three Oracle Storage Drive Enclosure DE3-12C disk shelves (first chain from the left, top three disk shelves) and three Oracle Storage Drive Enclosure DE3-24 disk shelves (first chain from the left, bottom three disk shelves), and two Oracle Storage Drive Enclosure DE3-12C disk shelves (first chain from the right).



The following figure shows clustered Oracle ZFS Storage ZS9-2 HE controllers with four HBAs each connected to eight Oracle Storage Drive Enclosure DE3-24P All-Flash disk shelves (two disk shelves per chain in the first four chains from the left), and one Oracle Storage Drive Enclosure DE3-12C disk shelf (first chain from the right).



The following figure shows clustered Oracle ZFS Storage ZS9-2 HE controllers with four HBAs each connected to eight Oracle Storage Drive Enclosure DE3-24P All-Flash disk shelves (two disk shelves per chain in the first four chains from the left), and two Oracle Storage Drive Enclosure DE3-12C disk shelves (first chain from the right).



4

Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to 4X4 Port SAS-2 HBAs

This section contains guidelines for properly cabling standalone and clustered controllers to 4X4 port SAS-2 HBAs.

To review these guidelines, see the following topics:

- Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Oracle ZFS Storage ZS5-4 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Oracle ZFS Storage ZS5-2 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Oracle ZFS Storage ZS4-4/ZS3-4 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Oracle ZFS Storage ZS3-2 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Sun ZFS Storage 7420 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Sun ZFS Storage 7320 Controllers

Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Oracle ZFS Storage ZS5-4 Controllers

This section contains guidelines for properly cabling standalone and clustered Oracle ZFS Storage ZS5-4 controllers to Oracle Storage Drive Enclosure DE2-24 disk shelves. Use the diagrams in this section to connect to one or more disk shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

- Oracle ZFS Storage ZS5-4 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)
- Oracle ZFS Storage ZS5-4 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (3 HBAs)
- Oracle ZFS Storage ZS5-4 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (4 HBAs)
- Oracle ZFS Storage ZS5-4 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)
- Oracle ZFS Storage ZS5-4 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (3 HBAs)

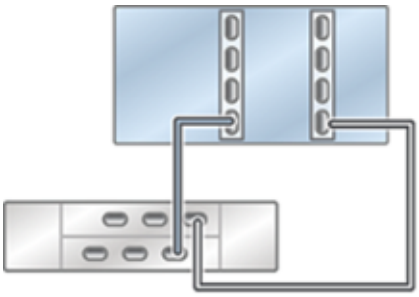
- Oracle ZFS Storage ZS5-4 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (4 HBAs)

Oracle ZFS Storage ZS5-4 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)

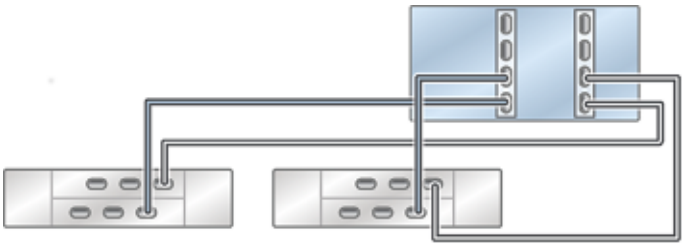
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-4 standalone controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For HBA port locations, see the hardware overview section for the Oracle ZFS Storage ZS5-4 controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

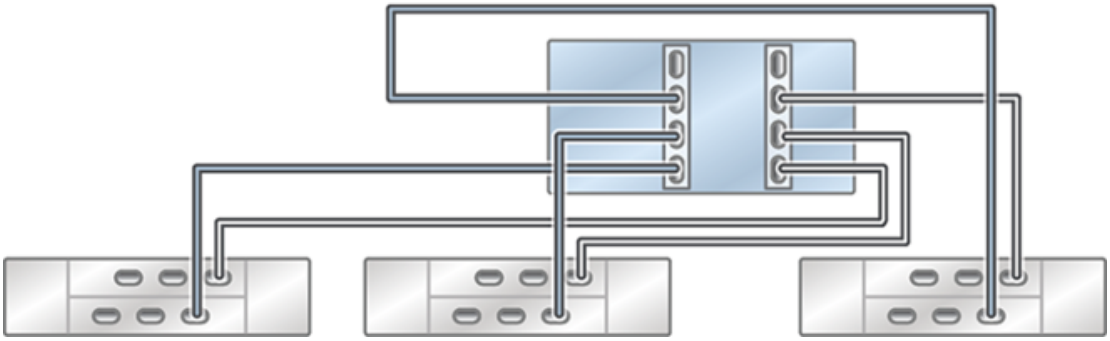
Standalone Oracle ZFS Storage ZS5-4 controller with two HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



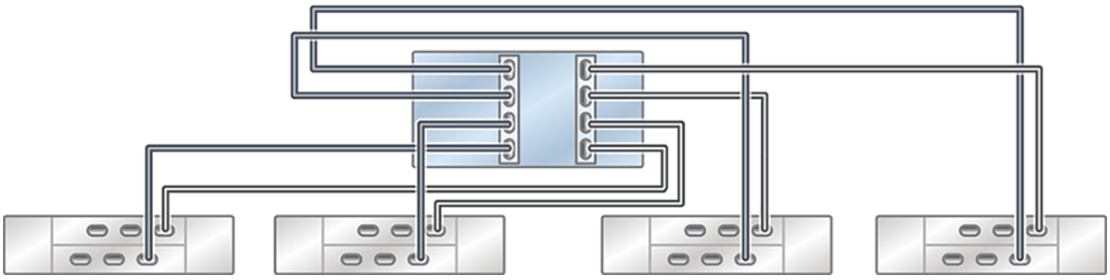
Standalone Oracle ZFS Storage ZS5-4 controller with two HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



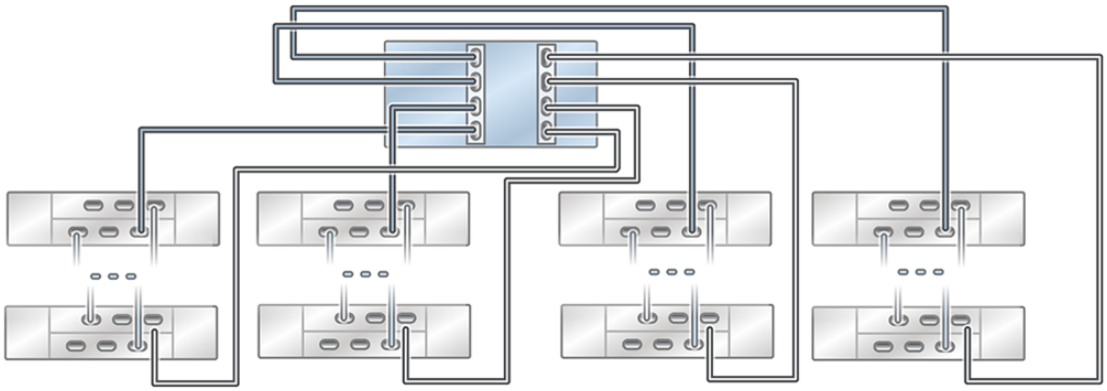
Standalone Oracle ZFS Storage ZS5-4 controller with two HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



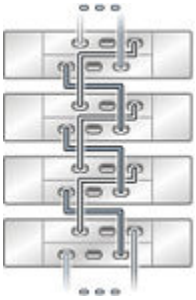
Standalone Oracle ZFS Storage ZS5-4 controller with two HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Standalone Oracle ZFS Storage ZS5-4 controller with two HBAs connected to multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Multiple disk shelves in a single chain

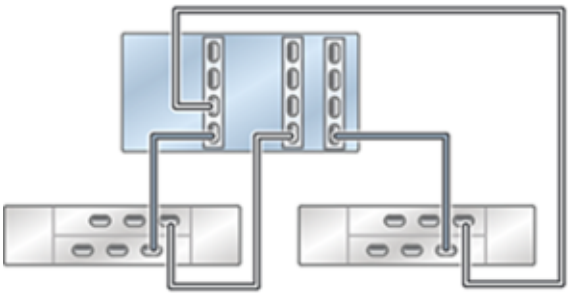


Oracle ZFS Storage ZS5-4 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (3 HBAs)

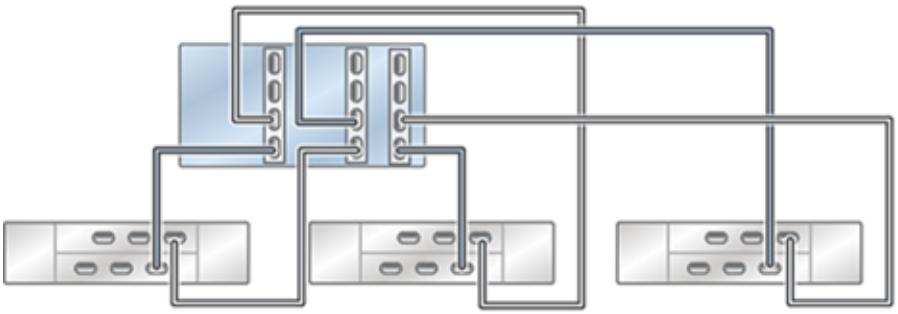
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-4 standalone controllers with three HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For HBA port locations, see the hardware overview section for the Oracle ZFS Storage ZS5-4 controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

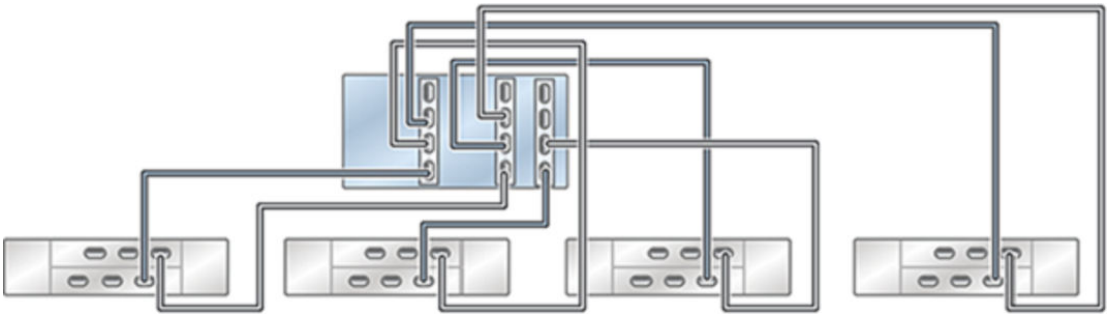
Standalone Oracle ZFS Storage ZS5-4 controller with three HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



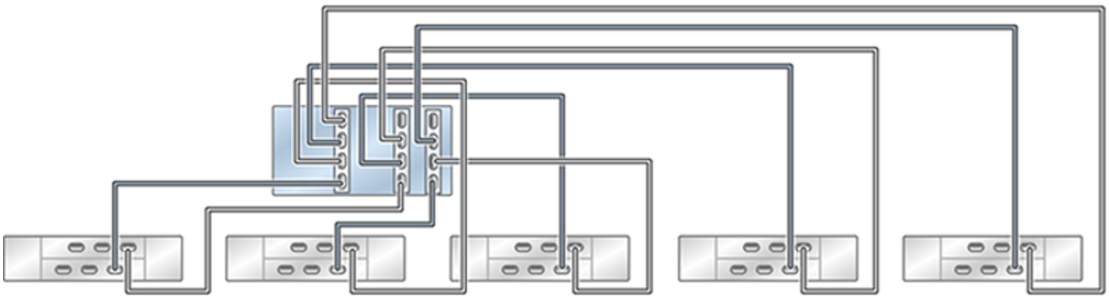
Standalone Oracle ZFS Storage ZS5-4 controller with three HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



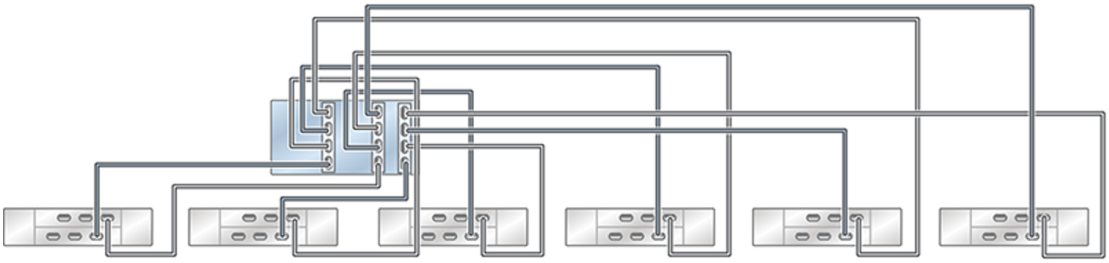
Standalone Oracle ZFS Storage ZS5-4 controller with three HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



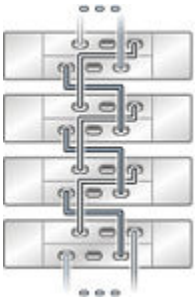
Standalone Oracle ZFS Storage ZS5-4 controller with three HBAs connected to five Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



Standalone Oracle ZFS Storage ZS5-4 controller with three HBAs connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



Multiple disk shelves in a single chain

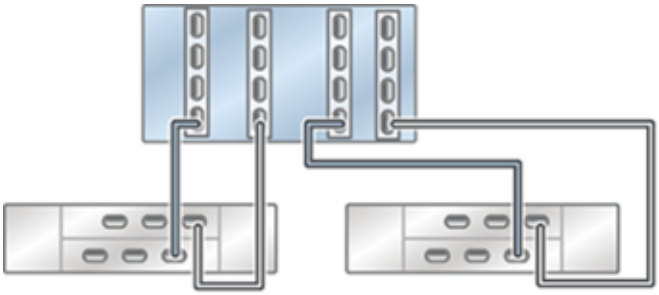


Oracle ZFS Storage ZS5-4 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (4 HBAs)

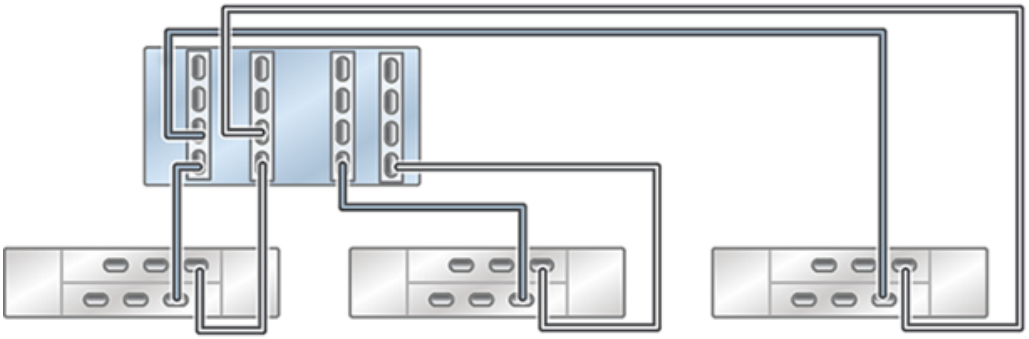
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-4 standalone controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For HBA port locations, see the hardware overview section for the Oracle ZFS Storage ZS5-4 controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

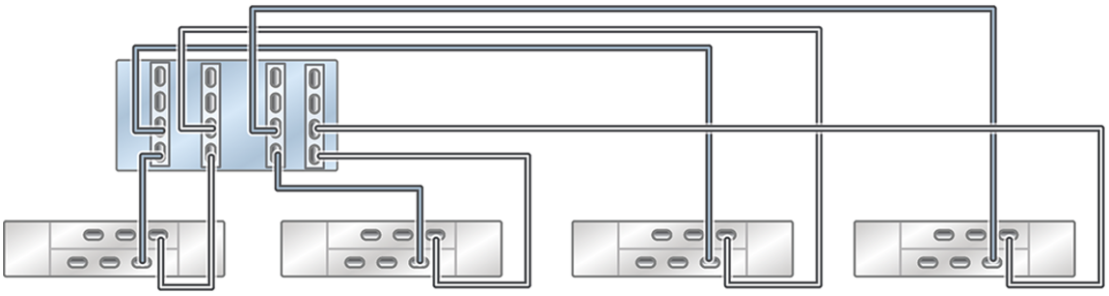
Standalone Oracle ZFS Storage ZS5-4 controller with four HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



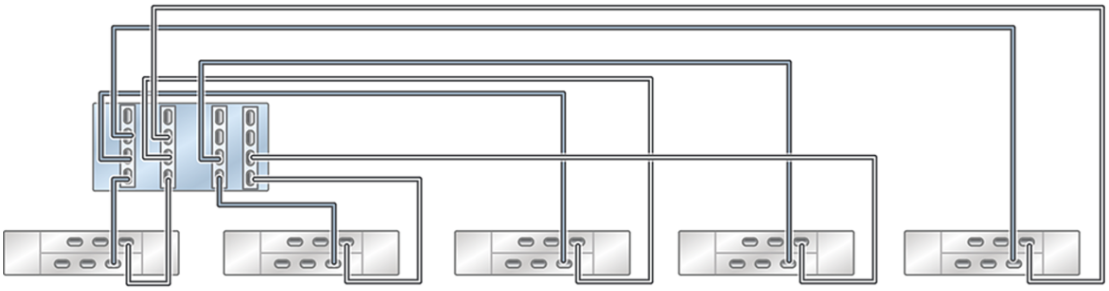
Standalone Oracle ZFS Storage ZS5-4 controller with four HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



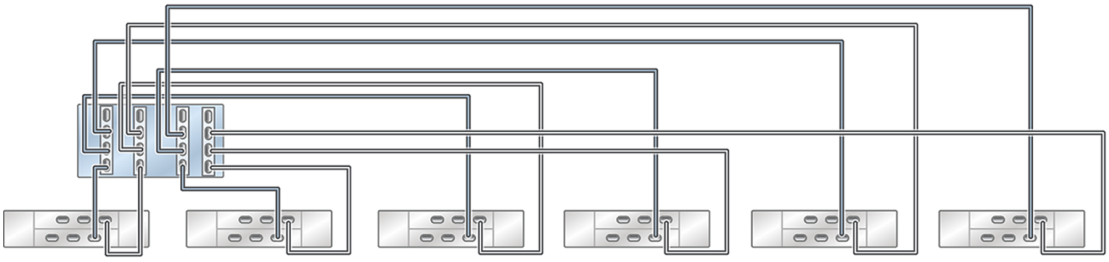
Standalone Oracle ZFS Storage ZS5-4 controller with four HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



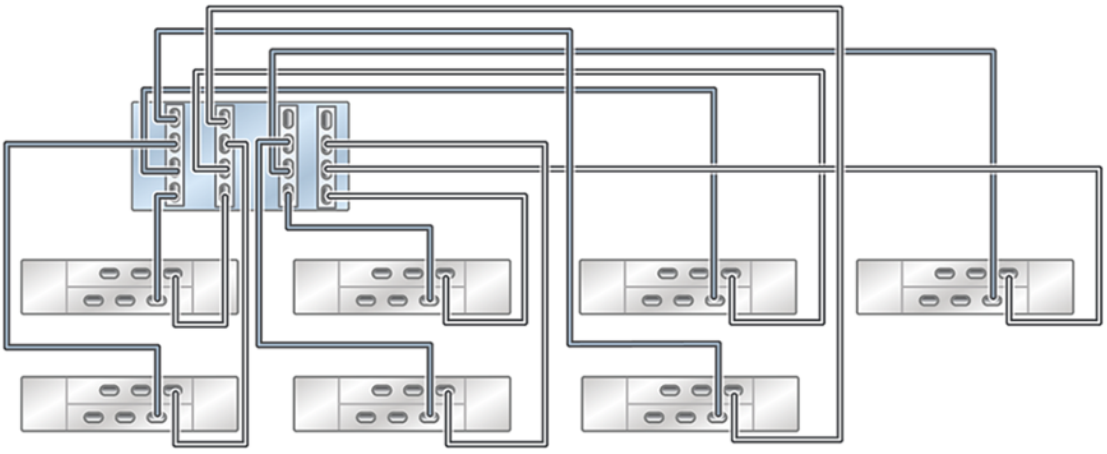
Standalone Oracle ZFS Storage ZS5-4 controller with four HBAs connected to five Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



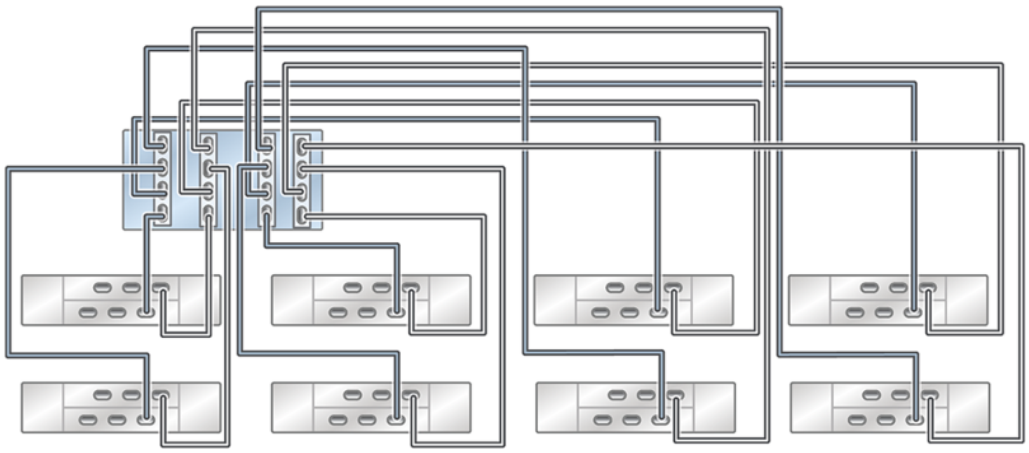
Standalone Oracle ZFS Storage ZS5-4 controller with four HBAs connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



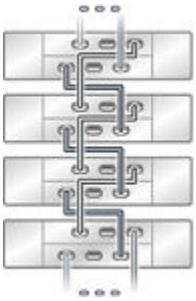
Standalone Oracle ZFS Storage ZS5-4 controller with four HBAs connected to seven Oracle Storage Drive Enclosure DE2-24 disk shelves in seven chains



Standalone Oracle ZFS Storage ZS5-4 controller with four HBAs connected to eight Oracle Storage Drive Enclosure DE2-24 disk shelves in eight chains



Multiple disk shelves in a single chain

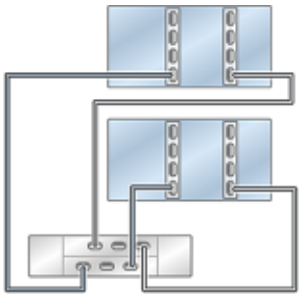


Oracle ZFS Storage ZS5-4 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)

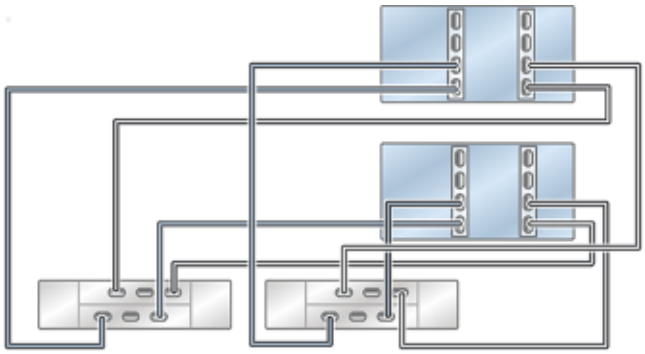
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-4 clustered controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For HBA port locations, see the hardware overview section for the Oracle ZFS Storage ZS5-4 controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

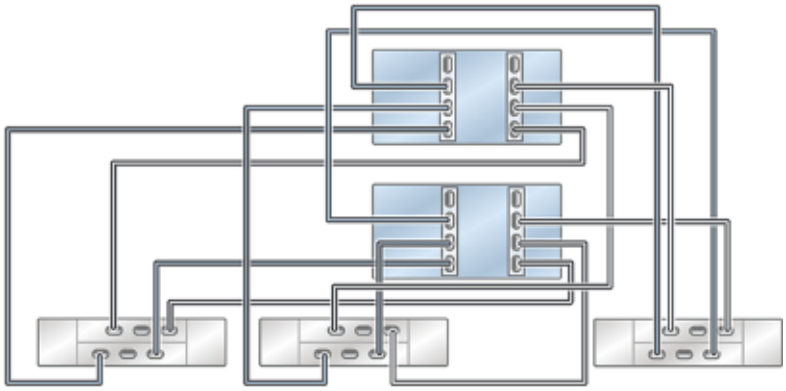
Clustered Oracle ZFS Storage ZS5-4 controllers with two HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



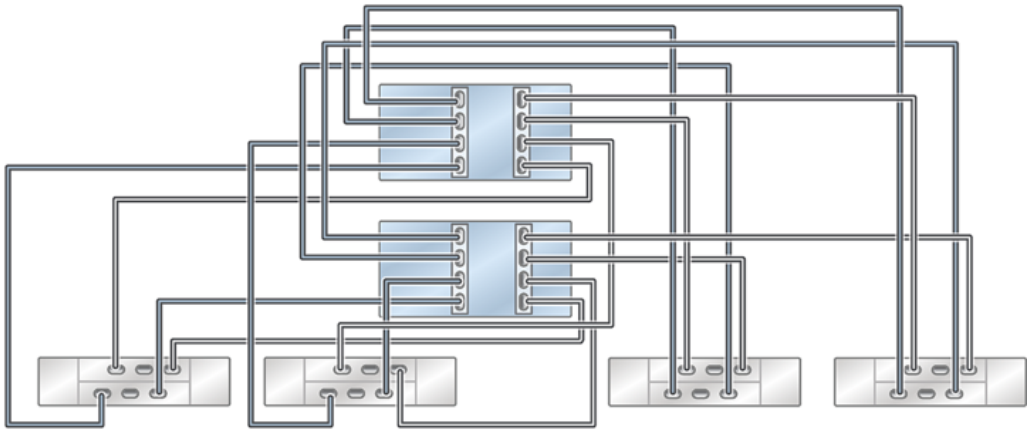
Clustered Oracle ZFS Storage ZS5-4 controllers with two HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



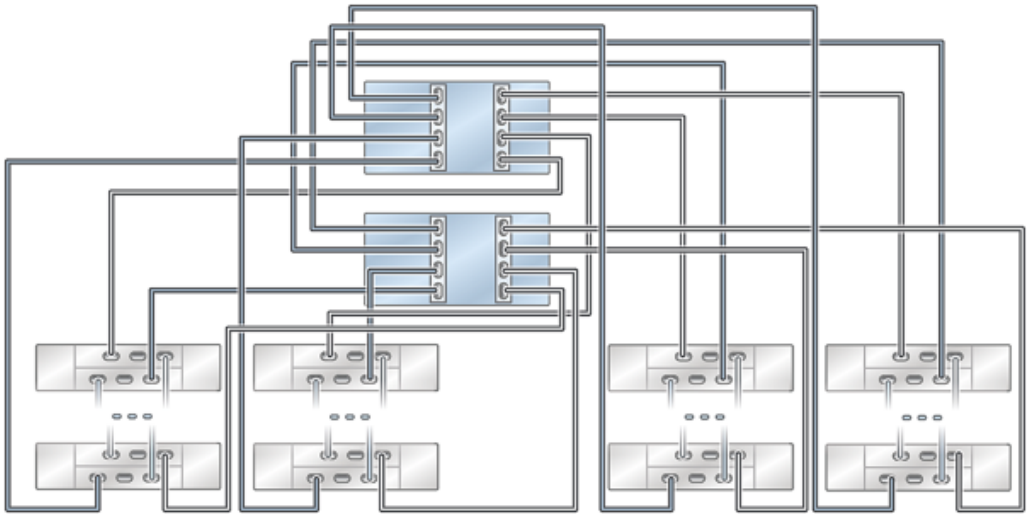
Clustered Oracle ZFS Storage ZS5-4 controllers with two HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



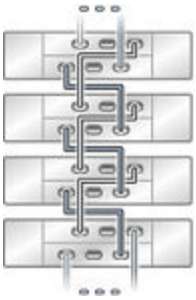
Clustered Oracle ZFS Storage ZS5-4 controllers with two HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Clustered Oracle ZFS Storage ZS5-4 controllers with two HBAs connected to multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Multiple disk shelves in a single chain

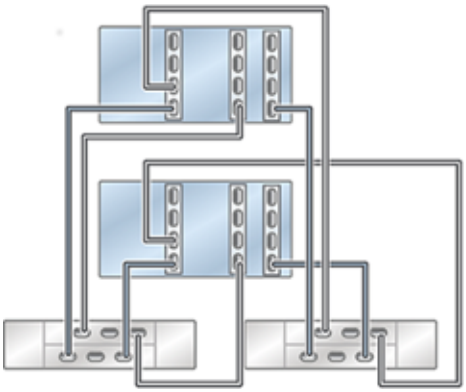


Oracle ZFS Storage ZS5-4 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (3 HBAs)

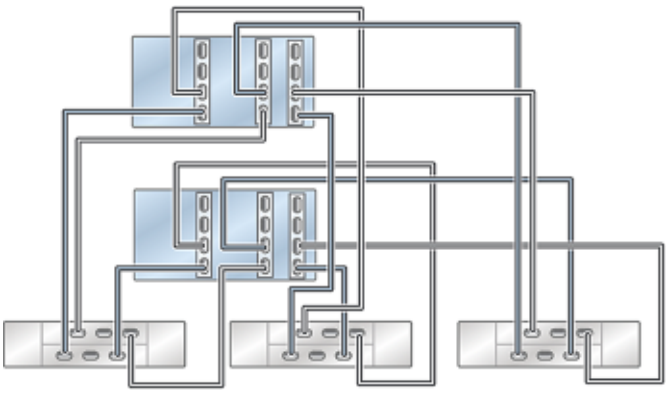
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-4 clustered controllers with three HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For HBA port locations, see the hardware overview section for the Oracle ZFS Storage ZS5-4 controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

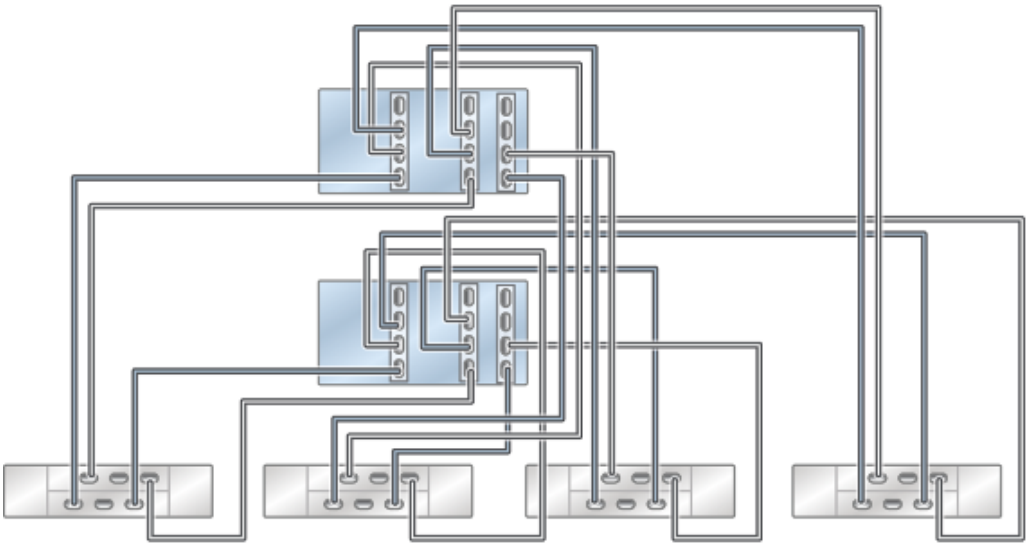
Clustered Oracle ZFS Storage ZS5-4 controllers with three HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



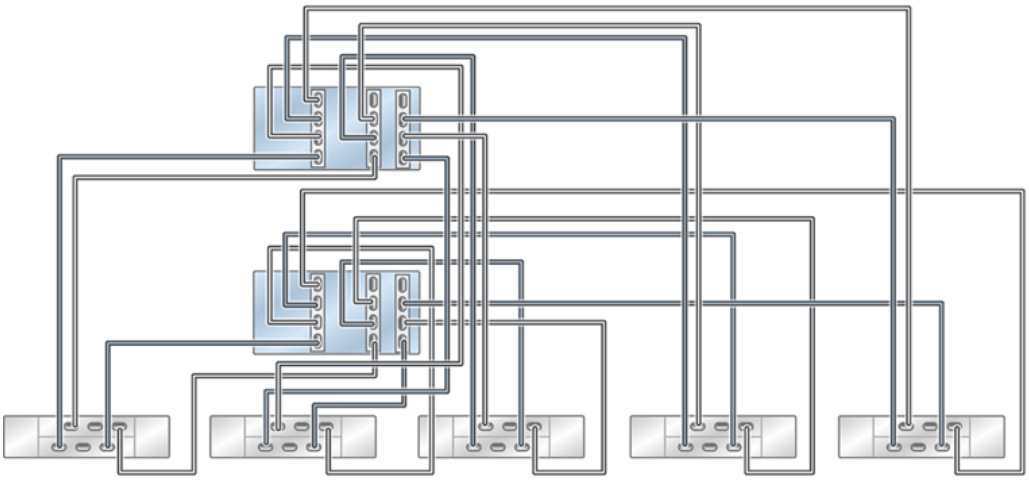
Clustered Oracle ZFS Storage ZS5-4 controllers with three HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



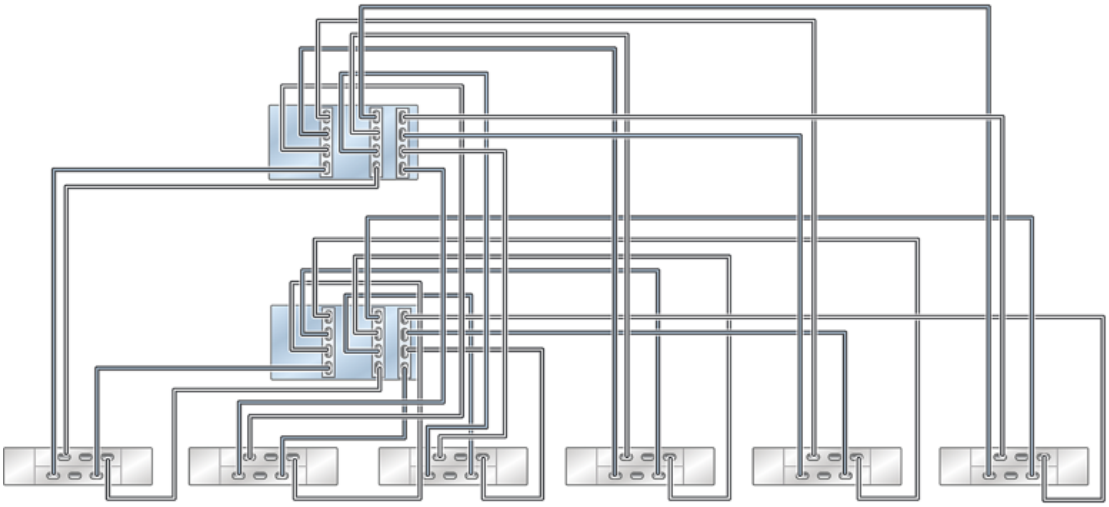
Clustered Oracle ZFS Storage ZS5-4 controllers with three HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



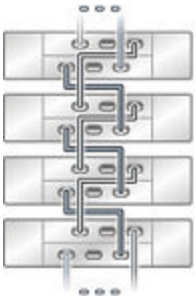
Clustered Oracle ZFS Storage ZS5-4 controllers with three HBAs connected to five Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



Clustered Oracle ZFS Storage ZS5-4 controllers with three HBAs connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



Multiple disk shelves in a single chain

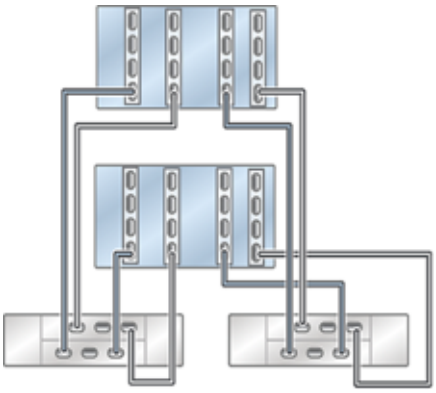


Oracle ZFS Storage ZS5-4 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (4 HBAs)

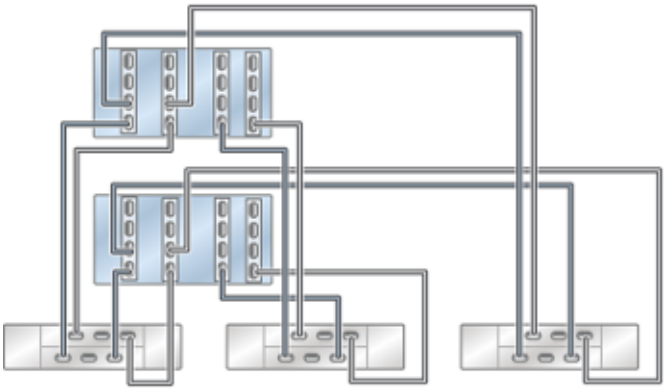
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-4 clustered controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For HBA port locations, see the hardware overview section for the Oracle ZFS Storage ZS5-4 controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

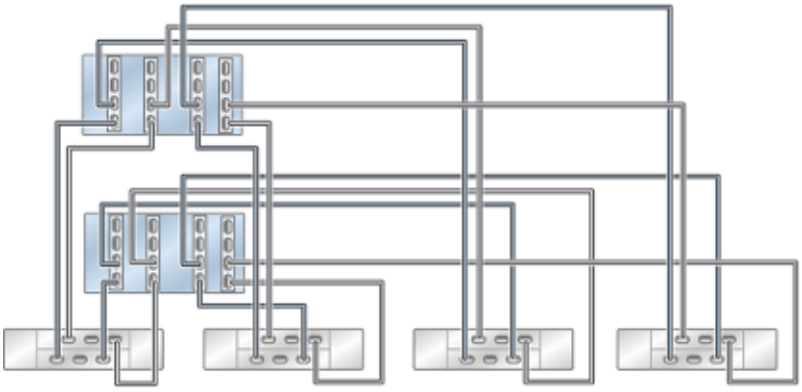
Clustered Oracle ZFS Storage ZS5-4 controllers with four HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



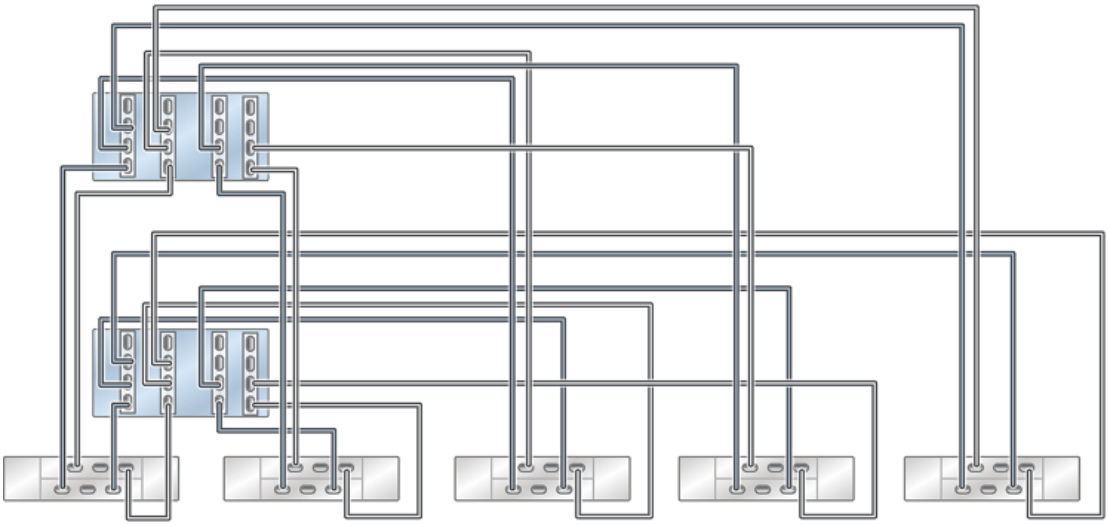
Clustered Oracle ZFS Storage ZS5-4 controllers with four HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



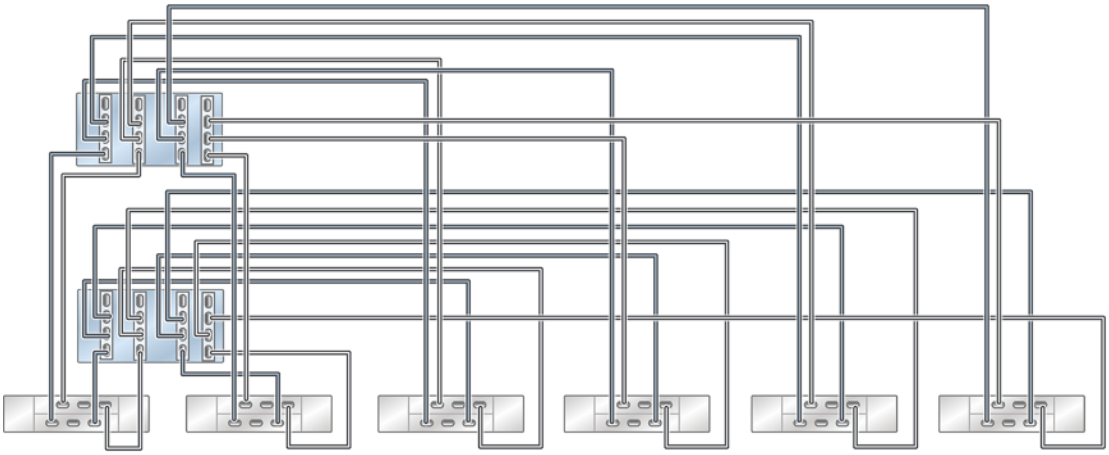
Clustered Oracle ZFS Storage ZS5-4 controllers with four HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



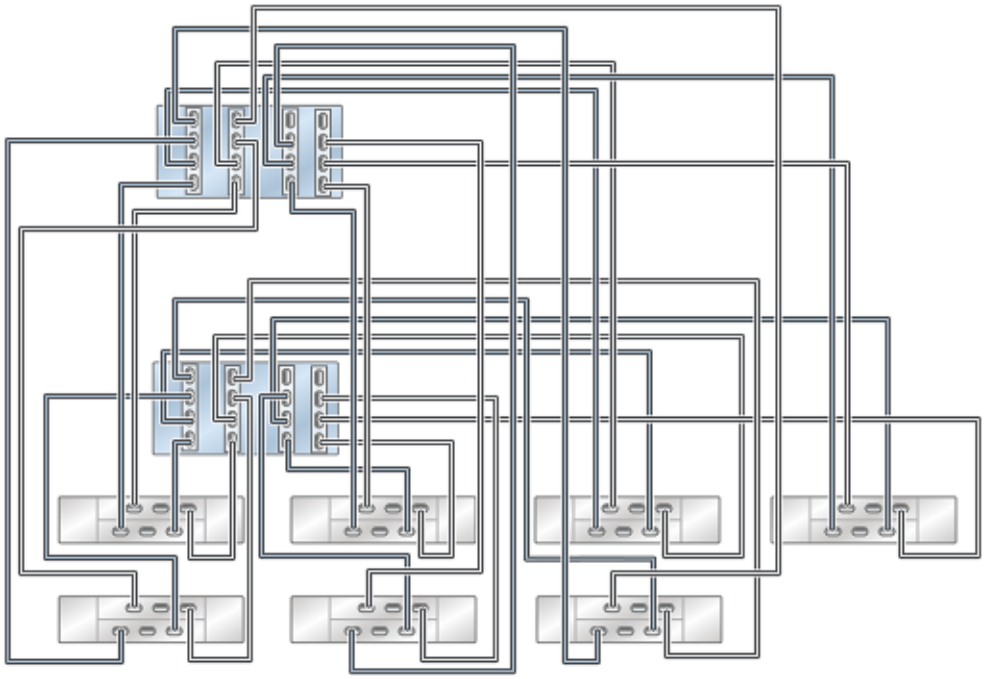
Clustered Oracle ZFS Storage ZS5-4 controllers with four HBAs connected to five Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



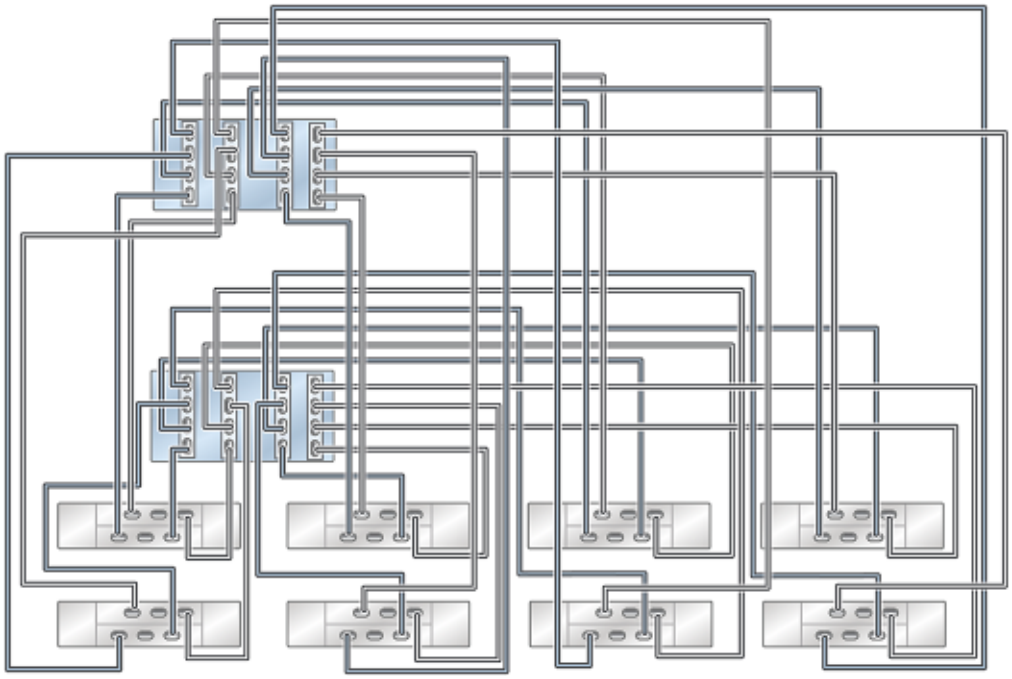
Clustered Oracle ZFS Storage ZS5-4 controllers with four HBAs connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



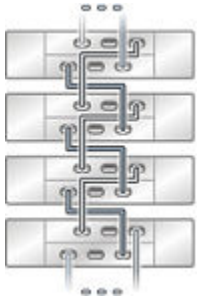
Clustered Oracle ZFS Storage ZS5-4 controllers with four HBAs connected to seven Oracle Storage Drive Enclosure DE2-24 disk shelves in seven chains



Clustered Oracle ZFS Storage ZS5-4 controllers with four HBAs connected to eight Oracle Storage Drive Enclosure DE2-24 disk shelves in eight chains



Multiple disk shelves in a single chain



Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Oracle ZFS Storage ZS5-2 Controllers

This section contains guidelines for properly cabling standalone and clustered Oracle ZFS Storage ZS5-2 controllers to Oracle Storage Drive Enclosure DE2-24 disk shelves. Use the diagrams in this section to connect to one or more disk shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

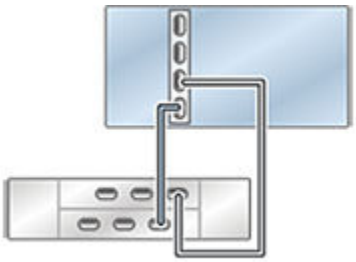
- Oracle ZFS Storage ZS5-2 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (1 HBA)
- Oracle ZFS Storage ZS5-2 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)
- Oracle ZFS Storage ZS5-2 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (1 HBA)
- Oracle ZFS Storage ZS5-2 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)

Oracle ZFS Storage ZS5-2 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (1 HBA)

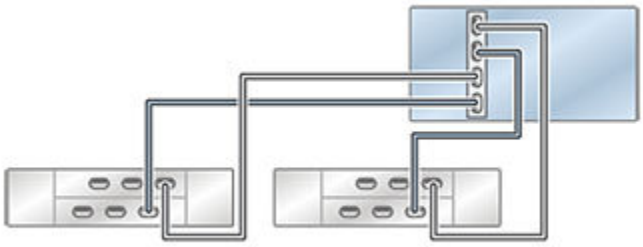
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-2 standalone controllers with one HBA. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For HBA port locations, see the hardware overview section for the Oracle ZFS Storage ZS5-2 controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

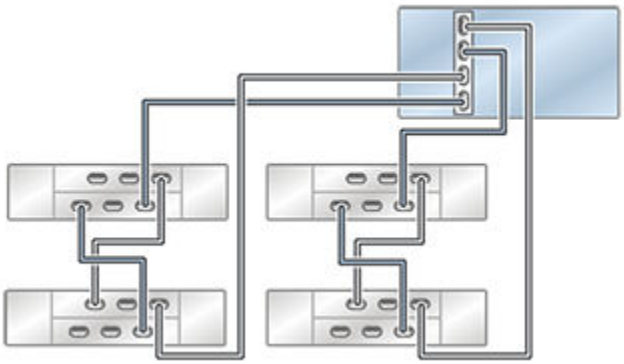
Standalone Oracle ZFS Storage ZS5-2 controller with one HBA connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



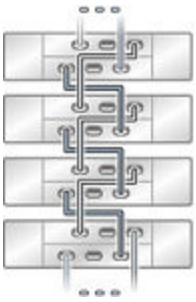
Standalone Oracle ZFS Storage ZS5-2 controller with one HBA connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



Standalone Oracle ZFS Storage ZS5-2 controller with one HBA connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



Multiple disk shelves in a single chain

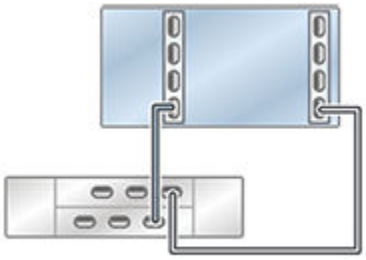


Oracle ZFS Storage ZS5-2 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)

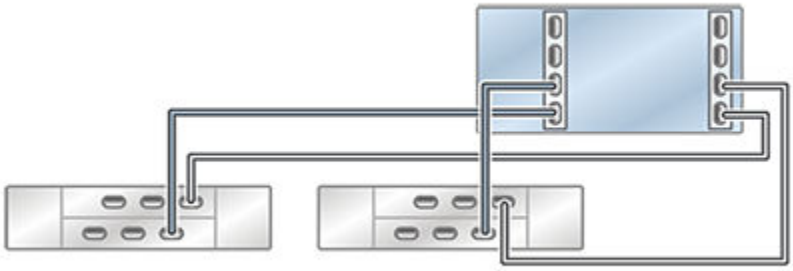
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-2 standalone controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For HBA port locations, see the hardware overview section for the Oracle ZFS Storage ZS5-2 controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

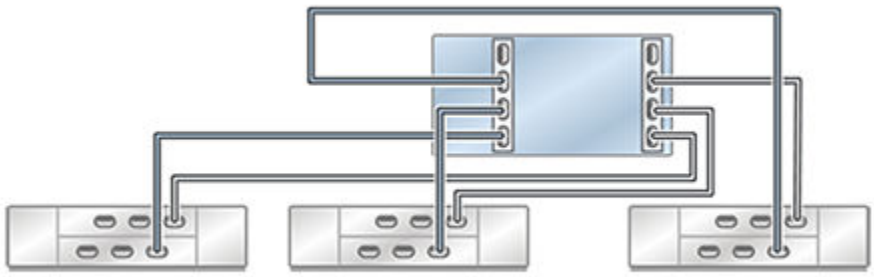
Standalone Oracle ZFS Storage ZS5-2 controller with two HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



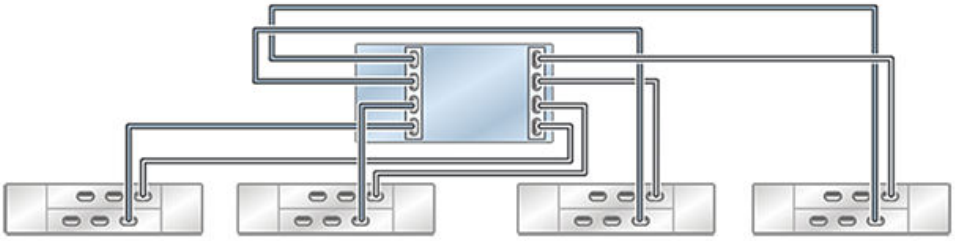
Standalone Oracle ZFS Storage ZS5-2 controller with two HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



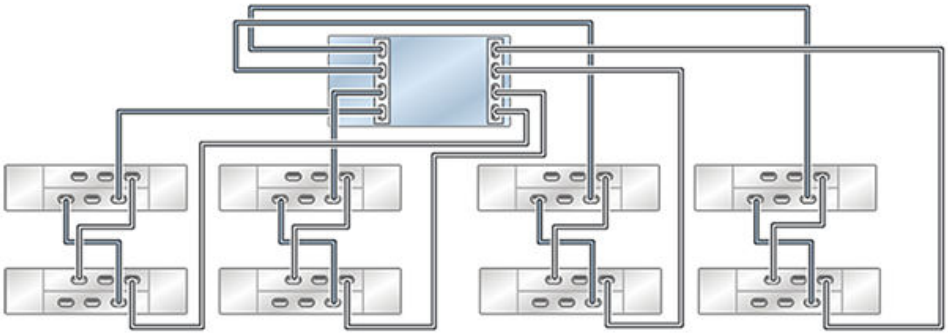
Standalone Oracle ZFS Storage ZS5-2 controller with two HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



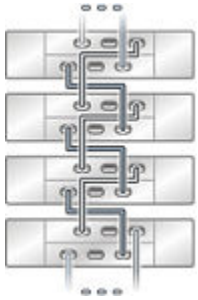
Standalone Oracle ZFS Storage ZS5-2 controller with two HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Standalone Oracle ZFS Storage ZS5-2 controller with two HBAs connected to eight Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Multiple disk shelves in a single chain

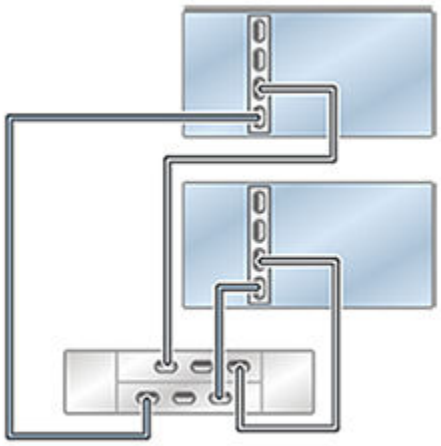


Oracle ZFS Storage ZS5-2 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (1 HBA)

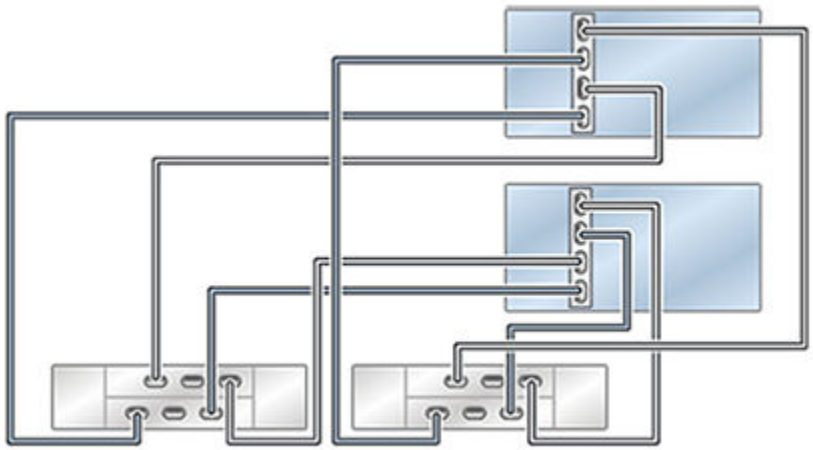
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-2 clustered controllers with one HBA. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For HBA port locations, see the hardware overview section for the Oracle ZFS Storage ZS5-2 controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

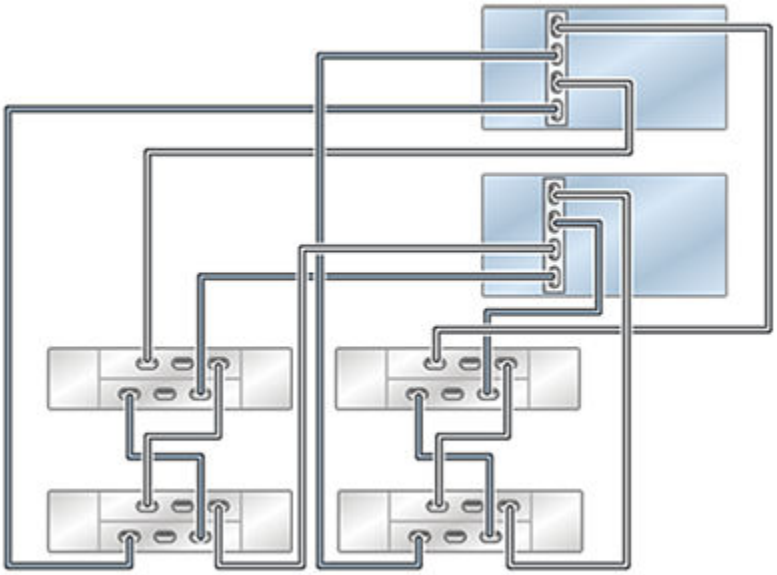
Clustered Oracle ZFS Storage ZS5-2 controllers with one HBA connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



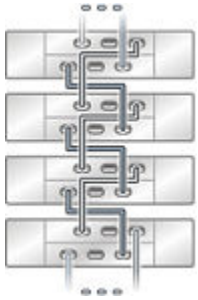
Clustered Oracle ZFS Storage ZS5-2 controllers with one HBA connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



Clustered Oracle ZFS Storage ZS5-2 controllers with one HBA connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



Multiple disk shelves in a single chain

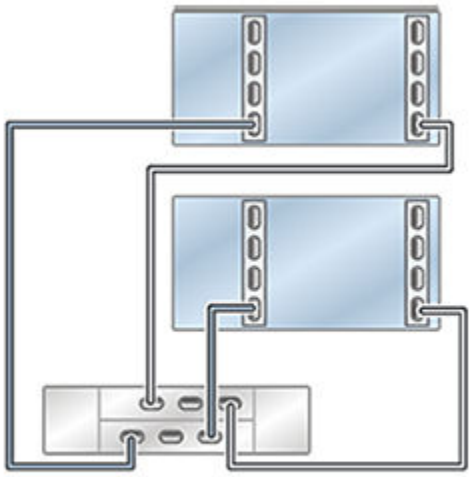


Oracle ZFS Storage ZS5-2 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)

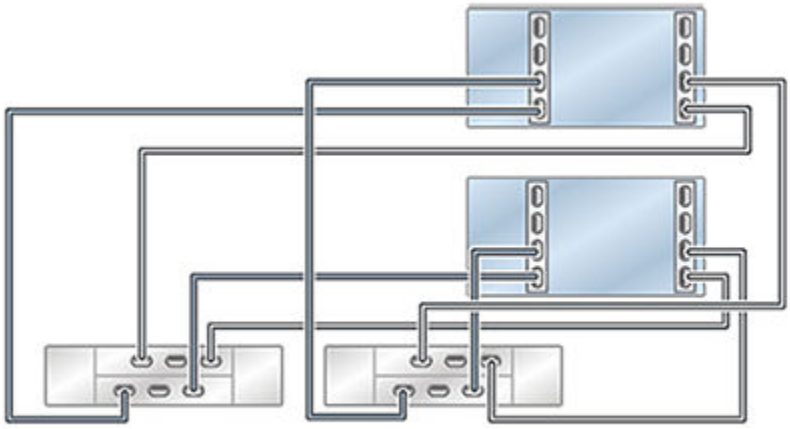
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS5-2 clustered controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For HBA port locations, see the hardware overview section for the Oracle ZFS Storage ZS5-2 controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

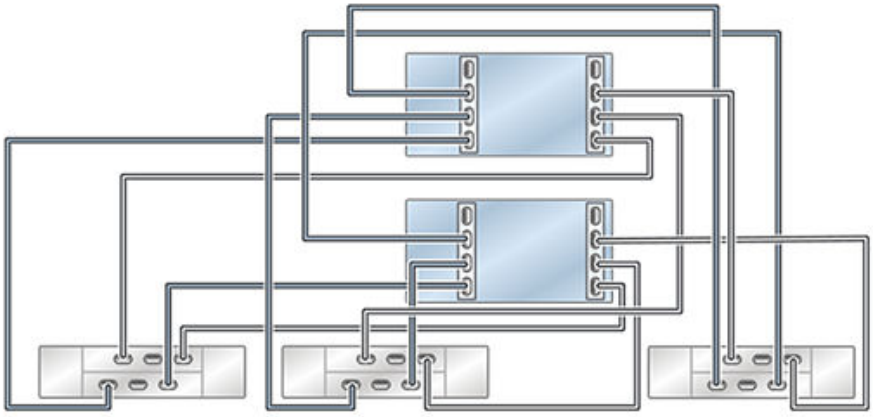
Clustered Oracle ZFS Storage ZS5-2 controllers with two HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



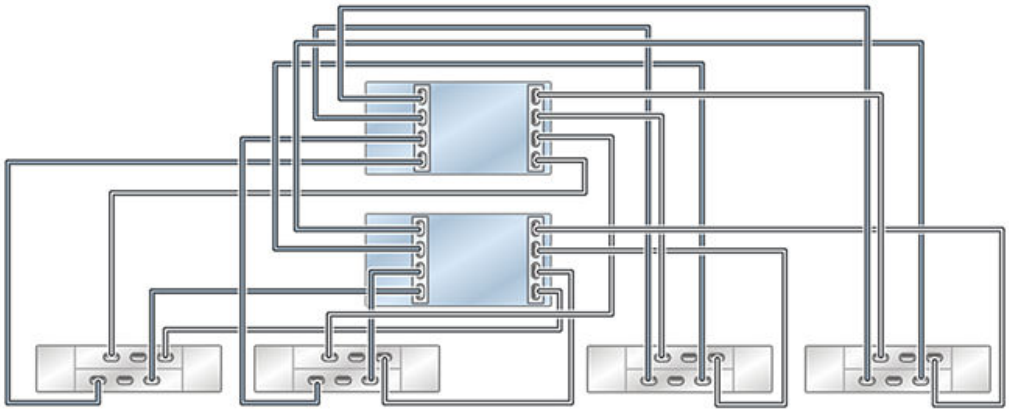
Clustered Oracle ZFS Storage ZS5-2 controllers with two HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



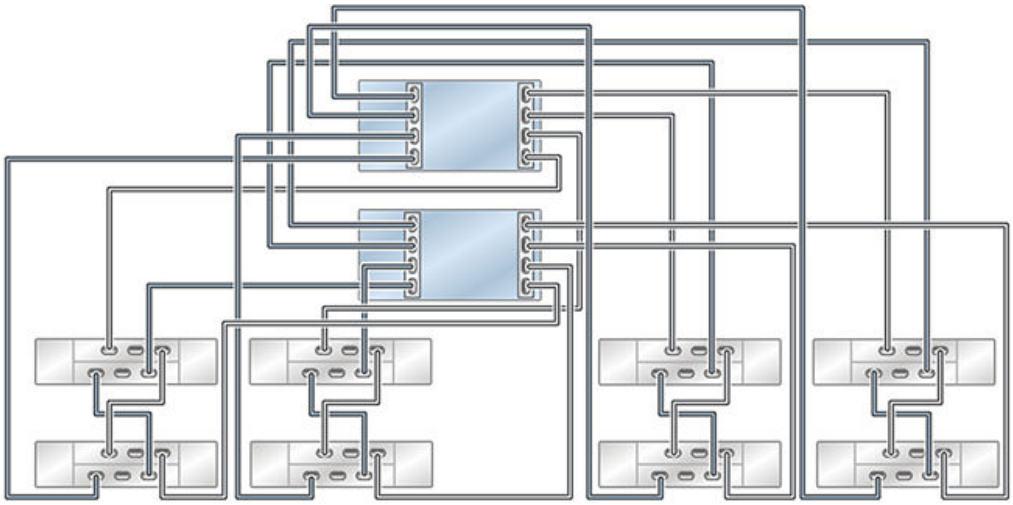
Clustered Oracle ZFS Storage ZS5-2 controllers with two HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



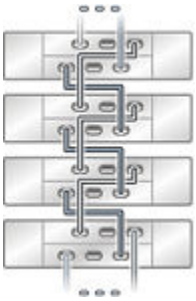
Clustered Oracle ZFS Storage ZS5-2 controllers with two HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Clustered Oracle ZFS Storage ZS5-2 controllers with two HBAs connected to eight Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Multiple disk shelves in a single chain



Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Oracle ZFS Storage ZS4-4/ZS3-4 Controllers

This section contains guidelines for properly cabling standalone and clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers to Oracle Storage Drive Enclosure DE2-24 disk shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

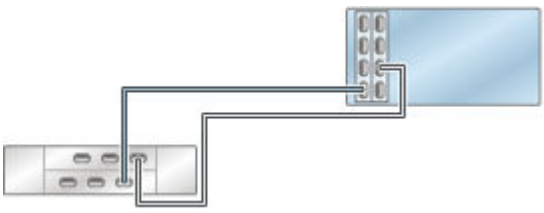
- Oracle ZFS Storage ZS4-4/ZS3-4 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)
- Oracle ZFS Storage ZS4-4/ZS3-4 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (3 HBAs)
- Oracle ZFS Storage ZS4-4/ZS3-4 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (4 HBAs)
- Oracle ZFS Storage ZS4-4/ZS3-4 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)
- Oracle ZFS Storage ZS4-4/ZS3-4 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (3 HBAs)
- Oracle ZFS Storage ZS4-4/ZS3-4 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (4 HBAs)

Oracle ZFS Storage ZS4-4/ZS3-4 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)

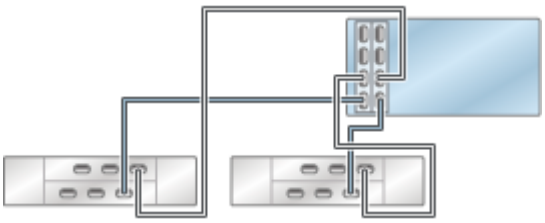
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS4-4/ZS3-4 standalone controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

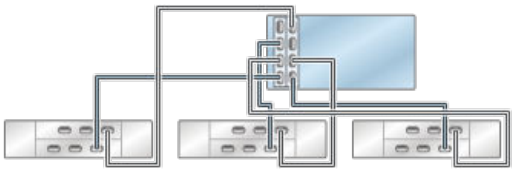
Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with two HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



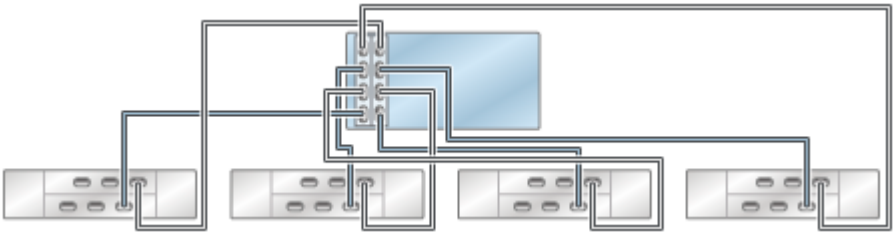
Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with two HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



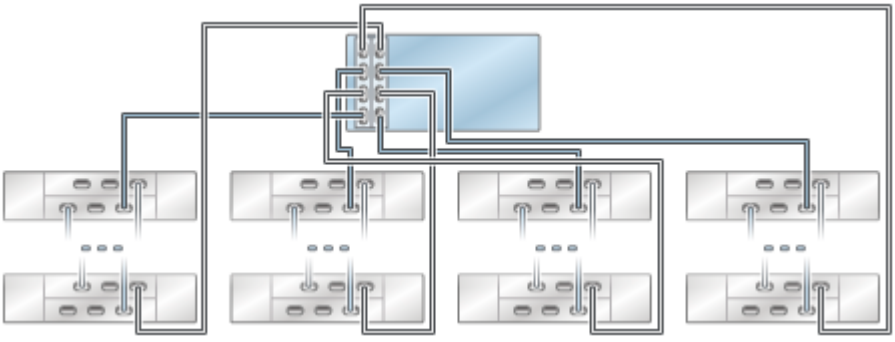
Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with two HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



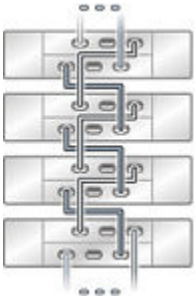
Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with two HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with two HBAs connected to multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Multiple disk shelves in a single chain



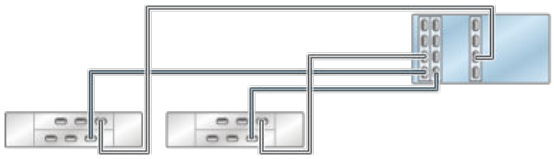
Oracle ZFS Storage ZS4-4/ZS3-4 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (3 HBAs)

The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS4-4/ZS3-4 standalone controllers with three HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

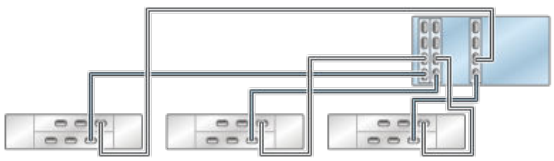
> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with three HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain

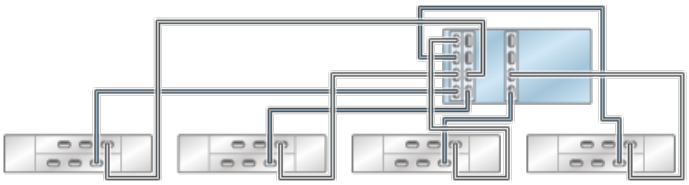
Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with three HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



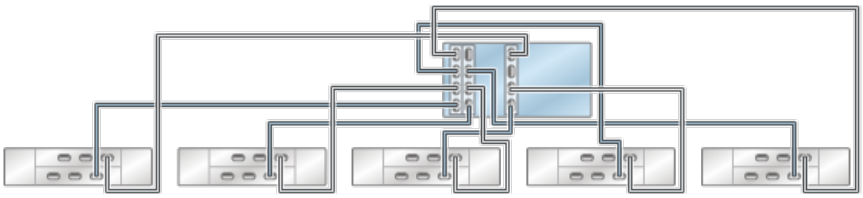
Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with three HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



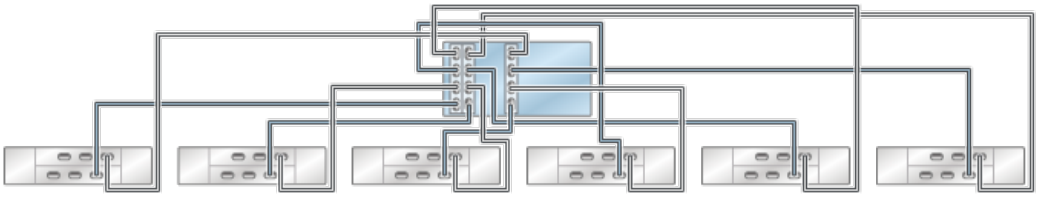
Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with three HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



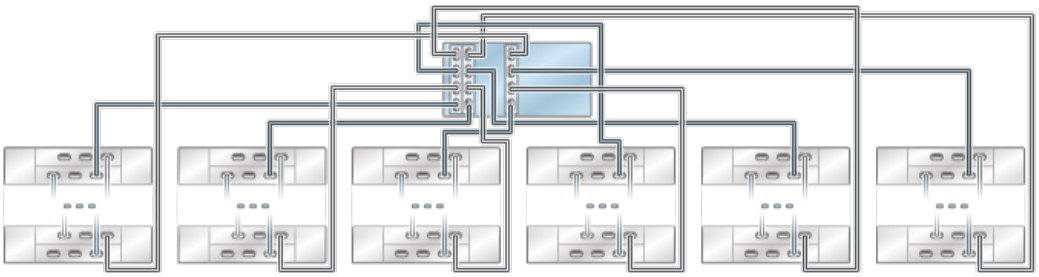
Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with three HBAs connected to five Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



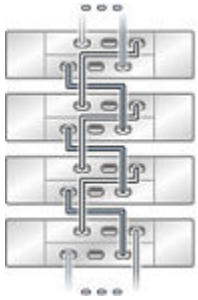
Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with three HBAs connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with three HBAs connected to multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



Multiple disk shelves in a single chain

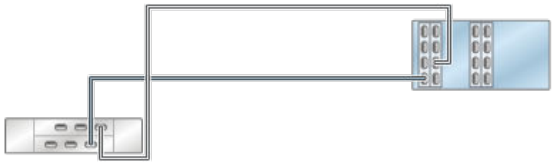


Oracle ZFS Storage ZS4-4/ZS3-4 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (4 HBAs)

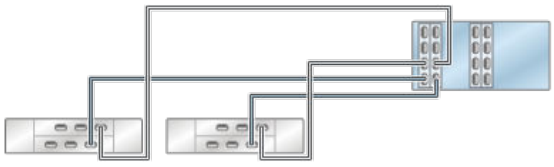
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS4-4/ZS3-4 standalone controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

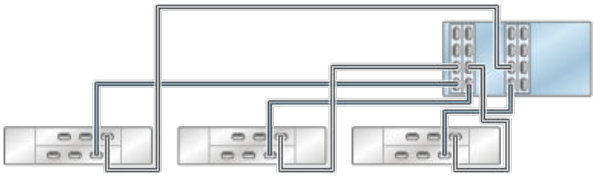
Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with four HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



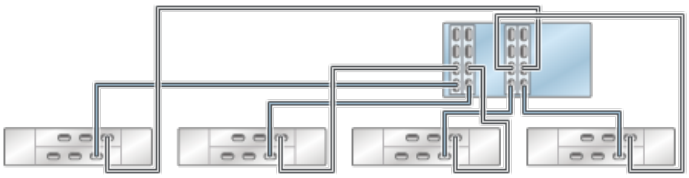
Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with four HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



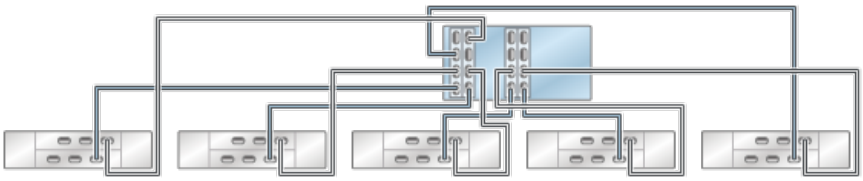
Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with four HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



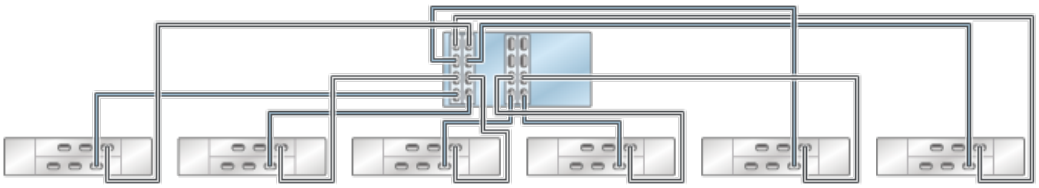
Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with four HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



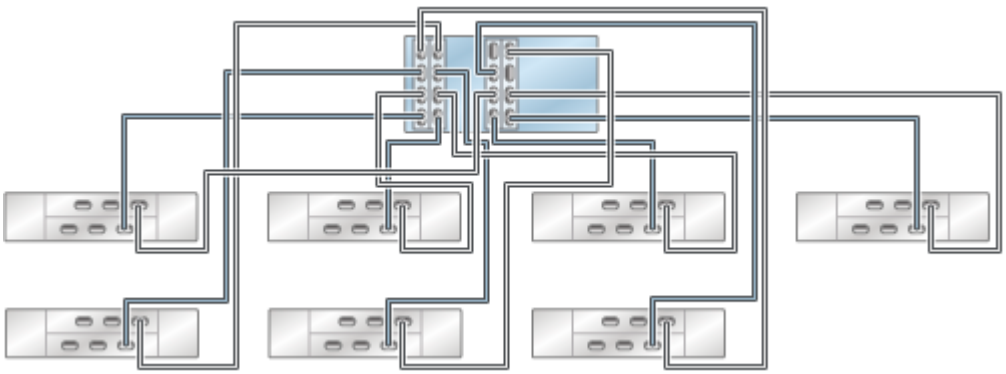
Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with four HBAs connected to five Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



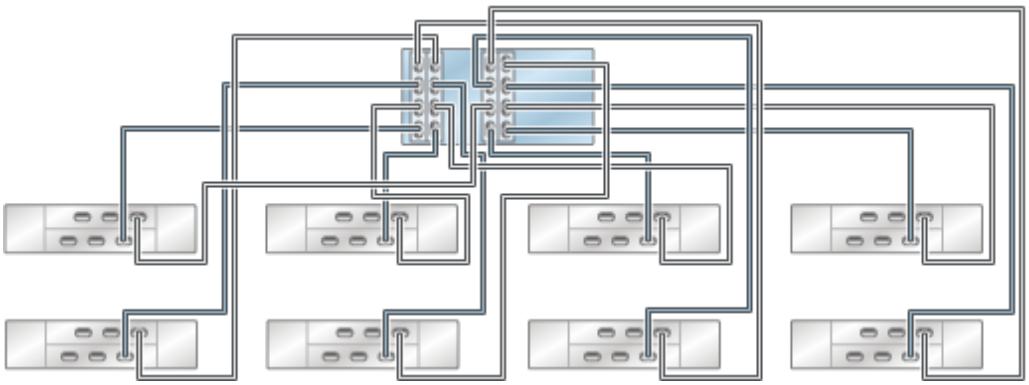
Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with four HBAs connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



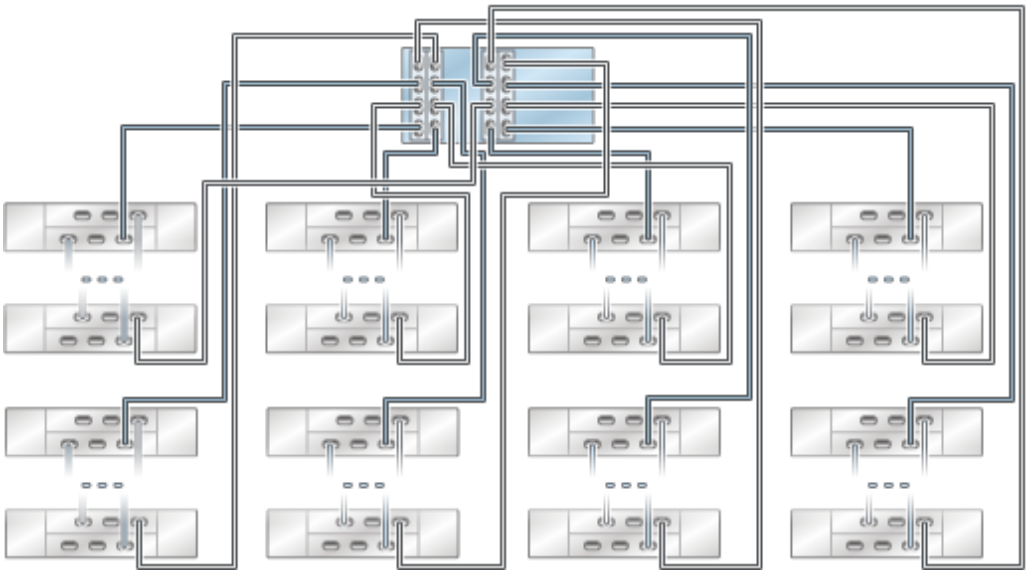
Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with four HBAs connected to seven Oracle Storage Drive Enclosure DE2-24 disk shelves in seven chains



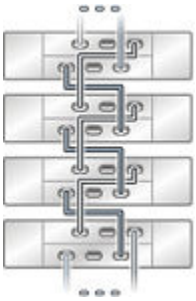
Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with four HBAs connected to eight Oracle Storage Drive Enclosure DE2-24 disk shelves in eight chains



Standalone Oracle ZFS Storage ZS4-4/ZS3-4 controller with four HBAs connected to multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in eight chains



Multiple disk shelves in a single chain

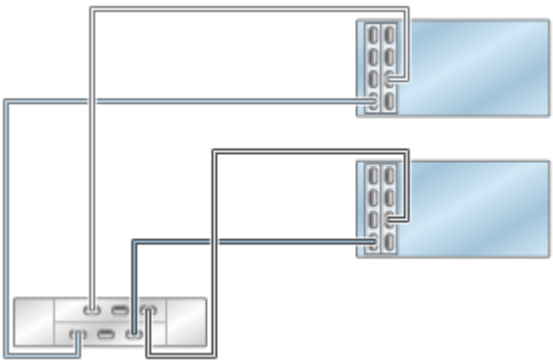


Oracle ZFS Storage ZS4-4/ZS3-4 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)

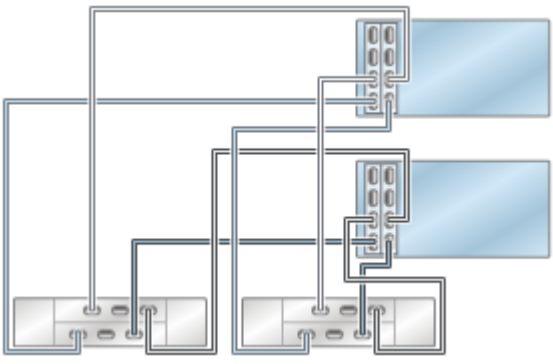
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS4-4/ZS3-4 clustered controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

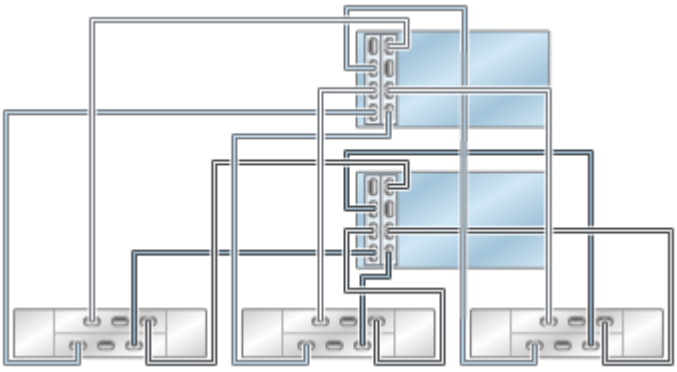
Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with two HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



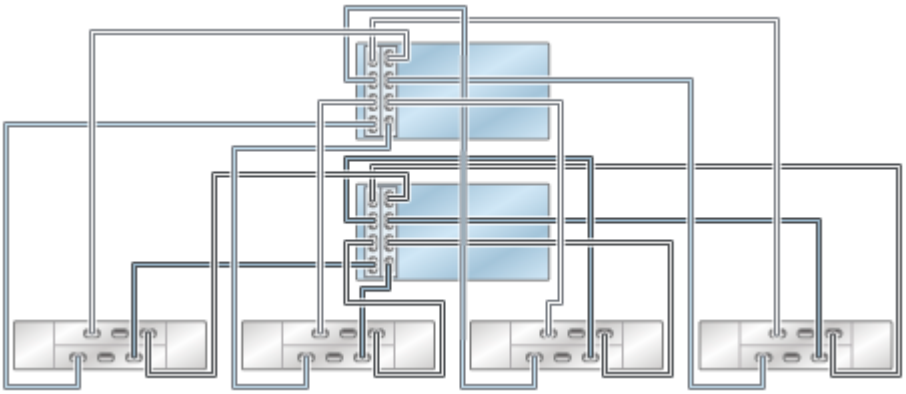
Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with two HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



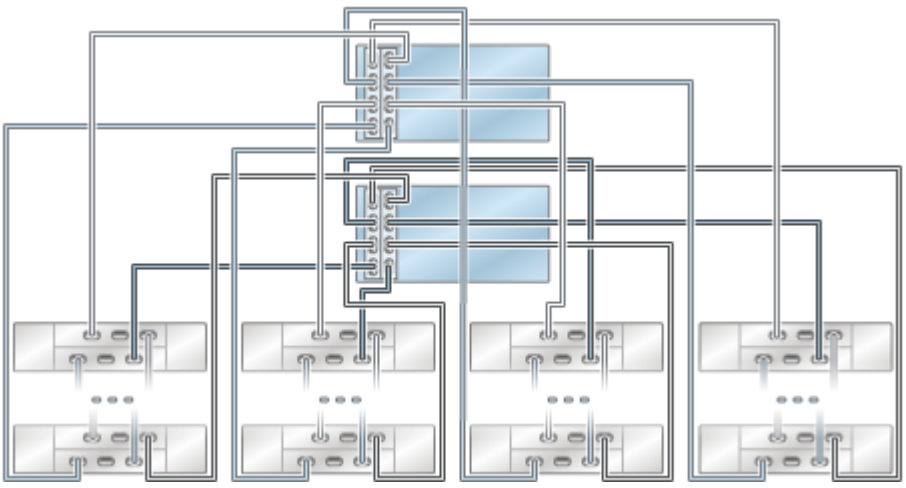
Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with two HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



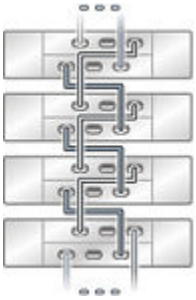
Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with two HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with two HBAs connected to multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Multiple disk shelves in a single chain



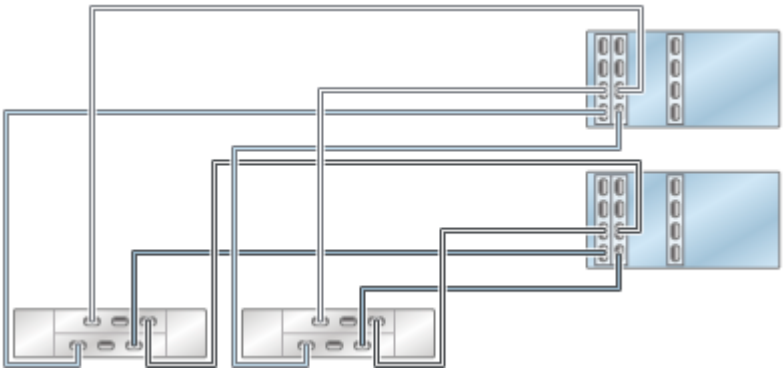
Oracle ZFS Storage ZS4-4/ZS3-4 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (3 HBAs)

The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS4-4/ZS3-4 clustered controllers with three HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

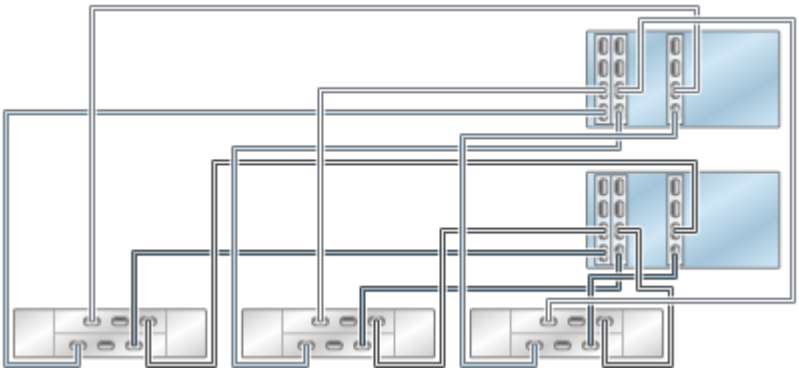
> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with three HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain

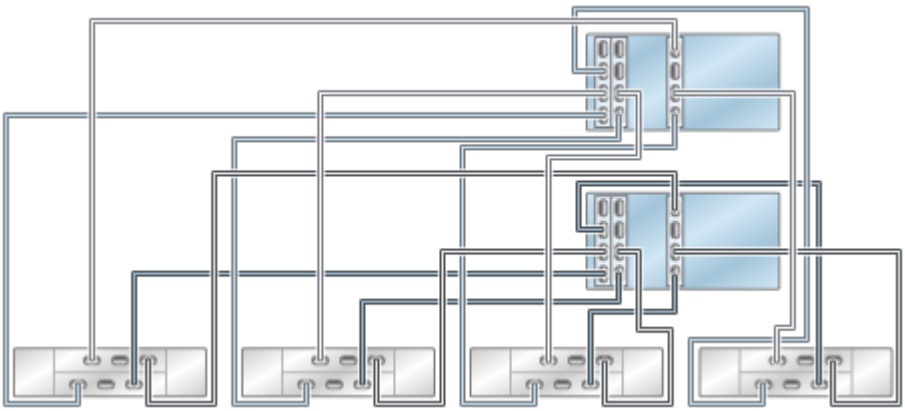
Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with three HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



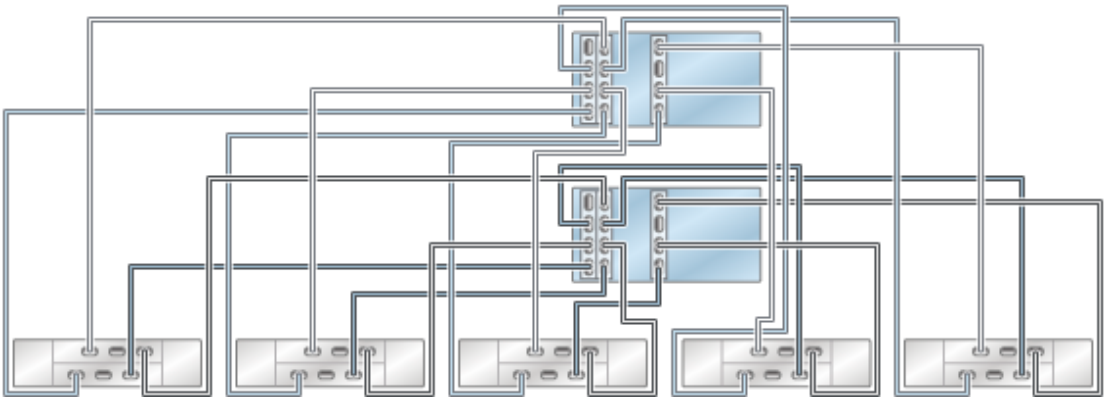
Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with three HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



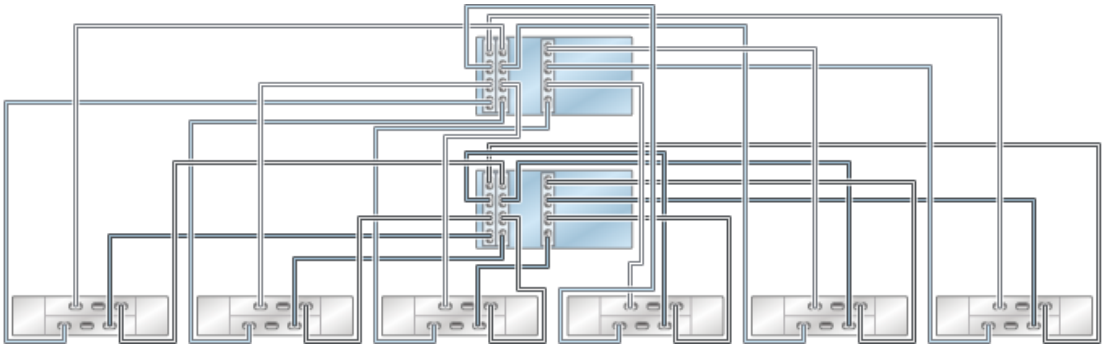
Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with three HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



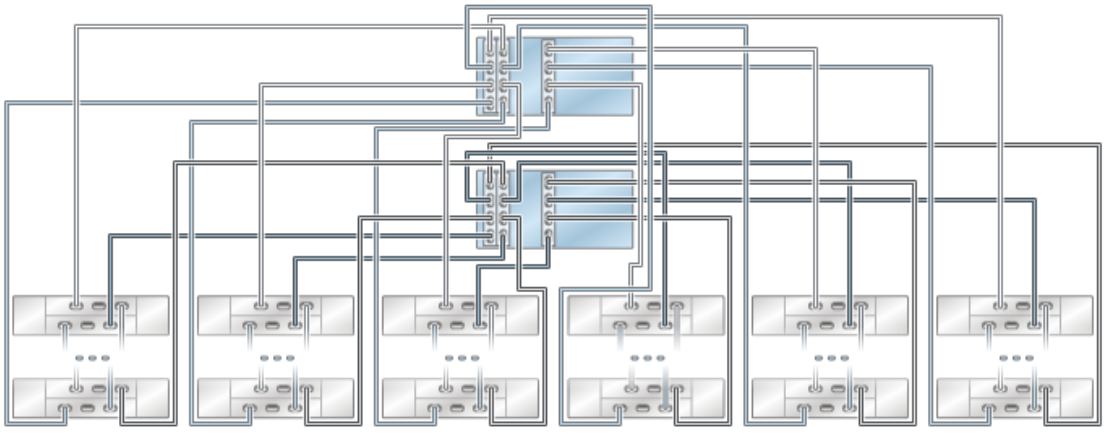
Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with three HBAs connected to five Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



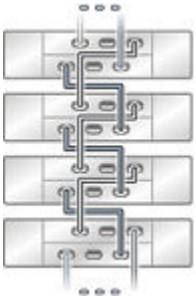
Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with three HBAs connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with three HBAs connected to multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



Multiple disk shelves in a single chain



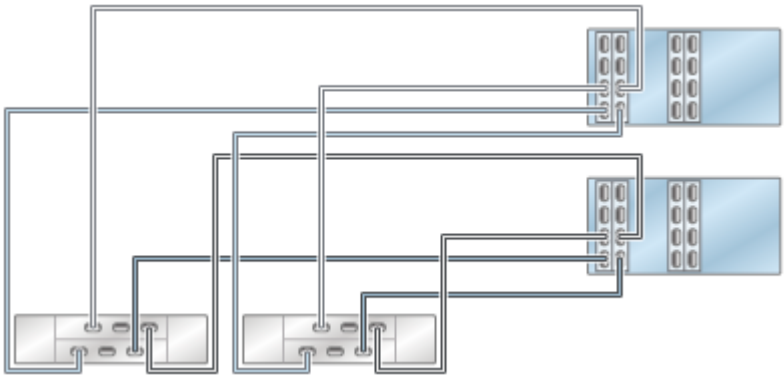
Oracle ZFS Storage ZS4-4/ZS3-4 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (4 HBAs)

The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS4-4/ZS3-4 clustered controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

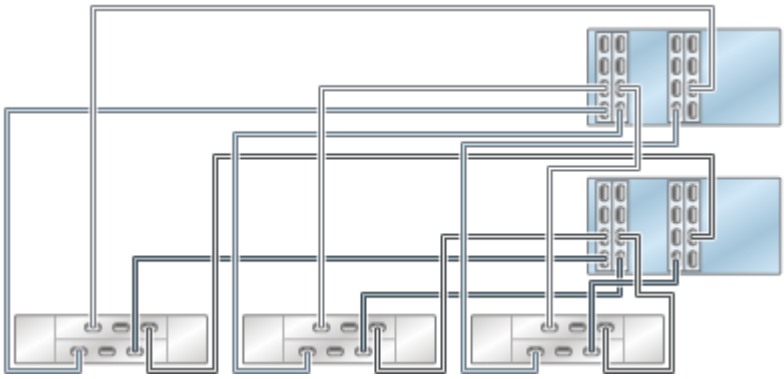
> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with four HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain

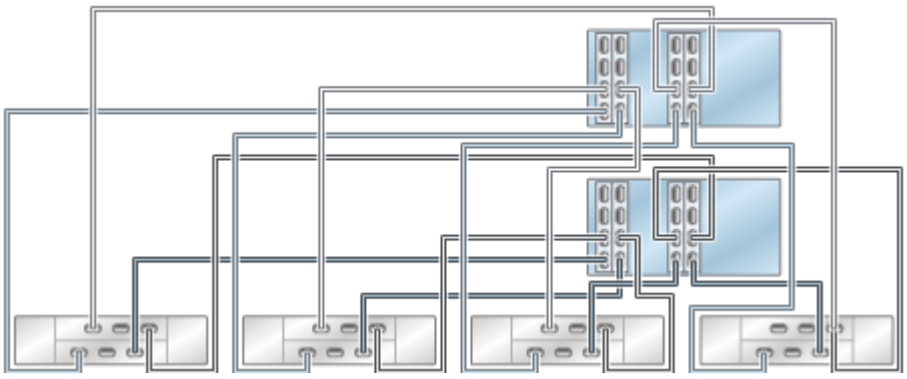
Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with four HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



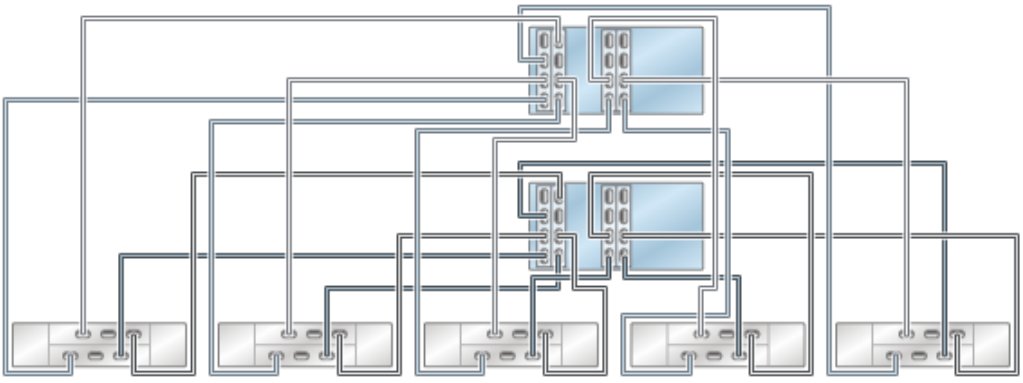
Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with four HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



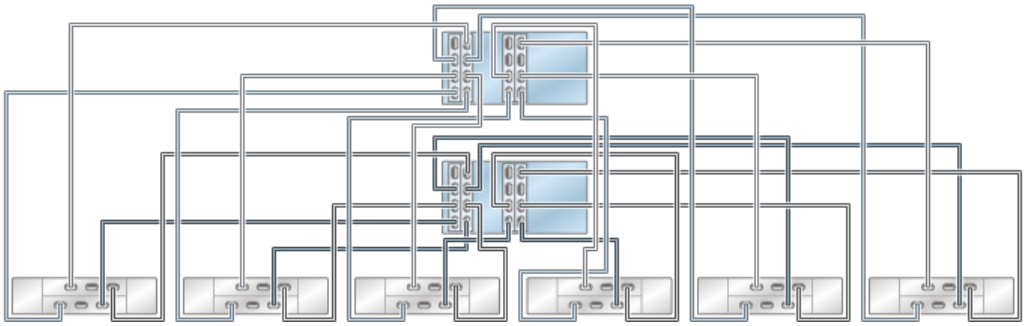
Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with four HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



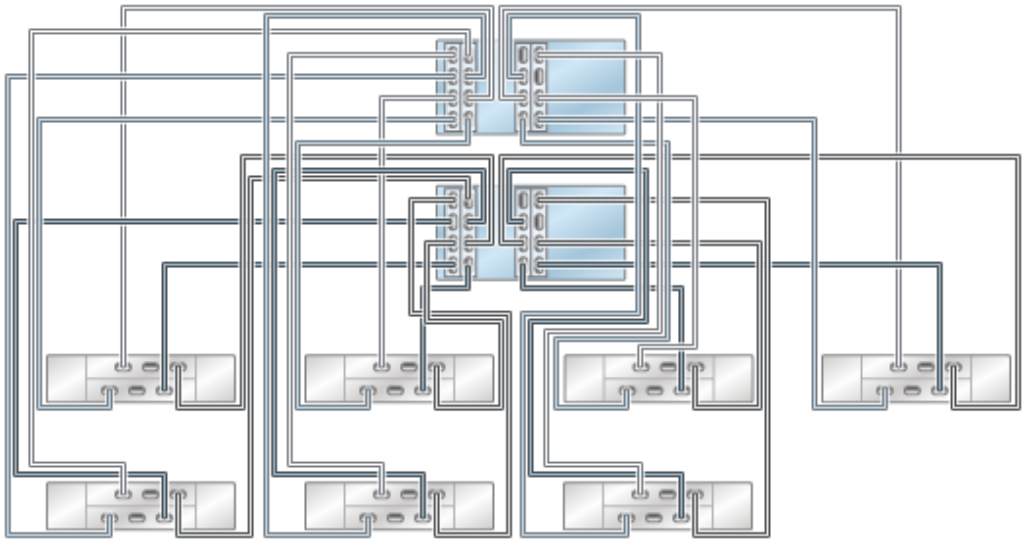
Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with four HBAs connected to five Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



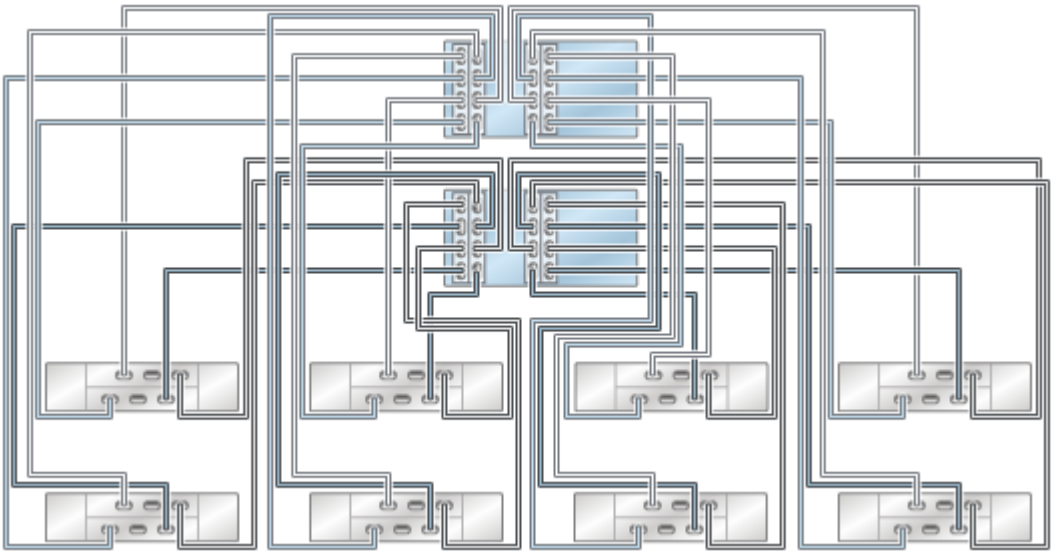
Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with four HBAs connected six Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



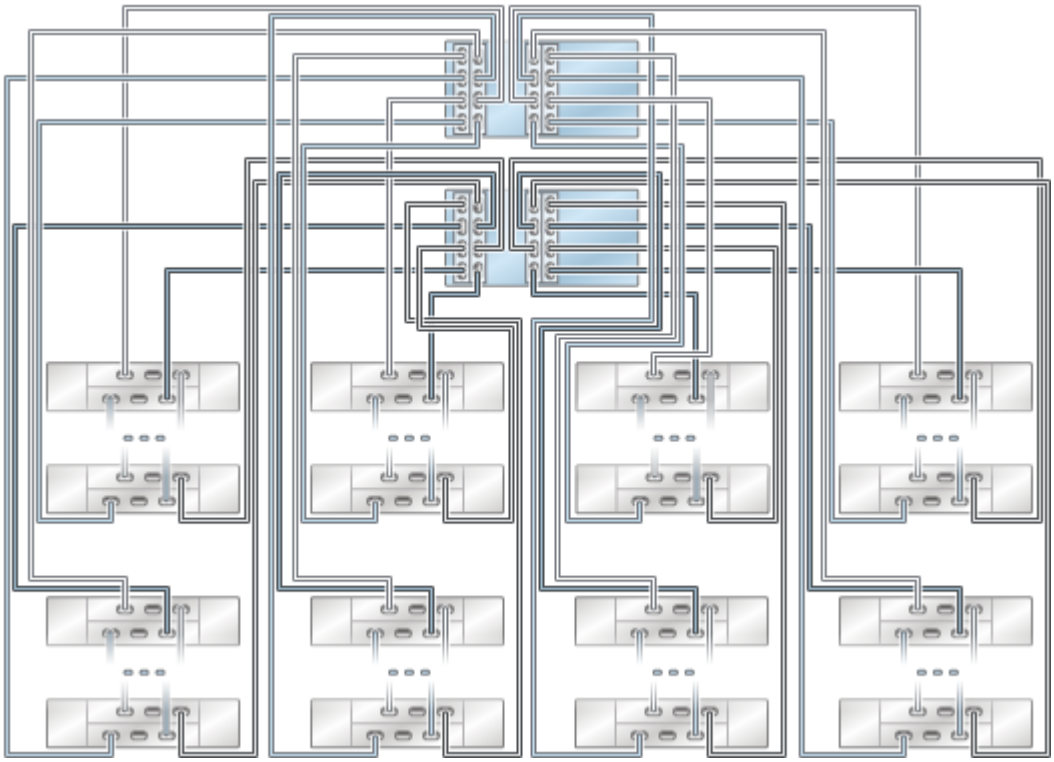
Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with four HBAs connected to seven Oracle Storage Drive Enclosure DE2-24 disk shelves in seven chains



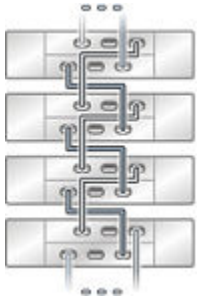
Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with four HBAs connected to eight Oracle Storage Drive Enclosure DE2-24 disk shelves in eight chains



Clustered Oracle ZFS Storage ZS4-4/ZS3-4 controllers with four HBAs connected to multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in eight chains



Multiple disk shelves in a single chain



Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Oracle ZFS Storage ZS3-2 Controllers

This section contains guidelines for properly cabling standalone and clustered Oracle ZFS Storage ZS3-2 controllers to Oracle Storage Drive Enclosure DE2-24 disk shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

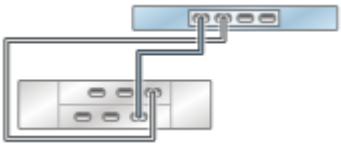
- Oracle ZFS Storage ZS3-2 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (1 HBA)
- Oracle ZFS Storage ZS3-2 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)
- Oracle ZFS Storage ZS3-2 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (1 HBA)
- Oracle ZFS Storage ZS3-2 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)

Oracle ZFS Storage ZS3-2 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (1 HBA)

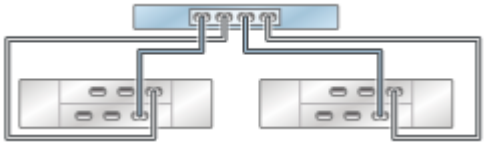
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-2 standalone controllers with one HBA. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

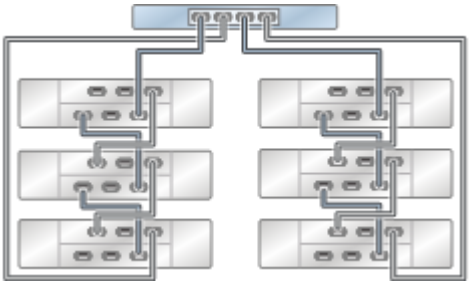
Standalone Oracle ZFS Storage ZS3-2 controller with one HBA connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



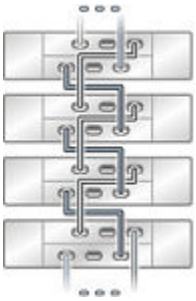
Standalone Oracle ZFS Storage ZS3-2 controller with one HBA connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



Standalone Oracle ZFS Storage ZS3-2 controller with one HBA connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



Multiple disk shelves in a single chain

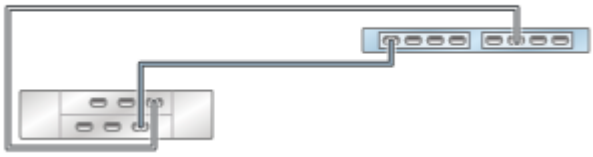


Oracle ZFS Storage ZS3-2 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)

The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-2 standalone controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

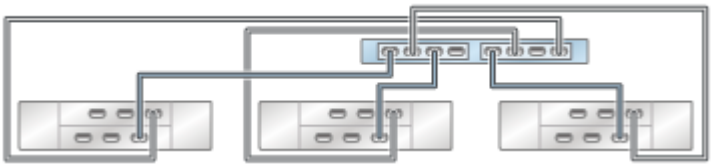
> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

Standalone Oracle ZFS Storage ZS3-2 controller with two HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in one chain

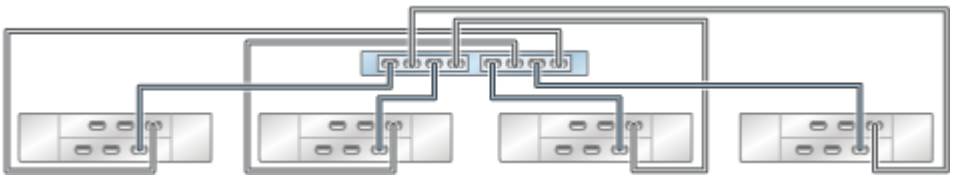


Standalone Oracle ZFS Storage ZS3-2 controller with two HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains

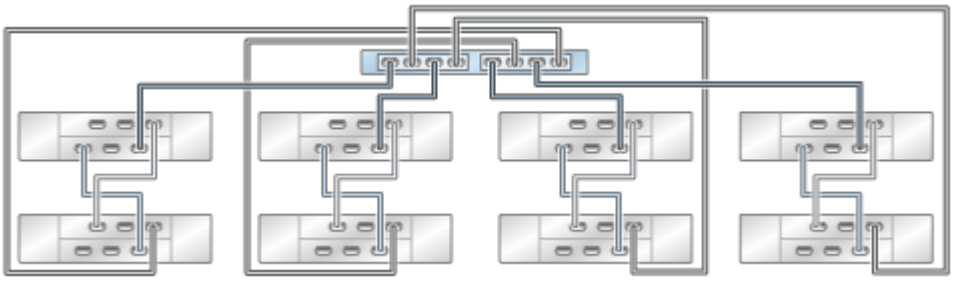
Standalone Oracle ZFS Storage ZS3-2 controller with two HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



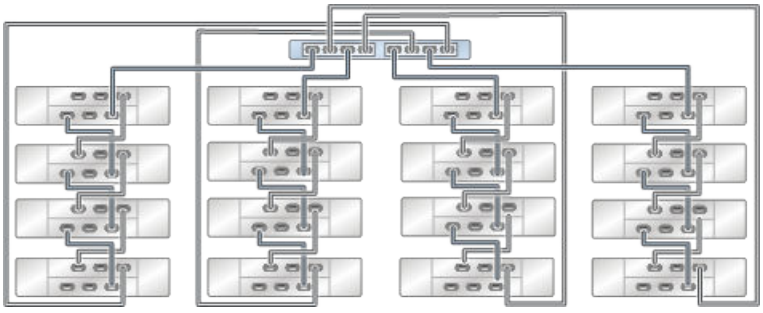
Standalone Oracle ZFS Storage ZS3-2 controller with two HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



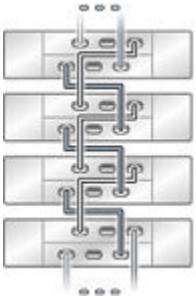
Standalone Oracle ZFS Storage ZS3-2 controller with two HBAs connected to eight Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Standalone Oracle ZFS Storage ZS3-2 controller with two HBAs connected to sixteen Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Multiple disk shelves in a single chain

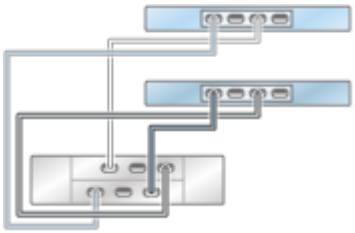


Oracle ZFS Storage ZS3-2 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (1 HBA)

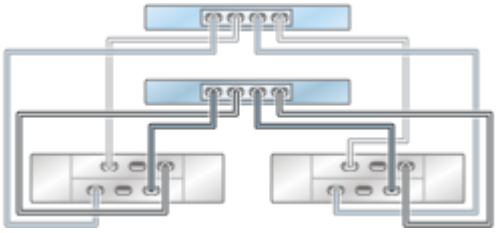
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-2 clustered controllers with one HBA. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

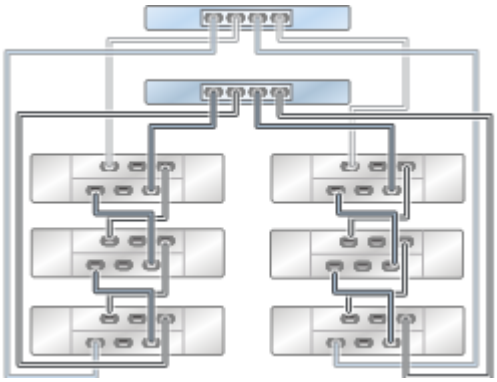
Clustered Oracle ZFS Storage ZS3-2 controllers with one HBA connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



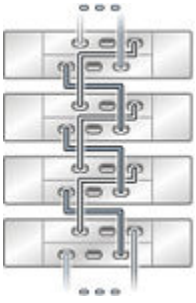
Clustered Oracle ZFS Storage ZS3-2 controllers with one HBA connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



Clustered Oracle ZFS Storage ZS3-2 controllers with one HBA connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



Multiple disk shelves in a single chain

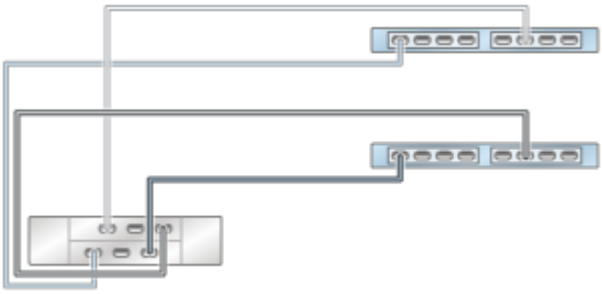


Oracle ZFS Storage ZS3-2 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)

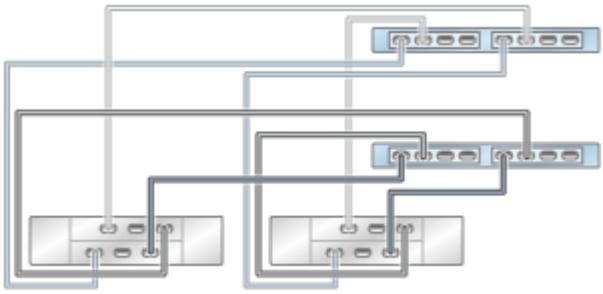
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-2 clustered controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

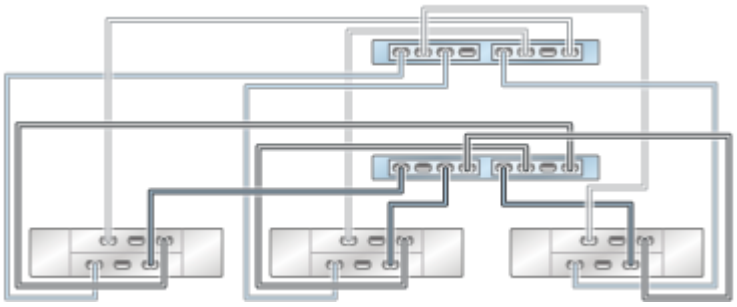
Clustered Oracle ZFS Storage ZS3-2 controllers with two HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



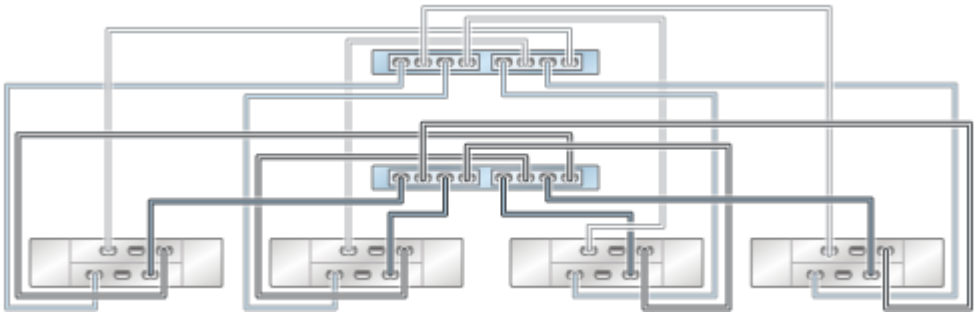
Clustered Oracle ZFS Storage ZS3-2 controllers with two HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



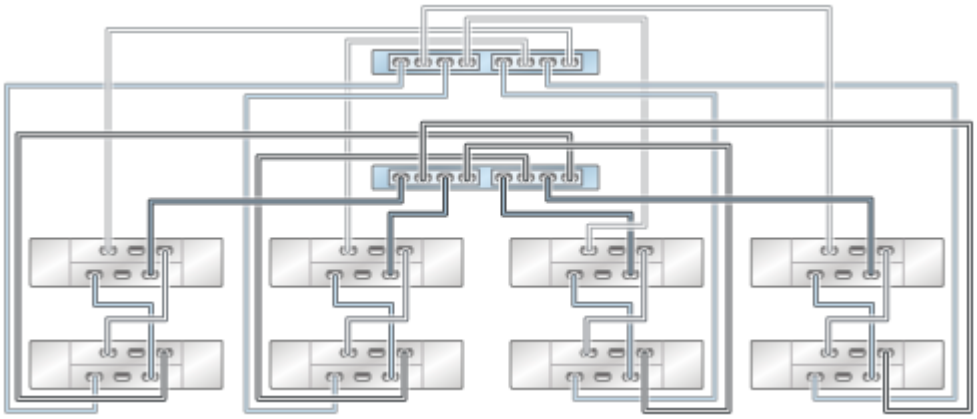
Clustered Oracle ZFS Storage ZS3-2 controllers with two HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



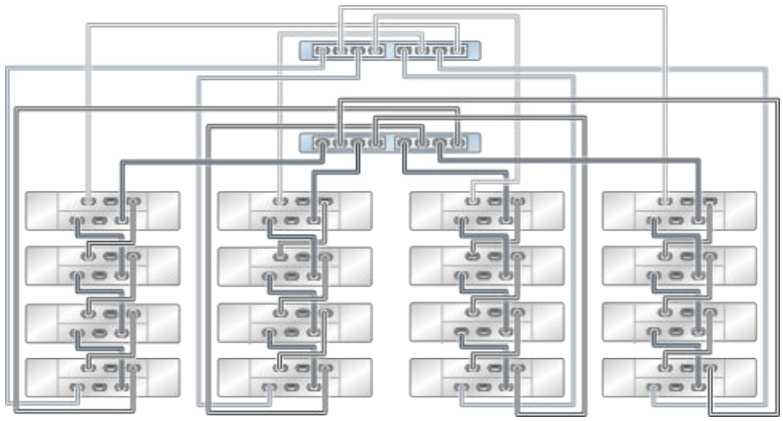
Clustered Oracle ZFS Storage ZS3-2 controllers with two HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



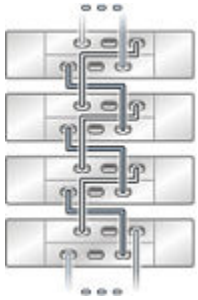
Clustered Oracle ZFS Storage ZS3-2 controllers with two HBAs connected to eight Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Clustered Oracle ZFS Storage ZS3-2 controllers with two HBAs connected to sixteen Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Multiple disk shelves in a single chain



Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Sun ZFS Storage 7420 Controllers

This section contains guidelines for properly cabling standalone and clustered Sun ZFS Storage 7420 controllers to Oracle Storage Drive Enclosure DE2-24 disk shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

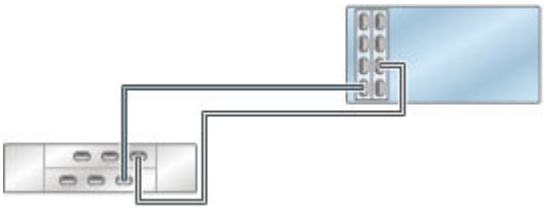
- Sun ZFS Storage 7420 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)
- Sun ZFS Storage 7420 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (3 HBAs)
- Sun ZFS Storage 7420 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (4 HBAs)
- Sun ZFS Storage 7420 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)
- Sun ZFS Storage 7420 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (3 HBAs)
- Sun ZFS Storage 7420 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (4 HBAs)

Sun ZFS Storage 7420 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)

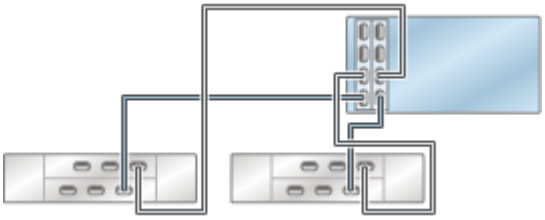
The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 standalone controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

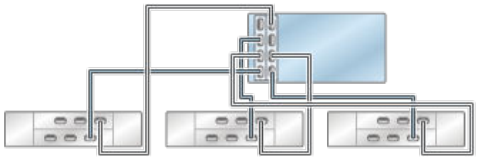
Standalone Sun ZFS Storage 7420 controller with two HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



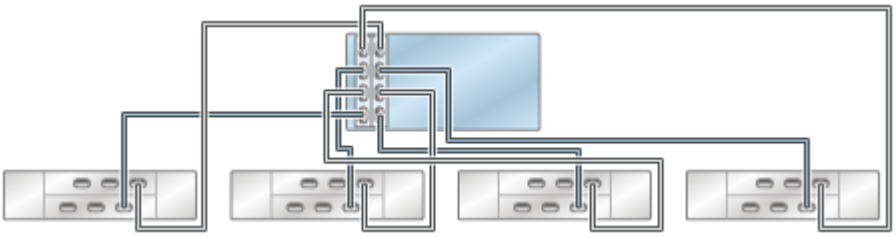
Standalone Sun ZFS Storage 7420 controller with two HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



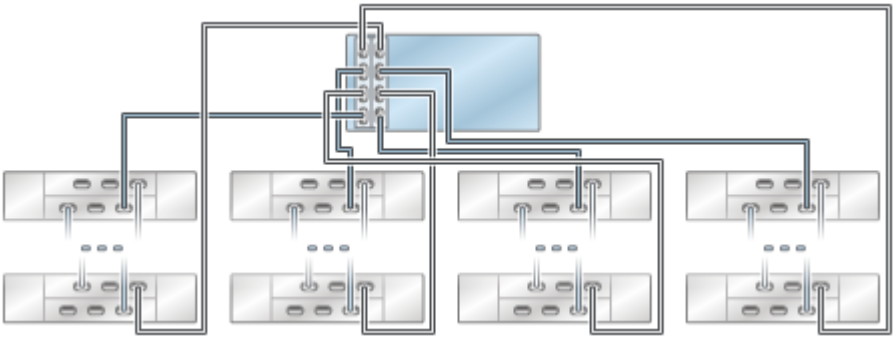
Standalone Sun ZFS Storage 7420 controller with two HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



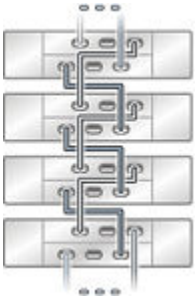
Standalone Sun ZFS Storage 7420 controller with two HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Standalone Sun ZFS Storage 7420 controller with two HBAs connected to multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Multiple disk shelves in a single chain



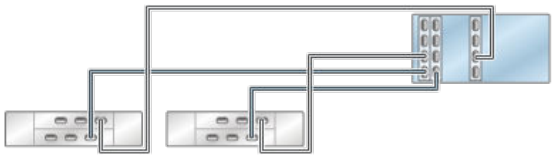
Sun ZFS Storage 7420 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (3 HBAs)

The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 standalone controllers with three HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

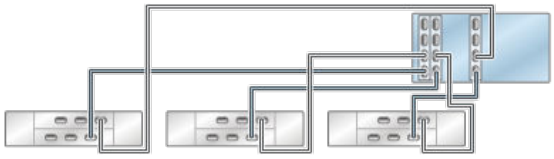
> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

Standalone Sun ZFS Storage 7420 controller with three HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain

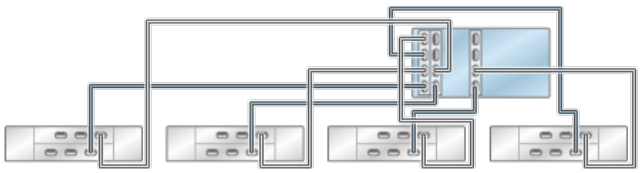
Standalone Sun ZFS Storage 7420 controller with three HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



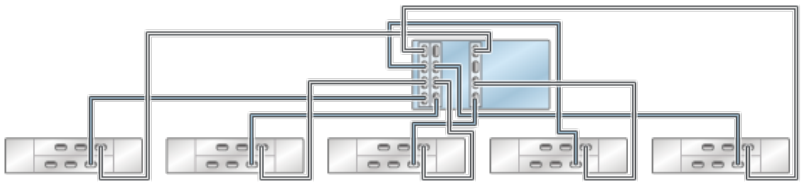
Standalone Sun ZFS Storage 7420 controller with three HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



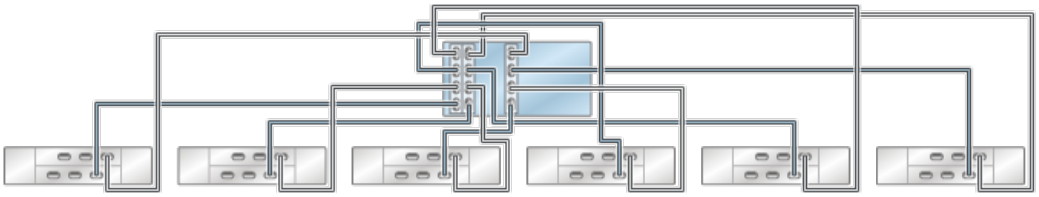
Standalone Sun ZFS Storage 7420 controller with three HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



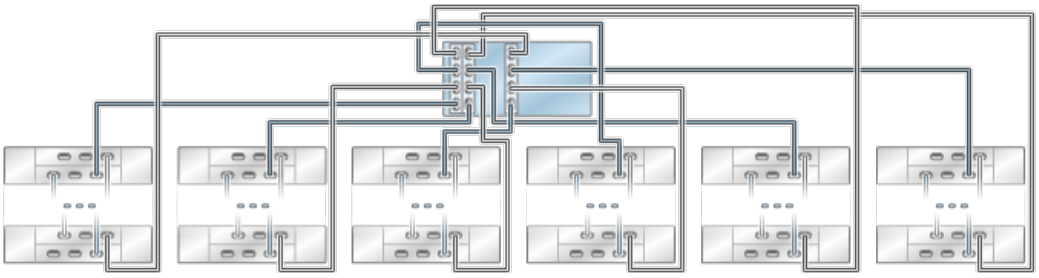
Standalone Sun ZFS Storage 7420 controller with three HBAs connected to five Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



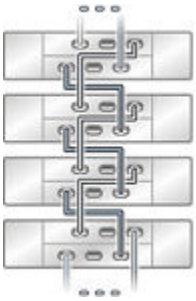
Standalone Sun ZFS Storage 7420 controller with three HBAs connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



Standalone Sun ZFS Storage 7420 controller with three HBAs connected to multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



Multiple disk shelves in a single chain

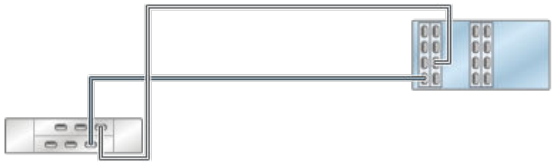


Sun ZFS Storage 7420 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (4 HBAs)

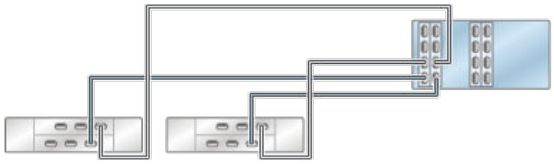
The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 standalone controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

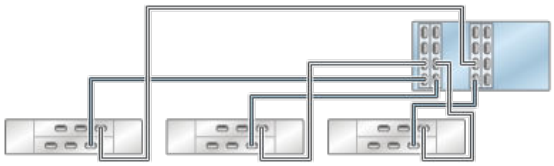
Standalone Sun ZFS Storage 7420 controller with four HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



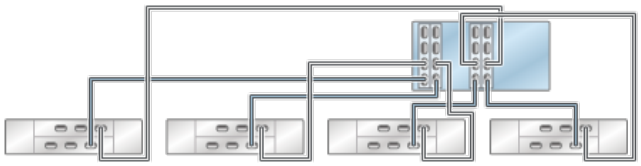
Standalone Sun ZFS Storage 7420 controller with four HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



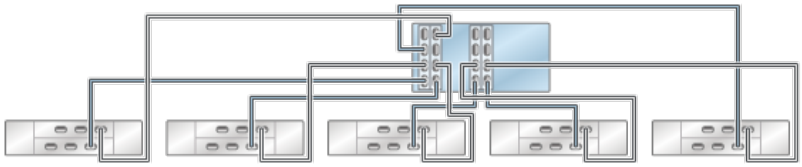
Standalone Sun ZFS Storage 7420 controller with four HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



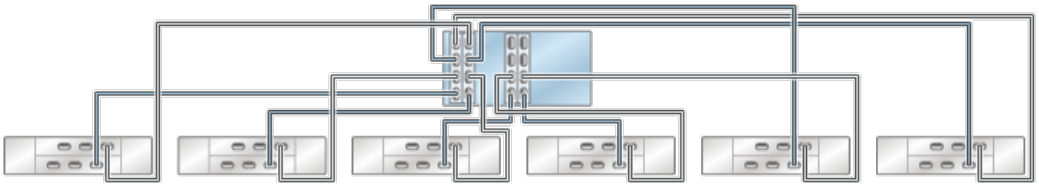
Standalone Sun ZFS Storage 7420 controller with four HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



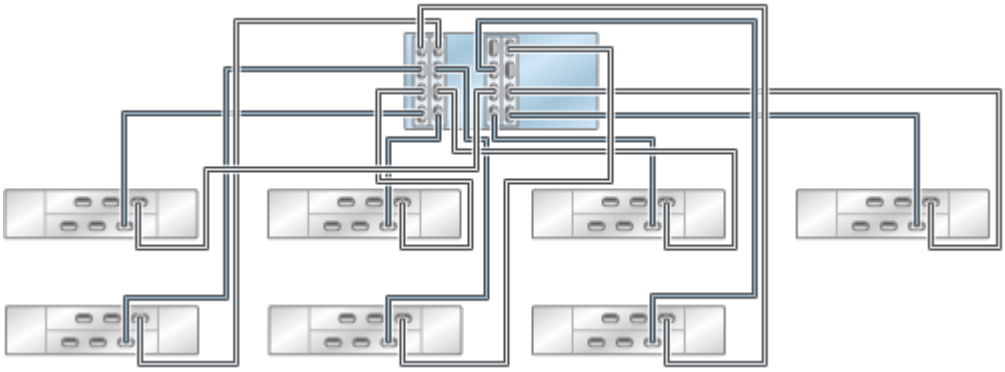
Standalone Sun ZFS Storage 7420 controller with four HBAs connected to five Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



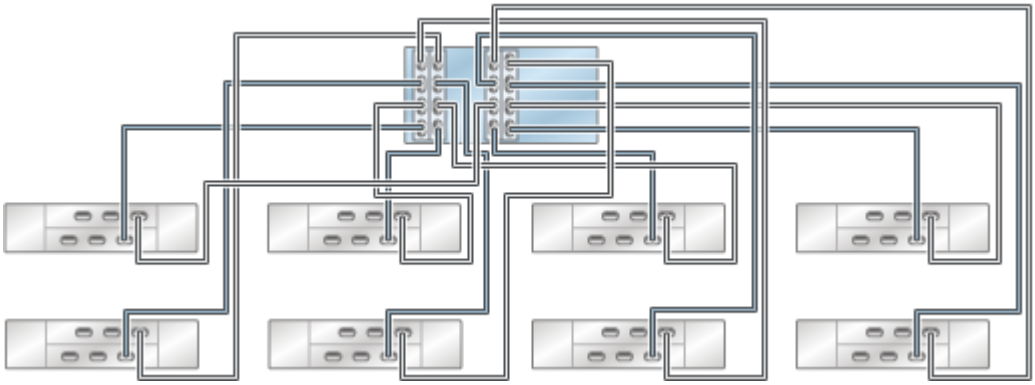
Standalone Sun ZFS Storage 7420 controller with four HBAs connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



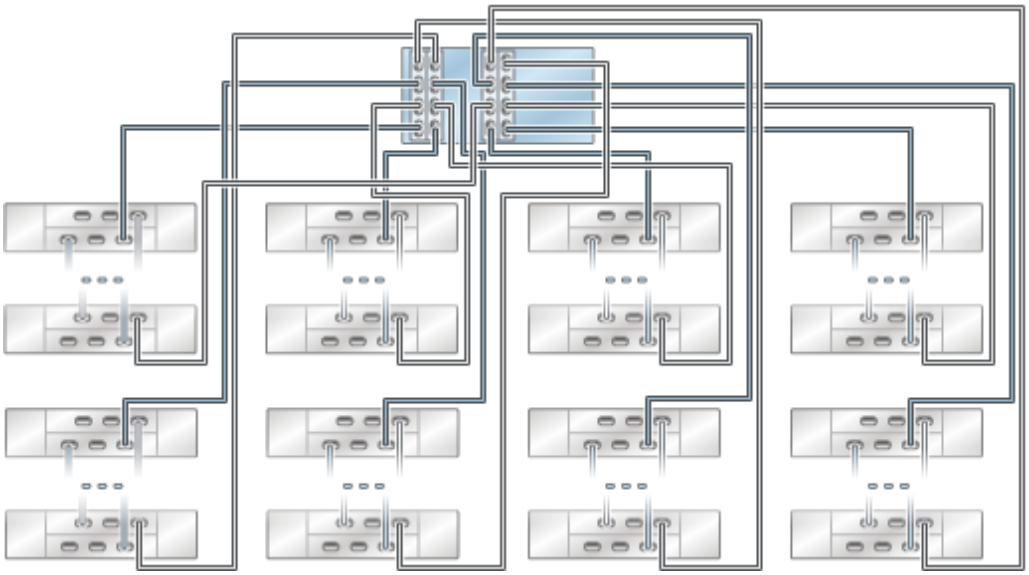
Standalone Sun ZFS Storage 7420 controller with four HBAs connected to seven Oracle Storage Drive Enclosure DE2-24 disk shelves in seven chains



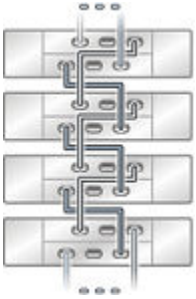
Standalone Sun ZFS Storage 7420 controller with four HBAs connected to eight Oracle Storage Drive Enclosure DE2-24 disk shelves in eight chains



Standalone Sun ZFS Storage 7420 controller with four HBAs connected to multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in eight chains



Multiple disk shelves in a single chain

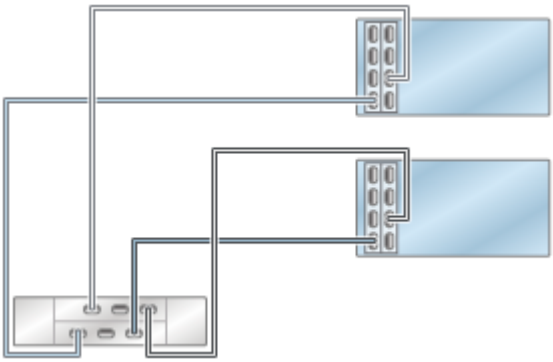


Sun ZFS Storage 7420 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)

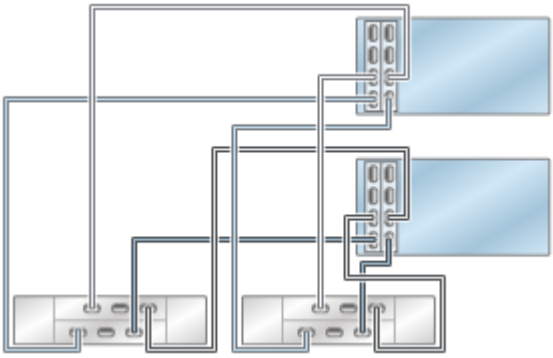
The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 clustered controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

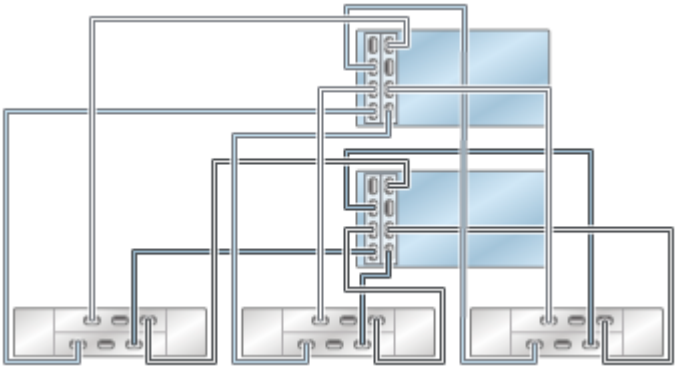
Clustered Sun ZFS Storage 7420 controllers with two HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



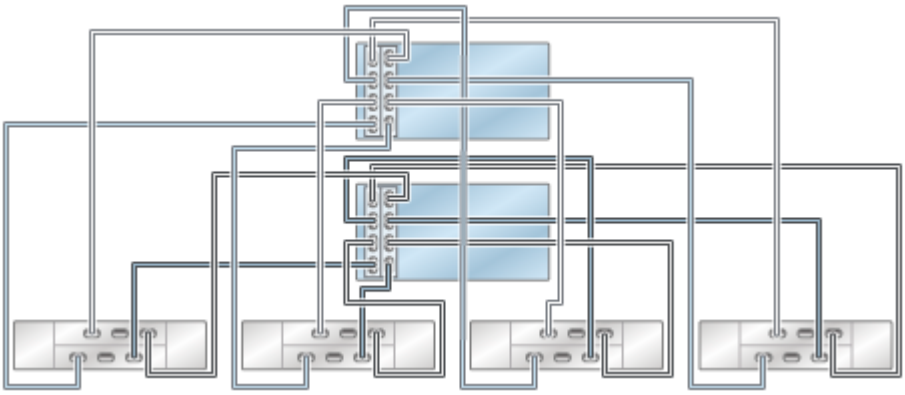
Clustered Sun ZFS Storage 7420 controllers with two HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



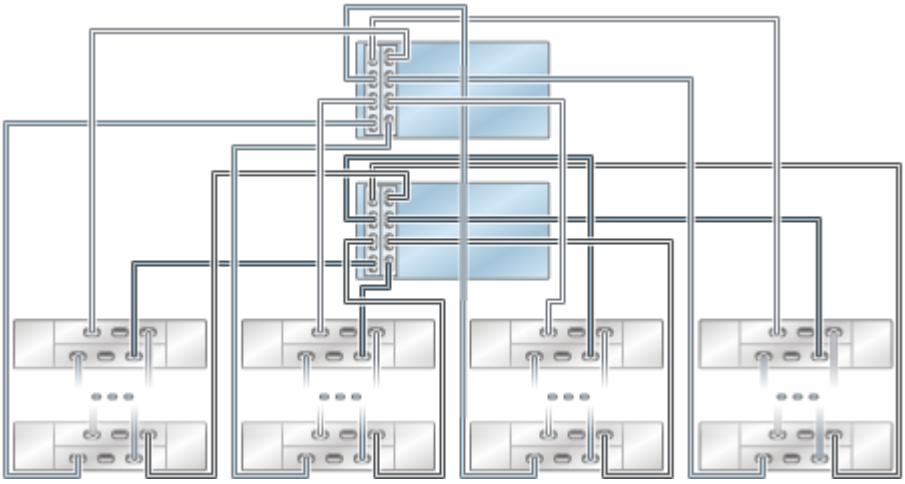
Clustered Sun ZFS Storage 7420 controllers with two HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



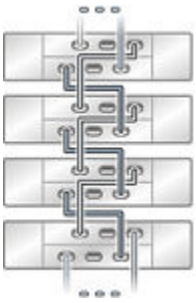
Clustered Sun ZFS Storage 7420 controllers with two HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Clustered Sun ZFS Storage 7420 controllers with two HBAs connected to multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Multiple disk shelves in a single chain



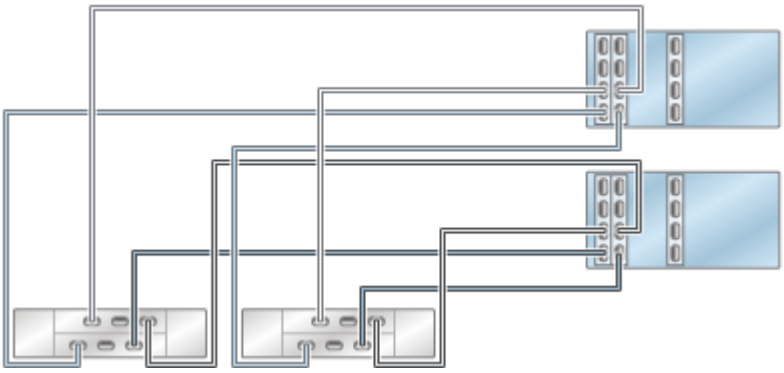
Sun ZFS Storage 7420 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (3 HBAs)

The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 clustered controllers with three HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

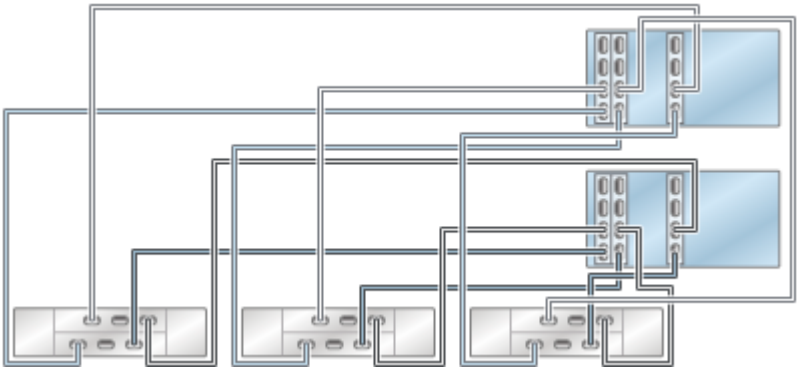
> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain

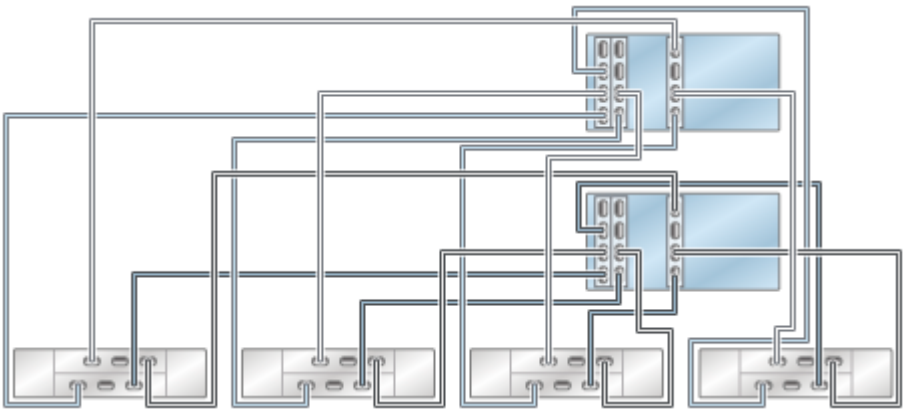
Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



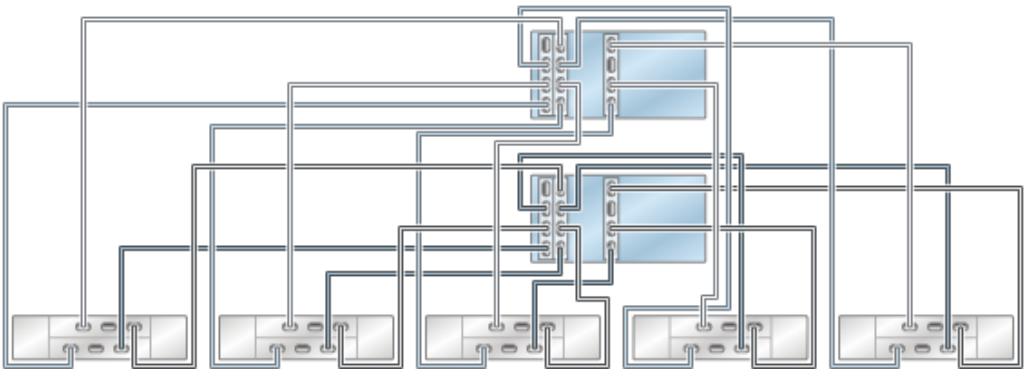
Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



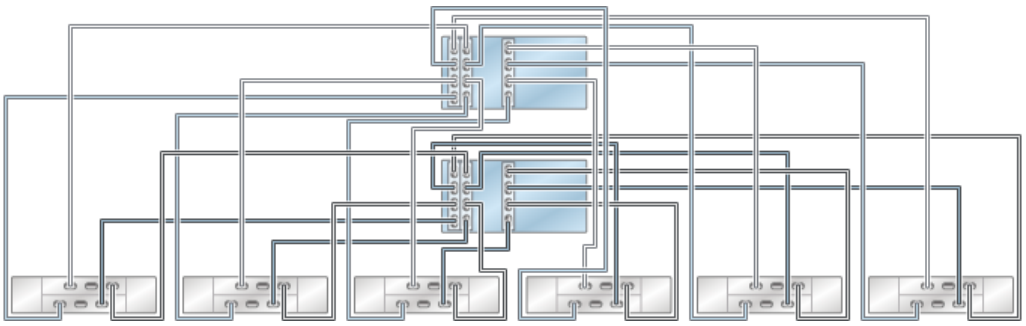
Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



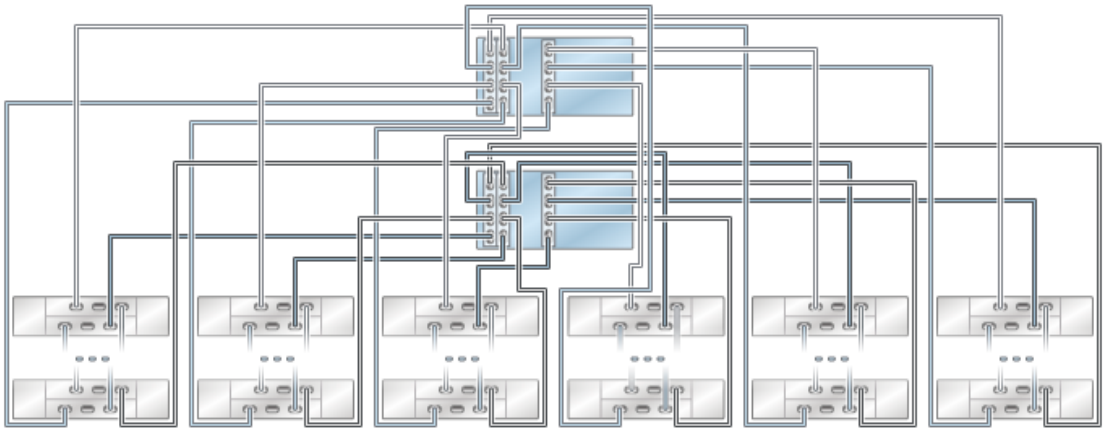
Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to five Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



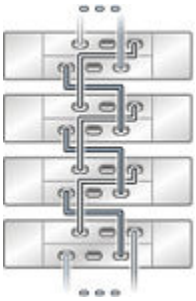
Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



Multiple disk shelves in a single chain



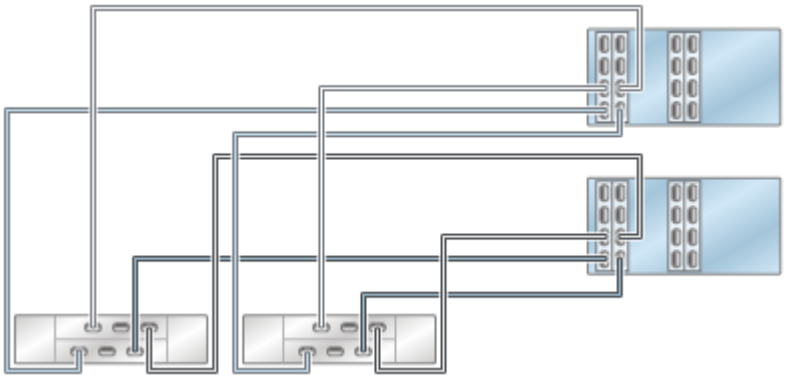
Sun ZFS Storage 7420 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (4 HBAs)

The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 clustered controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

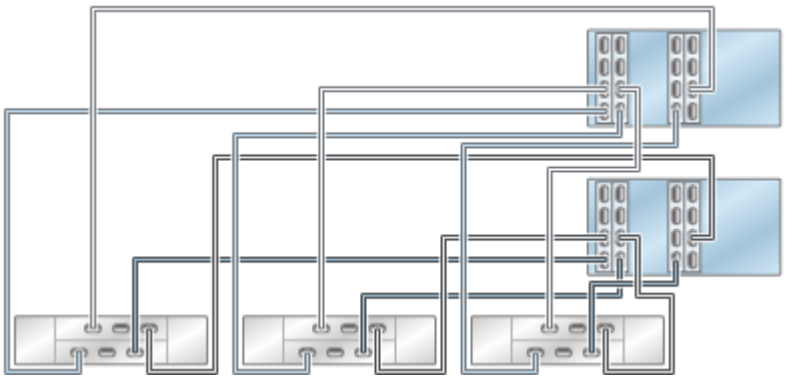
> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain

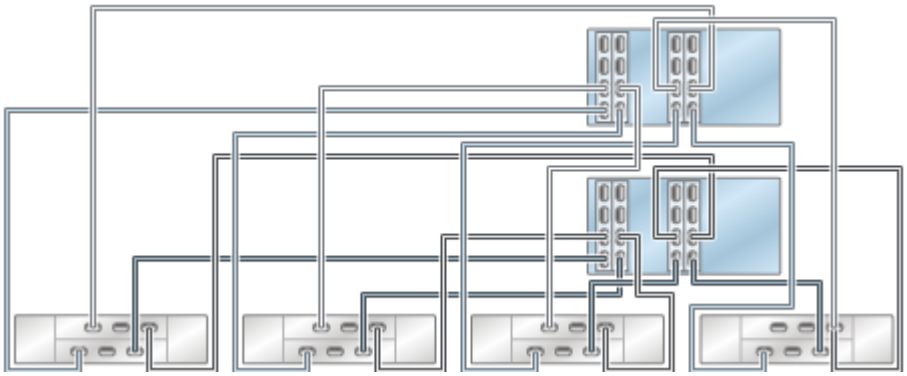
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



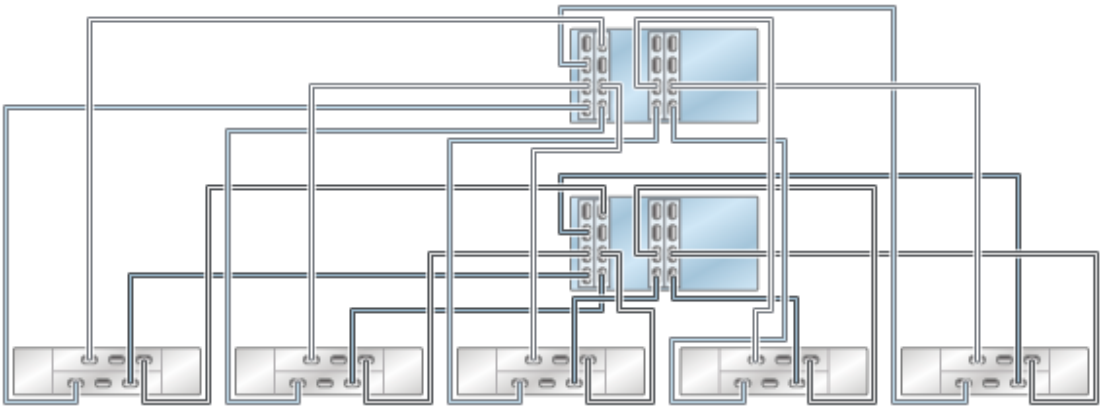
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



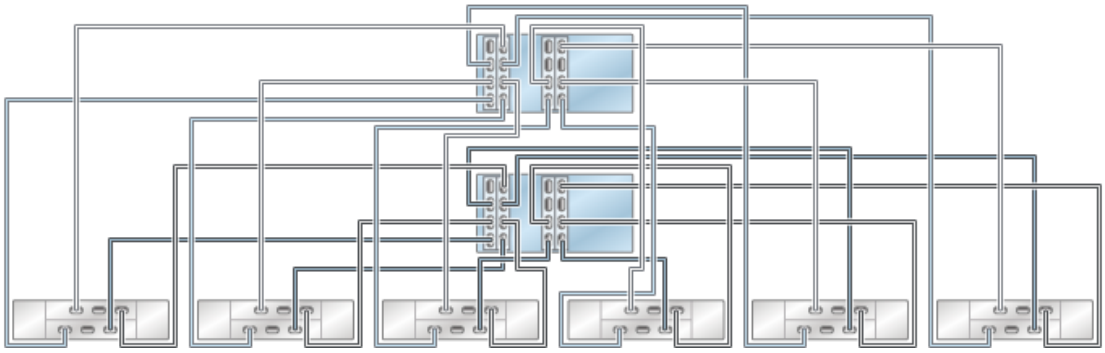
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



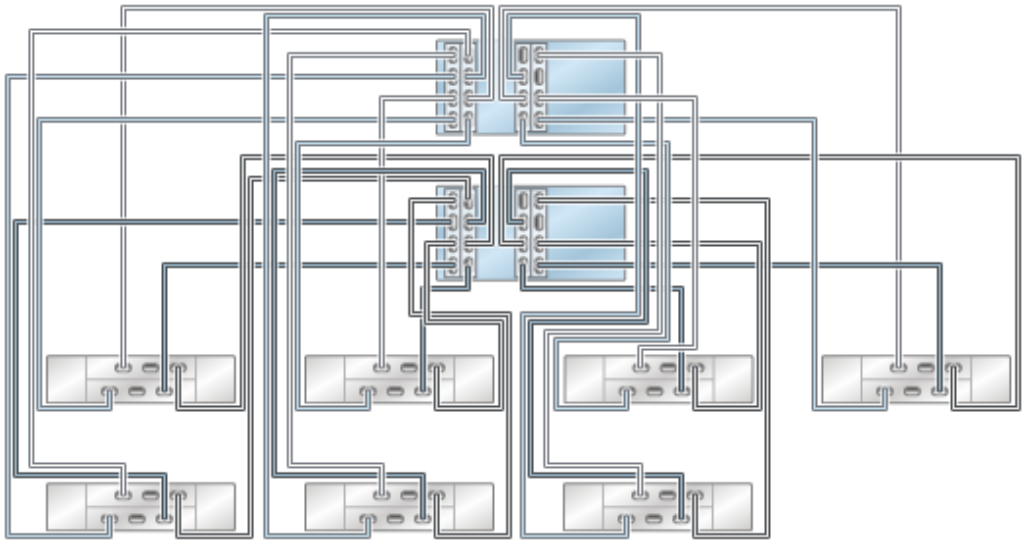
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to five Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



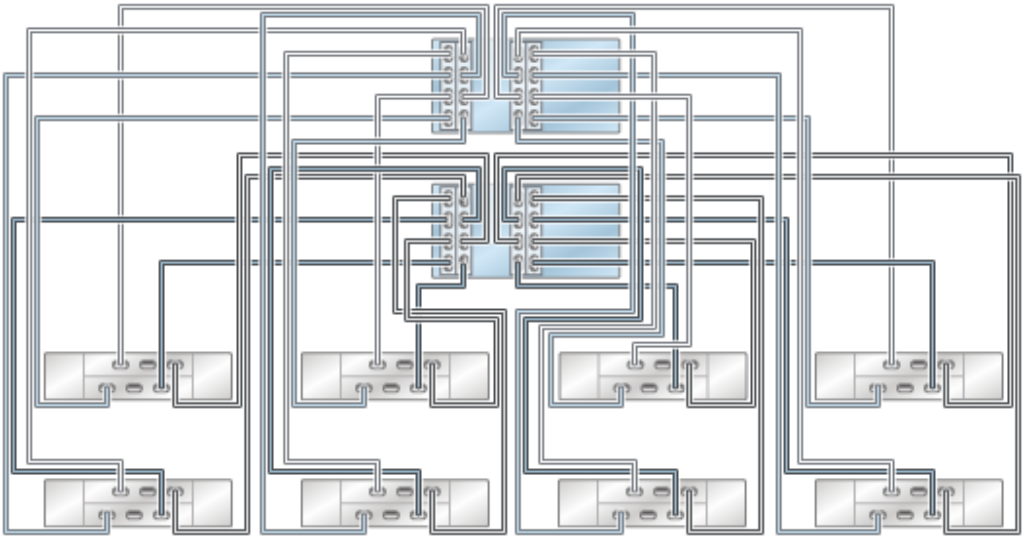
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



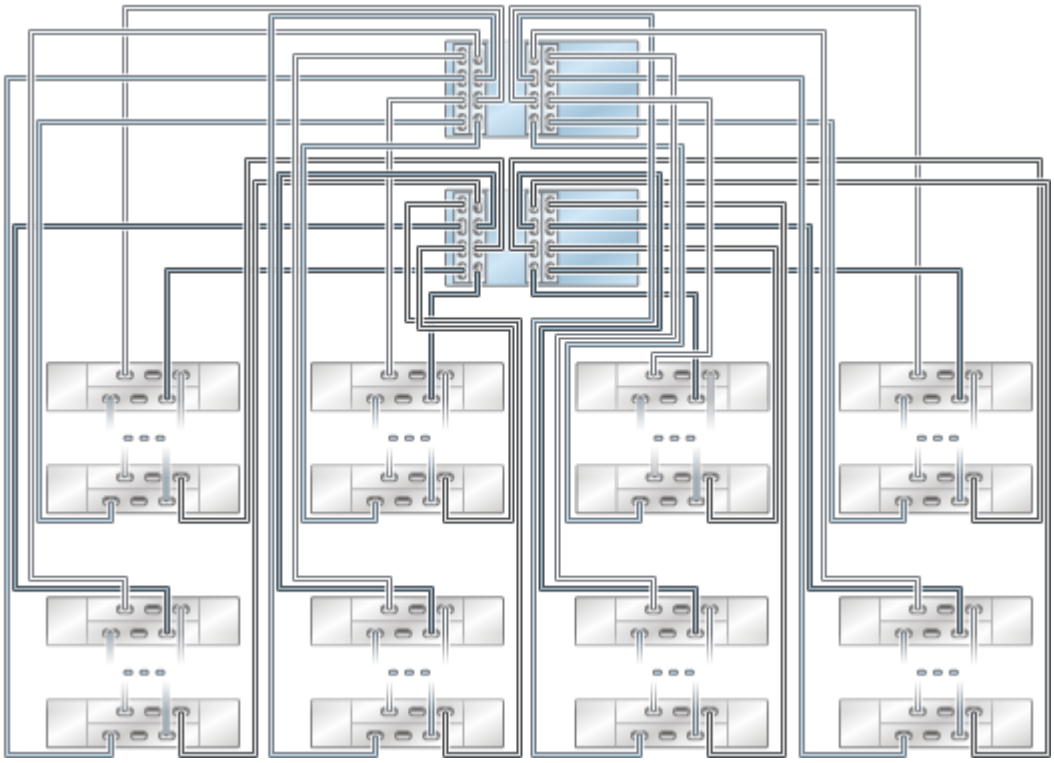
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to seven Oracle Storage Drive Enclosure DE2-24 disk shelves in seven chains



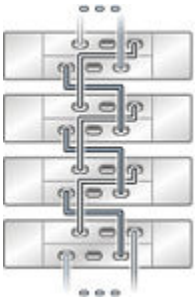
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to eight Oracle Storage Drive Enclosure DE2-24 disk shelves in eight chains



Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in eight chains



Multiple disk shelves in a single chain



Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Sun ZFS Storage 7320 Controllers

This section contains guidelines for properly cabling standalone and clustered Sun ZFS Storage 7320 controllers to Oracle Storage Drive Enclosure DE2-24 disk shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

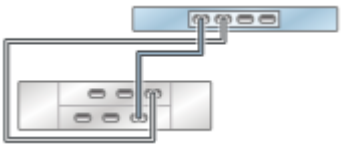
- Sun ZFS Storage 7320 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves
- Sun ZFS Storage 7320 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves

Sun ZFS Storage 7320 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves

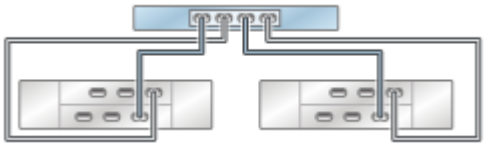
The following figures show a subset of the supported configurations for Sun ZFS Storage 7320 standalone controllers with one HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

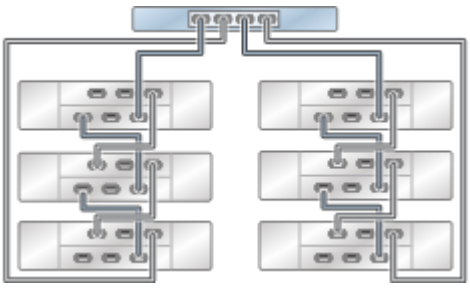
Standalone Sun ZFS Storage 7320 controller with one HBA connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



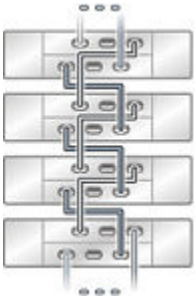
Standalone Sun ZFS Storage 7320 controller with one HBA connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



Standalone Sun ZFS Storage 7320 controller with one HBA connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



Multiple disk shelves in a single chain

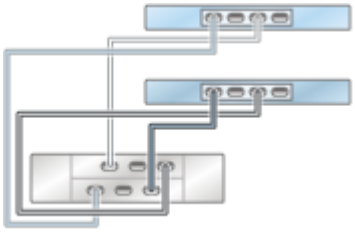


Sun ZFS Storage 7320 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves

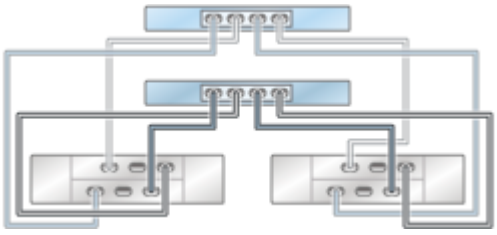
The following figures show a subset of the supported configurations for Sun ZFS Storage 7320 clustered controllers with one HBA. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

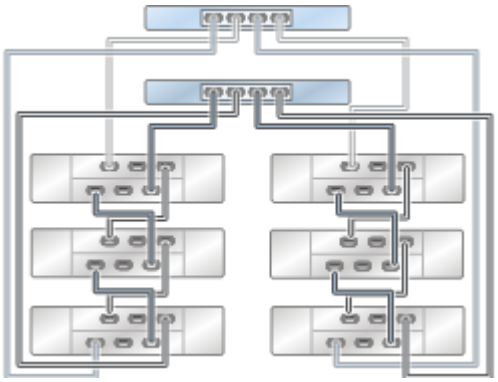
Clustered Sun ZFS Storage 7320 controllers with one HBA connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



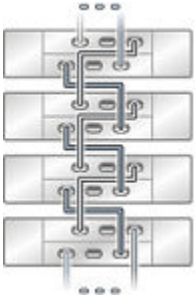
Clustered Sun ZFS Storage 7320 controllers with one HBA connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



Clustered Sun ZFS Storage 7320 controllers with one HBA connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



Multiple disk shelves in a single chain



5

Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to 2X4 Port SAS-2 HBAs

This section contains guidelines for properly cabling standalone and clustered controllers to 2X4 port SAS-2 HBAs.

To review these guidelines, see the following topics:

- Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Sun ZFS Storage 7420 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Sun ZFS Storage 7320 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Sun ZFS Storage 7120 Controllers

Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Sun ZFS Storage 7420 Controllers

This section contains guidelines for properly cabling standalone and clustered Sun ZFS Storage 7420 controllers to Oracle Storage Drive Enclosure DE2-24 disk shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

- Sun ZFS Storage 7420 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)
- Sun ZFS Storage 7420 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (3 HBAs)
- Sun ZFS Storage 7420 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (4 HBAs)
- Sun ZFS Storage 7420 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (5 HBAs)
- Sun ZFS Storage 7420 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (6 HBAs)
- Sun ZFS Storage 7420 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)
- Sun ZFS Storage 7420 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (3 HBAs)
- Sun ZFS Storage 7420 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (4 HBAs)
- Sun ZFS Storage 7420 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (5 HBAs)

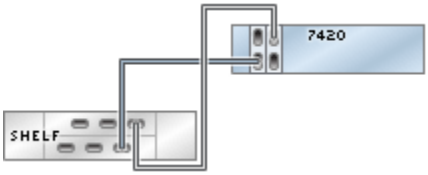
- Sun ZFS Storage 7420 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (6 HBAs)

Sun ZFS Storage 7420 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)

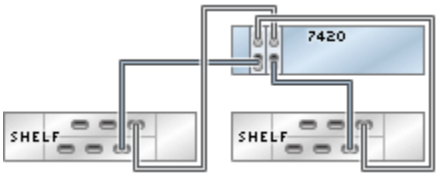
The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 standalone controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

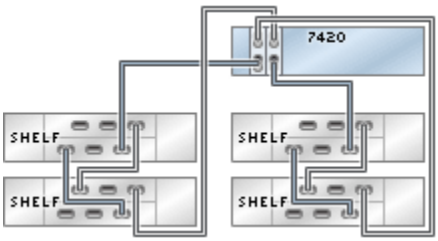
Standalone Sun ZFS Storage 7420 controller with two HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



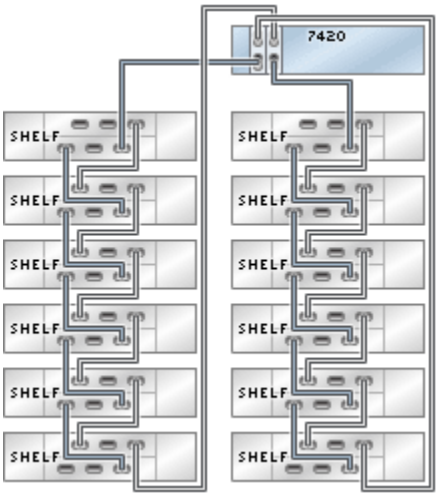
Standalone Sun ZFS Storage 7420 controller with two HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



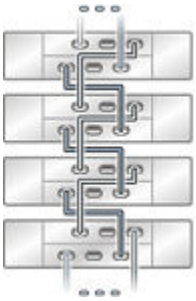
Standalone Sun ZFS Storage 7420 controller with two HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



Standalone Sun ZFS Storage 7420 controller with two HBAs connected to 12 Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



Multiple disk shelves in a single chain

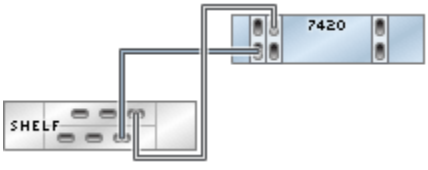


Sun ZFS Storage 7420 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (3 HBAs)

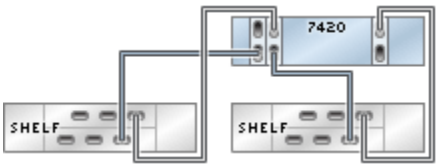
The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 standalone controllers with three HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

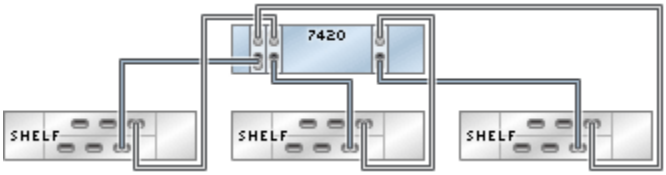
Standalone Sun ZFS Storage 7420 controller with three HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



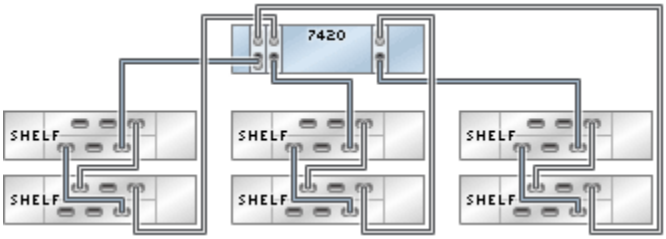
Standalone Sun ZFS Storage 7420 controller with three HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



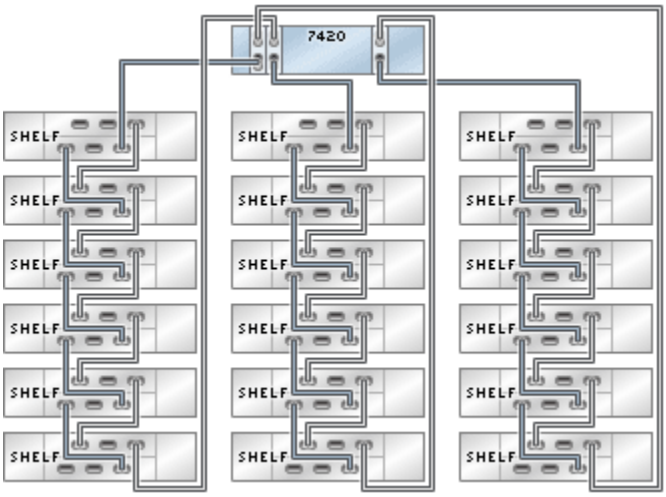
Standalone Sun ZFS Storage 7420 controller with three HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



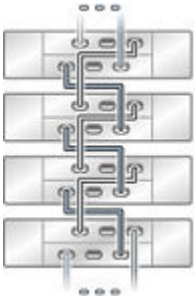
Standalone Sun ZFS Storage 7420 controller with three HBAs connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



Standalone Sun ZFS Storage 7420 controller with three HBAs connected to 18 Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



Multiple disk shelves in a single chain



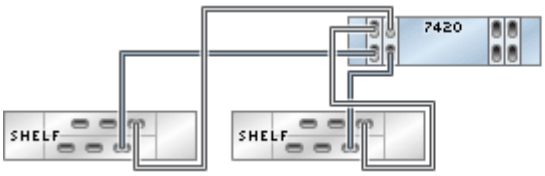
Sun ZFS Storage 7420 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (4 HBAs)

The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 standalone controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

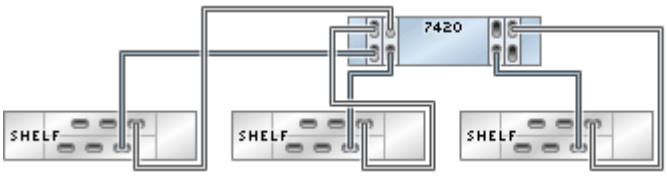
> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

Standalone Sun ZFS Storage 7420 controller with four HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain

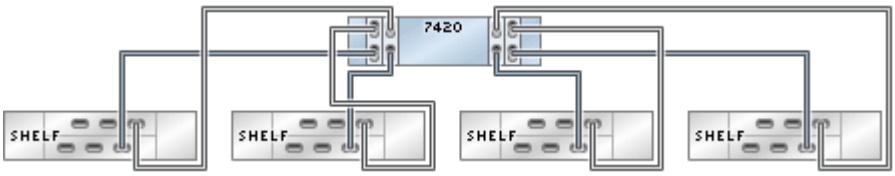
Standalone Sun ZFS Storage 7420 controller with four HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



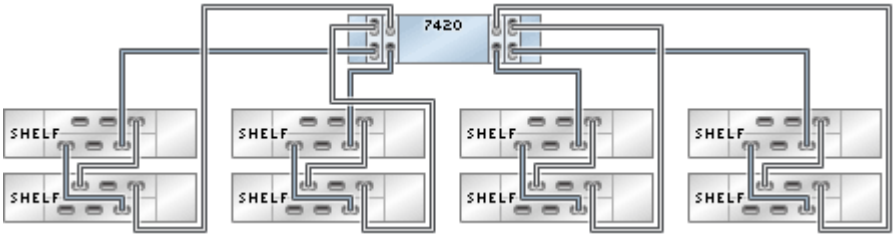
Standalone Sun ZFS Storage 7420 controller with four HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



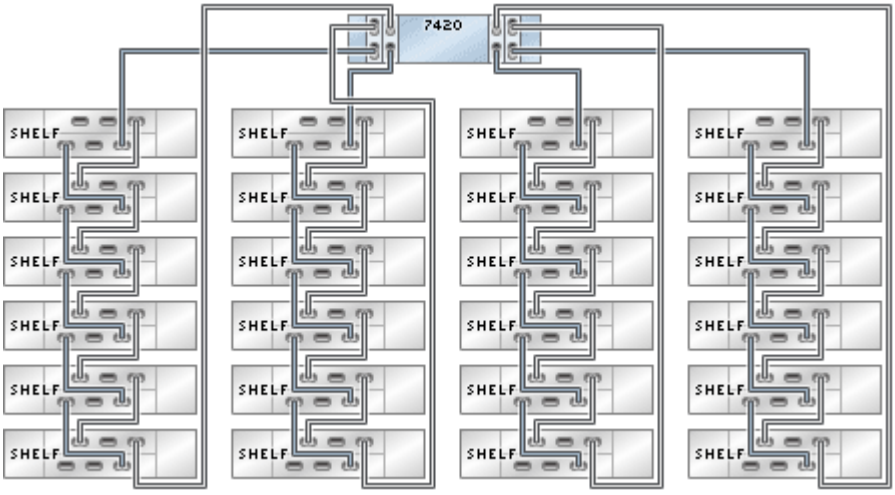
Standalone Sun ZFS Storage 7420 controller with four HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



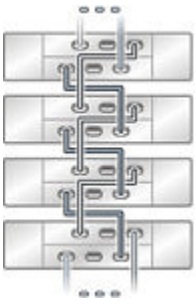
Standalone Sun ZFS Storage 7420 controller with four HBAs connected to eight Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Standalone Sun ZFS Storage 7420 controller with four HBAs connected to 24 Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Multiple disk shelves in a single chain



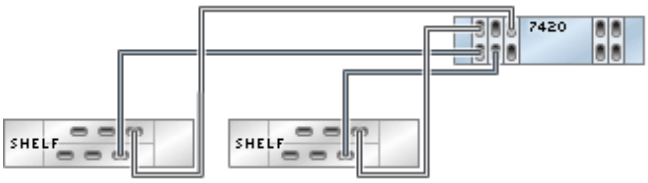
Sun ZFS Storage 7420 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (5 HBAs)

The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 standalone controllers with five HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

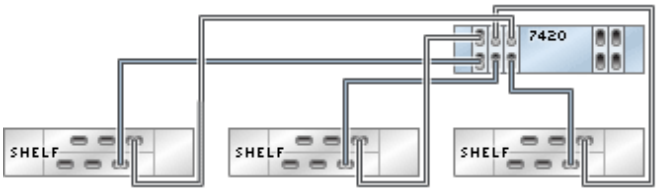
> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

Standalone Sun ZFS Storage 7420 controller with five HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain

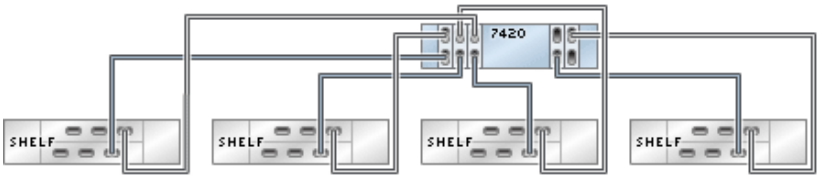
Standalone Sun ZFS Storage 7420 controller with five HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



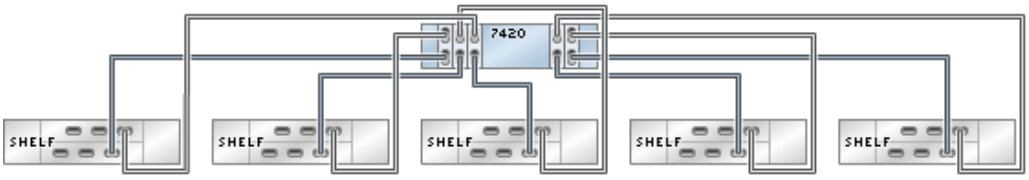
Standalone Sun ZFS Storage 7420 controller with five HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



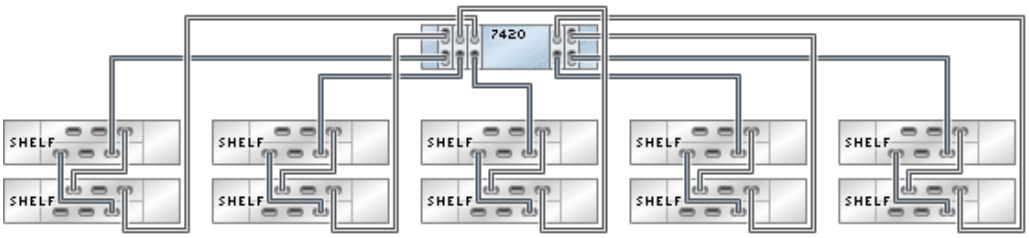
Standalone Sun ZFS Storage 7420 controller with five HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



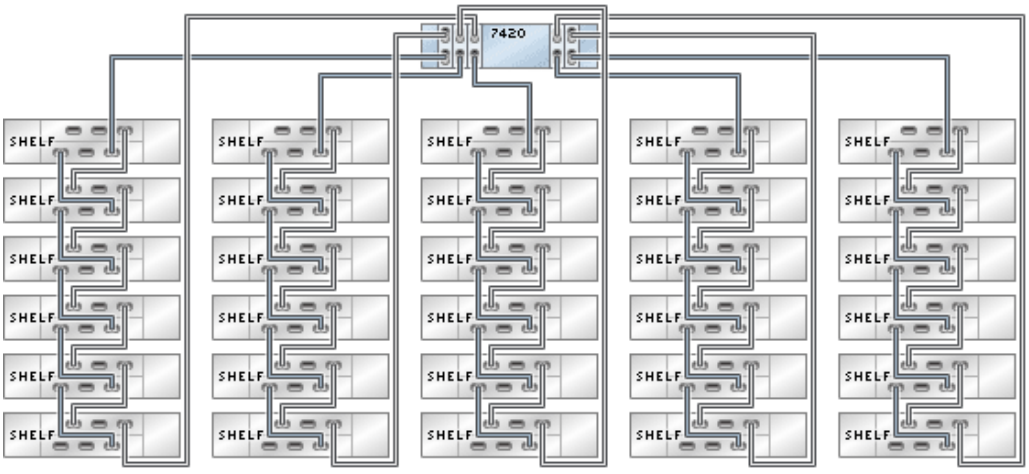
Standalone Sun ZFS Storage 7420 controller with five HBAs connected to five Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



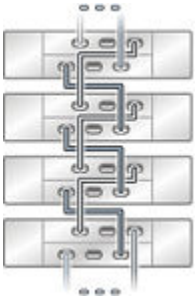
Standalone Sun ZFS Storage 7420 controller with five HBAs connected to ten Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



Standalone Sun ZFS Storage 7420 controller with five HBAs connected to 30 Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



Multiple disk shelves in a single chain



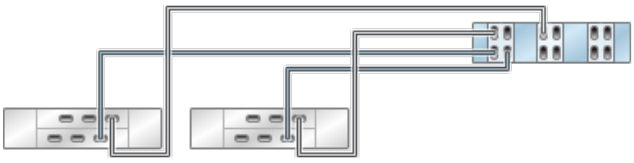
Sun ZFS Storage 7420 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (6 HBAs)

The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 standalone controllers with six HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

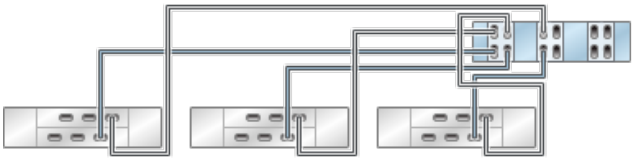
> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

Standalone Sun ZFS Storage 7420 controller with six HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain

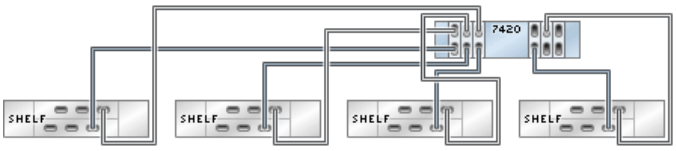
Standalone Sun ZFS Storage 7420 controller with six HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



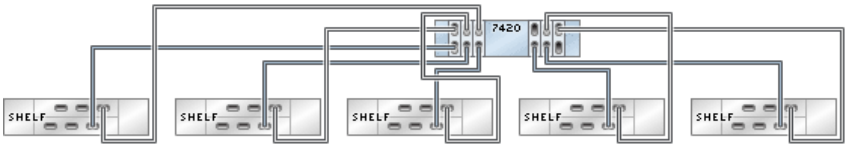
Standalone Sun ZFS Storage 7420 controller with six HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



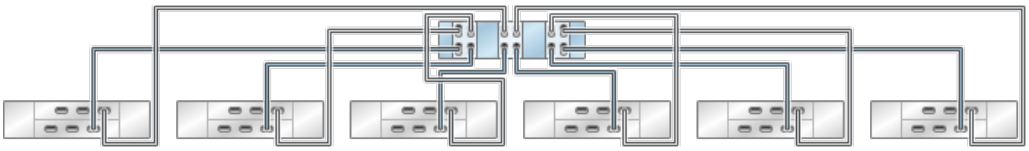
Standalone Sun ZFS Storage 7420 controller with six HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



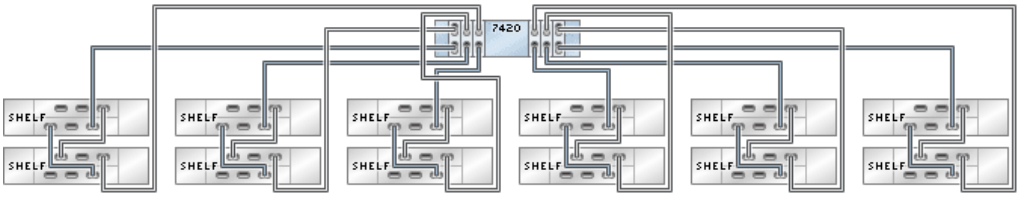
Standalone Sun ZFS Storage 7420 controller with six HBAs connected to five Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



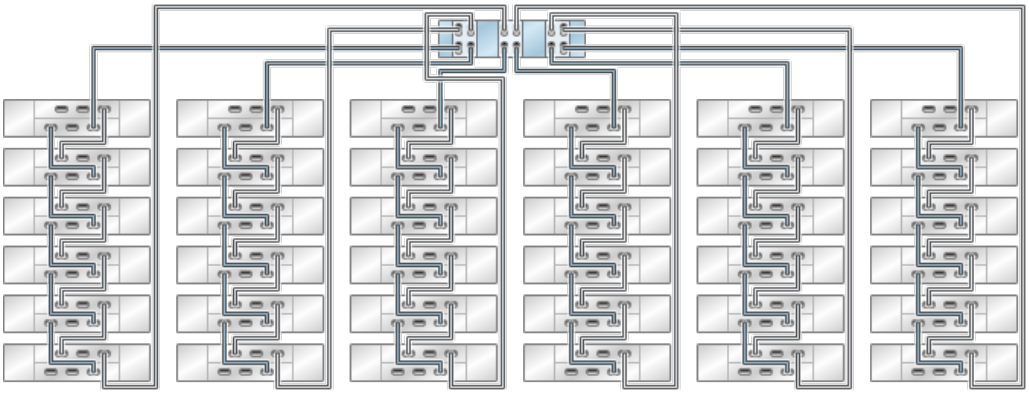
Standalone Sun ZFS Storage 7420 controller with six HBAs connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



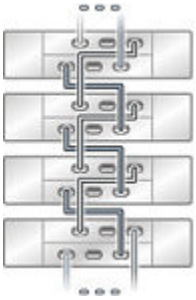
Standalone Sun ZFS Storage 7420 controller with six HBAs connected to 12 Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



Standalone Sun ZFS Storage 7420 controller with six HBAs connected to 36 Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



Multiple disk shelves in a single chain

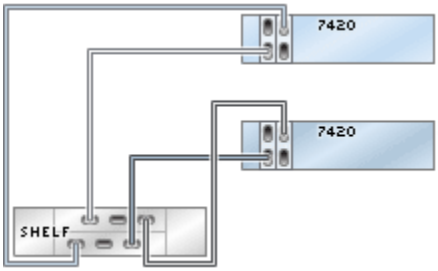


Sun ZFS Storage 7420 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (2 HBAs)

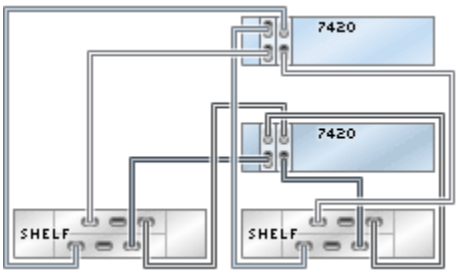
The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 clustered controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

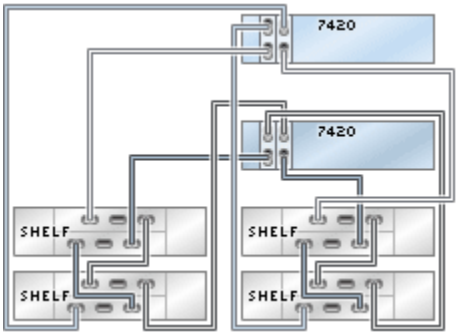
Clustered Sun ZFS Storage 7420 controllers with two HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



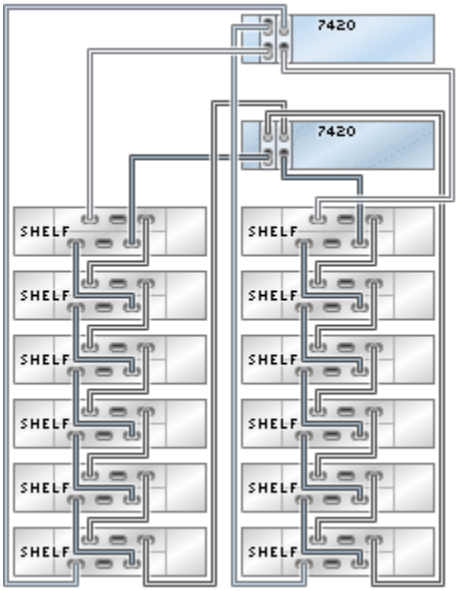
Clustered Sun ZFS Storage 7420 controllers with two HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



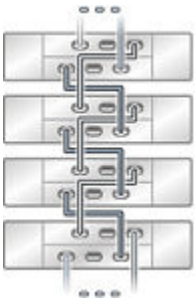
Clustered Sun ZFS Storage 7420 controllers with two HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



Clustered Sun ZFS Storage 7420 controllers with two HBAs connected to 12 Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



Multiple disk shelves in a single chain

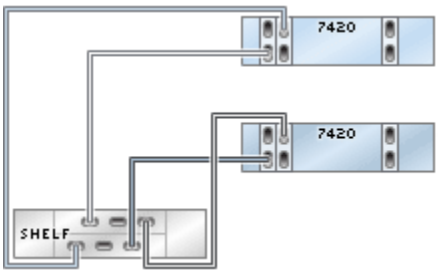


Sun ZFS Storage 7420 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (3 HBAs)

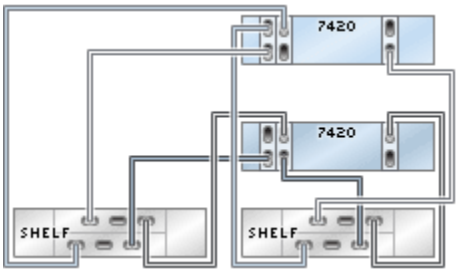
The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 clustered controllers with three HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

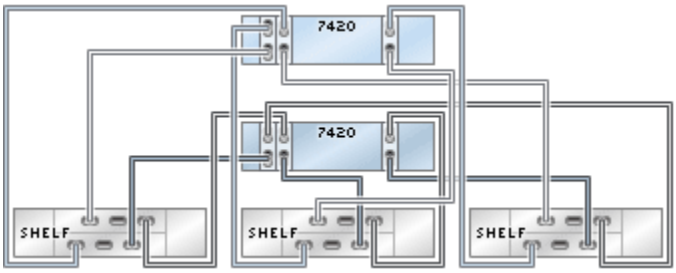
Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



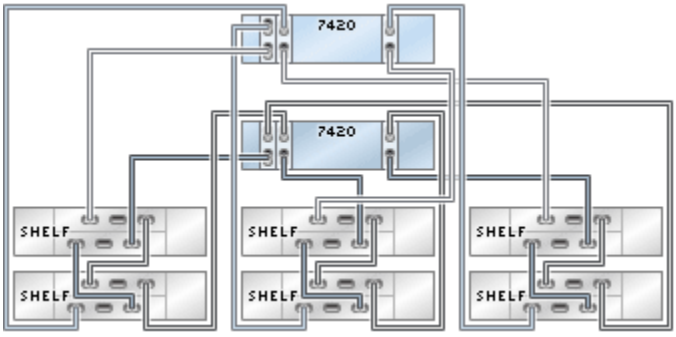
Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



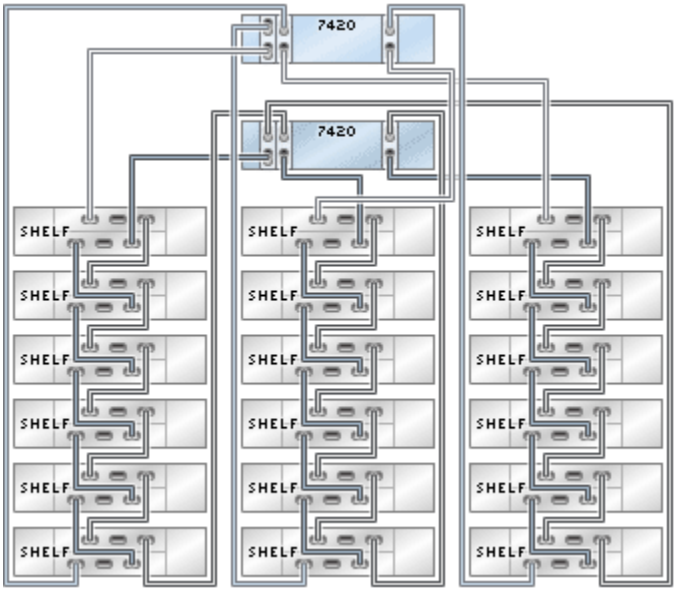
Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



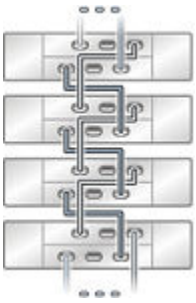
Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to 18 Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



Multiple disk shelves in a single chain

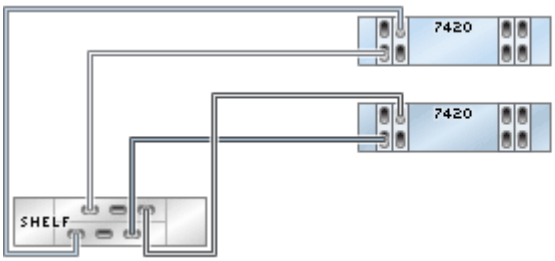


Sun ZFS Storage 7420 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (4 HBAs)

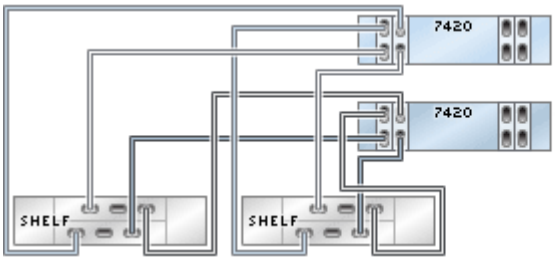
The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 clustered controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

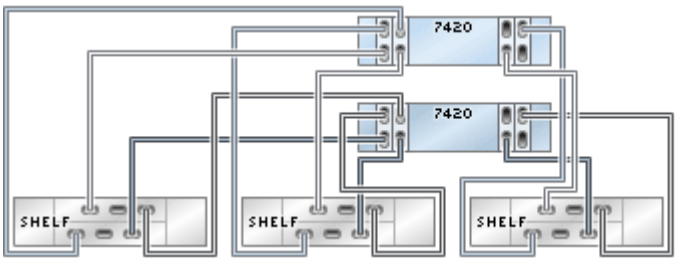
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



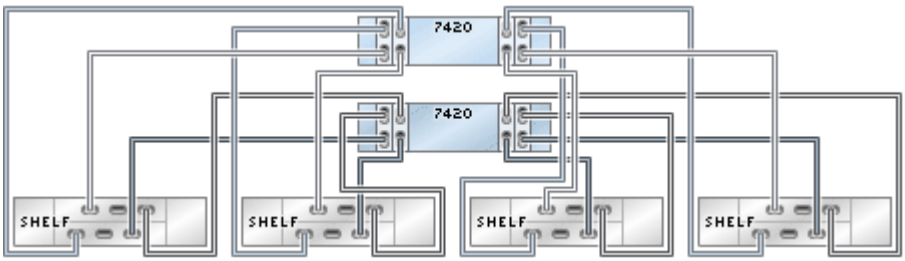
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



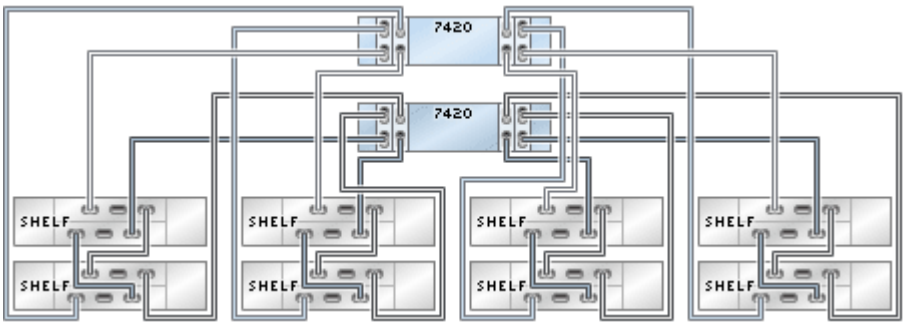
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



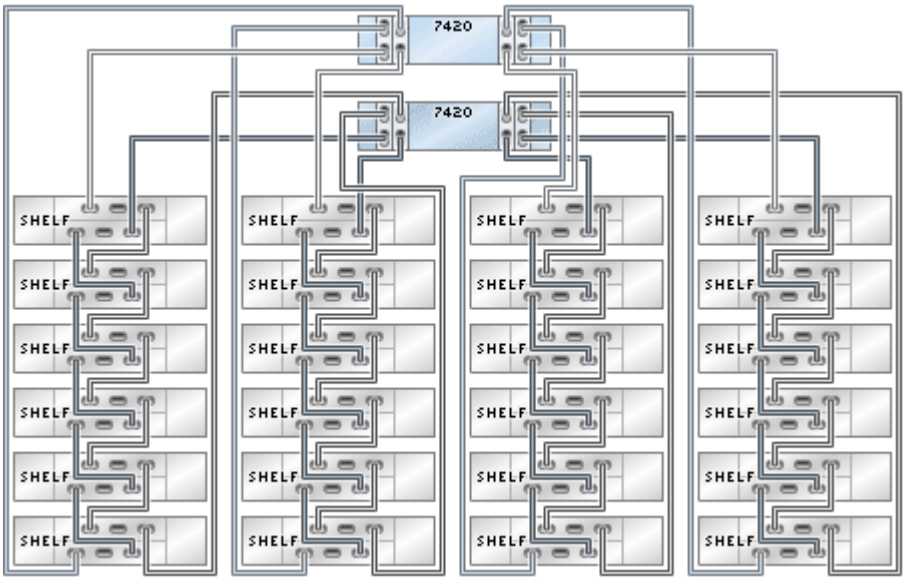
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



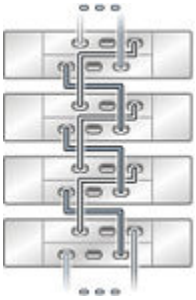
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to eight Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to 24 Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



Multiple disk shelves in a single chain



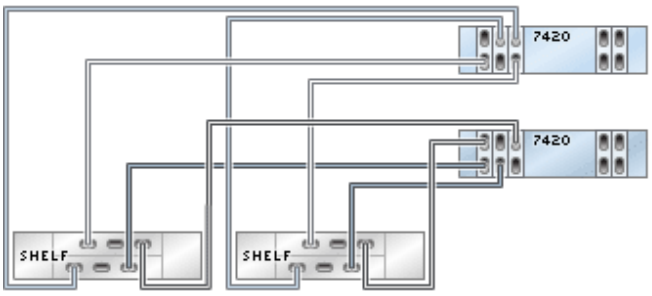
Sun ZFS Storage 7420 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (5 HBAs)

The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 clustered controllers with five HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

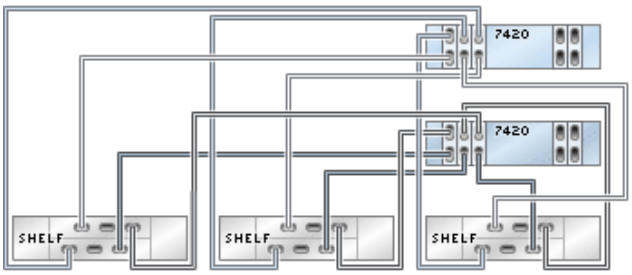
> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

Clustered Sun ZFS Storage 7420 controllers with five HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain

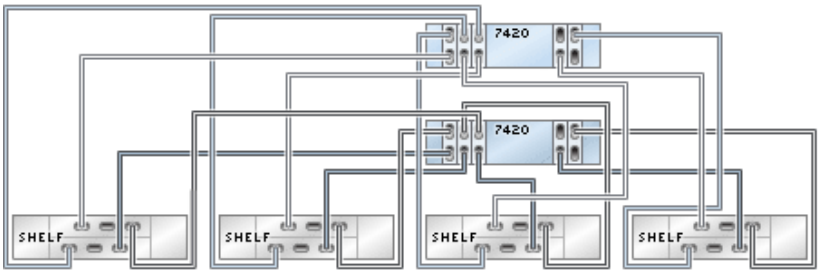
Clustered Sun ZFS Storage 7420 controllers with five HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



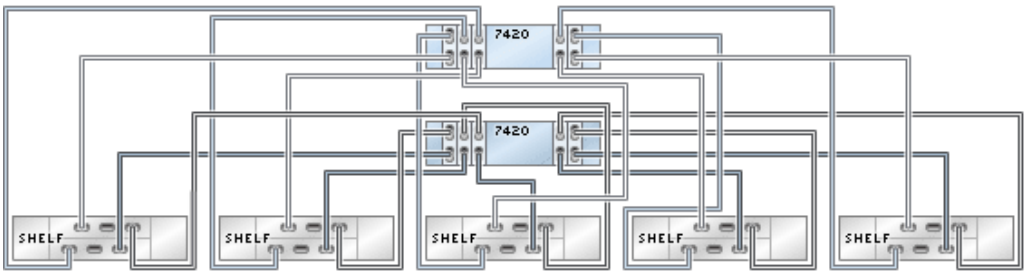
Clustered Sun ZFS Storage 7420 controllers with five HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



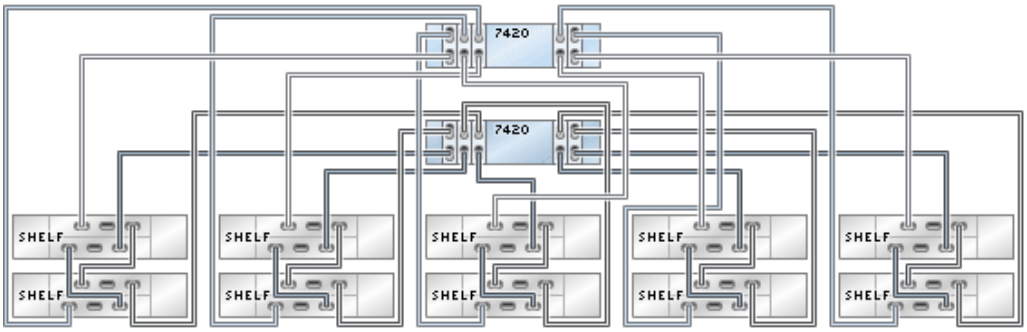
Clustered Sun ZFS Storage 7420 controllers with five HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



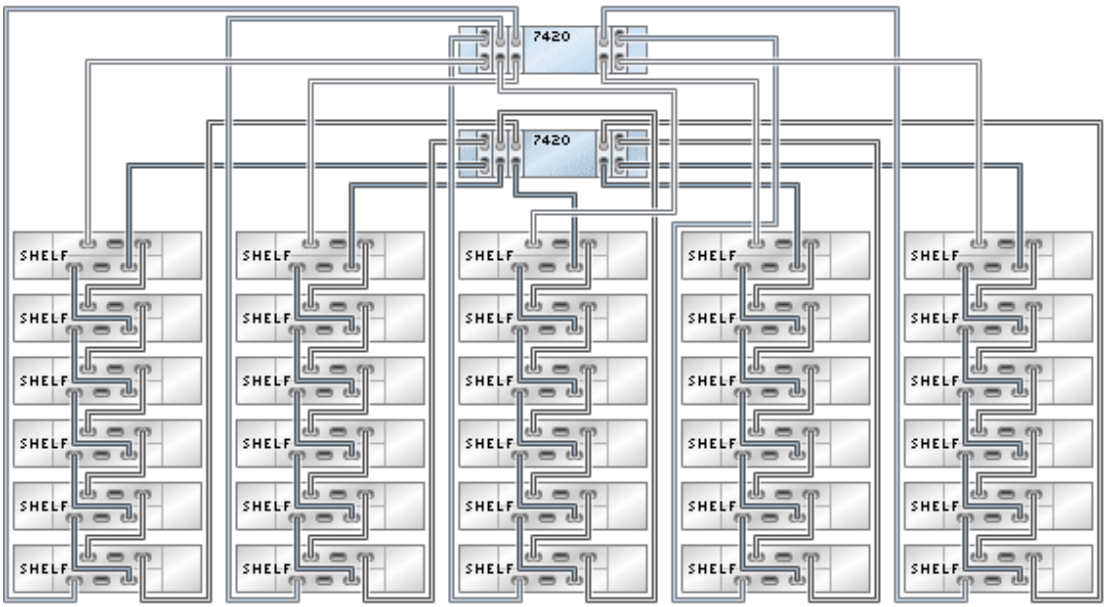
Clustered Sun ZFS Storage 7420 controllers with five HBAs connected to ten Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



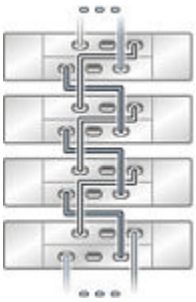
Clustered Sun ZFS Storage 7420 controllers with five HBAs connected to ten Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



Clustered Sun ZFS Storage 7420 controllers with five HBAs connected to 30 Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



Multiple disk shelves in a single chain



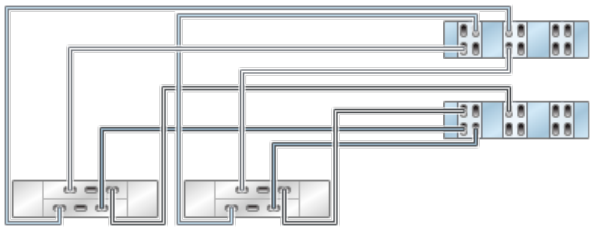
Sun ZFS Storage 7420 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves (6 HBAs)

The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 clustered controllers with six HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

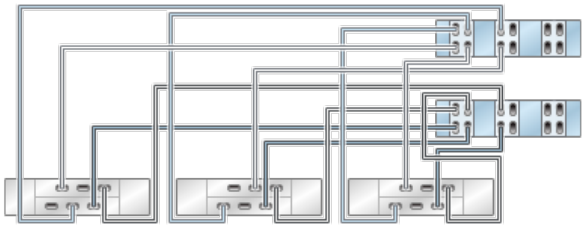
> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

Clustered Sun ZFS Storage 7420 controllers with six HBAs connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain

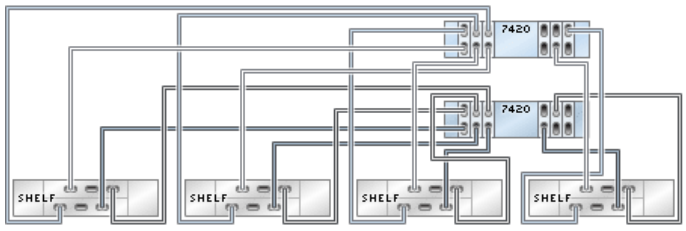
Clustered Sun ZFS Storage 7420 controllers with six HBAs connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in two chains



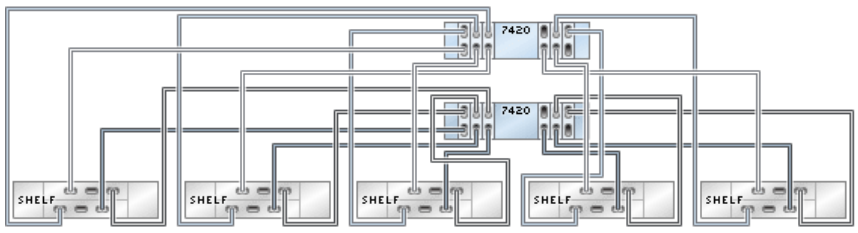
Clustered Sun ZFS Storage 7420 controllers with six HBAs connected to three Oracle Storage Drive Enclosure DE2-24 disk shelves in three chains



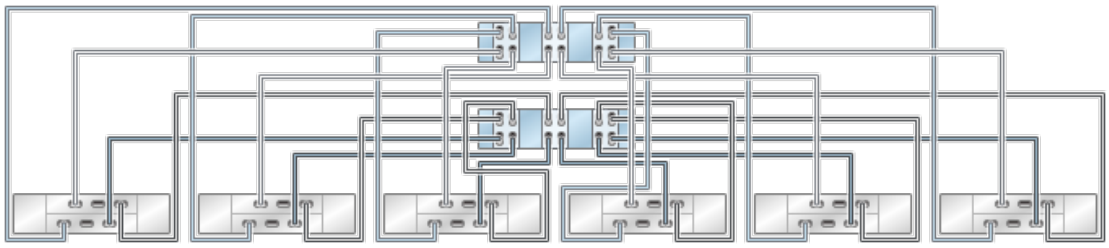
Clustered Sun ZFS Storage 7420 controllers with six HBAs connected to four Oracle Storage Drive Enclosure DE2-24 disk shelves in four chains



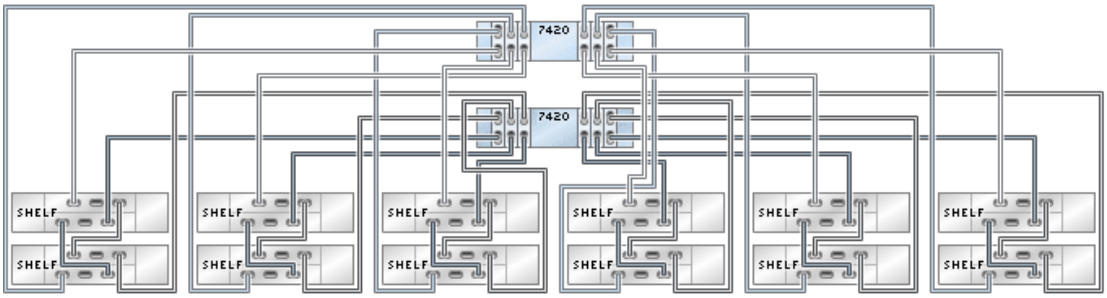
Clustered Sun ZFS Storage 7420 controllers with six HBAs connected to five Oracle Storage Drive Enclosure DE2-24 disk shelves in five chains



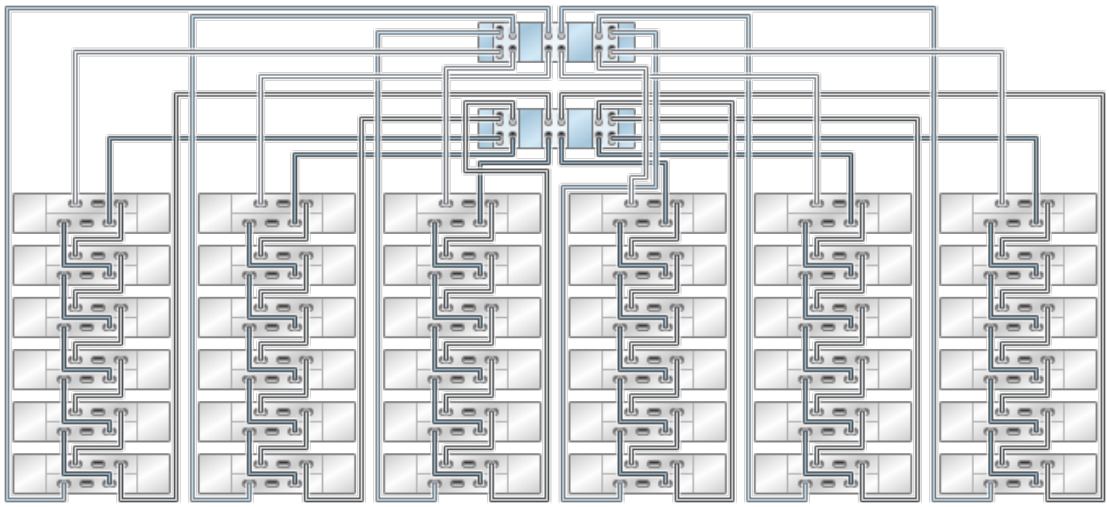
Clustered Sun ZFS Storage 7420 controllers with six HBAs connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



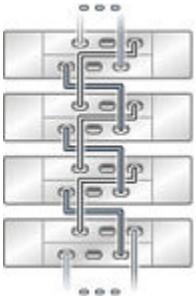
Clustered Sun ZFS Storage 7420 controllers with six HBAs connected to 12 Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



Clustered Sun ZFS Storage 7420 controllers with six HBAs connected to 36 Oracle Storage Drive Enclosure DE2-24 disk shelves in six chains



Multiple disk shelves in a single chain



Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Sun ZFS Storage 7320 Controllers

This section contains guidelines for properly cabling standalone and clustered Sun ZFS Storage 7320 controllers to Oracle Storage Drive Enclosure DE2-24 disk shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

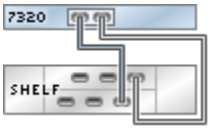
- Sun ZFS Storage 7320 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves
- Sun ZFS Storage 7320 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves

Sun ZFS Storage 7320 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves

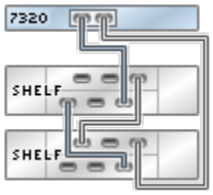
The following figures show a subset of the supported configurations for Sun ZFS Storage 7320 standalone controllers with one HBA. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

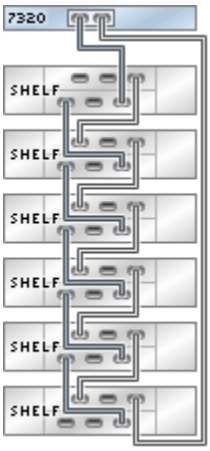
Standalone Sun ZFS Storage 7320 controller with one HBA connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



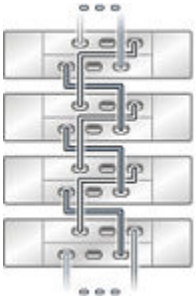
Standalone Sun ZFS Storage 7320 controller with one HBA connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Standalone Sun ZFS Storage 7320 controller with one HBA connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple disk shelves in a single chain

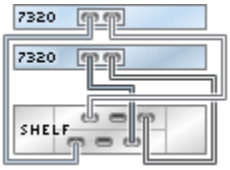


Sun ZFS Storage 7320 Clustered to Oracle Storage Drive Enclosure DE2-24 Disk Shelves

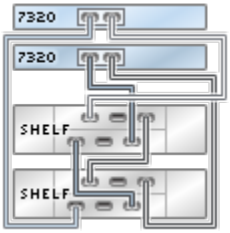
The following figures show a subset of the supported configurations for the Sun ZFS Storage 7320 clustered controllers with one HBA. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

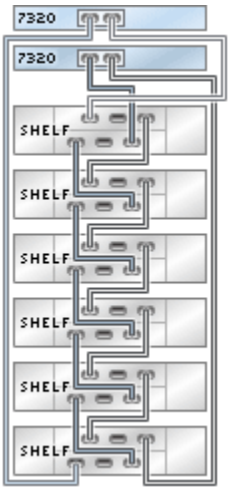
Clustered Sun ZFS Storage 7320 controllers with one HBA connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



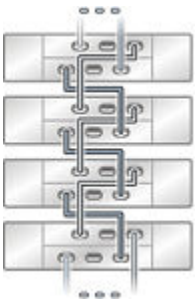
Clustered Sun ZFS Storage 7320 controllers with one HBA connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Clustered Sun ZFS Storage 7320 controllers with one HBA connected to six Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple disk shelves in a single chain



Cabling Oracle Storage Drive Enclosure DE2-24 Disk Shelves to Sun ZFS Storage 7120 Controllers

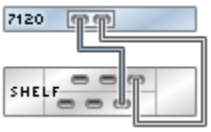
This section contains guidelines for properly cabling standalone Sun ZFS Storage 7120 controllers to Oracle Storage Drive Enclosure DE2-24 disk shelves. Use the diagrams in this section to connect to one or more disk shelves.

Sun ZFS Storage 7120 Standalone to Oracle Storage Drive Enclosure DE2-24 Disk Shelves

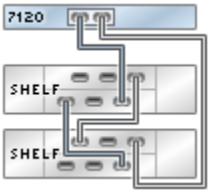
The following figures show the supported configurations for the Sun ZFS Storage 7120 standalone controller. To cable the controller to the disk shelves, see Getting Started with Cabling.

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

Standalone Sun ZFS Storage 7120 controller with one HBA connected to one Oracle Storage Drive Enclosure DE2-24 disk shelf in a single chain



Standalone Sun ZFS Storage 7120 controller with one HBA connected to two Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



6

Cabling Sun Disk Shelves

This section contains guidelines for properly cabling standalone and clustered controllers to Sun Disk Shelves.

To review these guidelines, see the following topics:

- Cabling Sun Disk Shelves to Sun ZFS Storage 7420 Controllers
- Cabling Sun Disk Shelves to Sun ZFS Storage 7320 Controllers
- Cabling Sun Disk Shelves to Sun ZFS Storage 7120 Controllers

Cabling Sun Disk Shelves to Sun ZFS Storage 7420 Controllers

This section contains guidelines for properly cabling standalone and clustered Sun ZFS Storage 7420 controllers to Sun Disk Shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

- Sun ZFS Storage 7420 Standalone to Sun Disk Shelves (2 HBAs)
- Sun ZFS Storage 7420 Standalone to Sun Disk Shelves (3 HBAs)
- Sun ZFS Storage 7420 Standalone to Sun Disk Shelves (4 HBAs)
- Sun ZFS Storage 7420 Standalone to Sun Disk Shelves (5 HBAs)
- Sun ZFS Storage 7420 Standalone to Sun Disk Shelves (6 HBAs)
- Sun ZFS Storage 7420 Clustered to Sun Disk Shelves (2 HBAs)
- Sun ZFS Storage 7420 Clustered to Sun Disk Shelves (3 HBAs)
- Sun ZFS Storage 7420 Clustered to Sun Disk Shelves (4 HBAs)
- Sun ZFS Storage 7420 Clustered to Sun Disk Shelves (5 HBAs)
- Sun ZFS Storage 7420 Clustered to Sun Disk Shelves (6 HBAs)

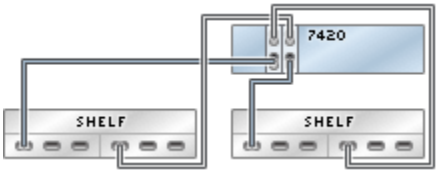
Sun ZFS Storage 7420 Standalone to Sun Disk Shelves (2 HBAs)

The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 standalone controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

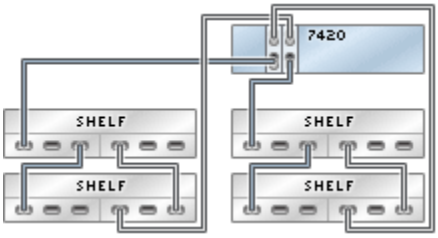
> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

Standalone Sun ZFS Storage 7420 controller with two HBAs connected to one Sun Disk Shelf in a single chain

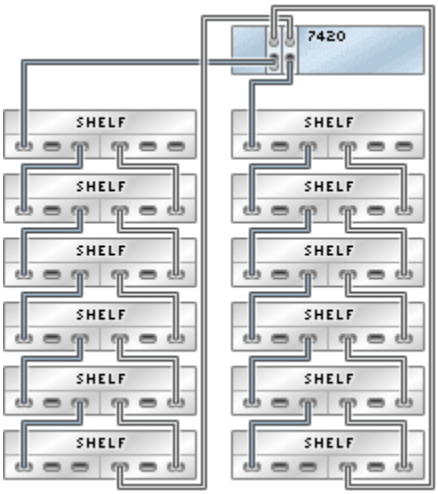
Standalone Sun ZFS Storage 7420 controller with two HBAs connected to two Sun Disk Shelves in two chains



Standalone Sun ZFS Storage 7420 controller with two HBAs connected to four Sun Disk Shelves in two chains



Standalone Sun ZFS Storage 7420 controller with two HBAs connected to 12 Sun Disk Shelves in two chains



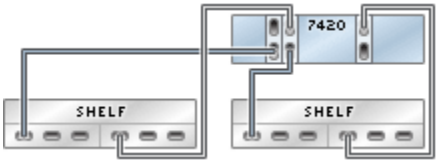
Sun ZFS Storage 7420 Standalone to Sun Disk Shelves (3 HBAs)

The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 standalone controllers with three HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

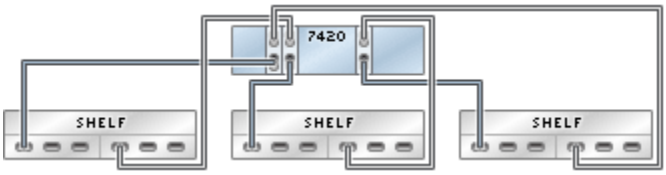
> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

Standalone Sun ZFS Storage 7420 controller with three HBAs connected to one Sun Disk Shelf in a single chain

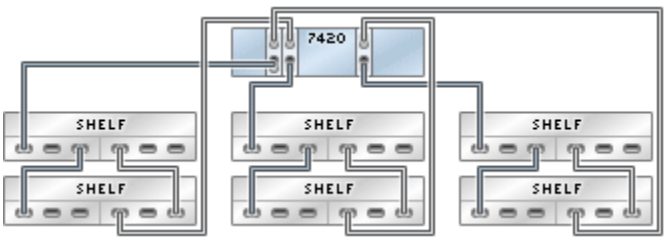
Standalone Sun ZFS Storage 7420 controller with three HBAs connected to two Sun Disk Shelves in two chains



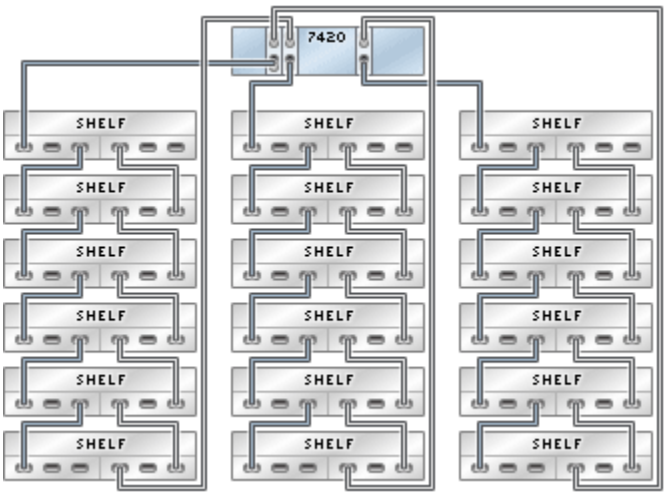
Standalone Sun ZFS Storage 7420 controller with three HBAs connected to three Sun Disk Shelves in three chains



Standalone Sun ZFS Storage 7420 controller with three HBAs connected to six Sun Disk Shelves in three chains



Standalone Sun ZFS Storage 7420 controller with three HBAs connected to 18 Sun Disk Shelves in three chains



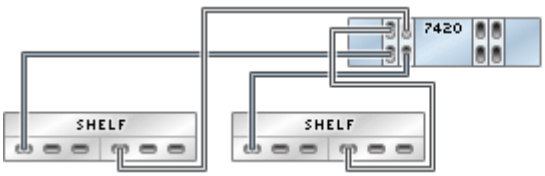
Sun ZFS Storage 7420 Standalone to Sun Disk Shelves (4 HBAs)

The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 standalone controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

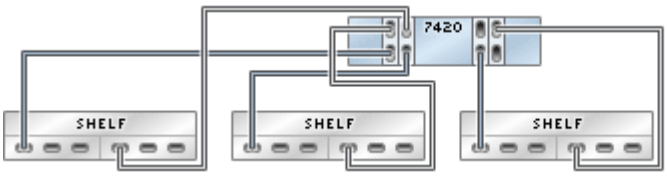
> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

Standalone Sun ZFS Storage 7420 controller with four HBAs connected to one Sun Disk Shelf in a single chain

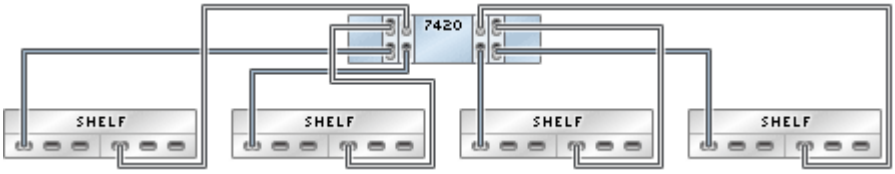
Standalone Sun ZFS Storage 7420 controller with four HBAs connected to two Sun Disk Shelves in two chains



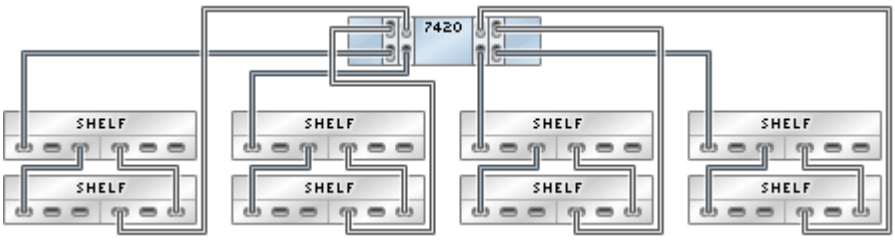
Standalone Sun ZFS Storage 7420 controller with four HBAs connected to three Sun Disk Shelves in three chains



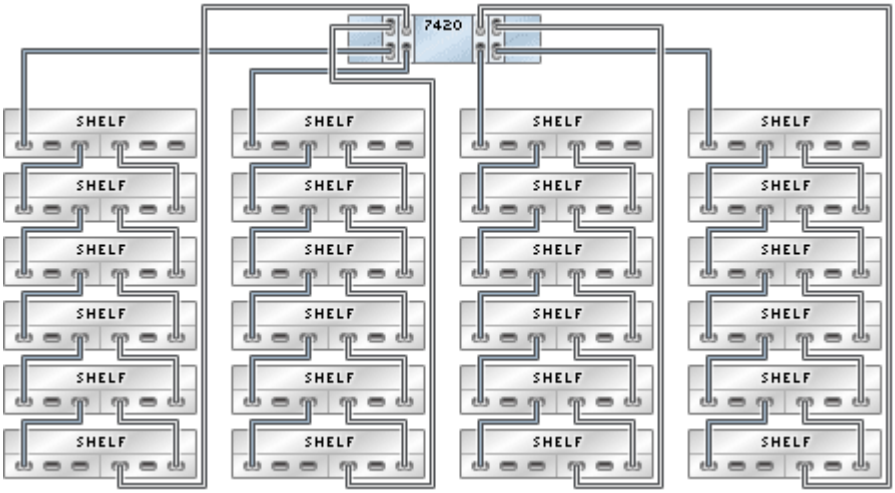
Standalone Sun ZFS Storage 7420 controller with four HBAs connected to four Sun Disk Shelves in four chains



Standalone Sun ZFS Storage 7420 controller with four HBAs connected to eight Sun Disk Shelves in four chains



Standalone Sun ZFS Storage 7420 controller with four HBAs connected to 24 Sun Disk Shelves in four chains



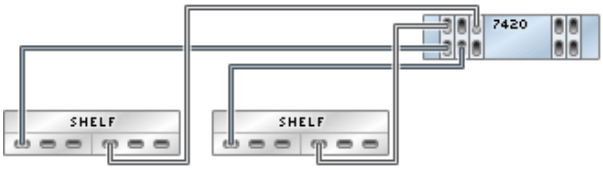
Sun ZFS Storage 7420 Standalone to Sun Disk Shelves (5 HBAs)

The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 standalone controllers with five HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

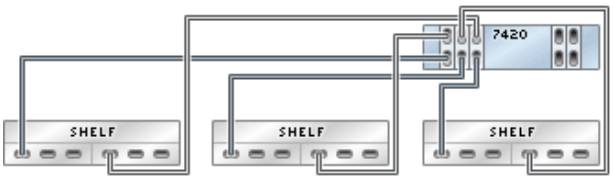
> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

Standalone Sun ZFS Storage 7420 controller with five HBAs connected to one Sun Disk Shelf in a single chain

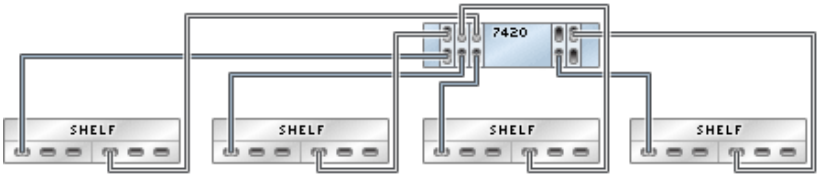
Standalone Sun ZFS Storage 7420 controller with five HBAs connected to two Sun Disk Shelves in two chains



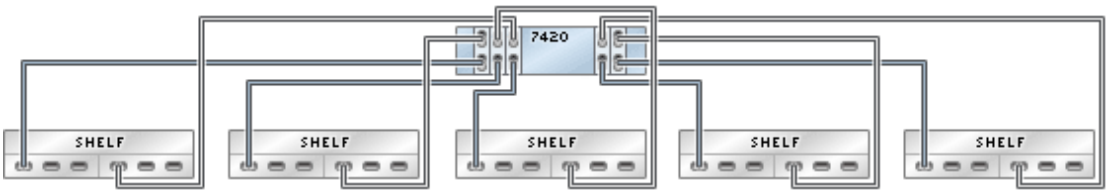
Standalone Sun ZFS Storage 7420 controller with five HBAs connected to three Sun Disk Shelves in three chains



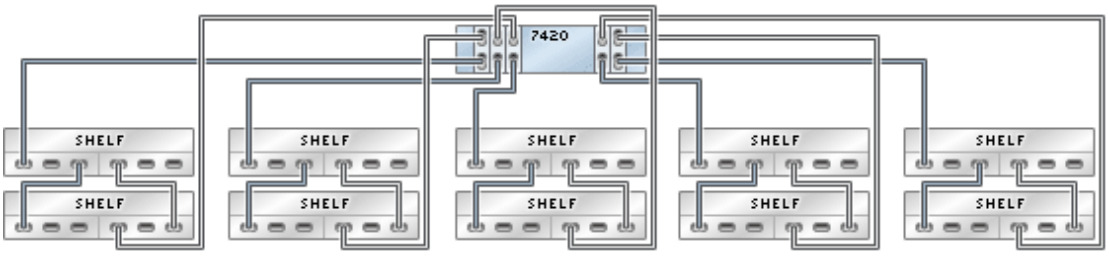
Standalone Sun ZFS Storage 7420 controller with five HBAs connected to four Sun Disk Shelves in four chains



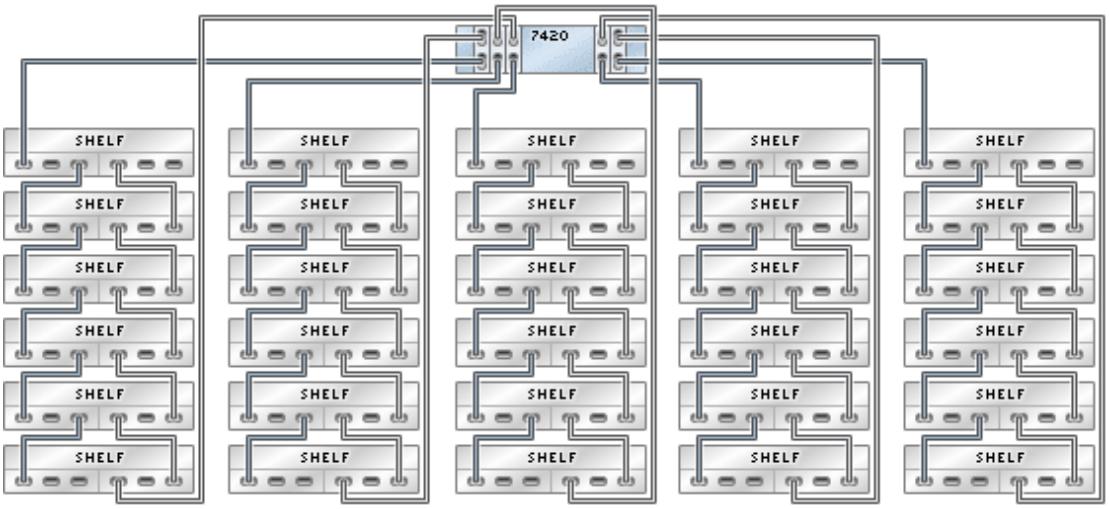
Standalone Sun ZFS Storage 7420 controller with five HBAs connected to five Sun Disk Shelves in five chains



Standalone Sun ZFS Storage 7420 controller with five HBAs connected to ten Sun Disk Shelves in five chains



Standalone Sun ZFS Storage 7420 controller with five HBAs connected to 30 Sun Disk Shelves in five chains



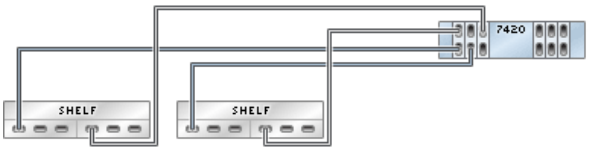
Sun ZFS Storage 7420 Standalone to Sun Disk Shelves (6 HBAs)

The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 standalone controllers with six HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

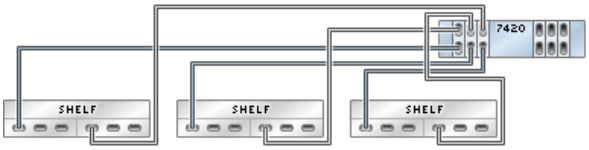
> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

Standalone Sun ZFS Storage 7420 controller with six HBAs connected to one Sun Disk Shelf in a single chain

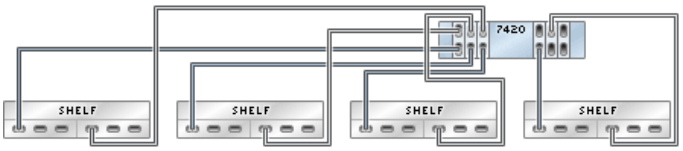
Standalone Sun ZFS Storage 7420 controller with six HBAs connected to two Sun Disk Shelves in two chains



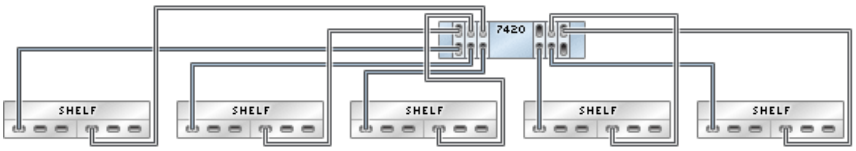
Standalone Sun ZFS Storage 7420 controller with six HBAs connected to three Sun Disk Shelves in three chains



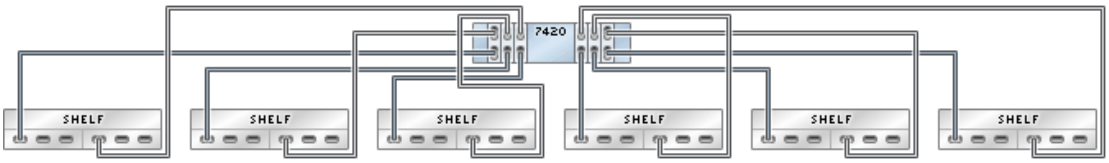
Standalone Sun ZFS Storage 7420 controller with six HBAs connected to four Sun Disk Shelves in four chains



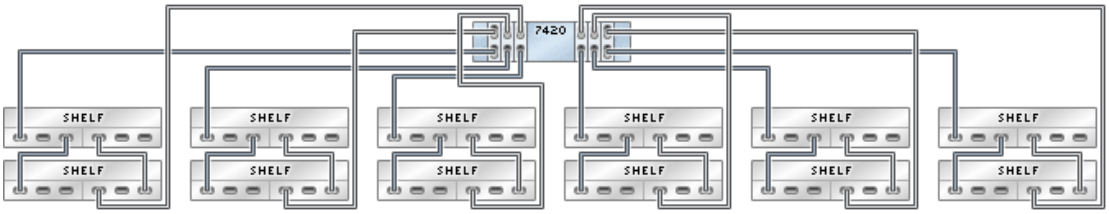
Standalone Sun ZFS Storage 7420 controller with six HBAs connected to five Sun Disk Shelves in five chains



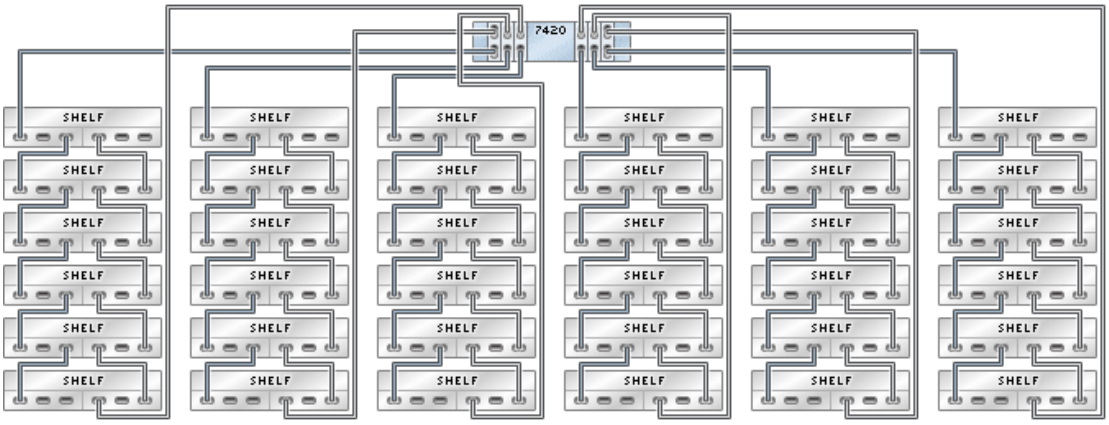
Standalone Sun ZFS Storage 7420 controller with six HBAs connected to six Sun Disk Shelves in six chains



Standalone Sun ZFS Storage 7420 controller with six HBAs connected to 12 Sun Disk Shelves in six chains



Standalone Sun ZFS Storage 7420 controller with six HBAs connected to 36 Sun Disk Shelves in six chains

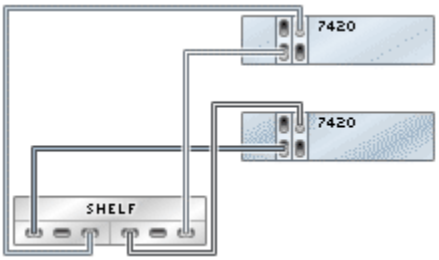


Sun ZFS Storage 7420 Clustered to Sun Disk Shelves (2 HBAs)

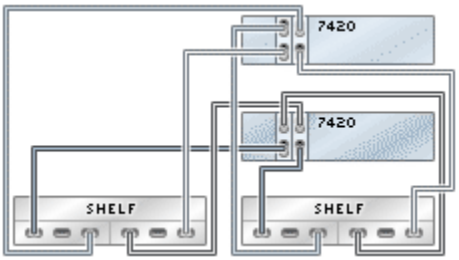
The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 clustered controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

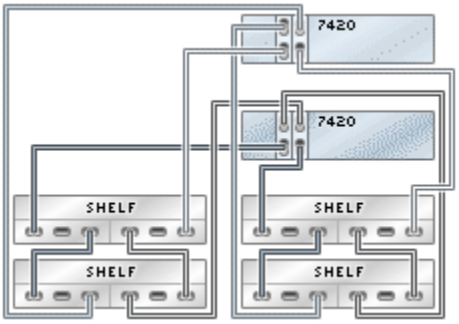
Clustered Sun ZFS Storage 7420 controllers with two HBAs connected to one Sun Disk Shelf in a single chain



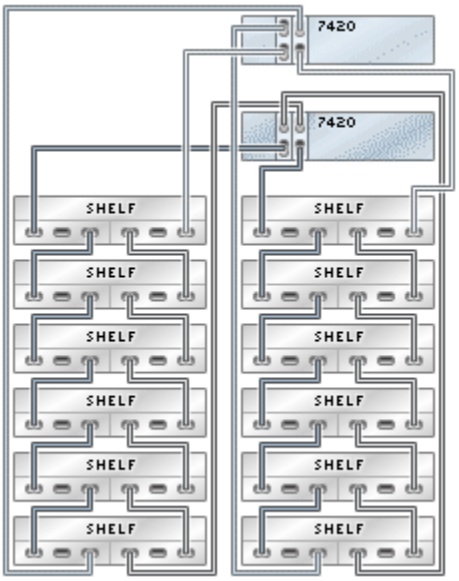
Clustered Sun ZFS Storage 7420 controllers with two HBAs connected to two Sun Disk Shelves in two chains



Clustered Sun ZFS Storage 7420 controllers with two HBAs connected to four Sun Disk Shelves in two chains



Clustered Sun ZFS Storage 7420 controllers with two HBAs connected to 12 Sun Disk Shelves in two chains

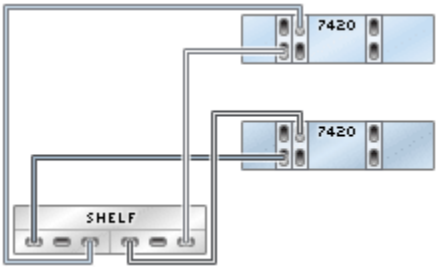


Sun ZFS Storage 7420 Clustered to Sun Disk Shelves (3 HBAs)

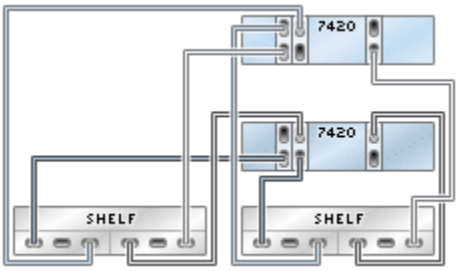
The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 clustered controllers with three HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

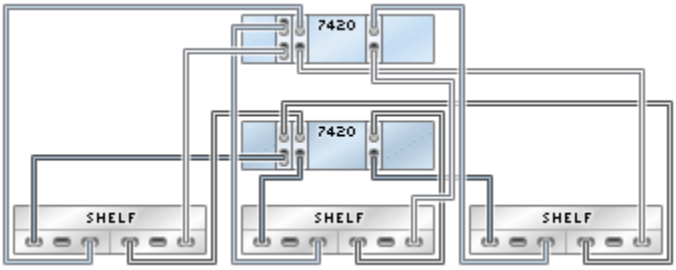
Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to one Sun Disk Shelf in a single chain



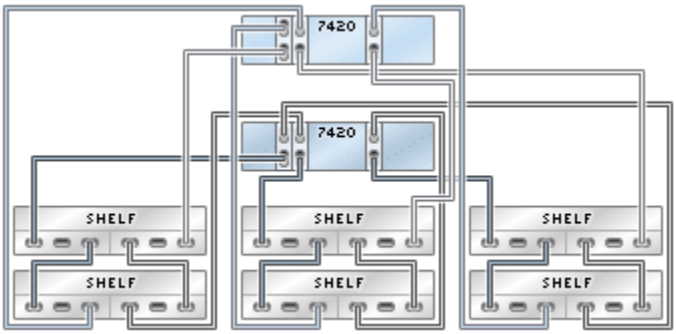
Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to two Sun Disk Shelves in two chains



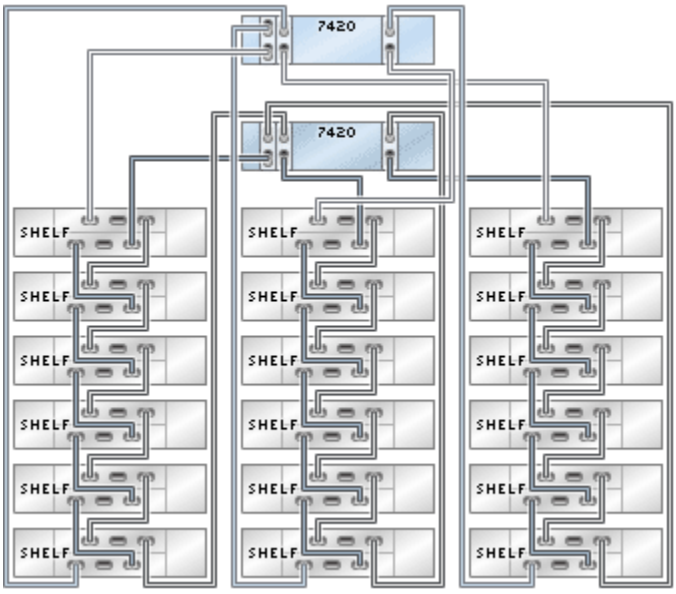
Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to three Sun Disk Shelves in three chains



Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to six Sun Disk Shelves in three chains



Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to 18 Sun Disk Shelves in three chains

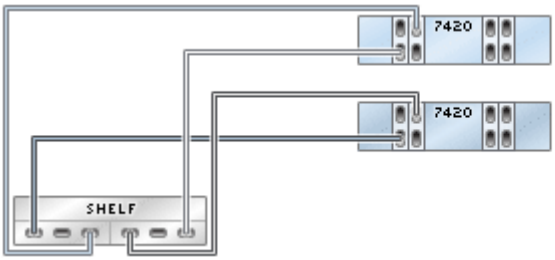


Sun ZFS Storage 7420 Clustered to Sun Disk Shelves (4 HBAs)

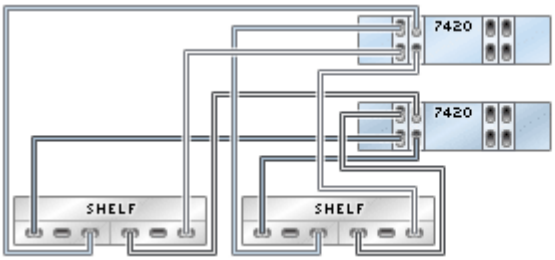
The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 clustered controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

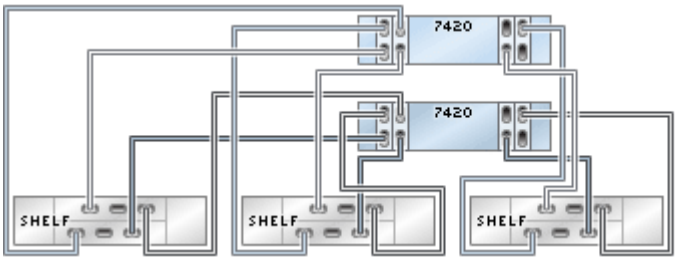
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to one Sun Disk Shelf in a single chain



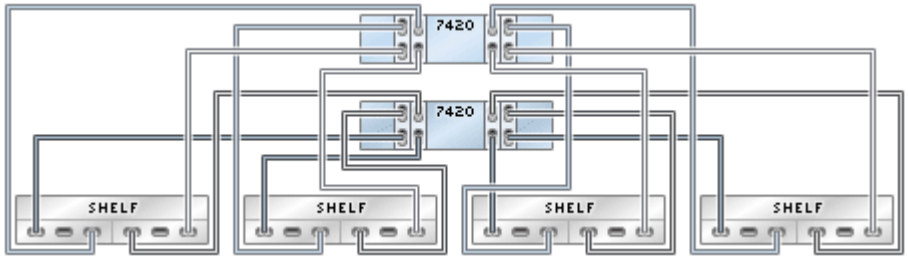
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to two Sun Disk Shelves in two chains



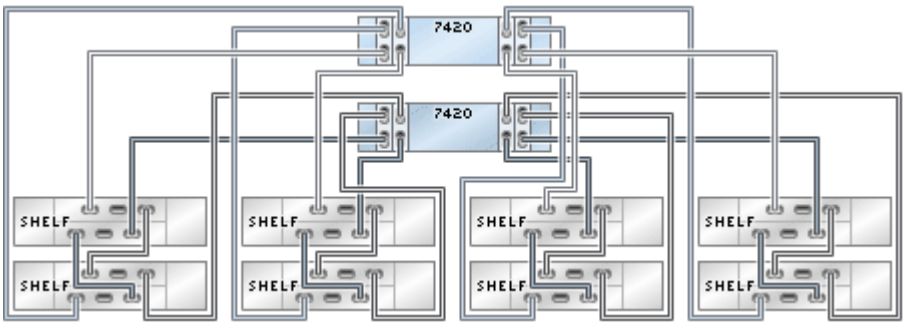
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to three Sun Disk Shelves in three chains



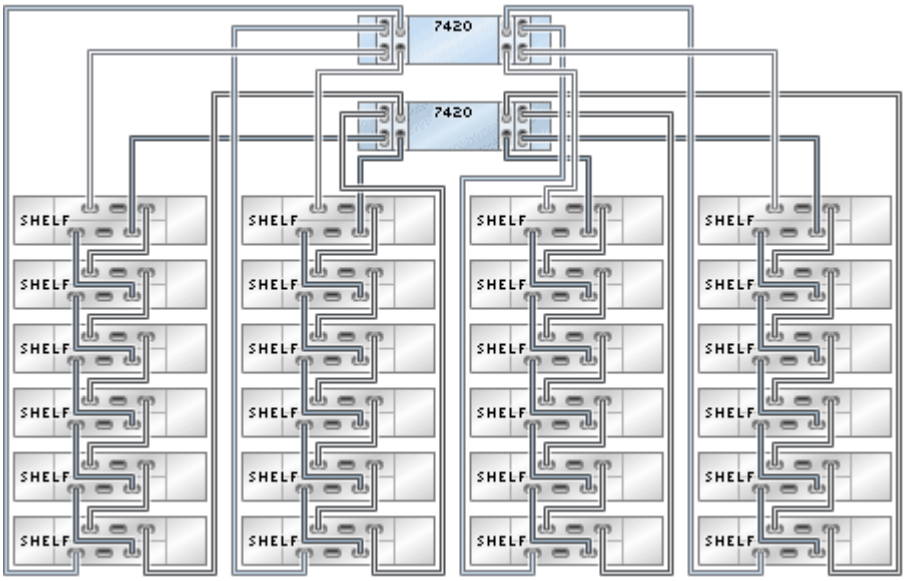
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to four Sun Disk Shelves in four chains



Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to eight Sun Disk Shelves in four chains



Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to 24 Sun Disk Shelves in four chains

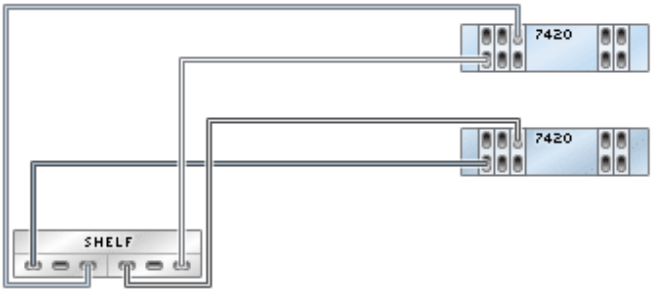


Sun ZFS Storage 7420 Clustered to Sun Disk Shelves (5 HBAs)

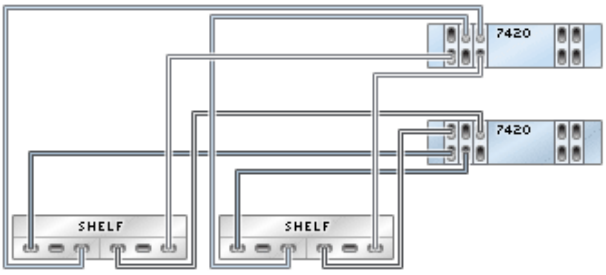
The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 clustered controllers with five HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

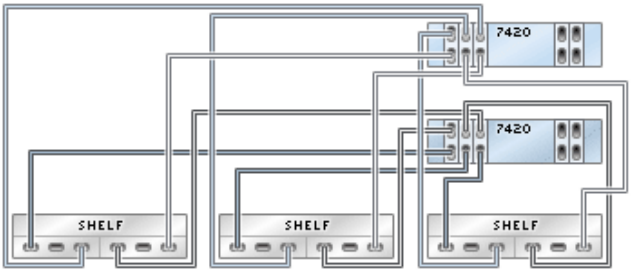
Clustered Sun ZFS Storage 7420 controllers with five HBAs connected to one Sun Disk Shelf in a single chain



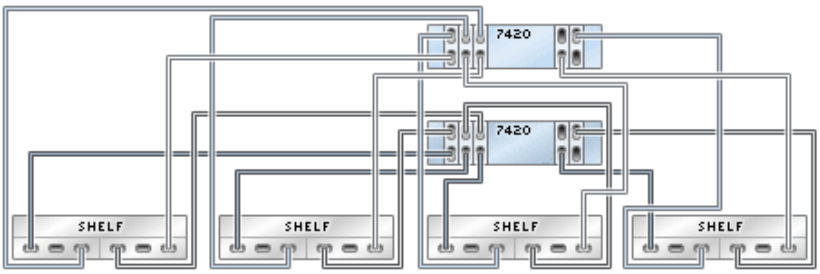
Clustered Sun ZFS Storage 7420 controllers with five HBAs connected to two Sun Disk Shelves in two chains



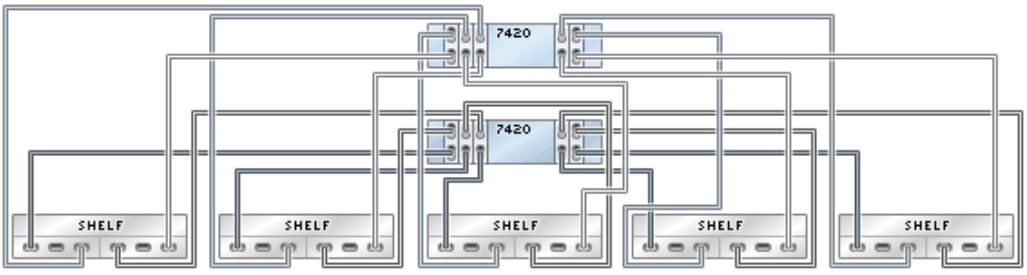
Clustered Sun ZFS Storage 7420 controllers with five HBAs connected to three Sun Disk Shelves in three chains



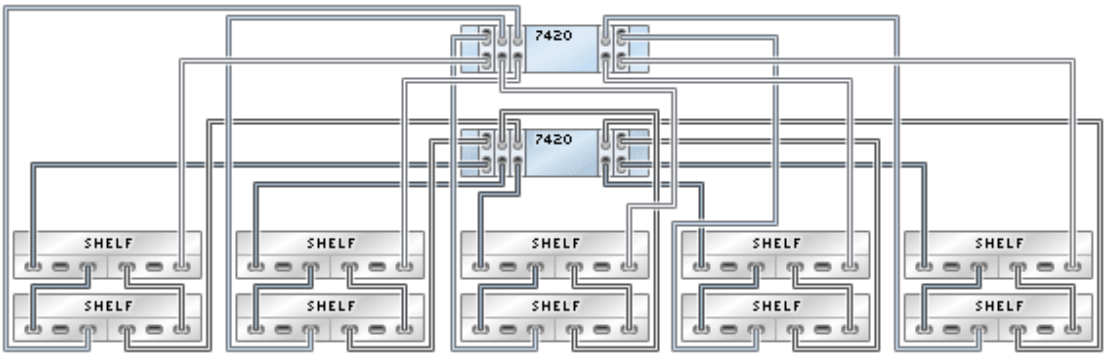
Clustered Sun ZFS Storage 7420 controllers with five HBAs connected to four Sun Disk Shelves in four chains



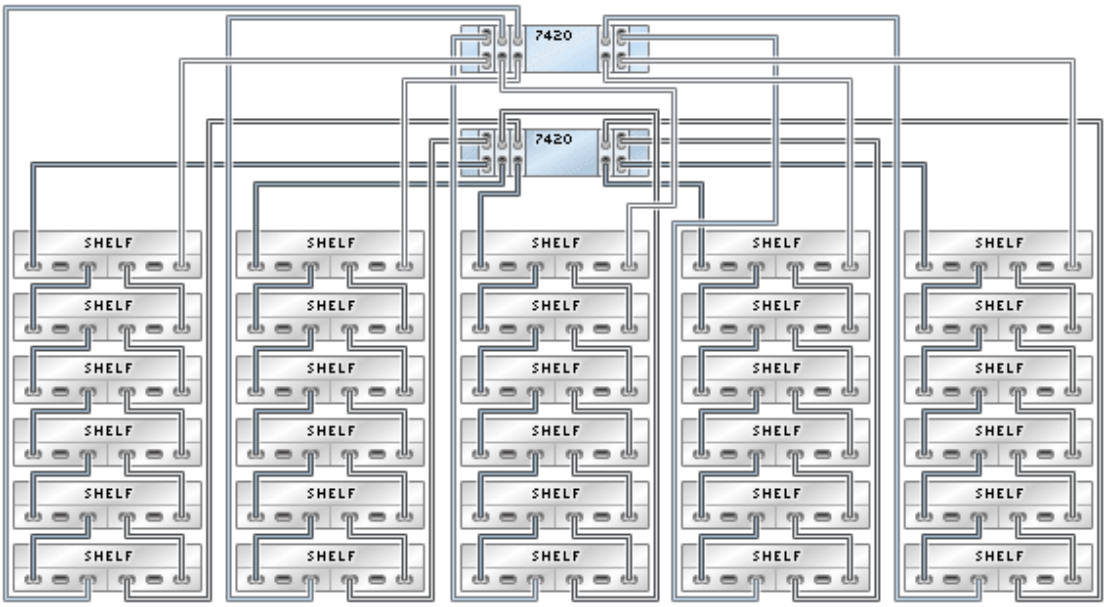
Clustered Sun ZFS Storage 7420 controllers with five HBAs connected to five Sun Disk Shelves in five chains



Clustered Sun ZFS Storage 7420 controllers with five HBAs connected to ten Sun Disk Shelves in five chains



Clustered Sun ZFS Storage 7420 controllers with five HBAs connected to 30 Sun Disk Shelves in five chains

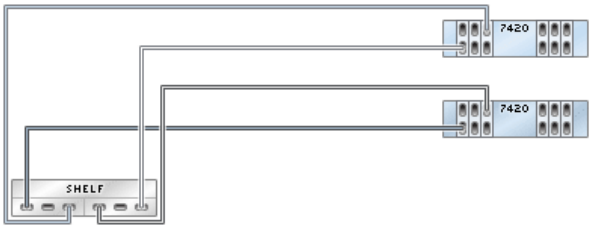


Sun ZFS Storage 7420 Clustered to Sun Disk Shelves (6 HBAs)

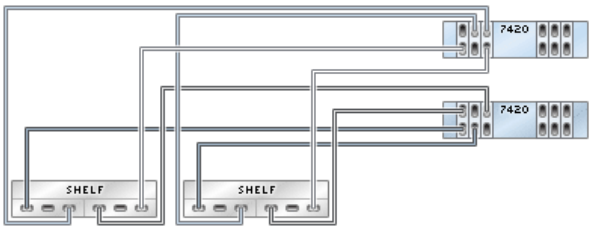
The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 clustered controllers with six HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

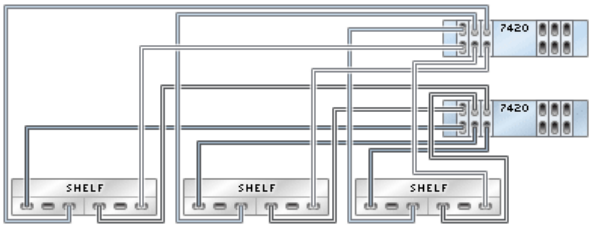
Clustered Sun ZFS Storage 7420 controllers with six HBAs connected to one Sun Disk Shelf in a single chain



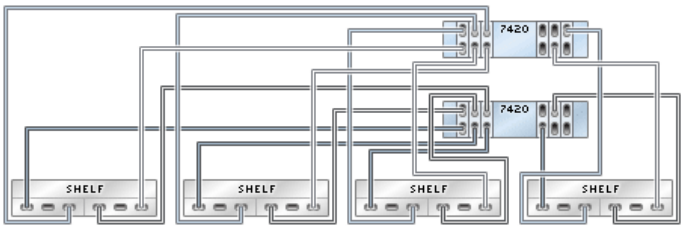
Clustered Sun ZFS Storage 7420 controllers with six HBAs connected to two Sun Disk Shelves in two chains



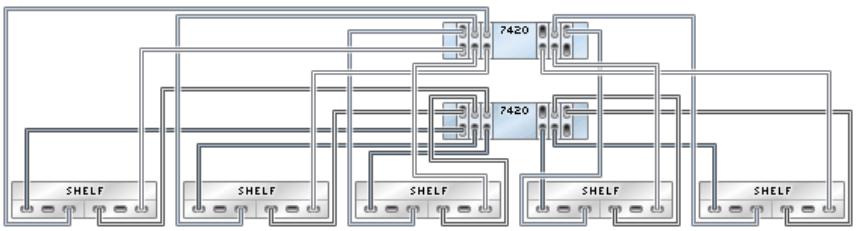
Clustered Sun ZFS Storage 7420 controllers with six HBAs connected to three Sun Disk Shelves in three chains



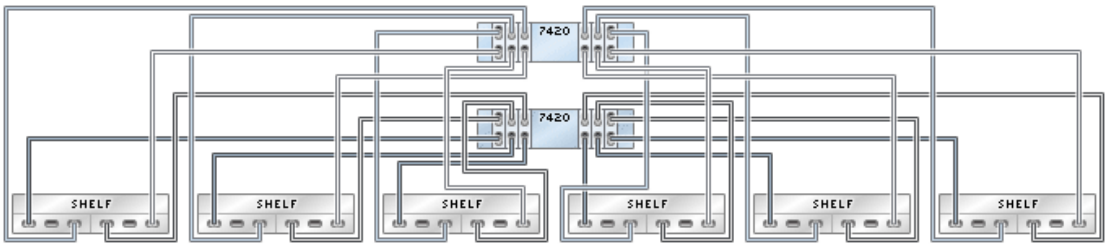
Clustered Sun ZFS Storage 7420 controllers with six HBAs connected to four Sun Disk Shelves in four chains



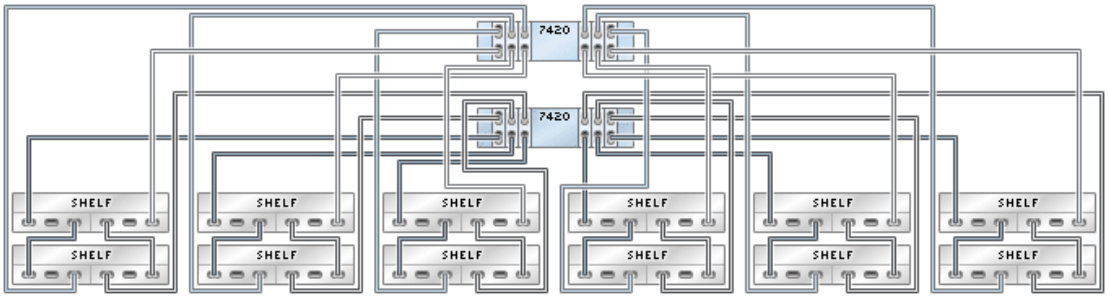
Clustered Sun ZFS Storage 7420 controllers with six HBAs connected to five Sun Disk Shelves in five chains



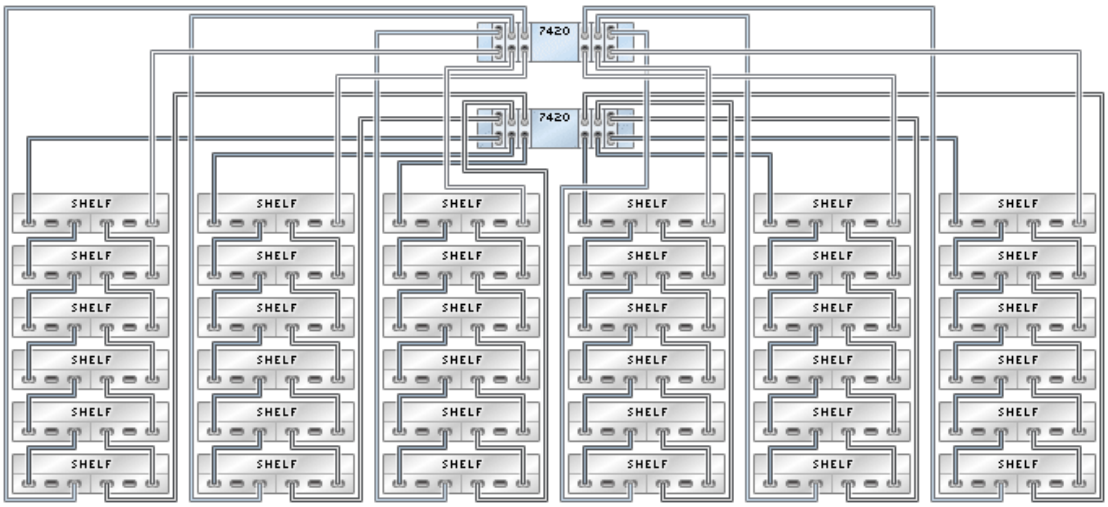
Clustered Sun ZFS Storage 7420 controllers with six HBAs connected to six Sun Disk Shelves in six chains



Clustered Sun ZFS Storage 7420 controllers with six HBAs connected to 12 Sun Disk Shelves in six chains



Clustered Sun ZFS Storage 7420 controllers with six HBAs connected to 36 Sun Disk Shelves in six chains



Cabling Sun Disk Shelves to Sun ZFS Storage 7320 Controllers

This section contains guidelines for properly cabling standalone and clustered Sun ZFS Storage 7320 controllers to Sun Disk Shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

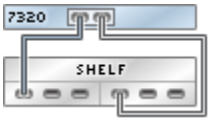
- Sun ZFS Storage 7320 Standalone to Sun Disk Shelves
- Sun ZFS Storage 7320 Clustered to Sun Disk Shelves

Sun ZFS Storage 7320 Standalone to Sun Disk Shelves

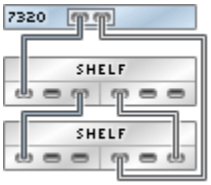
The following figures show a subset of the supported configurations for Sun ZFS Storage 7320 standalone controllers with one HBA. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

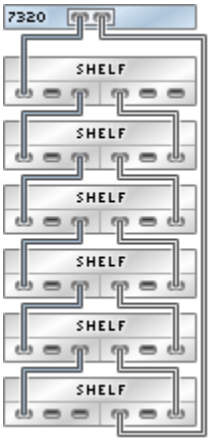
Standalone Sun ZFS Storage 7320 controller with one HBA connected to one Sun Disk Shelf in a single chain



Standalone Sun ZFS Storage 7320 controller with one HBA connected to two Sun Disk Shelves in a single chain



Standalone Sun ZFS Storage 7320 controller with one HBA connected to six Sun Disk Shelves in a single chain

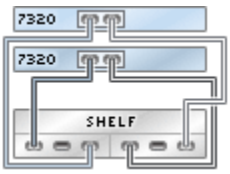


Sun ZFS Storage 7320 Clustered to Sun Disk Shelves

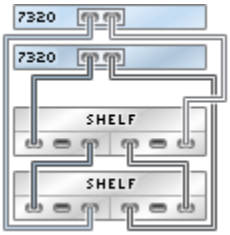
The following figures show a subset of the supported configurations for Sun ZFS Storage 7320 clustered controllers with one HBA. To cable the controller to the disk shelves, see Getting Started with Cabling.

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*.

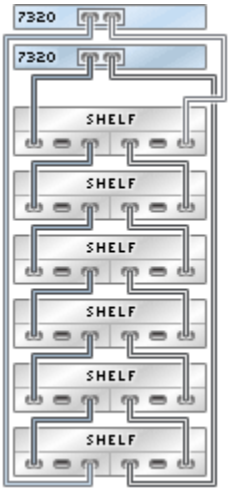
Clustered Sun ZFS Storage 7320 controllers with one HBA connected to one Sun Disk Shelf in a single chain



Clustered Sun ZFS Storage 7320 controllers with one HBA connected to two Sun Disk Shelves in a single chain



Clustered Sun ZFS Storage 7320 controllers with one HBA connected to six Sun Disk Shelves in a single chain



Cabling Sun Disk Shelves to Sun ZFS Storage 7120 Controllers

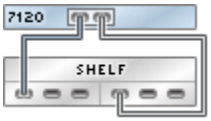
This section contains guidelines for properly cabling standalone Sun ZFS Storage 7120 controllers to Sun Disk Shelves. Use the diagrams in this section to connect to one or more disk shelves.

Sun ZFS Storage 7120 Standalone to Sun Disk Shelves

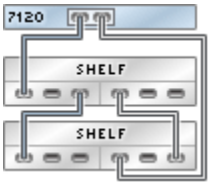
The following figures show a subset of the supported configurations for Sun ZFS Storage 7120 standalone controllers with one HBA. To cable the controller to the disk shelves, see Getting Started with Cabling.

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

Standalone Sun ZFS Storage 7120 controller with one HBA connected to one Sun Disk Shelf in a single chain



Standalone Sun ZFS Storage 7120 controller with one HBA connected to two Sun Disk Shelves in a single chain



7

Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves

This section contains guidelines for properly cabling controllers to Oracle Storage Drive Enclosure DE3-24 and DE2-24 disk shelves.

To review these guidelines, see the following topics:

- Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS9-2 High-end (HE) Controllers
- Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS9-2 Mid-range (MR) Controllers
- Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS7-2 High-end (HE) Controllers
- Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS7-2 Mid-range (MR) Controllers
- Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS5-4 Controllers
- Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS5-2 Controllers
- Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS4-4 Controllers
- Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS3-2 Controllers

Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS9-2 High-end (HE) Controllers

Oracle Storage Drive Enclosure DE2-24 disk shelves with the following drive types are supported by Oracle ZFS Storage ZS9-2 controllers:

- LFF HDDs
  - H7280A520SUN8.0T
  - H7280B520SUN8.0T
  - H7280B524SUN8.0T
- SFF HDDs
  - H101860SFSUN600G
  - H101812SFSUN1.2T

  - H1018124FSUN1.2T
- Write SSDs
  - HSCAC2DA6SUN200G
  - HBCAC2DH6SUN200G
  - HBSAC2DH6SUN200G
  - HPCAC2DH6ORA200G
  - HPSAC2DH6ORA200G
- Read SSDs
  - HSCAC2DA2SUN1.6T
  - HBCAC2DH2SUN3.2T
  - HBSAC2DH2SUN3.2T

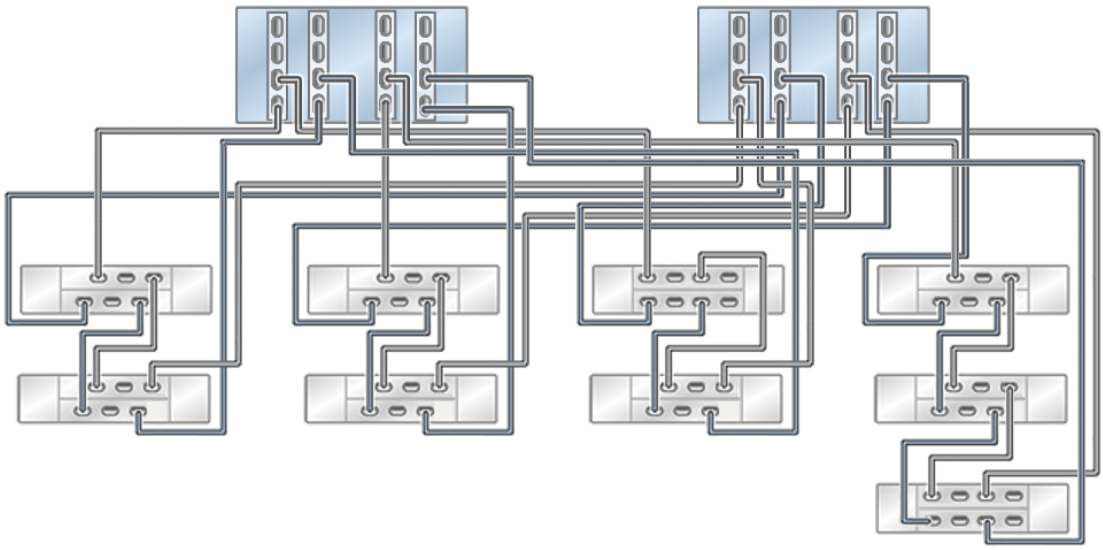
Refer to the diagrams in this section to upgrade or add to a system with Oracle Storage Drive Enclosure DE2-24 disk shelves by introducing one or more Oracle Storage Drive Enclosure DE3-24 disk shelves. **In the following diagrams, the Oracle Storage Drive Enclosure DE2-24 disk shelves have three I/O Module ports, while the Oracle Storage Drive Enclosure DE3-24 disk shelves have four ports.** See Cabinet and Cabling Guidelines for disk shelf intermixing guidelines.

> **Note:**
>
> Adding Oracle Storage Drive Enclosure DE3-24 disk shelves to an existing Oracle Storage Drive Enclosure DE2-24 storage configuration requires SAS-3 cabling and retains the legacy cabling and methodology if possible. In most cases it is easier to re-cable using the new cabling methodology. Use active optical cables (AOCs) to connect Oracle Storage Drive Enclosure DE3-24 disk shelves to the controller, and use SAS-2 copper cables to connect Oracle Storage Drive Enclosure DE2-24 disk shelves to the controller. The following examples illustrate re-cabling configurations with Oracle Storage Drive Enclosure DE2-24 disk shelves to accommodate Oracle ZFS Storage ZS9-2 HE controllers and Oracle Storage Drive Enclosure DE3-24 disk shelves.

Add an Oracle Storage Drive Enclosure DE3-24 to DE2-24 Disk Shelves at Chain End

In this example, a configuration of seven Oracle Storage Drive Enclosure DE2-24 (4 chains) is upgraded by adding two Oracle Storage Drive Enclosure DE3-24 disk shelves to the second rightmost chain (top) and rightmost chain (bottom).

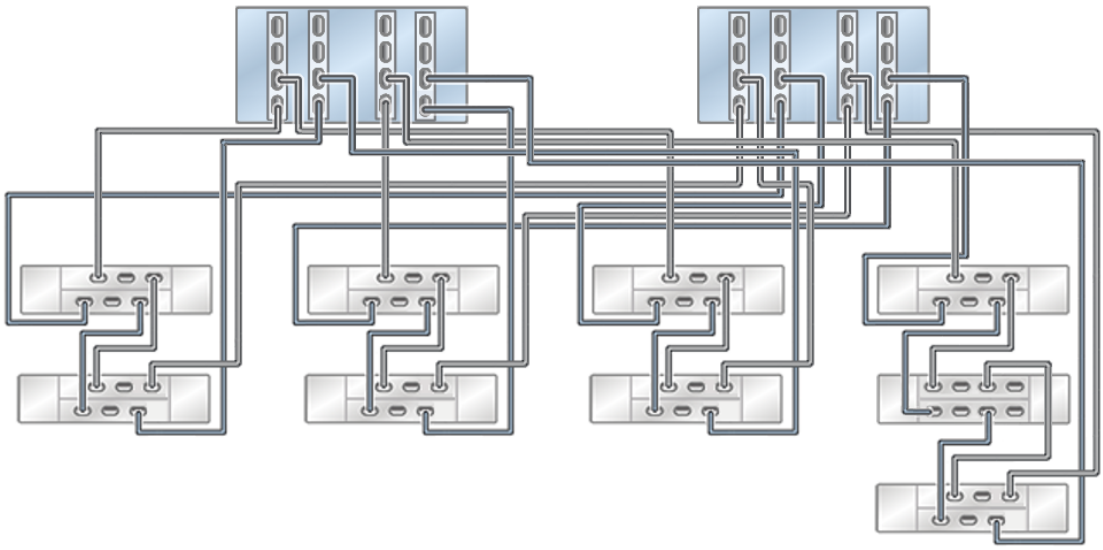
Clustered Oracle ZFS Storage ZS9-2 HE controllers with four HBAs connected to an Oracle Storage Drive Enclosure DE3-24 (second chain from right, first disk shelf) and a second Oracle Storage Drive Enclosure DE3-24 (right chain, third disk shelf) and seven Oracle Storage Drive Enclosure DE2-24 in four chains



Add/Replace Oracle Storage Drive Enclosure DE3-24 to/from DE2-24 Disk Shelves at Chain Middle

In this example, a configuration of eight Oracle Storage Drive Enclosure DE2-24 (4 chains) is upgraded by adding an Oracle Storage Drive Enclosure DE3-24 disk shelf to the middle of the rightmost chain.

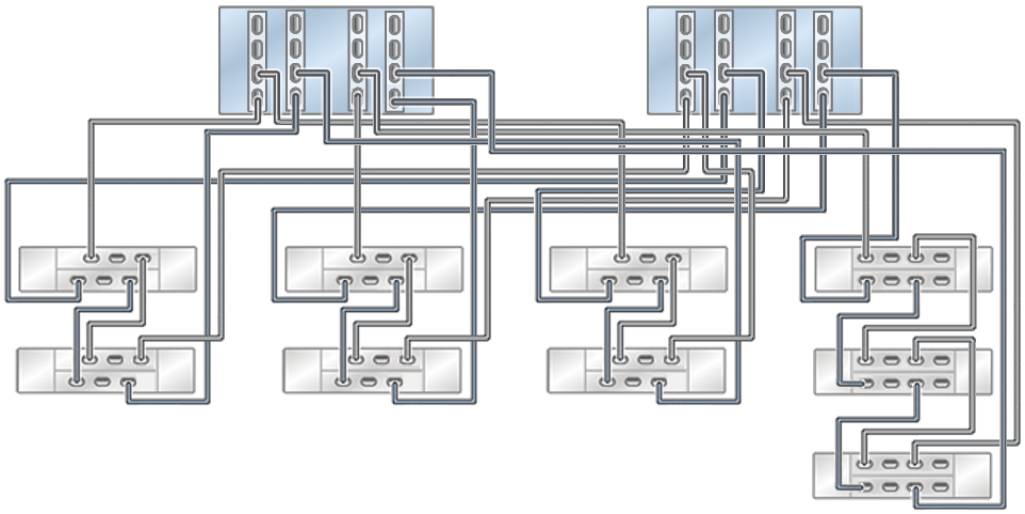
Clustered Oracle ZFS Storage ZS9-2 HE controllers with four HBAs connected to one Oracle Storage Drive Enclosure DE3-24 (right chain, second disk shelf) and eight Oracle Storage Drive Enclosure DE2-24 in four chains



Add Exclusive Oracle Storage Drive Enclosure DE3-24 Disk Shelves Chain

In this example, a configuration of six Oracle Storage Drive Enclosure DE2-24 (left 3 chains) is upgraded by adding a chain of three Oracle Storage Drive Enclosure DE3-24 (right chain).

Clustered Oracle ZFS Storage ZS9-2 HE controllers with four HBAs connected to three Oracle Storage Drive Enclosure DE3-24 (right chain) and six Oracle Storage Drive Enclosure DE2-24 in the first 3 chains



Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS9-2 Mid-range (MR) Controllers

See Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS9-2 High-end (HE) Controllers for a list of supported Oracle Storage Drive Enclosure DE2-24 disk shelves.

Refer to the diagrams in this section to upgrade or add to a system with Oracle Storage Drive Enclosure DE2-24 disk shelves by introducing one or more Oracle Storage Drive Enclosure DE3-24 disk shelves. **In the following diagrams, the Oracle Storage Drive Enclosure DE2-24 disk shelves have three I/O Module ports, while the Oracle Storage Drive Enclosure DE3-24 disk shelves have four ports.** See Cabinet and Cabling Guidelines for disk shelf intermixing guidelines.

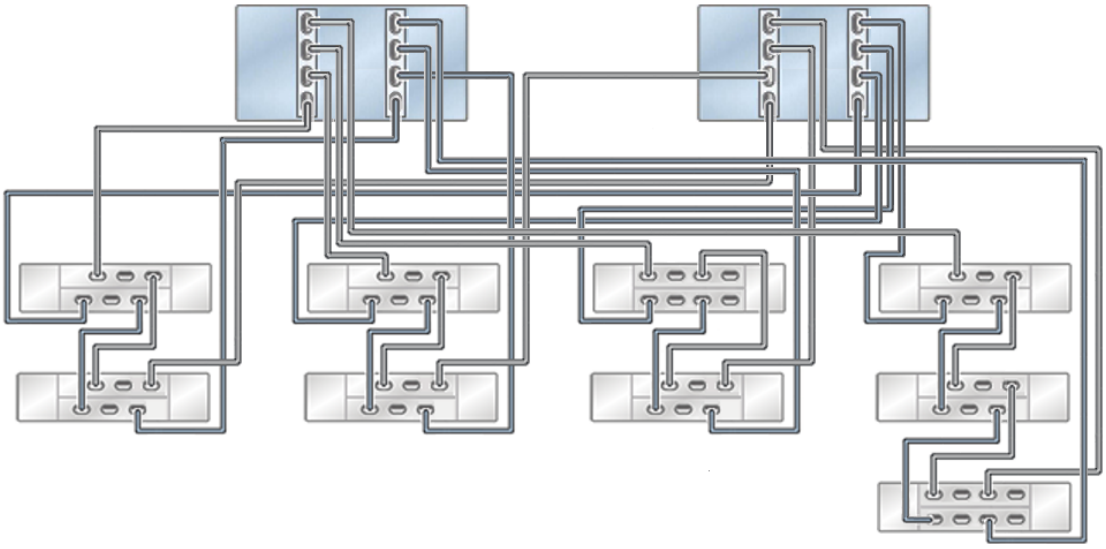
Note:

Adding Oracle Storage Drive Enclosure DE3-24 disk shelves to an existing Oracle Storage Drive Enclosure DE2-24 storage configuration requires SAS-3 cabling and retains the legacy cabling and methodology if possible. In most cases it is easier to re-cable using the new cabling methodology. Use active optical cables (AOCs) to connect Oracle Storage Drive Enclosure DE3-24 disk shelves to the controller, and use SAS-2 copper cables to connect Oracle Storage Drive Enclosure DE2-24 disk shelves to the controller. The following examples illustrate re-cabling configurations with Oracle Storage Drive Enclosure DE2-24 disk shelves to accommodate Oracle ZFS Storage ZS9-2 MR controllers and Oracle Storage Drive Enclosure DE3-24 disk shelves.

Add an Oracle Storage Drive Enclosure DE3-24 to DE2-24 Disk Shelves at Chain End

In this example, a configuration of seven Oracle Storage Drive Enclosure DE2-24 (4 chains) is upgraded by adding two Oracle Storage Drive Enclosure DE3-24 disk shelves to the second rightmost chain (top) and rightmost chain (bottom).

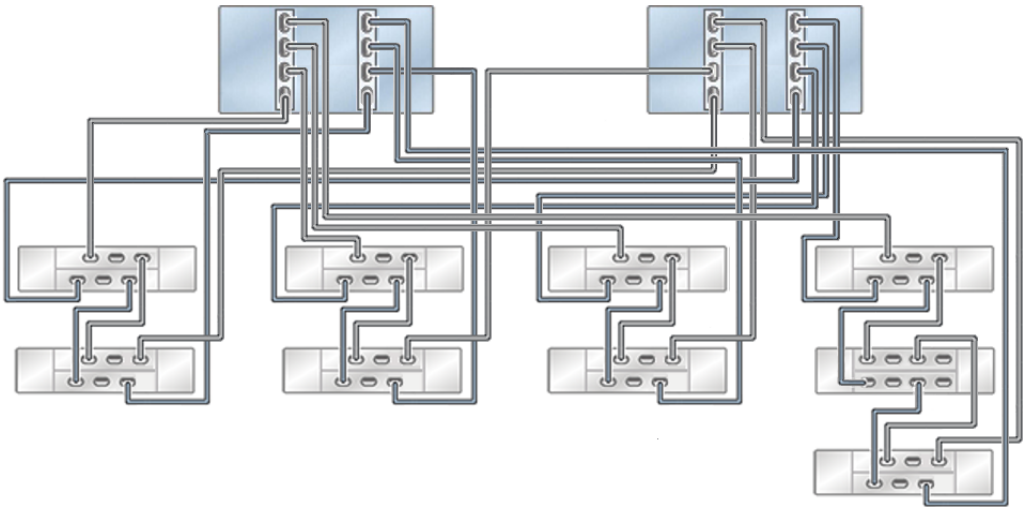
Clustered Oracle ZFS Storage ZS9-2 MR controllers with two HBAs connected to an Oracle Storage Drive Enclosure DE3-24 (second chain from right, first disk shelf) and a second Oracle Storage Drive Enclosure DE3-24 (right chain, third disk shelf) and seven Oracle Storage Drive Enclosure DE2-24 in four chains



Add/Replace an Oracle Storage Drive Enclosure DE3-24 to/from DE2-24 Disk Shelves at Chain Middle

In this example, a configuration of eight Oracle Storage Drive Enclosure DE2-24 (4 chains) is upgraded by adding an Oracle Storage Drive Enclosure DE3-24 disk shelf to the middle of the rightmost chain.

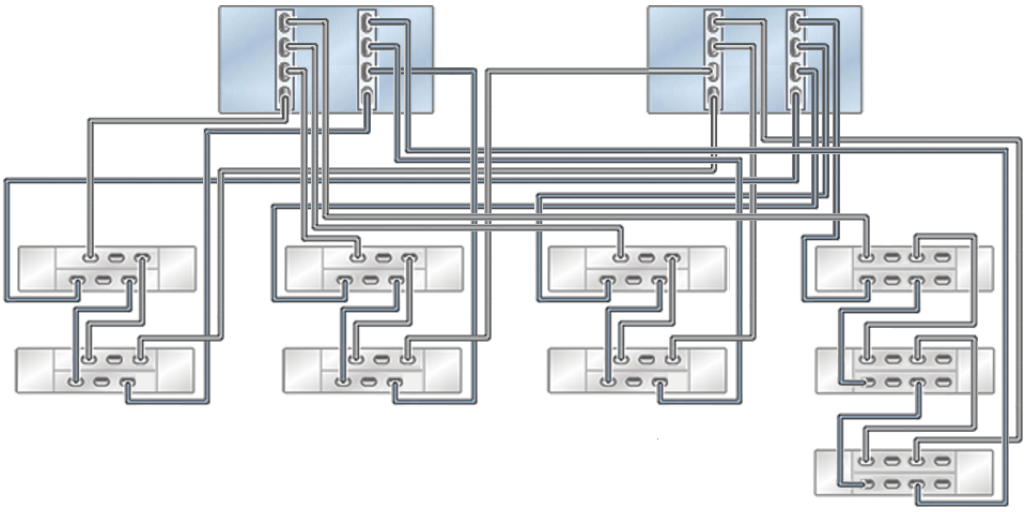
Clustered Oracle ZFS Storage ZS9-2 MR controllers with two HBAs connected to one Oracle Storage Drive Enclosure DE3-24 (right chain, second disk shelf) and eight Oracle Storage Drive Enclosure DE2-24 in four chains



Add Exclusive Oracle Storage Drive Enclosure DE3-24 Disk Shelves Chain

In this example, a configuration of six Oracle Storage Drive Enclosure DE2-24 (left 3 chains) is upgraded by adding a chain of three Oracle Storage Drive Enclosure DE3-24 (right chain).

Clustered Oracle ZFS Storage ZS9-2 MR controllers with two HBAs connected to three Oracle Storage Drive Enclosure DE3-24 (right chain) and six Oracle Storage Drive Enclosure DE2-24 in three chains



Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS7-2 High-end (HE) Controllers

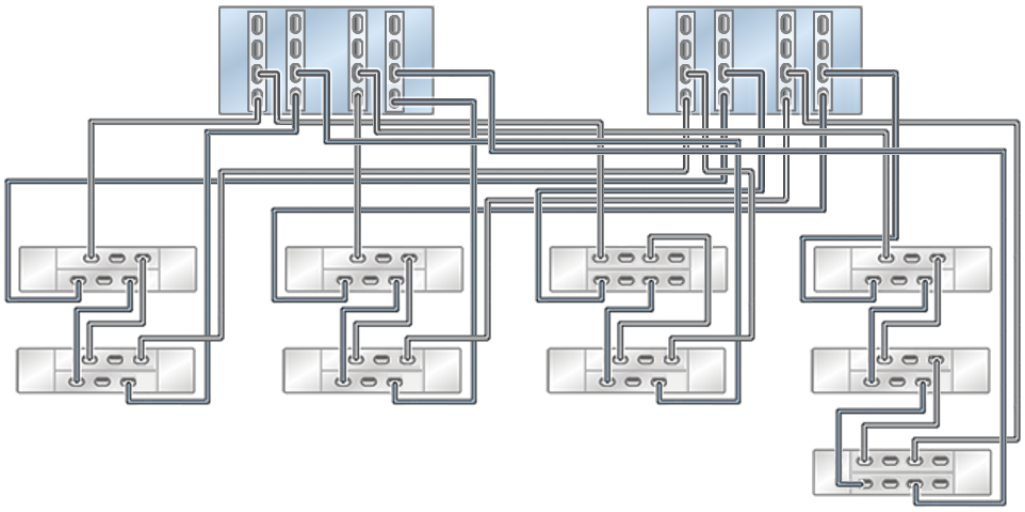
Refer to the diagrams in this section to upgrade or add to a system with Oracle Storage Drive Enclosure DE2-24 disk shelves by introducing one or more Oracle Storage Drive Enclosure DE3-24 disk shelves. **In the following diagrams, the Oracle Storage Drive Enclosure DE2-24 disk shelves have three I/O Module ports, while the Oracle Storage Drive Enclosure DE3-24 disk shelves have four ports.** See Cabinet and Cabling Guidelines for disk shelf intermixing guidelines.

> **Note:**
>
> Adding Oracle Storage Drive Enclosure DE3-24 disk shelves to an existing Oracle Storage Drive Enclosure DE2-24 storage configuration requires SAS-3 cabling and retains the legacy cabling and methodology if possible. In most cases it is easier to re-cable using the new cabling methodology. Use active optical cables (AOCs) to connect Oracle Storage Drive Enclosure DE3-24 disk shelves to the controller, and use SAS-2 copper cables to connect Oracle Storage Drive Enclosure DE2-24 disk shelves to the controller. The following examples illustrate re-cabling configurations with Oracle Storage Drive Enclosure DE2-24 disk shelves to accommodate Oracle ZFS Storage ZS7-2 HE controllers and Oracle Storage Drive Enclosure DE3-24 disk shelves.

Add an Oracle Storage Drive Enclosure DE3-24 to DE2-24 Disk Shelves at Chain End

In this example, a configuration of seven Oracle Storage Drive Enclosure DE2-24 (4 chains) is upgraded by adding two Oracle Storage Drive Enclosure DE3-24 disk shelves to the second rightmost chain (top) and rightmost chain (bottom).

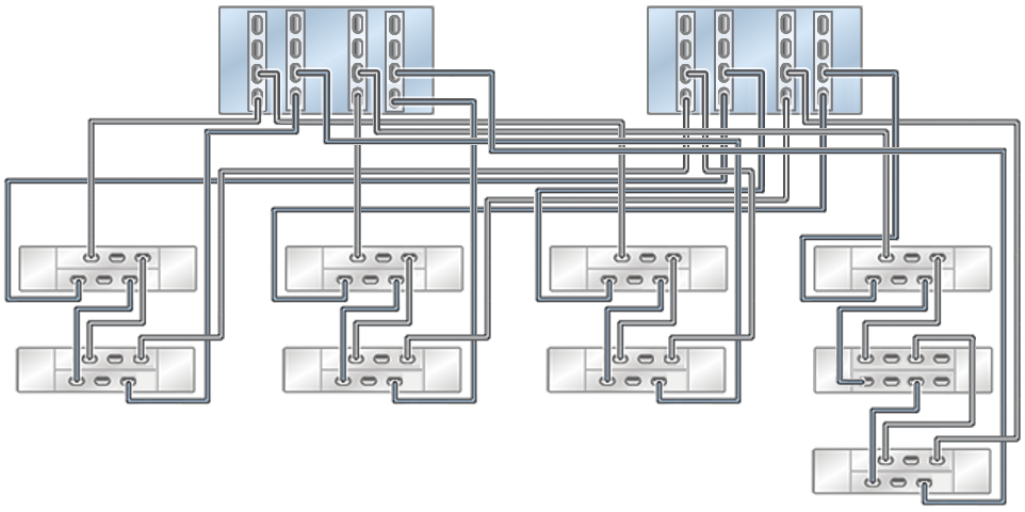
Clustered Oracle ZFS Storage ZS7-2 HE controllers with four HBAs connected to an Oracle Storage Drive Enclosure DE3-24 (second chain from right, first disk shelf) and a second Oracle Storage Drive Enclosure DE3-24 (right chain, third disk shelf) and seven Oracle Storage Drive Enclosure DE2-24 in four chains



Add/Replace Oracle Storage Drive Enclosure DE3-24 to/from DE2-24 Disk Shelves at Chain Middle

In this example, a configuration of eight Oracle Storage Drive Enclosure DE2-24 (4 chains) is upgraded by adding an Oracle Storage Drive Enclosure DE3-24 disk shelf to the middle of the rightmost chain.

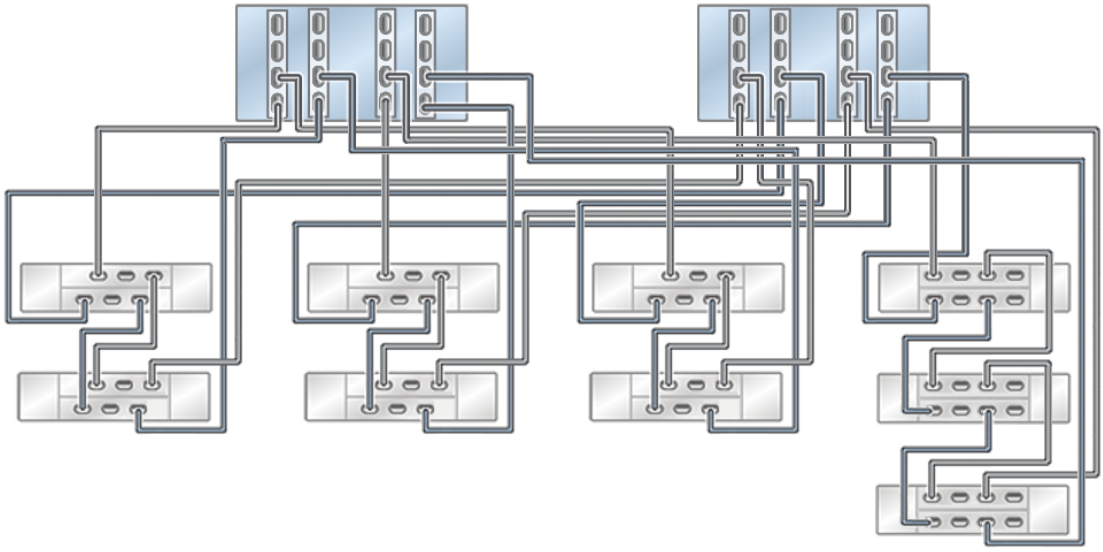
Clustered Oracle ZFS Storage ZS7-2 HE controllers with four HBAs connected to one Oracle Storage Drive Enclosure DE3-24 (right chain, second disk shelf) and eight Oracle Storage Drive Enclosure DE2-24 in four chains



Add Exclusive Oracle Storage Drive Enclosure DE3-24 Disk Shelves Chain

In this example, a configuration of six Oracle Storage Drive Enclosure DE2-24 (left 3 chains) is upgraded by adding a chain of three Oracle Storage Drive Enclosure DE3-24 (right chain).

Clustered Oracle ZFS Storage ZS7-2 HE controllers with four HBAs connected to three Oracle Storage Drive Enclosure DE3-24 (right chain) and six Oracle Storage Drive Enclosure DE2-24 in the first 3 chains



Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS7-2 Mid-range (MR) Controllers

Refer to the diagrams in this section to upgrade or add to a system with Oracle Storage Drive Enclosure DE2-24 disk shelves by introducing one or more Oracle Storage Drive Enclosure DE3-24 disk shelves. **In the following diagrams, the Oracle Storage Drive Enclosure DE2-24 disk shelves have three I/O Module ports, while the Oracle Storage Drive Enclosure DE3-24 disk shelves have four ports.** See Cabinet and Cabling Guidelines for disk shelf intermixing guidelines.

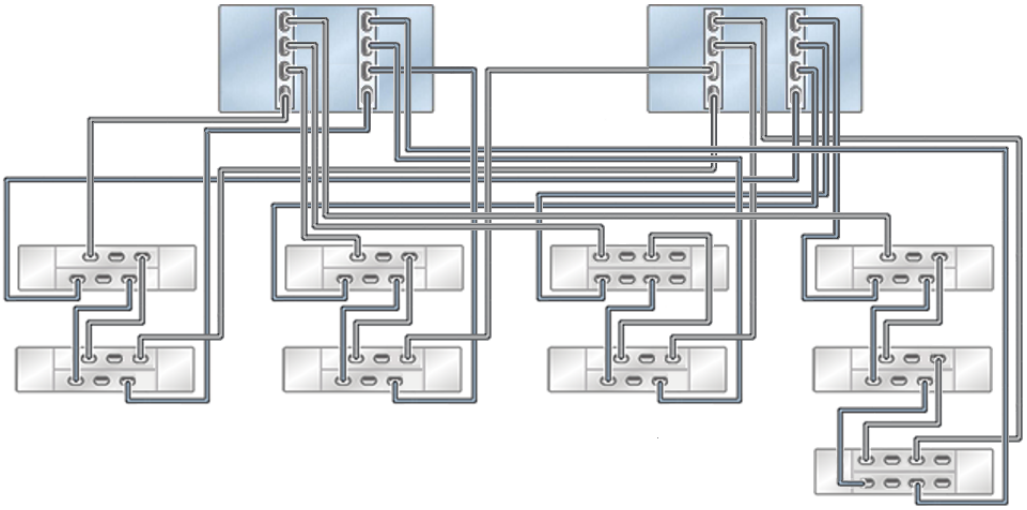
Note:

Adding Oracle Storage Drive Enclosure DE3-24 disk shelves to an existing Oracle Storage Drive Enclosure DE2-24 storage configuration requires SAS-3 cabling and retains the legacy cabling and methodology if possible. In most cases it is easier to re-cable using the new cabling methodology. Use active optical cables (AOCs) to connect Oracle Storage Drive Enclosure DE3-24 disk shelves to the controller, and use SAS-2 copper cables to connect Oracle Storage Drive Enclosure DE2-24 disk shelves to the controller. The following examples illustrate re-cabling configurations with Oracle Storage Drive Enclosure DE2-24 disk shelves to accommodate Oracle ZFS Storage ZS7-2 MR controllers and Oracle Storage Drive Enclosure DE3-24 disk shelves.

Add an Oracle Storage Drive Enclosure DE3-24 to DE2-24 Disk Shelves at Chain End

In this example, a configuration of seven Oracle Storage Drive Enclosure DE2-24 (4 chains) is upgraded by adding two Oracle Storage Drive Enclosure DE3-24 disk shelves to the second rightmost chain (top) and rightmost chain (bottom).

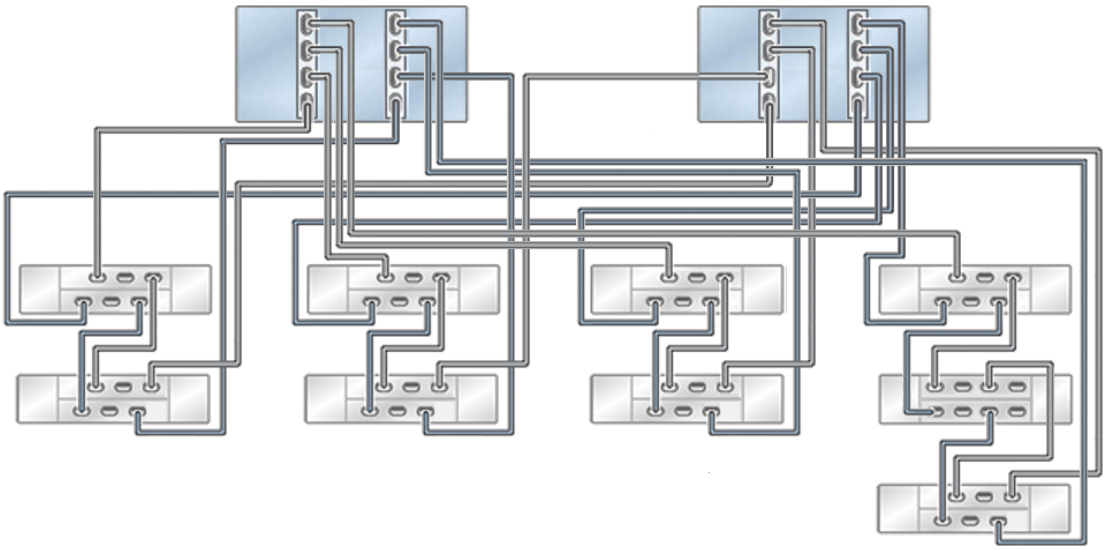
Clustered Oracle ZFS Storage ZS7-2 MR controllers with two HBAs connected to an Oracle Storage Drive Enclosure DE3-24 (second chain from right, first disk shelf) and a second Oracle Storage Drive Enclosure DE3-24 (right chain, third disk shelf) and seven Oracle Storage Drive Enclosure DE2-24 in four chains



Add/Replace an Oracle Storage Drive Enclosure DE3-24 to/from DE2-24 Disk Shelves at Chain Middle

In this example, a configuration of eight Oracle Storage Drive Enclosure DE2-24 (4 chains) is upgraded by adding an Oracle Storage Drive Enclosure DE3-24 disk shelf to the middle of the rightmost chain.

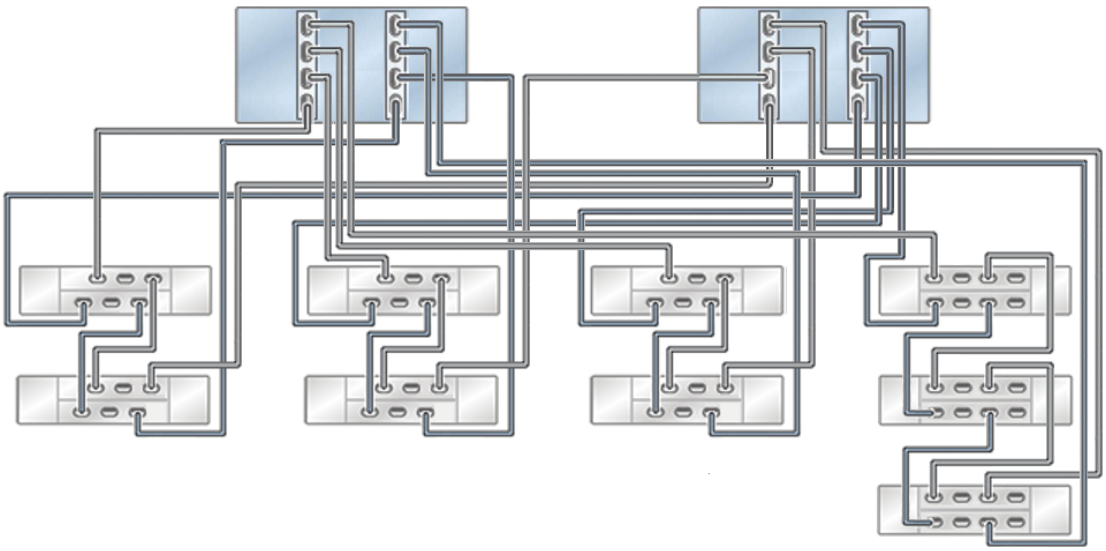
Clustered ZS7-2 MR controllers with two HBAs connected to one Oracle Storage Drive Enclosure DE3-24 (right chain, second disk shelf) and eight Oracle Storage Drive Enclosure DE2-24 in four chains



Add Exclusive Oracle Storage Drive Enclosure DE3-24 Disk Shelves Chain

In this example, a configuration of six Oracle Storage Drive Enclosure DE2-24 (left 3 chains) is upgraded by adding a chain of three Oracle Storage Drive Enclosure DE3-24 (right chain).

Clustered Oracle ZFS Storage ZS7-2 MR controllers with two HBAs connected to three Oracle Storage Drive Enclosure DE3-24 (right chain) and six Oracle Storage Drive Enclosure DE2-24 in three chains



Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS5-4 Controllers

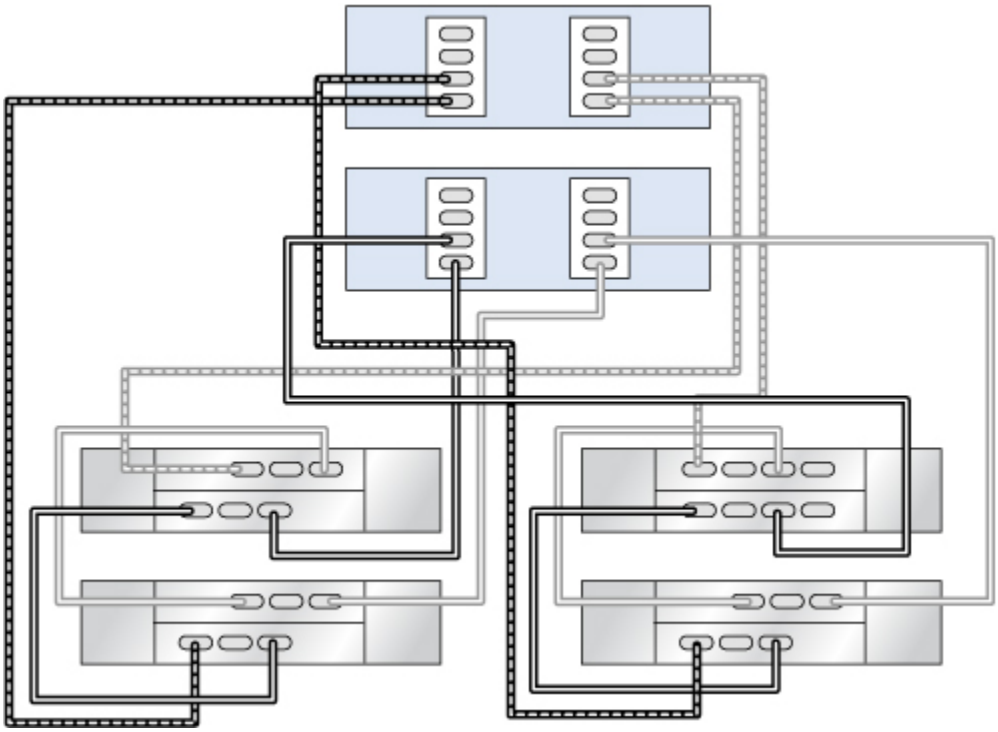
Refer to the diagrams in this section to upgrade or add to a system with Oracle Storage Drive Enclosure DE2-24 disk shelves by introducing one or more Oracle Storage Drive Enclosure DE3-24 disk shelves. **In the following diagrams, the Oracle Storage Drive Enclosure DE2-24 disk shelves have three I/O Module ports, while the Oracle Storage Drive Enclosure DE3-24 disk shelves have four ports.** See Cabinet and Cabling Guidelines for disk shelf intermixing guidelines.

> **Note:**
>
> Adding Oracle Storage Drive Enclosure DE3-24 disk shelves uses SAS-3 cabling, but retains the SAS-2 legacy cabling methodology. Replacing SAS-2 HBAs with SAS-3 HBAs does not affect cabling interconnect.

Add an Oracle Storage Drive Enclosure DE3-24 to DE2-24 Disk Shelves at Chain End

In this example, an Oracle Storage Drive Enclosure DE3-24 (right chain, first disk shelf) is added to a single Oracle Storage Drive Enclosure DE2-24 disk shelf chain. Left chain is not changed.

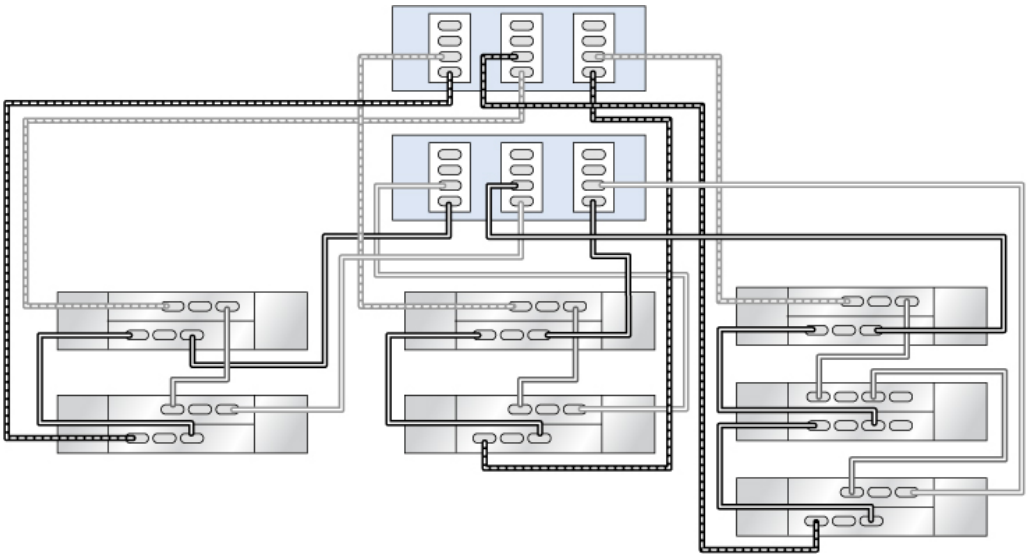
Clustered Oracle ZFS Storage ZS5-4 controllers with two HBAs connected to one Oracle Storage Drive Enclosure DE3-24 (right chain, first disk shelf) and three Oracle Storage Drive Enclosure DE2-24 in two chains



Add/Replace Oracle Storage Drive Enclosure DE3-24 to/from DE2-24 Disk Shelves at Chain Middle

In this example, an Oracle Storage Drive Enclosure DE3-24 (right chain, second disk shelf) is added/replaced to/from an Oracle Storage Drive Enclosure DE2-24 disk shelf chain in the middle. Remaining two chains on the left are not changed.

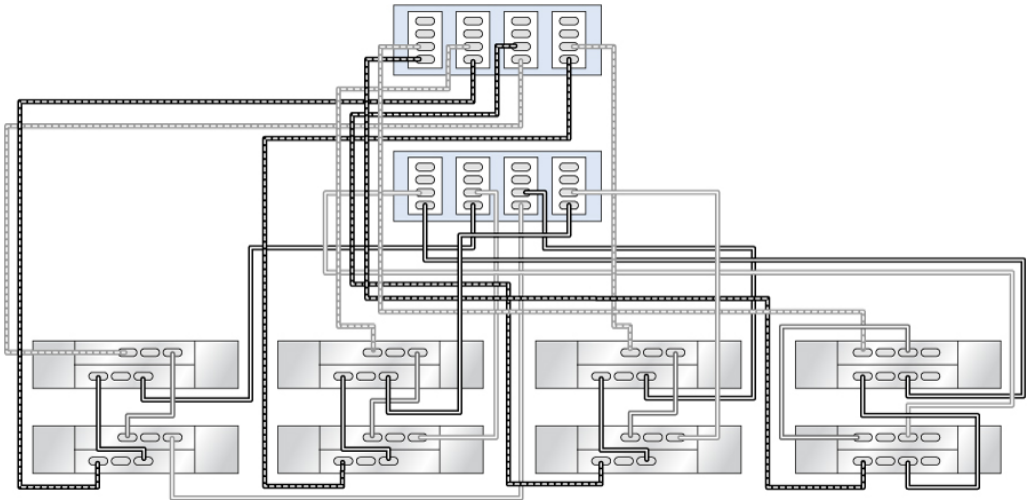
Clustered Oracle ZFS Storage ZS5-4 controllers with three HBAs connected to one Oracle Storage Drive Enclosure DE3-24 (right chain, second disk shelf) and six Oracle Storage Drive Enclosure DE2-24 in three chains



Add Exclusive Oracle Storage Drive Enclosure DE3-24 Disk Shelves Chain

In this example, a configuration of six Oracle Storage Drive Enclosure DE2-24 (left 3 chains) is upgraded by adding a chain of two Oracle Storage Drive Enclosure DE3-24 (right chain).

Clustered Oracle ZFS Storage ZS5-4 controllers with four HBAs connected to two Oracle Storage Drive Enclosure DE3-24 (right chain) and six Oracle Storage Drive Enclosure DE2-24 (left 3 chains)



Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS5-2 Controllers

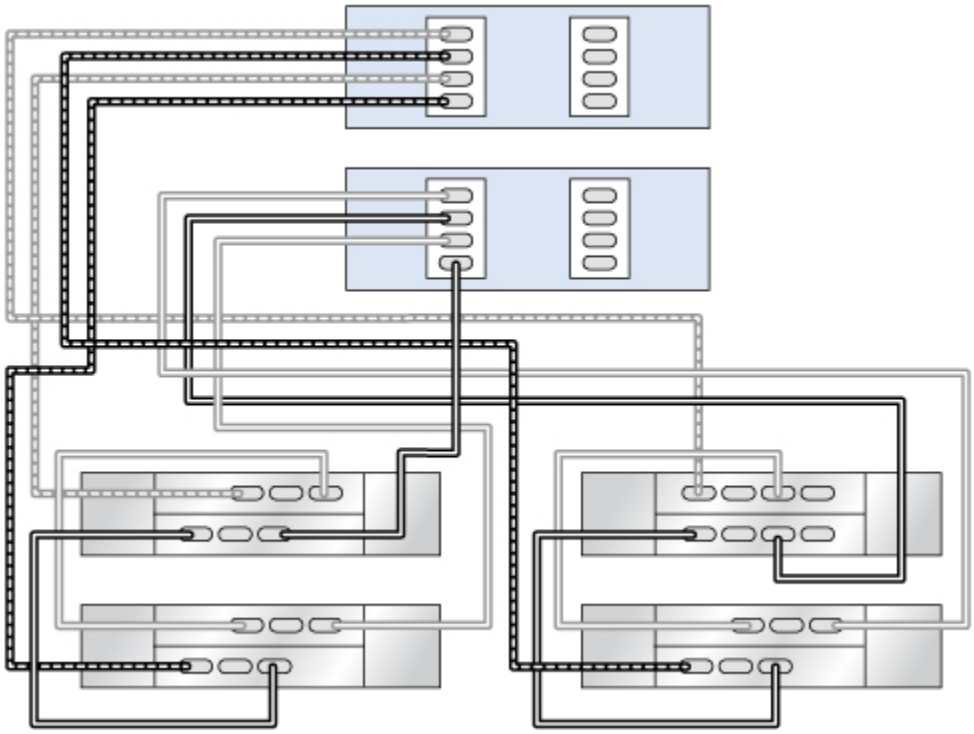
Refer to the diagrams in this section to upgrade or add to a system with Oracle Storage Drive Enclosure DE2-24 disk shelves by introducing one or more Oracle Storage Drive Enclosure DE3-24 disk shelves. **In the following diagrams, the Oracle Storage Drive Enclosure DE2-24 disk shelves have three I/O Module ports, while the Oracle Storage Drive Enclosure DE3-24 disk shelves have four ports.** See Cabinet and Cabling Guidelines for disk shelf intermixing guidelines.

> **Note:**
>
> Adding Oracle Storage Drive Enclosure DE3-24 disk shelves uses SAS-3 cabling, but retains the SAS-2 legacy cabling methodology. Replacing SAS-2 HBAs with SAS-3 HBAs does not affect cabling interconnect.

Add an Oracle Storage Drive Enclosure DE3-24 to DE2-24 Disk Shelves at Chain End

In this example, an Oracle Storage Drive Enclosure DE3-24 (right chain, first disk shelf) is added to a single Oracle Storage Drive Enclosure DE2-24 disk shelf chain. Left chain is not changed.

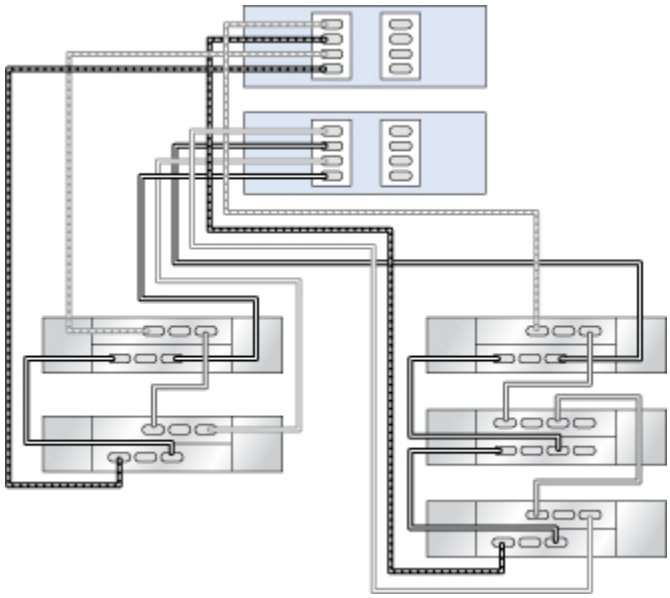
Clustered Oracle ZFS Storage ZS5-2 controllers with one HBA connected to one Oracle Storage Drive Enclosure DE3-24 (right chain, first disk shelf) and three Oracle Storage Drive Enclosure DE2-24 in two chains



Add/Replace an Oracle Storage Drive Enclosure DE3-24 to/from DE2-24 Disk Shelves at Chain Middle

In this example, an Oracle Storage Drive Enclosure DE3-24 (right chain, second disk shelf) is added/replaced to/from an Oracle Storage Drive Enclosure DE2-24 disk shelf chain in the middle. Remaining chain on the left is not changed.

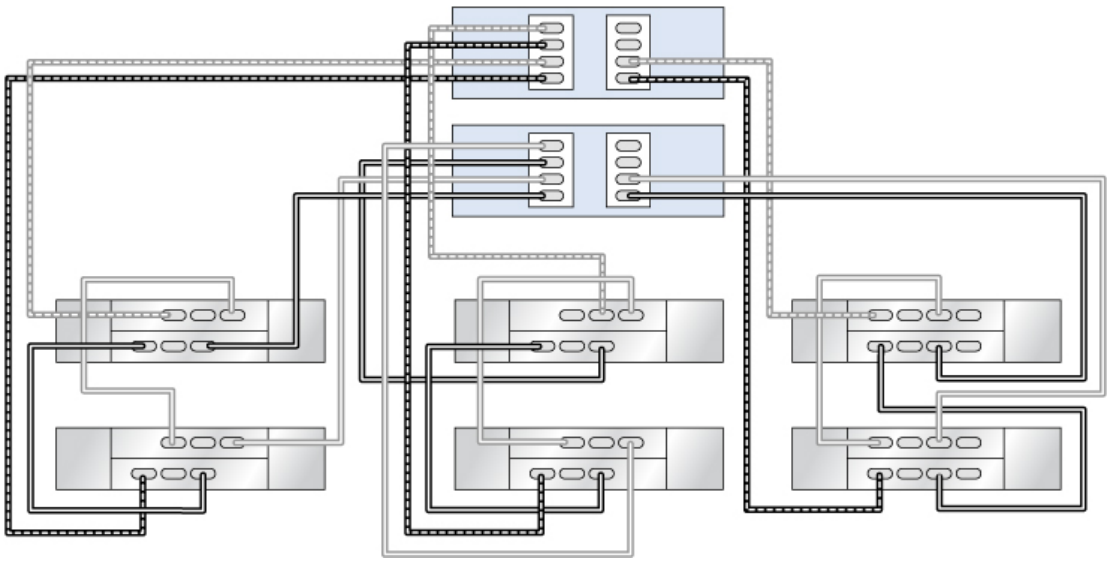
Clustered Oracle ZFS Storage ZS5-2 controllers with one HBA connected to one Oracle Storage Drive Enclosure DE3-24 (right chain, second disk shelf) and four Oracle Storage Drive Enclosure DE2-24 in two chains



Add Exclusive Oracle Storage Drive Enclosure DE3-24 Disk Shelves Chain

In this example, a chain of two Oracle Storage Drive Enclosure DE3-24 (right chain) is added. Remaining two chains on the left are not changed.

Clustered Oracle ZFS Storage ZS5-2 controllers with two HBAs connected to two Oracle Storage Drive Enclosure DE3-24 (right chain) and four Oracle Storage Drive Enclosure DE2-24 in three chains



Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS4-4 Controllers

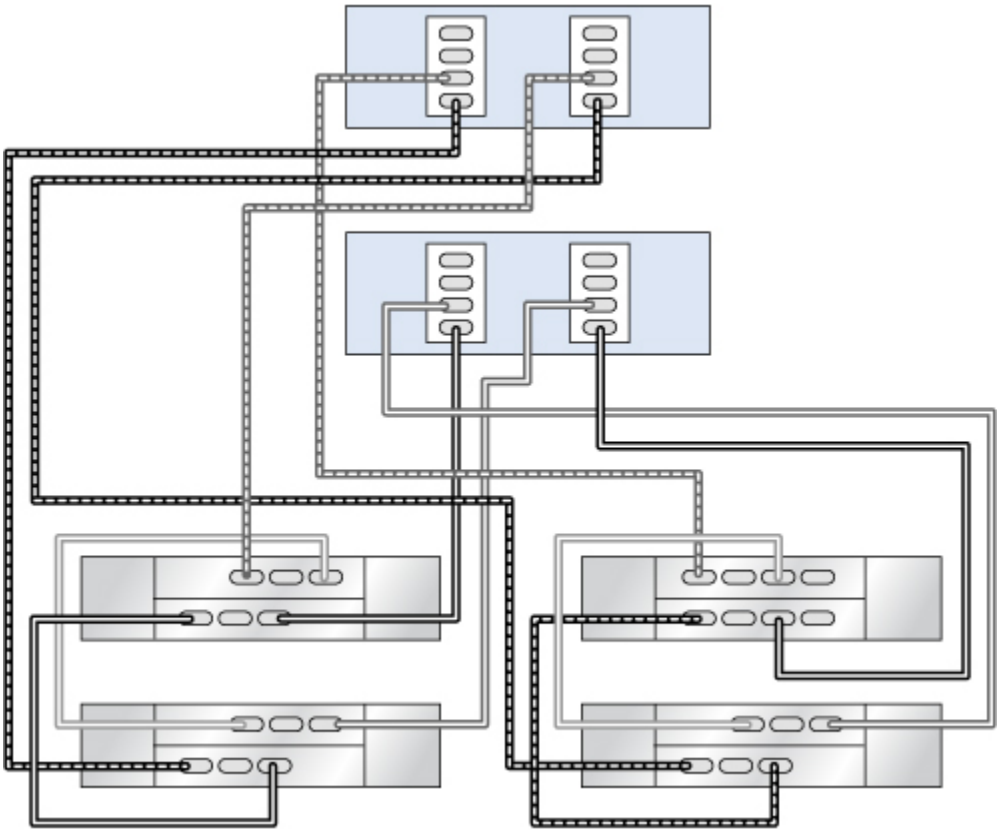
Refer to the diagrams in this section to upgrade or add to a system with Oracle Storage Drive Enclosure DE2-24 disk shelves by introducing one or more Oracle Storage Drive Enclosure DE3-24 disk shelves. **In the following diagrams, the Oracle Storage Drive Enclosure DE2-24 disk shelves have three I/O Module ports, while the Oracle Storage Drive Enclosure DE3-24 disk shelves have four ports.** See Cabinet and Cabling Guidelines for disk shelf intermixing guidelines.

> **Note:**
>
> Adding Oracle Storage Drive Enclosure DE3-24 disk shelves uses SAS-3 cabling, but retains the SAS-2 legacy cabling methodology. Replacing SAS-2 HBAs with SAS-3 HBAs does not affect cabling interconnect.

Add an Oracle Storage Drive Enclosure DE3-24 to DE2-24 Disk Shelves at Chain End

In this example, an Oracle Storage Drive Enclosure DE3-24 (right chain, first disk shelf) is added to a single Oracle Storage Drive Enclosure DE2-24 disk shelf chain. Left chain is not changed.

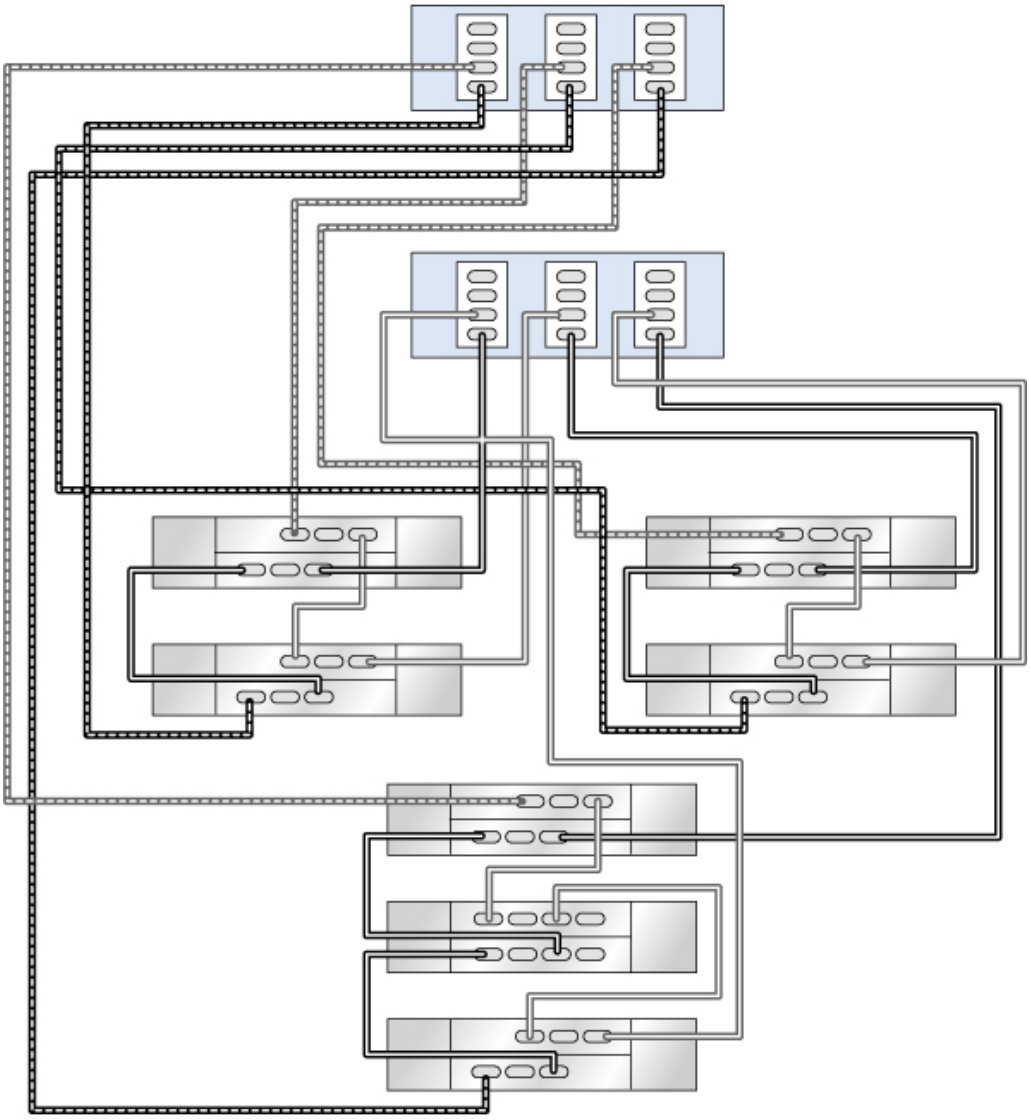
Clustered Oracle ZFS Storage ZS4-4 controllers with two HBAs connected to one Oracle Storage Drive Enclosure DE3-24 (right chain, first disk shelf) and three Oracle Storage Drive Enclosure DE2-24 in two chains



Add/Replace an Oracle Storage Drive Enclosure DE3-24 to/from DE2-24 Disk Shelves at Chain Middle

In this example, an Oracle Storage Drive Enclosure DE3-24 (bottom chain, second disk shelf) is added/replaced to an Oracle Storage Drive Enclosure DE2-24 disk shelf chain in the middle. Remaining two chains above it are not changed.

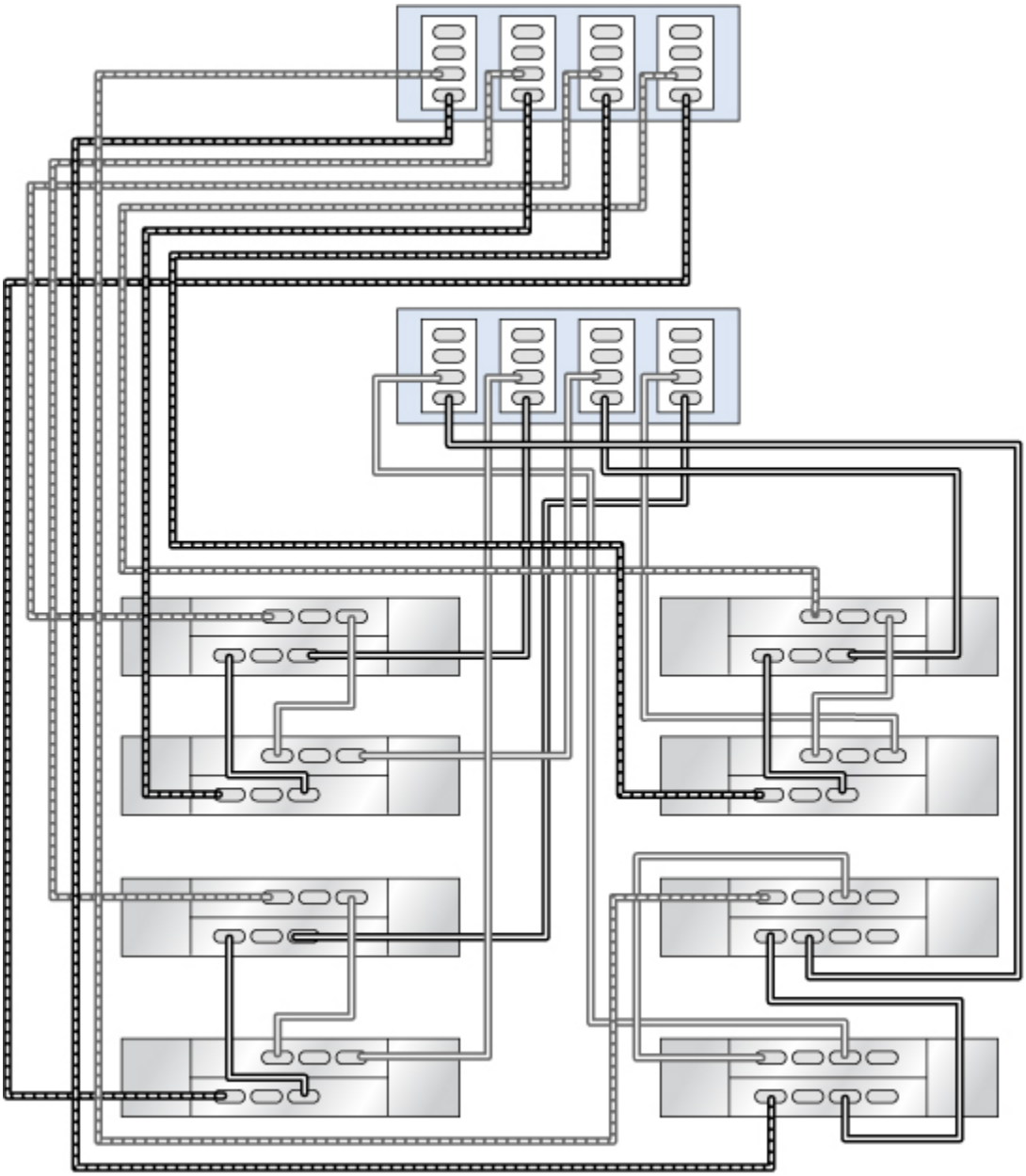
Clustered ZS4-4 controllers with three HBAs connected to one Oracle Storage Drive Enclosure DE3-24 (bottom chain, second disk shelf) and six Oracle Storage Drive Enclosure DE2-24 in three chains



Add Exclusive Oracle Storage Drive Enclosure DE3-24 Disk Shelves Chain

In this example, a chain of two Oracle Storage Drive Enclosure DE3-24 (right chain, third and fourth disk shelves) is added. Remaining three chains are not changed.

Clustered Oracle ZFS Storage ZS4-4 controllers with four HBAs connected to two Oracle Storage Drive Enclosure DE3-24 (right chain, third and fourth disk shelves) and six Oracle Storage Drive Enclosure DE2-24 in four chains



Cabling Mixed Oracle Storage Drive Enclosure DE3-24 and DE2-24 Disk Shelves to Oracle ZFS Storage ZS3-2 Controllers

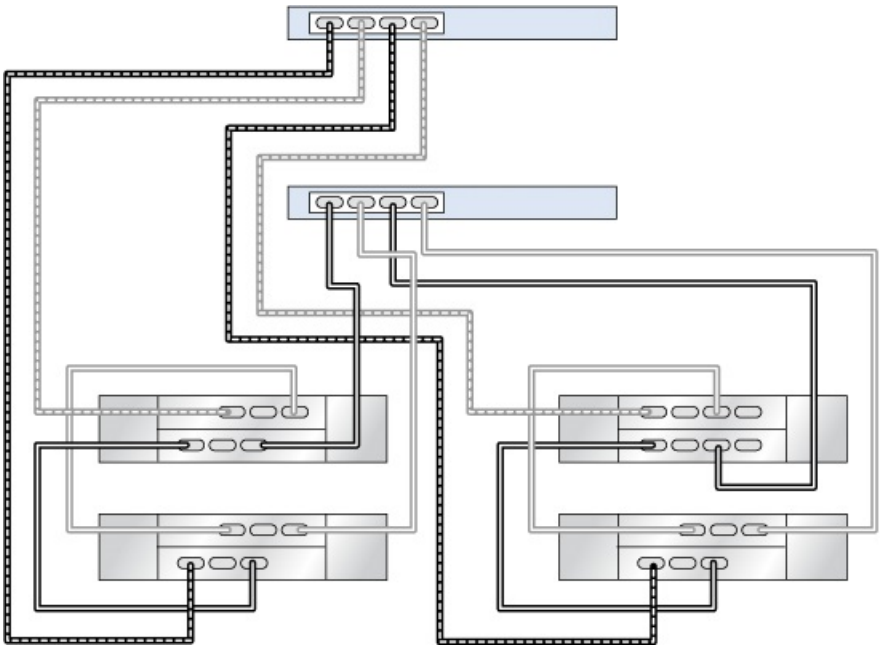
Refer to the diagrams in this section to upgrade or add to a system with Oracle Storage Drive Enclosure DE2-24 disk shelves by introducing one or more Oracle Storage Drive Enclosure DE3-24 disk shelves. **In the following diagrams, the Oracle Storage Drive Enclosure DE2-24 disk shelves have three I/O Module ports, while the Oracle Storage Drive Enclosure DE3-24 disk shelves have four ports.** See Cabinet and Cabling Guidelines for disk shelf intermixing guidelines.

> **Note:**
>
> Adding Oracle Storage Drive Enclosure DE3-24 disk shelves uses SAS-3 cabling, but retains the SAS-2 legacy cabling methodology. Replacing SAS-2 HBAs with SAS-3 HBAs does not affect cabling interconnect.

Add an Oracle Storage Drive Enclosure DE3-24 to DE2-24 Disk Shelves at Chain End

In this example, an Oracle Storage Drive Enclosure DE3-24 (right chain, first disk shelf) is added to a single Oracle Storage Drive Enclosure DE2-24 disk shelf chain. Left chain is not changed.

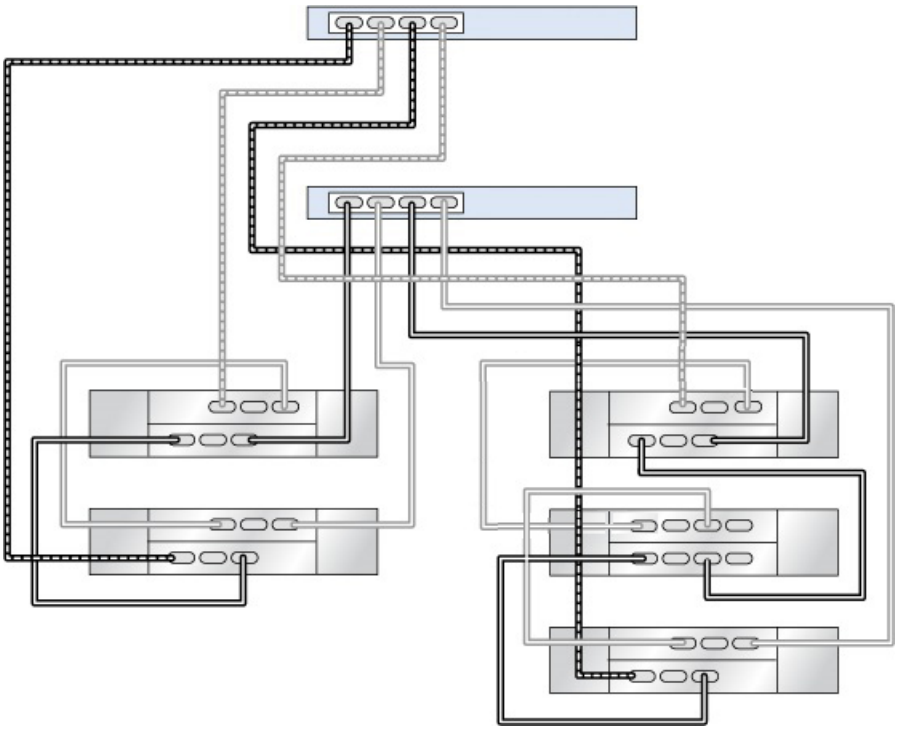
Clustered Oracle ZFS Storage ZS3-2 controllers with one HBA connected to one Oracle Storage Drive Enclosure DE3-24 (right chain, first disk shelf) and three Oracle Storage Drive Enclosure DE2-24 in two chains



Add/Replace an Oracle Storage Drive Enclosure DE3-24 to/from DE2-24 Disk Shelves at Chain Middle

In this example, an Oracle Storage Drive Enclosure DE3-24 (right chain, second disk shelf) is added/replaced to/from an Oracle Storage Drive Enclosure DE2-24 disk shelf chain in the middle. Remaining chain on the left is not changed.

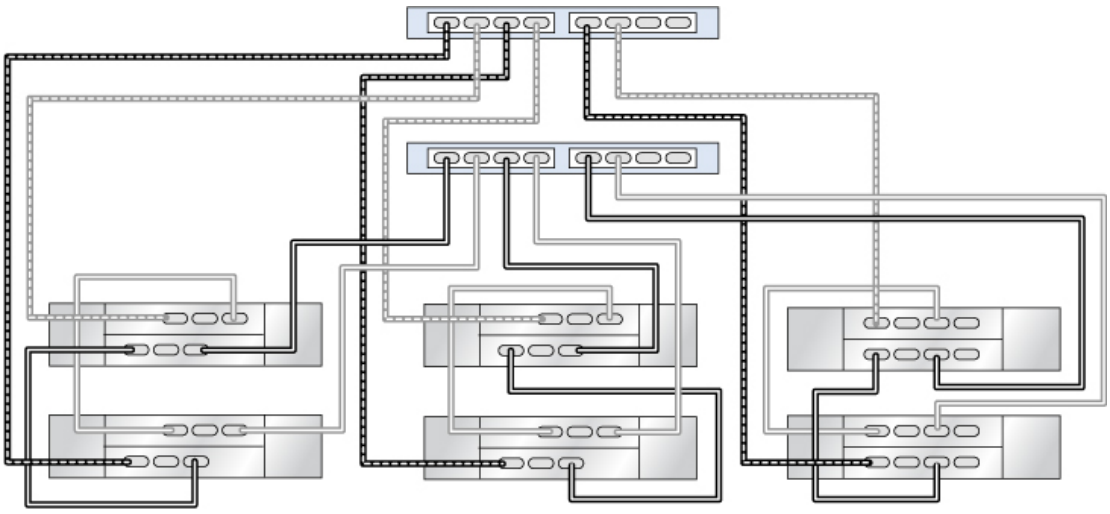
Clustered Oracle ZFS Storage ZS3-2 controllers with one HBA connected to one Oracle Storage Drive Enclosure DE3-24 (right chain, second disk shelf) and four Oracle Storage Drive Enclosure DE2-24 in two chains



Add Exclusive Oracle Storage Drive Enclosure DE3-24 Disk Shelves Chain

In this example, a chain of two Oracle Storage Drive Enclosure DE3-24 (right chain) is added. Remaining two chains on the left are not changed.

Clustered Oracle ZFS Storage ZS3-2 controllers with two HBAs connected to two Oracle Storage Drive Enclosure DE3-24 (right chain) and four Oracle Storage Drive Enclosure DE2-24 in three chains



8

Cabling Mixed Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves

This section contains guidelines for properly cabling standalone and clustered controllers to Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves.

To review these guidelines, see the following topics:

- Cabling Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves to Oracle ZFS Storage ZS3-4 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves to Oracle ZFS Storage ZS3-2 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves to Sun ZFS Storage 7420 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves to Sun ZFS Storage 7320 Controllers
- Cabling Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves to Sun ZFS Storage 7120 Controllers

Cabling Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves to Oracle ZFS Storage ZS3-4 Controllers

This section contains guidelines for properly cabling standalone and clustered Oracle ZFS Storage ZS3-4 controllers to Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves. You can attach mixed disk shelf types behind the same controllers, but each chain must contain only the same disk shelf type. Directly connecting different disk shelf types is not supported.

To connect to one or more disk shelves, use the diagrams in the following topics:

- Oracle ZFS Storage ZS3-4 Standalone to Mixed Disk Shelves (2 HBAs)
- Oracle ZFS Storage ZS3-4 Standalone to Mixed Disk Shelves (3 HBAs)
- Oracle ZFS Storage ZS3-4 Standalone to Mixed Disk Shelves (4 HBAs)
- Oracle ZFS Storage ZS3-4 Clustered to Mixed Disk Shelves (2 HBAs)
- Oracle ZFS Storage ZS3-4 Clustered to Mixed Disk Shelves (3 HBAs)
- Oracle ZFS Storage ZS3-4 Clustered to Mixed Disk Shelves (4 HBAs)

Oracle ZFS Storage ZS3-4 Standalone to Mixed Disk Shelves (2 HBAs)

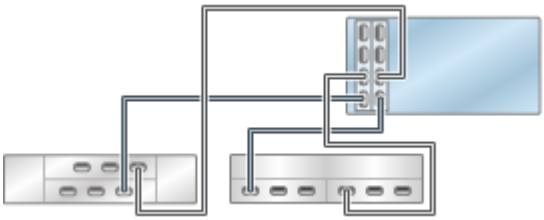
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-4 standalone controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

Using mixed disk shelves on a controller requires the following:

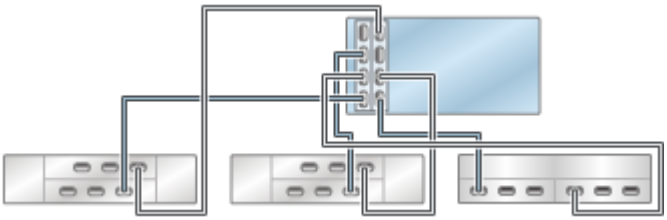
- The controller must use only 4X4 port SAS-2 HBAs
- Do not use mixed disk shelves in the same chain

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

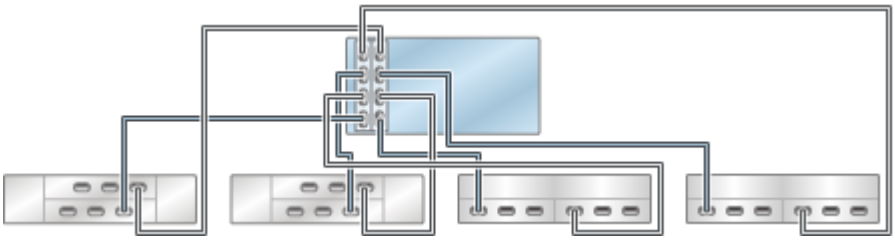
Standalone Oracle ZFS Storage ZS3-4 controllers with two HBAs connected to two mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



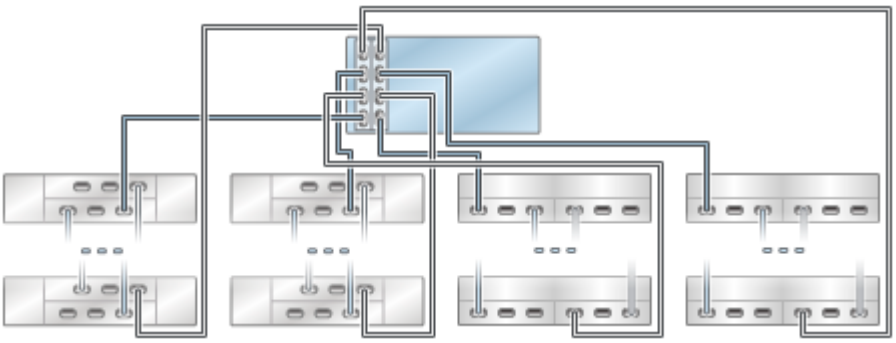
Standalone Oracle ZFS Storage ZS3-4 controllers with two HBAs connected to three mixed disk shelves in three chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



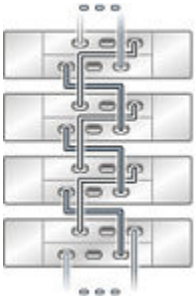
Standalone Oracle ZFS Storage ZS3-4 controllers with two HBAs connected to four mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



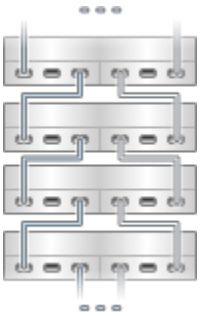
Standalone Oracle ZFS Storage ZS3-4 controllers with two HBAs connected to multiple mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



Multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple Sun Disk Shelves in a single chain



Oracle ZFS Storage ZS3-4 Standalone to Mixed Disk Shelves (3 HBAs)

The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-4 standalone controllers with three HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

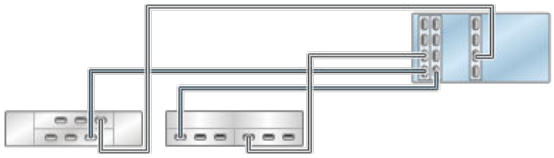
Using mixed disk shelves on a controller requires the following:

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

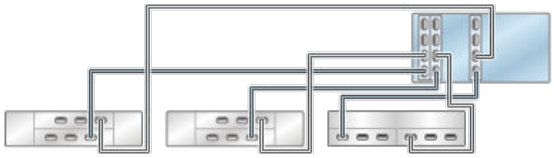
Note:

For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

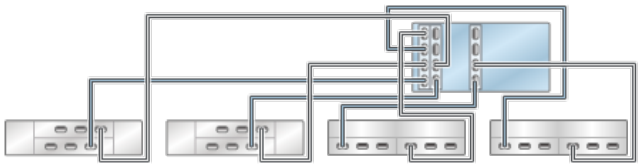
Standalone Oracle ZFS Storage ZS3-4 controllers with three HBAs connected to two mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



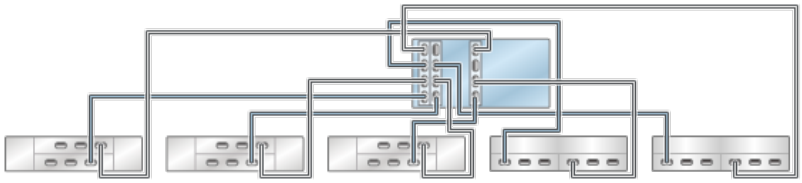
Standalone Oracle ZFS Storage ZS3-4 controllers with three HBAs connected to three mixed disk shelves in three chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



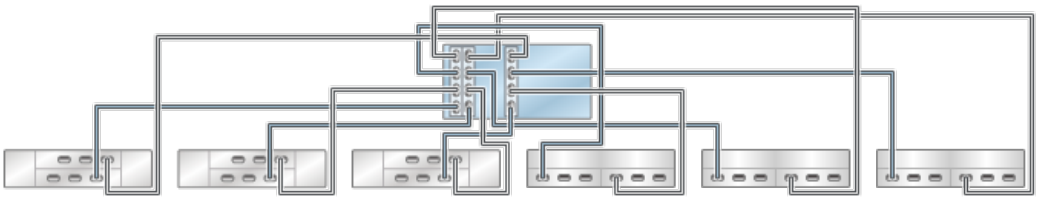
Standalone Oracle ZFS Storage ZS3-4 controllers with three HBAs connected to four mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



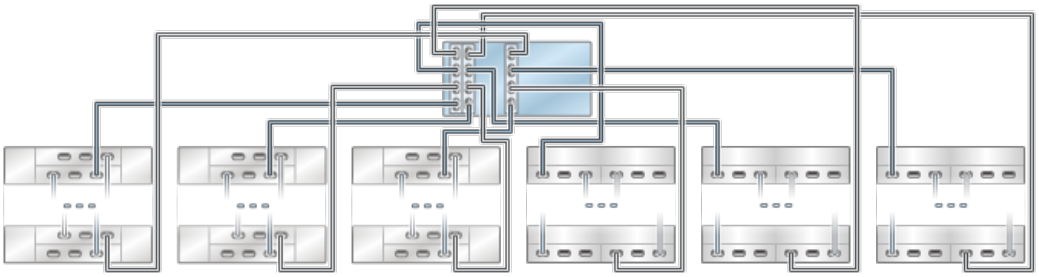
Standalone Oracle ZFS Storage ZS3-4 controllers with three HBAs connected to five mixed disk shelves in five chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



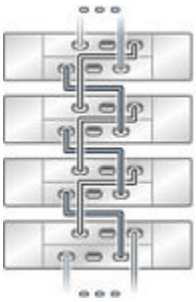
Standalone Oracle ZFS Storage ZS3-4 controllers with three HBAs connected to six mixed disk shelves in six chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



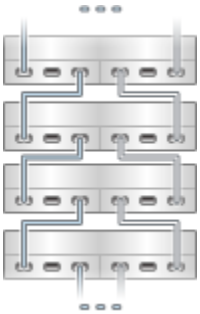
Standalone Oracle ZFS Storage ZS3-4 controllers with three HBAs connected to multiple mixed disk shelves in six chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



Multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple Sun Disk Shelves in a single chain



Oracle ZFS Storage ZS3-4 Standalone to Mixed Disk Shelves (4 HBAs)

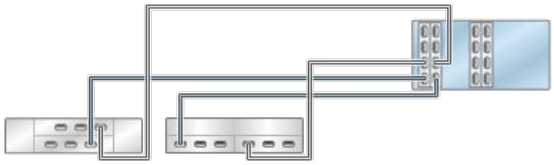
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-4 standalone controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

Using mixed disk shelves on a controller requires the following:

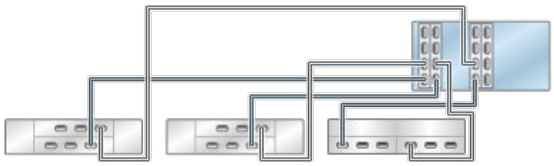
- The controller must use only 4X4 port SAS-2 HBAs
- Do not use mixed disk shelves in the same chain

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

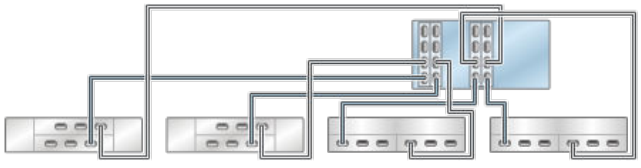
Standalone Oracle ZFS Storage ZS3-4 controllers with four HBAs connected to two mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



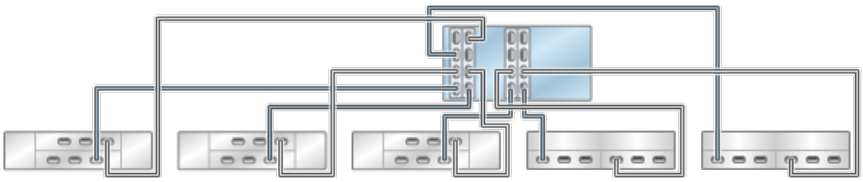
Standalone Oracle ZFS Storage ZS3-4 controllers with four HBAs connected to three mixed disk shelves in three chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



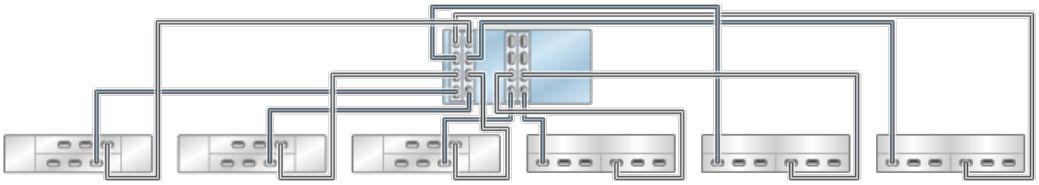
Standalone Oracle ZFS Storage ZS3-4 controllers with four HBAs connected to four mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



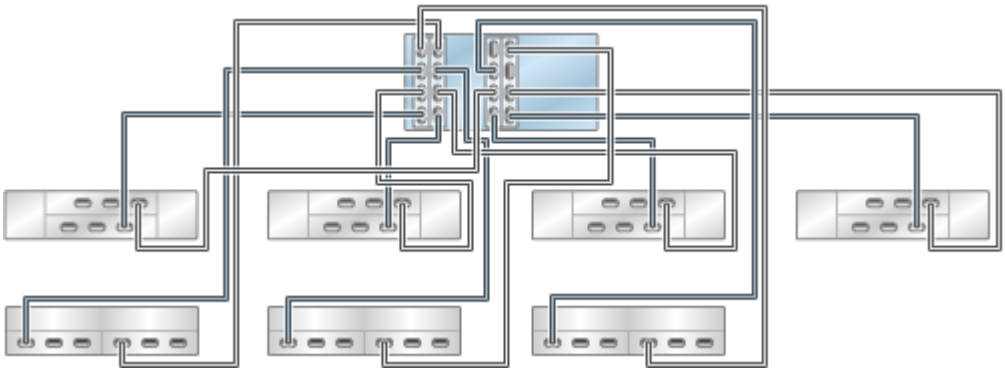
Standalone Oracle ZFS Storage ZS3-4 controllers with four HBAs connected to five mixed disk shelves in five chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



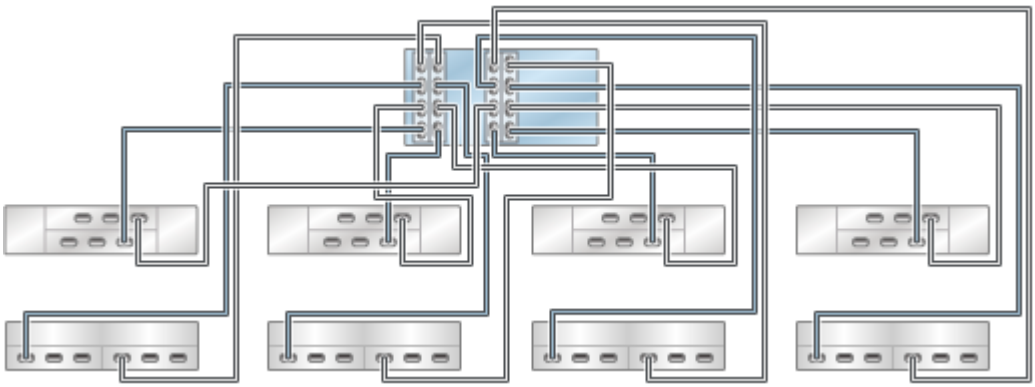
Standalone Oracle ZFS Storage ZS3-4 controllers with four HBAs connected to six mixed disk shelves in six chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



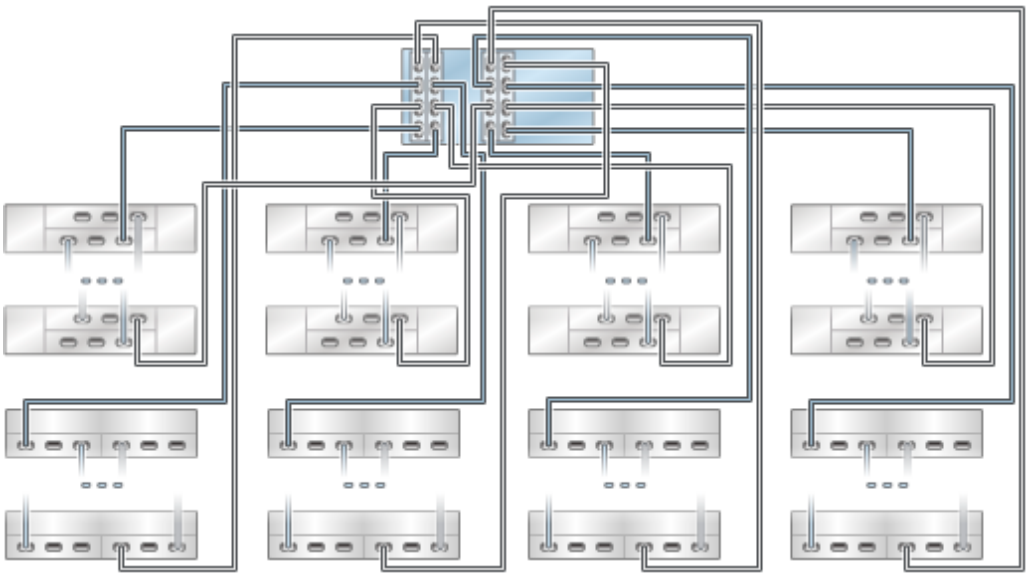
Standalone Oracle ZFS Storage ZS3-4 controllers with four HBAs connected to seven mixed disk shelves in seven chains (Oracle Storage Drive Enclosure DE2-24 shown on the top)



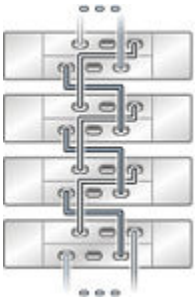
Standalone Oracle ZFS Storage ZS3-4 controllers with four HBAs connected to eight mixed disk shelves in eight chains (Oracle Storage Drive Enclosure DE2-24 shown on the top)



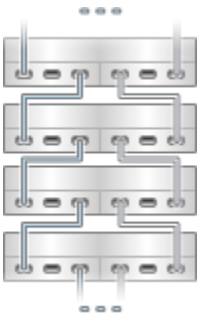
Standalone Oracle ZFS Storage ZS3-4 controllers with four HBAs connected to multiple mixed disk shelves in eight chains (Oracle Storage Drive Enclosure DE2-24 shown on the top)



Multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple Sun Disk Shelves in a single chain



Oracle ZFS Storage ZS3-4 Clustered to Mixed Disk Shelves (2 HBAs)

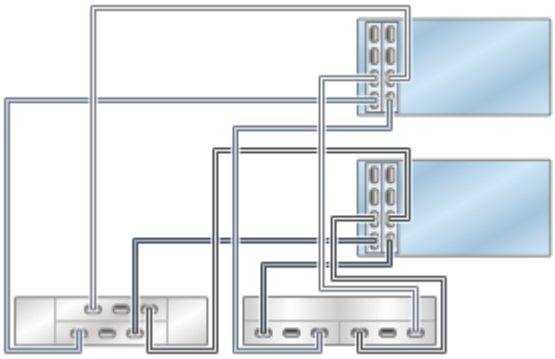
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-4 clustered controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

Using mixed disk shelves on a controller requires the following:

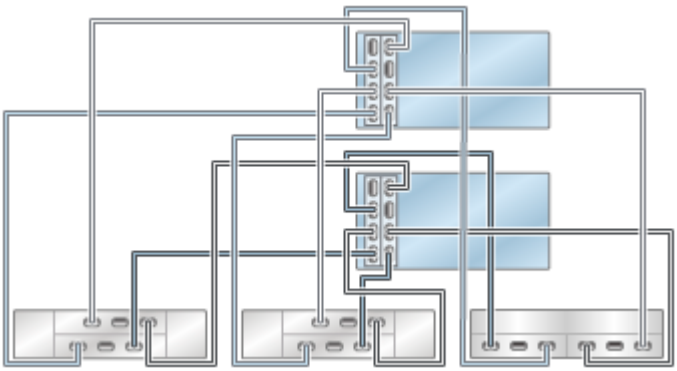
- The controller must use only 4X4 port SAS-2 HBAs
- Do not use mixed disk shelves in the same chain

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

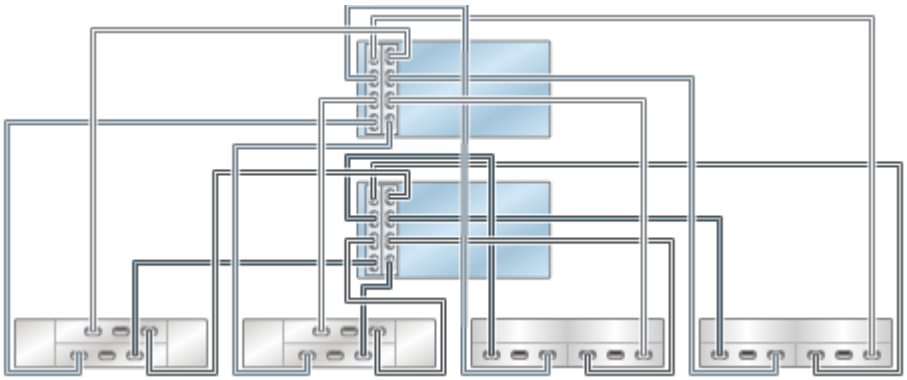
Clustered Oracle ZFS Storage ZS3-4 controllers with two HBAs connected to two mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



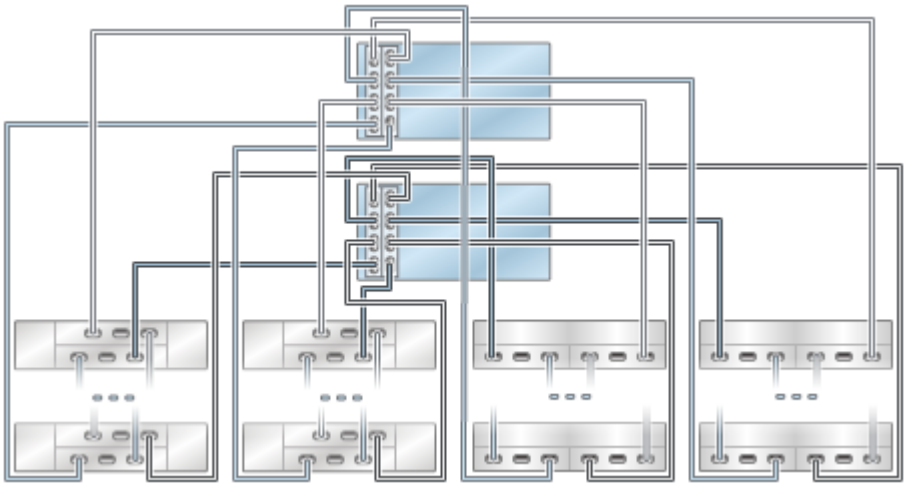
Clustered Oracle ZFS Storage ZS3-4 controllers with two HBAs connected to three mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



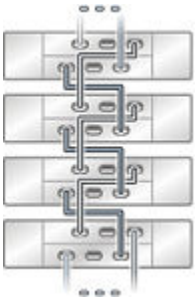
Clustered Oracle ZFS Storage ZS3-4 controllers with two HBAs connected to four mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



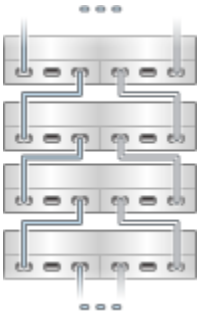
Clustered Oracle ZFS Storage ZS3-4 controllers with two HBAs connected to multiple mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



Multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple Sun Disk Shelves in a single chain



Oracle ZFS Storage ZS3-4 Clustered to Mixed Disk Shelves (3 HBAs)

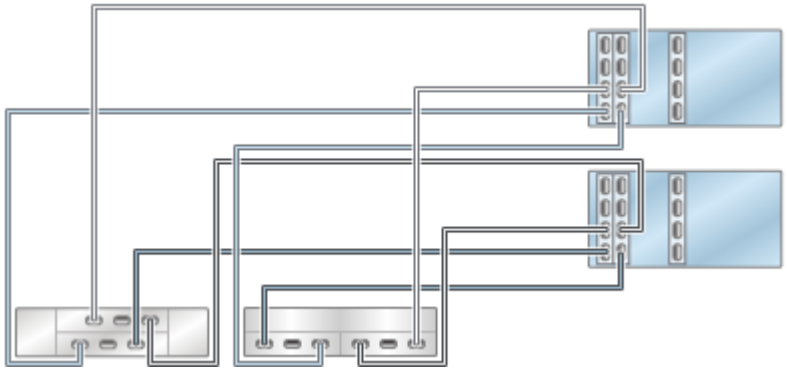
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-4 clustered controllers with three HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

Using mixed disk shelves on a controller requires the following:

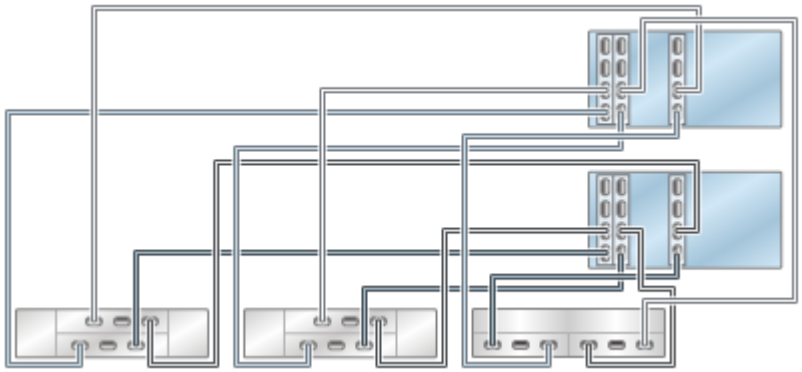
- The controller must use only 4X4 port SAS-2 HBAs
- Do not use mixed disk shelves in the same chain

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

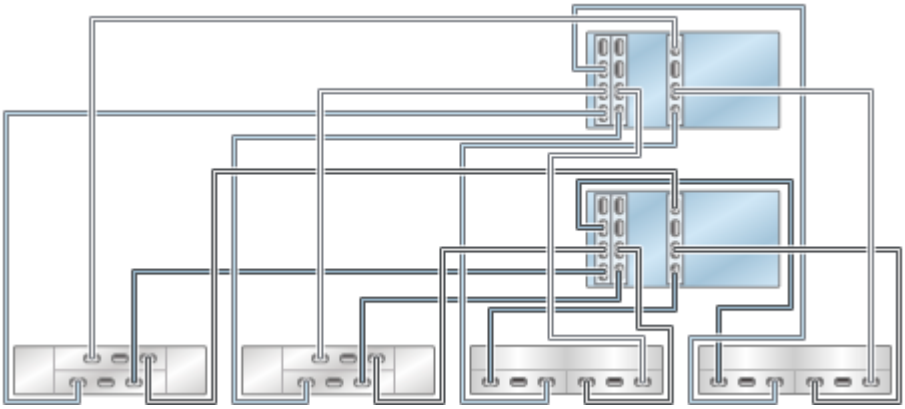
Clustered Oracle ZFS Storage ZS3-4 controllers with three HBAs connected to two mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



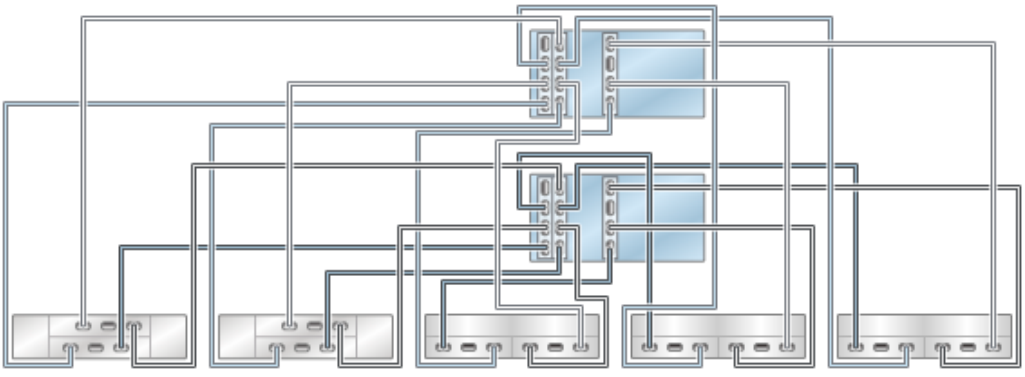
Clustered Oracle ZFS Storage ZS3-4 controllers with three HBAs connected to three mixed disk shelves in three chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



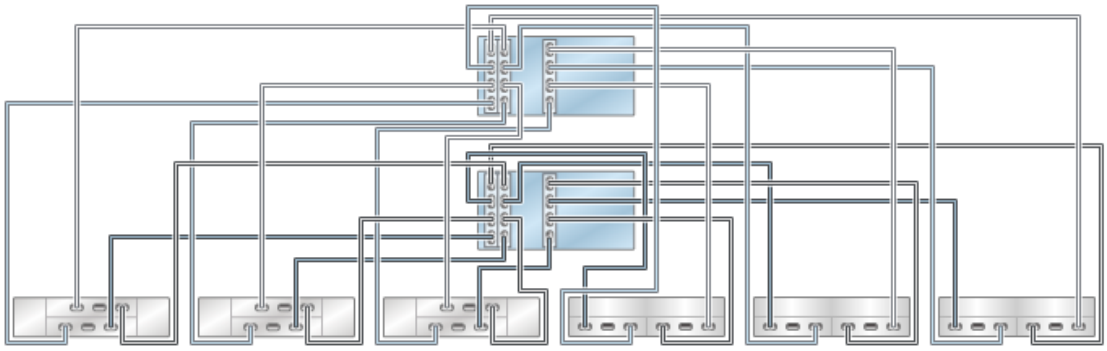
Clustered Oracle ZFS Storage ZS3-4 controllers with three HBAs connected to four mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



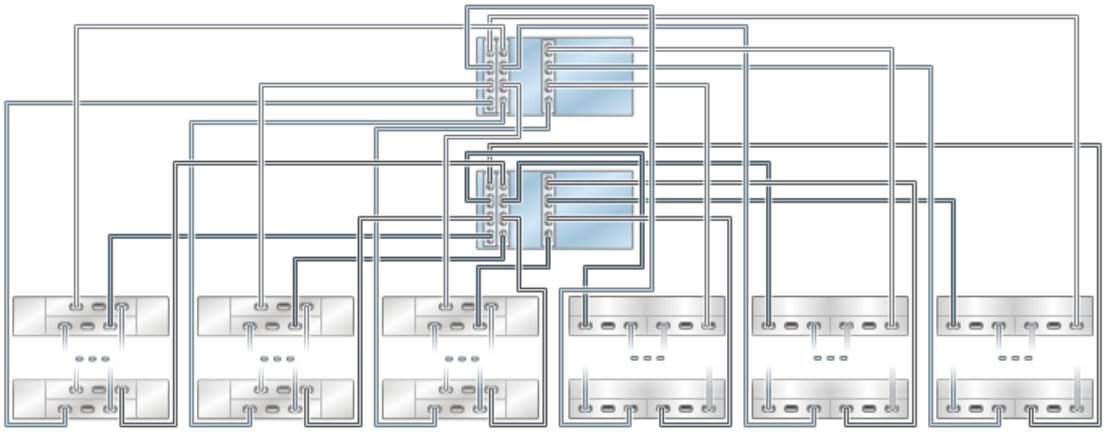
Clustered Oracle ZFS Storage ZS3-4 controllers with three HBAs connected to five mixed disk shelves in five chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



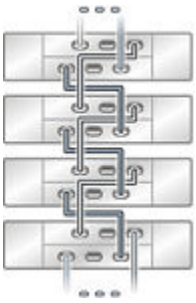
Clustered Oracle ZFS Storage ZS3-4 controllers with three HBAs connected to six mixed disk shelves in six chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



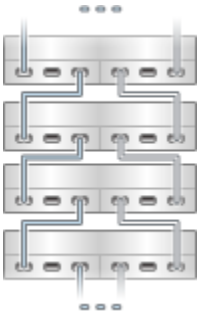
Clustered Oracle ZFS Storage ZS3-4 controllers with three HBAs connected to multiple mixed disk shelves in six chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



Multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple Sun Disk Shelves in a single chain



Oracle ZFS Storage ZS3-4 Clustered to Mixed Disk Shelves (4 HBAs)

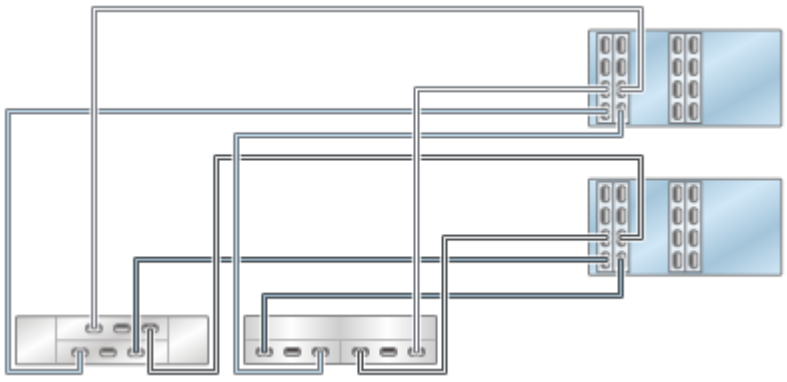
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-4 clustered controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

Using mixed disk shelves on a controller requires the following:

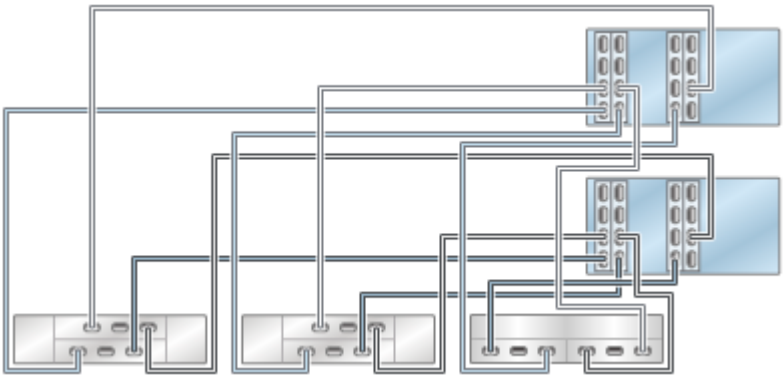
- The controller must use only 4X4 port SAS-2 HBAs
- Do not use mixed disk shelves in the same chain

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

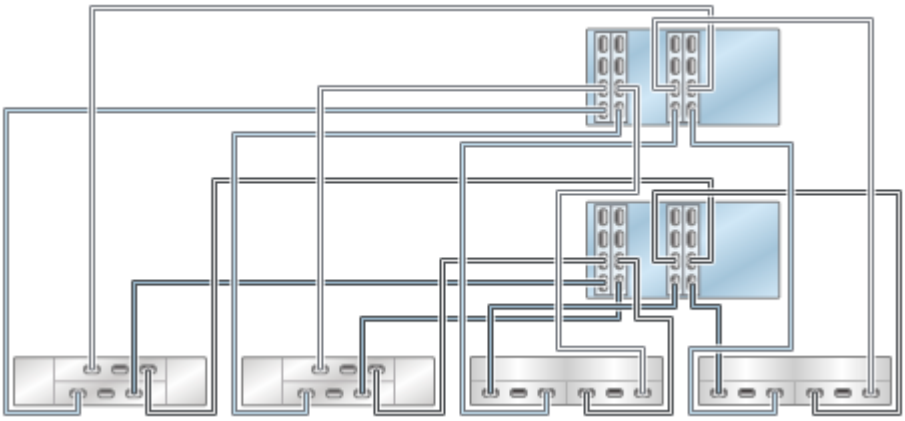
Clustered Oracle ZFS Storage ZS3-4 controllers with four HBAs connected to two mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



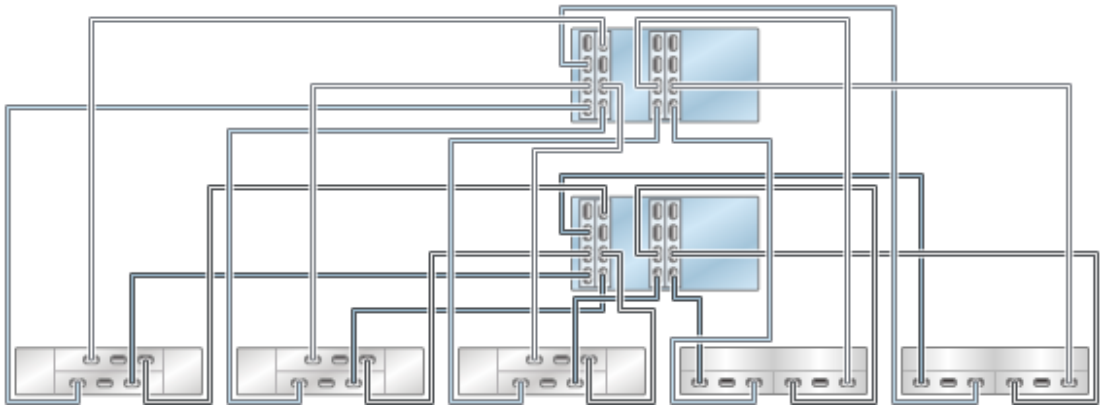
Clustered Oracle ZFS Storage ZS3-4 controllers with four HBAs connected to three mixed disk shelves in three chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



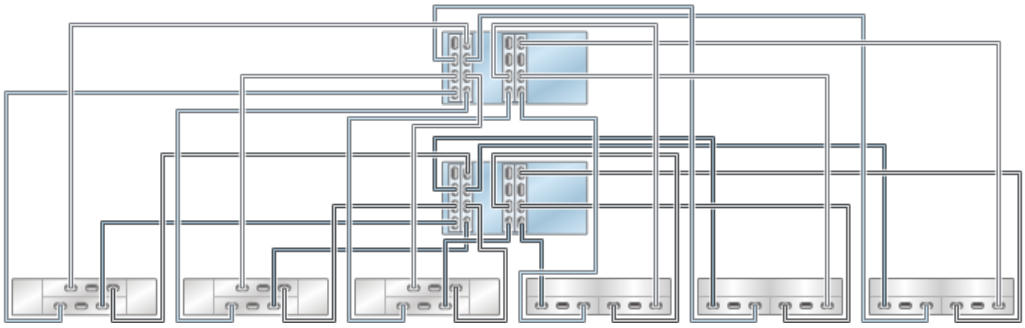
Clustered Oracle ZFS Storage ZS3-4 controllers with four HBAs connected to four mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



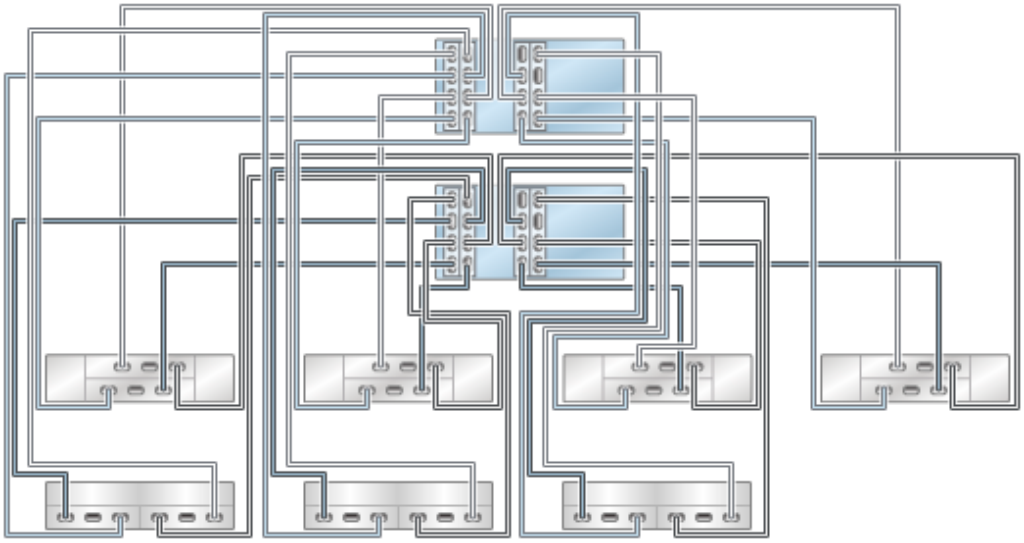
Clustered Oracle ZFS Storage ZS3-4 controllers with four HBAs connected to five mixed disk shelves in five chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



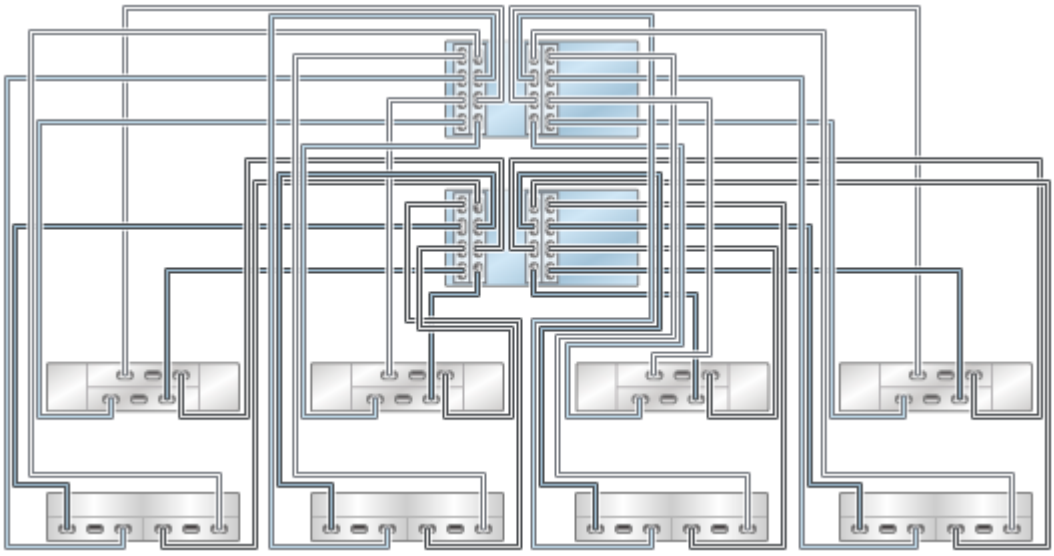
Clustered Oracle ZFS Storage ZS3-4 controllers with four HBAs connected to six mixed disk shelves in six chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



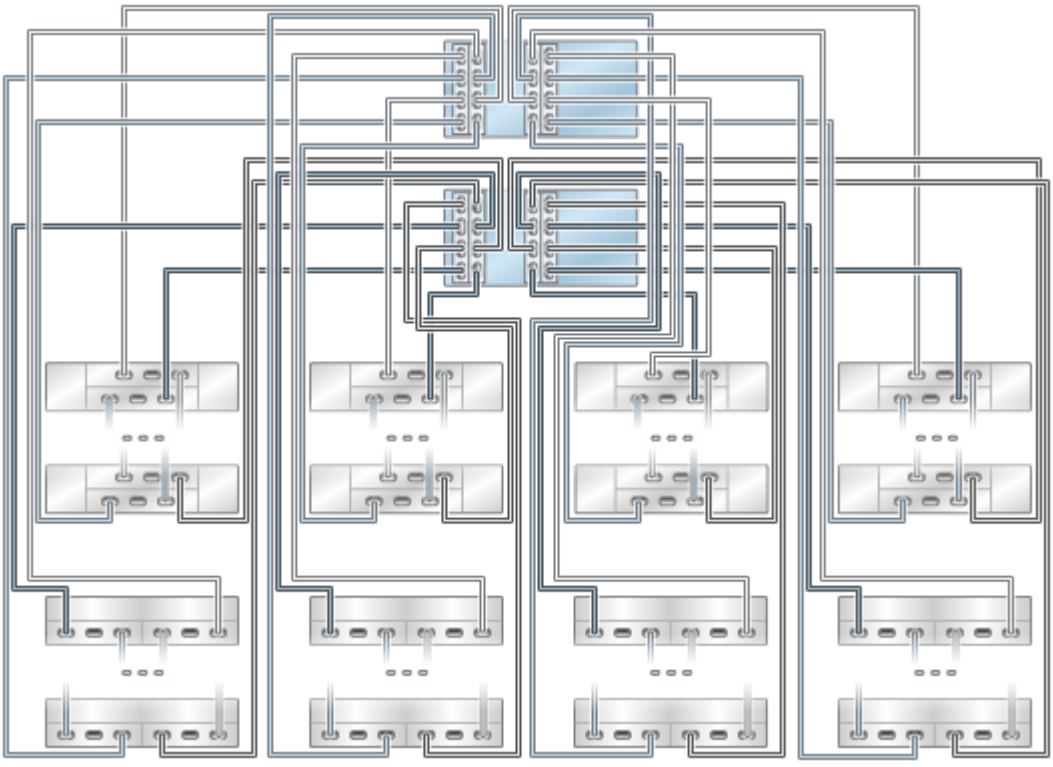
Clustered Oracle ZFS Storage ZS3-4 controllers with four HBAs connected to seven mixed disk shelves in seven chains (Oracle Storage Drive Enclosure DE2-24 shown on the top)



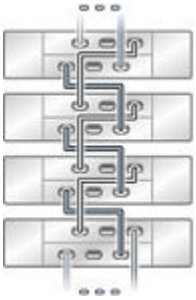
Clustered Oracle ZFS Storage ZS3-4 controllers with four HBAs connected to eight mixed disk shelves in eight chains (Oracle Storage Drive Enclosure DE2-24 shown on the top)



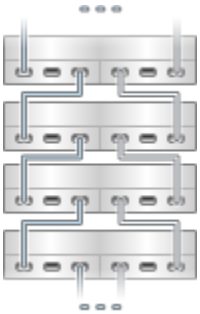
Clustered Oracle ZFS Storage ZS3-4 controllers with four HBAs connected to multiple mixed disk shelves in eight chains (Oracle Storage Drive Enclosure DE2-24 shown on the top)



Multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple Sun Disk Shelves in a single chain



Cabling Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves to Oracle ZFS Storage ZS3-2 Controllers

This section contains guidelines for properly cabling standalone and clustered Oracle ZFS Storage ZS3-2 controllers to Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

- Oracle ZFS Storage ZS3-2 Standalone to Mixed Disk Shelves (1 HBA)
- Oracle ZFS Storage ZS3-2 Standalone to Mixed Disk Shelves (2 HBAs)
- Oracle ZFS Storage ZS3-2 Clustered to Mixed Disk Shelves (1 HBA)
- Oracle ZFS Storage ZS3-2 Clustered to Mixed Disk Shelves (2 HBAs)

Oracle ZFS Storage ZS3-2 Standalone to Mixed Disk Shelves (1 HBA)

The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-2 standalone controllers with one HBA. To cable the controller to the disk shelves, see Getting Started with Cabling.

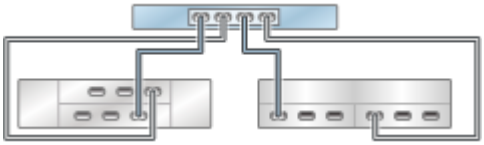
Using mixed disk shelves on a controller requires the following:

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

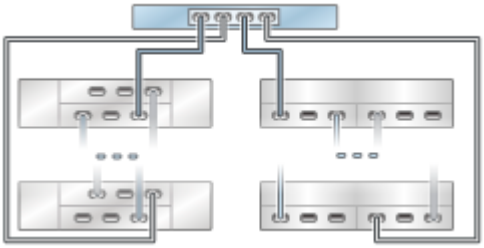
Note:

For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

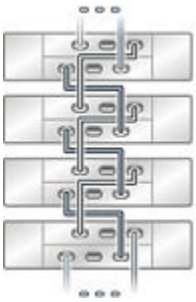
Standalone Oracle ZFS Storage ZS3-2 controller with one HBA connected to two mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



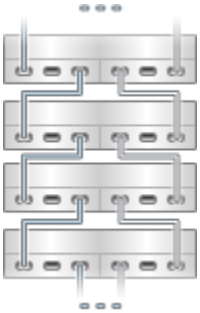
Standalone Oracle ZFS Storage ZS3-2 controller with one HBA connected to multiple mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



Multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple Sun Disk Shelves in a single chain



Oracle ZFS Storage ZS3-2 Standalone to Mixed Disk Shelves (2 HBAs)

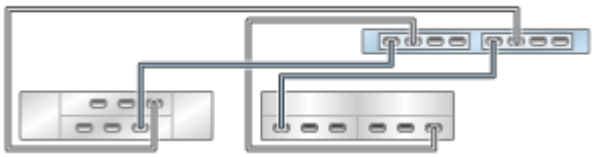
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-2 standalone controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

Using mixed disk shelves on a controller requires the following:

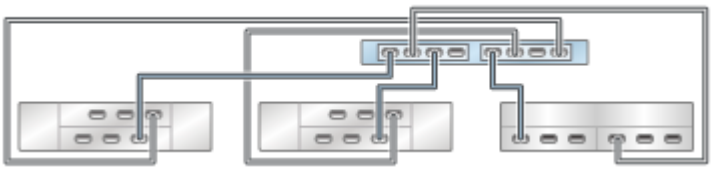
- The controller must use only 4X4 port SAS-2 HBAs
- Do not use mixed disk shelves in the same chain

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

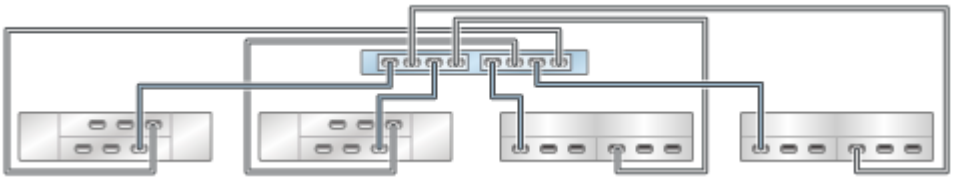
Standalone Oracle ZFS Storage ZS3-2 controller with two HBAs connected to two mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



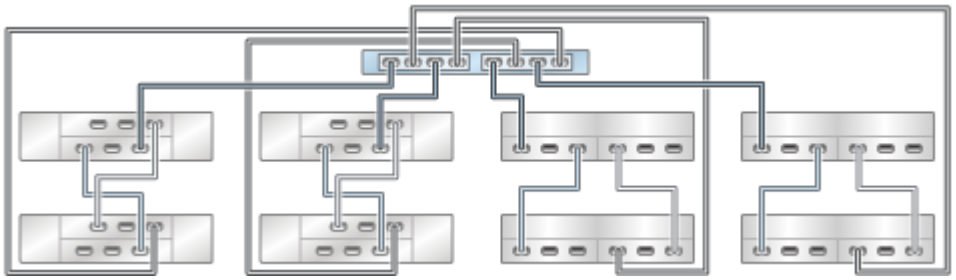
Standalone Oracle ZFS Storage ZS3-2 controller with two HBAs connected to three mixed disk shelves in three chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



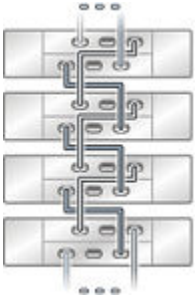
Standalone Oracle ZFS Storage ZS3-2 controller with two HBAs connected to four mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



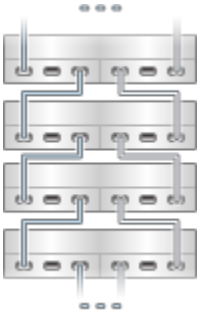
Standalone Oracle ZFS Storage ZS3-2 controller with two HBAs connected to eight mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



Multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple Sun Disk Shelves in a single chain



Oracle ZFS Storage ZS3-2 Clustered to Mixed Disk Shelves (1 HBA)

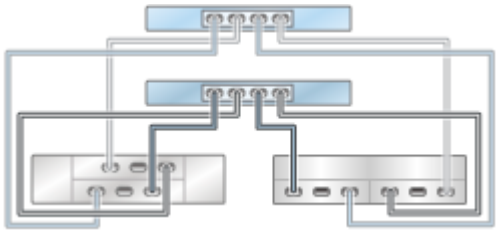
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-2 clustered controllers with one HBA. To cable the controller to the disk shelves, see Getting Started with Cabling.

Using mixed disk shelves on a controller requires the following:

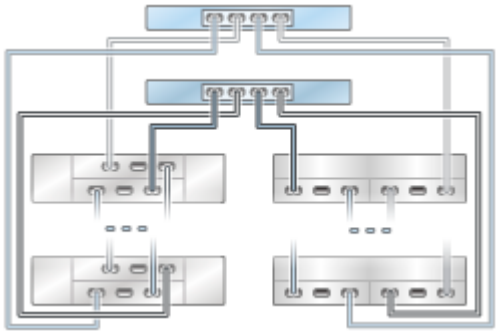
- The controller must use only 4X4 port SAS-2 HBAs
- Do not use mixed disk shelves in the same chain

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

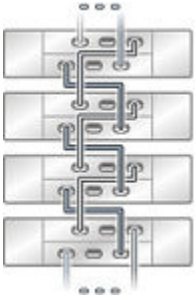
Clustered Oracle ZFS Storage ZS3-2 controllers with one HBA connected to two mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



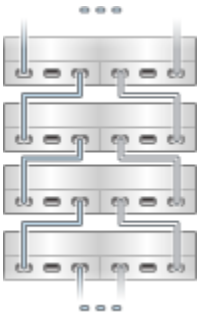
Clustered Oracle ZFS Storage ZS3-2 controllers with one HBA connected to multiple mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



Multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple Sun Disk Shelves in a single chain



Oracle ZFS Storage ZS3-2 Clustered to Mixed Disk Shelves (2 HBAs)

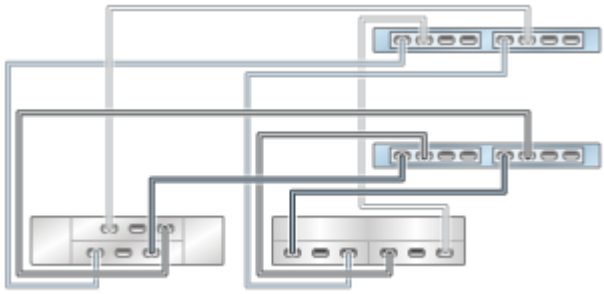
The following figures show a subset of the supported configurations for Oracle ZFS Storage ZS3-2 clustered controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

Using mixed disk shelves on a controller requires the following:

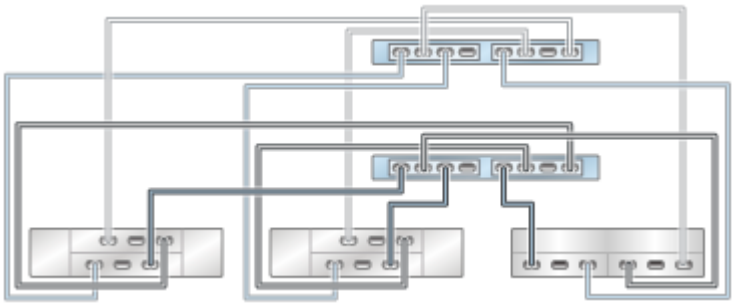
- The controller must use only 4X4 port SAS-2 HBAs
- Do not use mixed disk shelves in the same chain

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

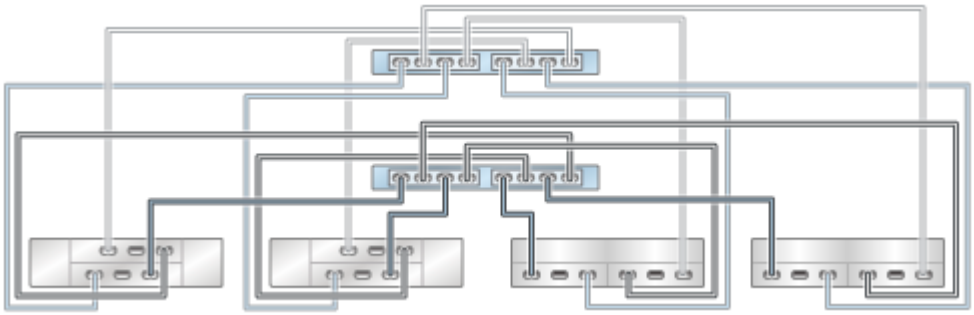
Clustered Oracle ZFS Storage ZS3-2 controller with two HBAs connected to two mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



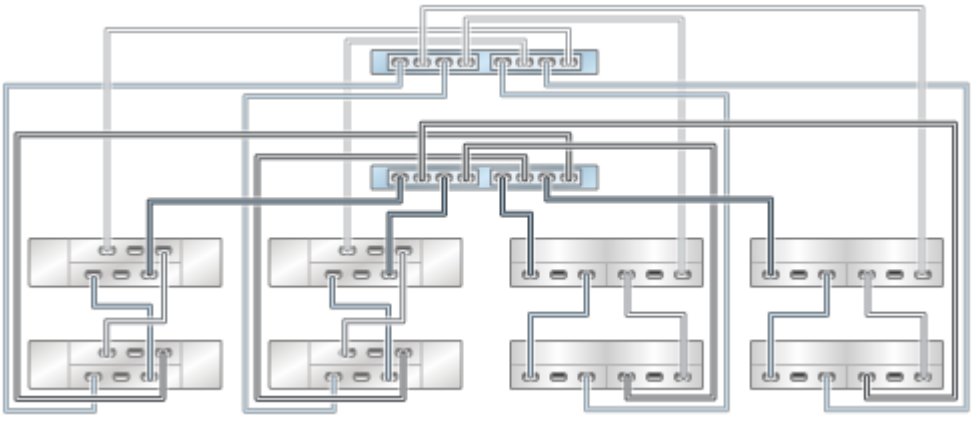
Clustered Oracle ZFS Storage ZS3-2 controller with two HBAs connected to three mixed disk shelves in three chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



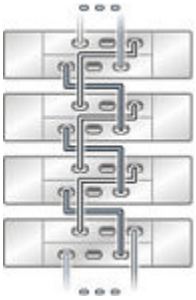
Clustered Oracle ZFS Storage ZS3-2 controller with two HBAs connected to four mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



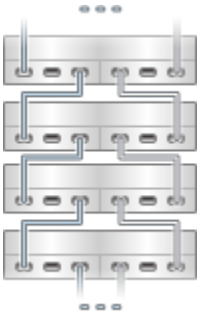
Clustered Oracle ZFS Storage ZS3-2 controller with two HBAs connected to eight mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



Multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple Sun Disk Shelves in a single chain



Cabling Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves to Sun ZFS Storage 7420 Controllers

This section contains guidelines for properly cabling standalone and clustered Sun ZFS Storage 7420 controllers to Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves. Use the diagrams in this section to connect to one or more disk shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

- Sun ZFS Storage 7420 Standalone to Mixed Disk Shelves (2 HBAs)
- Sun ZFS Storage 7420 Standalone to Mixed Disk Shelves (3 HBAs)
- Sun ZFS Storage 7420 Standalone to Mixed Disk Shelves (4 HBAs)
- Sun ZFS Storage 7420 Clustered to Mixed Disk Shelves (2 HBAs)
- Sun ZFS Storage 7420 Clustered to Mixed Disk Shelves (3 HBAs)
- Sun ZFS Storage 7420 Clustered to Mixed Disk Shelves (4 HBAs)

Sun ZFS Storage 7420 Standalone to Mixed Disk Shelves (2 HBAs)

The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 standalone controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

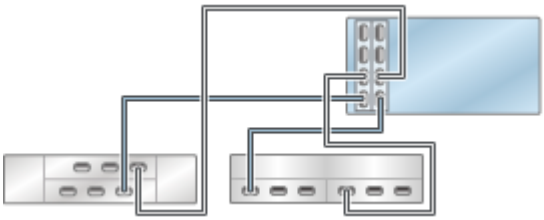
Using mixed disk shelves on a controller requires the following:

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

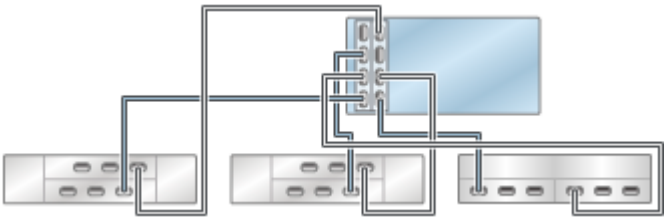
Note:

For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

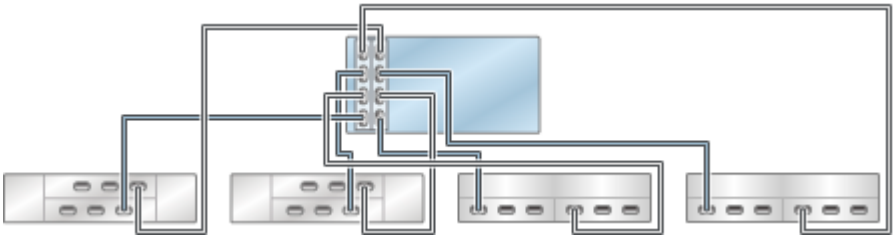
Standalone Sun ZFS Storage 7420 controllers with two HBAs connected to two mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



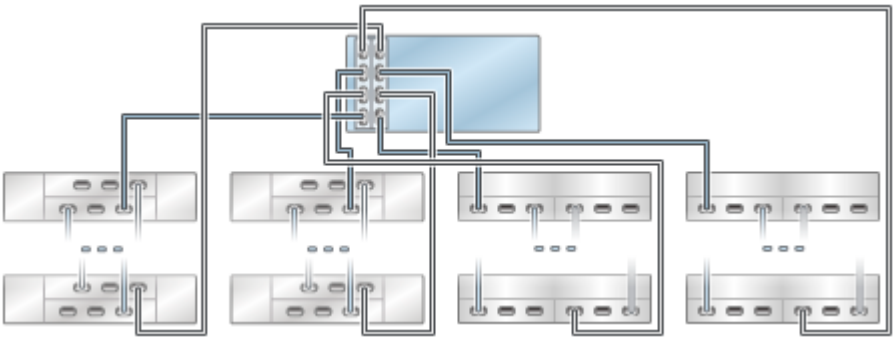
Standalone Sun ZFS Storage 7420 controllers with two HBAs connected to three mixed disk shelves in three chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



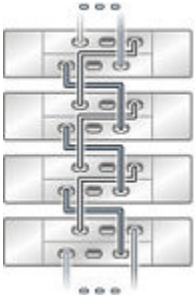
Standalone Sun ZFS Storage 7420 controllers with two HBAs connected to four mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



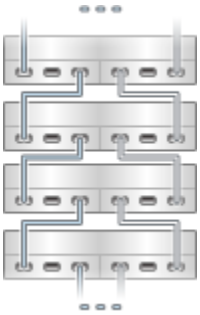
Standalone Sun ZFS Storage 7420 controllers with two HBAs connected to multiple mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



Multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple Sun Disk Shelves in a single chain



Sun ZFS Storage 7420 Standalone to Mixed Disk Shelves (3 HBAs)

The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 standalone controllers with three HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

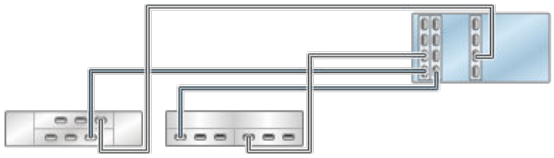
Using mixed disk shelves on a controller requires the following:

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

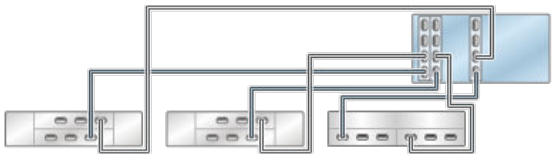
Note:

For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

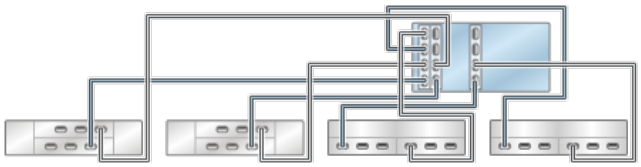
Standalone Sun ZFS Storage 7420 controllers with three HBAs connected to two mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



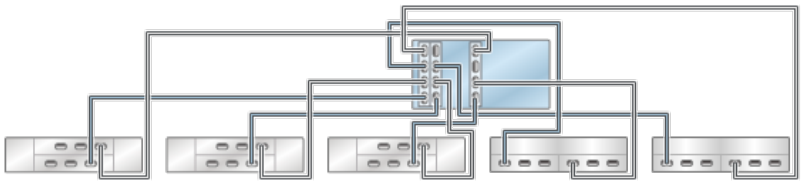
Standalone Sun ZFS Storage 7420 controllers with three HBAs connected to three mixed disk shelves in three chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



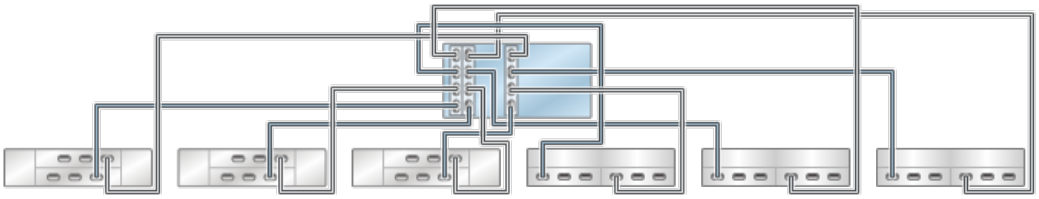
Standalone Sun ZFS Storage 7420 controllers with three HBAs connected to four mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



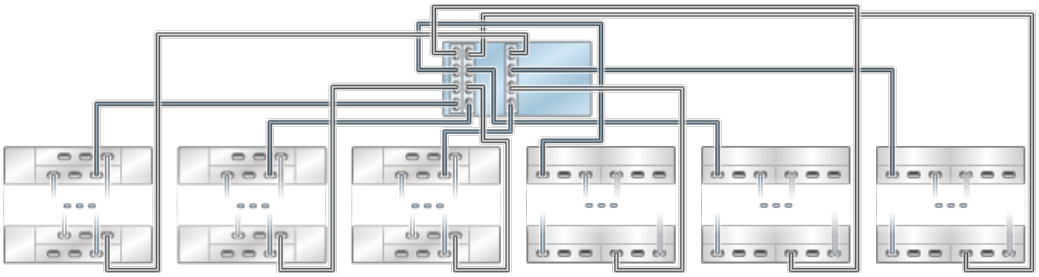
Standalone Sun ZFS Storage 7420 controllers with three HBAs connected to five mixed disk shelves in five chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



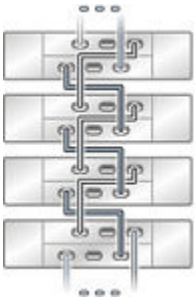
Standalone Sun ZFS Storage 7420 controllers with three HBAs connected to six mixed disk shelves in six chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



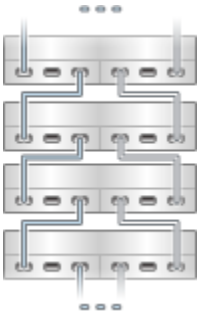
Standalone Sun ZFS Storage 7420 controllers with three HBAs connected to multiple mixed disk shelves in six chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



Multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple Sun Disk Shelves in a single chain



Sun ZFS Storage 7420 Standalone to Mixed Disk Shelves (4 HBAs)

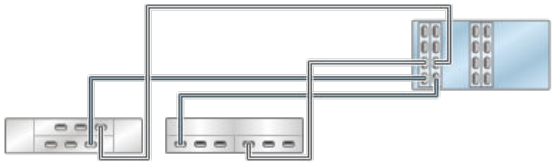
The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 standalone controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

Using mixed disk shelves on a controller requires the following:

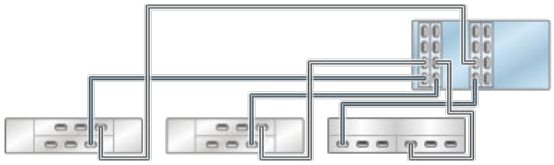
- The controller must use only 4X4 port SAS-2 HBAs
- Do not use mixed disk shelves in the same chain

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

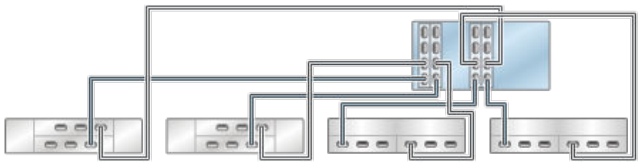
Standalone Sun ZFS Storage 7420 controllers with four HBAs connected to two mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



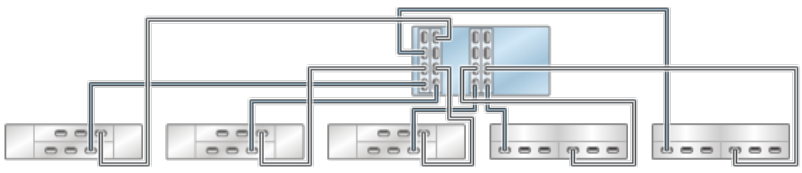
Standalone Sun ZFS Storage 7420 controllers with four HBAs connected to three mixed disk shelves in three chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



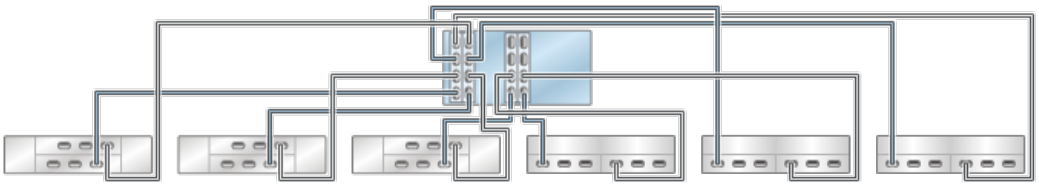
Standalone Sun ZFS Storage 7420 controllers with four HBAs connected to four mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



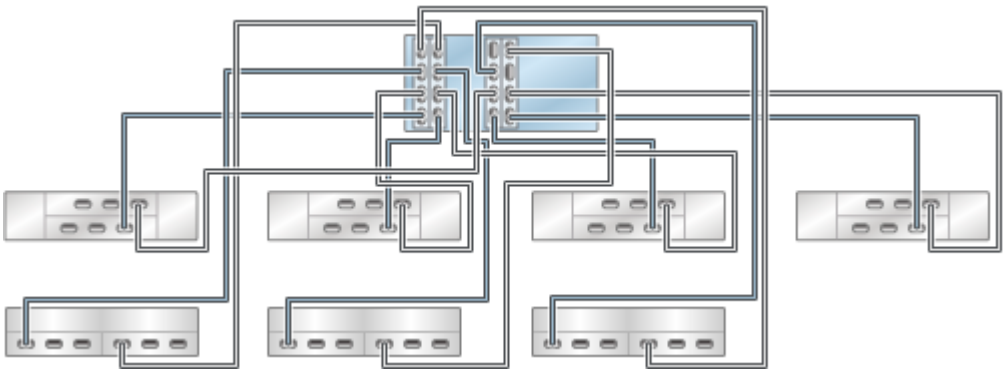
Standalone Sun ZFS Storage 7420 controllers with four HBAs connected to five mixed disk shelves in five chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



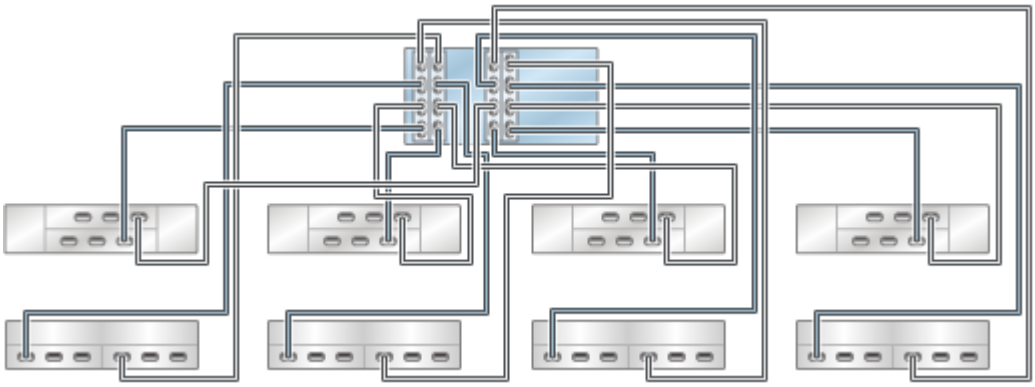
Standalone Sun ZFS Storage 7420 controllers with four HBAs connected to six mixed disk shelves in six chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



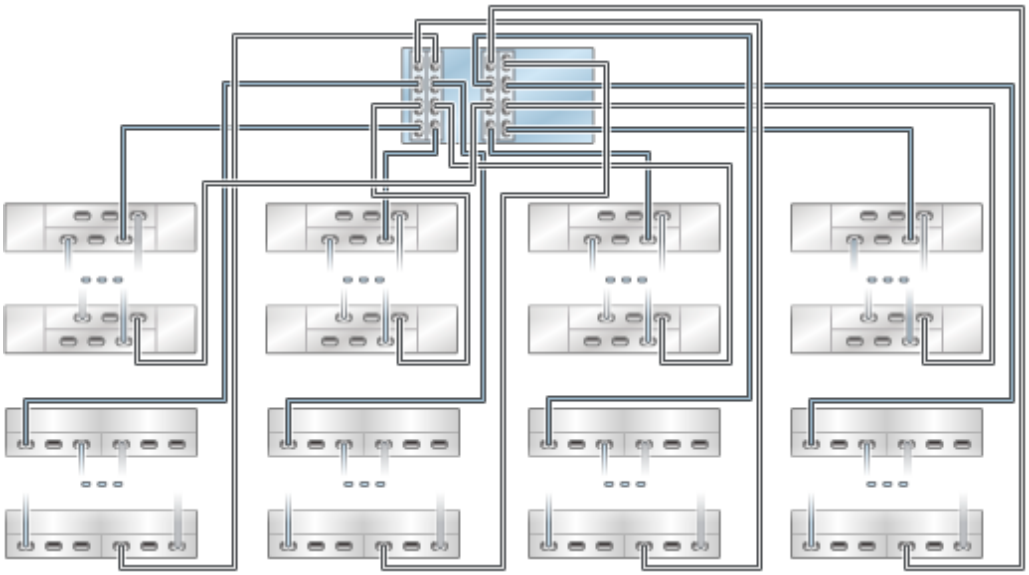
Standalone Sun ZFS Storage 7420 controllers with four HBAs connected to seven mixed disk shelves in seven chains (Oracle Storage Drive Enclosure DE2-24 shown on the top)



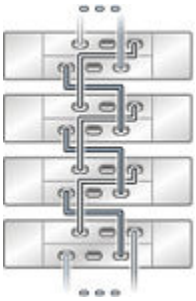
Standalone Sun ZFS Storage 7420 controllers with four HBAs connected to eight mixed disk shelves in eight chains (Oracle Storage Drive Enclosure DE2-24 shown on the top)



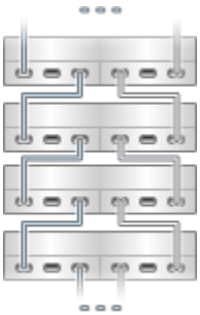
Standalone Sun ZFS Storage 7420 controllers with four HBAs connected to multiple mixed disk shelves in eight chains (Oracle Storage Drive Enclosure DE2-24 shown on the top)



Multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple Sun Disk Shelves in a single chain



Sun ZFS Storage 7420 Clustered to Mixed Disk Shelves (2 HBAs)

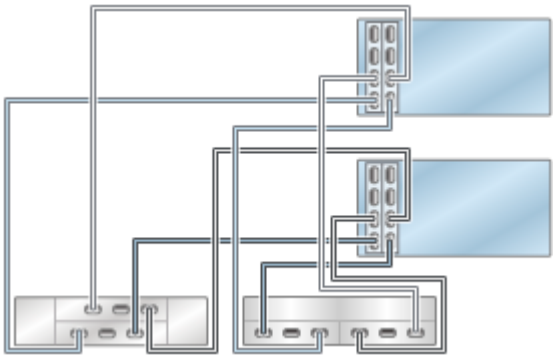
The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 clustered controllers with two HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

Using mixed disk shelves on a controller requires the following:

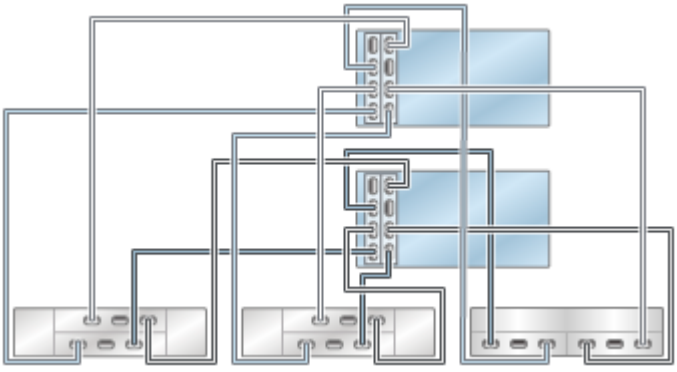
- The controller must use only 4X4 port SAS-2 HBAs
- Do not use mixed disk shelves in the same chain

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

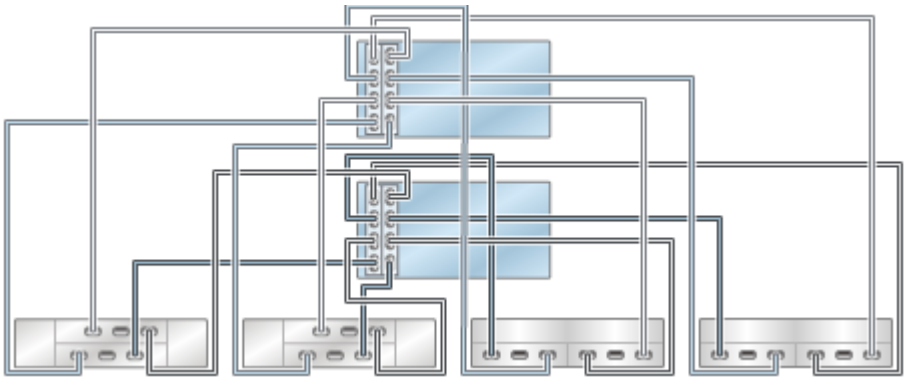
Clustered Sun ZFS Storage 7420 controllers with two HBAs connected to two mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



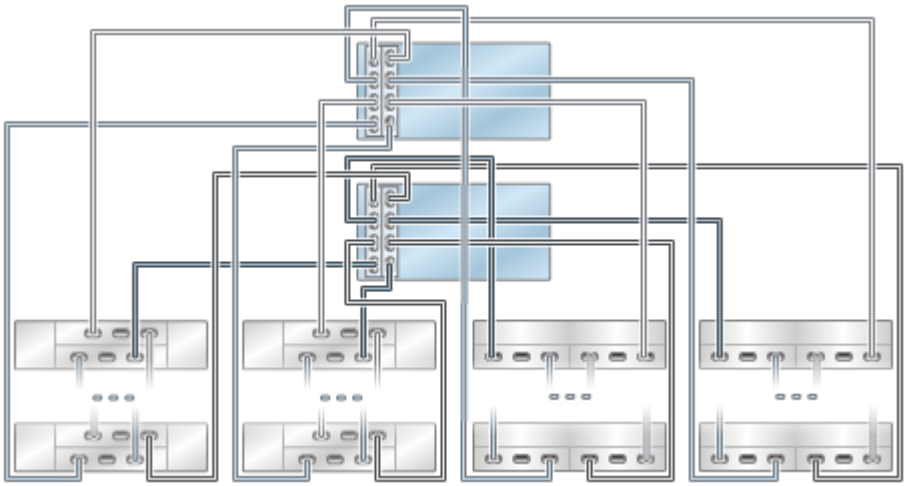
Clustered Sun ZFS Storage 7420 controllers with two HBAs connected to three mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



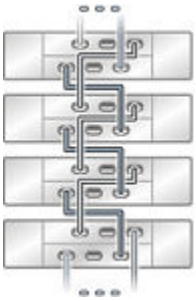
Clustered Sun ZFS Storage 7420 controllers with two HBAs connected to four mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



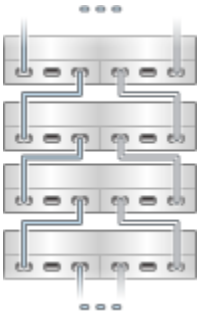
Clustered Sun ZFS Storage 7420 controllers with two HBAs connected to multiple mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



Multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple Sun Disk Shelves in a single chain



Sun ZFS Storage 7420 Clustered to Mixed Disk Shelves (3 HBAs)

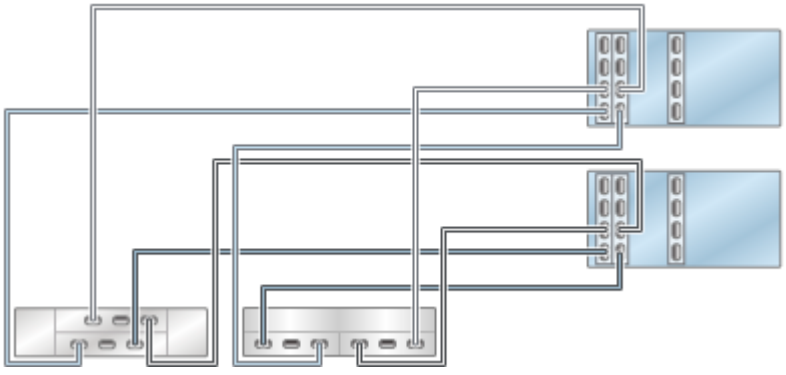
The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 clustered controllers with three HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

Using mixed disk shelves on a controller requires the following:

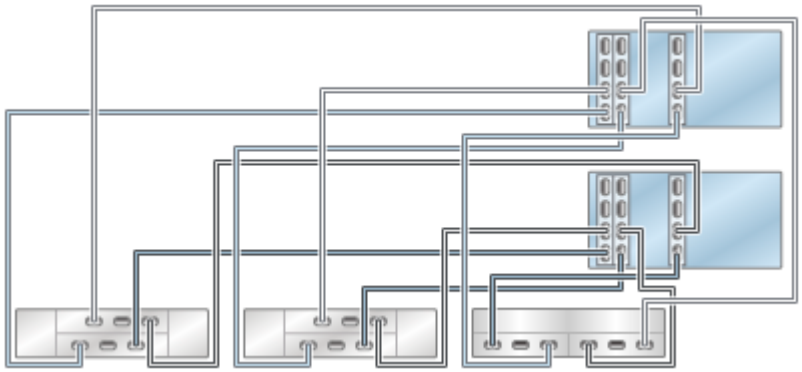
- The controller must use only 4X4 port SAS-2 HBAs
- Do not use mixed disk shelves in the same chain

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

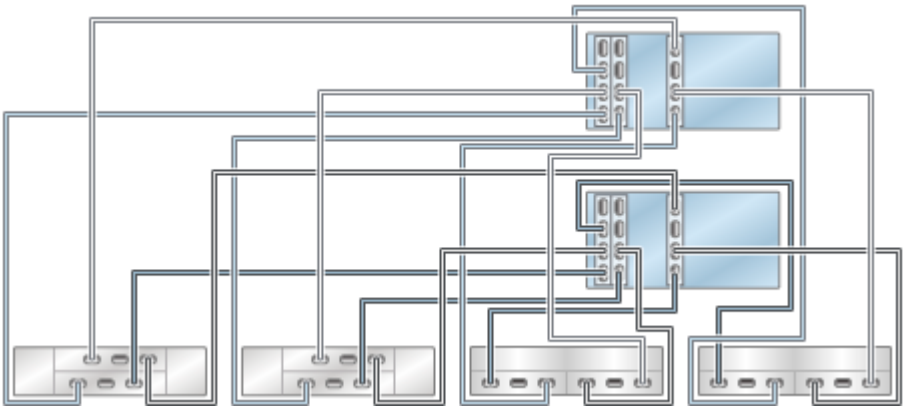
Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to two mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



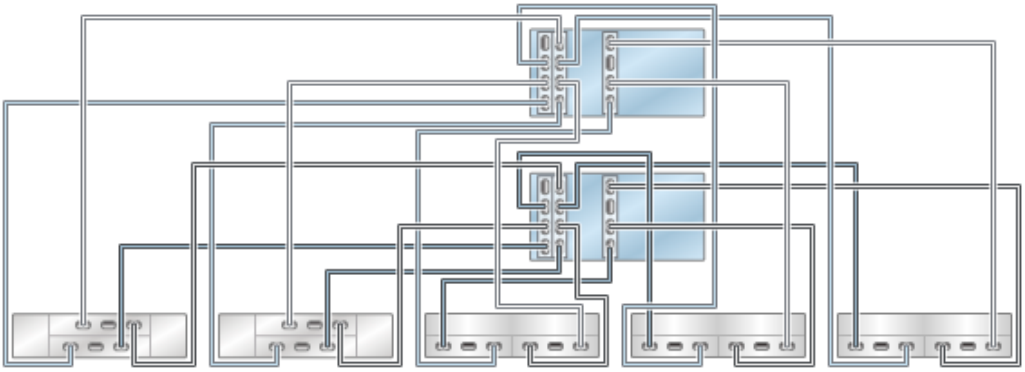
Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to three mixed disk shelves in three chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



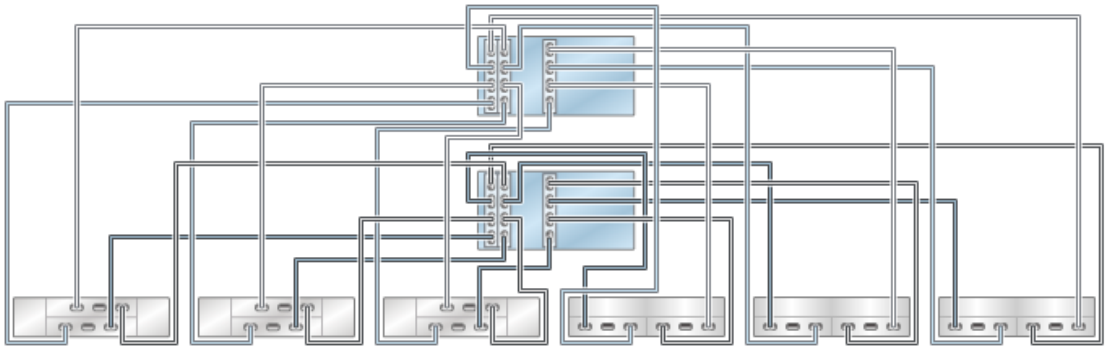
Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to four mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



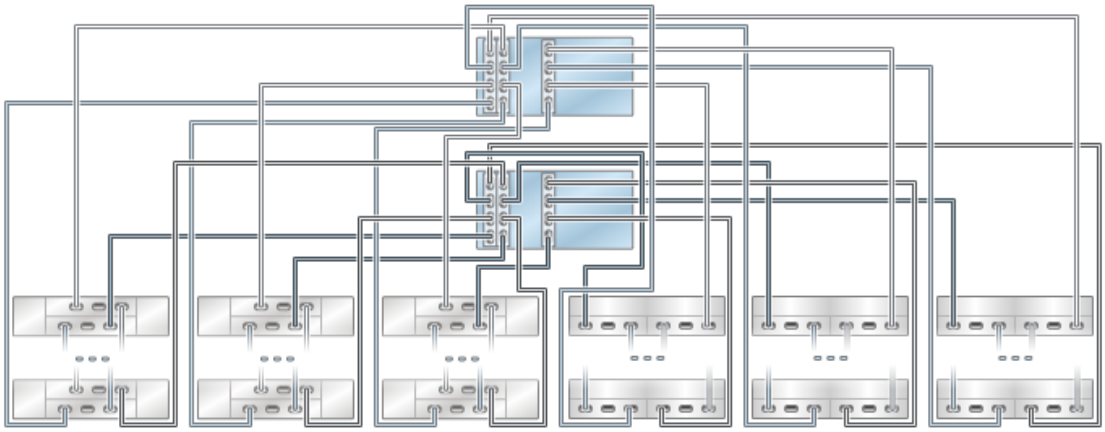
Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to five mixed disk shelves in five chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



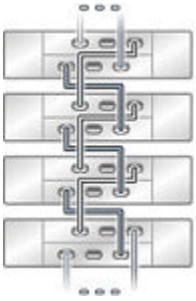
Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to six mixed disk shelves in six chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



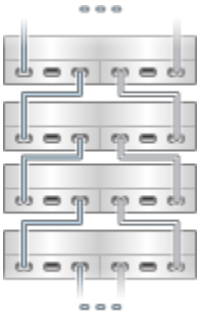
Clustered Sun ZFS Storage 7420 controllers with three HBAs connected to multiple mixed disk shelves in six chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



Multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple Sun Disk Shelves in a single chain



Sun ZFS Storage 7420 Clustered to Mixed Disk Shelves (4 HBAs)

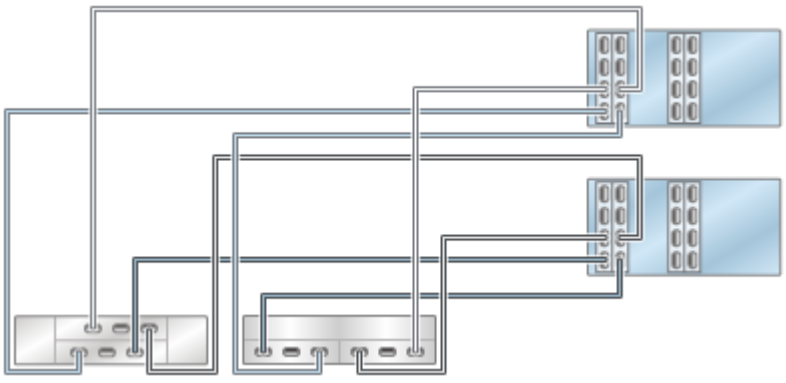
The following figures show a subset of the supported configurations for Sun ZFS Storage 7420 clustered controllers with four HBAs. To cable the controller to the disk shelves, see Getting Started with Cabling.

Using mixed disk shelves on a controller requires the following:

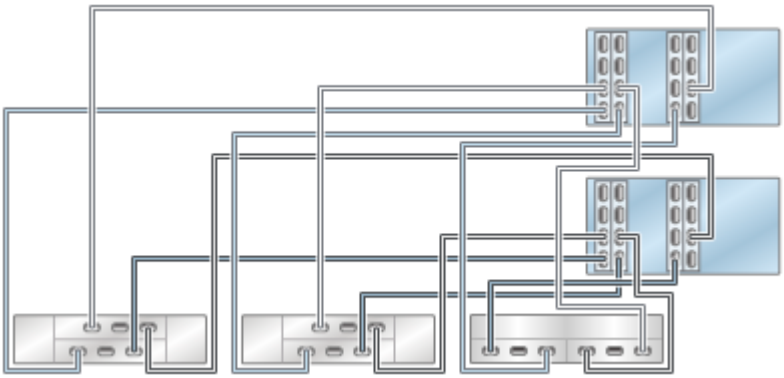
- The controller must use only 4X4 port SAS-2 HBAs
- Do not use mixed disk shelves in the same chain

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

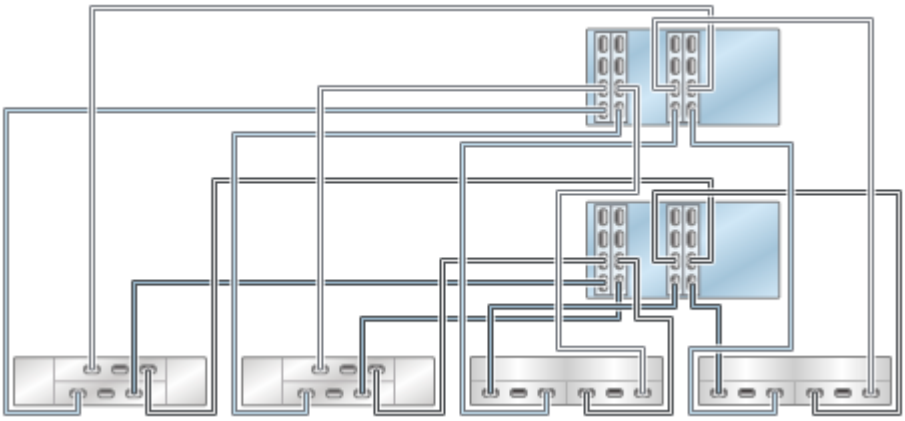
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to two mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



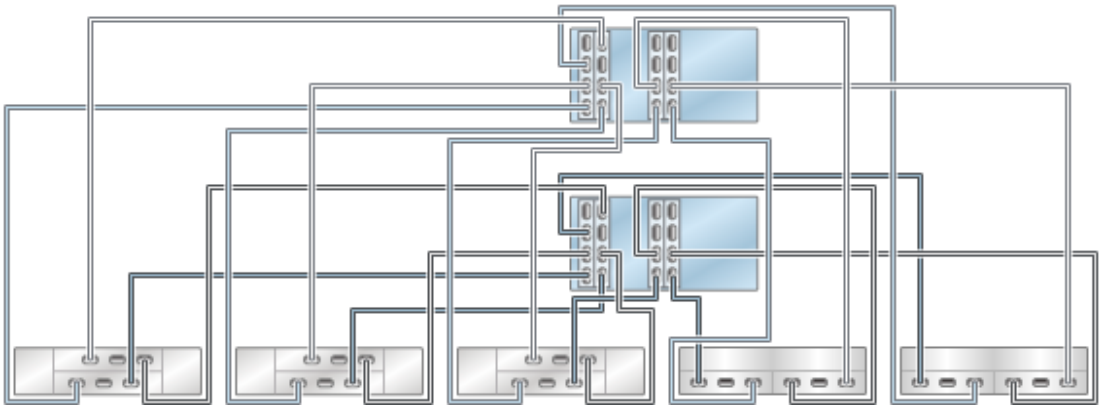
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to three mixed disk shelves in three chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



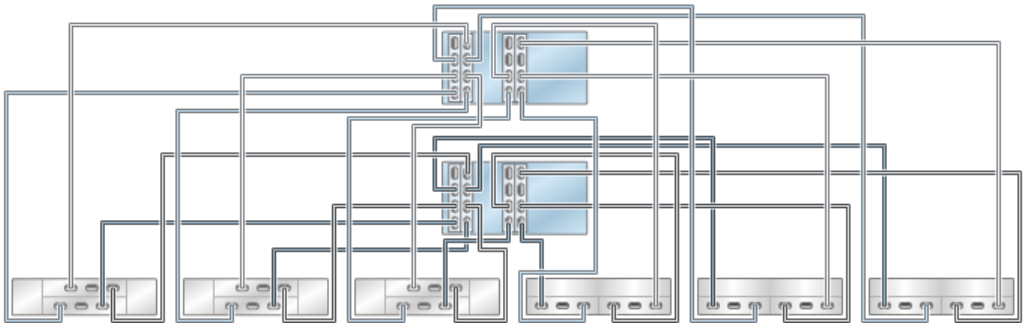
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to four mixed disk shelves in four chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



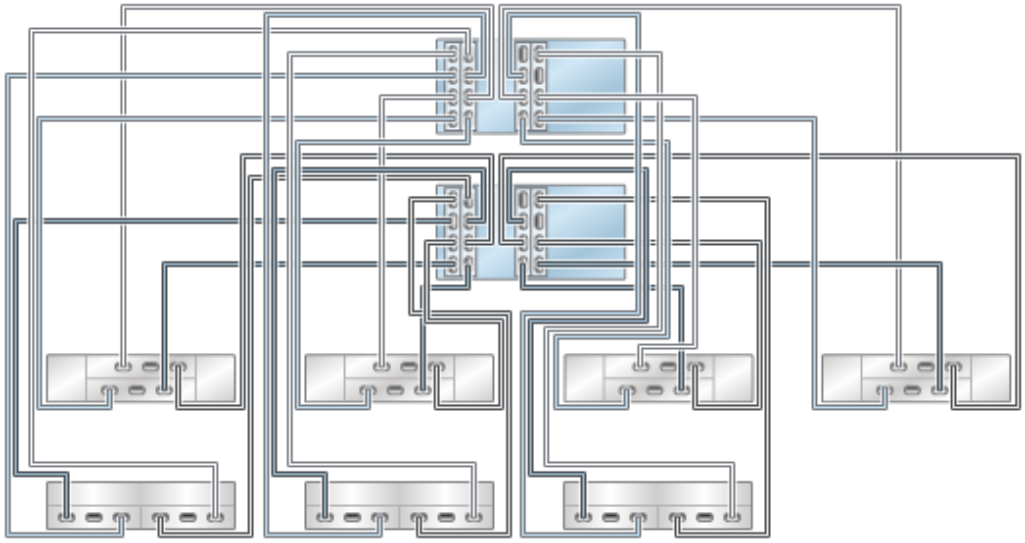
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to five mixed disk shelves in five chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



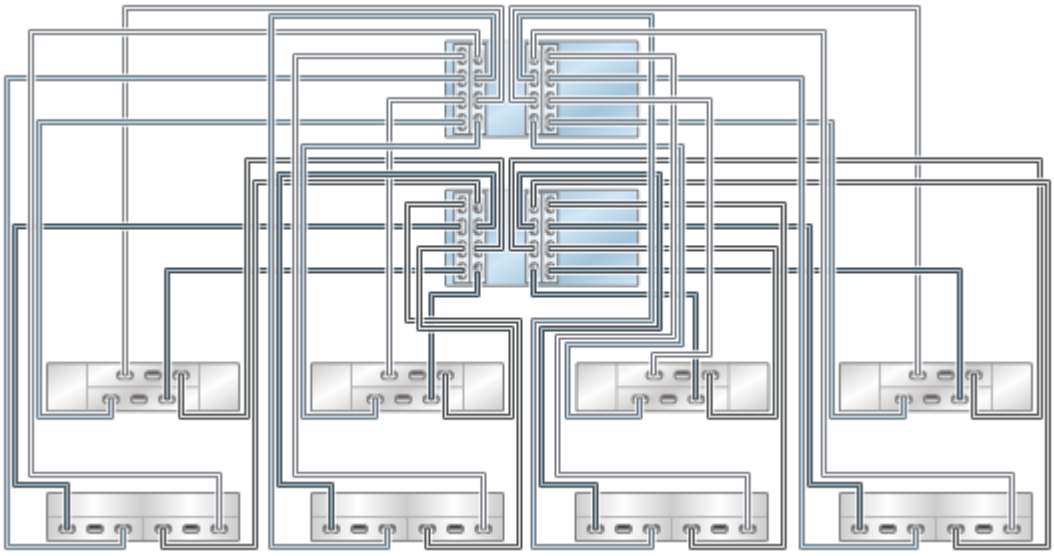
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to six mixed disk shelves in six chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



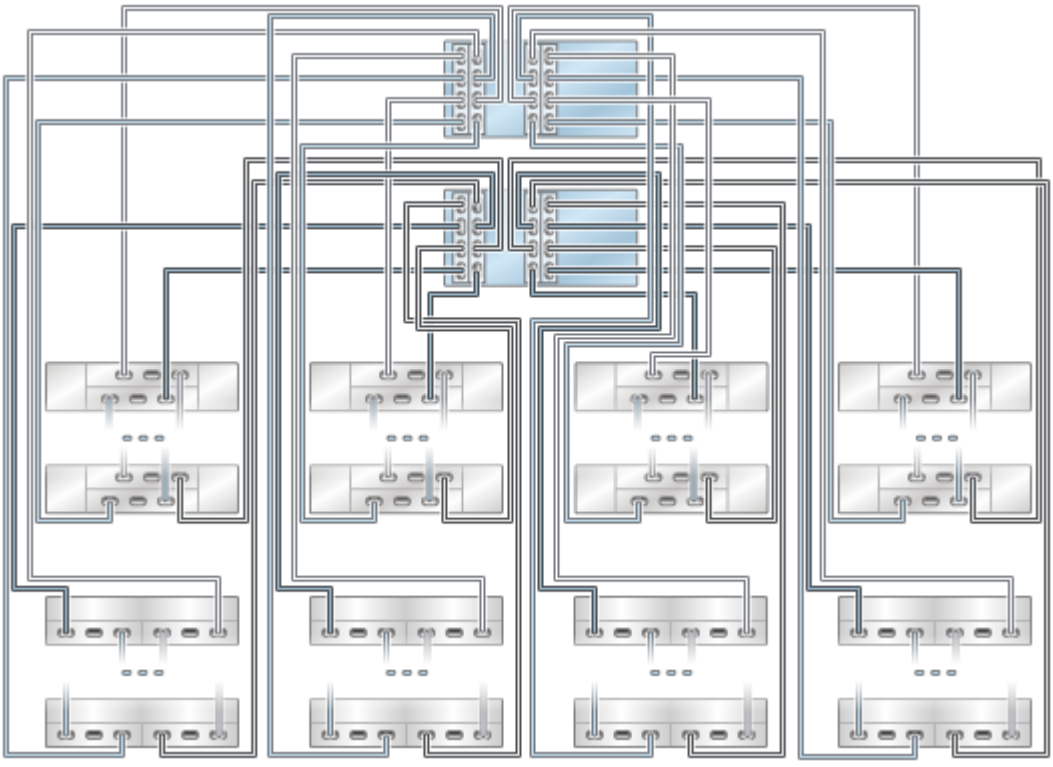
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to seven mixed disk shelves in seven chains (Oracle Storage Drive Enclosure DE2-24 shown on the top)



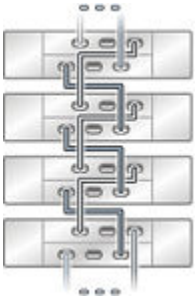
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to eight mixed disk shelves in eight chains (Oracle Storage Drive Enclosure DE2-24 shown on the top)



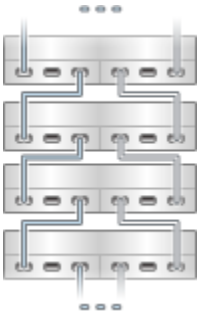
Clustered Sun ZFS Storage 7420 controllers with four HBAs connected to multiple mixed disk shelves in eight chains (Oracle Storage Drive Enclosure DE2-24 shown on the top)



Multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple Sun Disk Shelves in a single chain



Cabling Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves to Sun ZFS Storage 7320 Controllers

This section contains guidelines for properly cabling standalone and clustered Sun ZFS Storage 7320 controllers to Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves.

To connect to one or more disk shelves, use the diagrams in the following topics:

- Sun ZFS Storage 7320 Standalone to Mixed Disk Shelves
- Sun ZFS Storage 7320 Clustered to Mixed Disk Shelves

Sun ZFS Storage 7320 Standalone to Mixed Disk Shelves

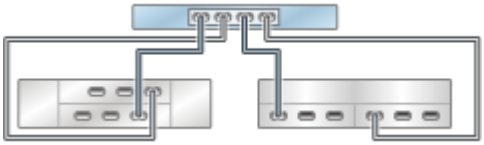
The following figures show a subset of the supported configurations for Sun ZFS Storage 7320 standalone controllers with one HBA. To cable the controller to the disk shelves, see Getting Started with Cabling.

Using mixed disk shelves on a controller requires the following:

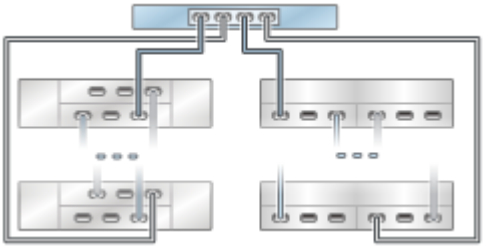
- The controller must use only 4X4 port SAS-2 HBAs
- Do not use mixed disk shelves in the same chain

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

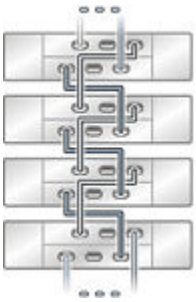
Standalone Sun ZFS Storage 7320 controller with one HBA connected to two mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



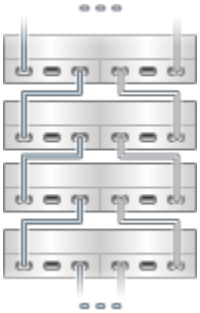
Standalone Sun ZFS Storage 7320 controller with one HBA connected to multiple mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



Multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple Sun Disk Shelves in a single chain



Sun ZFS Storage 7320 Clustered to Mixed Disk Shelves

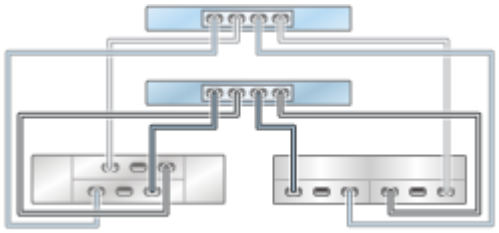
The following figures show a subset of the supported configurations for Sun ZFS Storage 7320 clustered controllers with one HBA. To cable the controller to the disk shelves, see Getting Started with Cabling.

Using mixed disk shelves on a controller, requires the following:

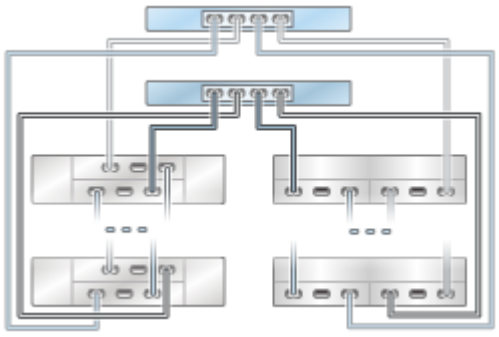
- The controller must use only 4X4 port SAS-2 HBAs
- Do not use mixed disk shelves in the same chain

> **Note:**
>
> For port locations, see the hardware overview section for the corresponding controller in *Oracle ZFS Storage Appliance Installation Guide, Release OS8.8.x*. 4X4 port SAS-2 HBAs are only supported with release AK 2013.1.0 and later.

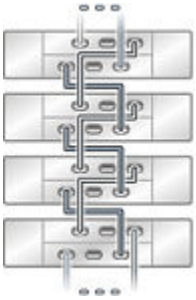
Clustered Sun ZFS Storage 7320 controllers with one HBA connected to two mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



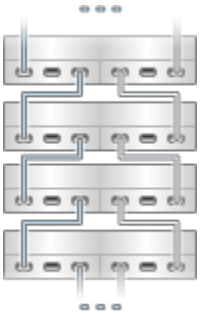
Clustered Sun ZFS Storage 7320 controllers with one HBA connected to multiple mixed disk shelves in two chains (Oracle Storage Drive Enclosure DE2-24 shown on the left)



Multiple Oracle Storage Drive Enclosure DE2-24 disk shelves in a single chain



Multiple Sun Disk Shelves in a single chain



Cabling Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves to Sun ZFS Storage 7120 Controllers

This section contains guidelines for properly cabling a standalone Sun ZFS Storage 7120 controller to Oracle Storage Drive Enclosure DE2-24 and Sun Disk Shelves. Use the diagram in this section to connect to one or more disk shelves.

Sun ZFS Storage 7120 Standalone to Mixed Disk Shelves

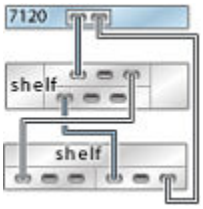
The following figure shows a subset of the supported configurations for Sun ZFS Storage 7120 standalone controllers with one HBA. To cable the controller to the disk shelves, see Getting Started with Cabling.

Using mixed disk shelves on a Sun ZFS Storage 7120 controller requires the following:

- The controller must use only 2X4 port SAS-2 HBAs
- Mixed disk shelves in the same chain must not exceed a chain depth of two

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

Standalone Sun ZFS Storage 7120 controller with one HBA connected to two mixed disk shelves in a single chain (Oracle Storage Drive Enclosure DE2-24 shown on top)


7120
shelf
shelf

9

Oracle ZFS Storage Appliance Racked System ZS9-2

This section provides overviews and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS9-2, which is a pre-racked and pre-cabled system that supports two configuration types: Oracle ZFS Storage Appliance Racked System ZS9-2 high-end (HE) model configurations, and Oracle ZFS Storage Appliance Racked System ZS9-2 mid-range (MR) model configurations.

This section contains the following topics:

- Oracle ZFS Storage Appliance Racked System ZS9-2 High-end (HE) Configurations
- Oracle ZFS Storage Appliance Racked System ZS9-2 Mid-range (MR) Configurations

Oracle ZFS Storage Appliance Racked System ZS9-2 High-end (HE) Configurations

This section provides overviews and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS9-2 HE, which is a pre-racked and pre-cabled system that supports two configuration types: capacity configurations and performance configurations.

This section contains the following topics:

- Capacity Configurations for Oracle ZFS Storage Appliance Racked System ZS9-2 HE
- All-Flash/Mixed Configurations for Oracle ZFS Storage Appliance Racked System ZS9-2 HE

Capacity Configurations for Oracle ZFS Storage Appliance Racked System ZS9-2 HE

This section provides an overview and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS9-2 HE capacity configurations.

This section contains the following topics:

- Overview of Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configurations
- Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configurations

Overview of Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configurations

Capacity configurations take advantage of high-capacity disk shelves and are available in a base cabinet, or a base cabinet with up to three expansion cabinets. Two Oracle ZFS

Storage ZS9-2 HE controllers and up to 39 Oracle Storage Drive Enclosure DE3-24C disk shelves or up to 78 Oracle Storage Drive Enclosure DE3-12C disk shelves can be supported, as shown in the following table. When both of these disk shelves are used in any configuration, the total number of disk shelves cannot exceed the available rack space.

> **Note:**
>
> Oracle ZFS Storage Appliance Racked System ZS9-2, which has preset configurations, can be upgraded in the field to any supported configuration for Oracle ZFS Storage ZS9-2. For example, you can upgrade the racked system by adding one disk shelf to a two-disk-shelf configuration, adding cabling for the new disk shelf, and then recabling the disk shelves. Thus, three disk shelves are supported, even though the racked system is not offered in a three-disk-shelf configuration. Complex upgrades require extensive planning and recabling.

Table 9-1 Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configurations Components

Base Cabinet	Expansion Cabinet 1	Expansion Cabinet 2	Expansion Cabinet 3
Disk Shelves - 2 SAS Chains: • Oracle Storage Drive Enclosure DE3-24C: – Up to 9 disk shelves – Factory configurations: 1, 2, 4, 6, 8, or 9 disk shelves • Oracle Storage Drive Enclosure DE3-12C: – Up to 18 disk shelves – Factory configurations: 2, 4, 8, 12, 16, or 18 disk shelves **Controllers:** • Two Oracle ZFS Storage ZS9-2 HE controllers	**Disk Shelves:** • Oracle Storage Drive Enclosure DE3-24C: – Up to 10 disk shelves – Factory configurations: 2, 4, 5, 6, 8, or 10 disk shelves • Oracle Storage Drive Enclosure DE3-12C: – Up to 20 disk shelves – Factory configurations: 4, 8, 10, 12, 16, or 20 disk shelves	**Disk Shelves:** • Oracle Storage Drive Enclosure DE3-24C: – Up to 10 disk shelves • Oracle Storage Drive Enclosure DE3-12C: – Up to 20 disk shelves	**Disk Shelves:** • Oracle Storage Drive Enclosure DE3-24C: – Up to 10 disk shelves • Oracle Storage Drive Enclosure DE3-12C: – Up to 20 disk shelves

Table 9-1 (Cont.) Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configurations Components

Base Cabinet	Expansion Cabinet 1	Expansion Cabinet 2	Expansion Cabinet 3
Disk Shelves - 4 SAS Chains: • Oracle Storage Drive Enclosure DE3-24C: – Up to 9 disk shelves – Factory configurations: 1, 2, 4, 6, 8, or 9 disk shelves • Oracle Storage Drive Enclosure DE3-12C: – Up to 18 disk shelves – Factory configurations: 2, 4, 8, 12, 16, or 18 disk shelves **Controllers:** • Two Oracle ZFS Storage ZS9-2 HE controllers	**Disk Shelves:** • Oracle Storage Drive Enclosure DE3-24C: – Up to 10 disk shelves. • Oracle Storage Drive Enclosure DE3-12C: – Up to 20 disk shelves.	**Disk Shelves:** • Oracle Storage Drive Enclosure DE3-24C: – Up to 10 disk shelves • Oracle Storage Drive Enclosure DE3-12C: – Up to 20 disk shelves	Not supported
Disk Shelves - 8 SAS Chains: • Oracle Storage Drive Enclosure DE3-24C: – Up to 9 disk shelves – Factory configurations: 1, 2, 4, 6, 8, or 9 disk shelves • Oracle Storage Drive Enclosure DE3-12C: – Up to 18 disk shelves – Factory configurations: 2, 4, 8, 12, 16, or 18 disk shelves **Controllers:** • Two Oracle ZFS Storage ZS9-2 HE controllers	Not supported	Not supported	Not supported

The Oracle ZFS Storage Appliance Racked System ZS9-2 HE capacity base cabinet comprises 1, 2, 4, 6, 8, or 9 Oracle Storage Drive Enclosure DE3-24C disk shelves; or 2, 4, 8, 12, 16, or 18 Oracle Storage Drive Enclosure DE3-12C disk shelves.

Each expansion cabinet comprises 2, 4, 5 (half rack), 6, 8, or 10 Oracle Storage Drive Enclosure DE3-24C disk shelves; or 4, 8, 10, 12, 16, or 20 Oracle Storage Drive Enclosure DE3-12C disk shelves.

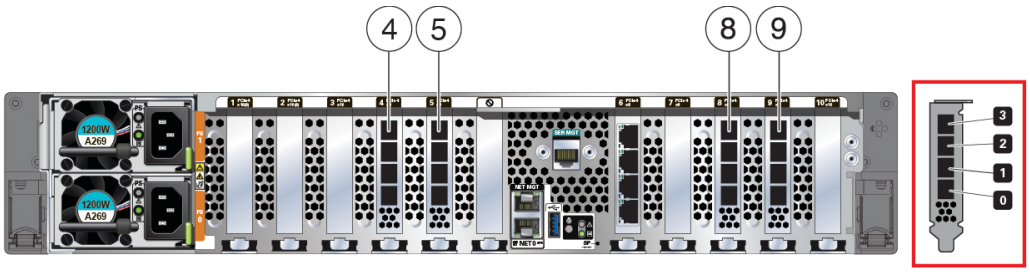
A maximum of 39 Oracle Storage Drive Enclosure DE3-24C disk shelves or 78 Oracle Storage Drive Enclosure DE3-12C disk shelves can be accommodated with one base cabinet and three expansion cabinets.

Each Oracle ZFS Storage ZS9-2 HE controller has four SAS HBA cards. Clustered Oracle ZFS Storage ZS9-2 HE controllers support a high-availability configuration consisting of:

- Up to 9 Oracle Storage Drive Enclosure DE3-24C disk shelves or up to 18 Oracle Storage Drive Enclosure DE3-12C disk shelves in the base cabinet configured in two, four, or eight chains, and
- Up to three expansion cabinets, each cabinet supporting:
  - **Oracle Storage Drive Enclosure DE3-24C Disk Shelves:** Two chains with a maximum of 5 disk shelves per chain, for a total of 10 disk shelves for one expansion cabinet, 20 disk shelves for two expansion cabinets, or 30 disk shelves for three expansion cabinets.
  - **Oracle Storage Drive Enclosure DE3-12C Disk Shelves:** Two chains with a maximum of 10 disk shelves per chain, for a total of 20 disk shelves for one expansion cabinet, 40 disk shelves for two expansion cabinets, or 60 disk shelves for three expansion cabinets.

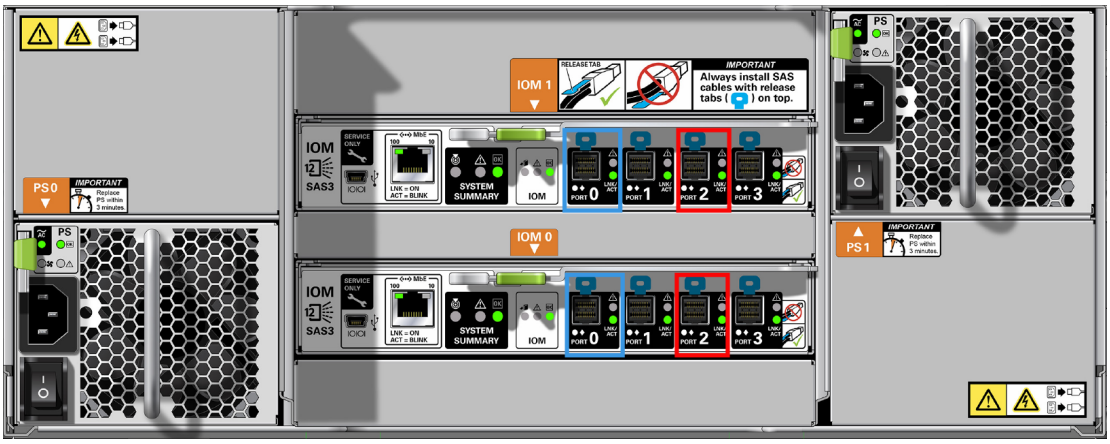
The cabinets are self-contained and pre-cabled following the required cabling methodology. Pre-racked system cabling tables and diagrams, which can also be used for planning future system expansion, are provided in the section Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configurations.

Each cabinet contains 42 rack units (RUs), with RU01 on the bottom. Each Oracle ZFS Storage ZS9-2 HE controller occupies two rack units, and its location is referenced by the bottommost rack unit number. The top controller is referred to as Controller 1 and is located in RU20 in the base cabinet, and the bottom controller is Controller 0 in RU17. The following figure shows the slot number for each HBA card, as well as the port numbers in each card.



Each Oracle Storage Drive Enclosure DE3-24C disk shelf occupies four rack units, and disk shelves are normally installed from the bottom of the base cabinet to the top for stability. Because the Oracle ZFS Storage ZS9-2 HE controller occupies two rack units, the base cabinet contains a filler panel above each controller so that the cabinet layout is similar to prior offerings of Oracle racked systems with three-rack-unit controllers. It also allows for better serviceability access and cabling through the rear cable management arm (CMA). As shown in the following figure, the Oracle Storage

Drive Enclosure DE3-24C disk shelf has two I/O Modules (IOMs) with four ports each. In all cabling configurations, Port 1 and Port 3 are never used.



Each Oracle Storage Drive Enclosure DE3-12C disk shelf occupies two rack units, and disk shelves are normally installed from the bottom of the base cabinet to the top for stability. As shown in the following figure, the Oracle Storage Drive Enclosure DE3-12C disk shelf has two I/O Modules (IOMs) with three ports each. In all cabling configurations, Port B, the middle port, is never used.

Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configurations

The following table describes the locations and port connections for two controllers and nine disk shelves in the base cabinet, using 3-meter optical SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs.

The following tables are for configurations of two chains in the base cabinet and two chains per expansion cabinet, therefore allowing a maximum of 39 disk shelves.

> **Note:**
>
> Two Oracle Storage Drive Enclosure DE3-12C disk shelves are the equivalent of one Oracle Storage Drive Enclosure DE3-24C disk shelf. Configuration information for both of these disk shelves is located in Overview of Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configurations. Also, Oracle Storage Drive Enclosure DE3-12C cabling guidelines are provided in Cabling Guidelines for Adding an Oracle Storage Drive Enclosure DE3-12C. Example Oracle Storage Drive Enclosure DE3-12C cabling diagrams are located in Example Mixed Disk Shelf Configurations.

Table 9-2 Base Cabinet: Controller and Disk Shelf Locations and Connections (Two Chains)

FROM	TO			
RU	**CONTROLLER**	**HBA PORT**	**RU**	**DISK SHELF PORT**
20	1	Slot 4, Port 0	1	IOM 1, Port 2
17	0	Slot 5, Port 0	1	IOM 0, Port 2
20	1	Slot 8, Port 0	23	IOM 1, Port 2
17	0	Slot 9, Port 0	23	IOM 0, Port 2
17	0	Slot 4, Port 0	1, 5, 13	IOM 1, Port 0
20	1	Slot 5, Port 0	1, 5, 13	IOM 0, Port 0
17	0	Slot 8, Port 0	27, 35, 39	IOM 1, Port 0
20	1	Slot 9, Port 0	27, 35, 39	IOM 0, Port 0

The following table describes the locations and port connections for 10 disk shelves in Expansion Cabinet 1, using 6-meter optical SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs. Expansion Cabinet 1 supports disk shelves 10 through 19.

Table 9-3 Expansion Cabinet 1: Controller and Disk Shelf Locations and Connections (Two Chains)

FROM	TO			
RU	**CONTROLLER**	**HBA PORT**	**RU**	**DISK SHELF PORT**
20	1	Slot 4, Port 1	1	IOM 1, Port 2
17	0	Slot 5, Port 1	1	IOM 0, Port 2
20	1	Slot 8, Port 1	21	IOM 1, Port 2
17	0	Slot 9, Port 1	21	IOM 0, Port 2
17	0	Slot 4, Port 1	5, 9, 13, 17	IOM 1, Port 0
20	1	Slot 5, Port 1	5, 9, 13, 17	IOM 0, Port 0
17	0	Slot 8, Port 1	25, 33, 37	IOM 1, Port 0
20	1	Slot 9, Port 1	25, 33, 37	IOM 0, Port 0

The following table describes the locations and port connections for 10 disk shelves in Expansion Cabinet 2, using 6-meter optical SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs. Expansion Cabinet 2 supports disk shelves 20 through 29.

Table 9-4 Expansion Cabinet 2: Controller and Disk Shelf Locations and Connections (Two Chains)

FROM	TO			
RU	**CONTROLLER**	**HBA PORT**	**RU**	**DISK SHELF PORT**
20	1	Slot 4, Port 2	1	IOM 1, Port 2
17	0	Slot 5, Port 2	1	IOM 0, Port 2
20	1	Slot 8, Port 2	21	IOM 1, Port 2
17	0	Slot 9, Port 2	21	IOM 0, Port 2
17	0	Slot 4, Port 2	5, 9, 13, 17	IOM 1, Port 0
20	1	Slot 5, Port 2	5, 9, 13, 17	IOM 0, Port 0
17	0	Slot 8, Port 2	25, 33, 37	IOM 1, Port 0
20	1	Slot 9, Port 2	25, 33, 37	IOM 0, Port 0

The following table describes the locations and port connections for 10 disk shelves in Expansion Cabinet 3, using 6-meter optical SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs. Expansion Cabinet 2 supports disk shelves 30 through 39.

Table 9-5 Expansion Cabinet 3: Controller and Disk Shelf Locations and Connections (Two Chains)

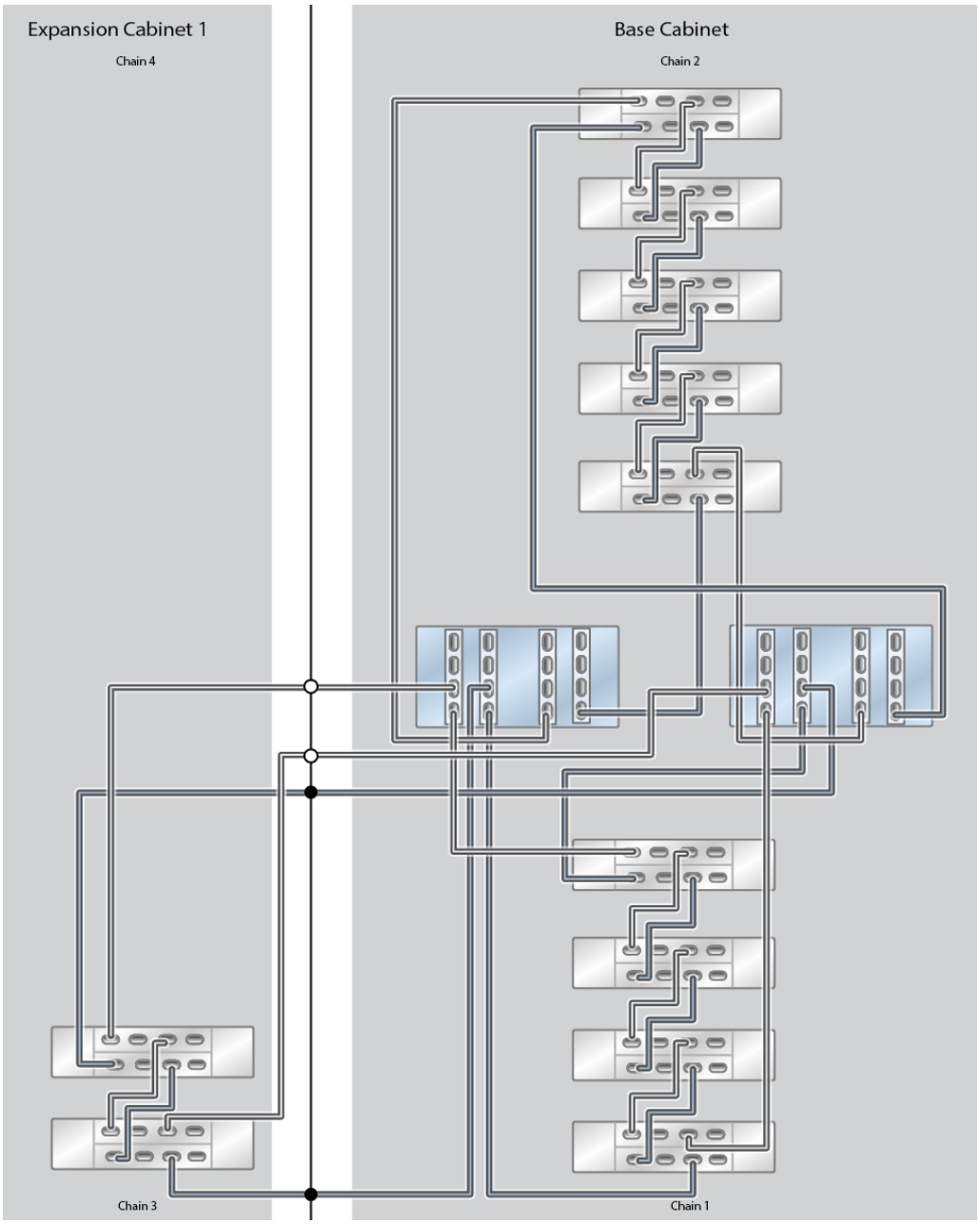
FROM	TO			
RU	**CONTROLLER**	**HBA PORT**	**RU**	**DISK SHELF PORT**
20	1	Slot 4, Port 3	1	IOM 1, Port 2
17	0	Slot 5, Port 3	1	IOM 0, Port 2
20	1	Slot 8, Port 3	21	IOM 1, Port 2
17	0	Slot 9, Port 3	21	IOM 0, Port 2
17	0	Slot 4, Port 3	5, 9, 13, 17	IOM 1, Port 0
20	1	Slot 5, Port 3	5, 9, 13, 17	IOM 0, Port 0
17	0	Slot 8, Port 3	25, 33, 37	IOM 1, Port 0
20	1	Slot 9, Port 3	25, 33, 37	IOM 0, Port 0

The following diagrams illustrate how pre-racked systems are cabled, as well as how to expand your system in the future. The legend for each diagram is as follows:

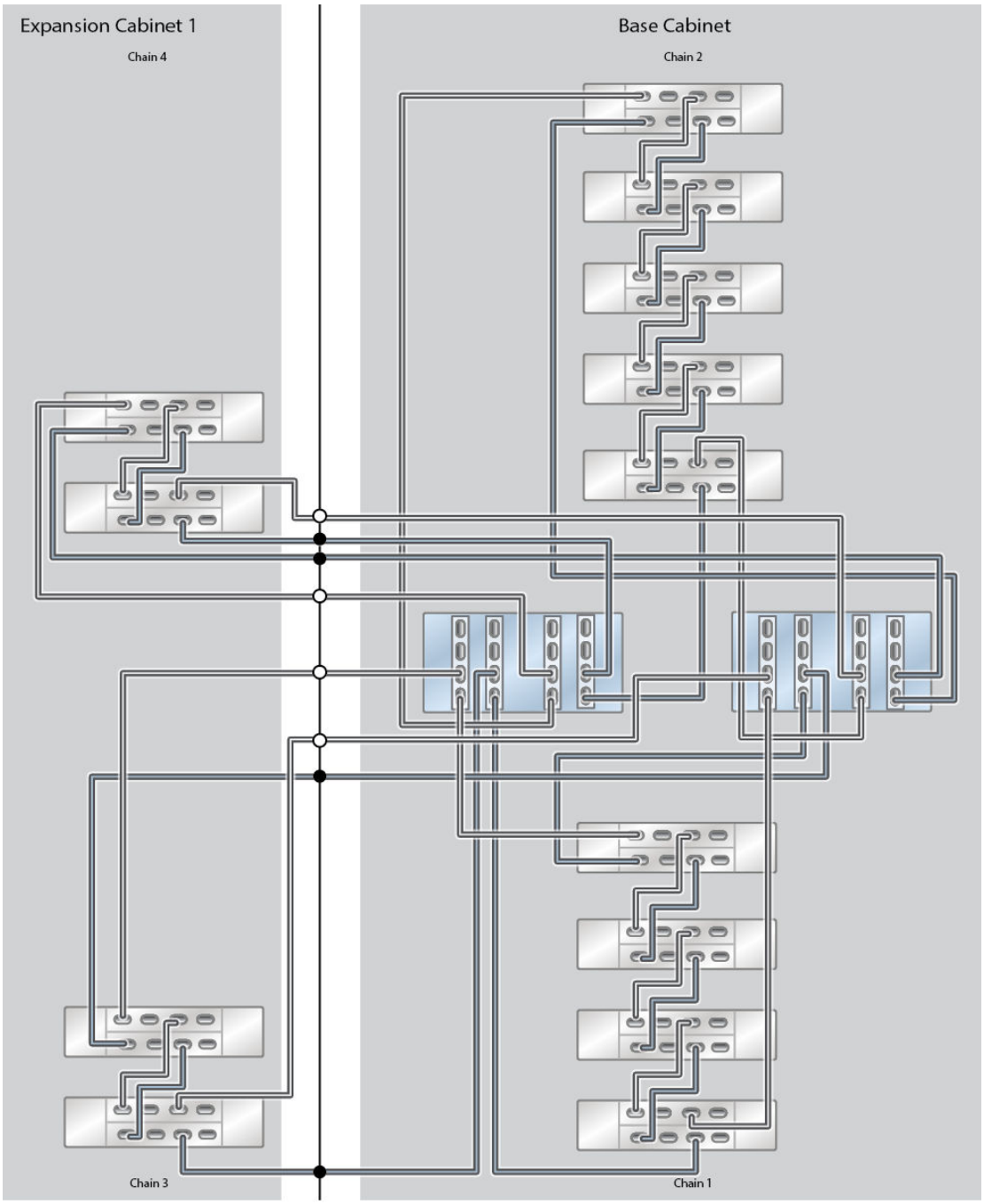
- A hollow circle indicates the cable connection to the top IOM (IOM 1).
- A solid circle indicates the cable connection to the bottom IOM (IOM 0).

Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configuration:

11 Oracle Storage Drive Enclosure DE3-24C Disk Shelves

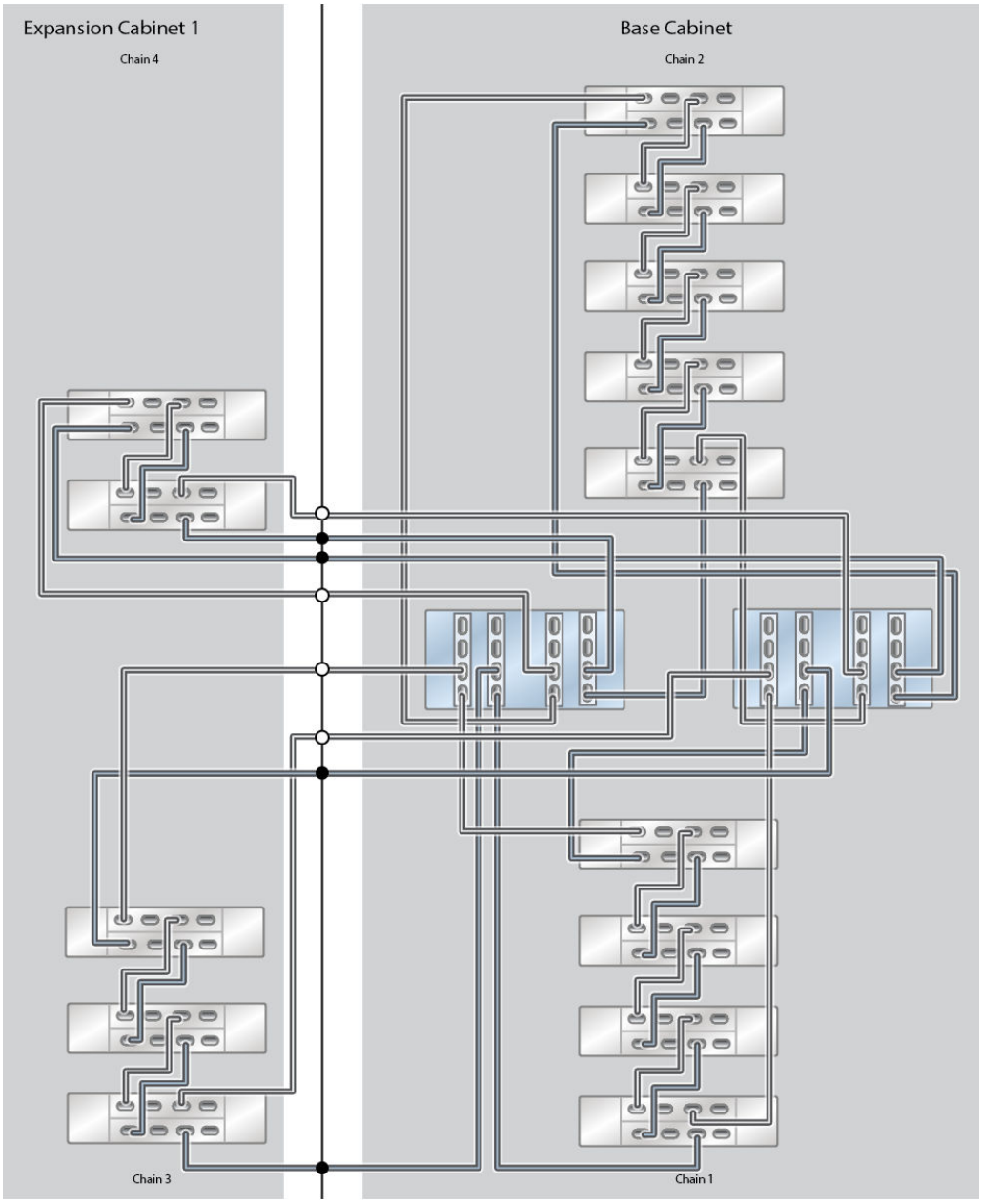


Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configuration: 13 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



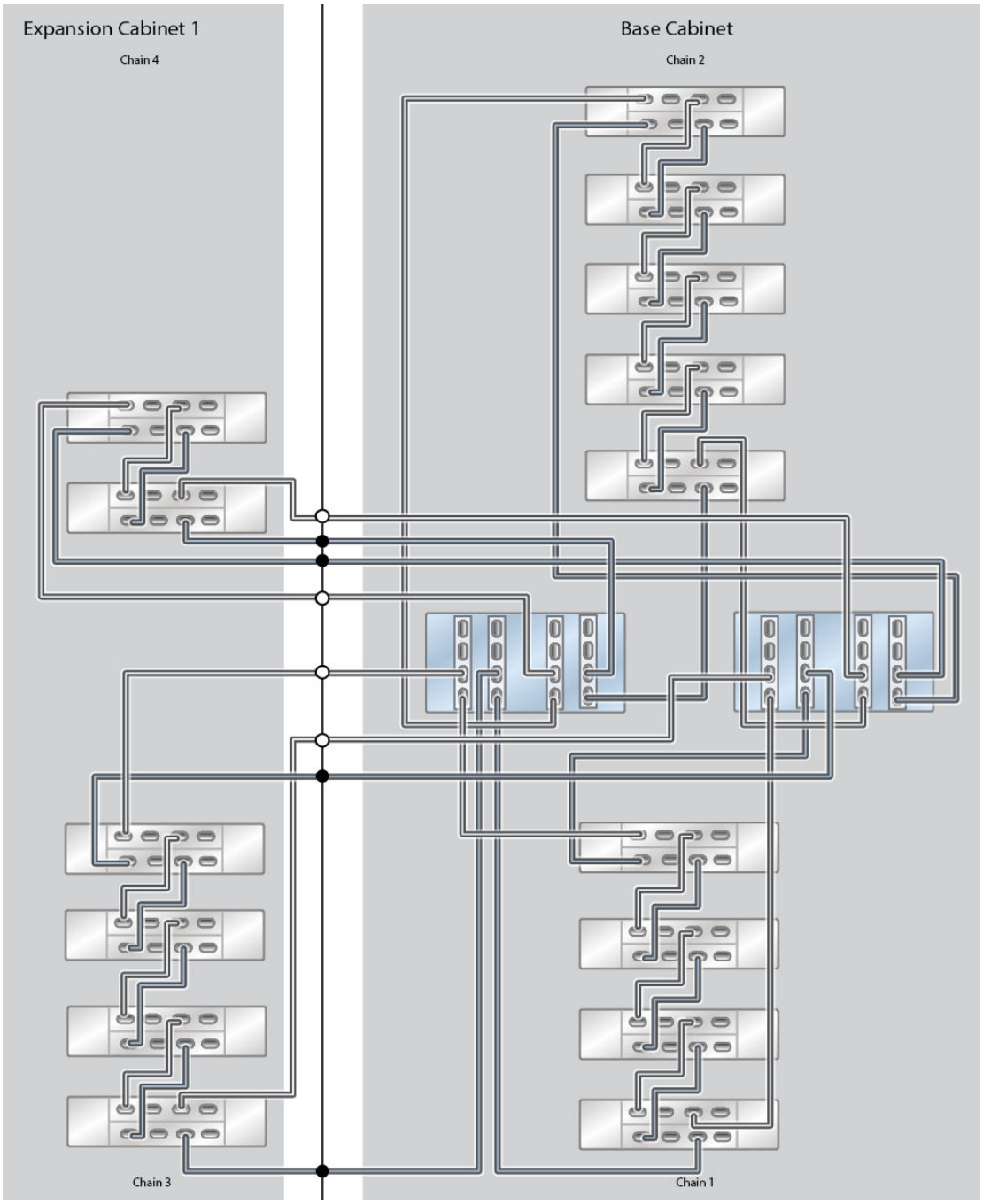
Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configuration:

14 Oracle Storage Drive Enclosure DE3-24C Disk Shelves (Expansion Cabinet 1 Half Rack)



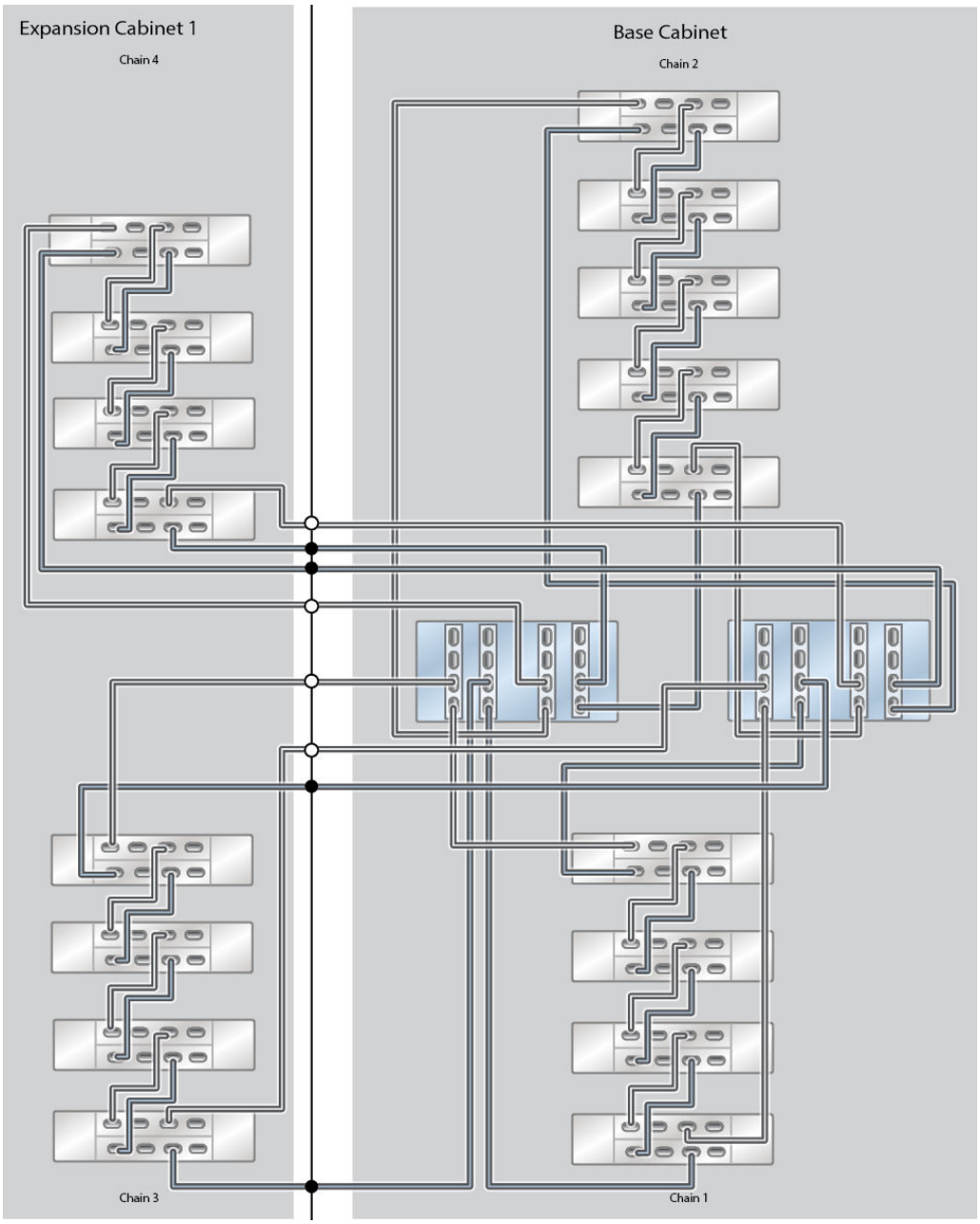
Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configuration:

15 Oracle Storage Drive Enclosure DE3-24C Disk Shelves

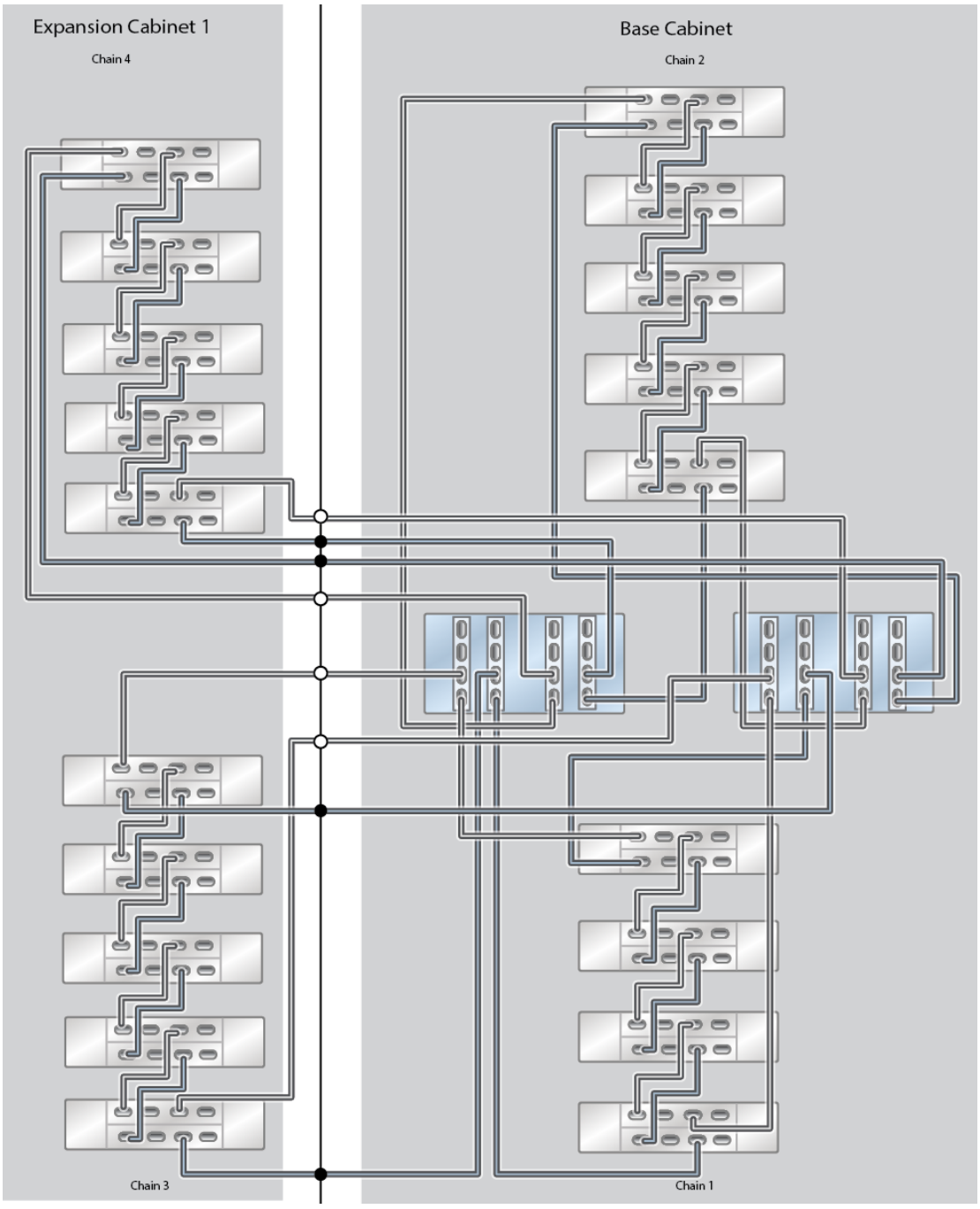


Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configuration:

17 Oracle Storage Drive Enclosure DE3-24C Disk Shelves

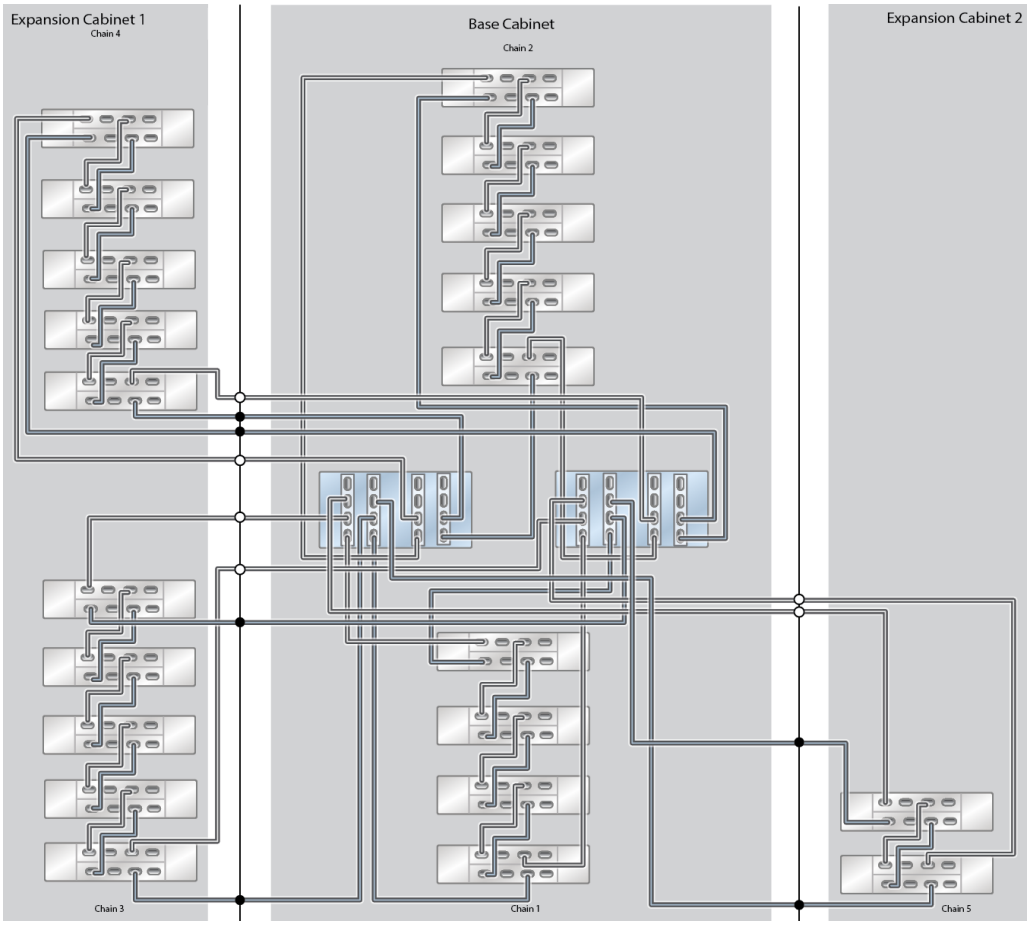


Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configuration: 19 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



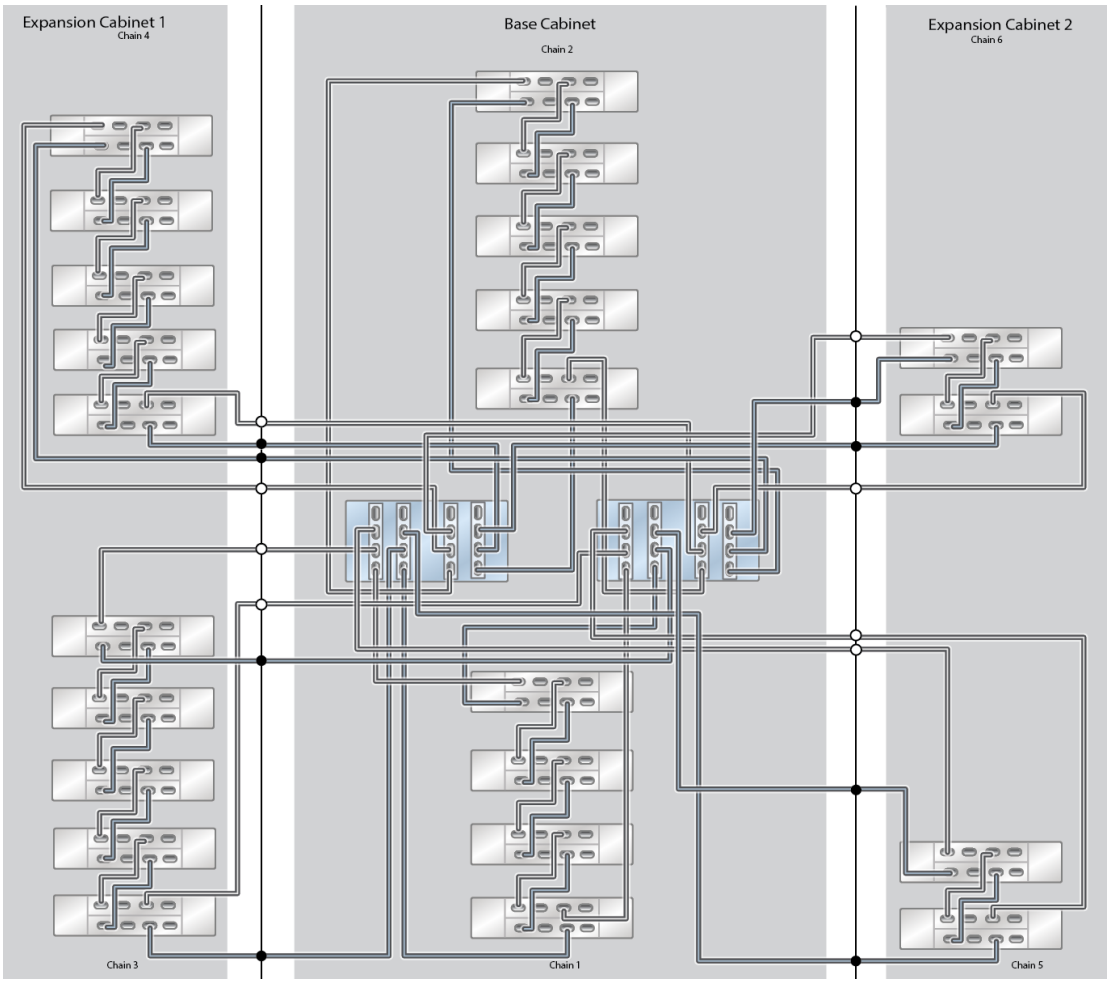
Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configuration:

21 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



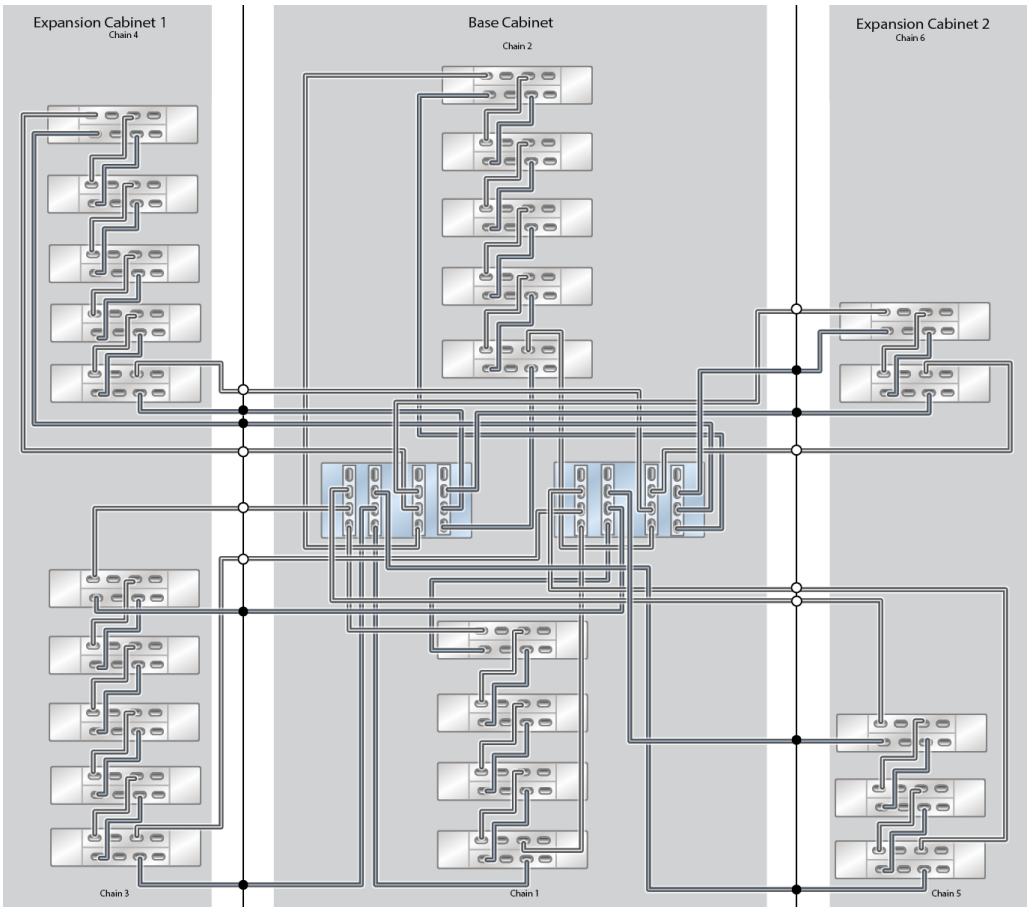
Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configuration:

23 Oracle Storage Drive Enclosure DE3-24C Disk Shelves

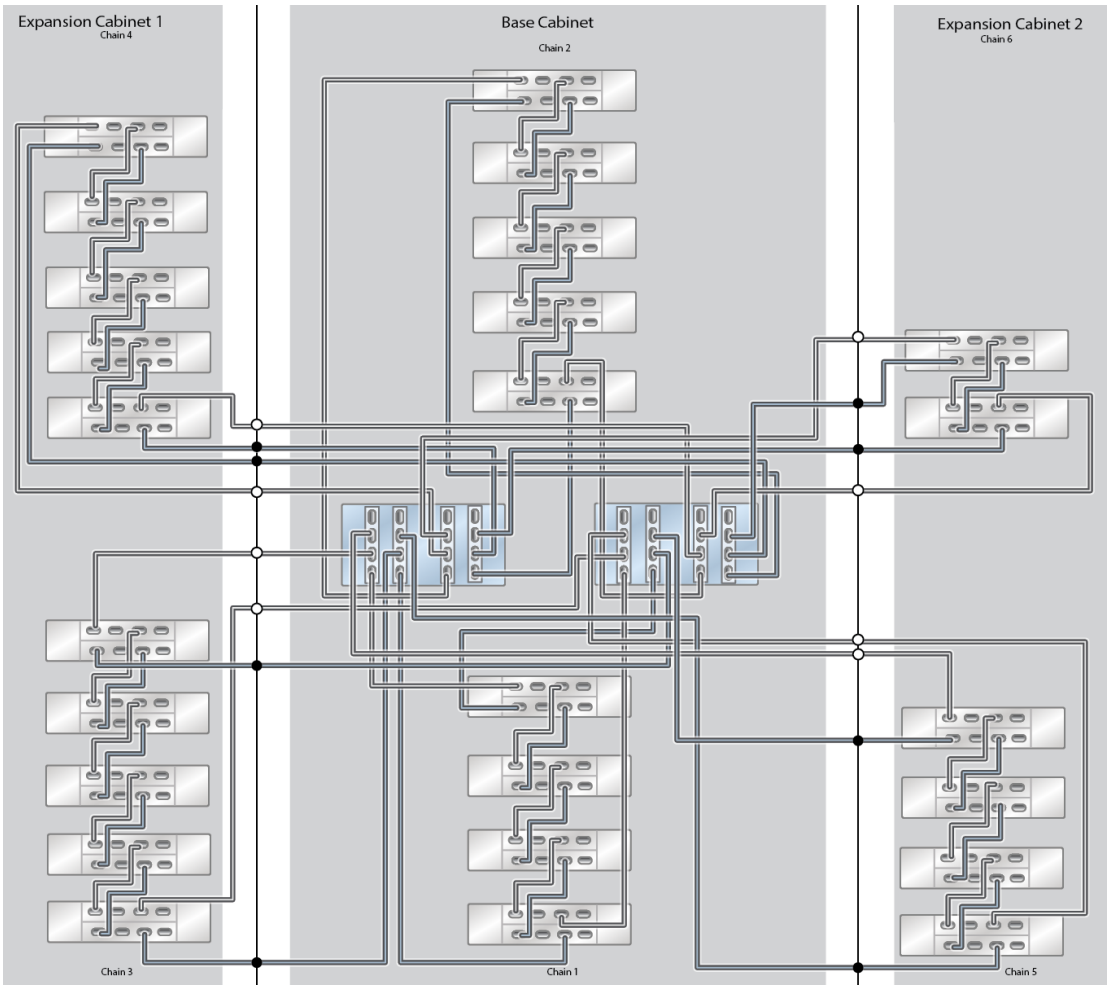


Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configuration:

24 Oracle Storage Drive Enclosure DE3-24C Disk Shelves (Expansion Cabinet 2 Half Rack)

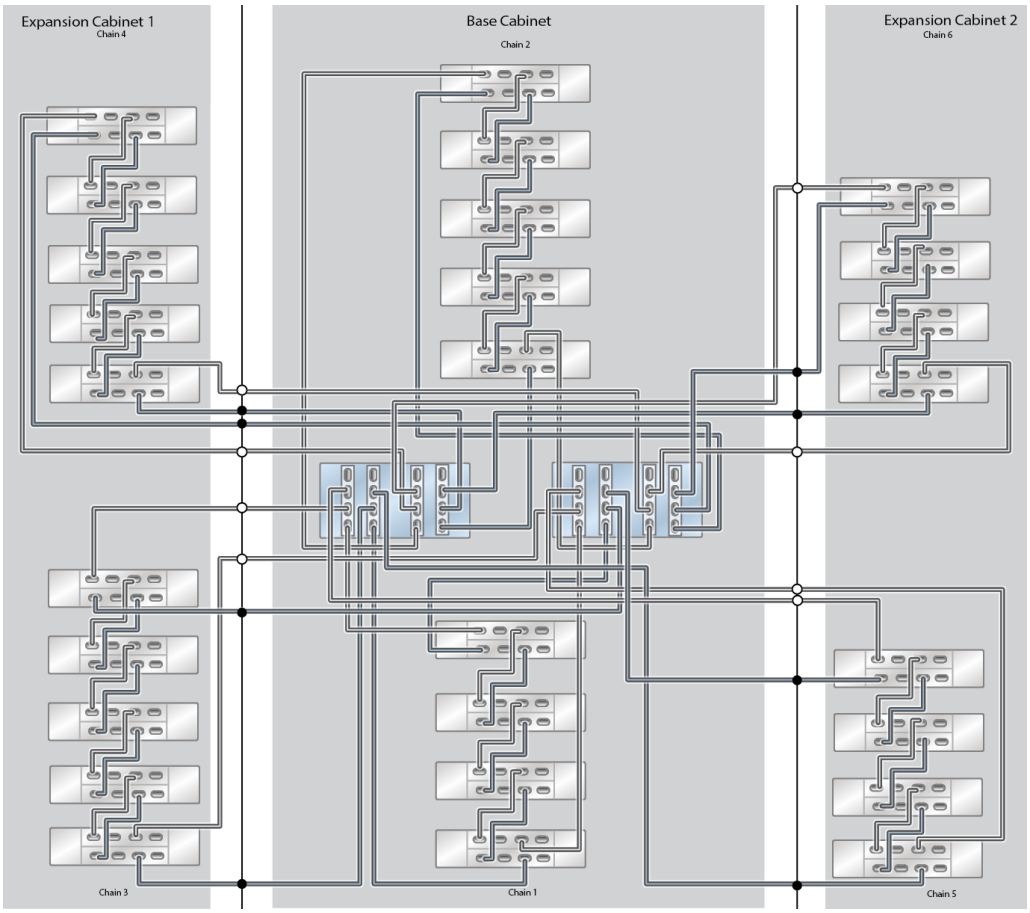


Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configuration: 25 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



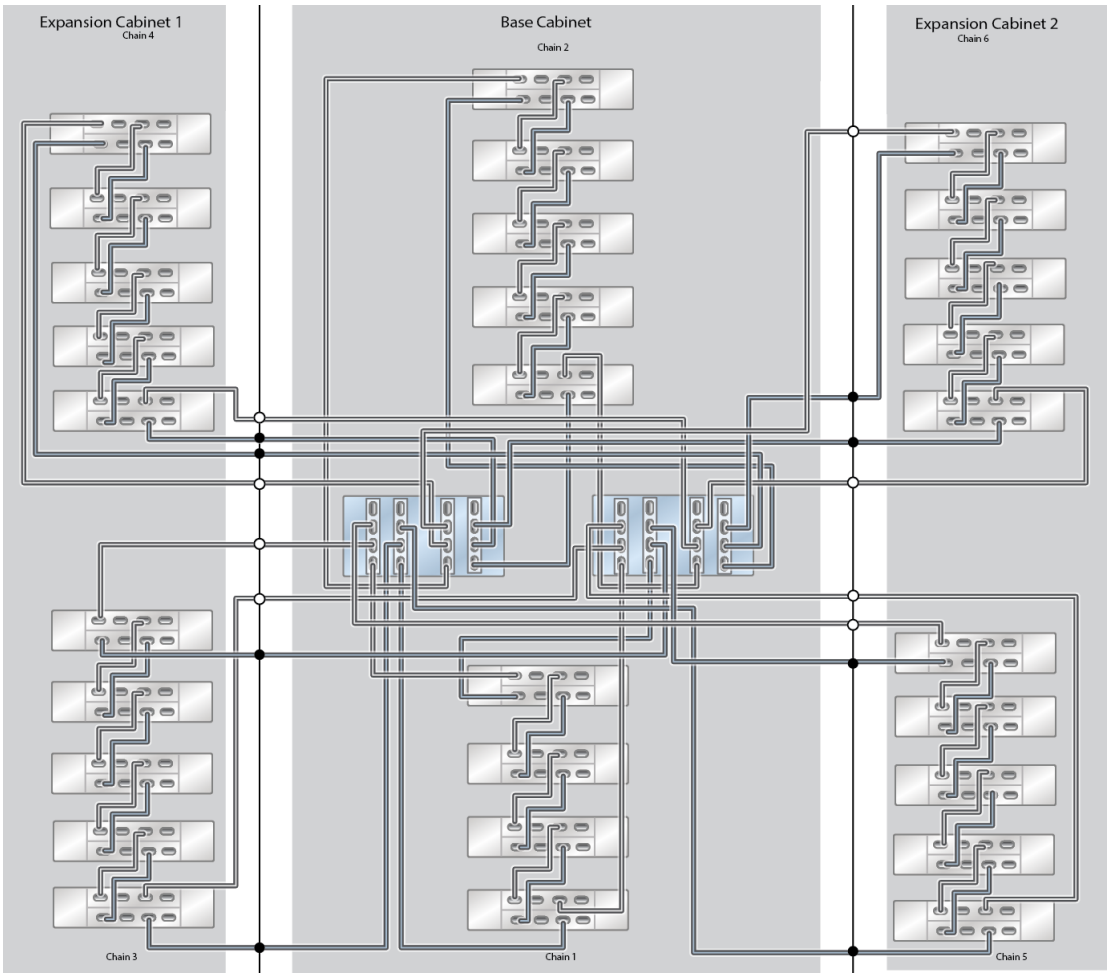
Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configuration:

27 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



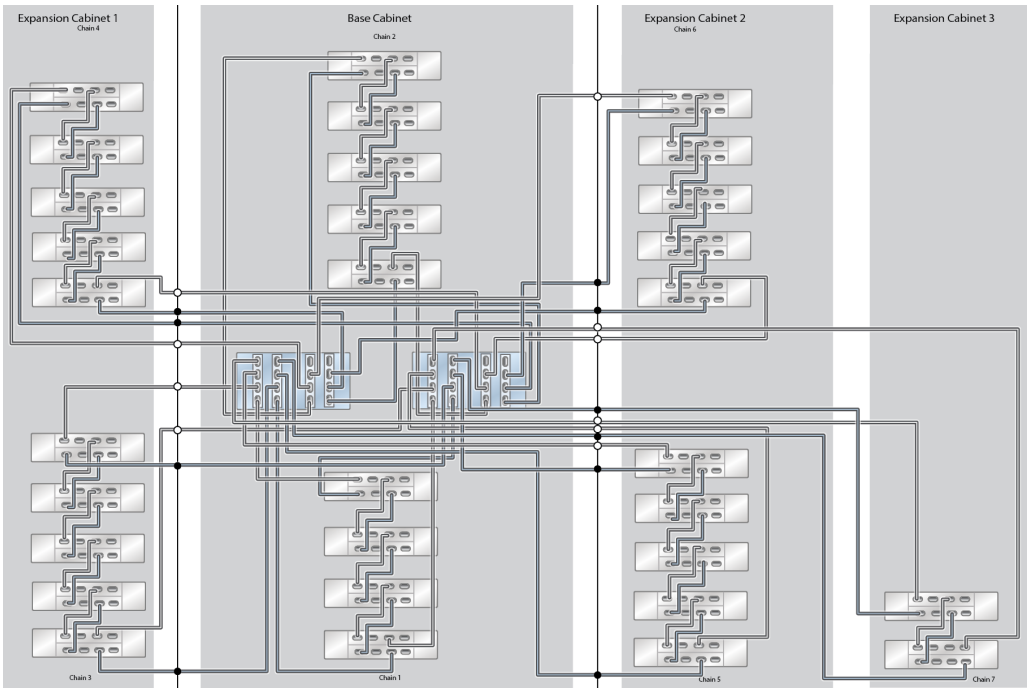
Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configuration:

29 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



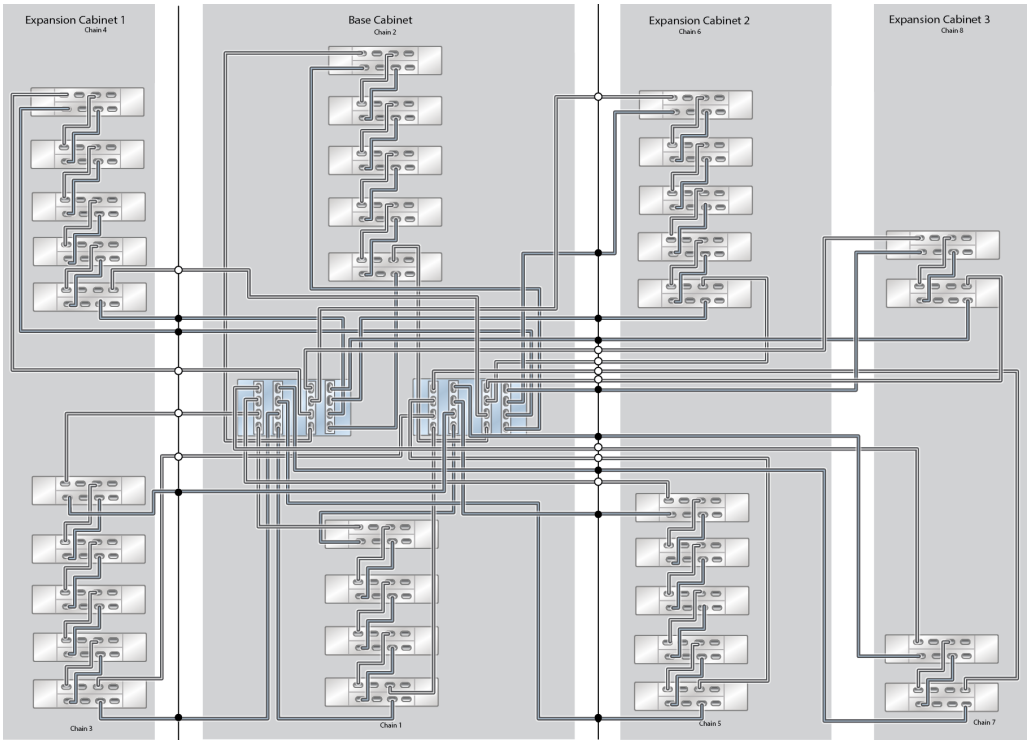
Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configuration:

31 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



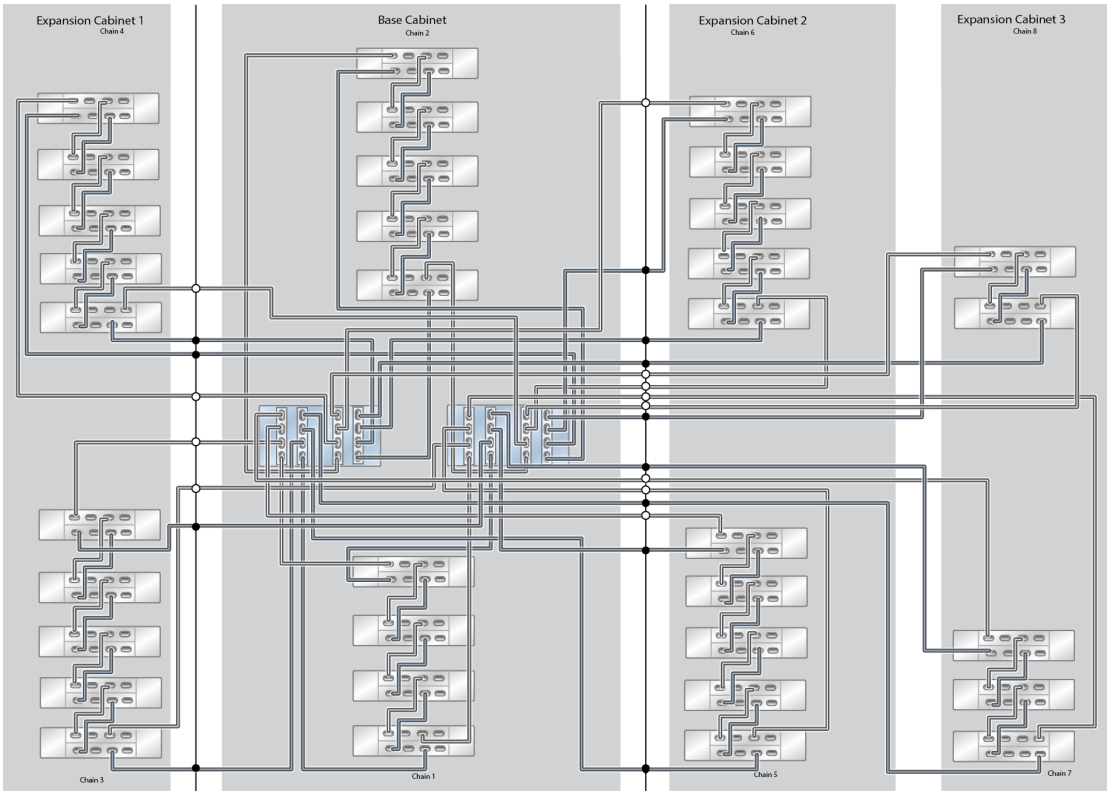
Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configuration:

33 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



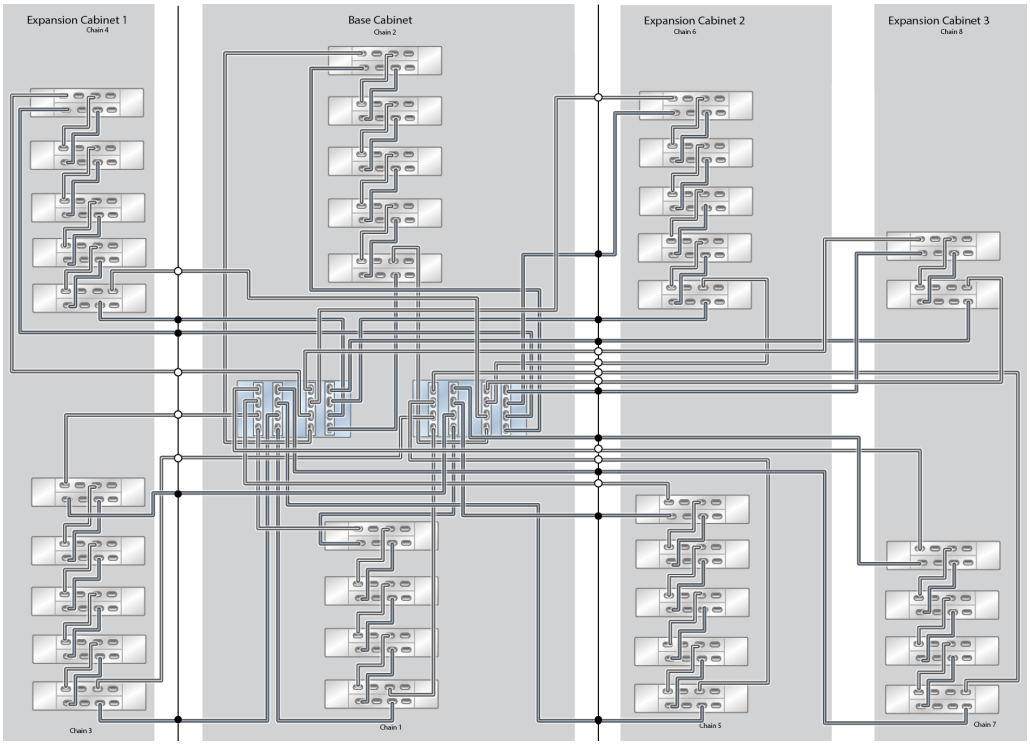
Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configuration:

34 Oracle Storage Drive Enclosure DE3-24C Disk Shelves (Expansion Cabinet 3 Half Rack)



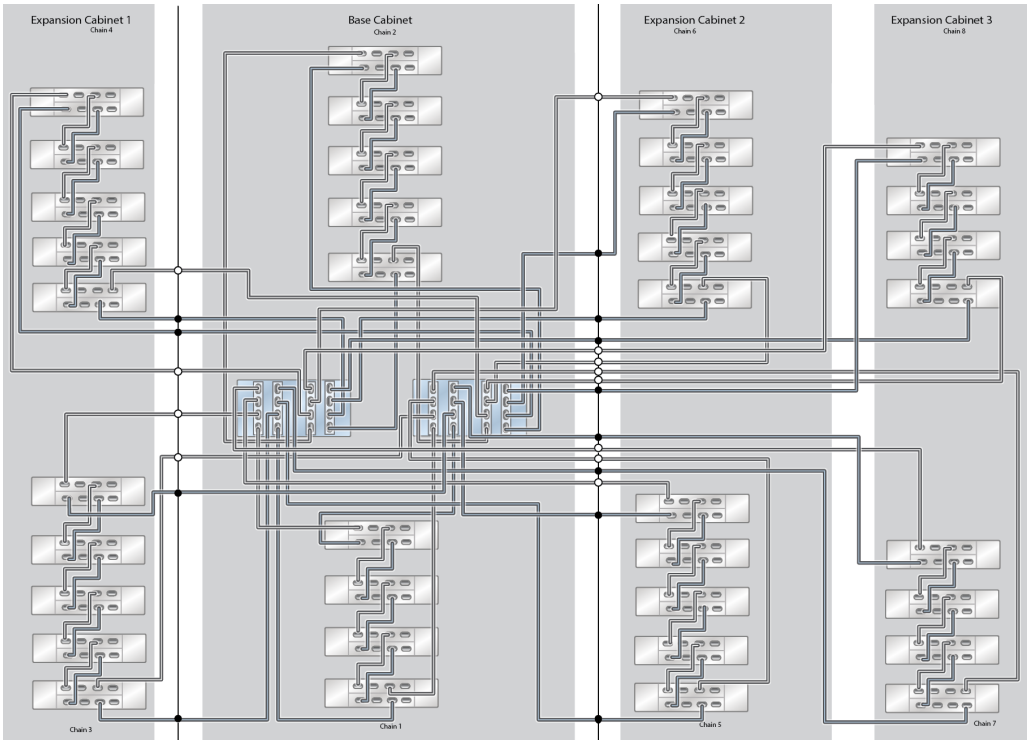
Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configuration:

35 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



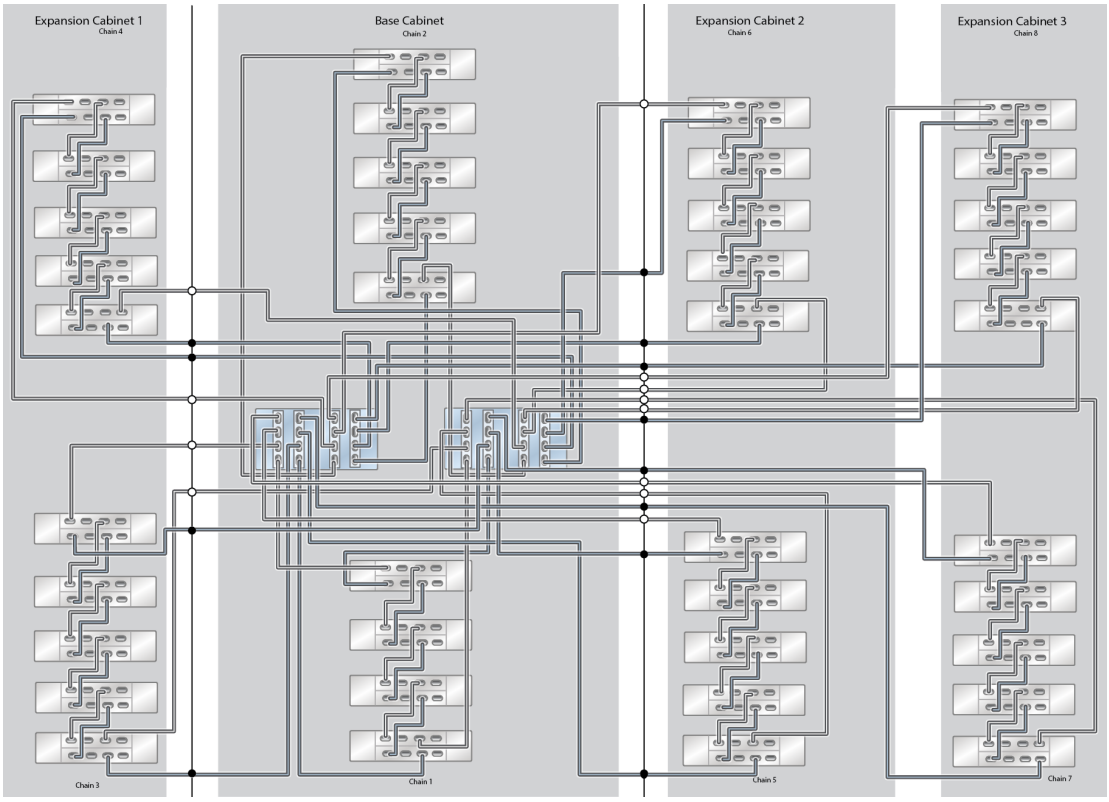
Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configuration:

37 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



Oracle ZFS Storage Appliance Racked System ZS9-2 HE Capacity Configuration:

39 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



All-Flash/Mixed Configurations for Oracle ZFS Storage Appliance Racked System ZS9-2 HE

This section provides an overview and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS9-2 HE consisting of all-flash/mixed configurations with either all Oracle Storage Drive Enclosure DE3-24P disk shelves or a mix of Oracle Storage Drive Enclosure DE3-24P and one or both of these disk shelf types:

- Oracle Storage Drive Enclosure DE3-24C
- Oracle Storage Drive Enclosure DE3-12C

High-performance Oracle Storage Drive Enclosure DE3-24P disk shelves comprise either 20 or 24 all-flash SSDs, or 20 or 24 high-speed hard disk drives. Some configurations include read cache and/or log devices.

Maximum performance configurations support Oracle Storage Drive Enclosure DE3-24P disk shelves, while optimum performance configurations support both Oracle Storage Drive Enclosure DE3-24P and DE3-24C and/or DE3-12C disk shelves. Some configurations do not support expansion cabinets.

This section contains the following topics:

- Overview of Oracle ZFS Storage Appliance Racked System ZS9-2 HE with All-Flash/Mixed Configurations
- Base Cabinet Configurations for Oracle ZFS Storage Appliance Racked System ZS9-2 HE with All-Flash/Mixed Configurations

- Expansion Cabinet Configurations for Oracle ZFS Storage Appliance Racked System ZS9-2 HE Performance Configurations

Overview of Oracle ZFS Storage Appliance Racked System ZS9-2 HE with All-Flash/Mixed Configurations

All-Flash/Mixed configurations take advantage of Oracle Storage Drive Enclosure DE3-24P high-performance disk shelves and are available in a base cabinet, or a base cabinet with up to three expansion cabinets for some configurations. Six base cabinet options are offered in a total of 35 possible system configurations, and all base cabinet options contain two Oracle ZFS Storage ZS9-2 HE controllers.

Expansion cabinets can contain one or both of these disk shelf types:

- Oracle Storage Drive Enclosure DE3-24C
- Oracle Storage Drive Enclosure DE3-12C

The total number of disk shelves cannot exceed the available rack space.

> **Note:**
>
> Oracle ZFS Storage Appliance Racked System ZS9-2, which has preset configurations, can be upgraded in the field to any supported configuration for Oracle ZFS Storage ZS9-2. For example, you can upgrade the racked system by adding one disk shelf to a two-disk-shelf configuration, adding cabling for the new disk shelf, and then recabling the disk shelves. Thus, three disk shelves are supported, even though the racked system is not offered in a three-disk-shelf configuration. Complex upgrades require extensive planning and recabling.

Oracle ZFS Storage Appliance Racked System ZS9-2 HE maximum performance configurations feature up to eight Oracle Storage Drive Enclosure DE3-24P disk shelves in the base cabinet. The disk shelves are configured as one single shelf per chain to obtain maximum performance. Depending on the number of chains in the base cabinet, Oracle ZFS Storage Appliance Racked System ZS9-2 HE maximum performance configurations can have up to three expansion cabinets.

Table 9-6 Oracle ZFS Storage Appliance Racked System ZS9-2 HE Maximum Performance Configurations Components

Base Cabinet	Expansion Cabinet 1	Expansion Cabinet 2	Expansion Cabinet 3
Disk Shelves: • Up to 8 Oracle Storage Drive Enclosure DE3-24P disk shelves • Factory configurations: 1, 2, 4, 6, or 8 Oracle Storage Drive Enclosure DE3-24P disk shelves **Controllers:** • Two Oracle ZFS Storage ZS9-2 HE controllers	**Disk Shelves:** • Oracle Storage Drive Enclosure DE3-24C: – Up to 10 disk shelves • Oracle Storage Drive Enclosure DE3-12C: – Up to 20 disk shelves	**Disk Shelves:** • Oracle Storage Drive Enclosure DE3-24C: – Up to 10 disk shelves • Oracle Storage Drive Enclosure DE3-12C: – Up to 20 disk shelves	**Disk Shelves:** • Oracle Storage Drive Enclosure DE3-24C: – Up to 10 disk shelves • Oracle Storage Drive Enclosure DE3-12C: – Up to 20 disk shelves

Oracle ZFS Storage Appliance Racked System ZS9-2 HE optimum performance configurations feature up to 18 Oracle Storage Drive Enclosure DE3-24P disk shelves (configured as two shelves per chain plus an additional two shelves on the last chain), as well as various combinations of Oracle Storage Drive Enclosure DE3-24C and/or DE3-12C and DE3-24P disk shelves in the base cabinet.

In the expansion cabinets, only up to 10 each Oracle Storage Drive Enclosure DE3-24C disk shelves, or up to 20 each Oracle Storage Drive Enclosure DE3-12C disk shelves are offered. For Oracle Storage Drive Enclosure DE3-24C, configurations are offered in multiples of two disk shelves, as well as half-rack expansion. For Oracle Storage Drive Enclosure DE3-12C, configurations are multiples of four disk shelves, as well as half-rack expansion.

Each expansion cabinet comprises 2, 4, 5 (half rack), 6, 8, or 10 Oracle Storage Drive Enclosure DE3-24C disk shelves; or 4, 8, 10, 12, 16, or 20 Oracle Storage Drive Enclosure DE3-12C disk shelves. Depending on the number of chains in the base cabinet, Oracle ZFS Storage Appliance Racked System ZS9-2 HE optimum performance configurations can have up to three expansion cabinets.

Table 9-7 Oracle ZFS Storage Appliance Racked System ZS9-2 HE Optimum Performance Configurations Components

Base Cabinet	Expansion Cabinet 1	Expansion Cabinet 2	Expansion Cabinet 3
Disk Shelves: • Oracle Storage Drive Enclosure DE3-24P: – Up to 18 disk shelves – Factory configurations: 2, 4, 6, 8, 10, 12, 14, 16, or 18 disk shelves • Mixed Oracle Storage Drive Enclosure DE3-24C / DE3-12C / DE3-24P Disk Shelves: – 2 Oracle Storage Drive Enclosure DE3-24C or 4 DE3-12C, and 2 to 14 DE3-24P – 4 Oracle Storage Drive Enclosure DE3-24C or 8 DE3-12C, and 2 to 10 DE3-24P – 6 Oracle Storage Drive Enclosure DE3-24C or 12 DE3-12C, and 2 to 6 DE3-24P – 8 Oracle Storage Drive Enclosure DE3-24C or 16 DE3-12C, and 2 DE3-24P **Controllers:** • Two Oracle ZFS Storage ZS9-2 HE controllers	**Disk Shelves:** • Oracle Storage Drive Enclosure DE3-24C: – Up to 10 disk shelves • Oracle Storage Drive Enclosure DE3-12C: – Up to 20 disk shelves	**Disk Shelves:** • Oracle Storage Drive Enclosure DE3-24C: – Up to 10 disk shelves • Oracle Storage Drive Enclosure DE3-12C: – Up to 20 disk shelves	**Disk Shelves:** • Oracle Storage Drive Enclosure DE3-24C: – Up to 10 disk shelves • Oracle Storage Drive Enclosure DE3-12C: – Up to 20 disk shelves

The Oracle ZFS Storage Appliance Racked System ZS9-2 HE all-flash/mixed configurations support various storage options.

Table 9-8 Oracle ZFS Storage Appliance Racked System ZS9-2 HE Disk Shelf Device Types and Allowable Configurations

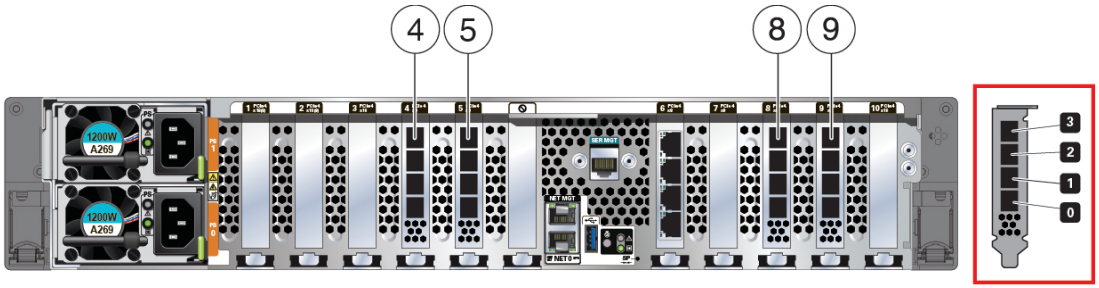
Disk Shelf	Data Devices	Read Cache Devices	Log Devices
Oracle Storage Drive Enclosure DE3-24P All-Flash	7.68 TB SSDs: 24 in slots 0 - 23 or 20 in slots 0 - 19	Not allowed	200 GB SSDs in slot 20 - 23
Oracle Storage Drive Enclosure DE3-24P	1.2 TB HDDs: 24 in slots 0 - 23 or 20 in slots 0 - 19	7.68 TB SSDs in slot 20 - 23	200 GB SSDs in slot 20 - 23
Oracle Storage Drive Enclosure DE3-24C	22 TB HDDs: 24 in slots 0 - 23 or 20 in slots 0 - 19	7.68 TB SSDs in slot 20 - 23	200 GB SSDs in slot 20 - 23
Oracle Storage Drive Enclosure DE3-12C	18 or 22 TB HDDs: 12 in slots 0 - 11 or 10 in slots 0 - 9	7.68 TB SSDs in slots 10 - 11	200 GB SSDs in slots 10 - 11

Base Cabinet Configurations for Oracle ZFS Storage Appliance Racked System ZS9-2 HE with All-Flash/Mixed Configurations

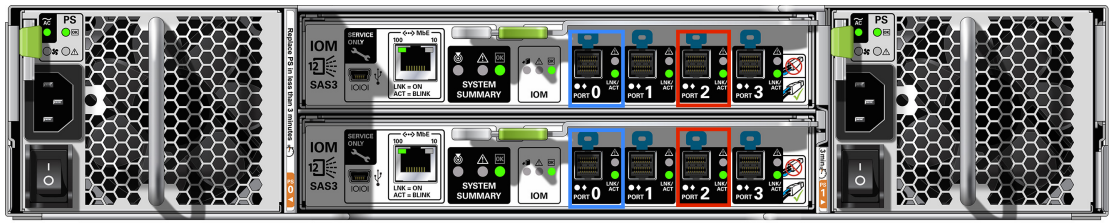
Oracle ZFS Storage Appliance Racked System ZS9-2 HE maximum performance configurations have four SAS-3 HBAs in each controller, which provide the maximum of 16 ports of SAS-3 HBA connectivity.

The SAS-3 HBA port numbering order is ascending, from bottom (Port 0) to top (Port 3). SAS-3 HBA cards and Oracle Storage Drive Enclosure DE3-24/DE3-12C disk shelves use the SFF 8644 connectors.

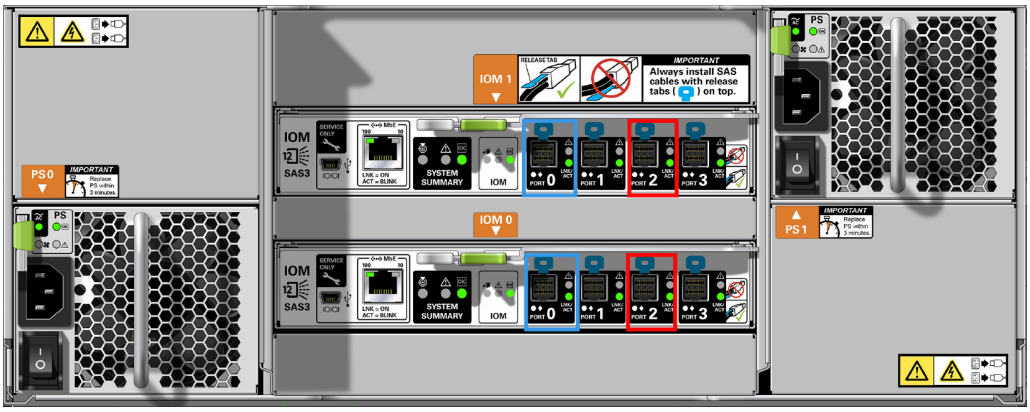
The following figure shows the slot number for each HBA card, as well as the port numbers in each card.



As shown in the following figure, the Oracle Storage Drive Enclosure DE3-24P disk shelf has two I/O modules (IOMs) with four ports each. In all cabling configurations, Port 1 and Port 3 are never used.



As shown in the following figure, the Oracle Storage Drive Enclosure DE3-24C disk shelf has two I/O modules (IOMs) with four ports each. In all cabling configurations, Port 1 and Port 3 are never used.



As shown in the following figure, the Oracle Storage Drive Enclosure DE3-12C disk shelf has two I/O modules (IOMs) with three ports each. In all cabling configurations, Port B is never used.

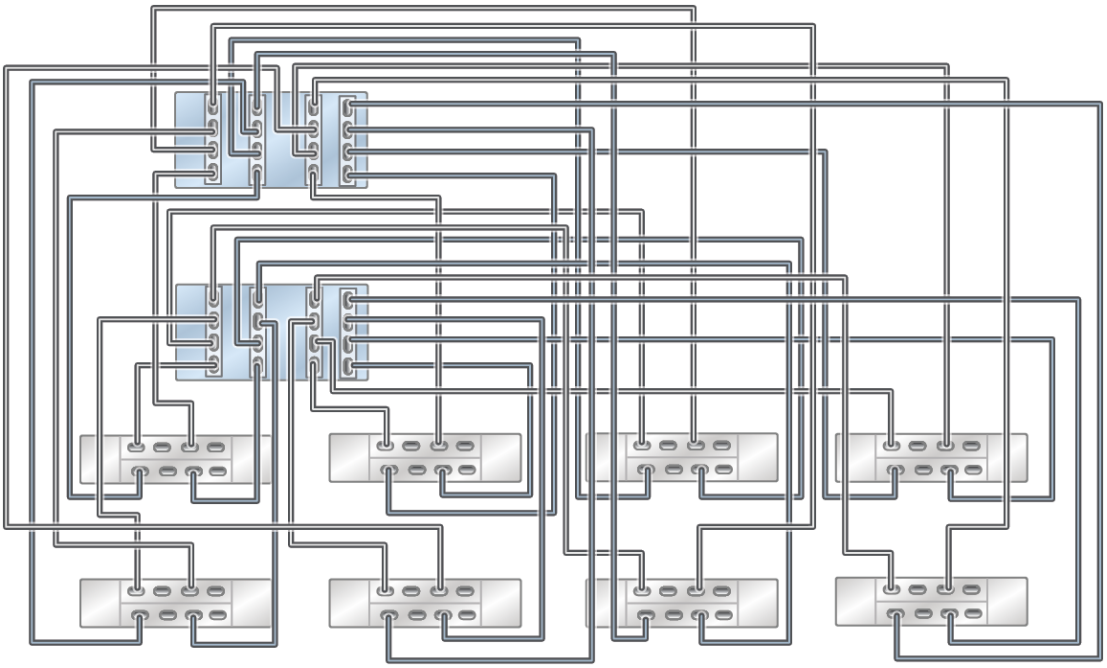
The Oracle ZFS Storage Appliance Racked System ZS9-2 HE with all-flash/mixed configurations follow standard cabling methodologies with additional restrictions that allow use of the cable management arm (CMA). They provide a more practical implementation for SSD log device and read cache device matching, limited multi-cabinet expansion, and can be configured for maximum or optimal performance.

Any upgrades that include more than one cabinet that is not an original Oracle ZFS Storage Appliance Racked System ZS9-2 HE or not compatible with Oracle ZFS Storage Appliance Racked System ZS9-2 HE must be re-cabled for that particular configuration. For cabling examples of connecting Oracle Storage Drive Enclosure DE3-24 disk shelves to an Oracle ZFS Storage ZS9-2 HE controller with 4x4 port SAS-3 HBAs, see Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS9-2 High-end (HE) Controllers. For cabling examples of connecting Oracle Storage Drive Enclosure DE3-12C disk shelves to an Oracle ZFS Storage ZS9-2 HE controller with 4x4 port SAS-3 HBAs, see Example Mixed Disk Shelf Configurations. For SAS cable length guidelines, see Cabinet and Cabling Guidelines.

The cabinets are self-contained and pre-cabled following the required cabling methodology. The following diagrams illustrate how the six base cabinet options are cabled for configurations with Oracle Storage Drive Enclosure DE3-24C disk shelves.

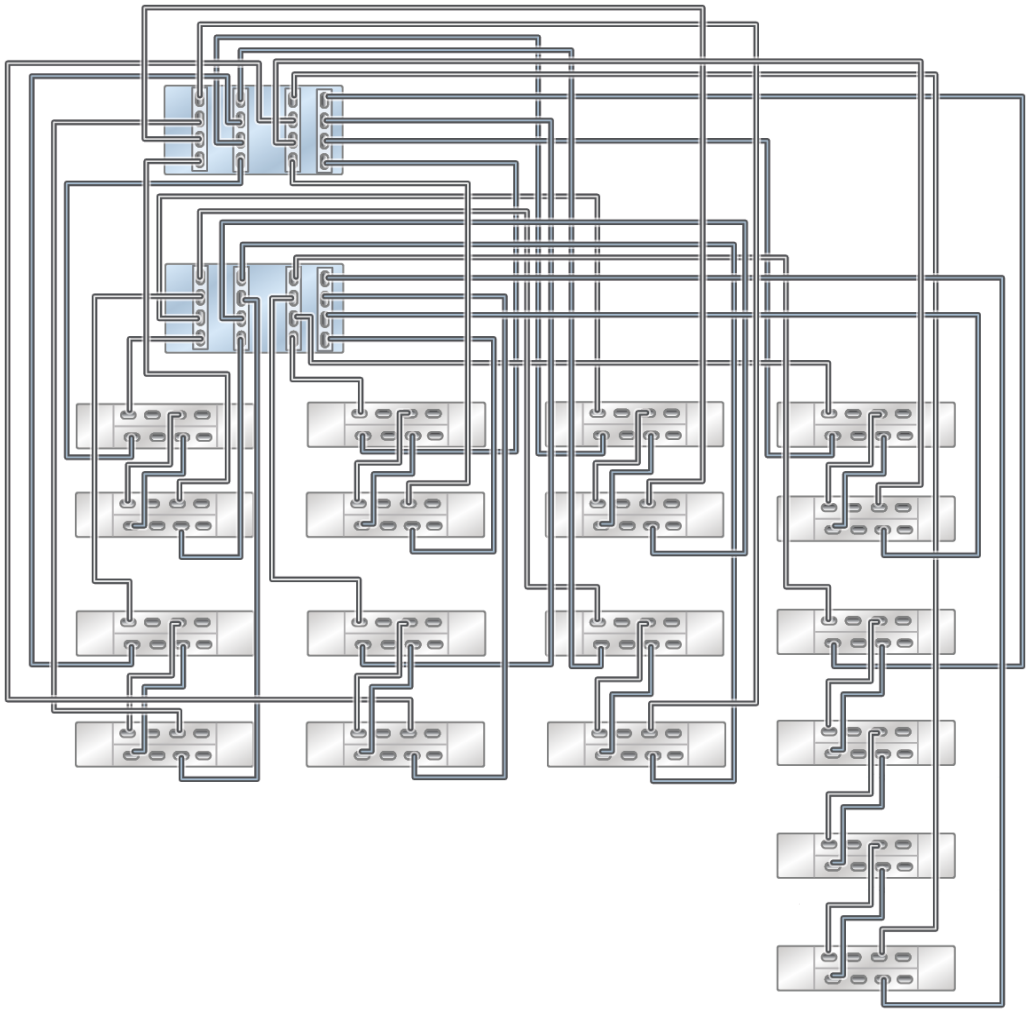
Oracle ZFS Storage Appliance Racked System ZS9-2 HE:

One to Eight Oracle Storage Drive Enclosure DE3-24P Disk Shelves (maximum performance)



Oracle ZFS Storage Appliance Racked System ZS9-2 HE Performance Configuration:

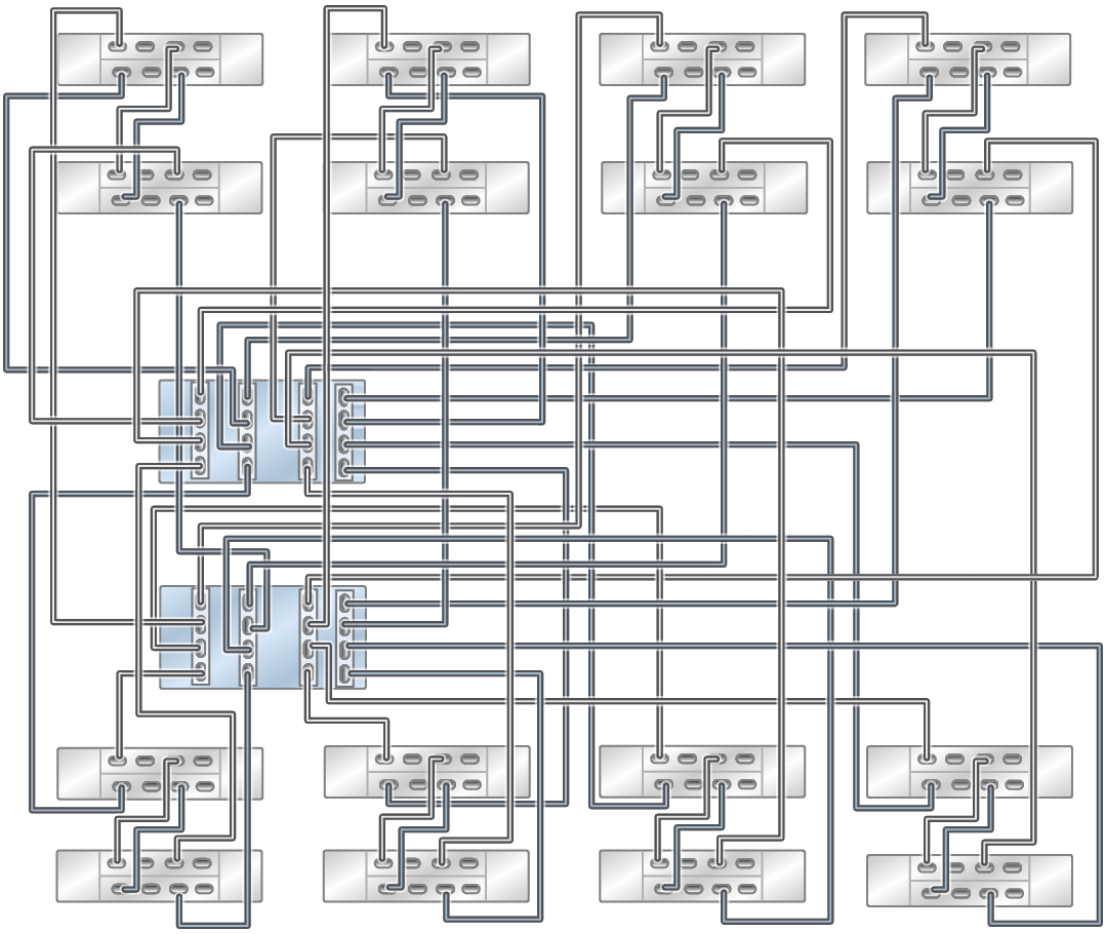
Two to 18 Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)



Oracle ZFS Storage Appliance Racked System ZS9-2 HE Performance Configuration:

Two Oracle Storage Drive Enclosure DE3-24C (bottom left) and

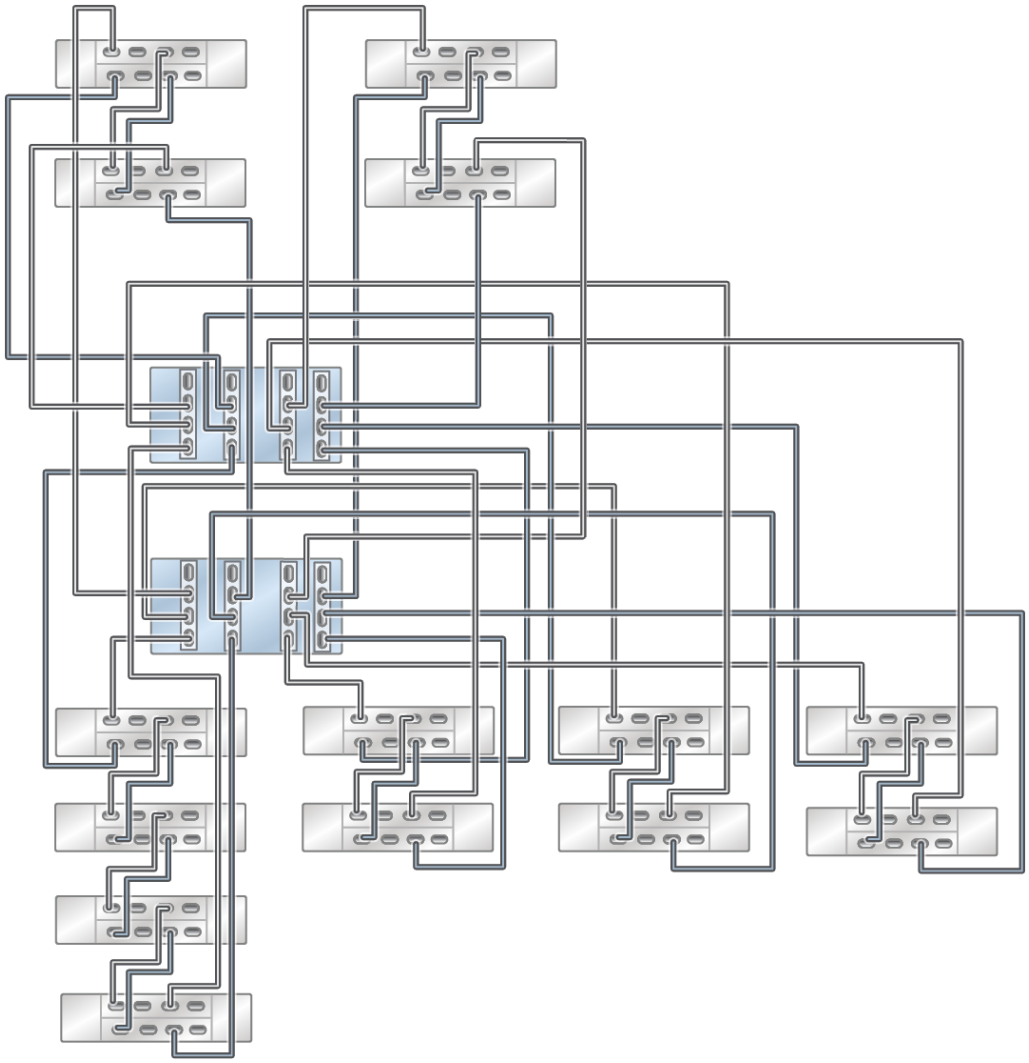
Two to 14 Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)



Oracle ZFS Storage Appliance Racked System ZS9-2 HE Performance Configuration:

Four Oracle Storage Drive Enclosure DE3-24C (bottom left) and

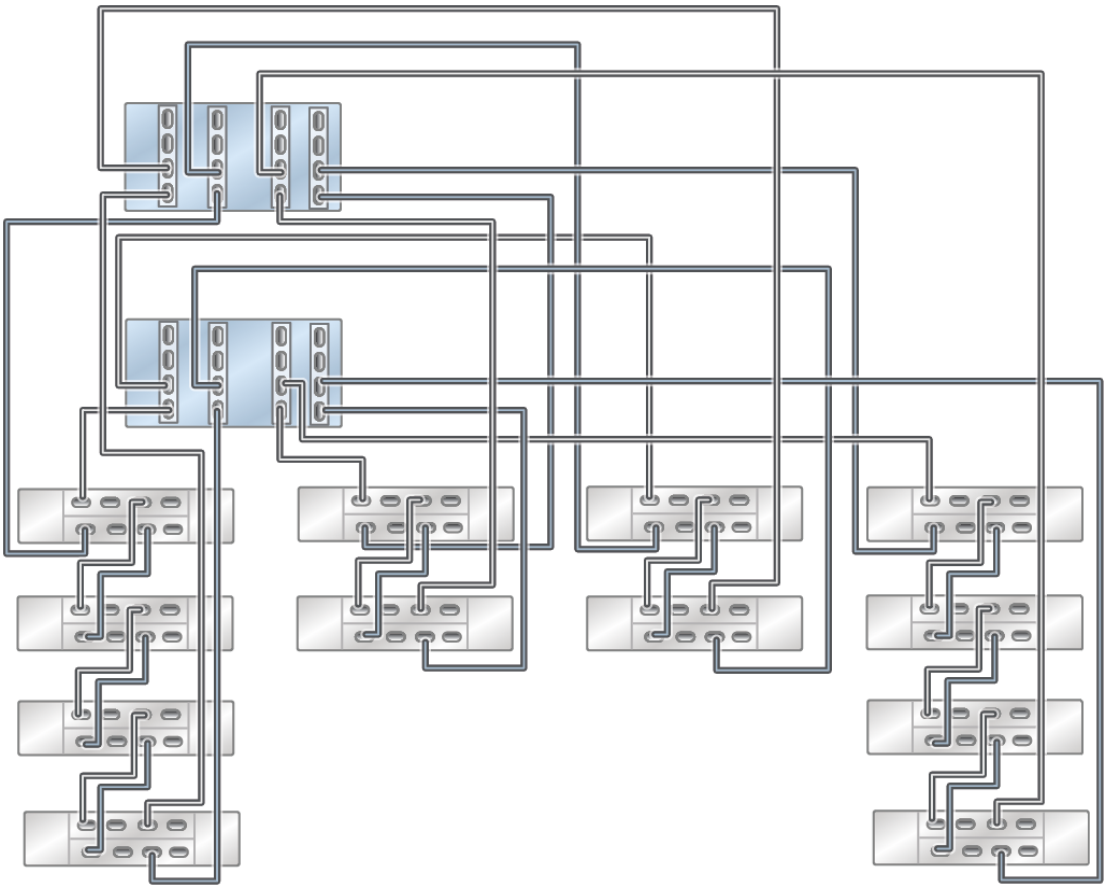
Two to Ten Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)



Oracle ZFS Storage Appliance Racked System ZS9-2 HE Performance Configuration:

Six Oracle Storage Drive Enclosure DE3-24C (first two chains from the left) and

Two to Six Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)

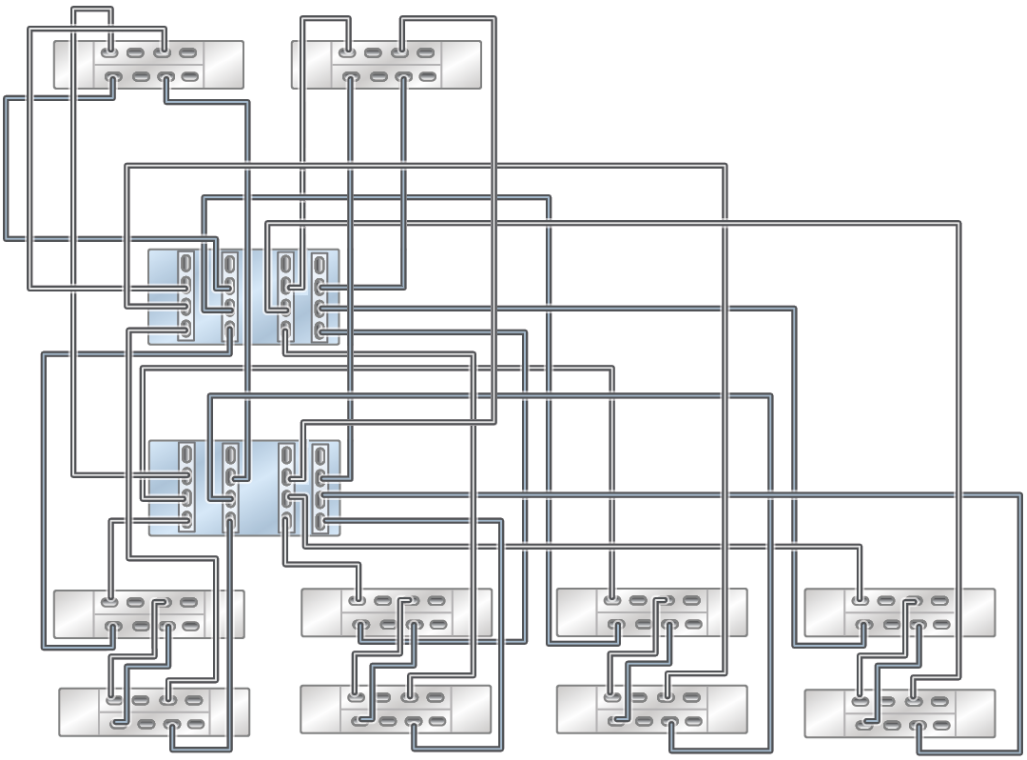


In the following figure, the Oracle Storage Drive Enclosure DE3-24C units are the bottom eight disk shelves.

Oracle ZFS Storage Appliance Racked System ZS9-2 HE Performance Configuration:

Eight Oracle Storage Drive Enclosure DE3-24C (bottom disk shelves) and

Two Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)



Expansion Cabinet Configurations for Oracle ZFS Storage Appliance Racked System ZS9-2 HE Performance Configurations

Oracle ZFS Storage Appliance Racked System ZS9-2 HE performance configurations support multiple cabinets that allow for expansion of up to 30 additional Oracle Storage Drive Enclosure DE3-24C disk shelves or up to 60 additional Oracle Storage Drive Enclosure DE3-12C disk shelves.

Each expansion cabinet can contain one or both of these disk shelf types:

- Oracle Storage Drive Enclosure DE3-24C: Up to 10 disk shelves. Also offered in a “half-rack” option.
- Oracle Storage Drive Enclosure DE3-12C: Up to 20 disk shelves.

For any configuration, the total number of disk shelves cannot exceed the available rack space.

> **Note:**
>
> Not all base cabinet configurations support expansion cabinets.

The expansion cabinet installation follows a balanced-chain installation where the chain on the bottom of the cabinet takes the first disk shelf pair, and the second chain on the top half takes the second pair. The alternating manner of a balanced chain installation distributes SSDs and follows the load-priority methodology.

The number of expansion cabinets supported is dependent on the number of chains remaining in the Oracle ZFS Storage Appliance Racked System ZS9-2 HE base cabinet. Each Oracle ZFS Storage Appliance Racked System ZS9-2 HE expansion cabinet requires two chains to support a full expansion cabinet. Also, a total of four SAS-3 HBA ports (two HBA ports for each chain) are required for each expansion cabinet.

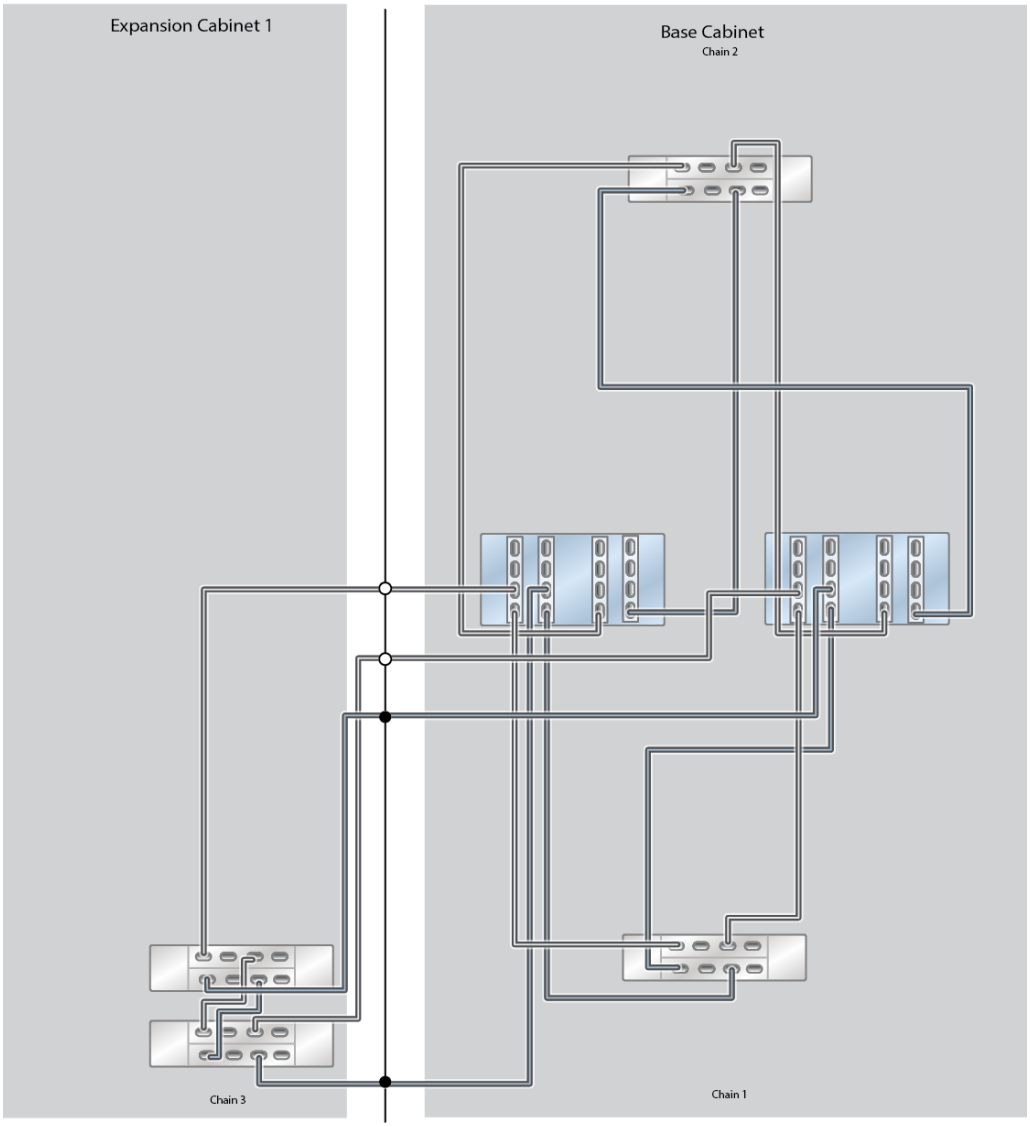
The following diagrams illustrate the cabling of Oracle ZFS Storage Appliance Racked System ZS9-2 HE expansion cabinet configurations with Oracle Storage Drive Enclosure DE3-24C disk shelves. The legend for each diagram is as follows:

- A hollow circle indicates the cable connection to the top IOM (IOM 1).
- A solid circle indicates the cable connection to the bottom IOM (IOM 0).

> **Note:**
>
> The base cabinet can contain all Oracle Storage Drive Enclosure DE3-24P (HDD) disk shelves, or all Oracle Storage Drive Enclosure DE3-24P All-Flash (SSD) disk shelves, or a mix of Oracle Storage Drive Enclosure DE3-24C/DE3-12C and DE3-24P disk shelves, as described in All-Flash/Mixed Configurations for Oracle ZFS Storage Appliance Racked System ZS9-2 HE.

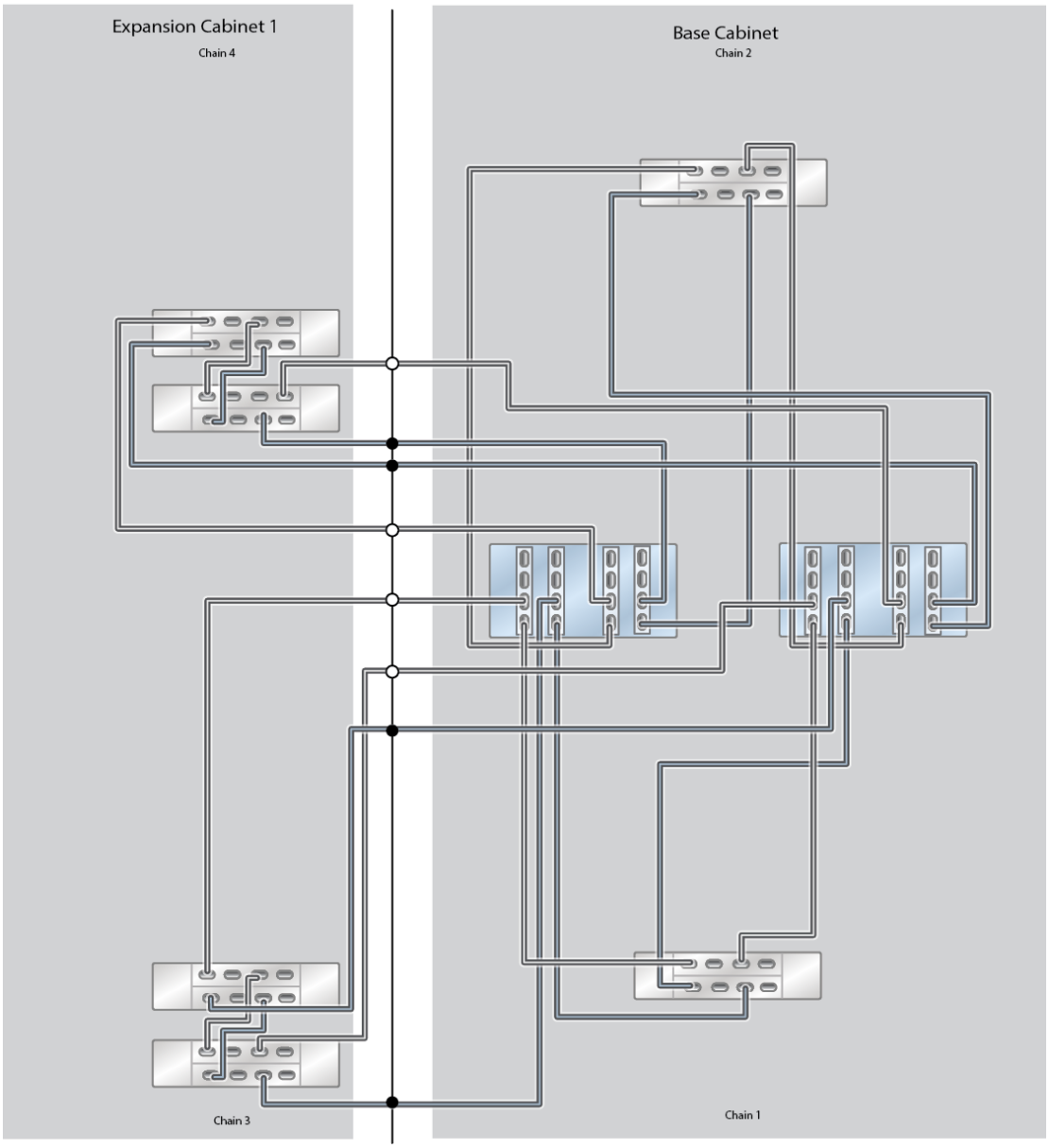
Oracle ZFS Storage Appliance Racked System ZS9-2 HE Performance Configuration:

One Expansion Cabinet with Two Oracle Storage Drive Enclosure DE3-24C Disk Shelves



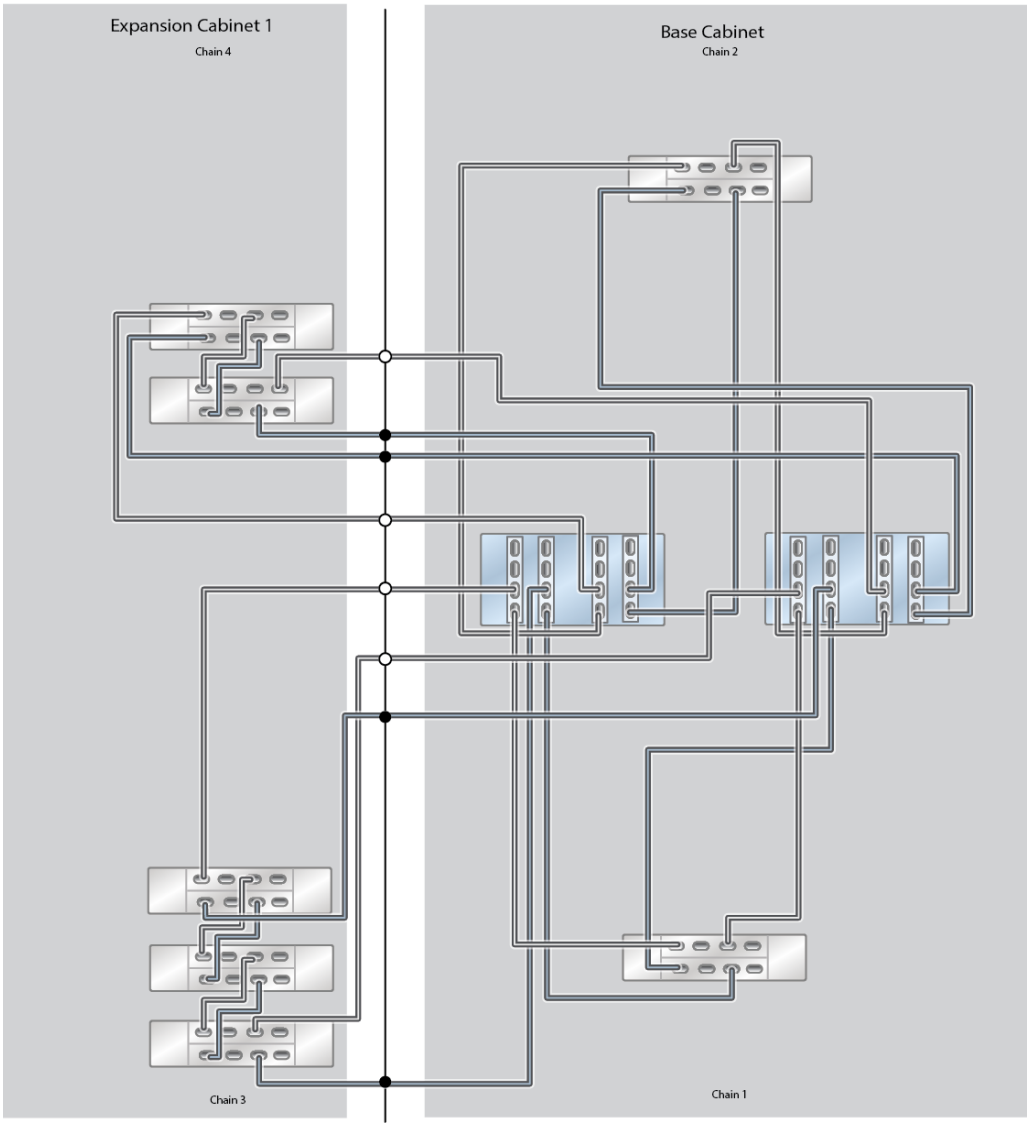
Oracle ZFS Storage Appliance Racked System ZS9-2 HE Performance Configuration:

One Expansion Cabinet with Four Oracle Storage Drive Enclosure DE3-24C Disk Shelves



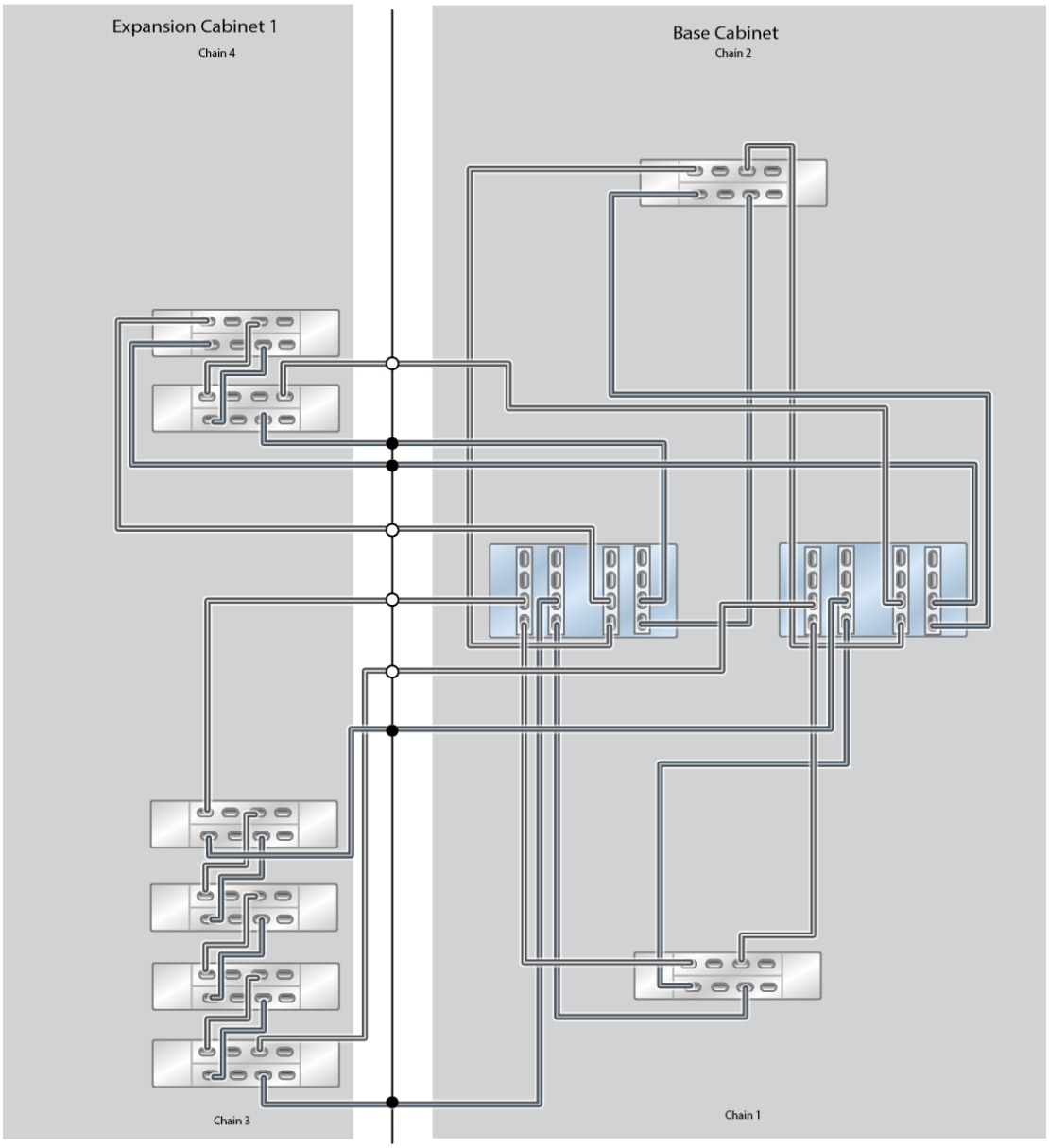
Oracle ZFS Storage Appliance Racked System ZS9-2 HE Performance Configuration:

One Expansion Cabinet with Five Oracle Storage Drive Enclosure DE3-24C Disk Shelves (Half Rack)



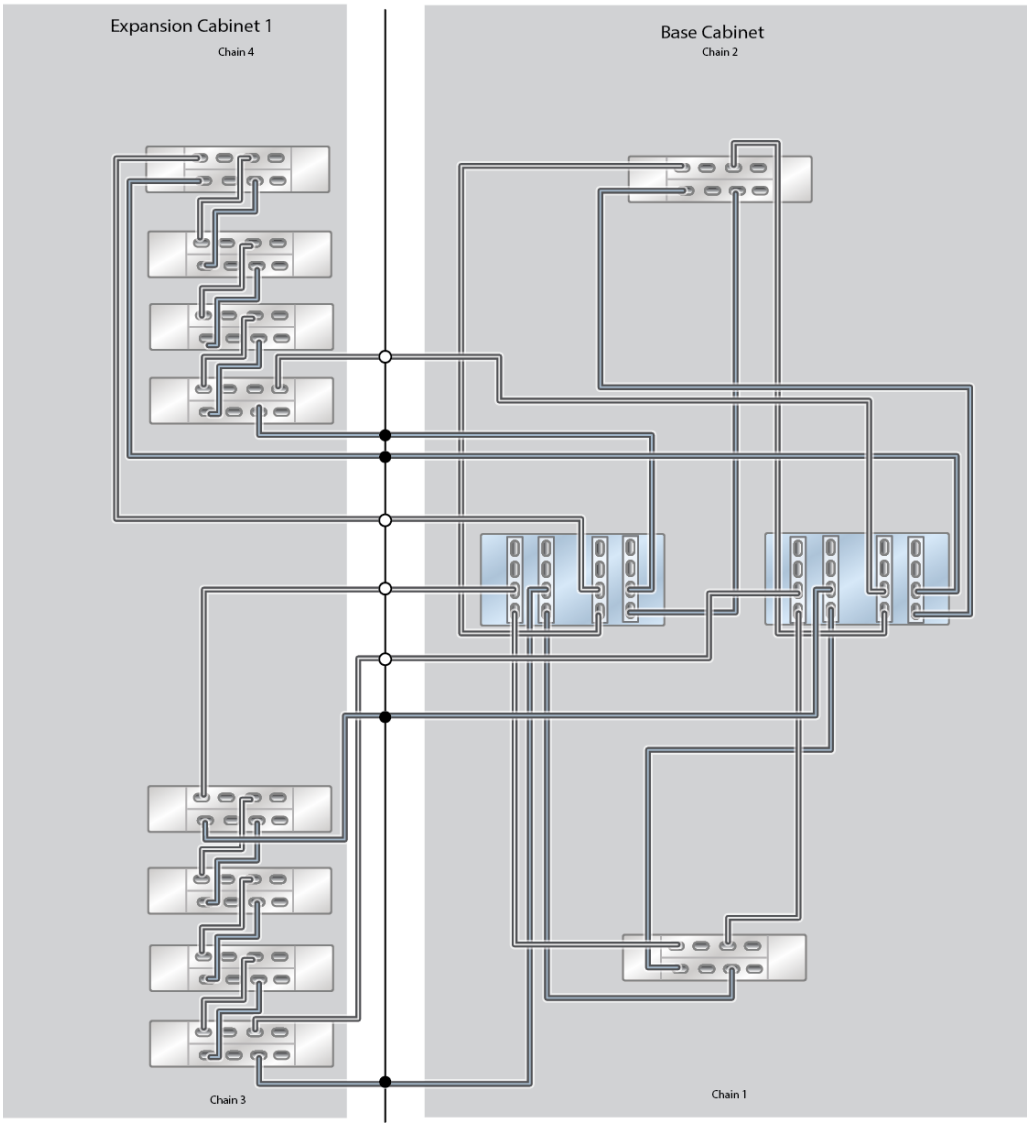
Oracle ZFS Storage Appliance Racked System ZS9-2 HE Performance Configuration:

One Expansion Cabinet with Six Oracle Storage Drive Enclosure DE3-24C Disk Shelves



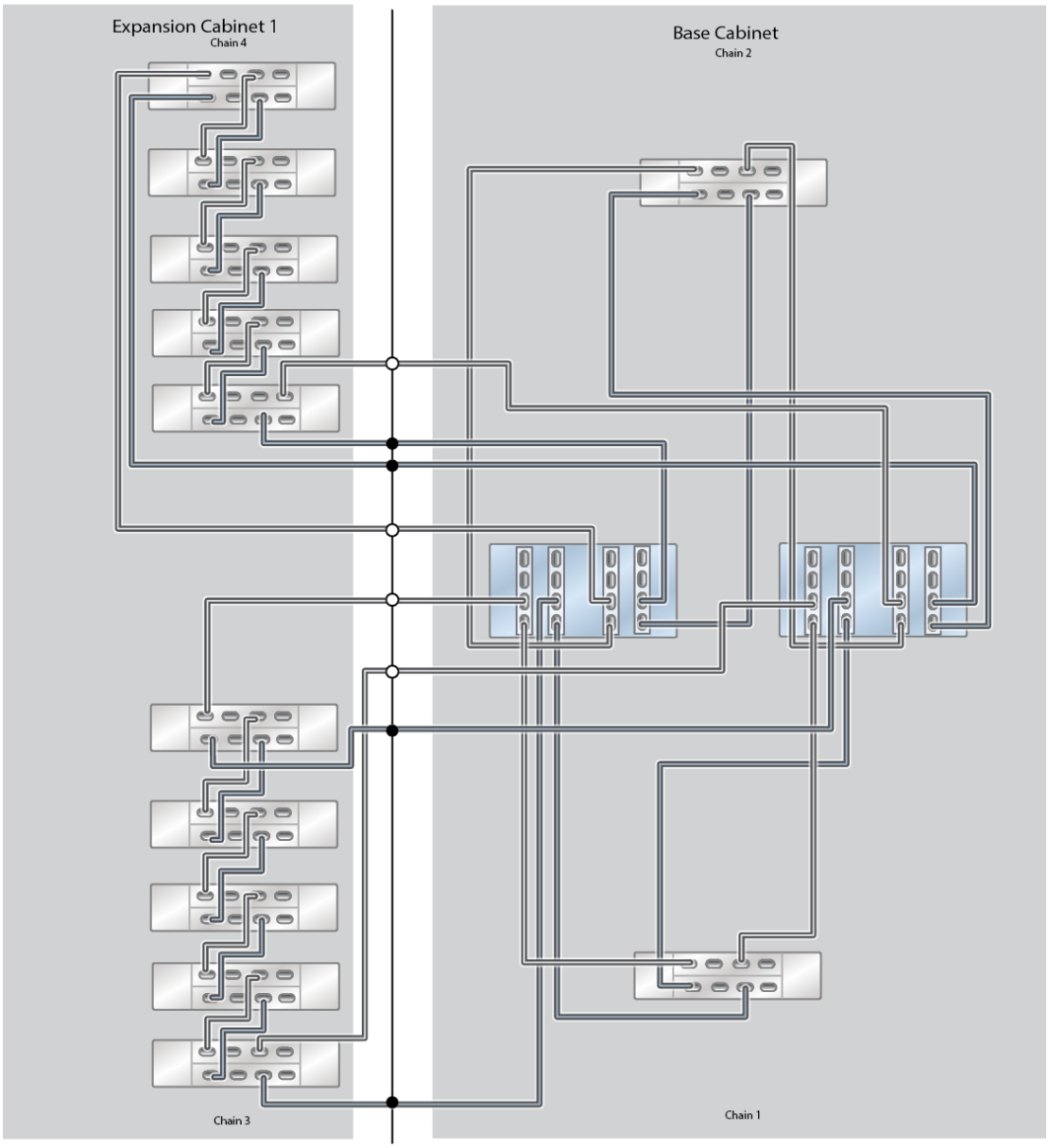
Oracle ZFS Storage Appliance Racked System ZS9-2 HE Performance Configuration:

One Expansion Cabinet with Eight Oracle Storage Drive Enclosure DE3-24C Disk Shelves



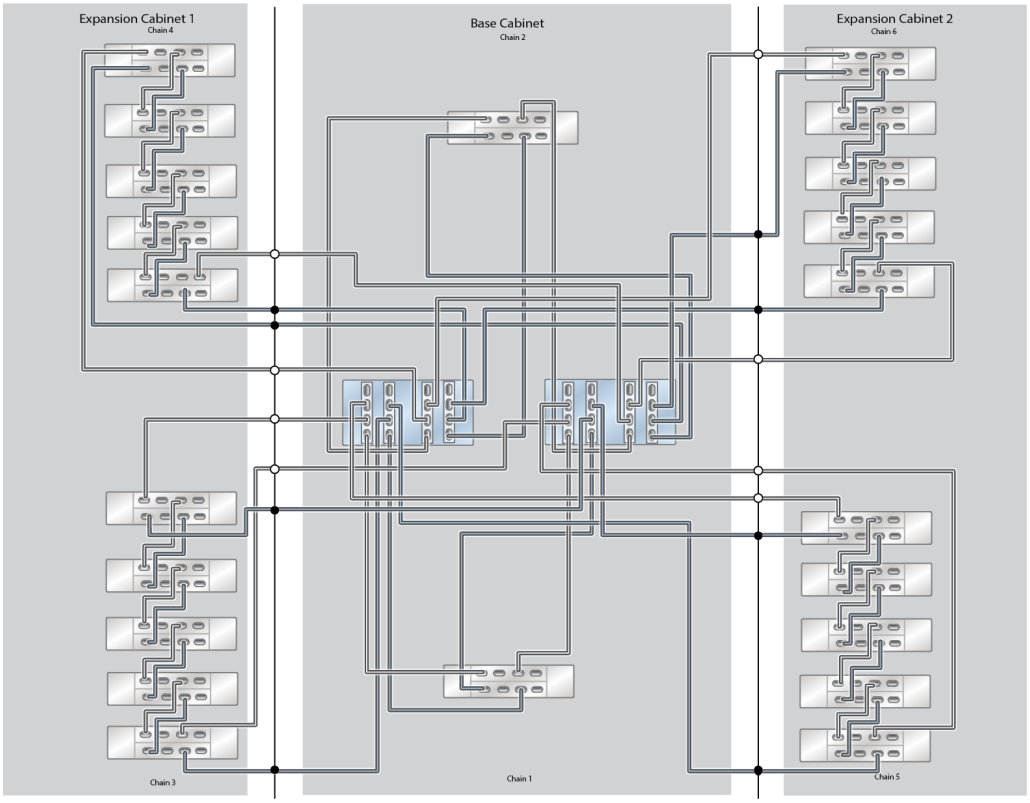
Oracle ZFS Storage Appliance Racked System ZS9-2 HE Performance Configuration:

One Expansion Cabinet with 10 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



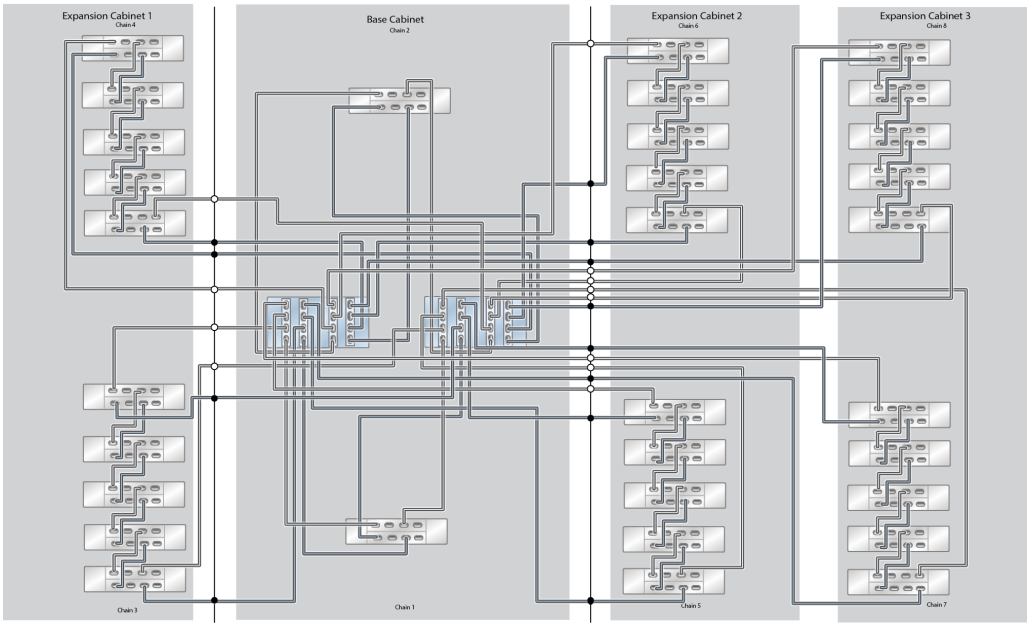
Oracle ZFS Storage Appliance Racked System ZS9-2 HE Performance Configuration:

Two Expansion Cabinets with 20 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



Oracle ZFS Storage Appliance Racked System ZS9-2 HE Performance Configuration:

Three Expansion Cabinets with 30 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



Oracle ZFS Storage Appliance Racked System ZS9-2 Mid-range (MR) Configurations

This section provides overviews and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS9-2 MR, which is a pre-racked and pre-cabled system that supports two configuration types: capacity configurations and performance configurations.

This section contains the following topics:

- Capacity Configurations for Oracle ZFS Storage Appliance Racked System ZS9-2 MR
- All-Flash/Mixed Configurations for Oracle ZFS Storage Appliance Racked System ZS9-2 MR

Capacity Configurations for Oracle ZFS Storage Appliance Racked System ZS9-2 MR

This section provides an overview and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS9-2 MR capacity configurations.

This section contains the following topics:

- Overview of Oracle ZFS Storage Appliance Racked System ZS9-2 MR Capacity Configurations
- Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS9-2 MR Capacity Configurations

Overview of Oracle ZFS Storage Appliance Racked System ZS9-2 MR Capacity Configurations

Capacity configurations take advantage of high-capacity disk shelves and are available in a base cabinet, or a base cabinet with one expansion cabinet. Two Oracle ZFS Storage ZS9-2 MR controllers and up to 19 Oracle Storage Drive Enclosure DE3-24C disk shelves or up to 38 Oracle Storage Drive Enclosure DE3-12C disk shelves can be supported, as shown in the following table. Note that the total number of disk shelves for the base cabinet and the expansion cabinet together cannot exceed 19 Oracle Storage Drive Enclosure DE3-24C disk shelves or 38 Oracle Storage Drive Enclosure DE3-12C disk shelves. When both of these disk shelves are used in any configuration, the total number of disk shelves cannot exceed the available rack space.

> **Note:**
>
> Oracle ZFS Storage Appliance Racked System ZS9-2, which has preset configurations, can be upgraded in the field to any supported configuration for Oracle ZFS Storage ZS9-2. For example, you can upgrade the racked system by adding one disk shelf to a two-disk-shelf configuration, adding cabling for the new disk shelf, and then recabling the disk shelves. Thus, three disk shelves are supported, even though the racked system is not offered in a three-disk-shelf configuration. Complex upgrades require extensive planning and recabling.

Table 9-9 Oracle ZFS Storage Appliance Racked System ZS9-2 MR Capacity Configurations Components

Base Cabinet	Expansion Cabinet 1
Disk Shelves: • Oracle Storage Drive Enclosure DE3-24C: – Up to 9 disk shelves – Factory configurations: 1, 2, 4, 6, 8, or 9 disk shelves • Oracle Storage Drive Enclosure DE3-12C: – Up to 18 disk shelves – Factory configurations: 2, 4, 8, 12, 16, or 18 disk shelves **Controllers:** • Two Oracle ZFS Storage ZS9-2 MR controllers	**Disk Shelves:** • Oracle Storage Drive Enclosure DE3-24C: – Up to 10 disk shelves – Factory configurations: 2, 4, 5, 6, 8, or 10 disk shelves • Oracle Storage Drive Enclosure DE3-12C: – Up to 20 disk shelves – Factory configurations: 4, 8, 10, 12, 16, or 20 disk shelves

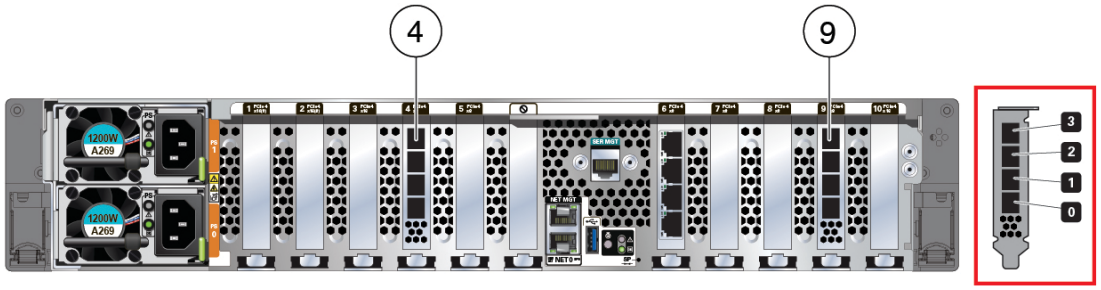
Each Oracle ZFS Storage ZS9-2 MR controller supports two SAS HBA cards. Two SAS HBA cards must be installed in each Oracle ZFS Storage ZS9-2 MR controller to support disk shelves in the expansion cabinet.

Each Oracle ZFS Storage ZS9-2 MR controller has two SAS HBA cards. Clustered Oracle ZFS Storage ZS9-2 MR controllers support a high-availability configuration consisting of:

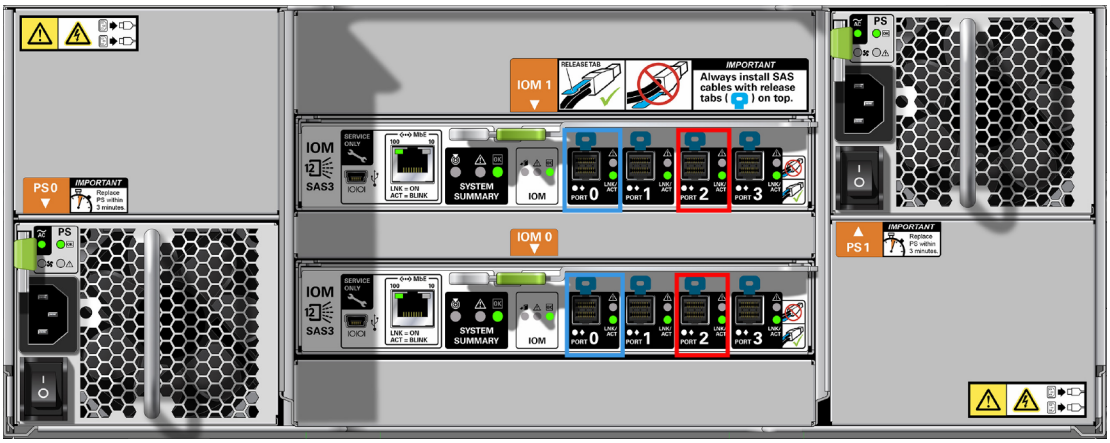
- Base cabinet: Two chains with four Oracle Storage Drive Enclosure DE3-24C disk shelves or eight Oracle Storage Drive Enclosure DE3-12C disk shelves in one chain, and five Oracle Storage Drive Enclosure DE3-24C disk shelves or ten Oracle Storage Drive Enclosure DE3-12C disk shelves in the other chain, and
- Expansion cabinet: Two chains with five Oracle Storage Drive Enclosure DE3-24C disk shelves or ten Oracle Storage Drive Enclosure DE3-12C disk shelves.

The cabinets are self-contained and pre-cabled following the required cabling methodology. Pre-racked system cabling tables and diagrams, which can also be used for planning future system expansion, are provided in the section Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS9-2 MR Capacity Configurations.

Each cabinet contains 42 rack units (RUs), with RU01 on the bottom. Each Oracle ZFS Storage ZS9-2 MR controller occupies two rack units, and its location is referenced by the bottommost rack unit number. The top controller is referred to as Controller 1 and is located in RU20 in the base cabinet; the bottom controller is Controller 0 in RU17. Because the Oracle ZFS Storage ZS9-2 MR controller occupies two rack units, the base cabinet contains a filler panel above each controller so the cabinet layout is similar to prior offerings of Oracle racked systems with three-rack-unit controllers. It also allows for better serviceability access and cabling through the rear CMA. The following figure shows the slot number for each HBA card, as well as the port numbers in each card.



Each Oracle Storage Drive Enclosure DE3-24C disk shelf occupies four rack units, and disk shelves are normally installed from the bottom of the cabinet to the top for stability. As shown in the following figure, the Oracle Storage Drive Enclosure DE3-24C disk shelf has two I/O Modules (IOMs) with four ports each. In all cabling configurations, Port 1 and Port 3 are never used.



Each Oracle Storage Drive Enclosure DE3-12C disk shelf occupies two rack units, and disk shelves are normally installed from the bottom of the base cabinet to the top for stability. As shown in the following figure, the Oracle Storage Drive Enclosure DE3-12C disk shelf has two I/O Modules (IOMs) with three ports each. In all cabling configurations, Port B, the middle port, is never used.

Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS9-2 MR Capacity Configurations

The following table describes the locations and port connections for two controllers and nine disk shelves in the base cabinet, using 3-meter optical SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs.

The following tables are for a full base rack configuration consisting of two chains, and an expansion rack configuration consisting of two chains.

> **Note:**
>
> Two Oracle Storage Drive Enclosure DE3-12C disk shelves are the equivalent of one Oracle Storage Drive Enclosure DE3-24C disk shelf. Configuration information for both of these disk shelves is located in Overview of Oracle ZFS Storage Appliance Racked System ZS9-2 MR Capacity Configurations. Also, Oracle Storage Drive Enclosure DE3-12C cabling guidelines and example cabling diagrams for specifically connecting to Oracle ZFS Storage Appliance Racked System ZS9-2 MR controllers are provided in Cabling Guidelines for Adding an Oracle Storage Drive Enclosure DE3-12C. Additional example Oracle Storage Drive Enclosure DE3-12C cabling diagrams are located in Example Mixed Disk Shelf Configurations.

Table 9-10 Base Cabinet: Controller and Disk Shelf Locations and Connections

FROM	TO			
RU	**CONTROLLER**	**HBA PORT**	**RU**	**DISK SHELF PORT**
20	1	Slot 4, Port 0	1	IOM 1, Port 2
17	0	Slot 9, Port 0	1	IOM 0 Port 2
20	1	Slot 4, Port 1	23	IOM 1, Port 2
17	0	Slot 9, Port 1	23	IOM 0 Port 2
17	0	Slot 4, Port 0	1, 5, 13	IOM 1, Port 0
20	1	Slot 9, Port 0	1, 5, 13	IOM 0, Port 0
17	0	Slot 4, Port 1	27, 35, 39	IOM 1, Port 0
20	1	Slot 9, Port 1	27, 35, 39	IOM 0, Port 0

The following table describes the locations and port connections for 10 disk shelves in an expansion cabinet, using 6-meter optical SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs. The expansion cabinet supports disk shelves 10 through 19.

Table 9-11 Expansion Cabinet: Controller and Disk Shelf Locations and Connections

FROM	TO			
RU	**CONTROLLER**	**HBA PORT**	**RU**	**DISK SHELF PORT**
20	1	Slot 4, Port 2	1	IOM 1, Port 2
17	0	Slot 9, Port 2	1	IOM 0, Port 2
20	1	Slot 4, Port 3	21	IOM 1, Port 2
17	0	Slot 9, Port 3	21	IOM 0, Port 2
17	0	Slot 4, Port 2	5, 9, 13, 17	IOM 1, Port 0
20	1	Slot 9, Port 2	5, 9, 13, 17	IOM 0, Port 0
17	0	Slot 4, Port 3	25, 33, 37	IOM 1, Port 0

Table 9-11 (Cont.) Expansion Cabinet: Controller and Disk Shelf Locations and Connections

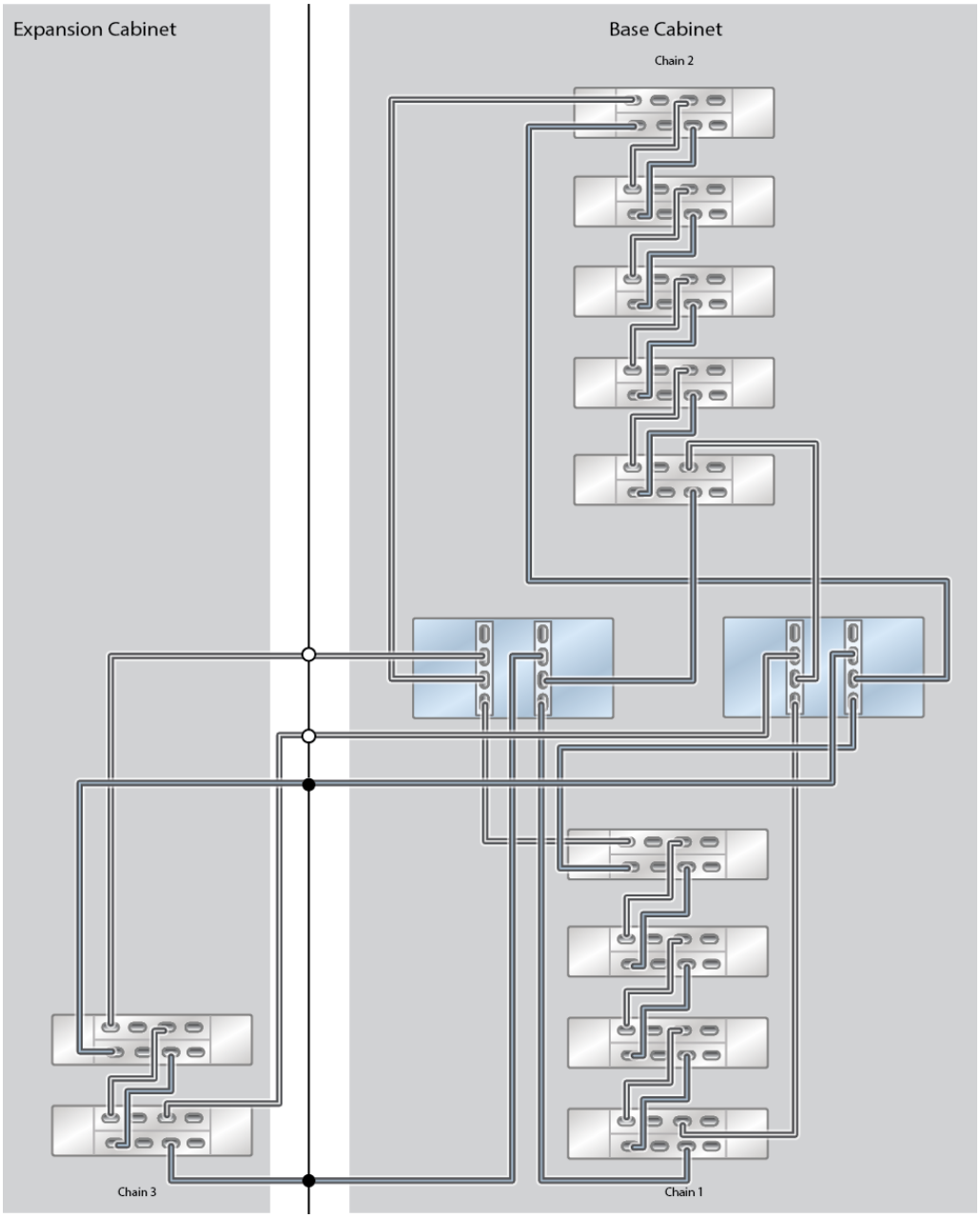
FROM	TO			
20	1	Slot 9, Port 3	25, 33, 37	IOM 0, Port 0

The following diagrams illustrate how pre-racked systems are cabled, as well as how to expand your system in the future. The legend for each diagram is as follows:

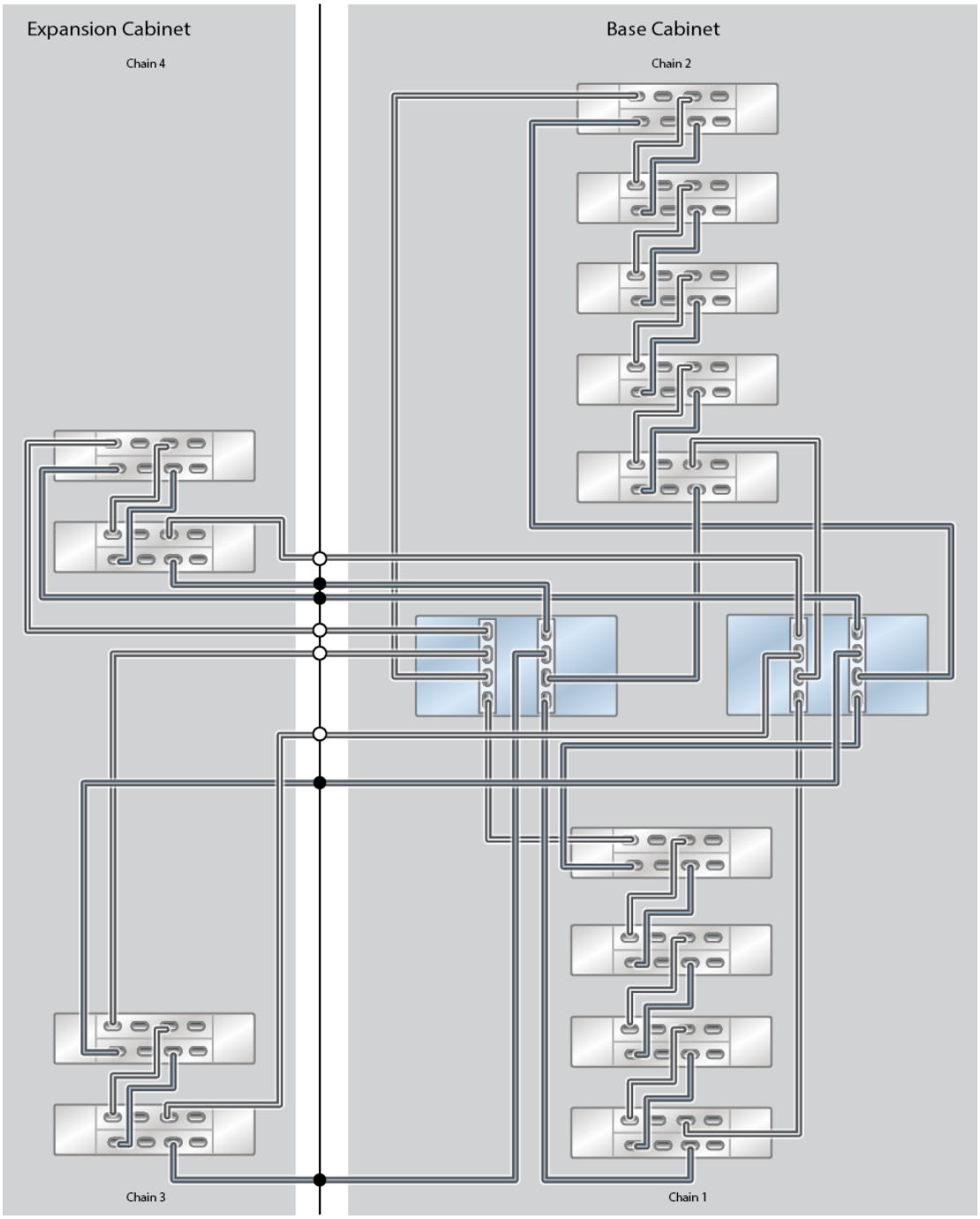
- A hollow circle indicates the cable connection to the top IOM (IOM 1).
- A solid circle indicates the cable connection to the bottom IOM (IOM 0).

Oracle ZFS Storage Appliance Racked System ZS9-2 MR Capacity Configuration:

11 Oracle Storage Drive Enclosure DE3-24C Disk Shelves

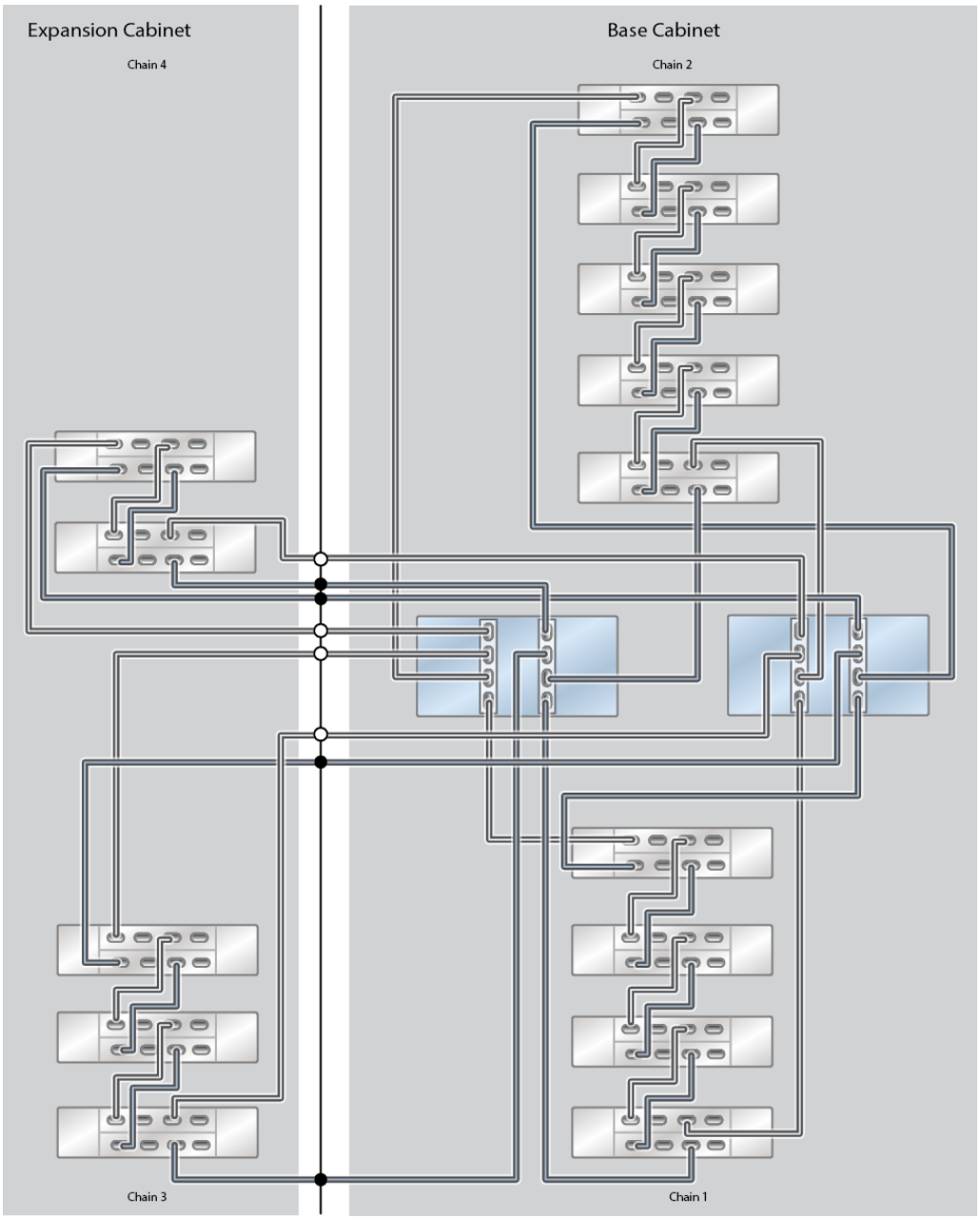


Oracle ZFS Storage Appliance Racked System ZS9-2 MR Capacity Configuration: 13 Oracle Storage Drive Enclosure DE3-24C Disk Shelves

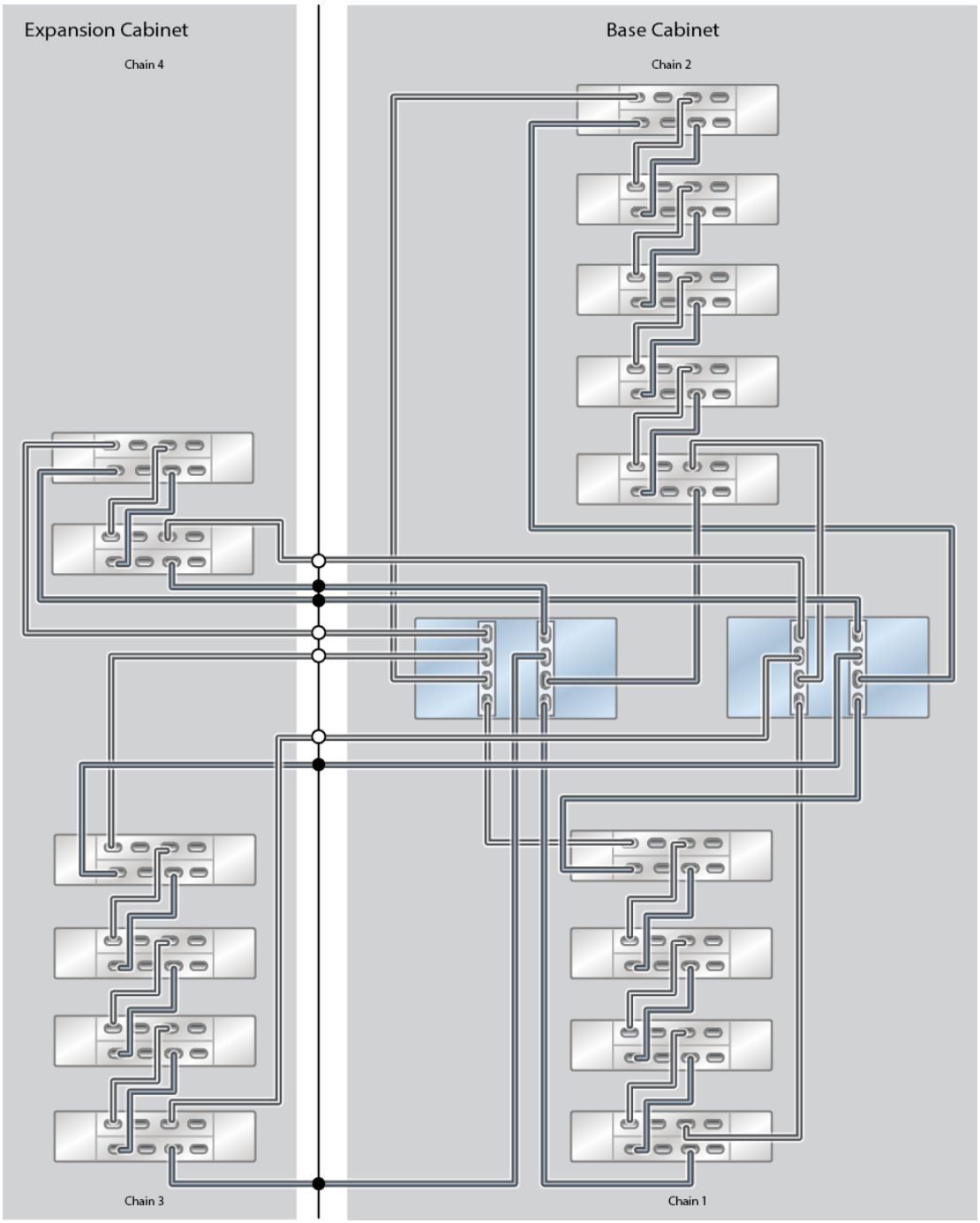


Oracle ZFS Storage Appliance Racked System ZS9-2 MR Capacity Configuration:

14 Oracle Storage Drive Enclosure DE3-24C Disk Shelves (Half Rack)

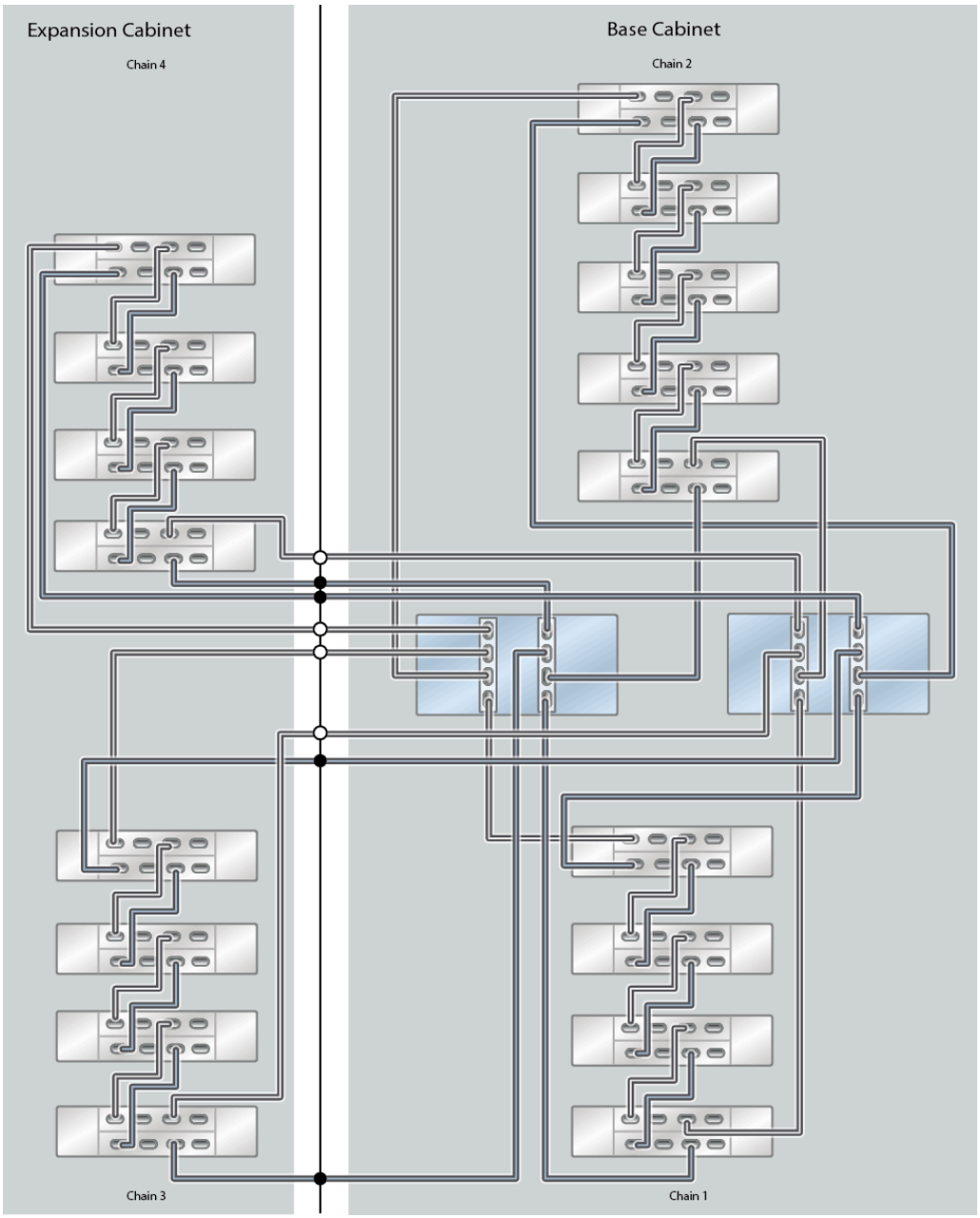


Oracle ZFS Storage Appliance Racked System ZS9-2 MR Capacity Configuration: 15 Oracle Storage Drive Enclosure DE3-24C Disk Shelves

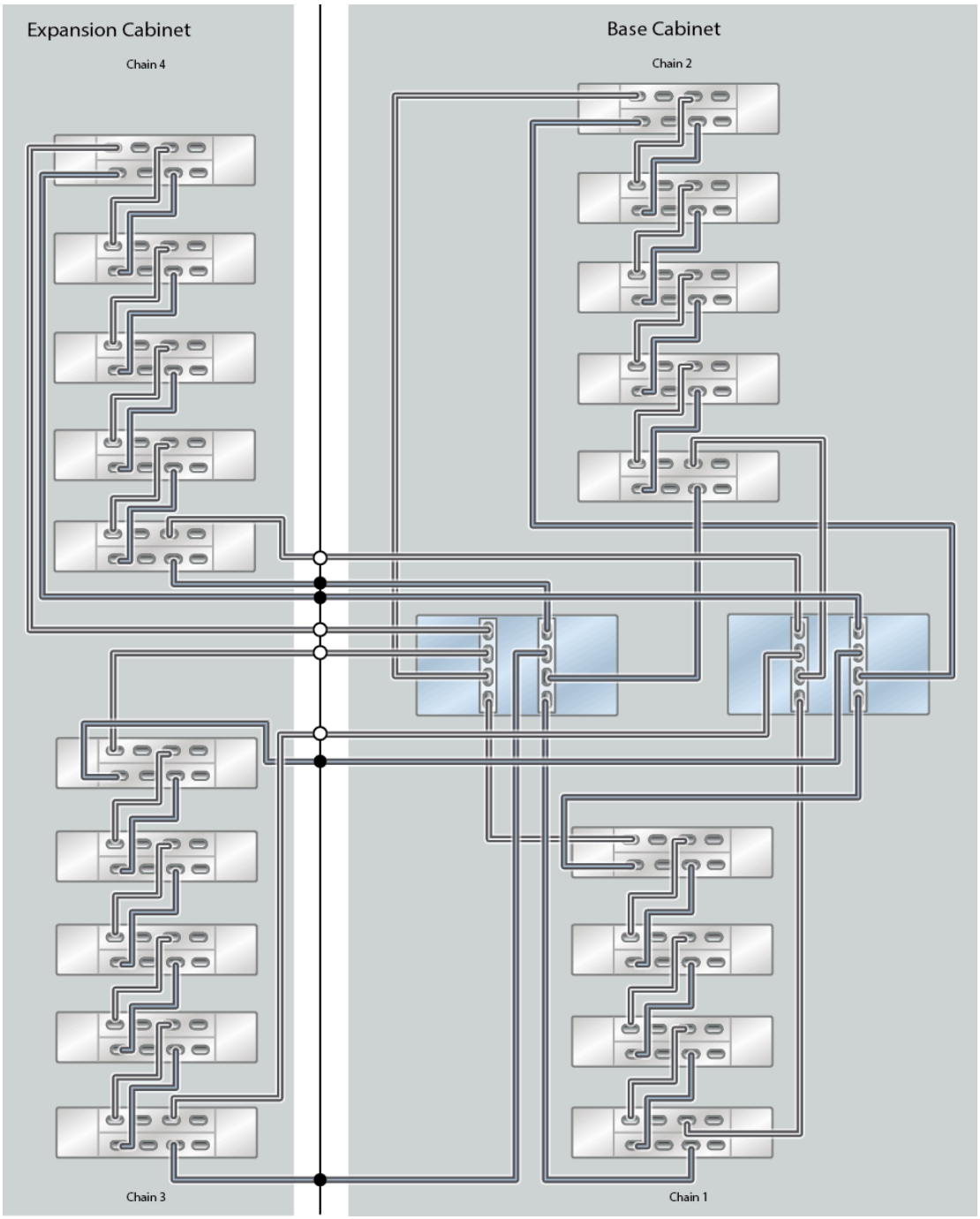


Oracle ZFS Storage Appliance Racked System ZS9-2 MR Capacity Configuration:

17 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



Oracle ZFS Storage Appliance Racked System ZS9-2 MR Capacity Configuration: 19 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



All-Flash/Mixed Configurations for Oracle ZFS Storage Appliance Racked System ZS9-2 MR

This section provides an overview and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS9-2 MR that consist of all-flash/mixed configurations with either all Oracle Storage Drive Enclosure DE3-24P disk shelves or a mix of Oracle Storage Drive Enclosure DE3-24P and one or both of these disk shelf types:

- Oracle Storage Drive Enclosure DE3-24C

- Oracle Storage Drive Enclosure DE3-12C

High-performance Oracle Storage Drive Enclosure DE3-24P disk shelves comprise either 20 or 24 all-flash SSDs, or 20 or 24 high-speed hard disk drives. Some configurations include read cache and/or log devices.

Maximum performance configurations support Oracle Storage Drive Enclosure DE3-24P disk shelves, while optimum performance configurations support both Oracle Storage Drive Enclosure DE3-24P and DE3-24C and/or DE3-12C disk shelves. Some configurations do not support expansion cabinets.

This section contains the following topics:

- Overview of Oracle ZFS Storage Appliance Racked System ZS9-2 MR with All-Flash/Mixed Configurations
- Base Cabinet Configurations for Oracle ZFS Storage Appliance Racked System ZS9-2 MR with All-Flash/Mixed Configurations

Overview of Oracle ZFS Storage Appliance Racked System ZS9-2 MR with All-Flash/Mixed Configurations

All-Flash/Mixed configurations take advantage of Oracle Storage Drive Enclosure DE3-24P high-performance disk shelves and are available in a base cabinet, or a base cabinet with up to one expansion cabinet for some configurations. Six base cabinet options are offered in a total of 33 possible system configurations, and all base cabinet options contain two Oracle ZFS Storage ZS9-2 MR controllers.

Expansion cabinets can contain one or both of these disk shelf types:

- Oracle Storage Drive Enclosure DE3-24C
- Oracle Storage Drive Enclosure DE3-12C

The total number of disk shelves cannot exceed the available rack space.

> **Note:**
>
> Oracle ZFS Storage Appliance Racked System ZS9-2, which has preset configurations, can be upgraded in the field to any supported configuration for Oracle ZFS Storage ZS9-2. For example, you can upgrade the racked system by adding one disk shelf to a two-disk-shelf configuration, adding cabling for the new disk shelf, and then recabling the disk shelves. Thus, three disk shelves are supported, even though the racked system is not offered in a three-disk-shelf configuration. Complex upgrades require extensive planning and recabling.

Oracle ZFS Storage Appliance Racked System ZS9-2 MR maximum performance configurations feature up to four Oracle Storage Drive Enclosure DE3-24P disk shelves in the base cabinet. The disk shelves are configured as one single shelf per chain to obtain maximum performance. Depending on the number of chains in the base cabinet, Oracle ZFS Storage Appliance Racked System ZS9-2 MR maximum performance configurations can support one expansion cabinet.

Table 9-12 Oracle ZFS Storage Appliance Racked System ZS9-2 MR Maximum Performance Configurations Components

Base Cabinet	Expansion Cabinet
Disk Shelves: • Up to 4 Oracle Storage Drive Enclosure DE3-24P disk shelves • Factory configurations: 1, 2, or 4 Oracle Storage Drive Enclosure DE3-24P disk shelves **Controllers:** • Two Oracle ZFS Storage ZS9-2 MR controllers	**Disk Shelves:** • Oracle Storage Drive Enclosure DE3-24C: – Up to 10 disk shelves • Oracle Storage Drive Enclosure DE3-12C: – Up to 20 disk shelves

Oracle ZFS Storage Appliance Racked System ZS9-2 MR optimum performance configurations feature up to 18 Oracle Storage Drive Enclosure DE3-24P disk shelves, as well as various combinations of Oracle Storage Drive Enclosure DE3-24C and/or DE3-12C and DE3-24P disk shelves in the base cabinet. Depending on the number of chains in the base cabinet, Oracle ZFS Storage Appliance Racked System ZS9-2 MR optimum performance configurations can support up to one expansion cabinet.

Table 9-13 Oracle ZFS Storage Appliance Racked System ZS9-2 MR Optimum Performance Configurations Components

Base Cabinet	Expansion Cabinet
Disk Shelves: • Oracle Storage Drive Enclosure DE3-24P: – Up to 18 disk shelves – Factory configurations: 2, 4, 6, 8, 10, 12, 14, 16, or 18 disk shelves • Mixed Oracle Storage Drive Enclosure DE3-24C / DE3-12C / DE3-24P Disk Shelves: – 2 Oracle Storage Drive Enclosure DE3-24C or 4 DE3-12C, and 2 to 14 DE3-24P – 4 Oracle Storage Drive Enclosure DE3-24C or 8 DE3-12C, and 2 to 10 DE3-24P – 6 Oracle Storage Drive Enclosure DE3-24C or 12 DE3-12C, and 2 to 6 DE3-24P – 8 Oracle Storage Drive Enclosure DE3-24C or 16 DE3-12C, and 2 DE3-24P **Controllers:** • Two Oracle ZFS Storage ZS9-2 MR controllers	**Disk Shelves:** • Oracle Storage Drive Enclosure DE3-24C: – Up to 10 disk shelves • Oracle Storage Drive Enclosure DE3-12C: – Up to 20 disk shelves

The Oracle ZFS Storage Appliance Racked System ZS9-2 MR all-flash/mixed configurations support various storage options.

Table 9-14 Oracle ZFS Storage Appliance Racked System ZS9-2 MR Disk Shelf Device Types and Allowable Configurations

Disk Shelf	Data Devices	Read Cache Devices	Log Devices
Oracle Storage Drive Enclosure DE3-24P All-Flash	7.68 TB SSDs: 24 in slots 0 - 23 or 20 in slots 0 - 19	Not allowed	200 GB SSDs in slot 20 - 23

Table 9-14 (Cont.) Oracle ZFS Storage Appliance Racked System ZS9-2 MR Disk Shelf Device Types and Allowable Configurations

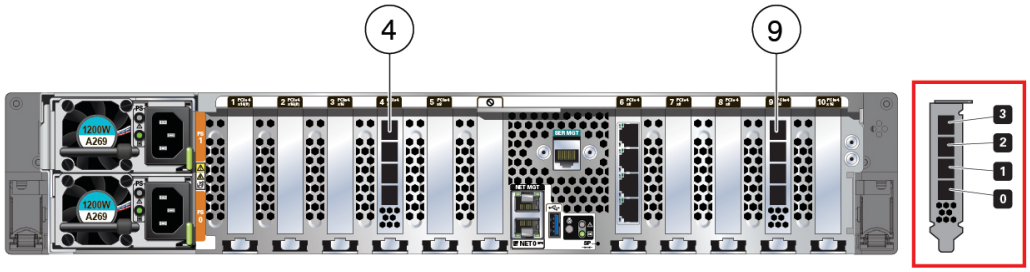
Disk Shelf	Data Devices	Read Cache Devices	Log Devices
Oracle Storage Drive Enclosure DE3-24P	1.2 TB HDDs: 24 in slots 0 - 23 or 20 in slots 0 - 19	7.68 TB SSDs in slot 20 - 23	200 GB SSDs in slot 20 - 23
Oracle Storage Drive Enclosure DE3-24C	22 TB HDDs: 24 in slots 0 - 23 or 20 in slots 0 - 19	7.68 TB SSDs in slot 20 - 23	200 GB SSDs in slot 20 - 23
Oracle Storage Drive Enclosure DE3-12C	18 or 22 TB HDDs: 12 in slots 0 - 11 or 10 in slots 0 - 9	7.68 TB SSDs in slots 10 - 11	200 GB SSDs in slots 10 - 11

Base Cabinet Configurations for Oracle ZFS Storage Appliance Racked System ZS9-2 MR with All-Flash/Mixed Configurations

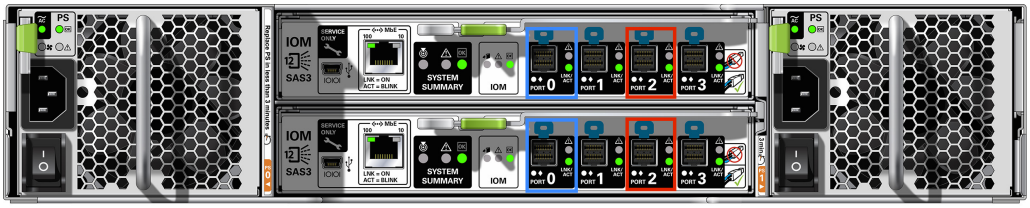
Oracle ZFS Storage Appliance Racked System ZS9-2 MR all-flash/mixed configurations have two SAS-3 HBAs in each controller, which provide the maximum of eight ports of SAS-3 HBA connectivity.

The SAS-3 HBA port numbering order is ascending, from bottom (Port 0) to top (Port 3). Both SAS-3 HBA cards and Oracle Storage Drive Enclosure DE3-24/DE3-12C disk shelves use the SFF 8644 connectors.

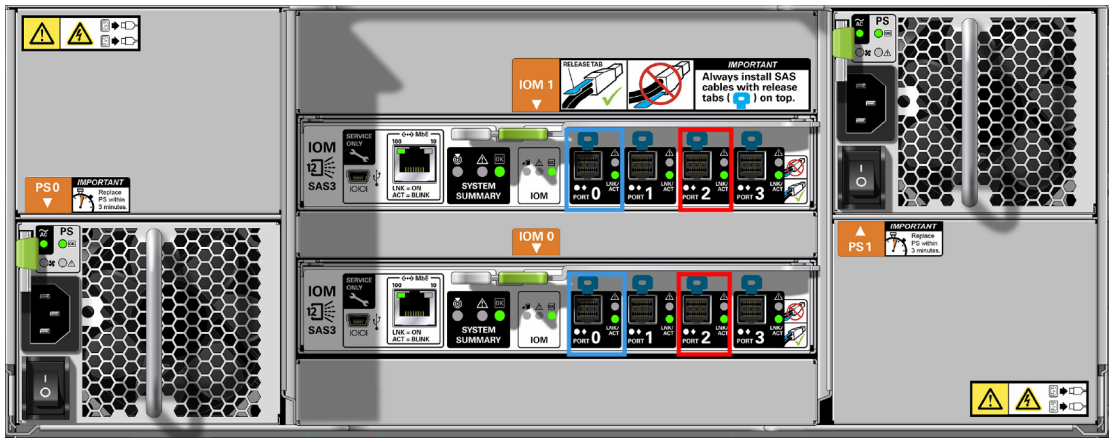
The following figure shows the slot number for each HBA card, as well as the port numbers in each card.



As shown in the following figure, the Oracle Storage Drive Enclosure DE3-24P disk shelf has two I/O modules (IOMs) with four ports each. In all cabling configurations, Port 1 and Port 3 are never used.



As shown in the following figure, the Oracle Storage Drive Enclosure DE3-24C disk shelf has two I/O modules (IOMs) with four ports each. In all cabling configurations, Port 1 and Port 3 are never used.



As shown in the following figure, the Oracle Storage Drive Enclosure DE3-12C disk shelf has two I/O modules (IOMs) with three ports each. In all cabling configurations, Port B is never used.

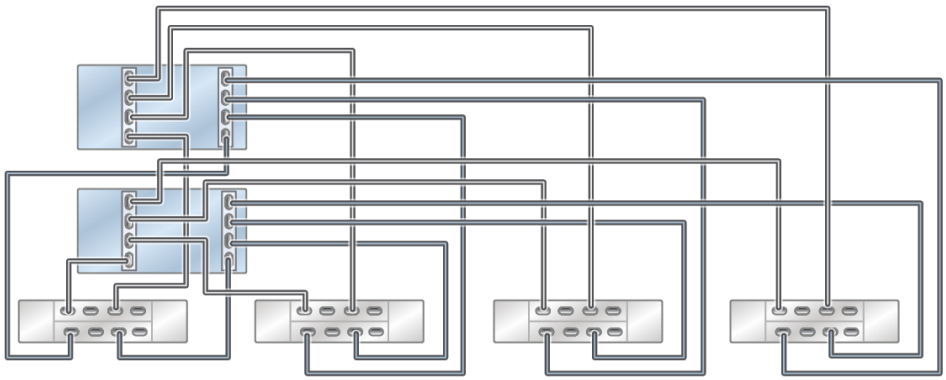
The Oracle ZFS Storage Appliance Racked System ZS9-2 MR cabling configurations follow standard cabling methodologies with additional restrictions that allow use of the cable management arm (CMA). They provide a more practical implementation for SSD log device and read cache device matching, and can be configured for maximum or optimal performance.

Any upgrades that include more than one cabinet that is not an original Oracle ZFS Storage Appliance Racked System ZS9-2 MR or not compatible with Oracle ZFS Storage Appliance Racked System ZS9-2 MR must be re-cabled for that particular configuration. For cabling examples of connecting Oracle Storage Drive Enclosure DE3-24 disk shelves to an Oracle ZFS Storage ZS9-2 MR controller with 4x4 port SAS-3 HBAs, see Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS9-2 Mid-range (MR) Controllers. For cabling examples of connecting Oracle Storage Drive Enclosure DE3-12C disk shelves to an Oracle ZFS Storage ZS9-2 MR controller with 4x4 port SAS-3 HBAs, see Example Mixed Disk Shelf Configurations. For SAS cable length guidelines, see Cabinet and Cabling Guidelines.

The cabinets are self-contained and pre-cabled following the required cabling methodology. The following diagrams illustrate how the six base cabinet options are cabled for configurations with Oracle Storage Drive Enclosure DE3-24C disk shelves.

Oracle ZFS Storage Appliance Racked System ZS9-2 MR Performance Configuration:

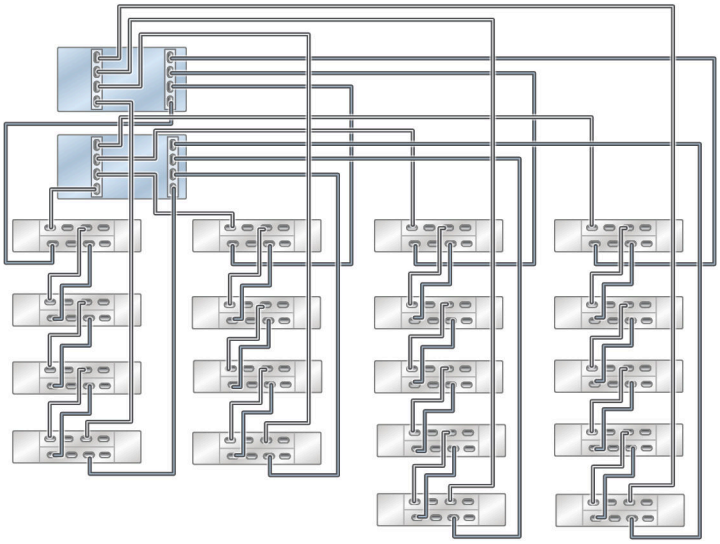
Four Oracle Storage Drive Enclosure DE3-24P Disk Shelves (maximum performance)



This configuration can have one, two, or four Oracle Storage Drive Enclosure DE3-24P disk shelves utilizing the maximum performance cabling scheme.

Oracle ZFS Storage Appliance Racked System ZS9-2 MR Performance Configuration:

18 Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)

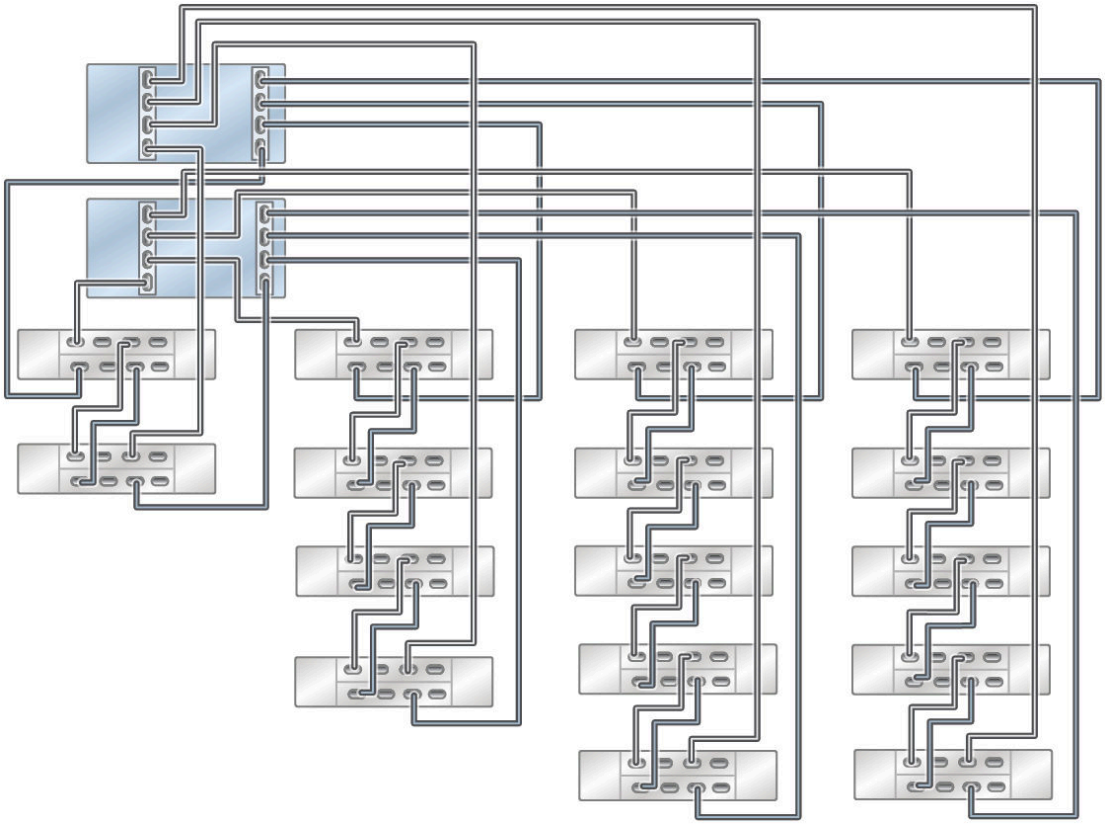


Oracle Storage Drive Enclosure DE3-24P disk shelves in this configuration are added in pairs. Any other combination of disk shelves are added by pairs starting at the bottom of the rack. Valid disk shelf count combinations are 2, 4, 6, 8, 10, 12, 14, 16, and 18 disk shelves.

Oracle ZFS Storage Appliance Racked System ZS9-2 MR Performance Configuration:

Two Oracle Storage Drive Enclosure DE3-24C (bottom left) and

Two Oracle Storage Drive Enclosure DE3-24P to 14 DE3-24P Disk Shelves (optimum performance)

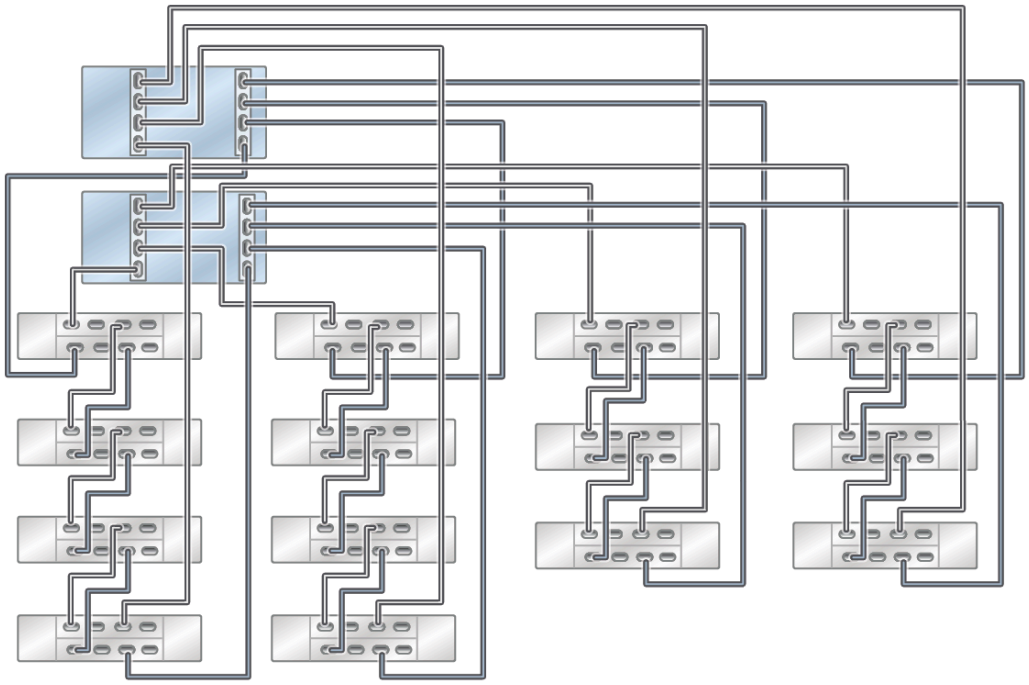


Oracle Storage Drive Enclosure DE3-24P disk shelves in this configuration are added in pairs. Any other combination of disk shelves are added by pairs starting at the bottom of the rack. Valid disk shelf count combinations are 2, 4, 6, 8, 10, 12, 14, and 16 disk shelves.

Oracle ZFS Storage Appliance Racked System ZS9-2 MR Performance Configuration:

Four Oracle Storage Drive Enclosure DE3-24C (bottom left) and

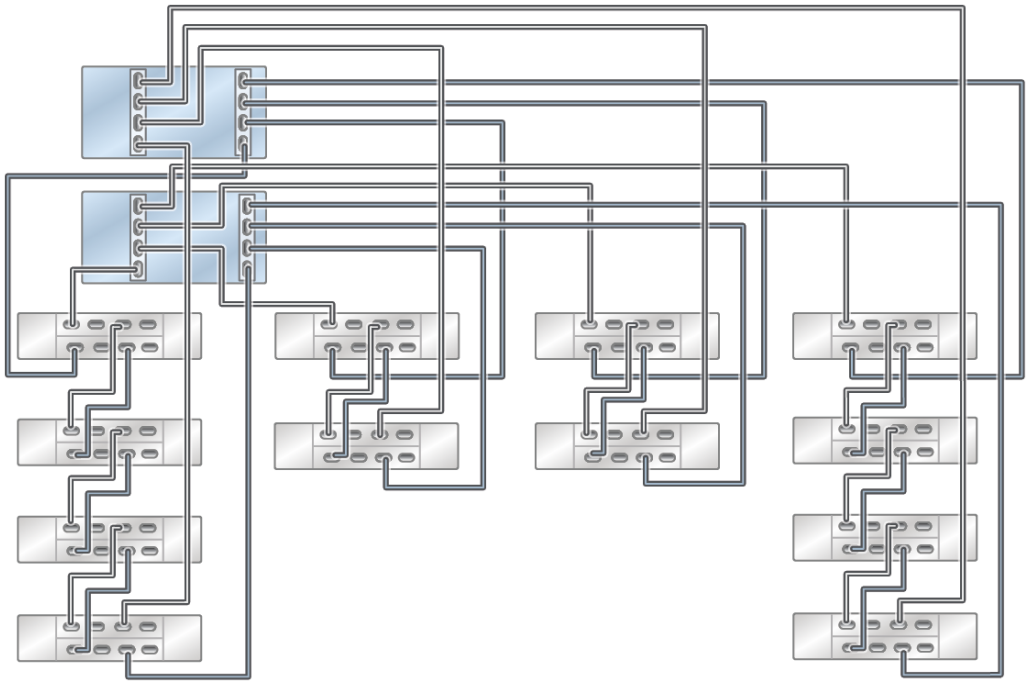
Two Oracle Storage Drive Enclosure DE3-24P to Ten DE3-24P Disk Shelves (optimum performance)



Oracle ZFS Storage Appliance Racked System ZS9-2 MR Performance Configuration:

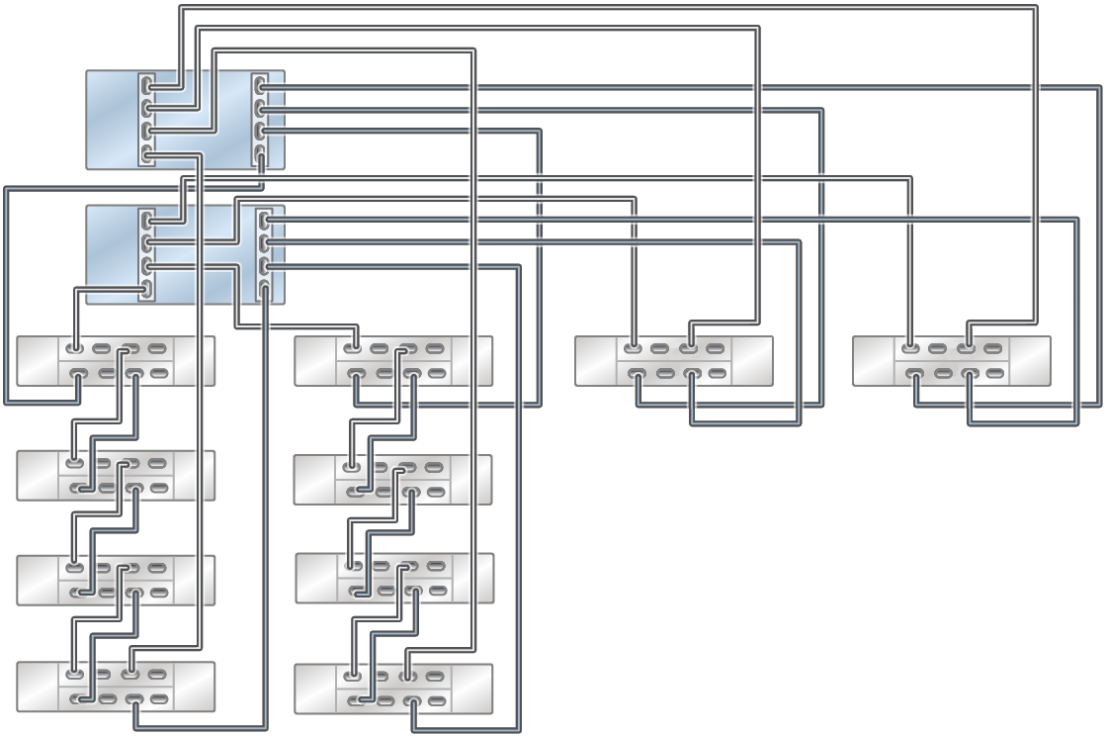
Six Oracle Storage Drive Enclosure DE3-24C (first two chains from the left) and

Two Oracle Storage Drive Enclosure DE3-24P to Six DE3-24P Disk Shelves (optimum performance)



Oracle ZFS Storage Appliance Racked System ZS9-2 MR Performance Configuration:

Eight Oracle Storage Drive Enclosure DE3-24C (first two chains from the left) and Two Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)



10

Oracle ZFS Storage Appliance Racked System ZS7-2

This section provides overviews and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS7-2, which is a pre-racked and pre-cabled system that supports two configuration types: Oracle ZFS Storage Appliance Racked System ZS7-2 high-end (HE) model configurations, and Oracle ZFS Storage Appliance Racked System ZS7-2 mid-range (MR) model configurations.

This section contains the following topics:

- Oracle ZFS Storage Appliance Racked System ZS7-2 High-end (HE) Configurations
- Oracle ZFS Storage Appliance Racked System ZS7-2 Mid-range (MR) Configurations

Oracle ZFS Storage Appliance Racked System ZS7-2 High-end (HE) Configurations

This section provides overviews and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS7-2 HE, which is a pre-racked and pre-cabled system that supports two configuration types: capacity configurations and performance configurations.

This section contains the following topics:

- Capacity Configurations for Oracle ZFS Storage Appliance Racked System ZS7-2 HE
- All-Flash/Mixed Configurations for Oracle ZFS Storage Appliance Racked System ZS7-2 HE

Capacity Configurations for Oracle ZFS Storage Appliance Racked System ZS7-2 HE

This section provides an overview and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS7-2 HE capacity configurations.

This section contains the following topics:

- Overview of Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configurations
- Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configurations

Overview of Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configurations

Capacity configurations take advantage of high-capacity disk shelves and are available in a base cabinet, or a base cabinet with up to three expansion cabinets. Two Oracle ZFS

Storage ZS7-2 HE controllers and up to 39 disk shelves can be supported, as shown in the following table.

> **Note:**
>
> Oracle ZFS Storage Appliance Racked System ZS7-2, which has preset configurations, can be upgraded in the field to any supported configuration for Oracle ZFS Storage ZS7-2. For example, you can upgrade the racked system by adding one disk shelf to a two-disk-shelf configuration, adding cabling for the new disk shelf, and then recabling the disk shelves. Thus, three disk shelves are supported, even though the racked system is not offered in a three-disk-shelf configuration. Complex upgrades require extensive planning and recabling.

Table 10-1 Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configurations Components

Base Cabinet	Expansion Cabinet 1	Expansion Cabinet 2	Expansion Cabinet 3
Up to 9 Oracle Storage Drive Enclosure DE3-24C disk shelves in 2 chains Factory configurations: 1, 2, 4, 6, 8, or 9 Oracle Storage Drive Enclosure DE3-24C disk shelves Two Oracle ZFS Storage ZS7-2 HE controllers	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves Factory configurations: 2, 4, 5, 6, 8, or 10 Oracle Storage Drive Enclosure DE3-24C disk shelves	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves
Up to 9 Oracle Storage Drive Enclosure DE3-24C disk shelves in 4 chains Factory configurations: 1, 2, 4, 6, 8, or 9 Oracle Storage Drive Enclosure DE3-24C disk shelves Two Oracle ZFS Storage ZS7-2 HE controllers	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves	Not supported
Up to 9 Oracle Storage Drive Enclosure DE3-24C disk shelves in 8 chains Factory configurations: 1, 2, 4, 6, 8, or 9 Oracle Storage Drive Enclosure DE3-24C disk shelves Two Oracle ZFS Storage ZS7-2 HE controllers	Not supported	Not supported	Not supported

Each Oracle ZFS Storage Appliance Racked System ZS7-2 HE base cabinet comprises 1, 2, 4, 6, 8, or 9 Oracle Storage Drive Enclosure DE3-24C disk shelves. Each expansion cabinet comprises 2, 4, 5 (half rack), 6, 8, or 10 Oracle Storage Drive Enclosure DE3-24C disk shelves. A maximum of 39 disk shelves can be accommodated with one base cabinet and three expansion cabinets.

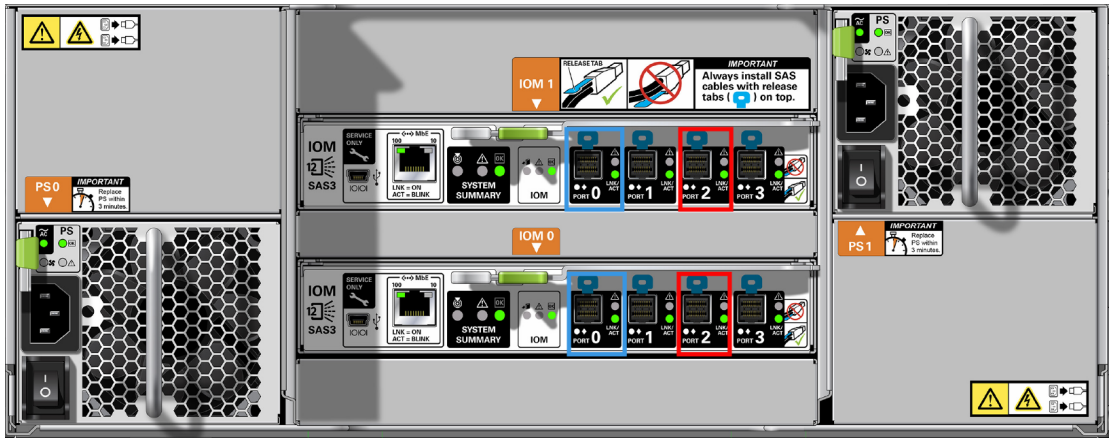
Each Oracle ZFS Storage ZS7-2 HE controller has four SAS HBA cards. Clustered Oracle ZFS Storage ZS7-2 HE controllers support a high-availability configuration consisting of:

- Up to nine disk shelves in the base cabinet configured in two, four, or eight chains, and
- Up to three expansion cabinets, each cabinet supporting two chains with a maximum of 5 disk shelves per disk chain, for a total of 10 disk shelves for one expansion cabinet, 20 disk shelves for two expansion cabinets, or 30 disk shelves for three expansion cabinets.

The cabinets are self-contained and pre-cabled following the required cabling methodology. Pre-racked system cabling tables and diagrams, which can also be used for planning future system expansion, are provided in the section Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configurations.

Each cabinet contains 42 rack units (RUs), with RU01 on the bottom. Each Oracle ZFS Storage ZS7-2 HE controller occupies two rack units, and its location is referenced by the bottommost rack unit number. The top controller is referred to as Controller 1 and is located in RU20 in the base cabinet, and the bottom controller is Controller 0 in RU17. The following figure shows the slot number for each HBA card, as well as the port numbers in each card.

Each Oracle Storage Drive Enclosure DE3-24C disk shelf occupies four rack units, and disk shelves are normally installed from the bottom of the base cabinet to the top for stability. Because the Oracle ZFS Storage ZS7-2 HE controller occupies two rack units, the base cabinet contains a filler panel above each controller so that the cabinet layout is similar to prior offerings of Oracle racked systems with three-rack-unit controllers. It also allows for better serviceability access and cabling through the rear cable management arm (CMA). As shown in the following figure, the Oracle Storage Drive Enclosure DE3-24C disk shelf has two I/O Modules (IOMs) with four ports each. In all cabling configurations, Port 1 and Port 3 are never used.



Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configurations

The following table describes the locations and port connections for two controllers and nine disk shelves in the base cabinet, using 3-meter optical SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs.

The following tables are for configurations of two chains in the base cabinet and two chains per expansion cabinet, therefore allowing a maximum of 39 disk shelves.

Table 10-2 Base Cabinet: Controller and Disk Shelf Locations and Connections (Two Chains)

FROM	TO			
RU	**CONTROLLER**	**HBA PORT**	**RU**	**DISK SHELF PORT**
20	1	Slot 2, Port 0	1	IOM 1, Port 2
17	0	Slot 3, Port 0	1	IOM 0, Port 2
20	1	Slot 9, Port 0	23	IOM 1, Port 2
17	0	Slot 10, Port 0	23	IOM 0, Port 2
17	0	Slot 2, Port 0	1, 5, 13	IOM 1, Port 0
20	1	Slot 3, Port 0	1, 5, 13	IOM 0, Port 0
17	0	Slot 9, Port 0	27, 35, 39	IOM 1, Port 0
20	1	Slot 10, Port 0	27, 35, 39	IOM 0, Port 0

The following table describes the locations and port connections for 10 disk shelves in Expansion Cabinet 1, using 6-meter optical SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs. Expansion Cabinet 1 supports disk shelves 10 through 19.

Table 10-3 Expansion Cabinet 1: Controller and Disk Shelf Locations and Connections (Two Chains)

FROM	TO			
RU	**CONTROLLER**	**HBA PORT**	**RU**	**DISK SHELF PORT**
20	1	Slot 2, Port 1	1	IOM 1, Port 2
17	0	Slot 3, Port 1	1	IOM 0, Port 2
20	1	Slot 9, Port 1	21	IOM 1, Port 2
17	0	Slot 10, Port 1	21	IOM 0, Port 2
17	0	Slot 2, Port 1	5, 9, 13, 17	IOM 1, Port 0
20	1	Slot 3, Port 1	5, 9, 13, 17	IOM 0, Port 0
17	0	Slot 9, Port 1	25, 33, 37	IOM 1, Port 0
20	1	Slot 10, Port 1	25, 33, 37	IOM 0, Port 0

The following table describes the locations and port connections for 10 disk shelves in Expansion Cabinet 2, using 6-meter optical SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs. Expansion Cabinet 2 supports disk shelves 20 through 29.

Table 10-4 Expansion Cabinet 2: Controller and Disk Shelf Locations and Connections (Two Chains)

FROM	TO			
RU	**CONTROLLER**	**HBA PORT**	**RU**	**DISK SHELF PORT**
20	1	Slot 2, Port 2	1	IOM 1, Port 2
17	0	Slot 3, Port 2	1	IOM 0, Port 2
20	1	Slot 9, Port 2	21	IOM 1, Port 2
17	0	Slot 10, Port 2	21	IOM 0, Port 2
17	0	Slot 2, Port 2	5, 9, 13, 17	IOM 1, Port 0
20	1	Slot 3, Port 2	5, 9, 13, 17	IOM 0, Port 0
17	0	Slot 9, Port 2	25, 33, 37	IOM 1, Port 0
20	1	Slot 10, Port 2	25, 33, 37	IOM 0, Port 0

The following table describes the locations and port connections for 10 disk shelves in Expansion Cabinet 3, using 6-meter optical SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs. Expansion Cabinet 2 supports disk shelves 30 through 39.

Table 10-5 Expansion Cabinet 3: Controller and Disk Shelf Locations and Connections (Two Chains)

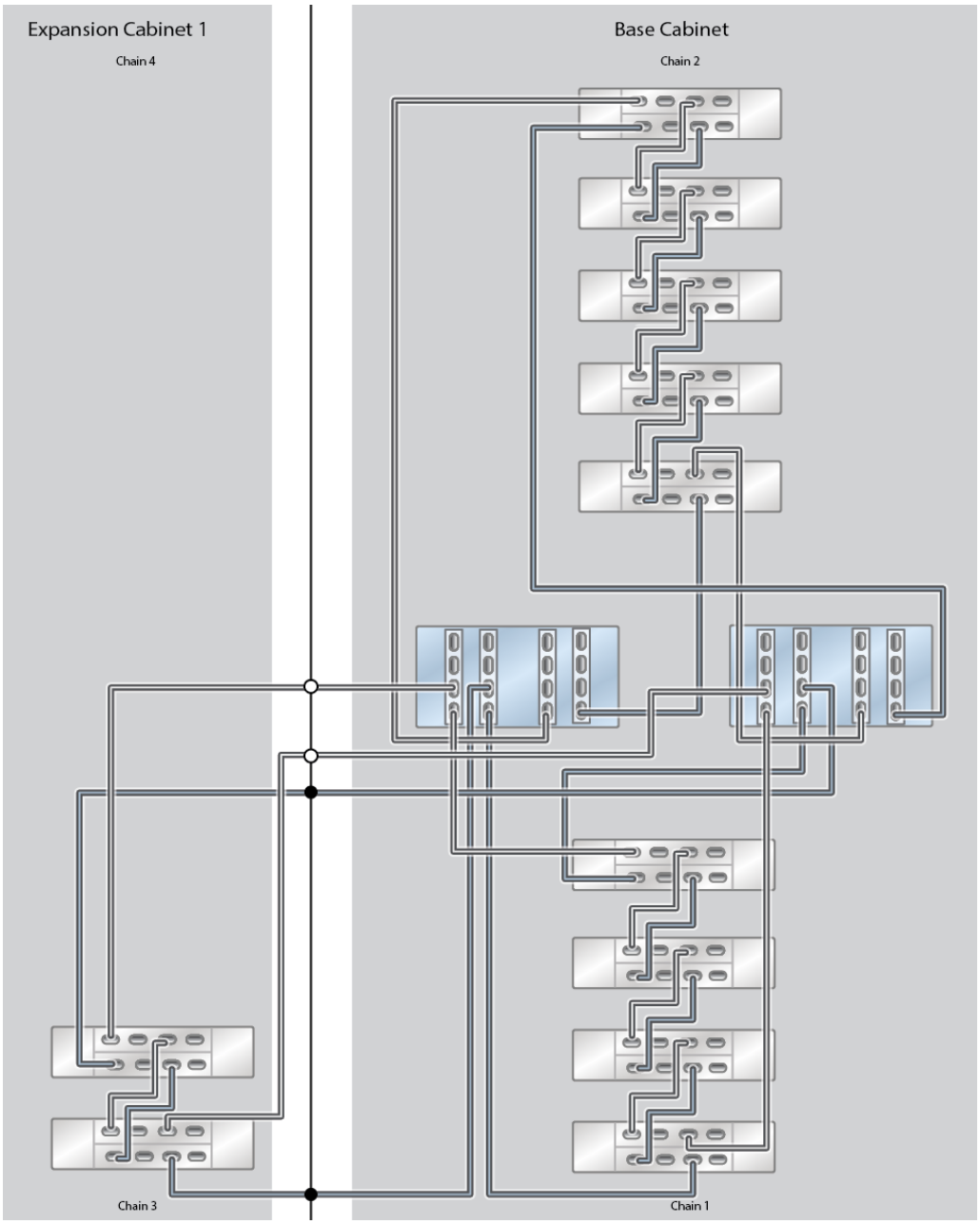
FROM	TO			
RU	**CONTROLLER**	**HBA PORT**	**RU**	**DISK SHELF PORT**
20	1	Slot 2, Port 3	1	IOM 1, Port 2
17	0	Slot 3, Port 3	1	IOM 0, Port 2
20	1	Slot 9, Port 3	21	IOM 1, Port 2
17	0	Slot 10, Port 3	21	IOM 0, Port 2
17	0	Slot 2, Port 3	5, 9, 13, 17	IOM 1, Port 0
20	1	Slot 3, Port 3	5, 9, 13, 17	IOM 0, Port 0
17	0	Slot 9, Port 3	25, 33, 37	IOM 1, Port 0
20	1	Slot 10, Port 3	25, 33, 37	IOM 0, Port 0

The following diagrams illustrate how pre-racked systems are cabled, as well as how to expand your system in the future. The legend for each diagram is as follows:

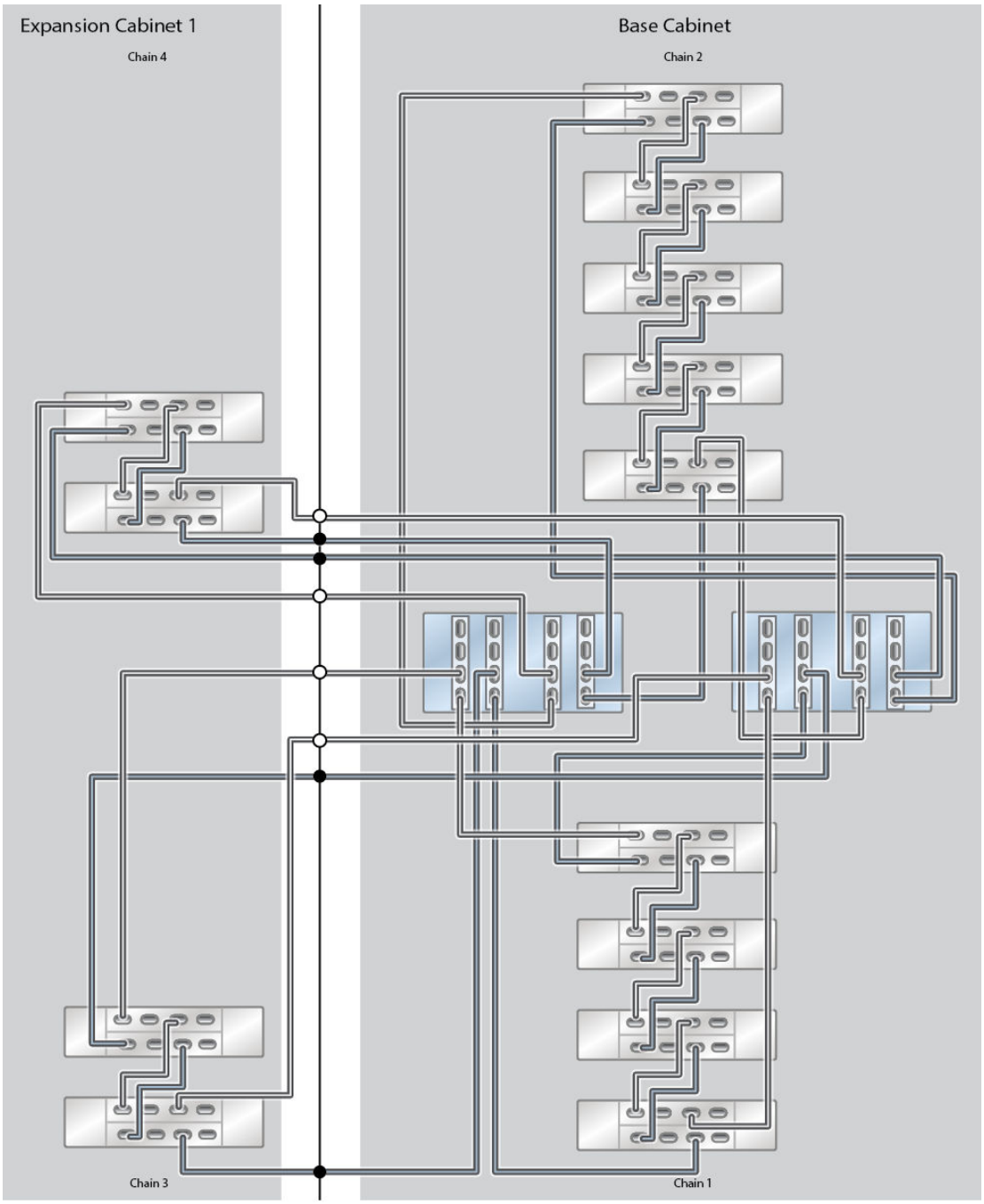
- A hollow circle indicates the cable connection to the top IOM (IOM 1).
- A solid circle indicates the cable connection to the bottom IOM (IOM 0).

Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configuration:

11 Oracle Storage Drive Enclosure DE3-24C Disk Shelves

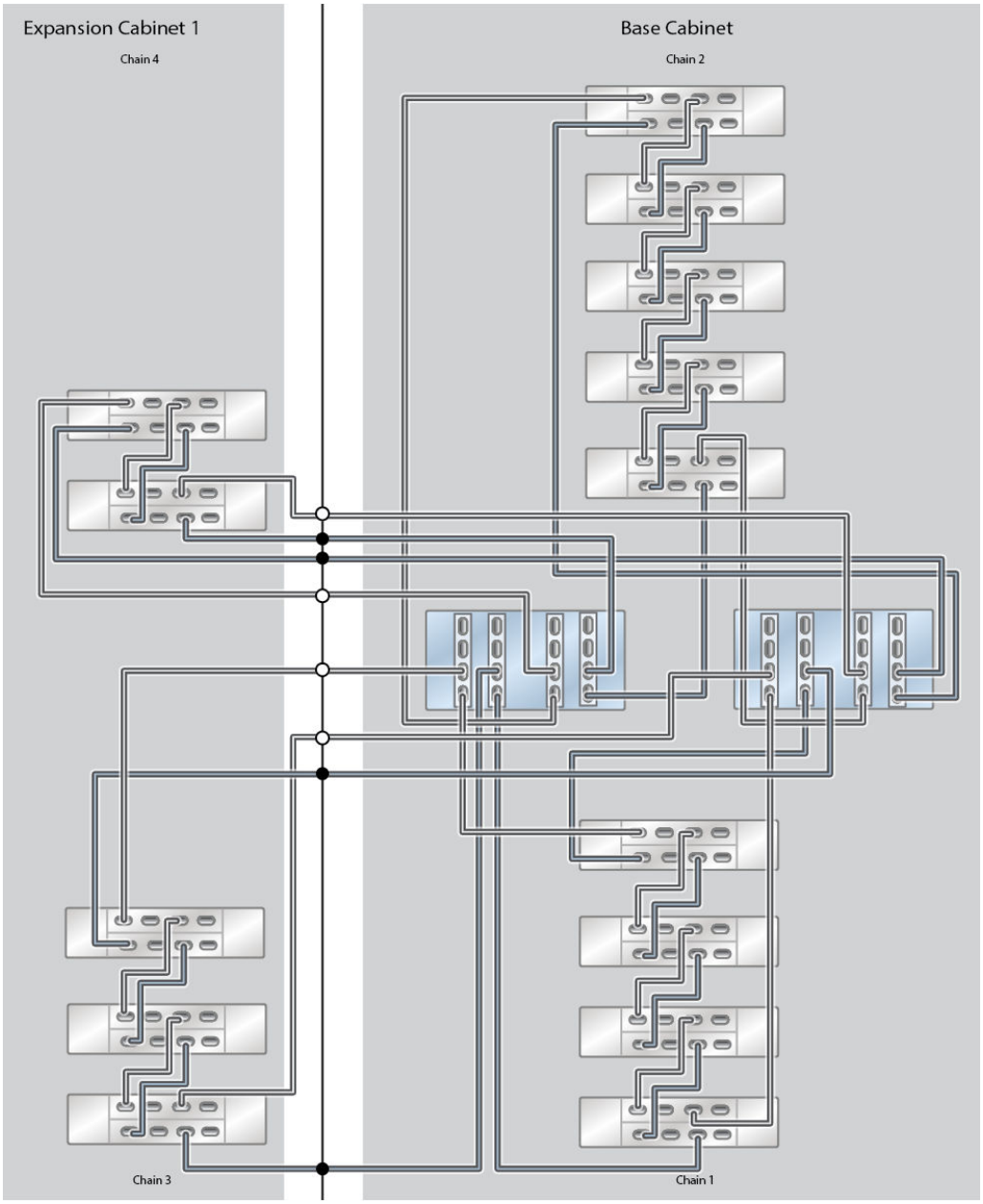


Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configuration: 13 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



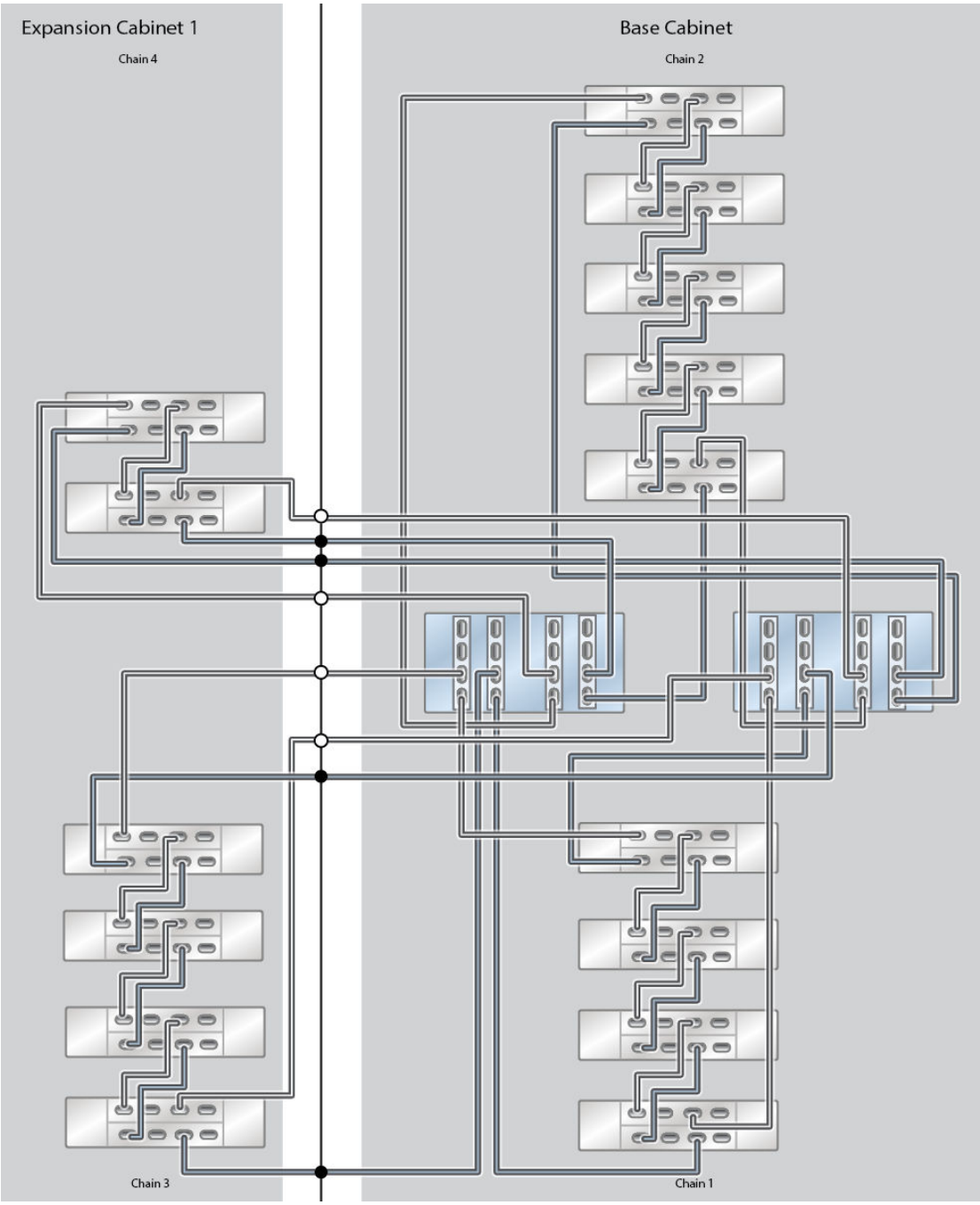
Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configuration:

14 Oracle Storage Drive Enclosure DE3-24C Disk Shelves (Expansion Cabinet 1 Half Rack)



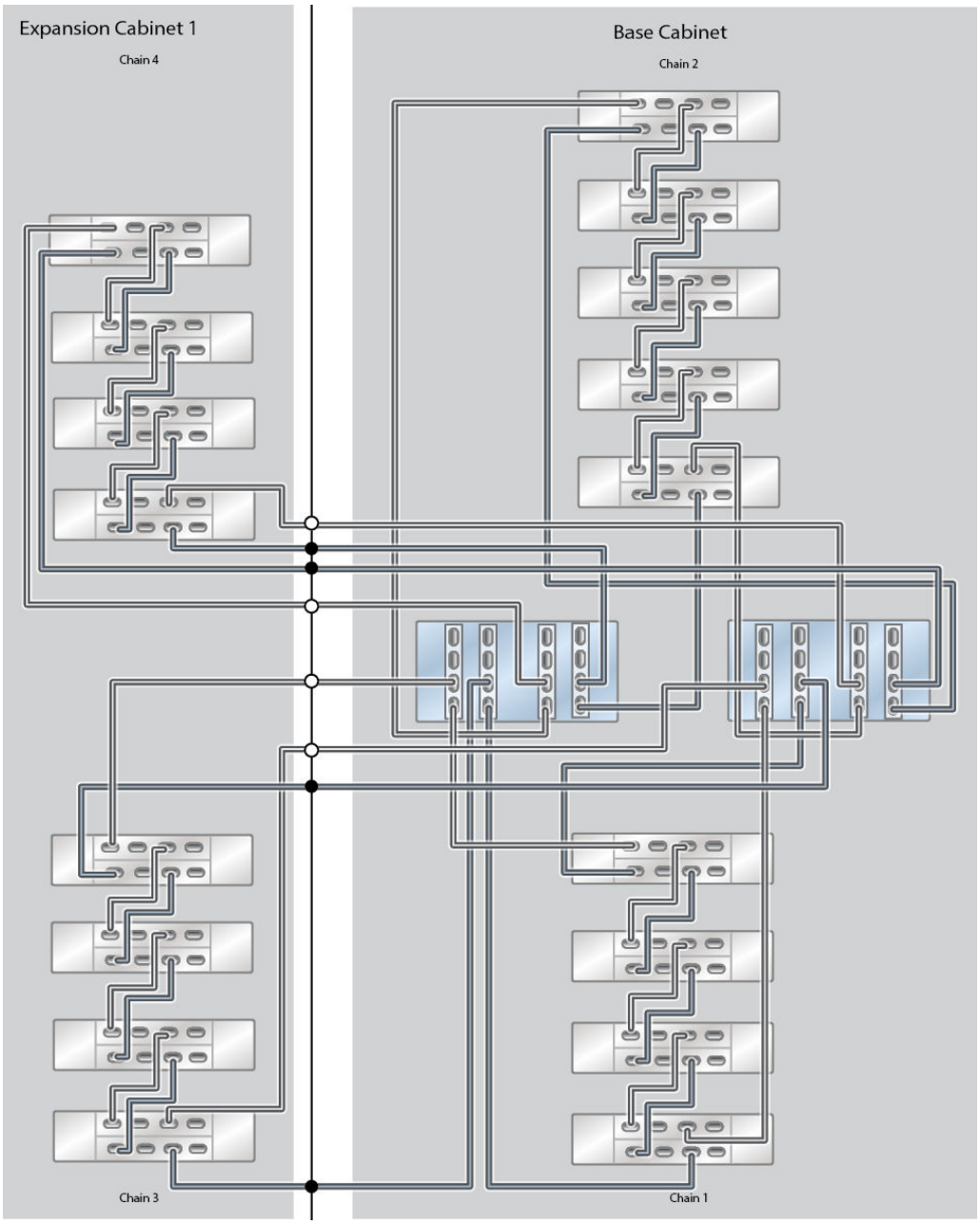
Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configuration:

15 Oracle Storage Drive Enclosure DE3-24C Disk Shelves

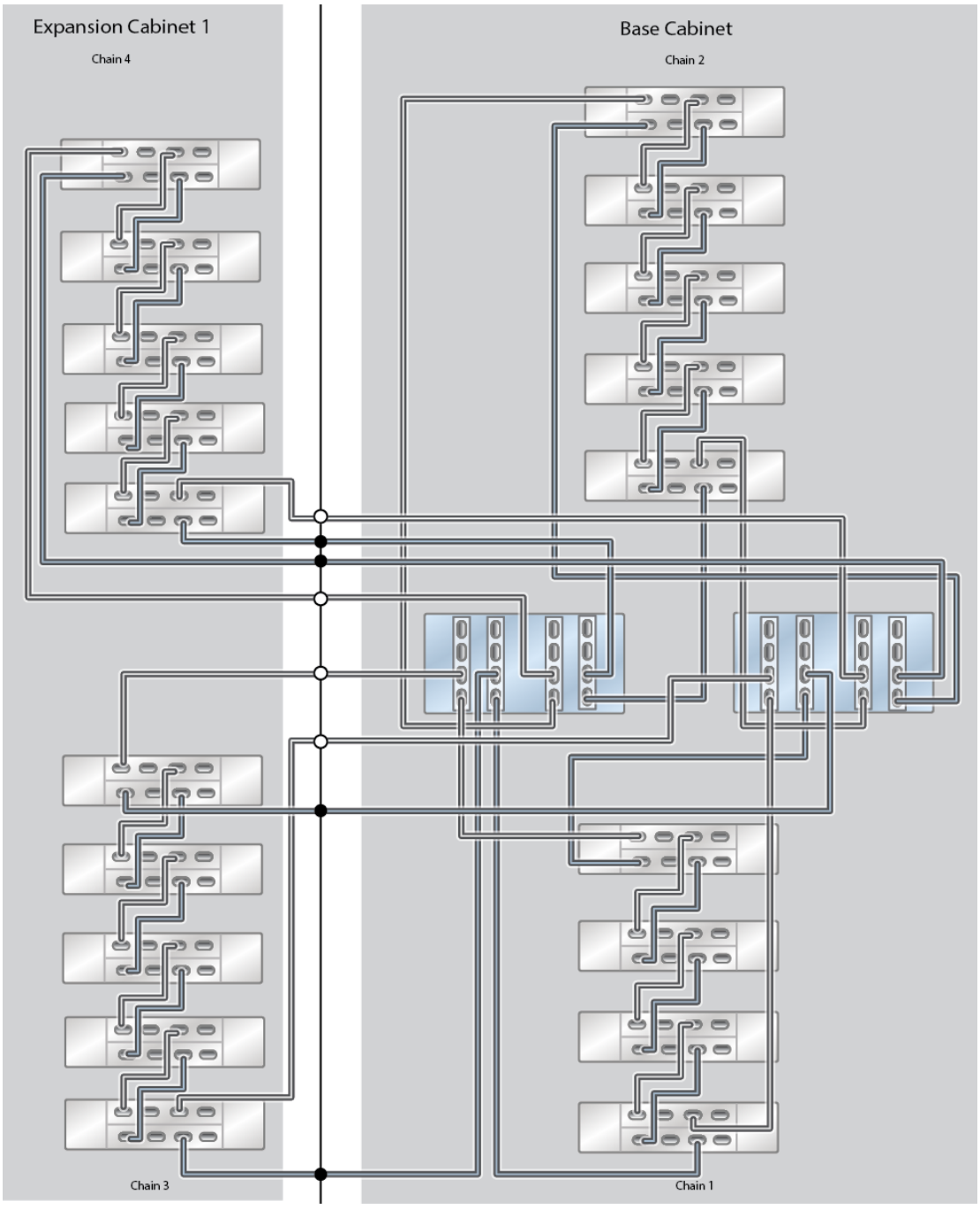


Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configuration:

17 Oracle Storage Drive Enclosure DE3-24C Disk Shelves

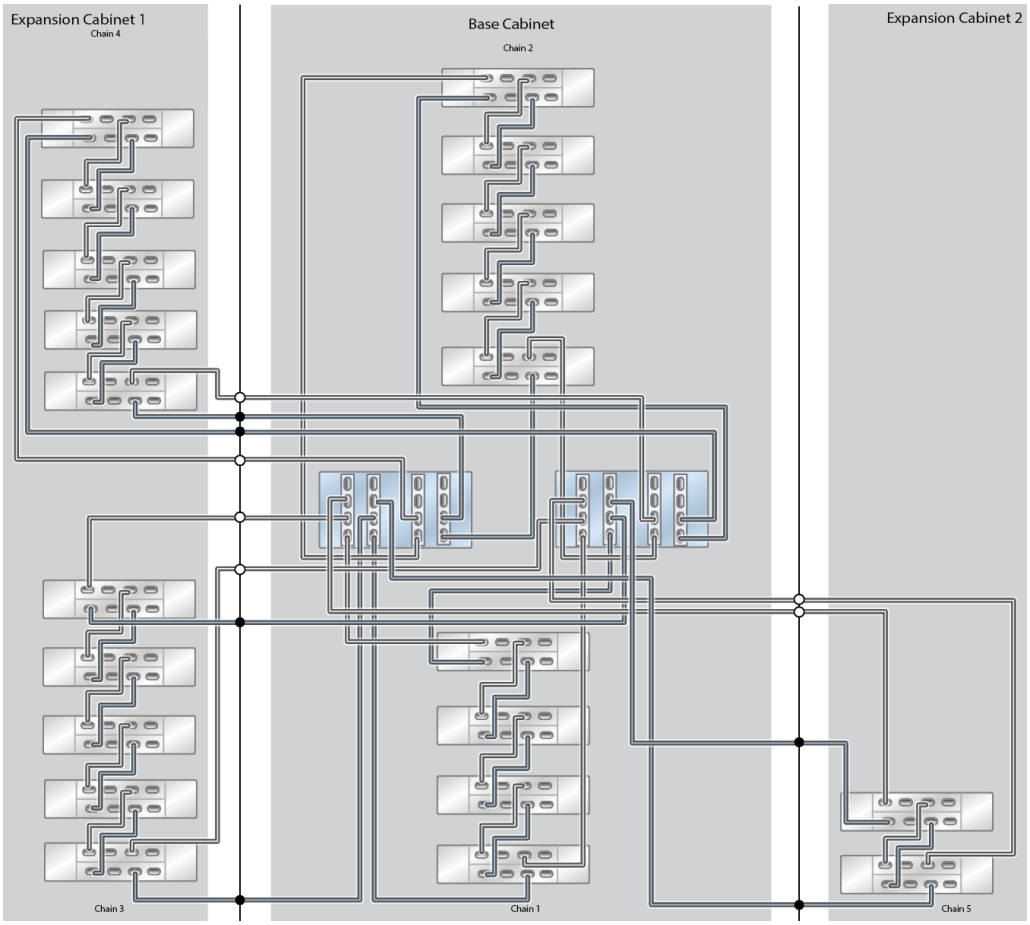


Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configuration: 19 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



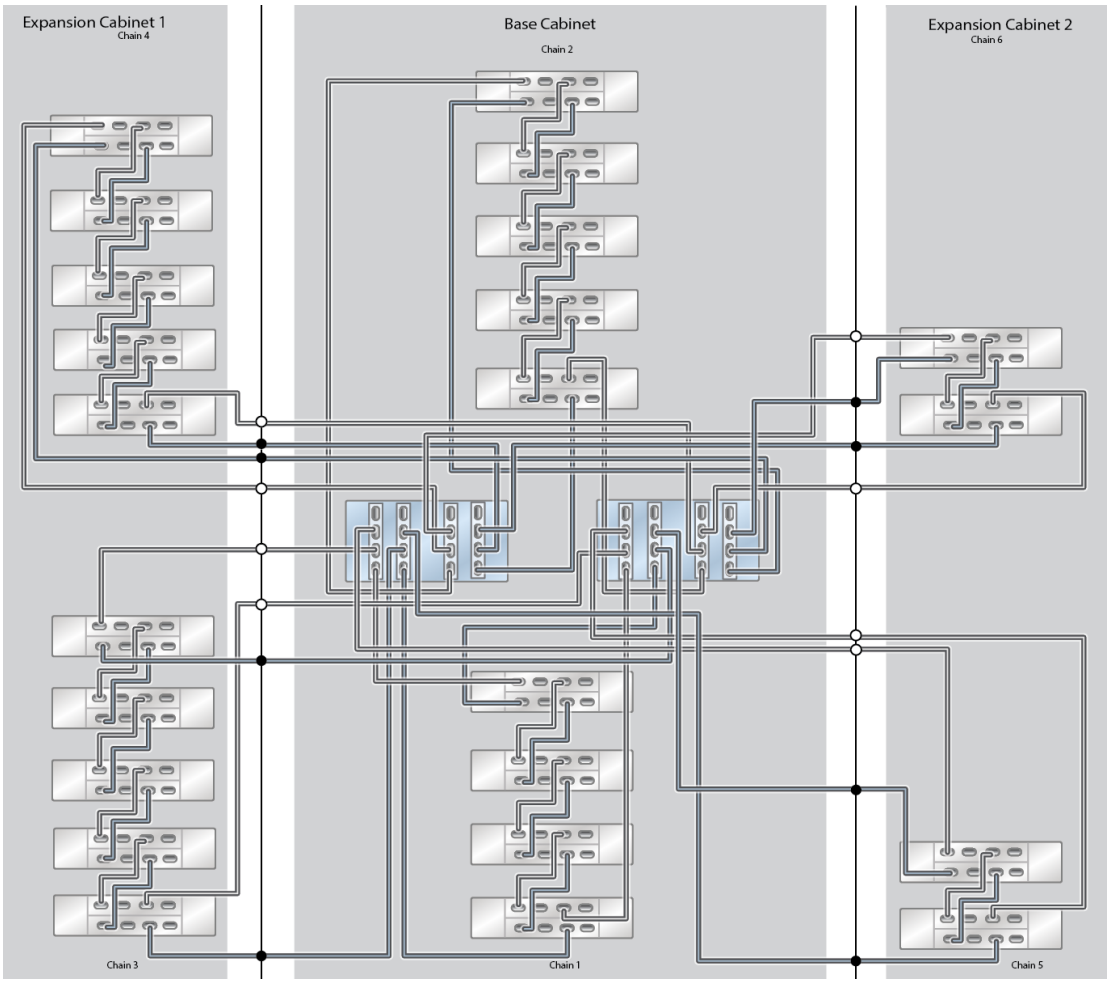
Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configuration:

21 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



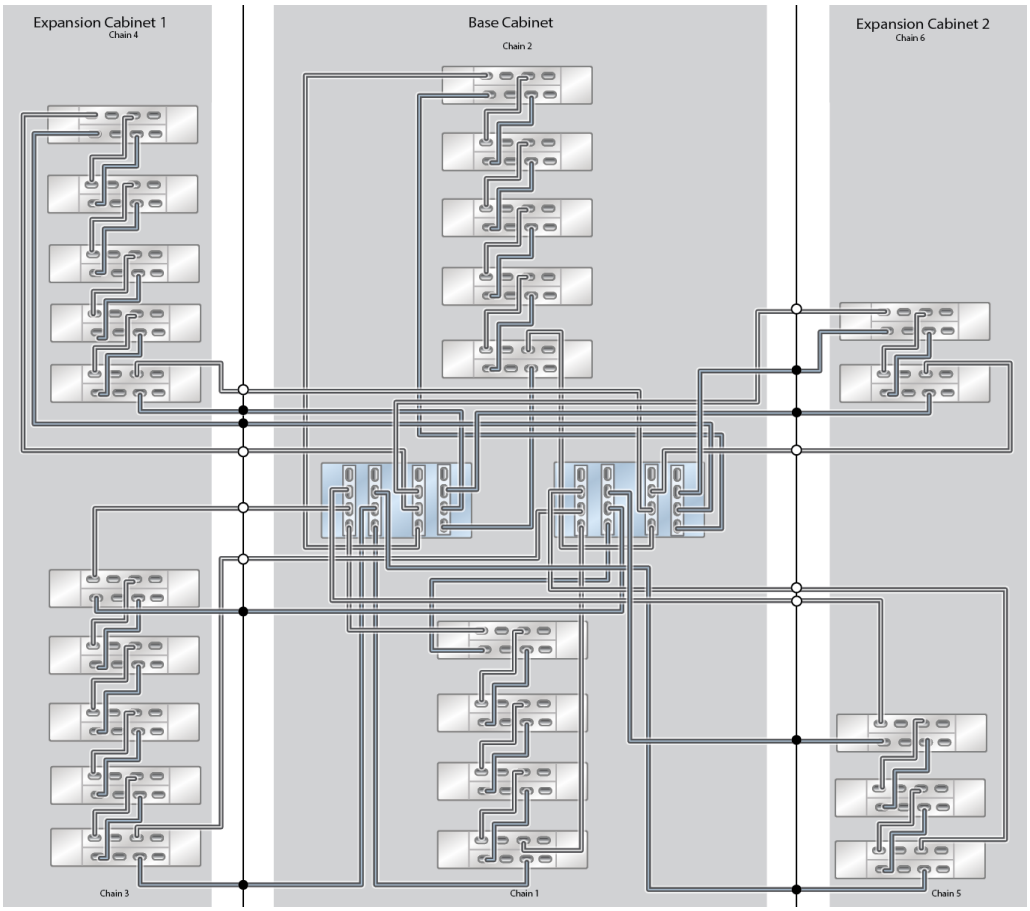
Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configuration:

23 Oracle Storage Drive Enclosure DE3-24C Disk Shelves

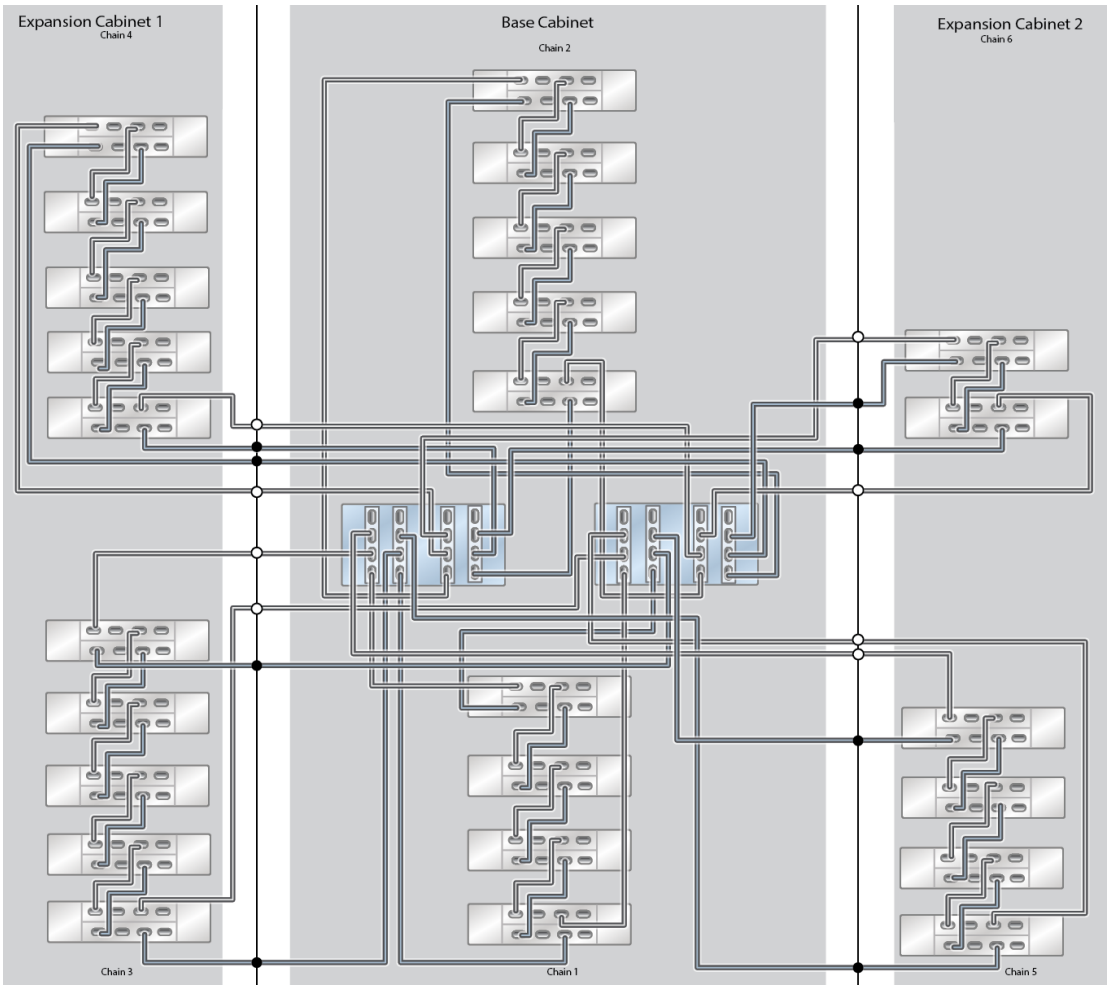


Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configuration:

24 Oracle Storage Drive Enclosure DE3-24C Disk Shelves (Expansion Cabinet 2 Half Rack)

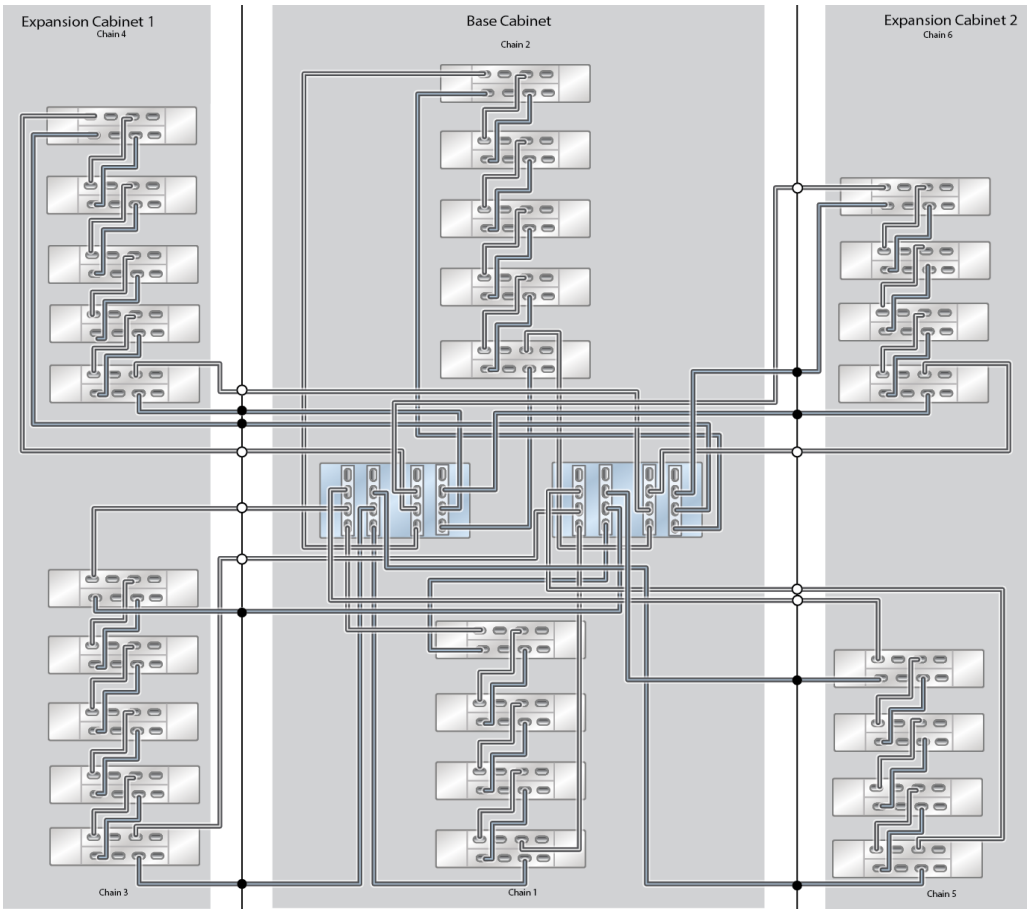


Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configuration: 25 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



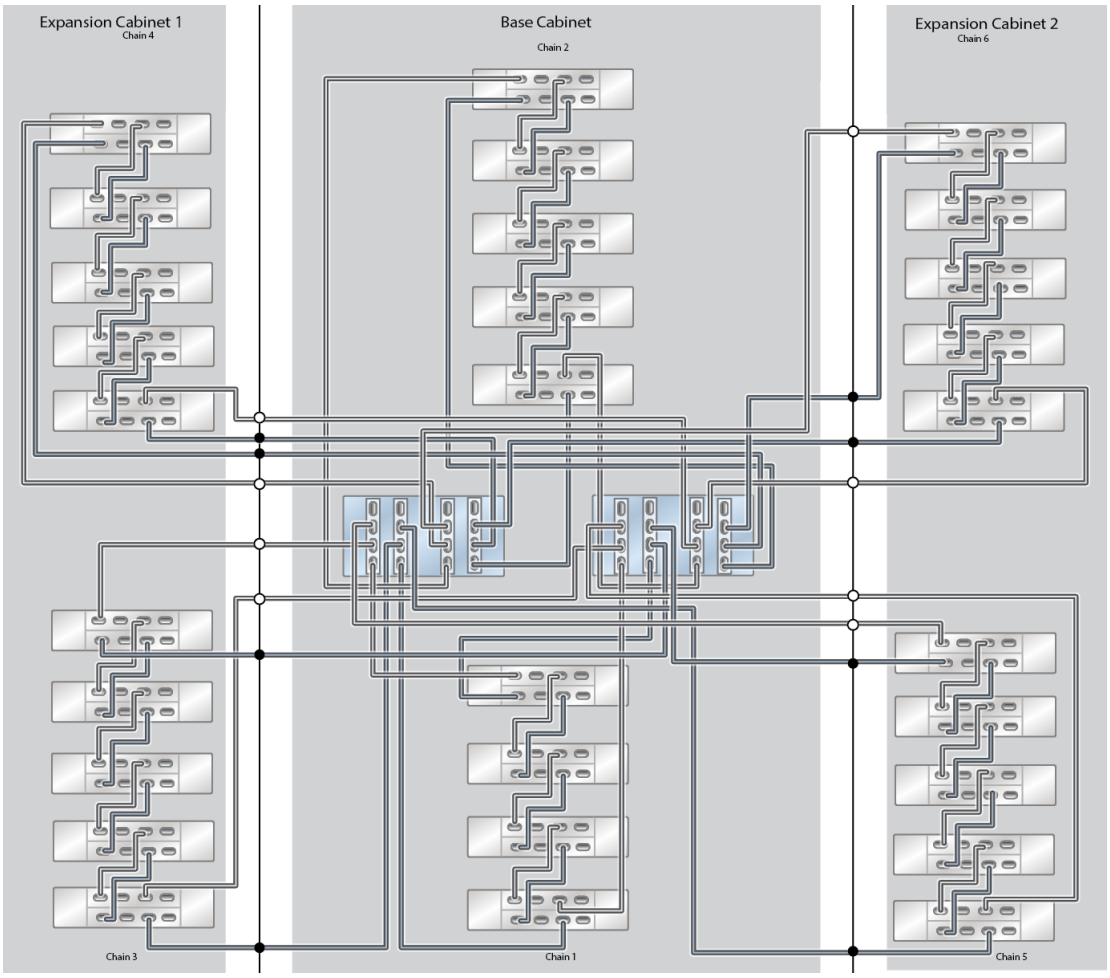
Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configuration:

27 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



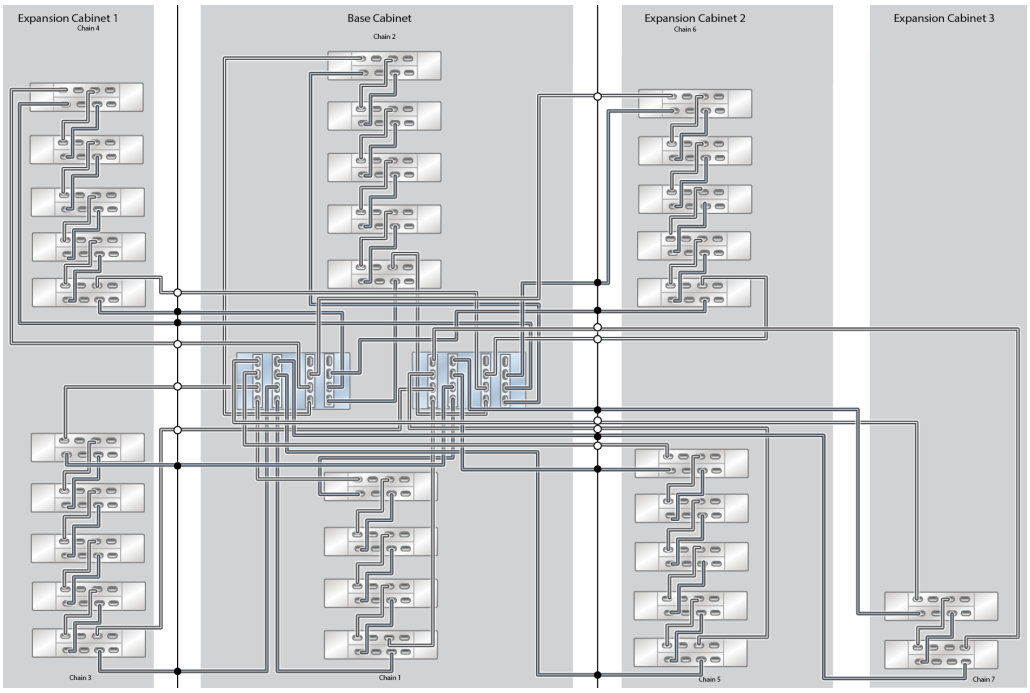
Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configuration:

29 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



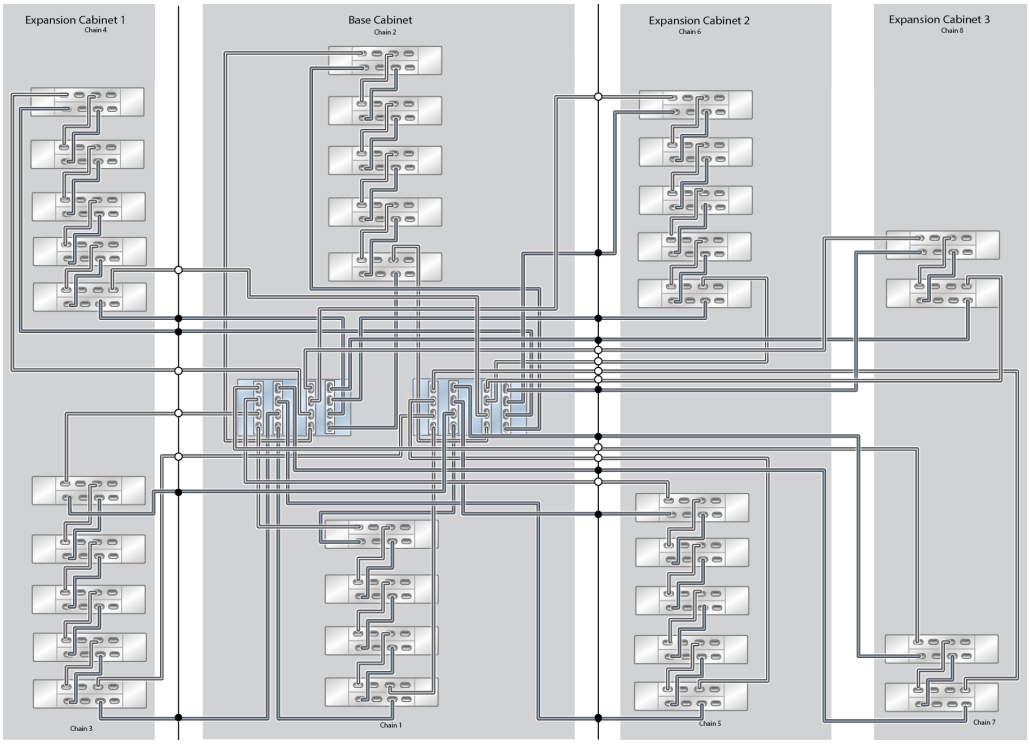
Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configuration:

31 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



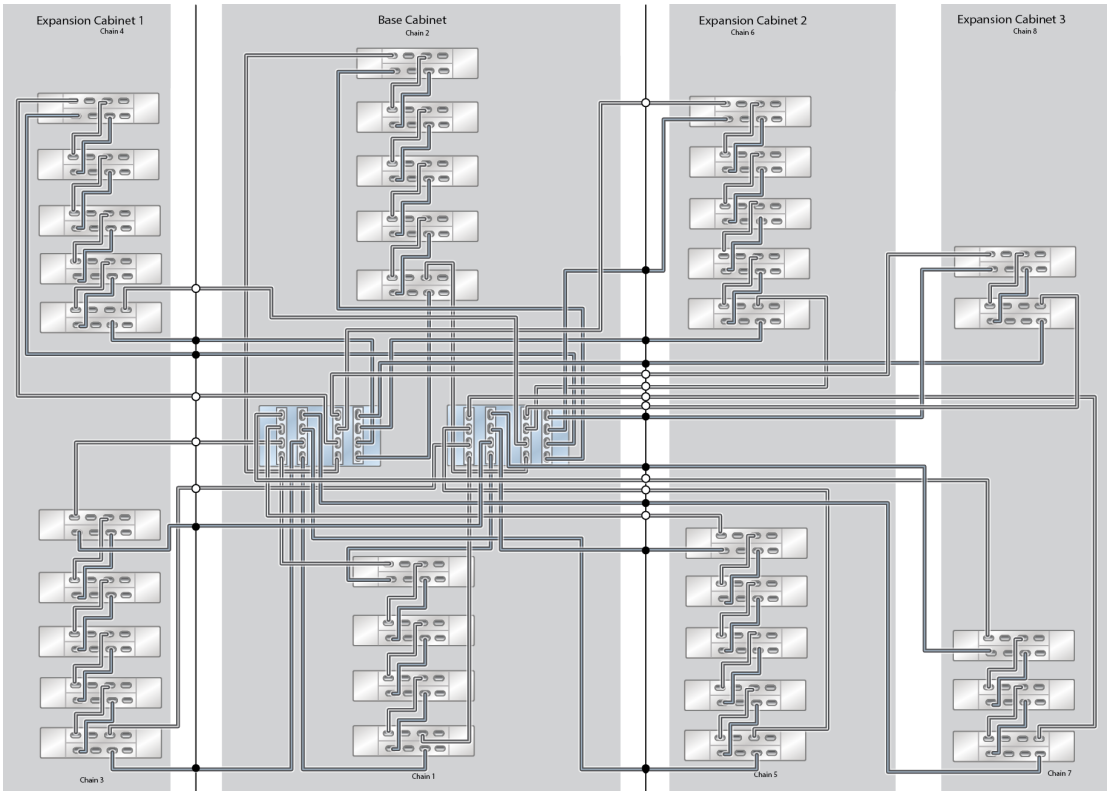
Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configuration:

33 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



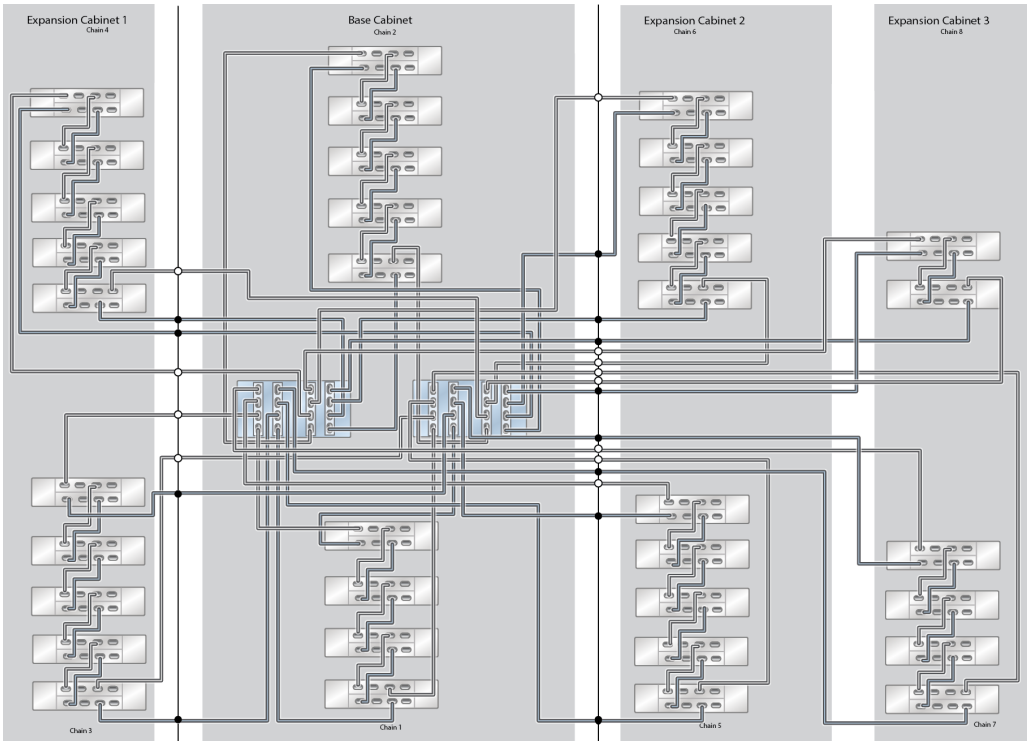
Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configuration:

34 Oracle Storage Drive Enclosure DE3-24C Disk Shelves (Expansion Cabinet 3 Half Rack)



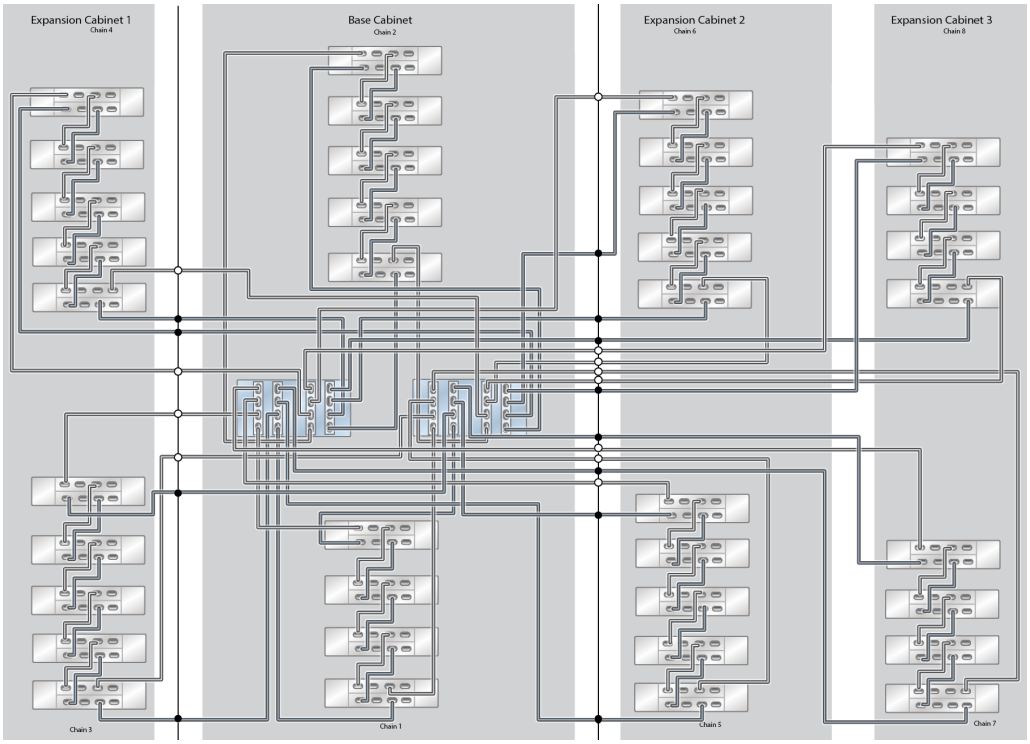
Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configuration:

35 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



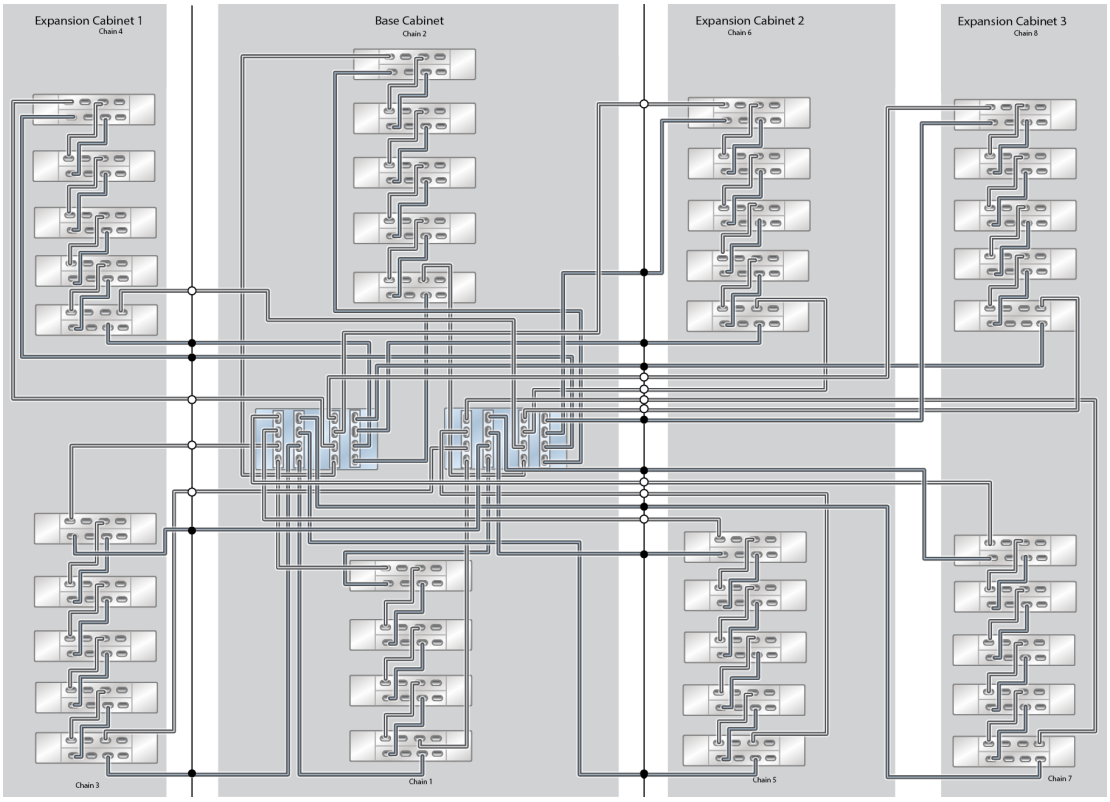
Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configuration:

37 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



Oracle ZFS Storage Appliance Racked System ZS7-2 HE Capacity Configuration:

39 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



All-Flash/Mixed Configurations for Oracle ZFS Storage Appliance Racked System ZS7-2 HE

This section provides an overview and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS7-2 HE that consist of all-flash/mixed configurations with either all Oracle Storage Drive Enclosure DE3-24P disk shelves, or a mix of Oracle Storage Drive Enclosure DE3-24P and DE3-24C disk shelves. High-performance Oracle Storage Drive Enclosure DE3-24P disk shelves comprise either 20 or 24 all-flash SSDs, or 20 or 24 high-speed hard disk drives. Some configurations include read cache and/or log devices. Maximum performance configurations support Oracle Storage Drive Enclosure DE3-24P disk shelves, while optimum performance configurations support both Oracle Storage Drive Enclosure DE3-24P and DE3-24C disk shelves. Some configurations do not support expansion cabinets.

This section contains the following topics:

- Overview of Oracle ZFS Storage Appliance Racked System ZS7-2 HE with All-Flash/Mixed Configurations
- Base Cabinet Configurations for Oracle ZFS Storage Appliance Racked System ZS7-2 HE with All-Flash/Mixed Configurations
- Expansion Cabinet Configurations for Oracle ZFS Storage Appliance Racked System ZS7-2 HE Performance Configurations

Overview of Oracle ZFS Storage Appliance Racked System ZS7-2 HE with All-Flash/Mixed Configurations

All-Flash/Mixed configurations take advantage of Oracle Storage Drive Enclosure DE3-24P high-performance disk shelves and are available in a base cabinet, or a base cabinet with up to three expansion cabinets for some configurations. Six base cabinet options are offered in a total of 30 possible system configurations, and all base cabinet options contain two Oracle ZFS Storage ZS7-2 HE controllers.

> **Note:**
>
> Oracle ZFS Storage Appliance Racked System ZS7-2, which has preset configurations, can be upgraded in the field to any supported configuration for Oracle ZFS Storage ZS7-2. For example, you can upgrade the racked system by adding one disk shelf to a two-disk-shelf configuration, adding cabling for the new disk shelf, and then recabling the disk shelves. Thus, three disk shelves are supported, even though the racked system is not offered in a three-disk-shelf configuration. Complex upgrades require extensive planning and recabling.

Oracle ZFS Storage Appliance Racked System ZS7-2 HE maximum performance configurations feature up to eight Oracle Storage Drive Enclosure DE3-24P disk shelves in the base cabinet. The disk shelves are configured as one single shelf per chain to obtain maximum performance. Depending on the number of chains in the base cabinet, Oracle ZFS Storage Appliance Racked System ZS7-2 HE maximum performance configurations can have up to three expansion cabinets.

Table 10-6 Oracle ZFS Storage Appliance Racked System ZS7-2 HE Maximum Performance Configurations Components

Base Cabinet	Expansion Cabinet 1	Expansion Cabinet 2	Expansion Cabinet 3
Up to 8 Oracle Storage Drive Enclosure DE3-24P disk shelves Factory configurations: 1, 2, 4, 6, or 8 Oracle Storage Drive Enclosure DE3-24P disk shelves Two Oracle ZFS Storage ZS7-2 HE controllers	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves

Oracle ZFS Storage Appliance Racked System ZS7-2 HE optimum performance configurations feature up to 18 Oracle Storage Drive Enclosure DE3-24P disk shelves (configured as two shelves per chain plus an additional two shelves on the last chain), as well as various combinations of Oracle Storage Drive Enclosure DE3-24C and DE3-24P disk shelves in the base cabinet. Only Oracle Storage Drive Enclosure DE3-24C disk shelves, up to 10 each, are offered in the expansion cabinets. Configurations are offered in multiples of two disk shelves, as well as half-rack expansion. Each expansion cabinet can contain 2, 4, 5 (half-rack), 6, 8, or 10 Oracle Storage Drive Enclosure DE3-24C disk shelves. Depending on the number of chains

in the base cabinet, Oracle ZFS Storage Appliance Racked System ZS7-2 HE optimum performance configurations can have up to three expansion cabinets.

Table 10-7 Oracle ZFS Storage Appliance Racked System ZS7-2 HE Optimum Performance Configurations Components

Base Cabinet	Expansion Cabinet 1	Expansion Cabinet 2	Expansion Cabinet 3
Up to 18 Oracle Storage Drive Enclosure DE3-24P disk shelves Factory configurations: • Oracle Storage Drive Enclosure DE3-24P disk shelves: 2, 4, 6, 8, 10, 12, 14, 16, or 18 • Mixed Oracle Storage Drive Enclosure DE3-24C / DE3-24P disk shelves: – 2 Oracle Storage Drive Enclosure DE3-24C / 2 to 14 DE3-24P – 4 Oracle Storage Drive Enclosure DE3-24C / 2 to 10 DE3-24P – 6 Oracle Storage Drive Enclosure DE3-24C / 2 to 6 DE3-24P – 8 Oracle Storage Drive Enclosure DE3-24C / 2 DE3-24P Two Oracle ZFS Storage ZS7-2 HE controllers	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves

The Oracle ZFS Storage Appliance Racked System ZS7-2 HE all-flash/mixed configurations support various storage options.

Table 10-8 Oracle ZFS Storage Appliance Racked System ZS7-2 HE Disk Shelf Device Types and Allowable Configurations

Disk Shelf	Data Devices	Read Cache Devices	Log Devices
Oracle Storage Drive Enclosure DE3-24P All-Flash	7.68 TB SSDs: 24 in slots 0 - 23 or 20 in slots 0 - 19	Not allowed	200 GB SSDs in slot 20 - 23
Oracle Storage Drive Enclosure DE3-24P	1.2 TB HDDs: 24 in slots 0 - 23 or 20 in slots 0 - 19	7.68 TB SSDs in slot 20 - 23	200 GB SSDs in slot 20 - 23
Oracle Storage Drive Enclosure DE3-24C	10 or 14 TB HDDs: 24 in slots 0 - 23 or 20 in slots 0 - 19	7.68 TB SSDs in slot 20 - 23	200 GB SSDs in slot 20 - 23

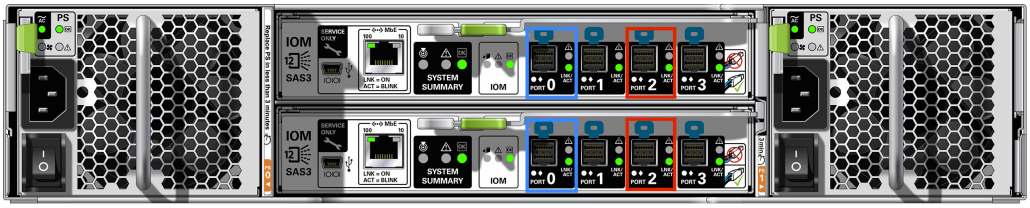
Base Cabinet Configurations for Oracle ZFS Storage Appliance Racked System ZS7-2 HE with All-Flash/Mixed Configurations

Oracle ZFS Storage Appliance Racked System ZS7-2 HE maximum performance configurations have four SAS-3 HBAs in each controller, which provide the maximum of 16 ports of SAS-3 HBA connectivity.

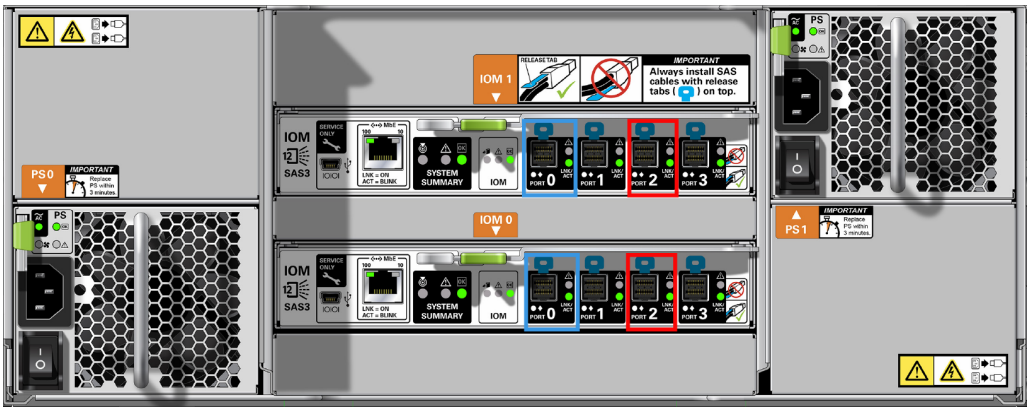
The SAS-3 HBA port numbering order is ascending, from bottom (Port 0) to top (Port 3). Both SAS-3 HBA cards and DE3-24 disk shelves use the SFF 8644 connectors.

The following figure shows the slot number for each HBA card, as well as the port numbers in each card.

As shown in the following figure, the Oracle Storage Drive Enclosure DE3-24P disk shelf has two I/O modules (IOMs) with four ports each. In all cabling configurations, Port 1 and Port 3 are never used.



As shown in the following figure, the Oracle Storage Drive Enclosure DE3-24C disk shelf has two I/O modules (IOMs) with four ports each. In all cabling configurations, Port 1 and Port 3 are never used.



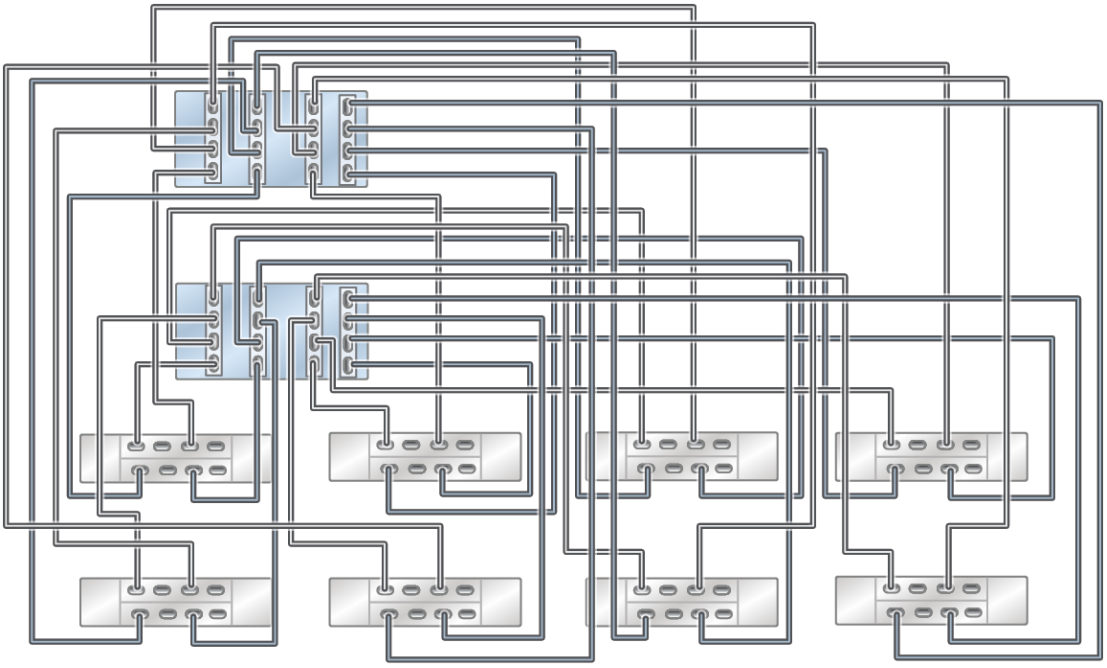
The Oracle ZFS Storage Appliance Racked System ZS7-2 HE all-flash/mixed configurations follow standard cabling methodologies with additional restrictions that allow use of the cable management arm (CMA). They provide a more practical implementation for SSD log device and read cache device matching, limited multi-cabinet expansion, and can be configured for maximum or optimal performance.

Any upgrades that change the number of SAS-3 HBA cards, or include more than one cabinet that is not an original Oracle ZFS Storage Appliance Racked System ZS7-2 HE or not compatible with Oracle ZFS Storage Appliance Racked System ZS7-2 HE must be re-cabled for that particular configuration. For cabling examples of connecting Oracle Storage Drive Enclosure DE3-24 disk shelves to an Oracle ZFS Storage ZS7-2 HE controller with 4x4 port SAS-3 HBAs, see Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS7-2 High-end (HE) Controllers. For SAS cable length guidelines, see Cabinet and Cabling Guidelines.

The cabinets are self-contained and pre-cabled following the required cabling methodology. The following diagrams illustrate how the six base cabinet options are cabled.

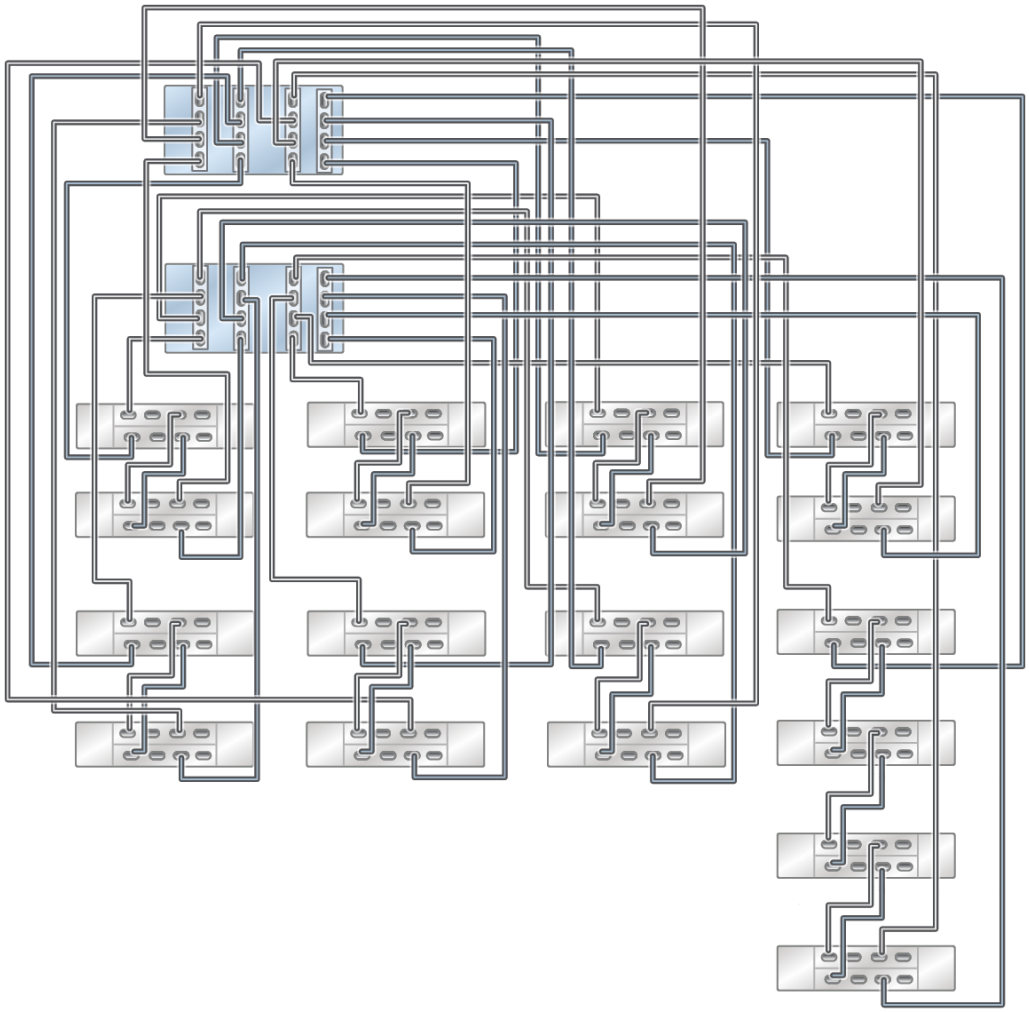
Oracle ZFS Storage Appliance Racked System ZS7-2 HE Performance Configuration:

One to Eight Oracle Storage Drive Enclosure DE3-24P Disk Shelves (maximum performance)



Oracle ZFS Storage Appliance Racked System ZS7-2 HE Performance Configuration:

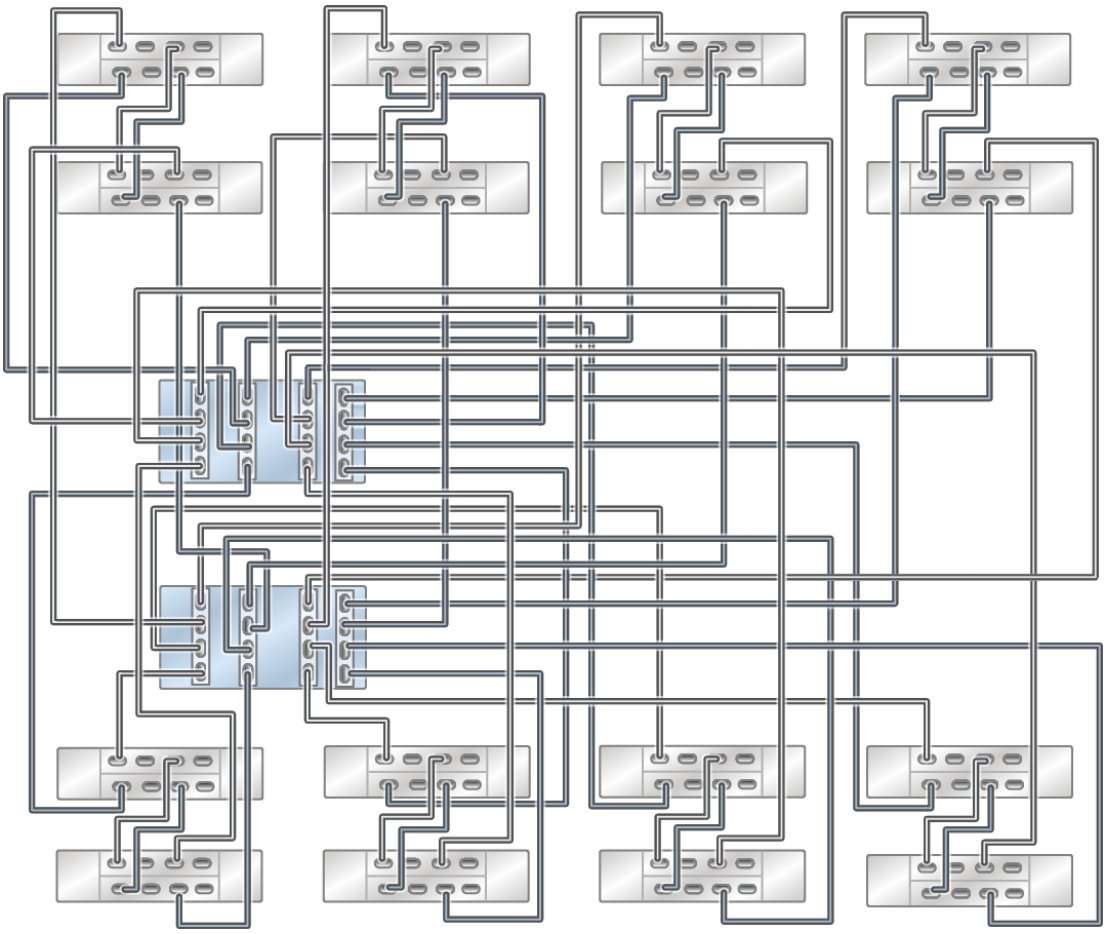
Two to 18 Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)



Oracle ZFS Storage Appliance Racked System ZS7-2 HE Performance Configuration:

Two Oracle Storage Drive Enclosure DE3-24C (bottom left) and

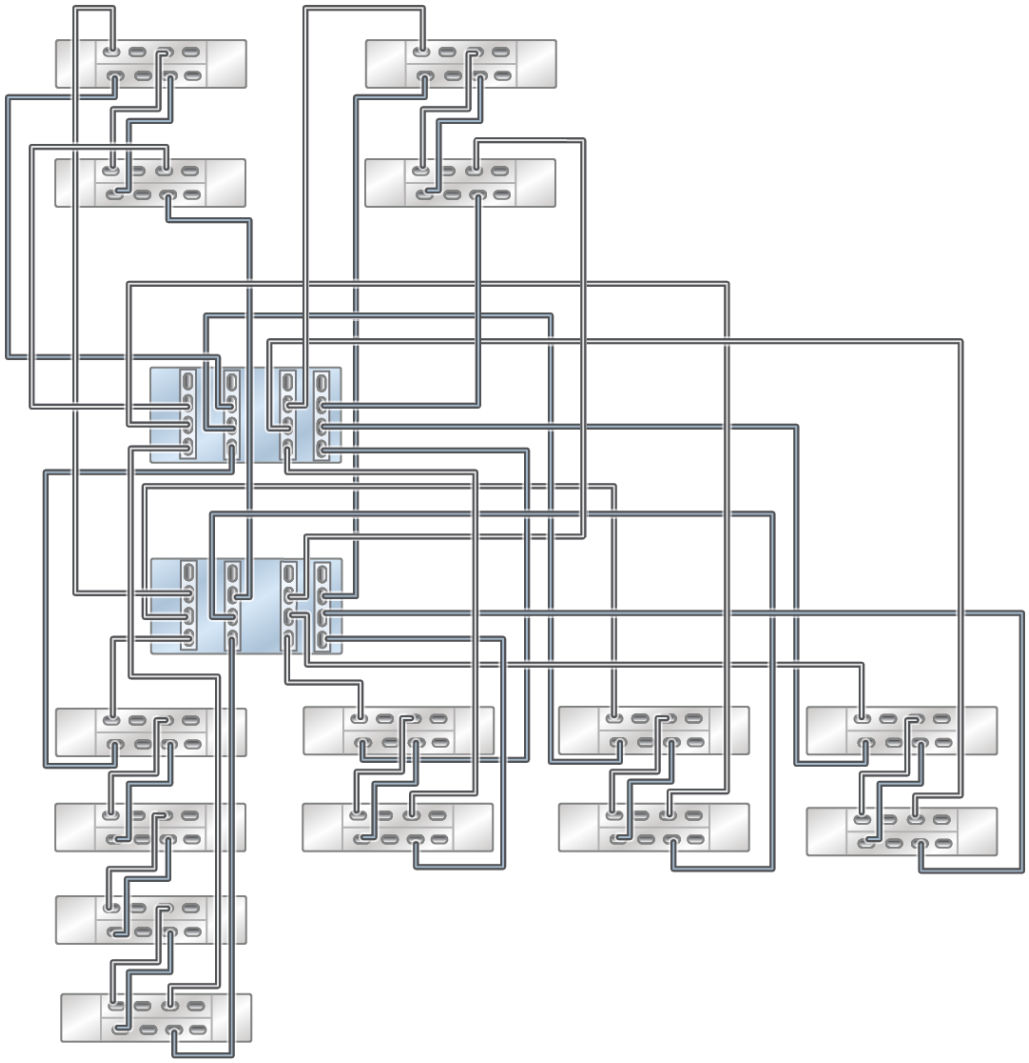
Two to 14 Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)



Oracle ZFS Storage Appliance Racked System ZS7-2 HE Performance Configuration:

Four Oracle Storage Drive Enclosure DE3-24C (bottom left) and

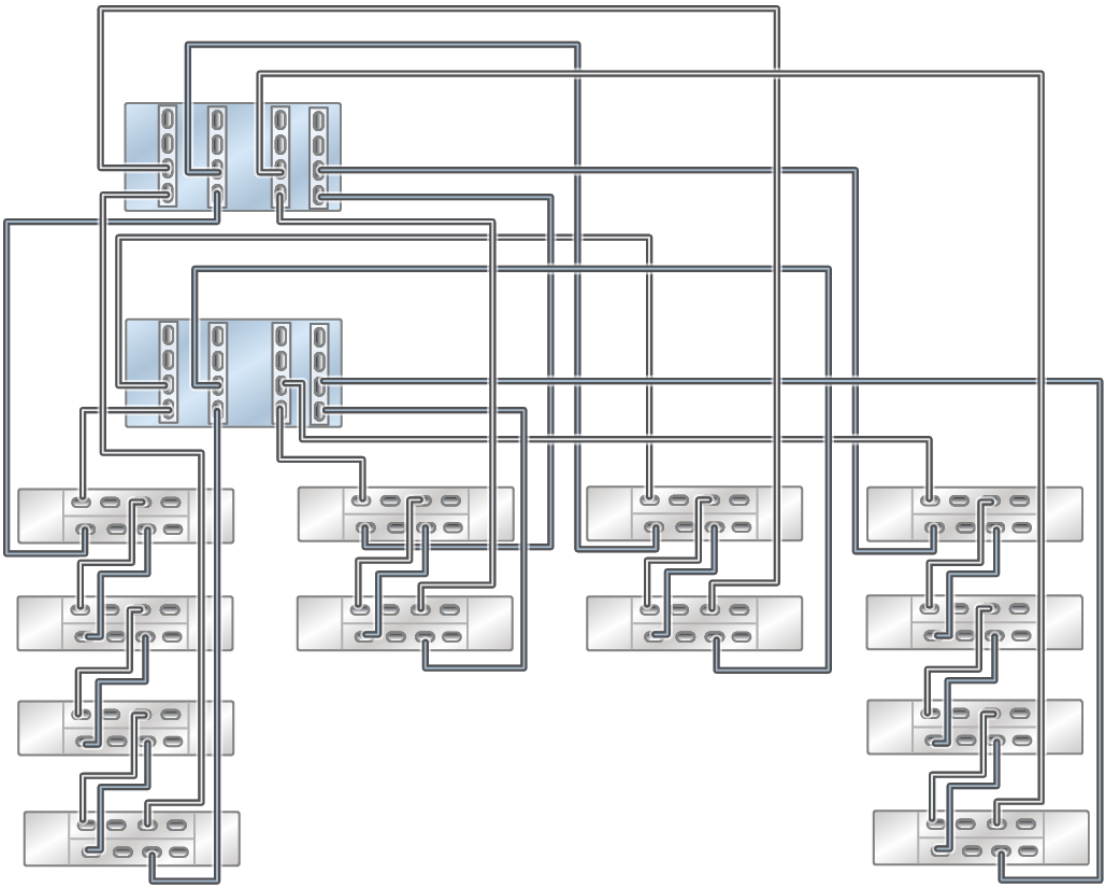
Two to Ten Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)



Oracle ZFS Storage Appliance Racked System ZS7-2 HE Performance Configuration:

Six Oracle Storage Drive Enclosure DE3-24C (first two chains from the left) and

Two to Six Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)

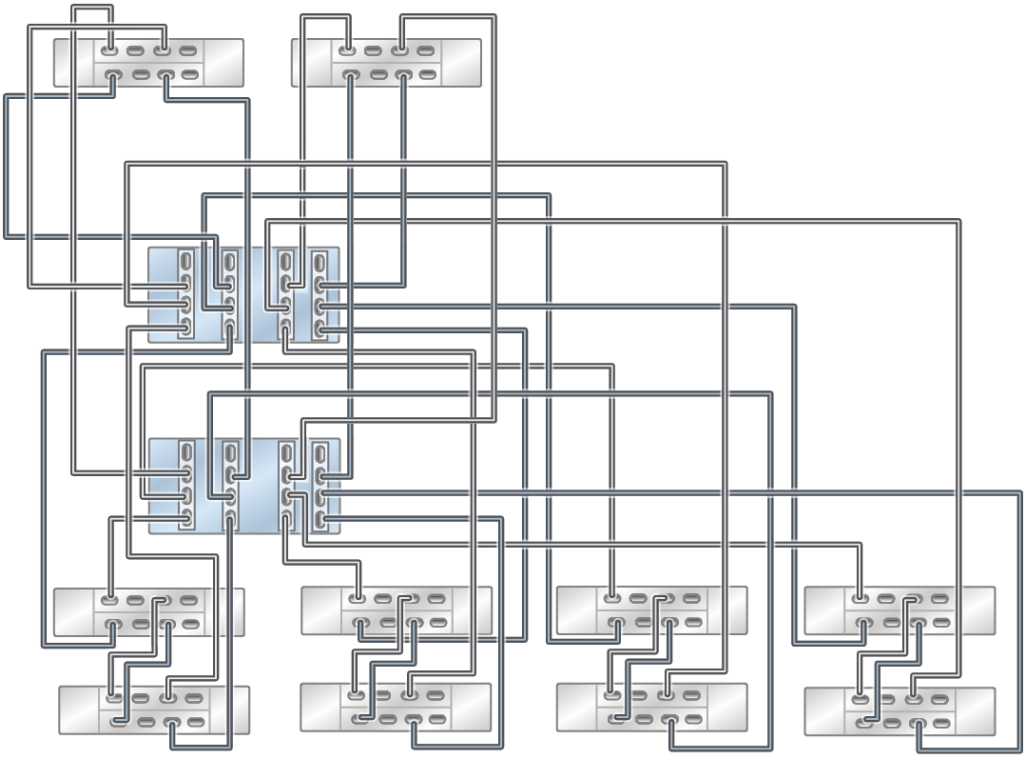


In the following figure, the Oracle Storage Drive Enclosure DE3-24C units are the bottom eight disk shelves.

Oracle ZFS Storage Appliance Racked System ZS7-2 HE Performance Configuration:

Eight Oracle Storage Drive Enclosure DE3-24C (bottom disk shelves) and

Two Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)



Expansion Cabinet Configurations for Oracle ZFS Storage Appliance Racked System ZS7-2 HE Performance Configurations

Oracle ZFS Storage Appliance Racked System ZS7-2 HE performance configurations support multiple cabinets that allow for expansion of up to 30 additional disk shelves. Each expansion cabinet accommodates a maximum of 10 Oracle Storage Drive Enclosure DE3-24C disk shelves and is also offered in a “half-rack” option.

> **Note:**
>
> Not all base cabinet configurations support expansion cabinets.

The expansion cabinet installation follows a balanced-chain installation where the chain on the bottom of the cabinet takes the first disk shelf pair, and the second chain on the top half takes the second pair. The alternating manner of a balanced chain installation distributes SSDs and follows the load-priority methodology.

The number of expansion cabinets supported is dependent on the number of chains remaining in the Oracle ZFS Storage Appliance Racked System ZS7-2 HE base cabinet. Each Oracle ZFS Storage Appliance Racked System ZS7-2 HE expansion cabinet requires two chains to support a full expansion cabinet. Also, a total of four SAS-3 HBA ports (two HBA ports for each chain) are required for each expansion cabinet.

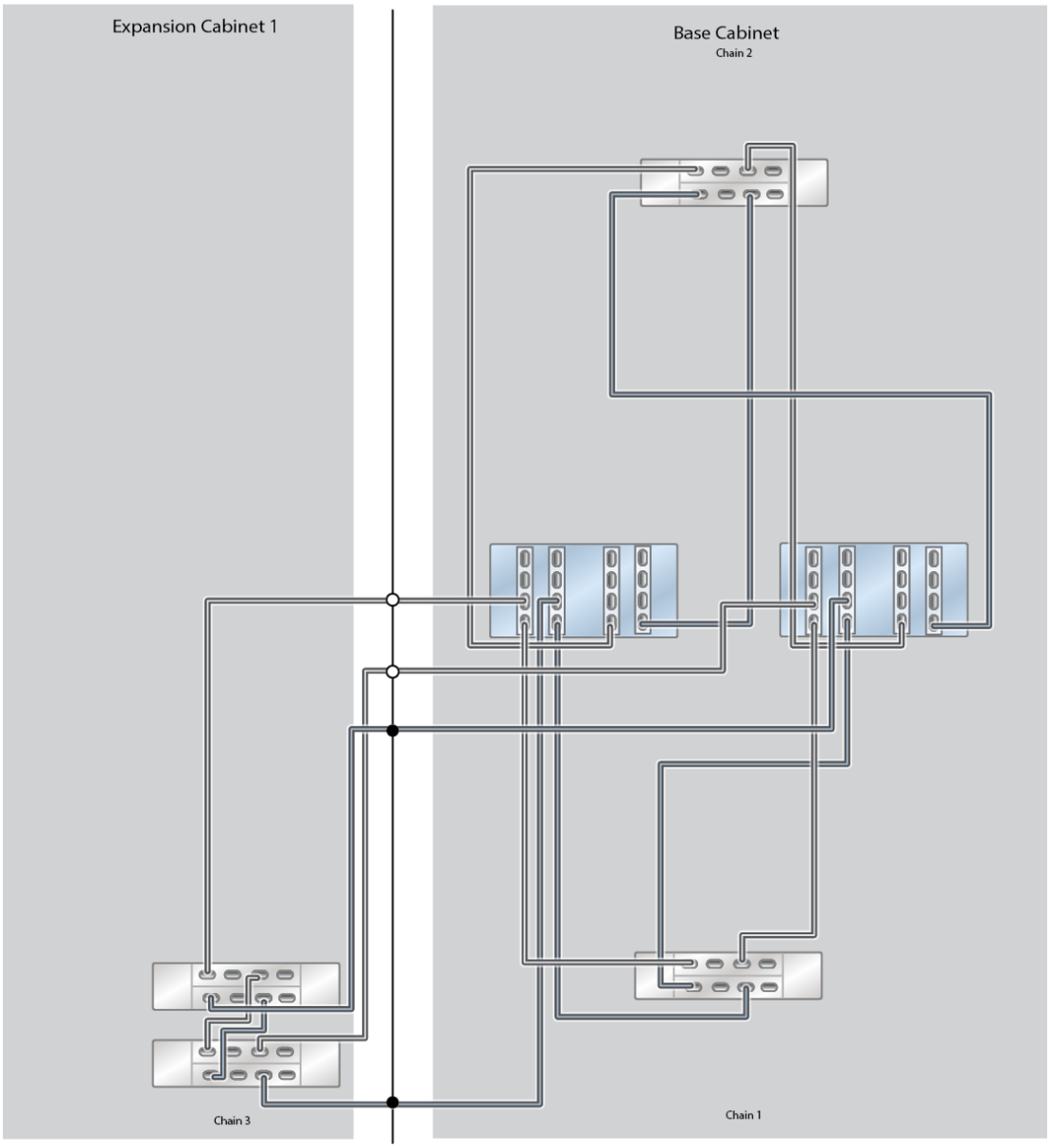
The following diagrams illustrate the cabling of Oracle ZFS Storage Appliance Racked System ZS7-2 HE expansion cabinet configurations. The legend for each diagram is as follows:

- A hollow circle indicates the cable connection to the top IOM (IOM 1).
- A solid circle indicates the cable connection to the bottom IOM (IOM 0).

> **Note:**
>
> The base cabinet can contain all Oracle Storage Drive Enclosure DE3-24P (HDD) disk shelves, or all Oracle Storage Drive Enclosure DE3-24P All-Flash (SSD) disk shelves, or a mix of Oracle Storage Drive Enclosure DE3-24C and DE3-24P disk shelves, as described in All-Flash/Mixed Configurations for Oracle ZFS Storage Appliance Racked System ZS7-2 HE.

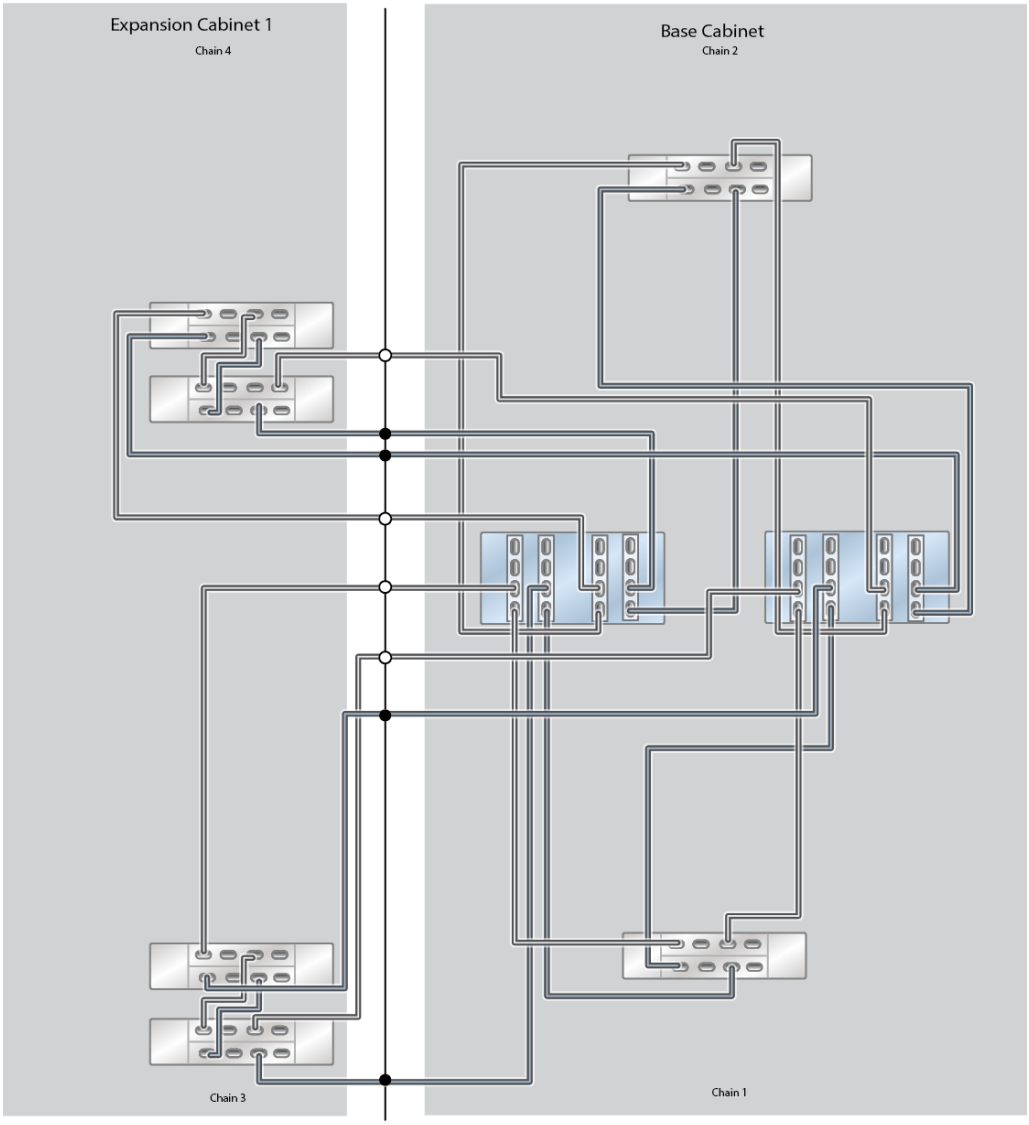
Oracle ZFS Storage Appliance Racked System ZS7-2 HE Performance Configuration:

One Expansion Cabinet with Two Oracle Storage Drive Enclosure DE3-24C Disk Shelves



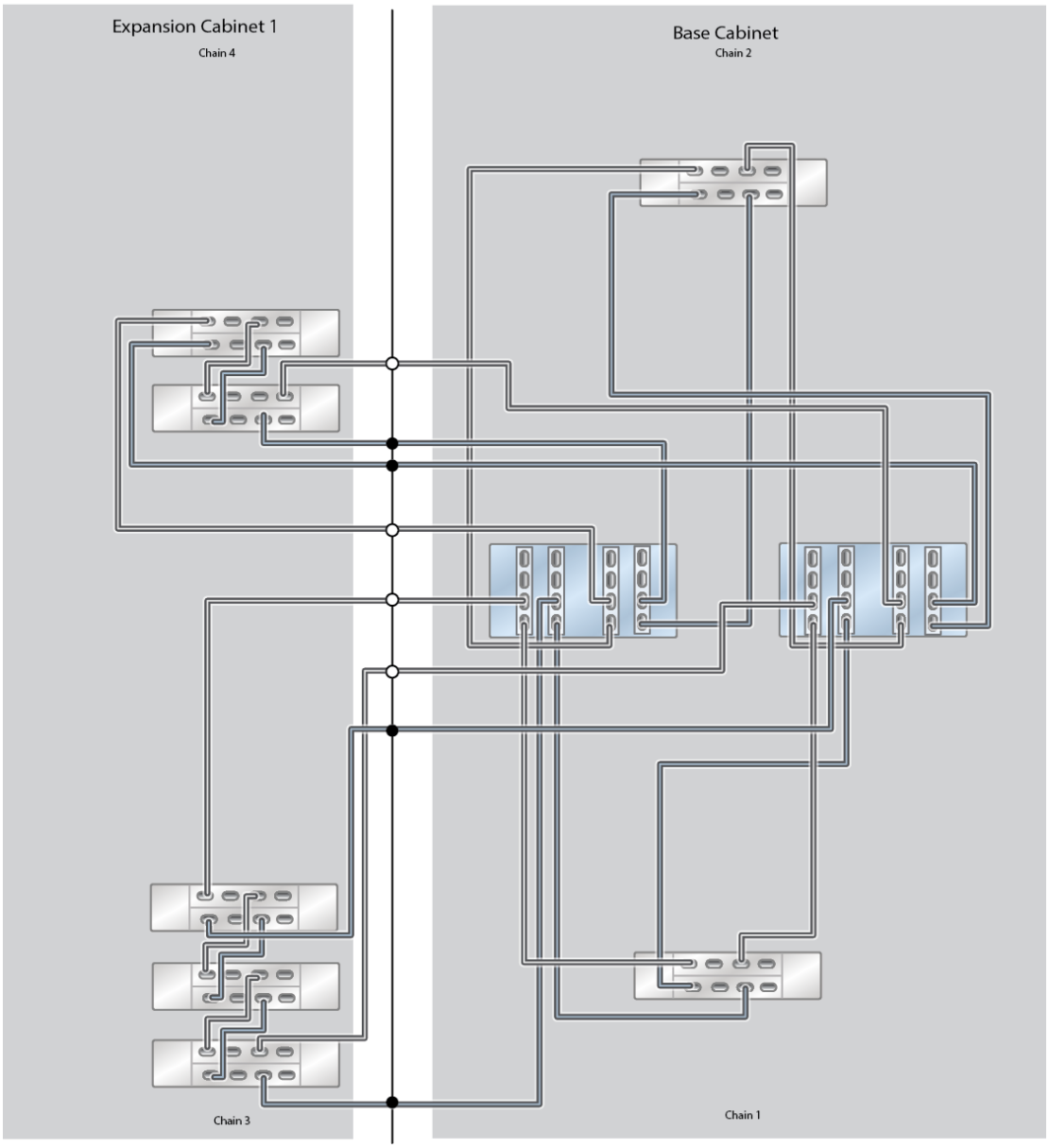
Oracle ZFS Storage Appliance Racked System ZS7-2 HE Performance Configuration:

One Expansion Cabinet with Four Oracle Storage Drive Enclosure DE3-24C Disk Shelves



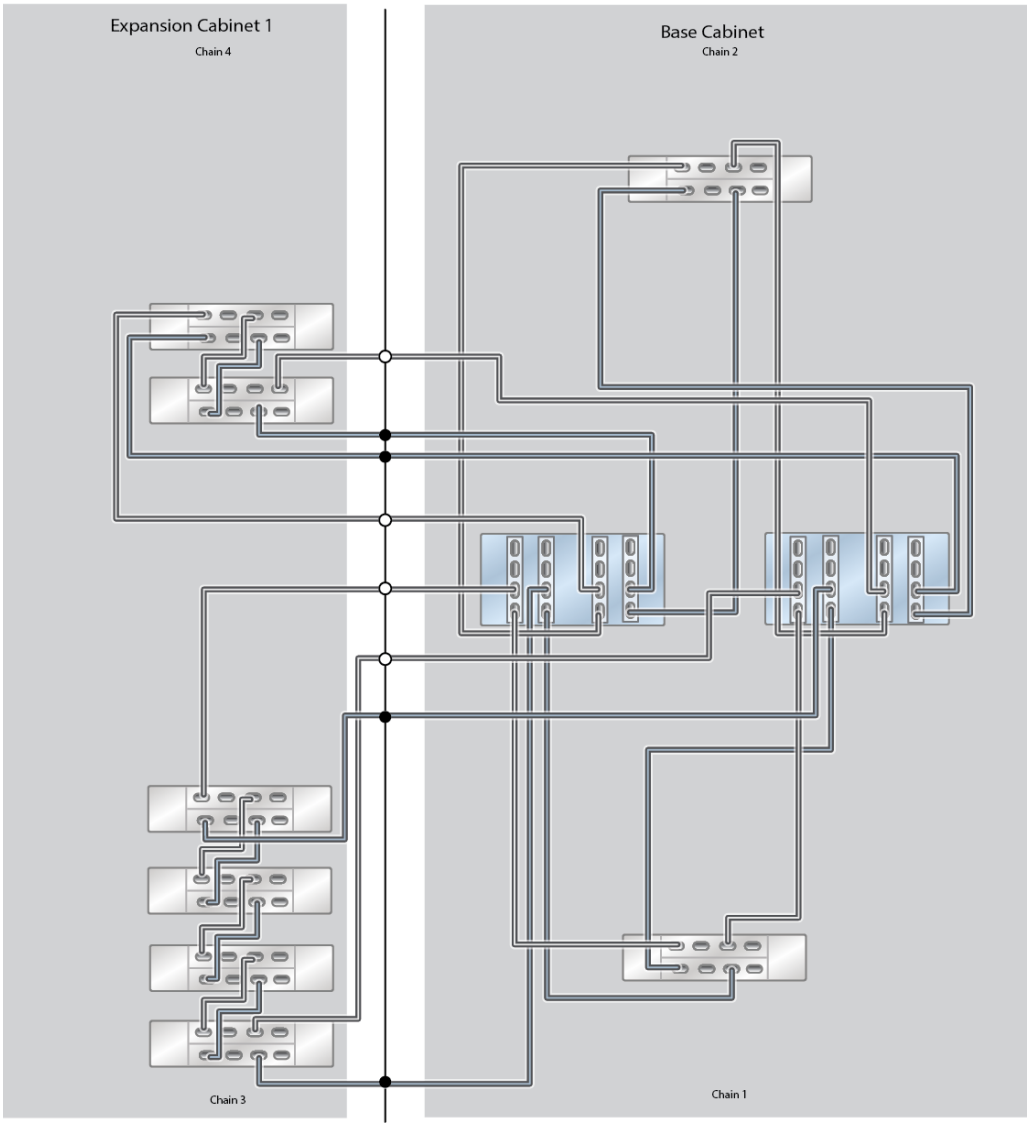
Oracle ZFS Storage Appliance Racked System ZS7-2 HE Performance Configuration:

One Expansion Cabinet with Five Oracle Storage Drive Enclosure DE3-24C Disk Shelves (Half Rack)



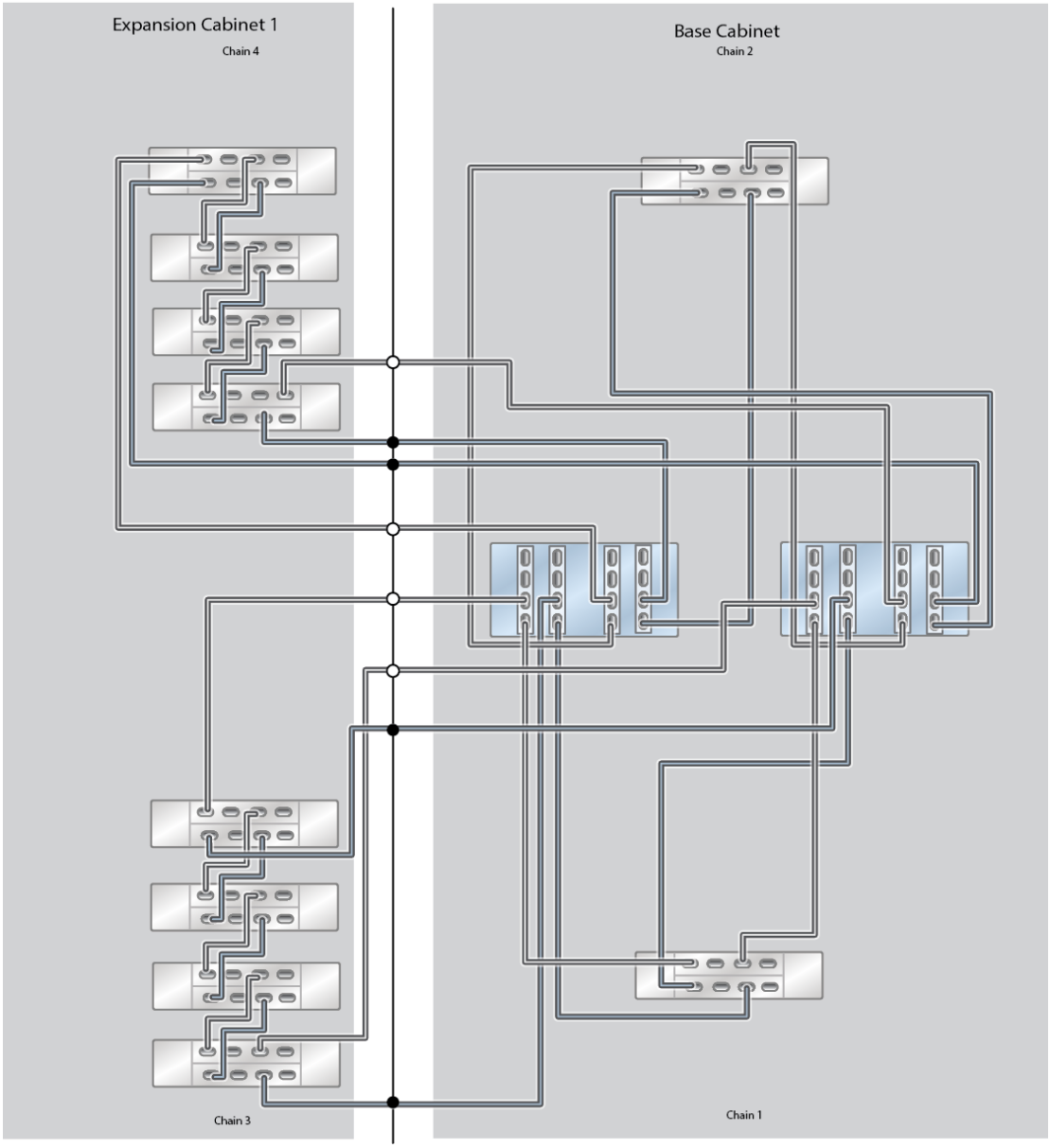
Oracle ZFS Storage Appliance Racked System ZS7-2 HE Performance Configuration:

One Expansion Cabinet with Six Oracle Storage Drive Enclosure DE3-24C Disk Shelves



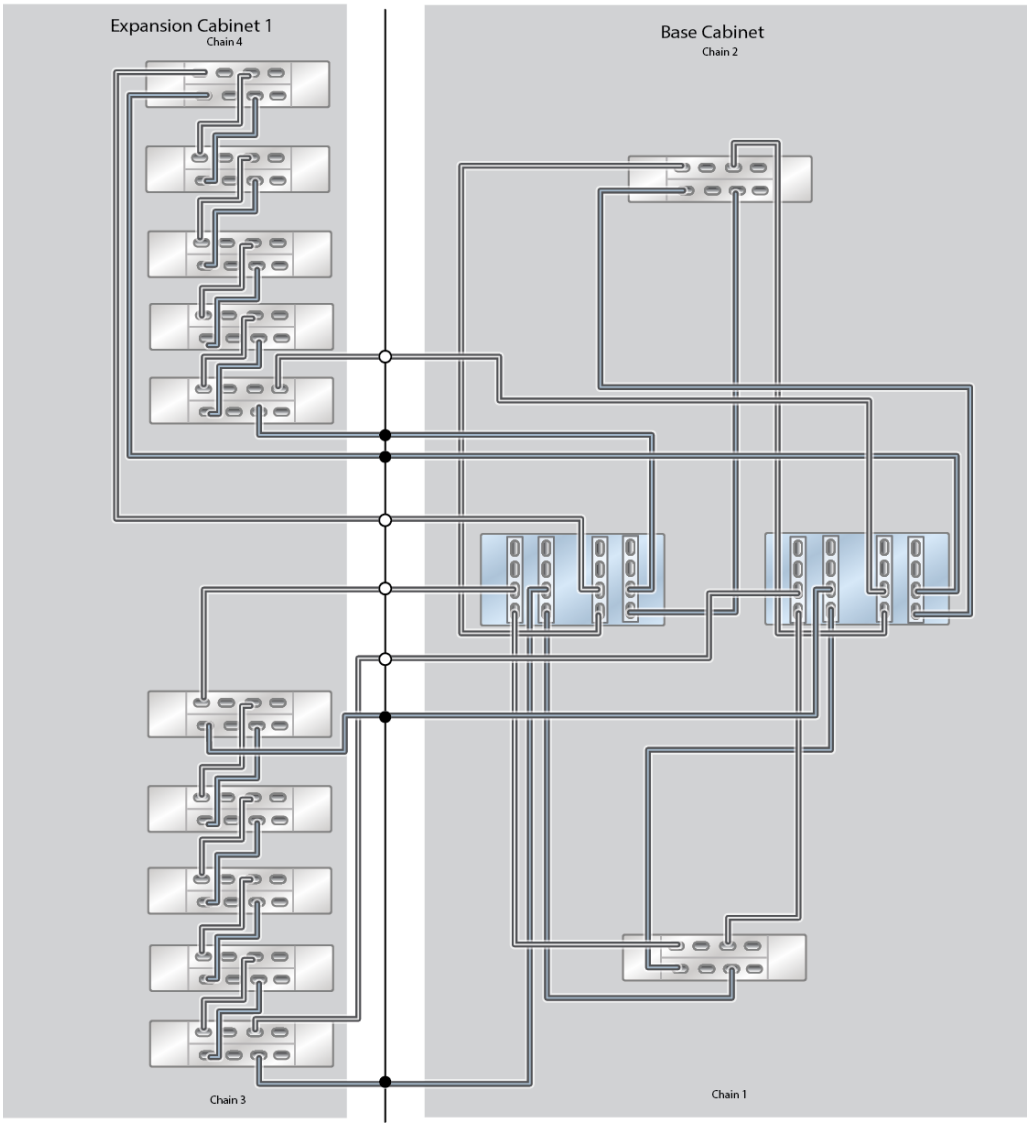
Oracle ZFS Storage Appliance Racked System ZS7-2 HE Performance Configuration:

One Expansion Cabinet with Eight Oracle Storage Drive Enclosure DE3-24C Disk Shelves



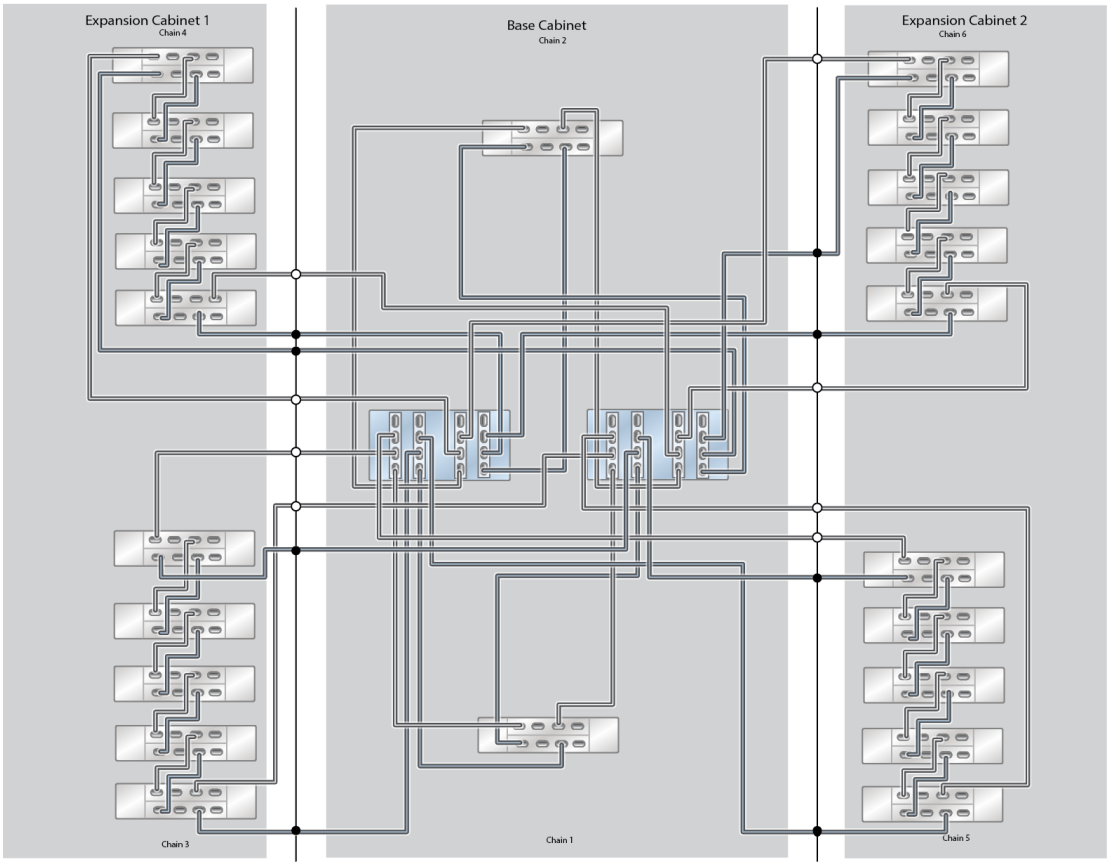
Oracle ZFS Storage Appliance Racked System ZS7-2 HE Performance Configuration:

One Expansion Cabinet with 10 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



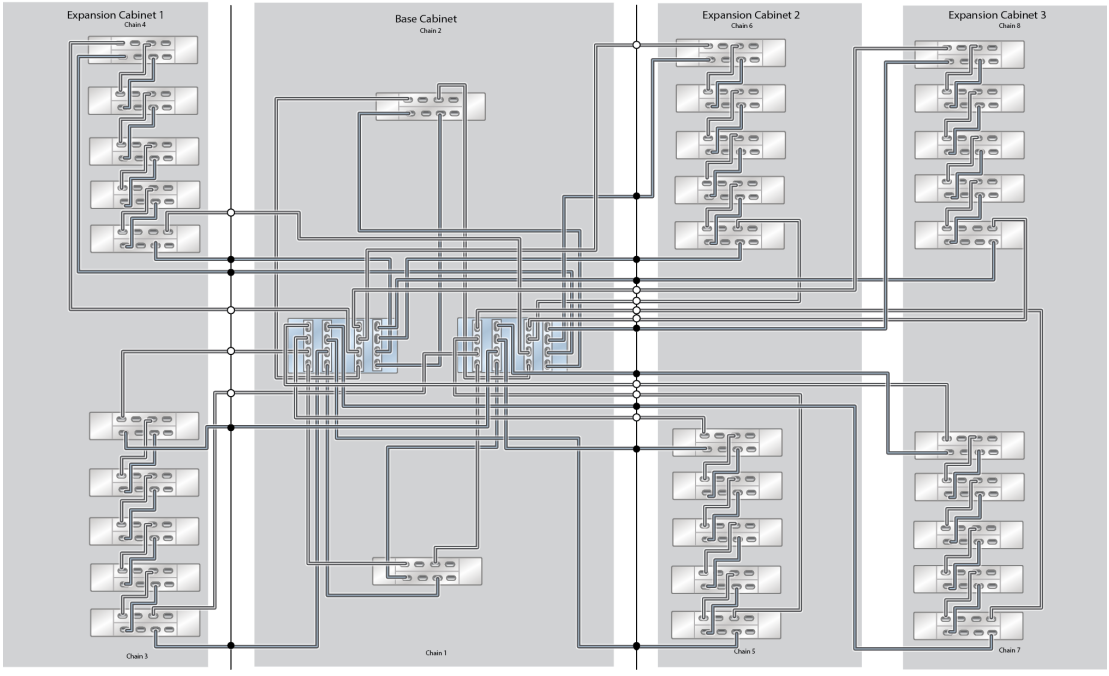
Oracle ZFS Storage Appliance Racked System ZS7-2 HE Performance Configuration:

Two Expansion Cabinets with 20 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



Oracle ZFS Storage Appliance Racked System ZS7-2 HE Performance Configuration:

Three Expansion Cabinets with 30 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



Oracle ZFS Storage Appliance Racked System ZS7-2 Mid-range (MR) Configurations

This section provides overviews and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS7-2 MR, which is a pre-racked and pre-cabled system that supports two configuration types: capacity configurations and performance configurations.

This section contains the following topics:

- Capacity Configurations for Oracle ZFS Storage Appliance Racked System ZS7-2 MR
- All-Flash/Mixed Configurations for Oracle ZFS Storage Appliance Racked System ZS7-2 MR

Capacity Configurations for Oracle ZFS Storage Appliance Racked System ZS7-2 MR

This section provides an overview and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS7-2 MR capacity configurations.

This section contains the following topics:

- Overview of Oracle ZFS Storage Appliance Racked System ZS7-2 MR Capacity Configurations
- Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS7-2 MR Capacity Configurations

Overview of Oracle ZFS Storage Appliance Racked System ZS7-2 MR Capacity Configurations

Capacity configurations take advantage of high-capacity disk shelves and are available in a base cabinet, or a base cabinet with one expansion cabinet. Two Oracle ZFS Storage ZS7-2 MR controllers and up to 19 Oracle Storage Drive Enclosure DE3-24C disk shelves can be supported, as shown in the following table. Note that the total number of disk shelves for the base cabinet and the expansion cabinet together cannot exceed 19.

> **Note:**
>
> Oracle ZFS Storage Appliance Racked System ZS7-2, which has preset configurations, can be upgraded in the field to any supported configuration for Oracle ZFS Storage ZS7-2. For example, you can upgrade the racked system by adding one disk shelf to a two-disk-shelf configuration, adding cabling for the new disk shelf, and then recabling the disk shelves. Thus, three disk shelves are supported, even though the racked system is not offered in a three-disk-shelf configuration. Complex upgrades require extensive planning and recabling.

Table 10-9 Oracle ZFS Storage Appliance Racked System ZS7-2 MR Capacity Configurations Components

Base Cabinet	Expansion Cabinet 1
Up to 9 Oracle Storage Drive Enclosure DE3-24C disk shelves Factory configurations: 1, 2, 4, 6, 8, or 9 Oracle Storage Drive Enclosure DE3-24C disk shelves Two Oracle ZFS Storage ZS7-2 MR controllers	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves Factory configurations: 2, 4, 5, 6, 8, or 10 Oracle Storage Drive Enclosure DE3-24C disk shelves

Each Oracle ZFS Storage ZS7-2 MR controller supports two SAS HBA cards. Two SAS HBA cards must be installed in each Oracle ZFS Storage ZS7-2 MR controller to support disk shelves in the expansion cabinet.

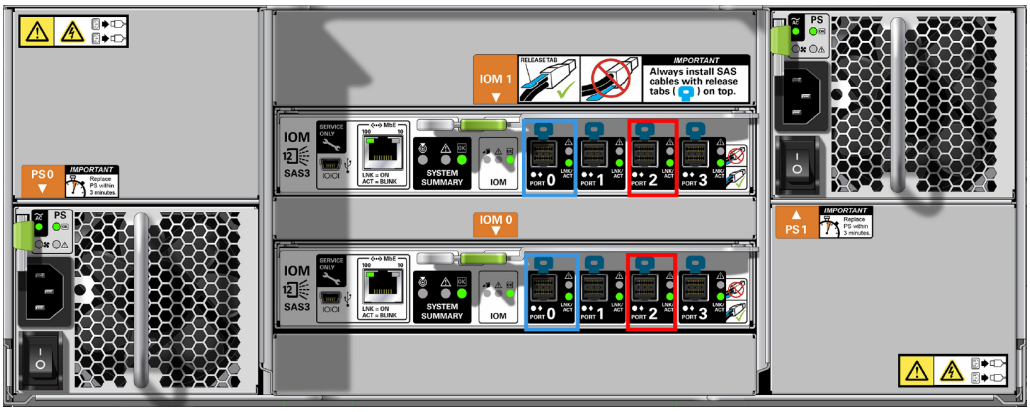
Each Oracle ZFS Storage ZS7-2 MR controller has two SAS HBA cards. Clustered Oracle ZFS Storage ZS7-2 MR controller support a high-availability configuration consisting of:

- Base cabinet: Two chains with four disk shelves in one chain and five disk shelves in the other chain for a total of nine disk shelves, and
- Expansion cabinet: Two chains with five disk shelves in each chain for a total of ten disk shelves.

The cabinets are self-contained and pre-cabled following the required cabling methodology. Pre-racked system cabling tables and diagrams, which can also be used for planning future system expansion, are provided in the section Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS7-2 MR Capacity Configurations.

Each cabinet contains 42 rack units (RUs), with RU01 on the bottom. Each Oracle ZFS Storage ZS7-2 MR controller occupies two rack units, and its location is referenced by the bottommost rack unit number. The top controller is referred to as Controller 1 and is located in RU20 in the base cabinet; the bottom controller is Controller 0 in RU17. Because the Oracle ZFS Storage ZS7-2 MR controller occupies two rack units, the base cabinet contains a filler panel above each controller so the cabinet layout is similar to prior offerings of Oracle racked systems with three-rack-unit controllers. It also allows for better serviceability access and cabling through the rear cable management arm (CMA). The following figure shows the slot number for each HBA card, as well as the port numbers in each card.

Each Oracle Storage Drive Enclosure DE3-24C disk shelf occupies four rack units, and disk shelves are normally installed from the bottom of the cabinet to the top for stability. As shown in the following figure, the Oracle Storage Drive Enclosure DE3-24C disk shelf has two I/O Modules (IOMs) with four ports each. In all cabling configurations, Port 1 and Port 3 are never used.



Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS7-2 MR Capacity Configurations

The following table describes the locations and port connections for two controllers and nine disk shelves in the base cabinet, using 3-meter optical SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs.

> **Note:**
>
> The following tables are for a full base rack configuration consisting of two chains, and an expansion rack configuration consisting of two chains.

Table 10-10 Base Cabinet: Controller and Disk Shelf Locations and Connections

FROM	TO			
RU	**CONTROLLER**	**HBA PORT**	**RU**	**DISK SHELF PORT**
20	1	Slot 2, Port 0	1	IOM 1, Port 2
17	0	Slot 10, Port 0	1	IOM 0 Port 2
20	1	Slot 2, Port 1	23	IOM 1, Port 2
17	0	Slot 10, Port 1	23	IOM 0 Port 2
17	0	Slot 2, Port 0	1, 5, 13	IOM 1, Port 0
20	1	Slot 10, Port 0	1, 5, 13	IOM 0, Port 0
17	0	Slot 2, Port 1	27, 35, 39	IOM 1, Port 0
20	1	Slot 10, Port 1	27, 35, 39	IOM 0, Port 0

The following table describes the locations and port connections for 10 disk shelves in an expansion cabinet, using 6-meter optical SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs. The expansion Cabinet supports disk shelves 10 through 19.

Table 10-11 Expansion Cabinet: Controller and Disk Shelf Locations and Connections

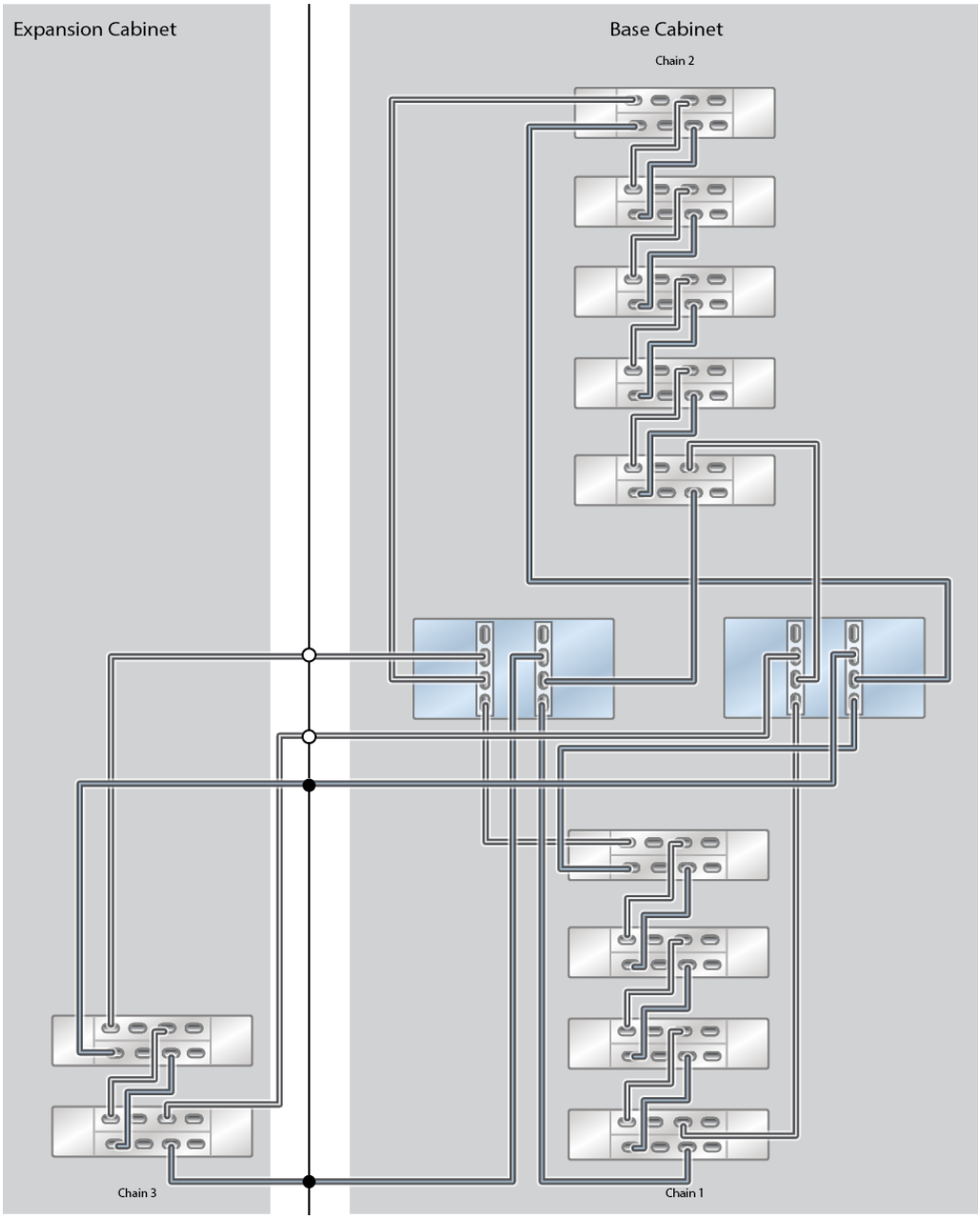
FROM	TO			
RU	**CONTROLLER**	**HBA PORT**	**RU**	**DISK SHELF PORT**
20	1	Slot 2, Port 2	1	IOM 1, Port 2
17	0	Slot 10, Port 2	1	IOM 0, Port 2
20	1	Slot 2, Port 3	21	IOM 1, Port 2
17	0	Slot 10, Port 3	21	IOM 0, Port 2
17	0	Slot 2, Port 2	5, 9, 13, 17	IOM 1, Port 0
20	1	Slot 10, Port 2	5, 9, 13, 17	IOM 0, Port 0
17	0	Slot 2, Port 3	25, 33, 37	IOM 1, Port 0
20	1	Slot 10, Port 3	25, 33, 37	IOM 0, Port 0

The following diagrams illustrate how pre-racked systems are cabled, as well as how to expand your system in the future. The legend for each diagram is as follows:

- A hollow circle indicates the cable connection to the top IOM (IOM 1).
- A solid circle indicates the cable connection to the bottom IOM (IOM 0).

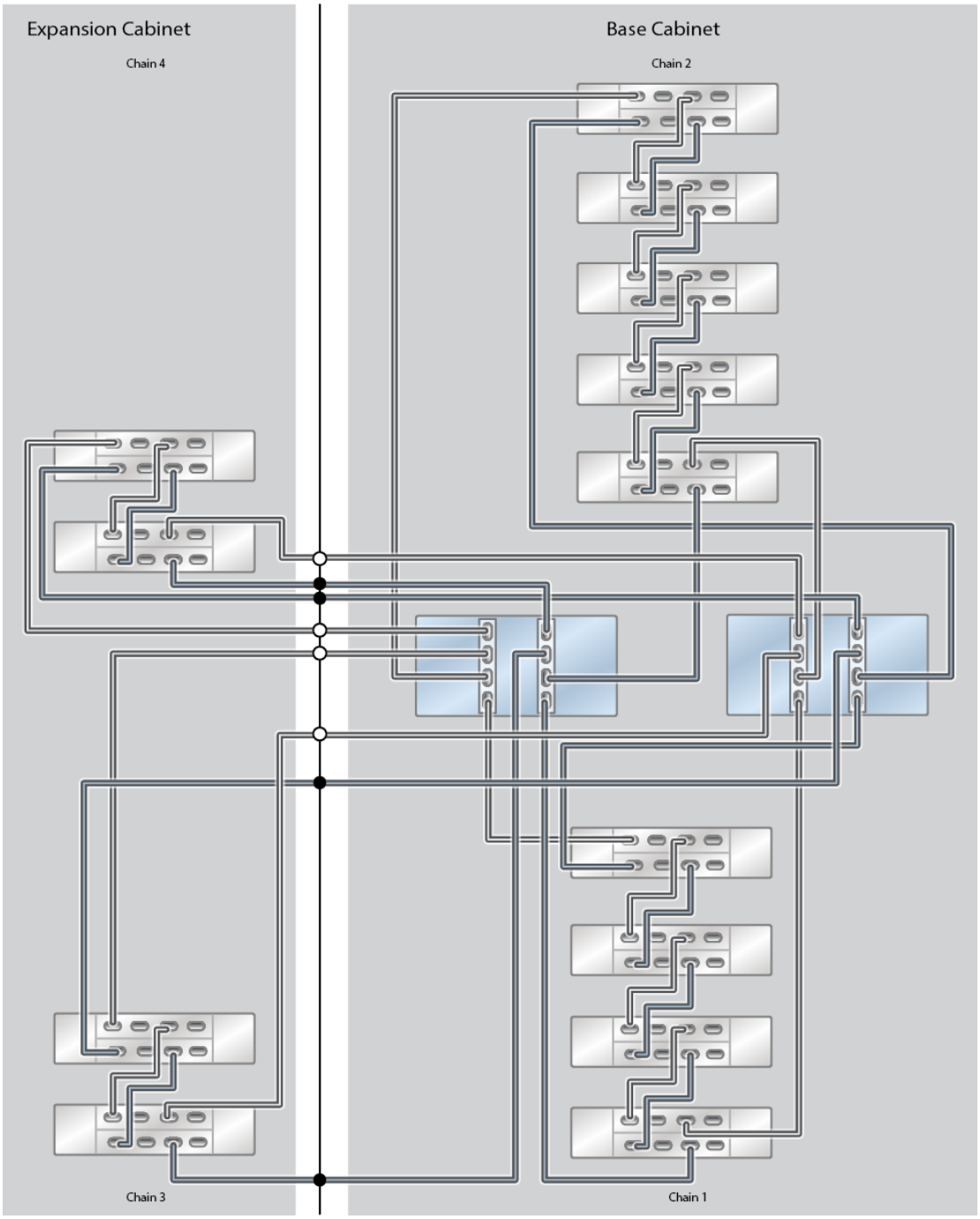
Oracle ZFS Storage Appliance Racked System ZS7-2 MR Capacity Configuration:

11 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



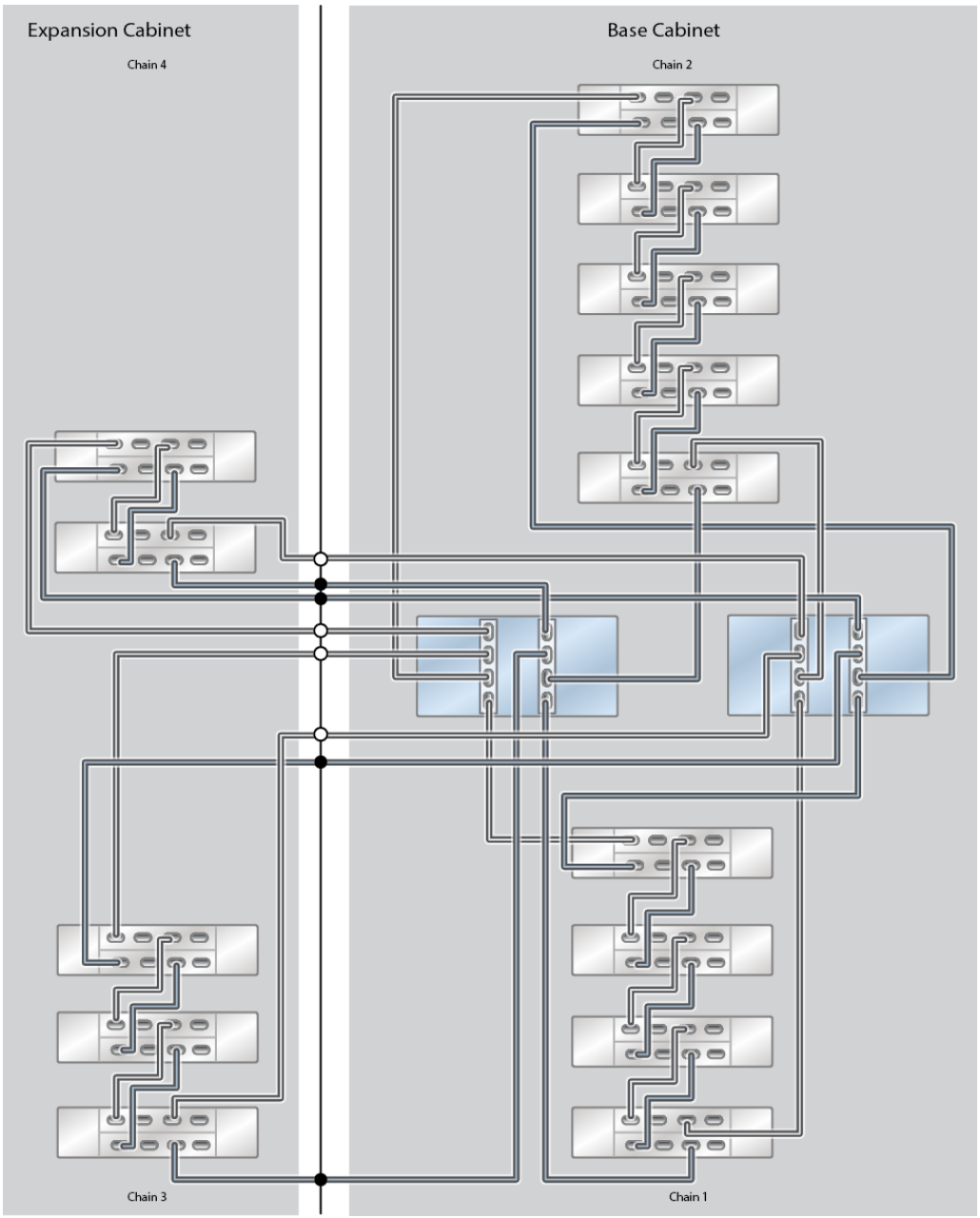
Oracle ZFS Storage Appliance Racked System ZS7-2 MR Capacity Configuration:

13 Oracle Storage Drive Enclosure DE3-24C Disk Shelves

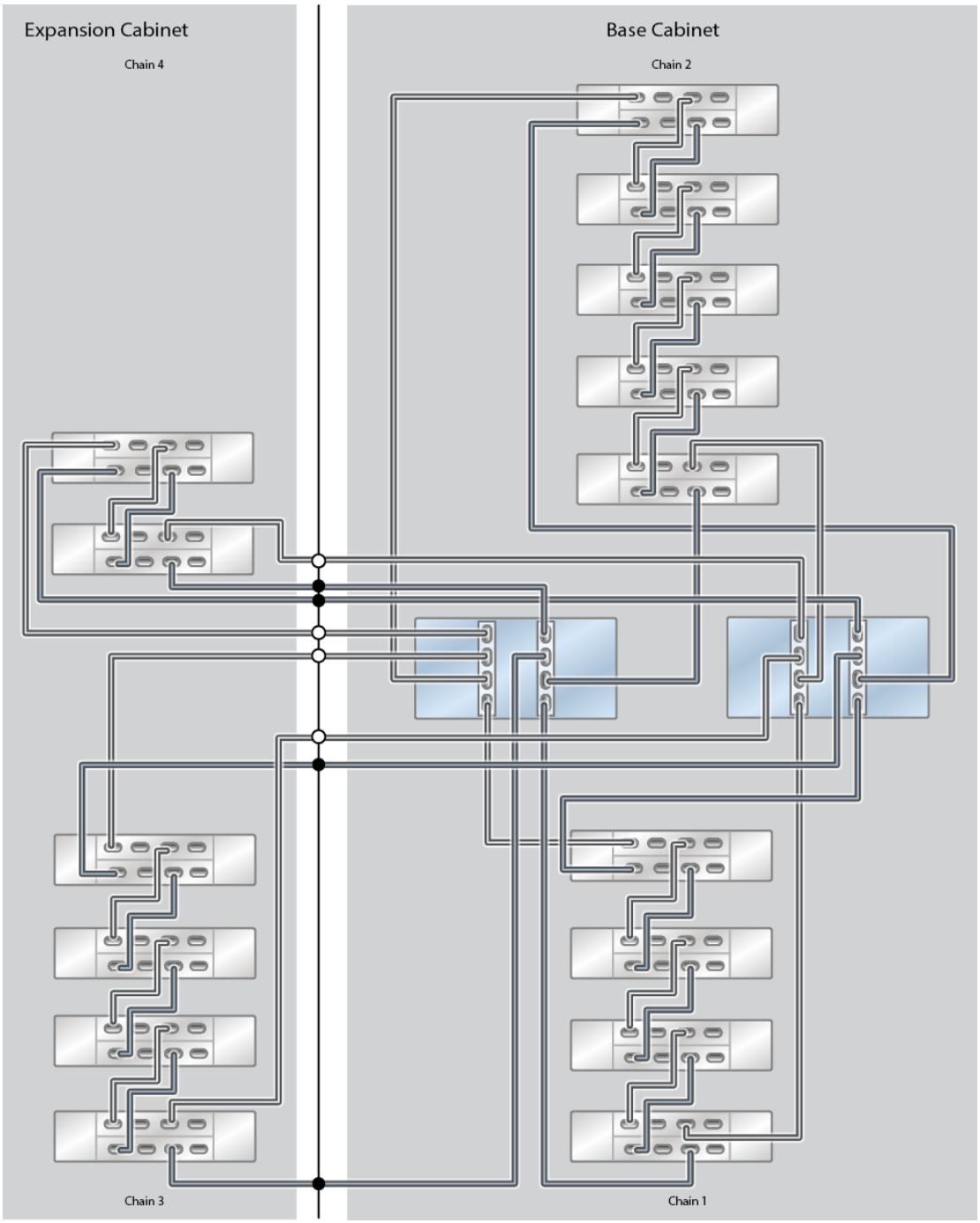


Oracle ZFS Storage Appliance Racked System ZS7-2 MR Capacity Configuration:

14 Oracle Storage Drive Enclosure DE3-24C Disk Shelves (Half Rack)

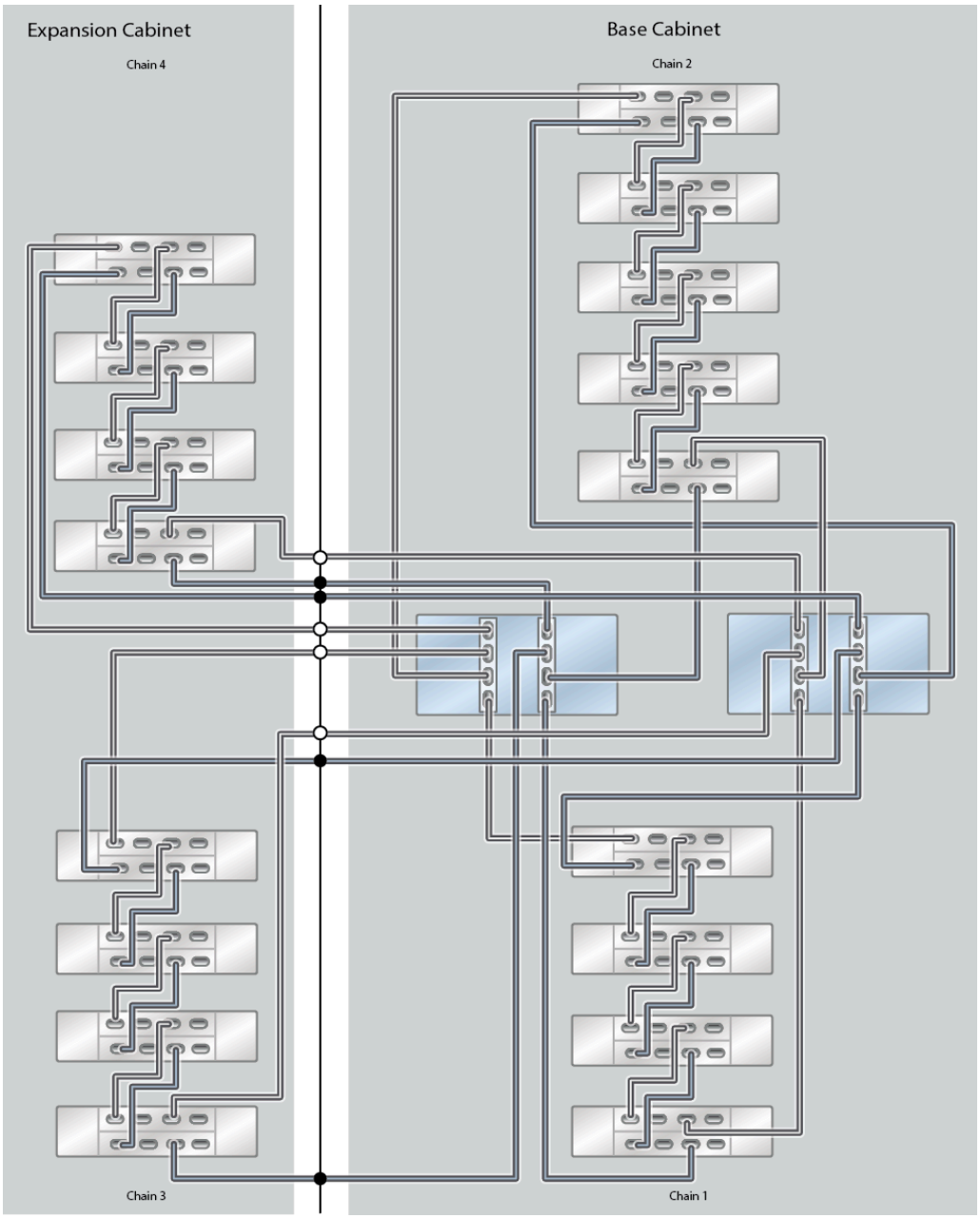


Oracle ZFS Storage Appliance Racked System ZS7-2 MR Capacity Configuration: 15 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



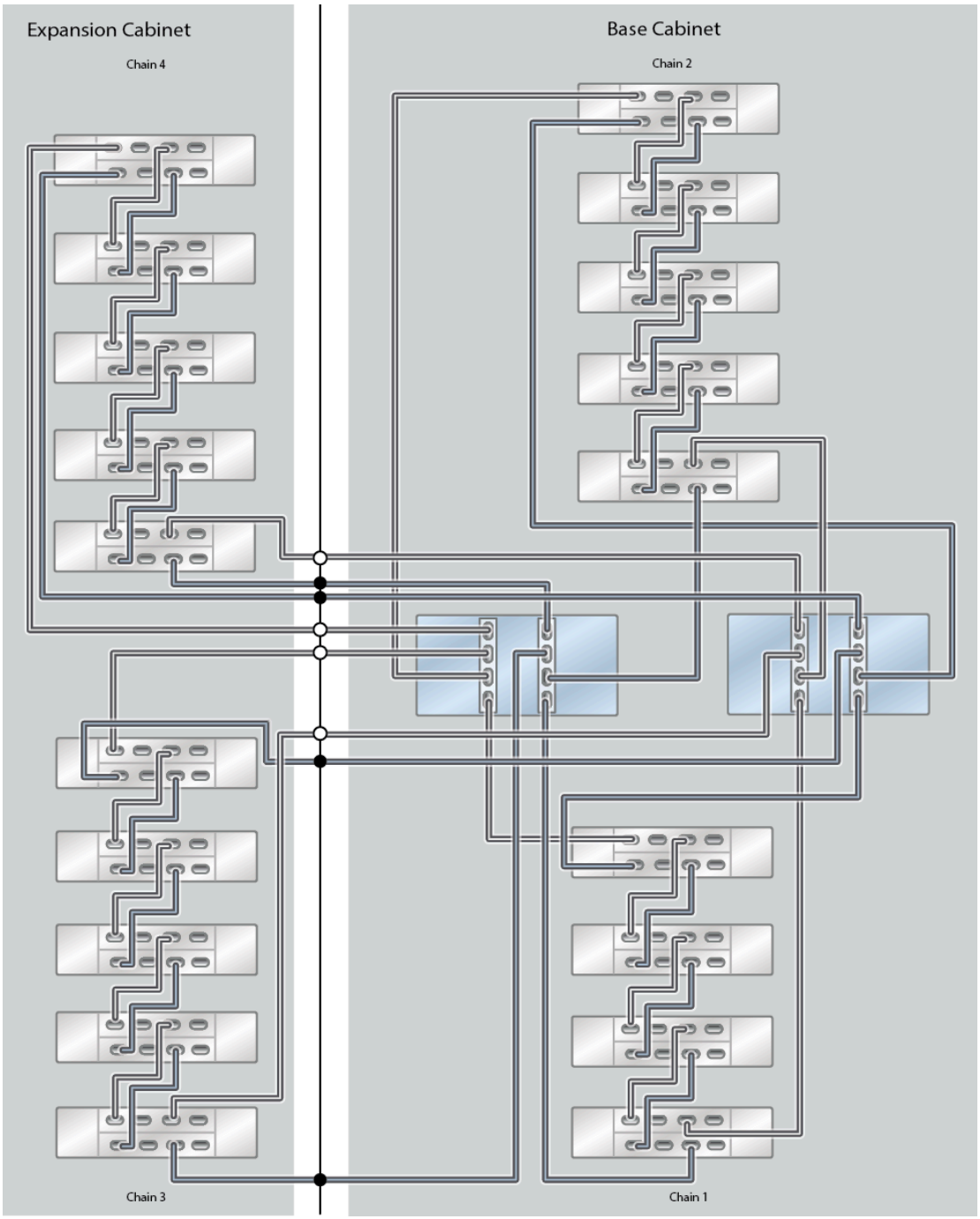
Oracle ZFS Storage Appliance Racked System ZS7-2 MR Capacity Configuration:

17 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



Oracle ZFS Storage Appliance Racked System ZS7-2 MR Capacity Configuration:

19 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



All-Flash/Mixed Configurations for Oracle ZFS Storage Appliance Racked System ZS7-2 MR

This section provides an overview and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS7-2 MR that consist of all-flash/mixed configurations with either all Oracle Storage Drive Enclosure DE3-24P disk shelves, or a mix of Oracle Storage Drive Enclosure DE3-24P and DE3-24C disk shelves. High-performance Oracle Storage Drive Enclosure DE3-24P disk shelves comprise either 20 or 24 all-flash SSDs, or 20 or 24 high-speed hard

disk drives. Some configurations include read cache and/or log devices. Maximum performance configurations support Oracle Storage Drive Enclosure DE3-24P disk shelves, while optimum performance configurations support both Oracle Storage Drive Enclosure DE3-24P and DE3-24C disk shelves. Some configurations do not support expansion cabinets.

This section contains the following topics:

- Overview of Oracle ZFS Storage Appliance Racked System ZS7-2 MR with All-Flash/Mixed Configurations
- Base Cabinet Configurations for Oracle ZFS Storage Appliance Racked System ZS7-2 MR with All-Flash/Mixed Configurations

Overview of Oracle ZFS Storage Appliance Racked System ZS7-2 MR with All-Flash/Mixed Configurations

All-Flash/Mixed configurations take advantage of Oracle Storage Drive Enclosure DE3-24P high-performance disk shelves and are available in a base cabinet, or a base cabinet with up to one expansion cabinet for some configurations. Six base cabinet options are offered in a total of 27 possible system configurations, and all base cabinet options contain two Oracle ZFS Storage ZS7-2 MR controllers.

> **Note:**
>
> Oracle ZFS Storage Appliance Racked System ZS7-2, which has preset configurations, can be upgraded in the field to any supported configuration for Oracle ZFS Storage ZS7-2. For example, you can upgrade the racked system by adding one disk shelf to a two-disk-shelf configuration, adding cabling for the new disk shelf, and then recabling the disk shelves. Thus, three disk shelves are supported, even though the racked system is not offered in a three-disk-shelf configuration. Complex upgrades require extensive planning and recabling.

Oracle ZFS Storage Appliance Racked System ZS7-2 MR maximum performance configurations feature up to four Oracle Storage Drive Enclosure DE3-24P disk shelves in the base cabinet. The disk shelves are configured as one single shelf per chain to obtain maximum performance. Depending on the number of chains in the base cabinet, Oracle ZFS Storage Appliance Racked System ZS7-2 MR maximum performance configurations can support one expansion cabinet.

Table 10-12 Oracle ZFS Storage Appliance Racked System ZS7-2 MR Maximum Performance Configurations Components

Base Cabinet	Expansion Cabinet
Up to 4 Oracle Storage Drive Enclosure DE3-24P disk shelves Factory configurations: 1, 2, or 4 Oracle Storage Drive Enclosure DE3-24P disk shelves Two Oracle ZFS Storage ZS7-2 MR controllers	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves

Oracle ZFS Storage Appliance Racked System ZS7-2 MR optimum performance configurations feature up to 18 Oracle Storage Drive Enclosure DE3-24P disk shelves, as well as various combinations of Oracle Storage Drive Enclosure DE3-24C and DE3-24P disk shelves in the base cabinet. Depending on the number of chains in the base cabinet, Oracle ZFS Storage Appliance Racked System ZS7-2 MR optimum performance configurations can support up to one expansion cabinet.

Table 10-13 Oracle ZFS Storage Appliance Racked System ZS7-2 MR Optimum Performance Configurations Components

Base Cabinet	Expansion Cabinet
Up to 18 Oracle Storage Drive Enclosure DE3-24P disk shelves Factory configurations: • Oracle Storage Drive Enclosure DE3-24P disk shelves: 2, 4, 6, 8, 10, 12, 14, 16, or 18 • Mixed Oracle Storage Drive Enclosure DE3-24C / DE3-24P disk shelves: – 2 Oracle Storage Drive Enclosure DE3-24C / 2 to 14 DE3-24P – 4 Oracle Storage Drive Enclosure DE3-24C / 2 to 10 DE3-24P – 6 Oracle Storage Drive Enclosure DE3-24C / 2 to 6 DE3-24P – 8 Oracle Storage Drive Enclosure DE3-24C / 2 DE3-24P Two Oracle ZFS Storage ZS7-2 MR controllers	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves

The Oracle ZFS Storage Appliance Racked System ZS7-2 MR all-flash/mixed configurations support various storage options.

Table 10-14 Oracle ZFS Storage Appliance Racked System ZS7-2 MR Disk Shelf Device Types and Allowable Configurations

Disk Shelf	Data Devices	Read Cache Devices	Log Devices
Oracle Storage Drive Enclosure DE3-24P All-Flash	7.68 TB SSDs: 24 in slots 0 - 23 or 20 in slots 0 - 19	Not allowed	200 GB SSDs in slot 20 - 23
Oracle Storage Drive Enclosure DE3-24P	1.2 TB HDDs: 24 in slots 0 - 23 or 20 in slots 0 - 19	7.68 TB SSDs in slot 20 - 23	200 GB SSDs in slot 20 - 23
Oracle Storage Drive Enclosure DE3-24C	10 or 14 TB HDDs: 24 in slots 0 - 23 or 20 in slots 0 - 19	7.68 TB SSDs in slot 20 - 23	200 GB SSDs in slot 20 - 23

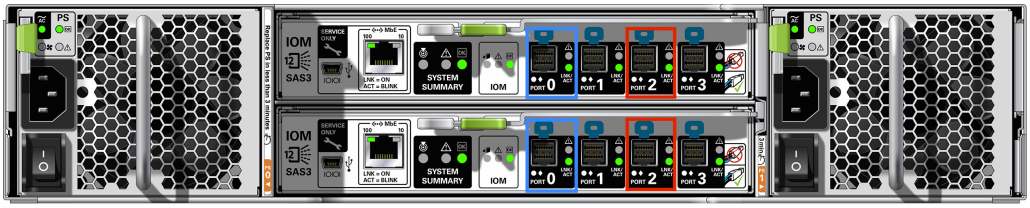
Base Cabinet Configurations for Oracle ZFS Storage Appliance Racked System ZS7-2 MR with All-Flash/Mixed Configurations

Oracle ZFS Storage Appliance Racked System ZS7-2 MR all-flash/mixed configurations have two SAS-3 HBAs in each controller, which provide the maximum of eight ports of SAS-3 HBA connectivity.

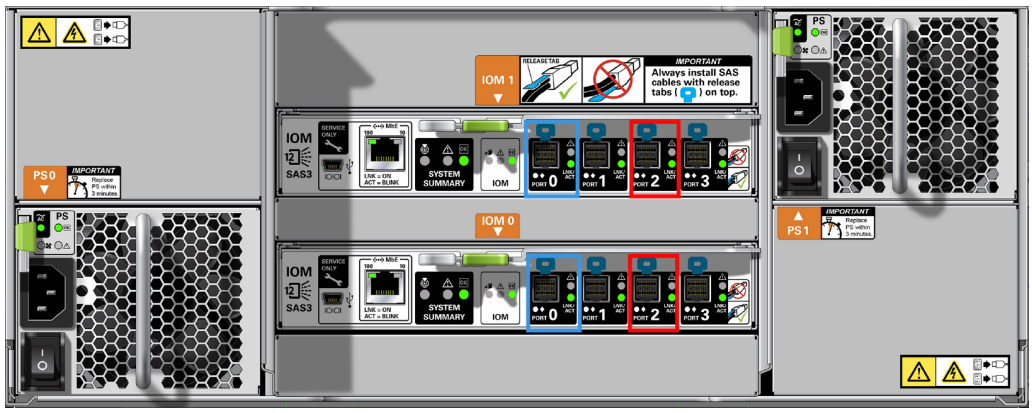
The SAS-3 HBA port numbering order is ascending, from bottom (Port 0) to top (Port 3). Both SAS-3 HBA cards and Oracle Storage Drive Enclosure DE3-24 disk shelves use the SFF 8644 connectors.

The following figure shows the slot number for each HBA card, as well as the port numbers in each card.

As shown in the following figure, the Oracle Storage Drive Enclosure DE3-24P disk shelf has two I/O modules (IOMs) with four ports each. In all cabling configurations, Port 1 and Port 3 are never used.



As shown in the following figure, the Oracle Storage Drive Enclosure DE3-24C disk shelf has two I/O modules (IOMs) with four ports each. In all cabling configurations, Port 1 and Port 3 are never used.



The Oracle ZFS Storage Appliance Racked System ZS7-2 MR cabling configurations follow standard cabling methodologies with additional restrictions that allow use of the cable management arm (CMA). They provide a more practical implementation for SSD log device and read cache device matching, and can be configured for maximum or optimal performance.

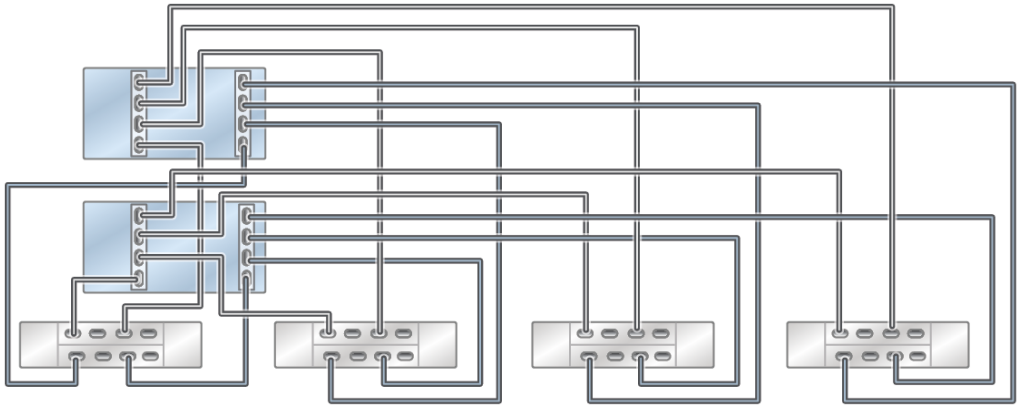
Any upgrades that change the number of SAS-3 HBA cards, or include more than one cabinet that is not an original Oracle ZFS Storage Appliance Racked System ZS7-2

MR or not compatible with Oracle ZFS Storage Appliance Racked System ZS7-2 MR must be re-cabled for that particular configuration. For cabling examples of connecting Oracle Storage Drive Enclosure DE3-24 disk shelves to an Oracle ZFS Storage ZS7-2 MR controller with 4x4 port SAS-3 HBAs, see Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS7-2 Mid-range (MR) Controllers. For SAS cable length guidelines, see Cabinet and Cabling Guidelines.

The cabinets are self-contained and pre-cabled following the required cabling methodology. The following diagrams illustrate how the six base cabinet options are cabled.

Oracle ZFS Storage Appliance Racked System ZS7-2 MR Performance Configuration:

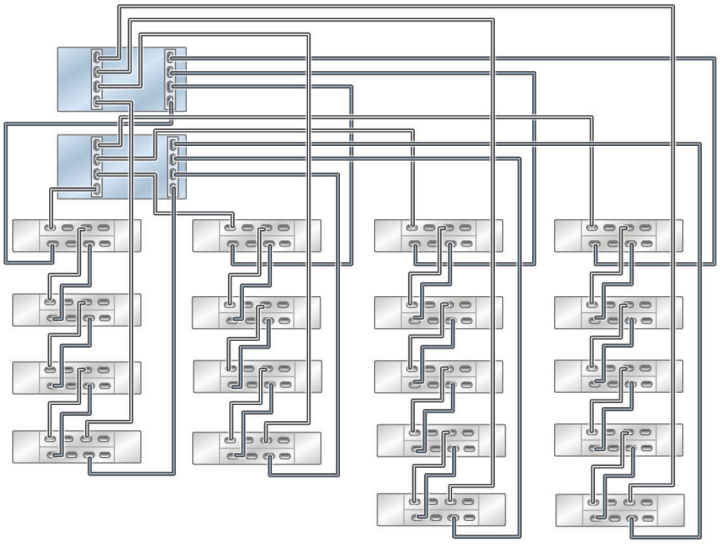
Four Oracle Storage Drive Enclosure DE3-24P Disk Shelves (maximum performance)



This configuration can have one, two, or four Oracle Storage Drive Enclosure DE3-24P disk shelves utilizing the maximum performance cabling scheme.

Oracle ZFS Storage Appliance Racked System ZS7-2 MR Performance Configuration:

18 Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)

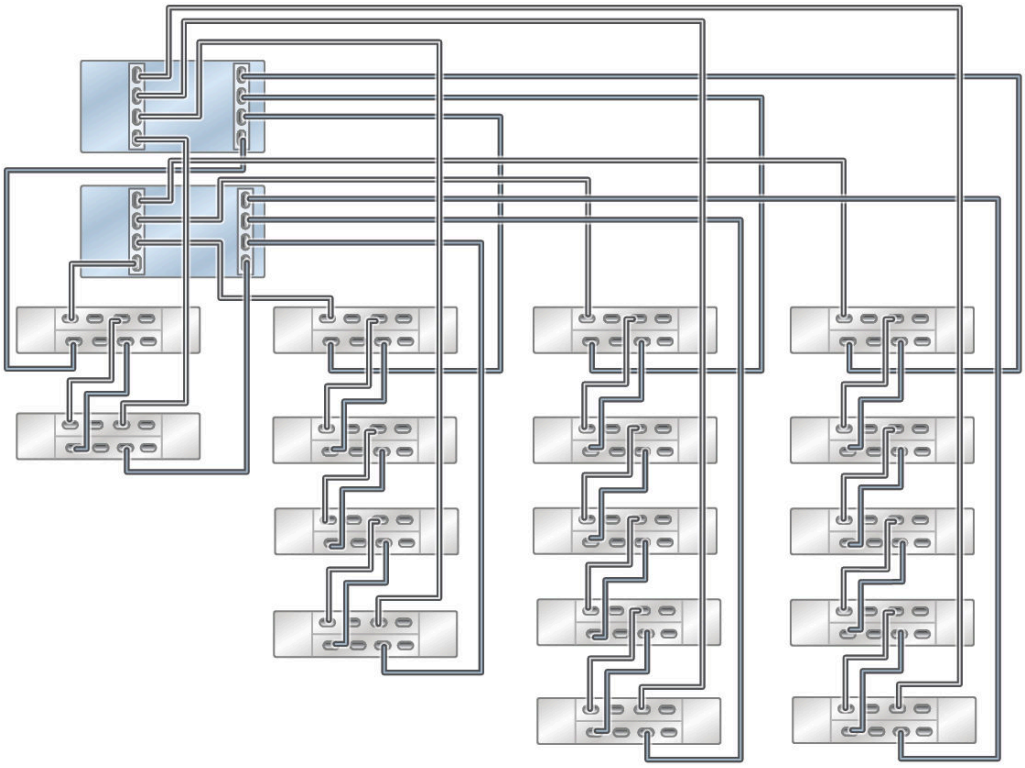


Oracle Storage Drive Enclosure DE3-24P disk shelves in this configuration are added in pairs. Any other combination of disk shelves are added by pairs starting at the bottom of the rack. Valid disk shelf count combinations are 2, 4, 6, 8, 10, 12, 14, 16, and 18 disk shelves.

Oracle ZFS Storage Appliance Racked System ZS7-2 MR Performance Configuration:

Two Oracle Storage Drive Enclosure DE3-24C (bottom left) and

Two Oracle Storage Drive Enclosure DE3-24P to 14 DE3-24P Disk Shelves (optimum performance)

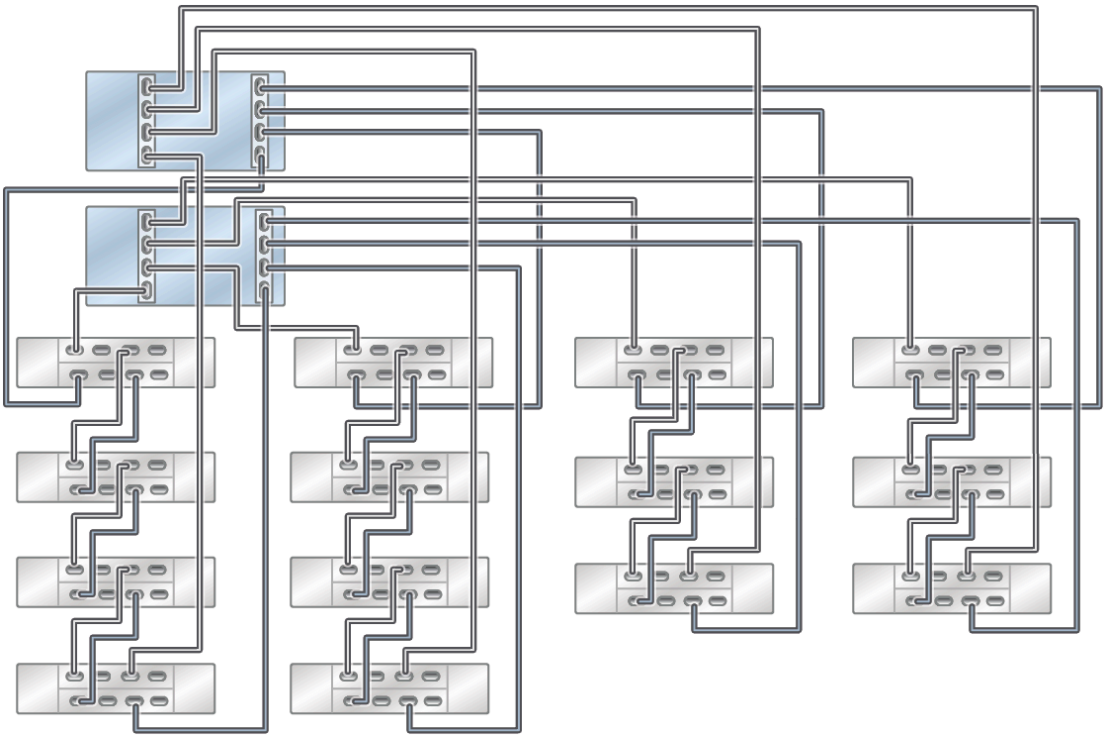


Oracle Storage Drive Enclosure DE3-24P disk shelves in this configuration are added in pairs. Any other combination of disk shelves are added by pairs starting at the bottom of the rack. Valid disk shelf count combinations are 2, 4, 6, 8, 10, 12, 14, and 16 disk shelves.

Oracle ZFS Storage Appliance Racked System ZS7-2 MR Performance Configuration:

Four Oracle Storage Drive Enclosure DE3-24C (bottom left) and

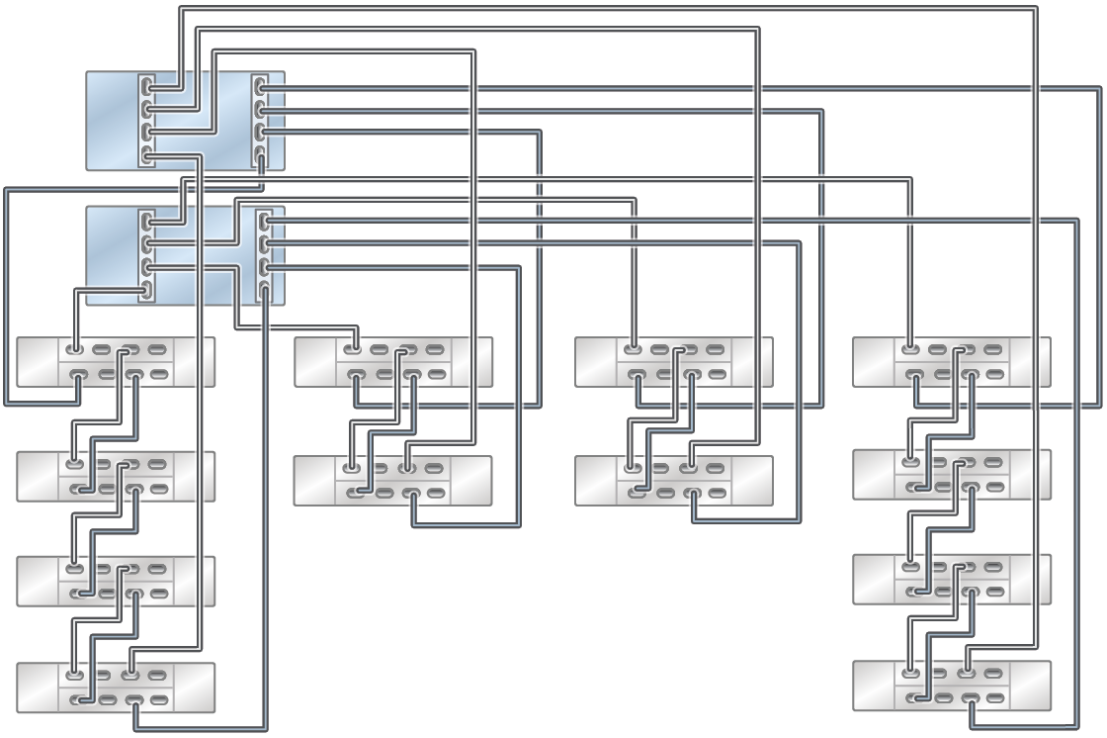
Two Oracle Storage Drive Enclosure DE3-24P to Ten DE3-24P Disk Shelves (optimum performance)



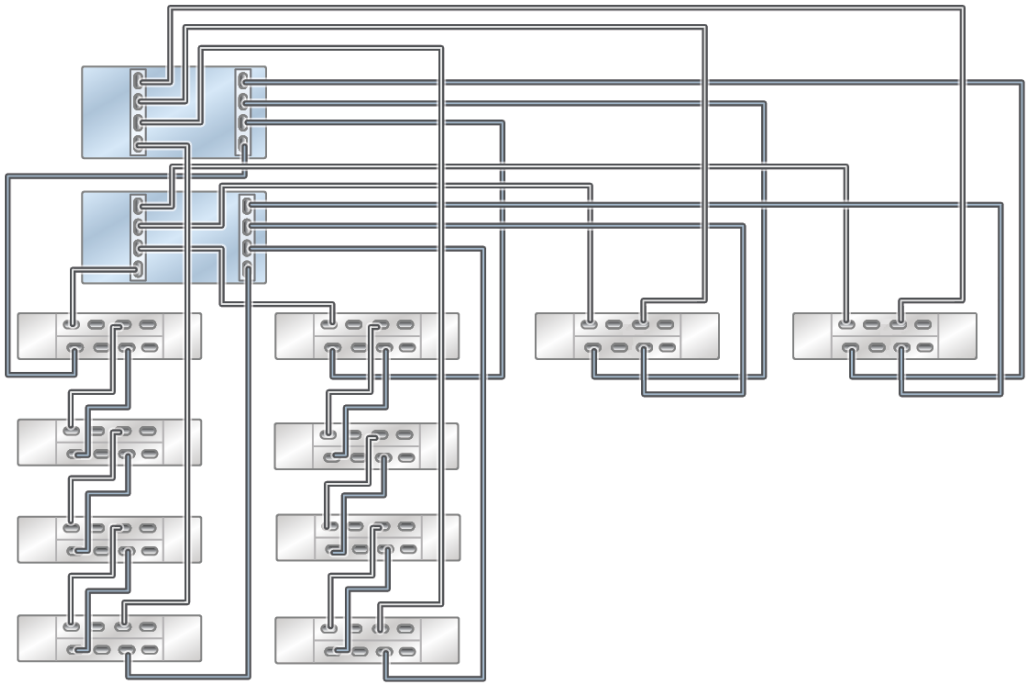
Oracle ZFS Storage Appliance Racked System ZS7-2 MR Performance Configuration:

Six Oracle Storage Drive Enclosure DE3-24C (first two chains from the left) and

Two Oracle Storage Drive Enclosure DE3-24P to Six DE3-24P Disk Shelves (optimum performance)



Oracle ZFS Storage Appliance Racked System ZS7-2 MR Performance Configuration: Eight Oracle Storage Drive Enclosure DE3-24C (first two chains from the left) and Two Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)



11

Oracle ZFS Storage Appliance Racked System ZS5-4

This section provides overviews and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS5-4, which is a pre-racked and pre-cabled system that supports two configuration types: capacity configurations and performance configurations.

This section contains the following topics:

- Capacity Configurations for Oracle ZFS Storage Appliance Racked System ZS5-4
- Performance Configurations for Oracle ZFS Storage Appliance Racked System ZS5-4

Capacity Configurations for Oracle ZFS Storage Appliance Racked System ZS5-4

This section provides an overview and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS5-4 capacity configurations.

This section contains the following topics:

- Overview of Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configurations
- Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configurations

Overview of Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configurations

Capacity configurations take advantage of high-capacity disk shelves and are available in a base cabinet, or a base cabinet with up to three expansion cabinets. Two Oracle ZFS Storage ZS5-4 controllers and up to 38 disk shelves can be supported, as shown in the following table.

Table 11-1 Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configurations Components

Base Cabinet	Expansion Cabinet 1	Expansion Cabinet 2	Expansion Cabinet 3
Up to 8 Oracle Storage Drive Enclosure DE3-24C disk shelves Two Oracle ZFS Storage ZS5-4 controllers	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves

Configurations are offered in multiples of two disk shelves, as well as half-rack expansion: 2 disk shelves (minimum), 4, 6, 8, 10, 12, 13 (half rack), 14, 16, 18, 20, 22, 23 (half rack), 24, 26, 28, 30, 32, 33 (half rack), 34, 36, and 38 (maximum).

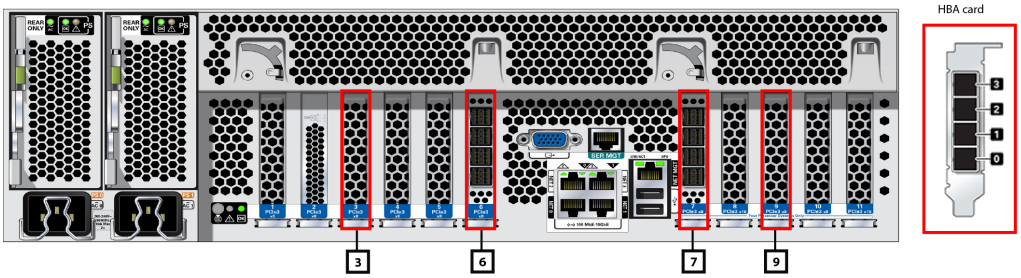
Each Oracle ZFS Storage ZS5-4 controller supports two, three, or four SAS HBA cards. Four SAS HBA cards must be installed in each Oracle ZFS Storage ZS5-4 controller to support disk shelves in the expansion cabinet(s).

Clustered Oracle ZFS Storage ZS5-4 controllers that contain four SAS HBAs each support a high-availability configuration consisting of:

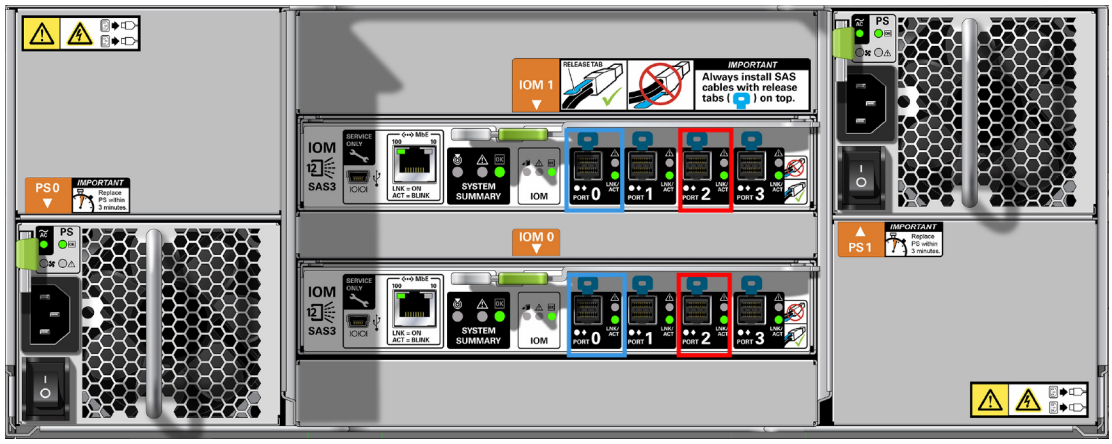
- Two chains of four disk shelves per disk chain in the base cabinet for a total of eight disk shelves, and
- One to three expansion cabinets, each cabinet supporting two chains with a maximum of five disk shelves per disk chain, for a total of 10 disk shelves for one expansion cabinet, 20 disk shelves for two expansion cabinets, or 30 disk shelves for three expansion cabinets.

The cabinets are self-contained and pre-cabled following the required cabling methodology. Pre-racked system cabling tables and diagrams, which can also be used for planning future system expansion, are provided in the section Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configurations.

Each cabinet contains 42 rack units (RUs), with RU01 on the bottom. Each Oracle ZFS Storage ZS5-4 controller occupies three rack units, and its location is referenced by the bottommost rack unit number. The top controller is referred to as Controller 1 and is located in RU20 in the base cabinet, and the bottom controller is Controller 0 in RU17. The following figure shows the slot number for each HBA card, as well as the port numbers in each card.



Each Oracle Storage Drive Enclosure DE3-24C disk shelf occupies four rack units, and disk shelves are normally installed from the bottom of the cabinet to the top for stability. To provide higher performance capabilities, disk chains are alternated from the bottom to the top of the base cabinet, with four disk shelves per chain and gaps between components. Therefore, the first disk shelf is in RU01, the second in RU05, the third in RU23, the fourth in RU27, the fifth in RU09, and so on in an alternating manner. As shown in the following figure, the Oracle Storage Drive Enclosure DE3-24C disk shelf has two I/O Modules (IOMs) with four ports each. In all cabling configurations, Port 1 and Port 3 are never used.



Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configurations

The following table describes the locations and port connections for two controllers and eight disk shelves in the base cabinet, using 3-meter SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs.

Table 11-2 Base Cabinet: Controller and Disk Shelf Locations and Connections

FROM	TO				
RU	**CONTROLLER**	**HBA PORT**	**RU**	**DISK SHELF**	**DISK SHELF PORT**
20	1	Slot 3, Port 0	1	1	IOM 1, Port 2
17	0	Slot 6, Port 0	1	1	IOM 0, Port 2
20	1	Slot 7, Port 0	23	3	IOM 1, Port 2
17	0	Slot 9, Port 0	23	3	IOM 0, Port 2
17	0	Slot 3, Port 0	5, 13	2, 6	IOM 1, Port 0
20	1	Slot 6, Port 0	5, 13	2, 6	IOM 0, Port 0
17	0	Slot 7, Port 0	27, 35	4, 8	IOM 1, Port 0
20	1	Slot 9, Port 0	27, 35	4, 8	IOM 0, Port 0

The following table describes the locations and port connections for 10 disk shelves in Expansion Cabinet 1, using 6-meter SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs. Expansion Cabinet 1 supports disk shelves 9 through 18.

Table 11-3 Expansion Cabinet 1: Controller and Disk Shelf Locations and Connections

FROM	TO				
RU	**CONTROLLER**	**HBA PORT**	**RU**	**DISK SHELF**	**DISK SHELF PORT**
20	1	Slot 3, Port 1	1	9	IOM 1, Port 2
17	0	Slot 6, Port 1	1	9	IOM 0, Port 2

Table 11-3 (Cont.) Expansion Cabinet 1: Controller and Disk Shelf Locations and Connections

FROM	TO				
20	1	Slot 7, Port 1	21	11	IOM 1, Port 2
17	0	Slot 9, Port 1	21	11	IOM 0, Port 2
17	0	Slot 3, Port 1	5, 9, 13, 17	10, 13, 14, 17	IOM 1, Port 0
20	1	Slot 6, Port 1	5, 9, 13, 17	10, 13, 14, 17	IOM 0, Port 0
17	0	Slot 7, Port 1	25, 33, 37	12, 16, 18	IOM 1, Port 0
20	1	Slot 9, Port 1	25, 33, 37	12, 16, 18	IOM 0, Port 0

The following table describes the locations and port connections for 10 disk shelves in Expansion Cabinet 2, using 6-meter SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs. Expansion Cabinet 2 supports disk shelves 19 through 28.

Table 11-4 Expansion Cabinet 2: Controller and Disk Shelf Locations and Connections

FROM	TO				
RU	CONTROLLER	HBA PORT	RU	DISK SHELF	DISK SHELF PORT
20	1	Slot 3, Port 2	1	19	IOM 1, Port 2
17	0	Slot 6, Port 2	1	19	IOM 0, Port 2
20	1	Slot 7, Port 2	21	21	IOM 1, Port 2
17	0	Slot 9, Port 2	21	21	IOM 0, Port 2
17	0	Slot 3, Port 2	5, 9, 13, 17	20, 23, 24, 27	IOM 1, Port 0
20	1	Slot 6, Port 2	5, 9, 13, 17	20, 23, 24, 27	IOM 0, Port 0
17	0	Slot 7, Port 2	25, 33, 37	22, 26, 28	IOM 1, Port 0
20	1	Slot 9, Port 2	25, 33, 37	22, 26, 28	IOM 0, Port 0

The following table describes the locations and port connections for 10 disk shelves in Expansion Cabinet 3, using 6-meter SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs. Expansion Cabinet 2 supports disk shelves 29 through 38.

Table 11-5 Expansion Cabinet 3: Controller and Disk Shelf Locations and Connections

FROM	TO				
RU	CONTROLLER	HBA PORT	RU	DISK SHELF	DISK SHELF PORT
20	1	Slot 3, Port 3	1	29	IOM 1, Port 2
17	0	Slot 6, Port 3	1	29	IOM 0, Port 2
20	1	Slot 7, Port 3	21	31	IOM 1, Port 2
17	0	Slot 9, Port 3	21	31	IOM 0, Port 2
17	0	Slot 3, Port 3	5, 9, 13, 17	30, 33, 34, 37	IOM 1, Port 0

Table 11-5 (Cont.) Expansion Cabinet 3: Controller and Disk Shelf Locations and Connections

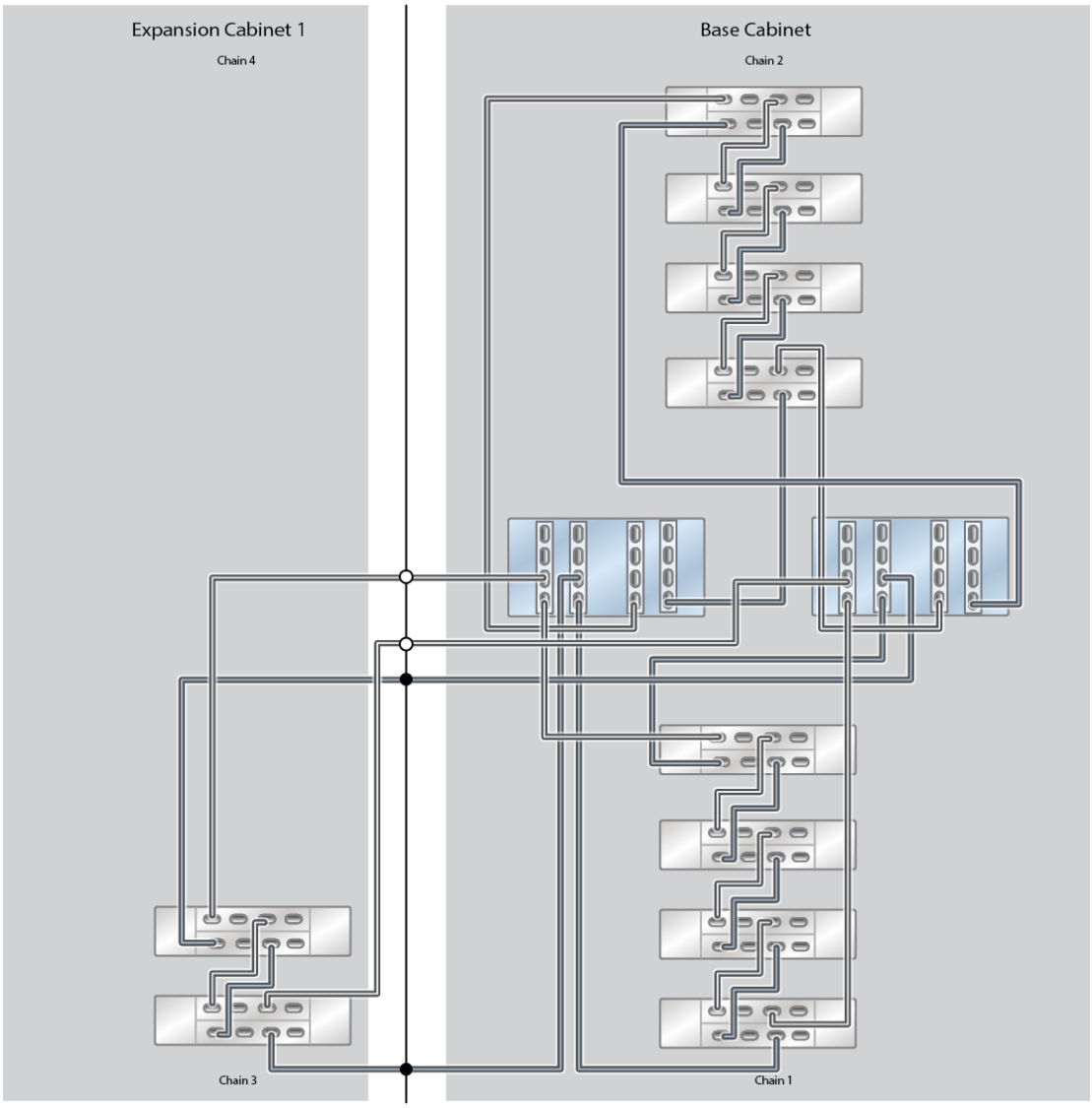
FROM	TO				
20	1	Slot 6, Port 3	5, 9, 13, 17	30, 33, 34, 37	IOM 0, Port 0
17	0	Slot 7, Port 3	25, 33, 37	32, 36, 38	IOM 1, Port 0
20	1	Slot 9, Port 3	25, 33, 37	32, 36, 38	IOM 0, Port 0

The following diagrams illustrate how pre-racked systems are cabled, as well as how to expand your system in the future. The legend for each diagram is as follows:

- A hollow circle indicates the cable connection to the top IOM (IOM 1).
- A solid circle indicates the cable connection to the bottom IOM (IOM 0).

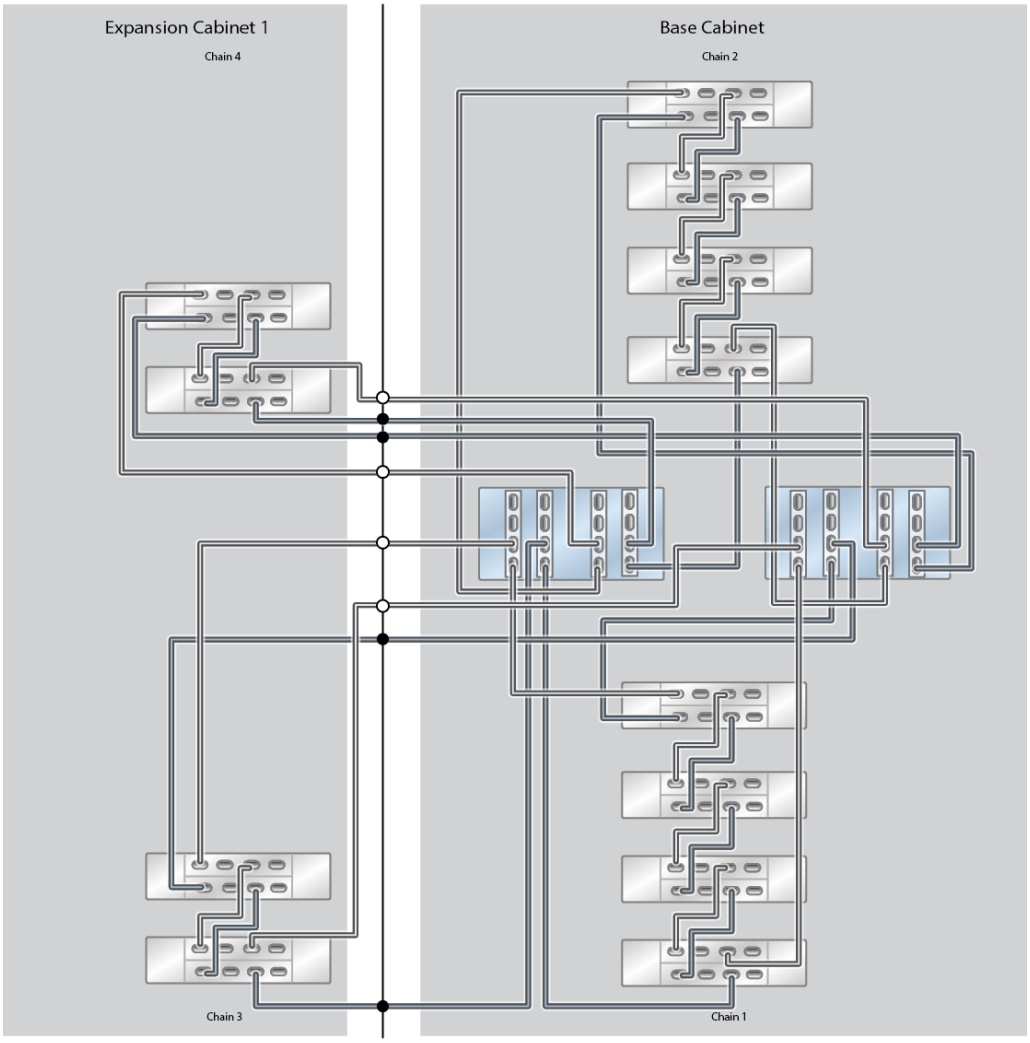
Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configuration:

10 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



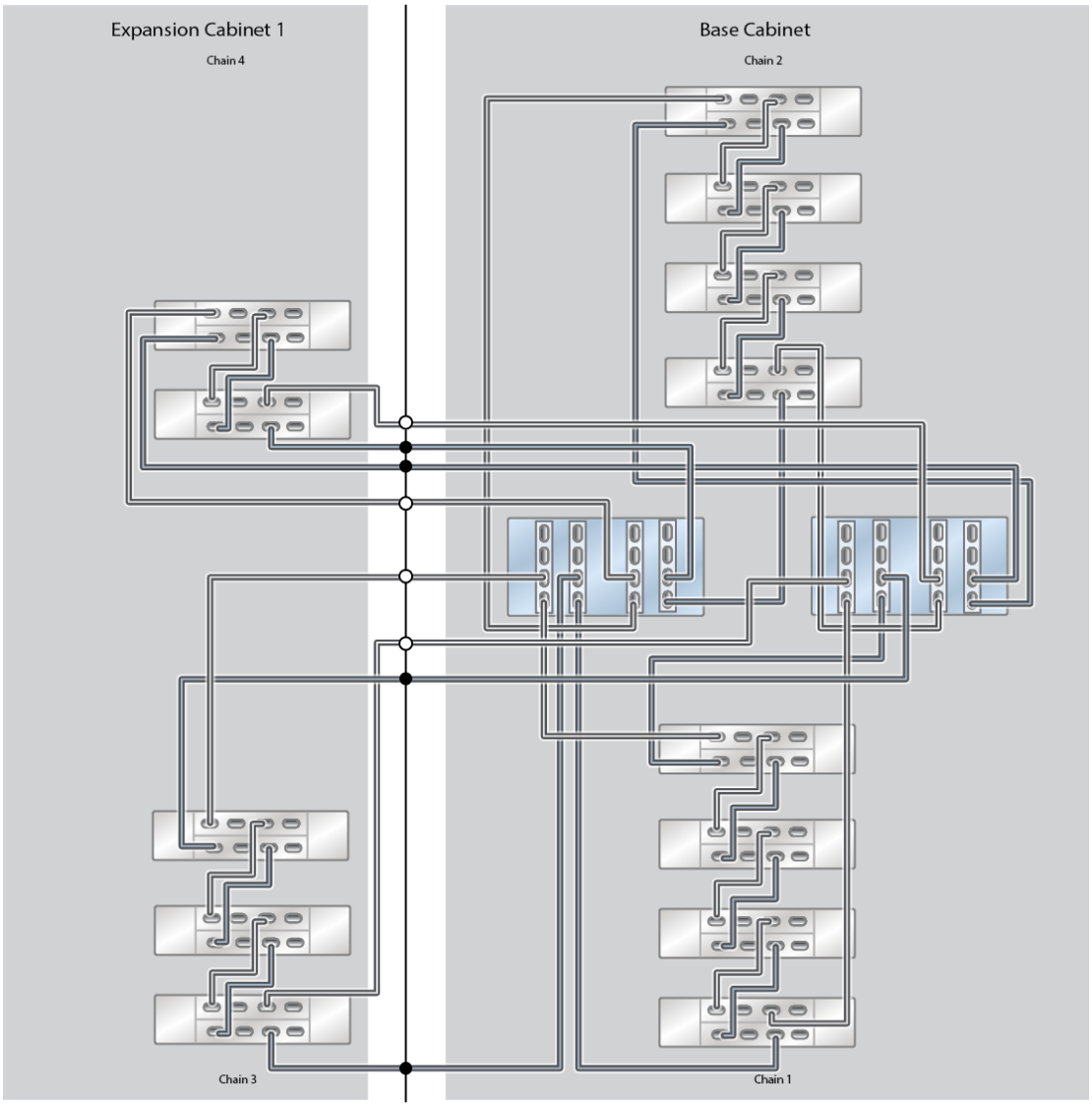
Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configuration:

12 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



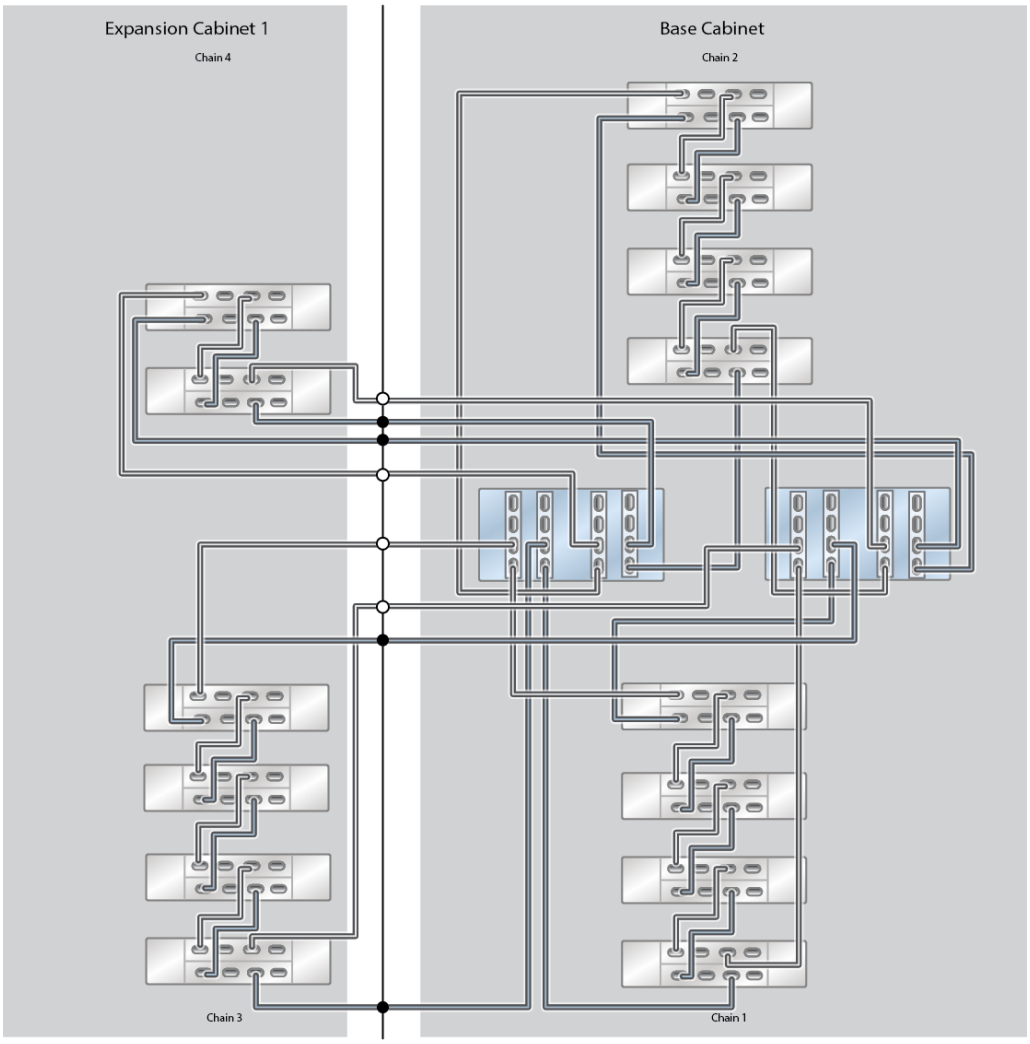
Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configuration:

13 Oracle Storage Drive Enclosure DE3-24C Disk Shelves (Half Rack)



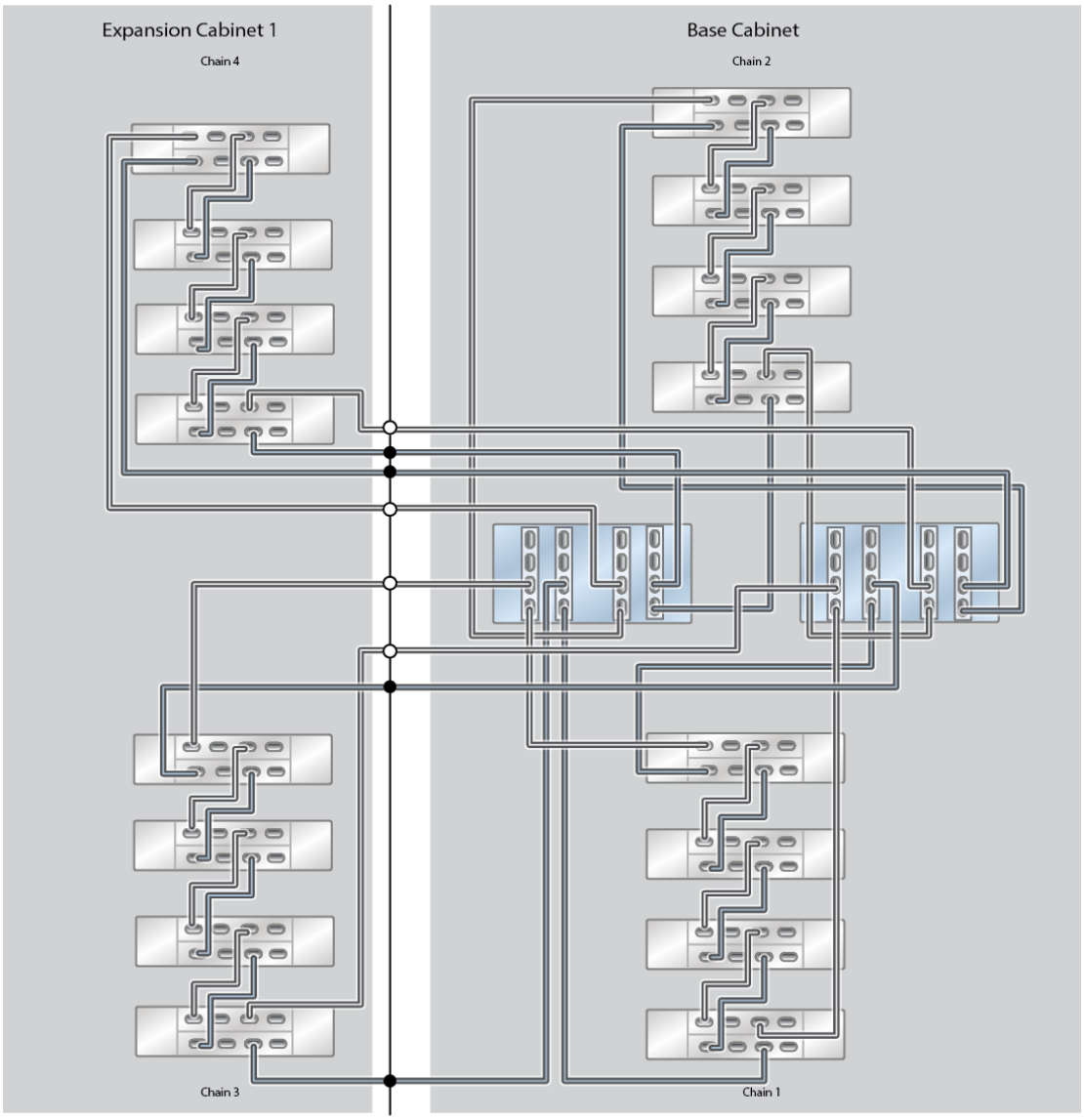
Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configuration:

14 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



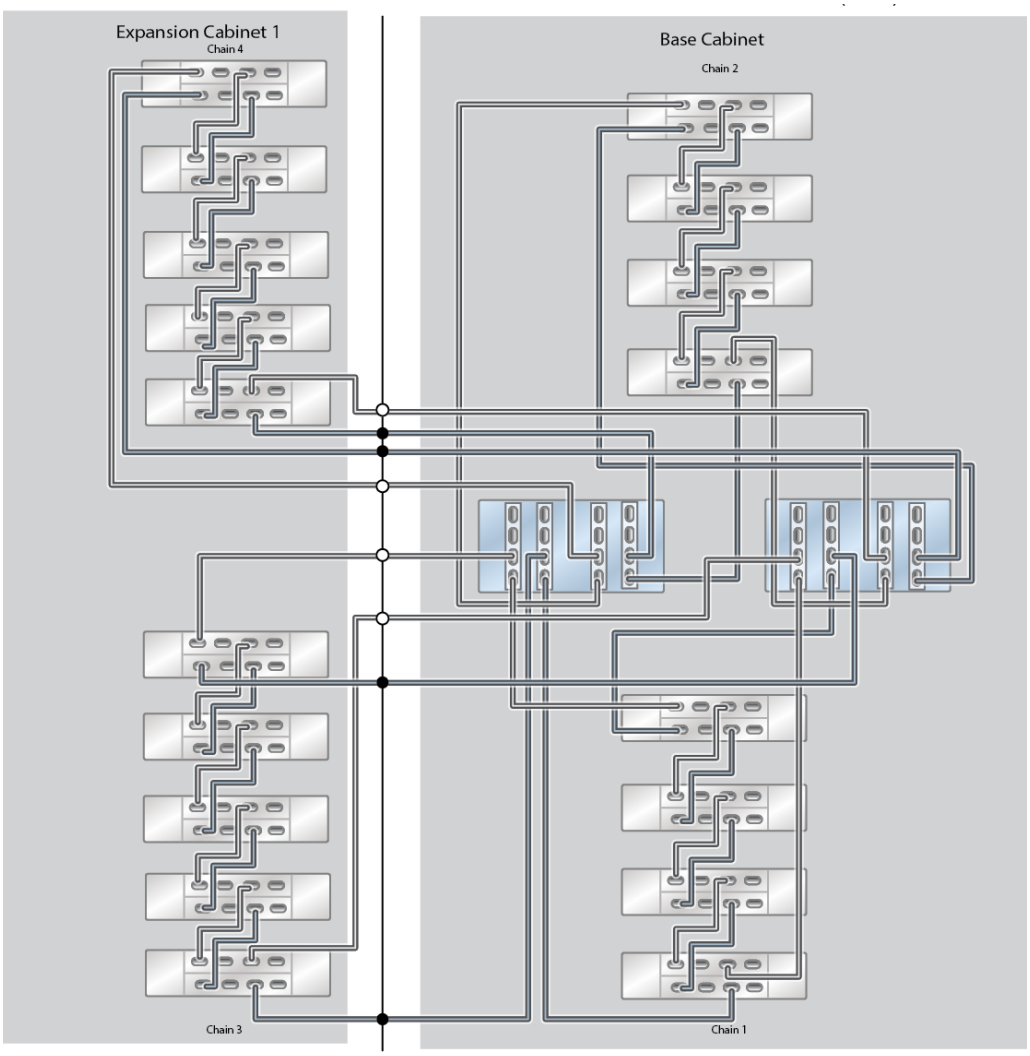
Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configuration:

16 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



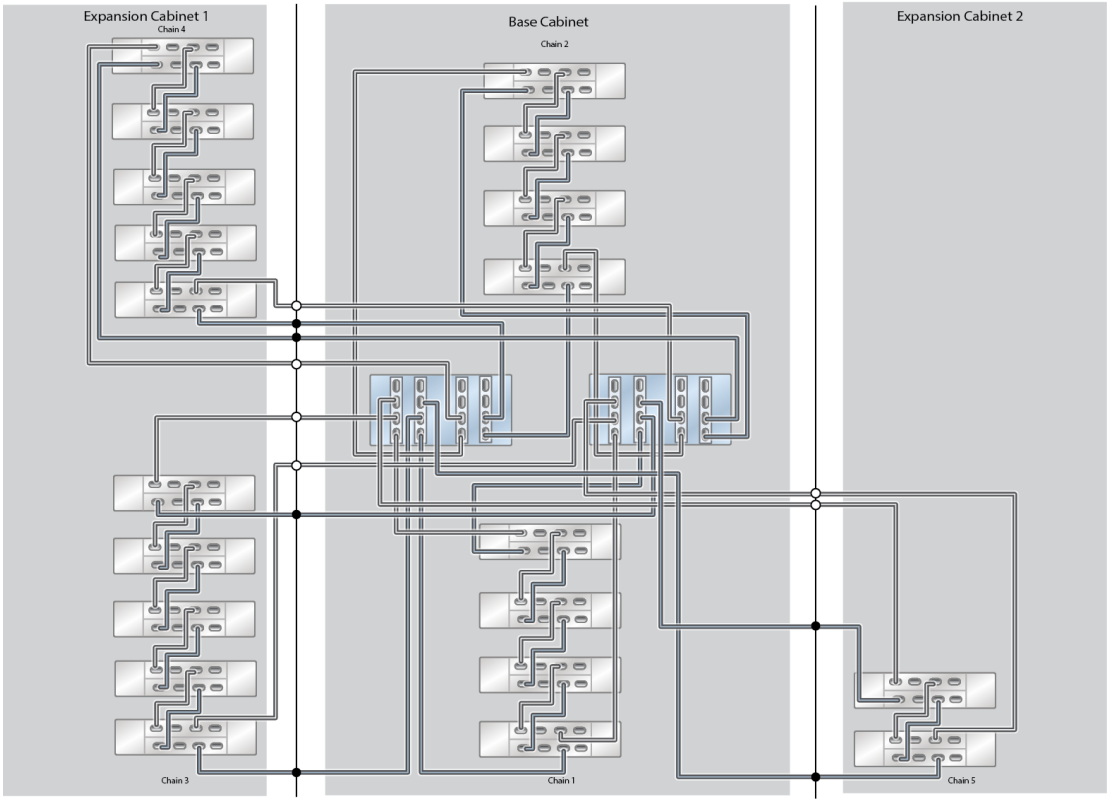
Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configuration:

18 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



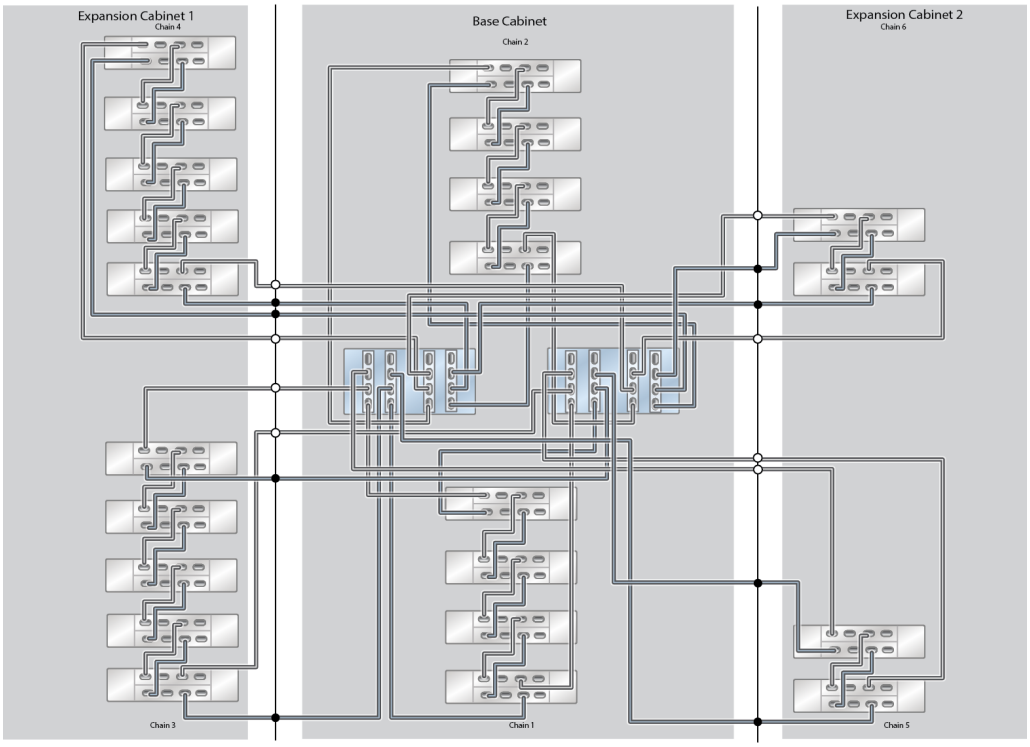
Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configuration:

20 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



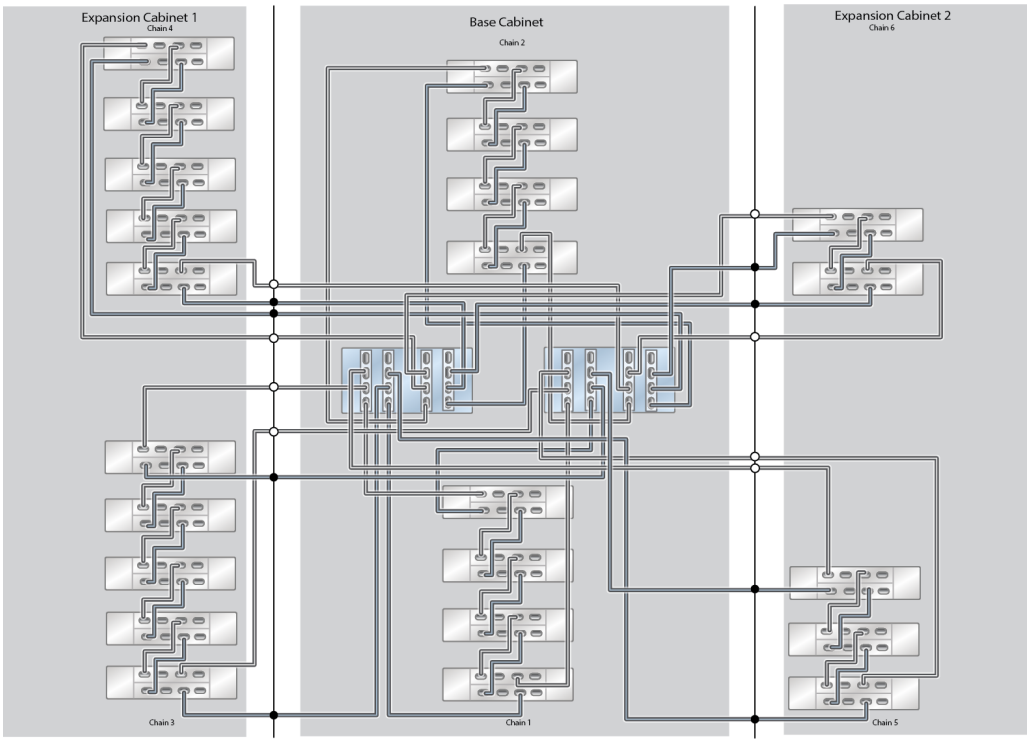
Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configuration:

22 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



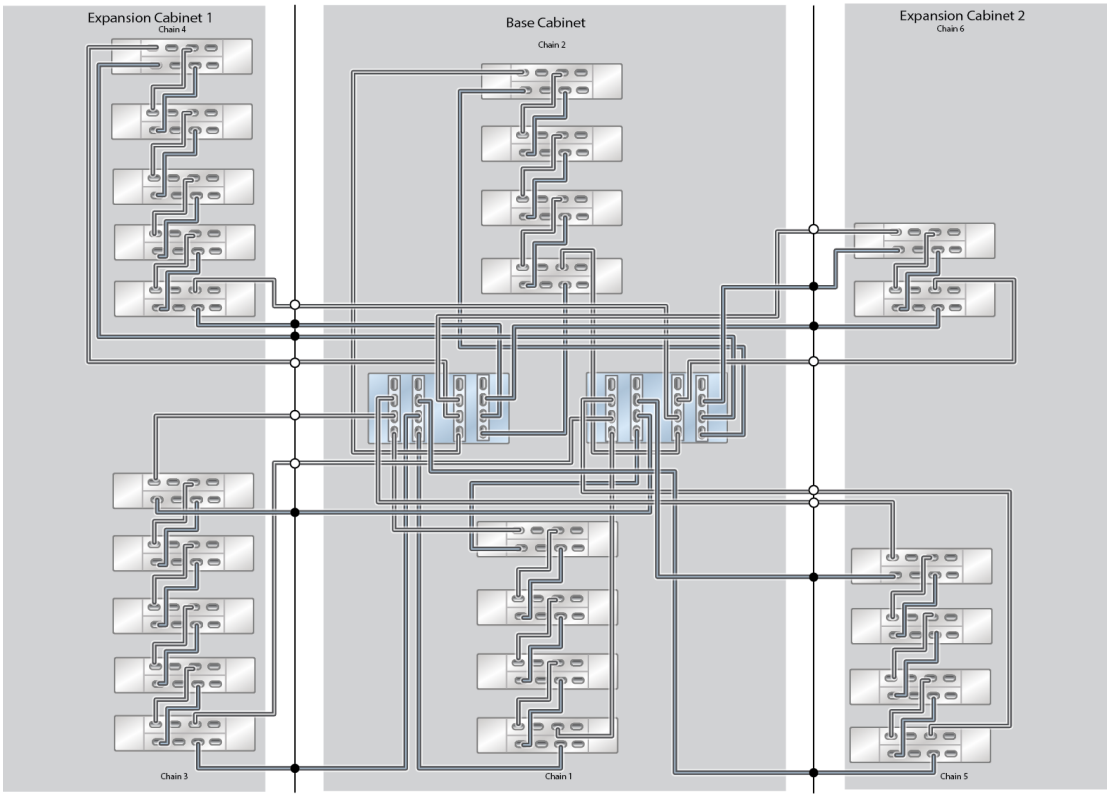
Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configuration:

23 Oracle Storage Drive Enclosure DE3-24C Disk Shelves (Half Rack)



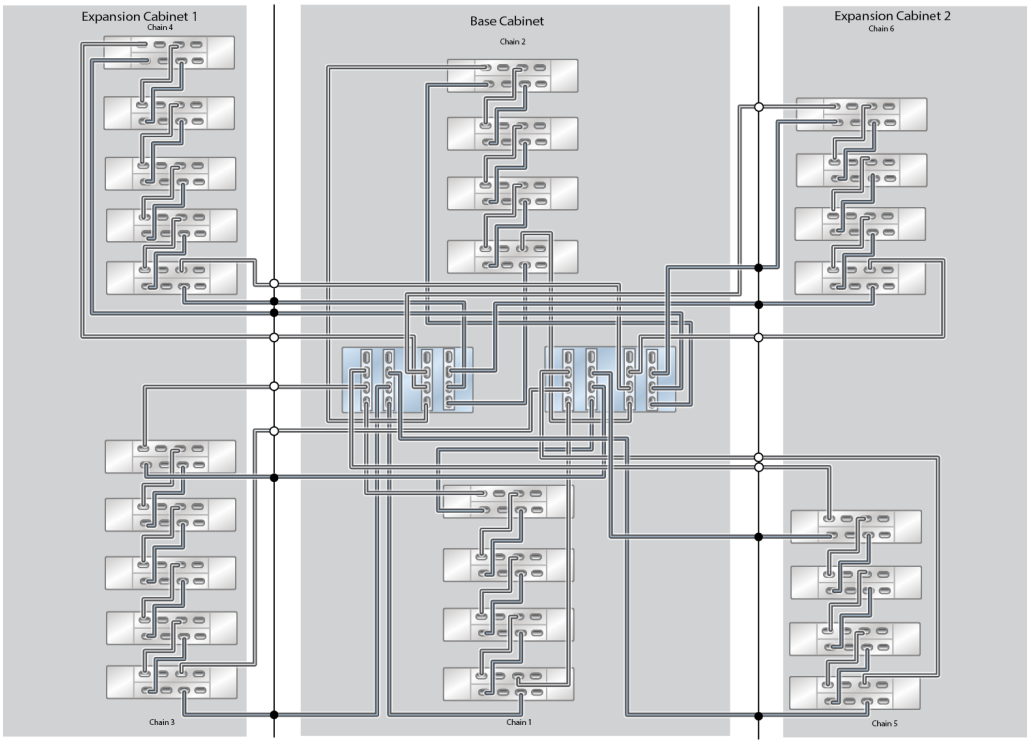
Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configuration:

24 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



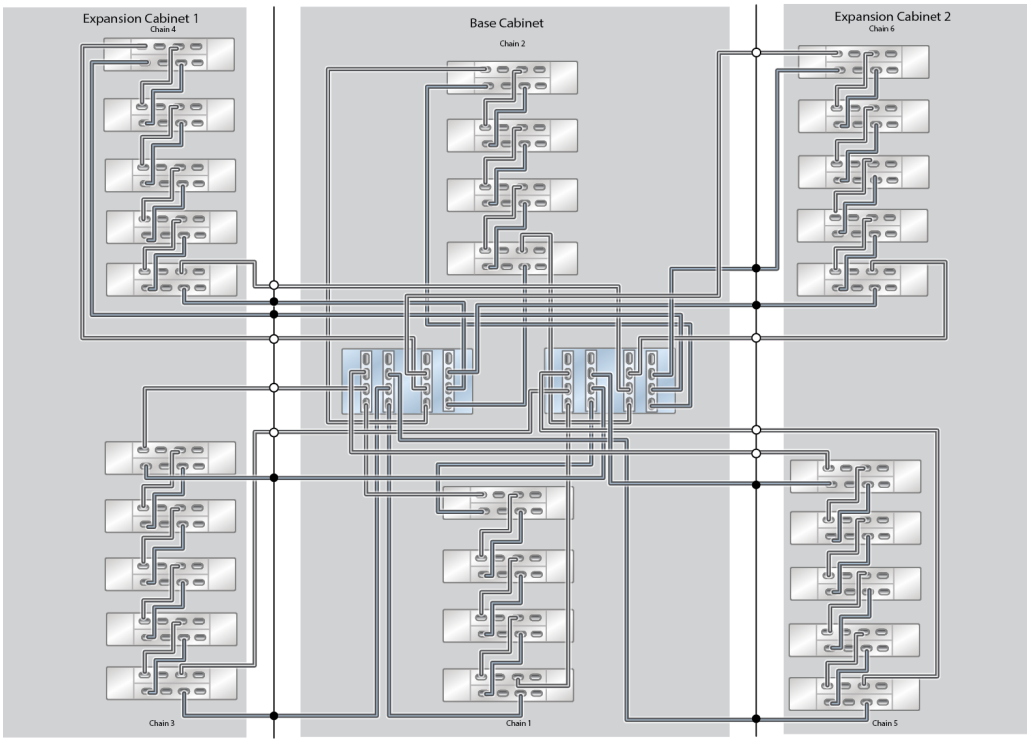
Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configuration:

26 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



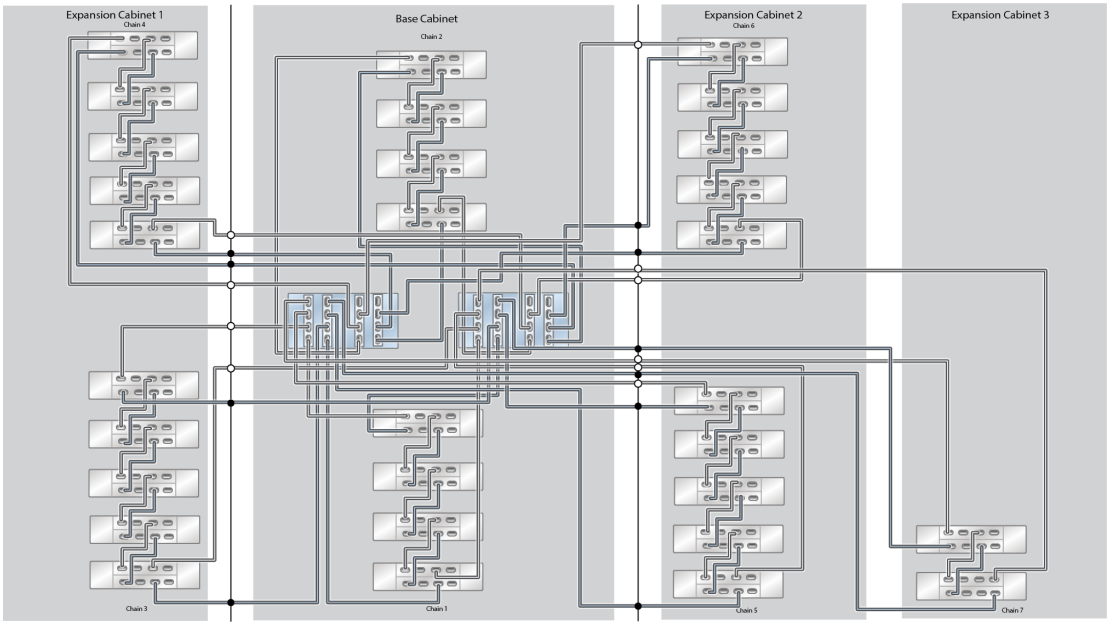
Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configuration:

28 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



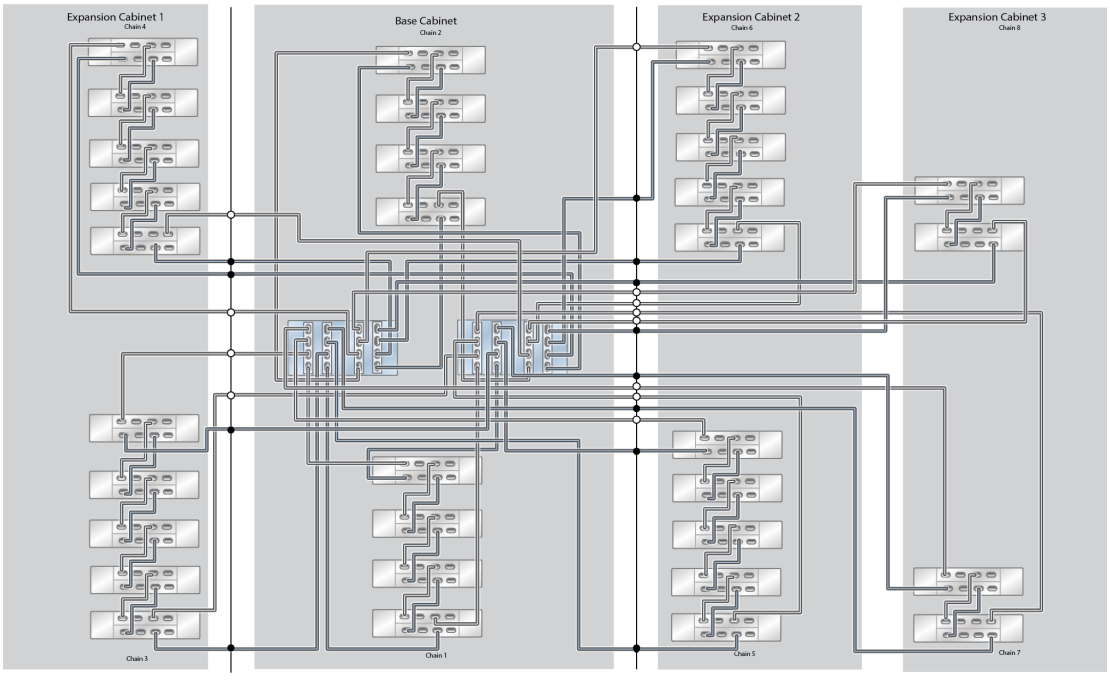
Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configuration:

30 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



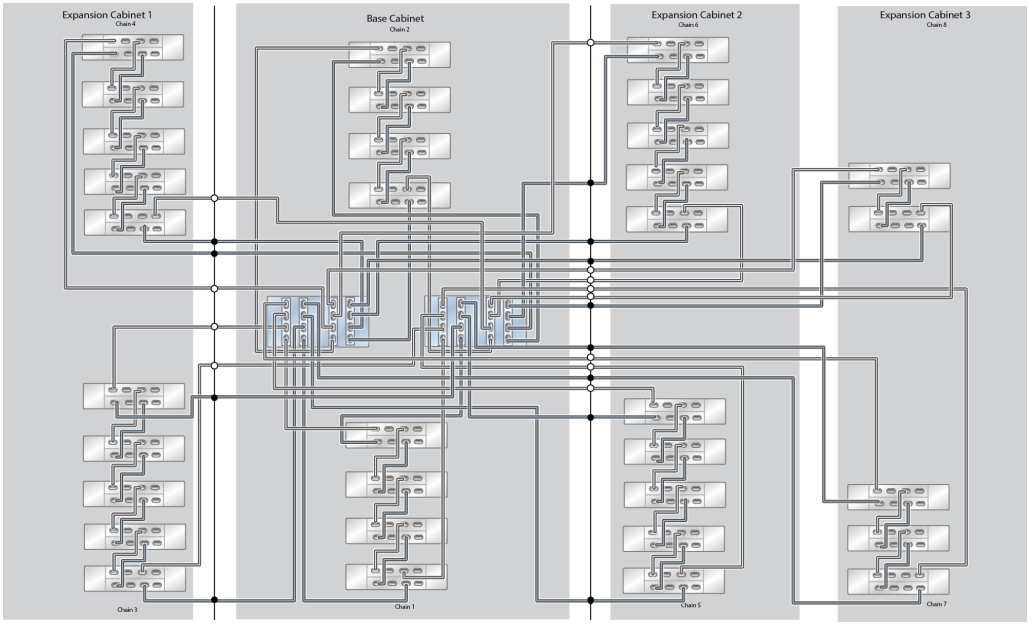
Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configuration:

32 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



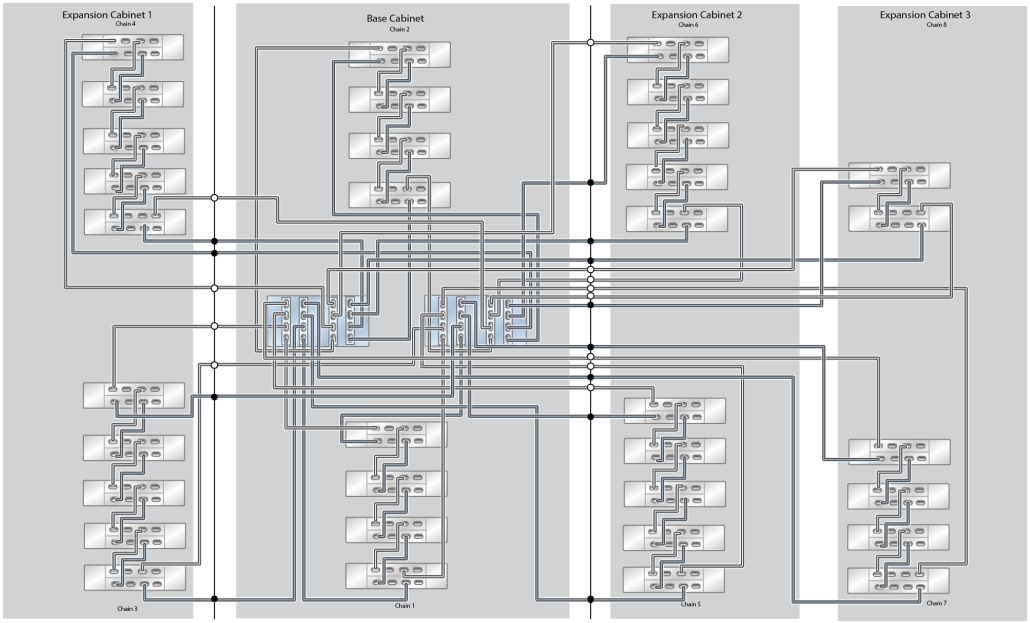
Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configuration:

33 Oracle Storage Drive Enclosure DE3-24C Disk Shelves (Half Rack)



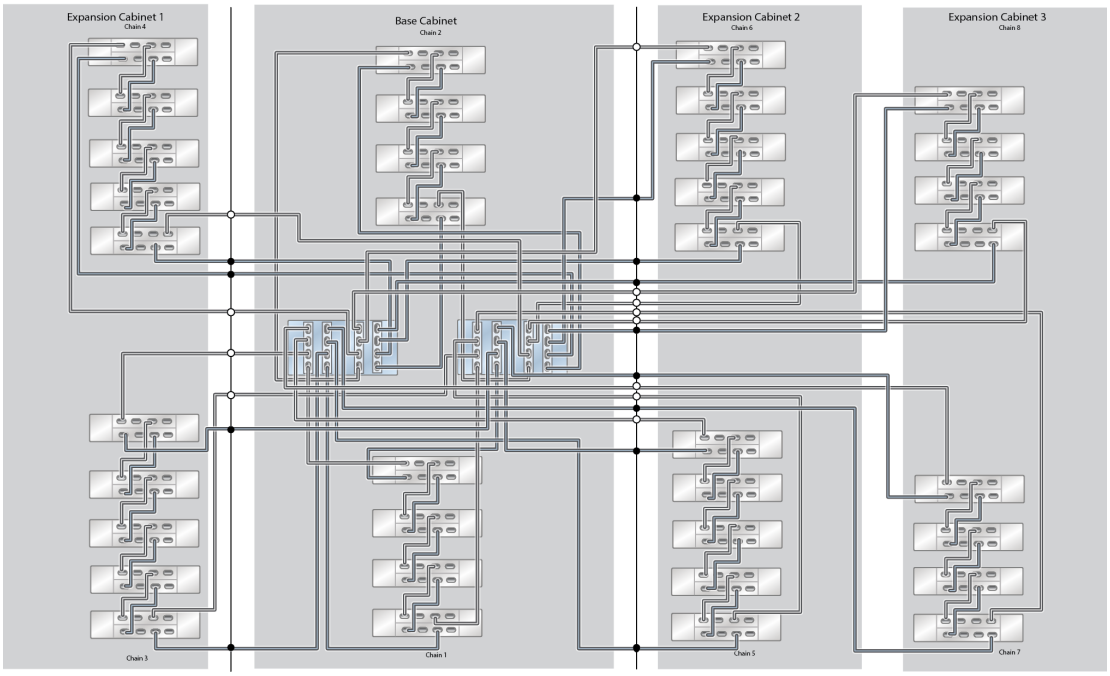
Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configuration:

34 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



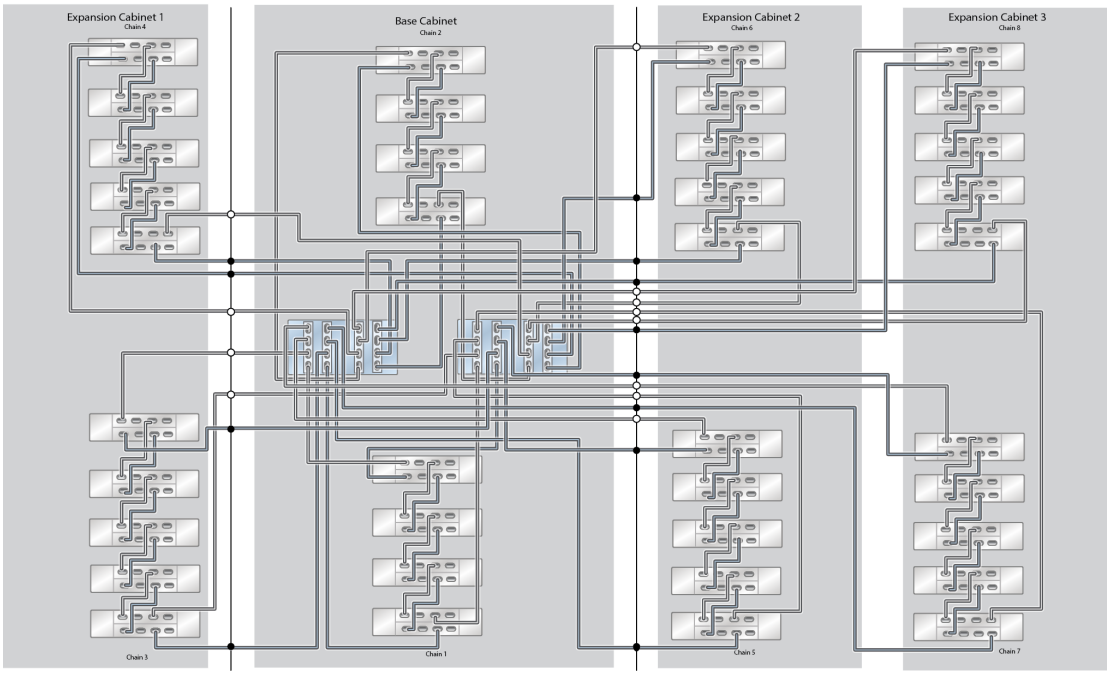
Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configuration:

36 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



Oracle ZFS Storage Appliance Racked System ZS5-4 Capacity Configuration:

38 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



Performance Configurations for Oracle ZFS Storage Appliance Racked System ZS5-4

This section provides an overview and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS5-4 performance configurations.

This section contains the following topics:

- Overview of Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configurations
- Base Cabinet Configurations for Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configurations
- Expansion Cabinet Configurations for Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configurations

Overview of Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configurations

Performance configurations take advantage of high-performance disk shelves and are available in a base cabinet, or a base cabinet with up to three expansion cabinets for some configurations. Five base cabinet options are offered in a total of 24 possible system configurations, and all base cabinet options contain two Oracle ZFS Storage ZS5-4 controllers.

Oracle ZFS Storage Appliance Racked System ZS5-4 maximum performance configurations feature up to eight Oracle Storage Drive Enclosure DE3-24P All-Flash disk shelves in the base cabinet. The disk shelves are configured as one single shelf per chain to obtain maximum performance. No expansion cabinets are supported for this configuration.

Table 11-6 Oracle ZFS Storage Appliance Racked System ZS5-4 Maximum Performance Configurations Components

Base Cabinet	Expansion Cabinet
Up to eight Oracle Storage Drive Enclosure DE3-24P All-Flash disk shelves Two Oracle ZFS Storage ZS5-4 controllers	Not supported

Oracle ZFS Storage Appliance Racked System ZS5-4 optimum performance configurations feature up to 16 Oracle Storage Drive Enclosure DE3-24P disk shelves (configured as two shelves per chain) as well as a combination of up to 14 Oracle Storage Drive Enclosure DE3-24C and DE3-24P disk shelves in the base cabinet. Only Oracle Storage Drive Enclosure DE3-24C disk shelves, up to 10 each, are offered in the expansion cabinets. Configurations are offered in multiples of two disk shelves, as well as half-rack expansion. Each expansion cabinet can contain 2, 4, 5 (half-rack), 6, 8, or 10 Oracle Storage Drive Enclosure DE3-24C disk shelves. Oracle ZFS Storage Appliance Racked System ZS5-4 performance configurations can have up to three expansion cabinets.

Table 11-7 Oracle ZFS Storage Appliance Racked System ZS5-4 Optimum Performance Configurations Components

Base Cabinet	Expansion Cabinet 1	Expansion Cabinet 2	Expansion Cabinet 3
Up to 16 Oracle Storage Drive Enclosure DE3-24P disk shelves, or up to 14 Oracle Storage Drive Enclosure DE3-24C and DE3-24P disk shelves Two Oracle ZFS Storage ZS5-4 controllers	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves	Up to 10 Oracle Storage Drive Enclosure DE3-24C disk shelves

The Oracle ZFS Storage Appliance Racked System ZS5-4 performance configurations support various storage options.

Table 11-8 Oracle ZFS Storage Appliance Racked System ZS5-4 Disk Shelf Device Types and Allowable Configurations

Disk Shelf	Data Devices	Read Cache Devices	Log Devices
Oracle Storage Drive Enclosure DE3-24P All-Flash	3.2 TB SSDs: 24 in slots 0 - 23 or 20 in slots 0 - 19	Not allowed	200 GB SSDs in slot 20 - 23
Oracle Storage Drive Enclosure DE3-24P	1.2 TB HDDs: 24 in slots 0 - 23 or 20 in slots 0 - 19	3.2 TB SSDs in slot 20 - 23	200 GB SSDs in slot 20 - 23
Oracle Storage Drive Enclosure DE3-24C	8 TB HDDs: 24 in slots 0 - 23 or 20 in slots 0 - 19	3.2 TB SSDs in slot 20 - 23	200 GB SSDs in slot 20 - 23

Disk Shelf Allowable Configurations and Load Priority

The following are allowable configurations for additional Oracle Storage Drive Enclosure DE3-24 disk shelf pairs:

- 20 SSD or HDD data drives and up to 4 SSD log or read cache devices
- 20 SSD or HDD data drives and 2 SSD log or read cache devices
- 24 SSD or HDD data drives

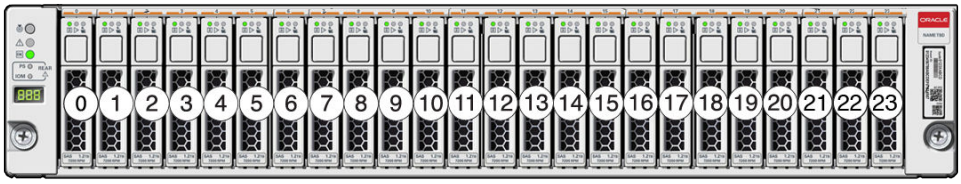
The placement of Oracle Storage Drive Enclosure DE3-24 disk shelves follows this priority:

1. Oracle Storage Drive Enclosure DE3-24 disk shelves with SSD log devices
2. Oracle Storage Drive Enclosure DE3-24 disk shelves with SSD read cache devices
3. Oracle Storage Drive Enclosure DE3-24 disk shelves without SSD log or read cache devices

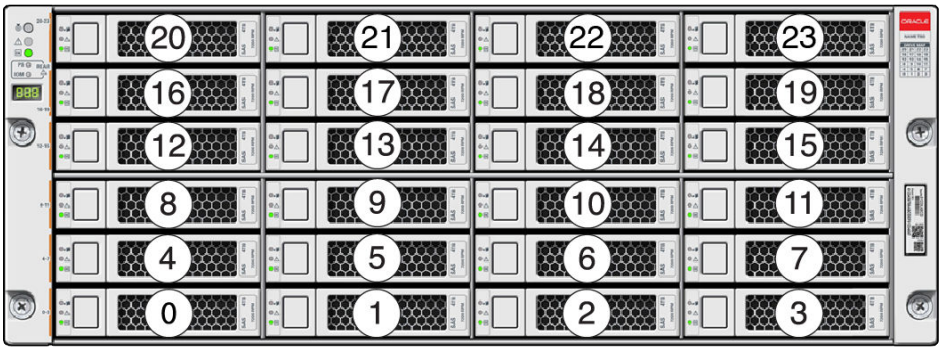
In all cases, the placement of SSD log devices takes precedence over SSD read cache devices, and the placement is always in disk shelf pairs. The only exception where pairs are not installed is for an expansion “half-rack” such that only one disk shelf is added to the expansion cabinet, for a total of five disk shelves. SSD log and read cache devices can be

installed into Oracle Storage Drive Enclosure DE3-24 disk shelves in slots 20, 21, 22, and 23 in that order of priority.

Oracle Storage Drive Enclosure DE3-24P Disk Shelf Drive Locations (Front View)



Oracle Storage Drive Enclosure DE3-24C Disk Shelf Drive Locations (Front View)

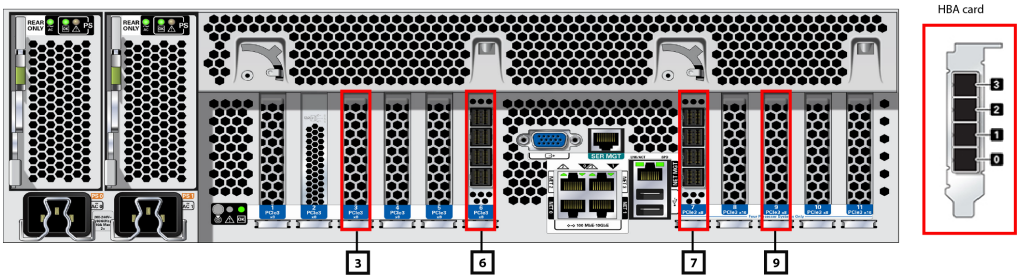


Base Cabinet Configurations for Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configurations

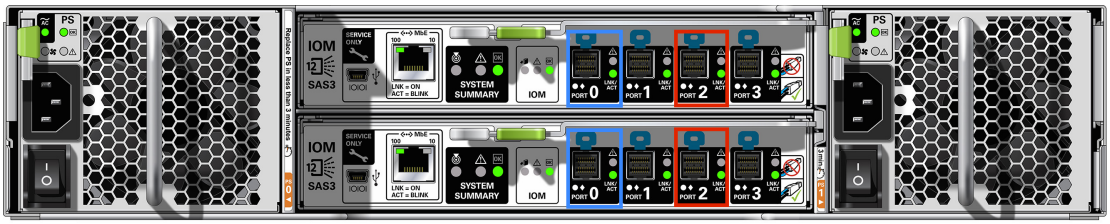
Oracle ZFS Storage Appliance Racked System ZS5-4 maximum performance configurations require four SAS-3 HBAs, which provide the maximum of 16 ports of SAS-3 HBA connectivity.

The SAS-3 HBA port numbering order is ascending, from bottom (Port 0) to top (Port 3). Both SAS-3 HBA cards and Oracle Storage Drive Enclosure DE3-24 disk shelves use the SFF 8644 connectors.

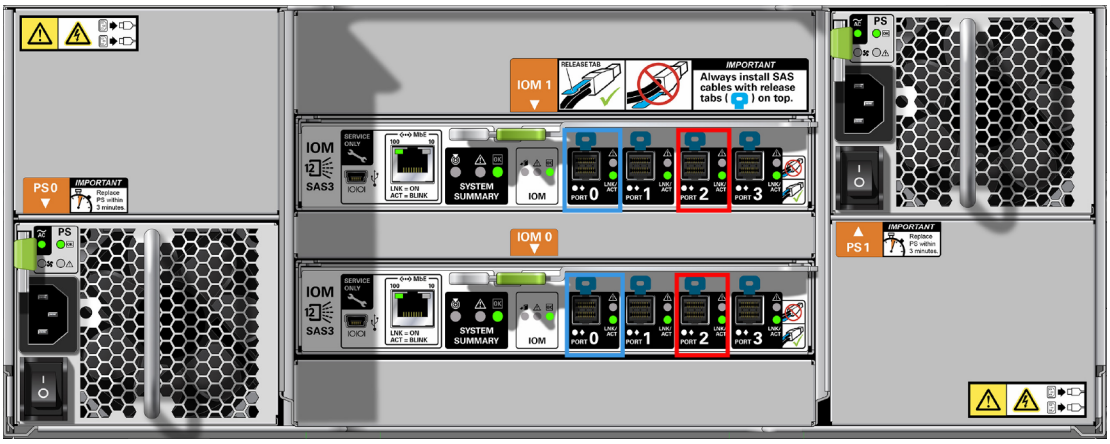
Oracle ZFS Storage ZS5-4 Controller HBA Slot Numbers (Back View)



Oracle Storage Drive Enclosure DE3-24P Disk Shelf HBA Connections (Back View)



Oracle Storage Drive Enclosure DE3-24C Disk Shelf HBA Connections (Back View)



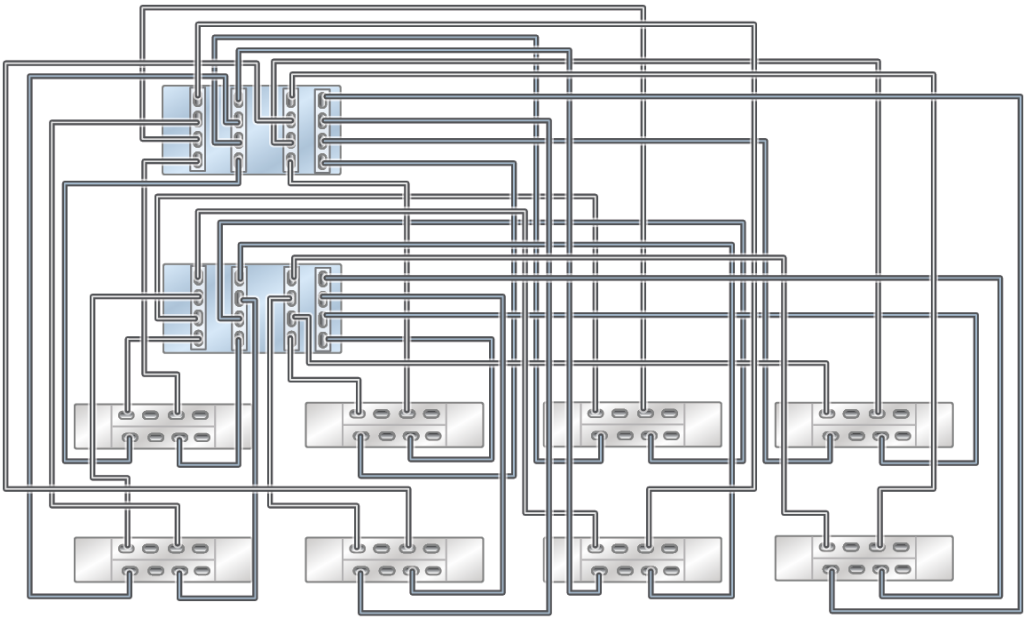
The Oracle ZFS Storage Appliance Racked System ZS5-4 performance configurations follow standard cabling methodologies with additional restrictions that allow use of the cable management arm (CMA). They provide a more practical implementation for SSD log device and read cache device matching, limited multi-cabinet expansion, and can be configured for maximum or optimal performance.

Any upgrades that change the number of SAS-3 HBA cards, or include more than one cabinet that is not an original Oracle ZFS Storage Appliance Racked System ZS5-4 or not compatible with Oracle ZFS Storage Appliance Racked System ZS5-4 must be re-cabled for that particular configuration. For cabling examples of connecting Oracle Storage Drive Enclosure DE3-24 disk shelves to an Oracle ZFS Storage ZS5-4 controller with 4x4 port SAS-3 HBAs, see Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS5-4 Controllers. For SAS cable length guidelines, see Cabinet and Cabling Guidelines.

The cabinets are self-contained and pre-cabled following the required cabling methodology. The following diagrams illustrate how the five base cabinet options are cabled.

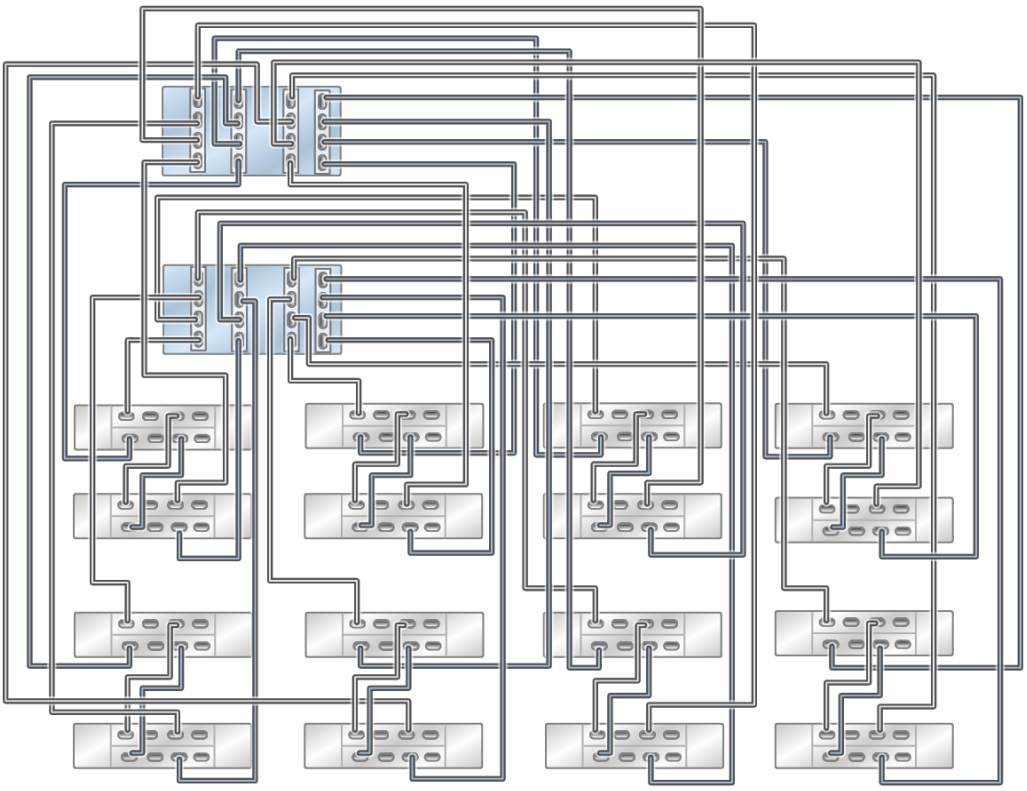
Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configuration:

Eight Oracle Storage Drive Enclosure DE3-24P All-Flash Disk Shelves (maximum performance)



Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configuration:

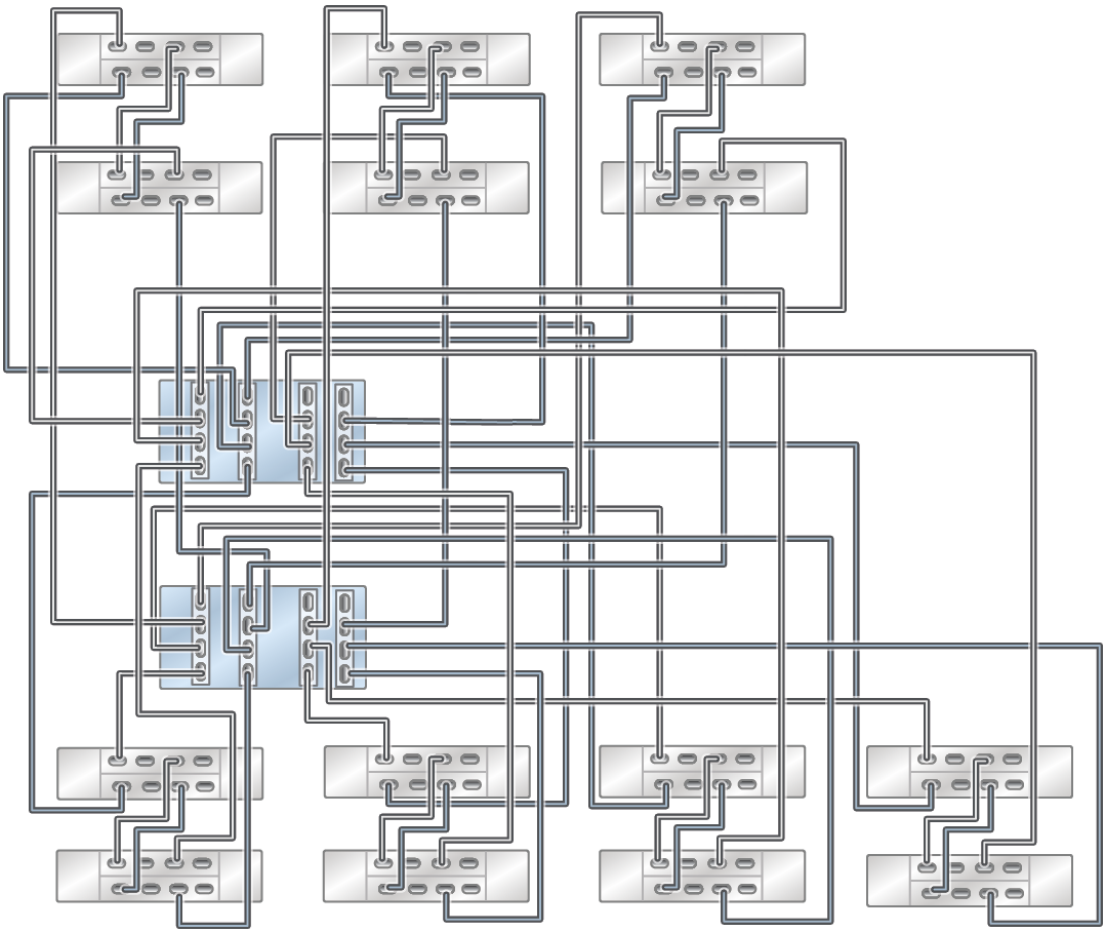
16 Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)



Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configuration:

Two Oracle Storage Drive Enclosure DE3-24C (bottom left) and

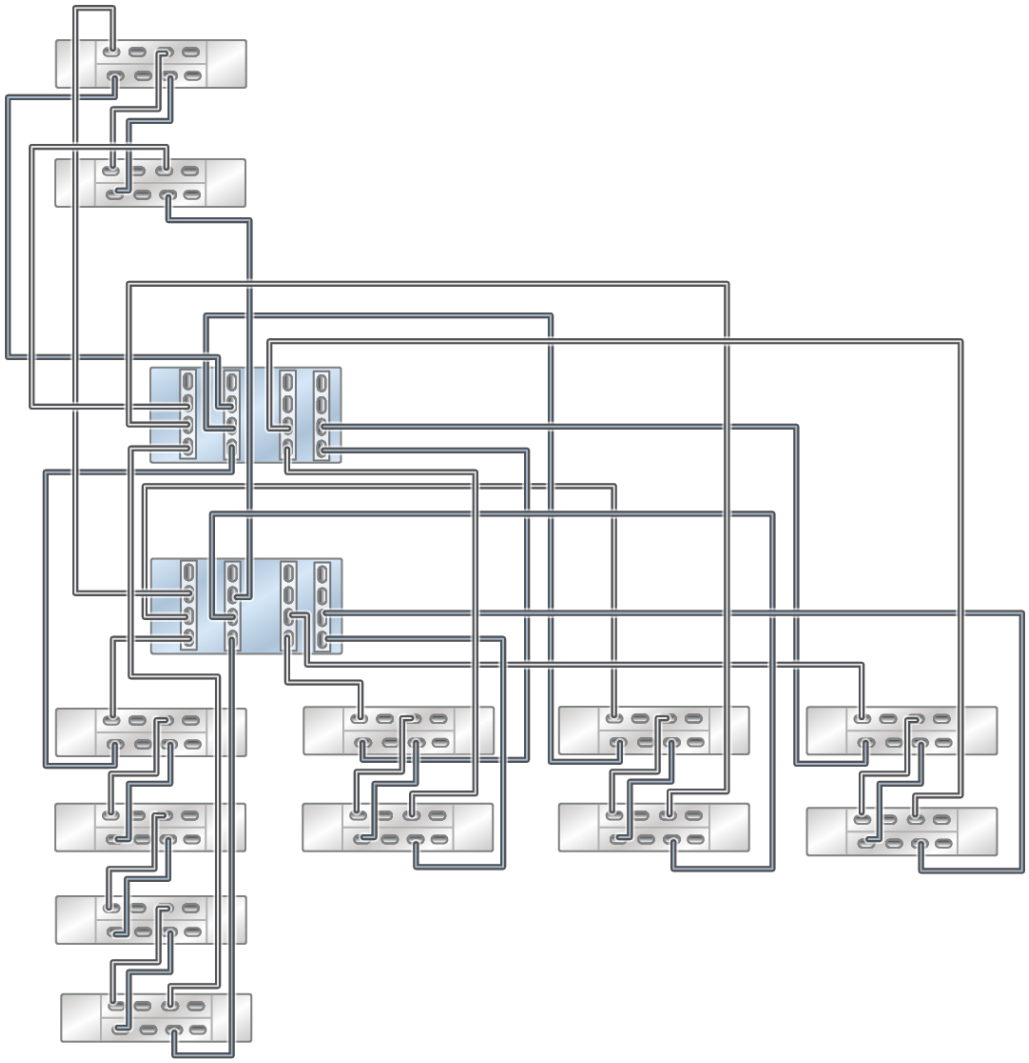
12 Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)



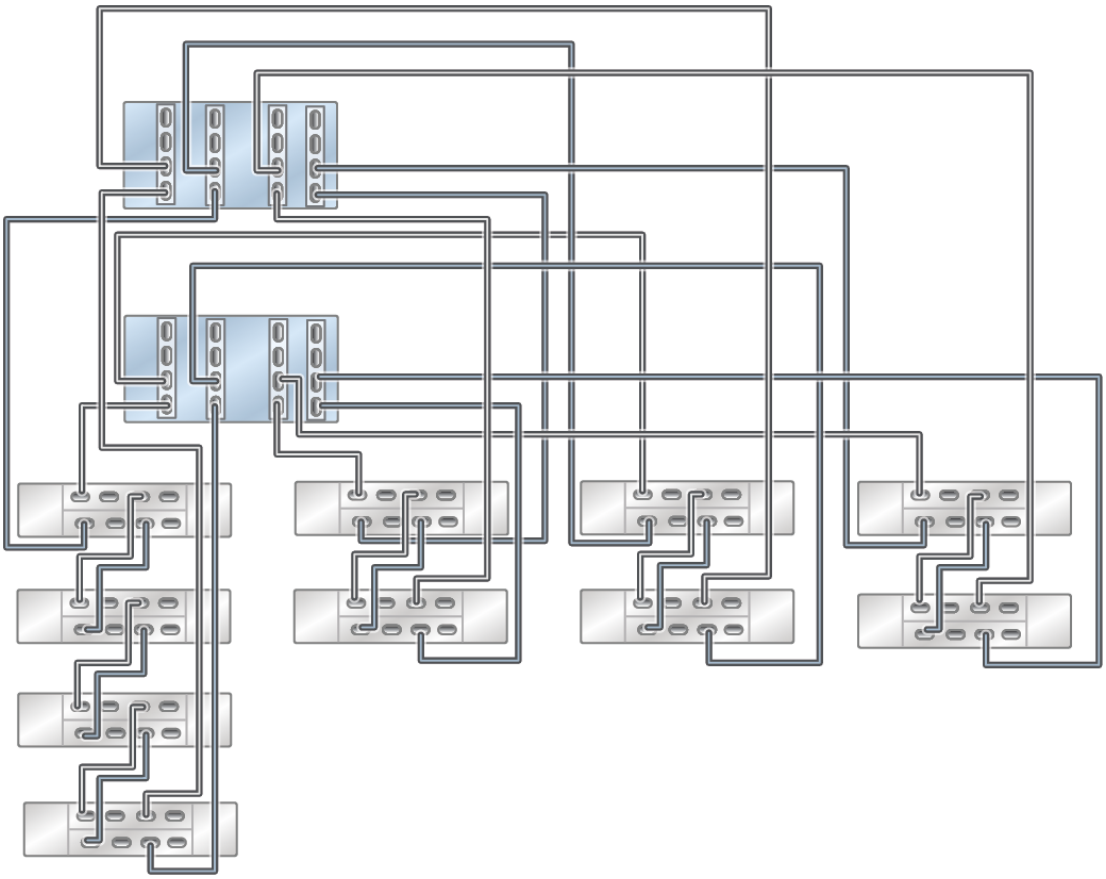
Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configuration:

Four Oracle Storage Drive Enclosure DE3-24C (bottom left) and

Eight Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)



Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configuration: Six Oracle Storage Drive Enclosure DE3-24C (first two chains from the left) and Four Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)



Expansion Cabinet Configurations for Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configurations

Oracle ZFS Storage Appliance Racked System ZS5-4 performance configurations support multiple cabinets that allow for expansion of up to 30 additional disk shelves. Each expansion cabinet accommodates a maximum of 10 Oracle Storage Drive Enclosure DE3-24C disk shelves, and is also offered in a “half-rack” option.

> **Note:**
>
> Not all base cabinet configurations support expansion cabinets.

The expansion cabinet installation follows a balanced-chain installation where the chain on the bottom of the cabinet takes the first disk shelf pair, and the second chain on the top half takes the second pair. The alternating manner of a balanced chain installation distributes SSDs and follows the load-priority methodology.

The number of expansion cabinets supported is dependent on the number of chains remaining in the Oracle ZFS Storage Appliance Racked System ZS5-4 base cabinet. Each Oracle ZFS Storage Appliance Racked System ZS5-4 expansion cabinet requires two chains to support a full expansion cabinet. Also, a total of four SAS-3 HBA ports (two HBA ports for each chain) are required for each expansion cabinet.

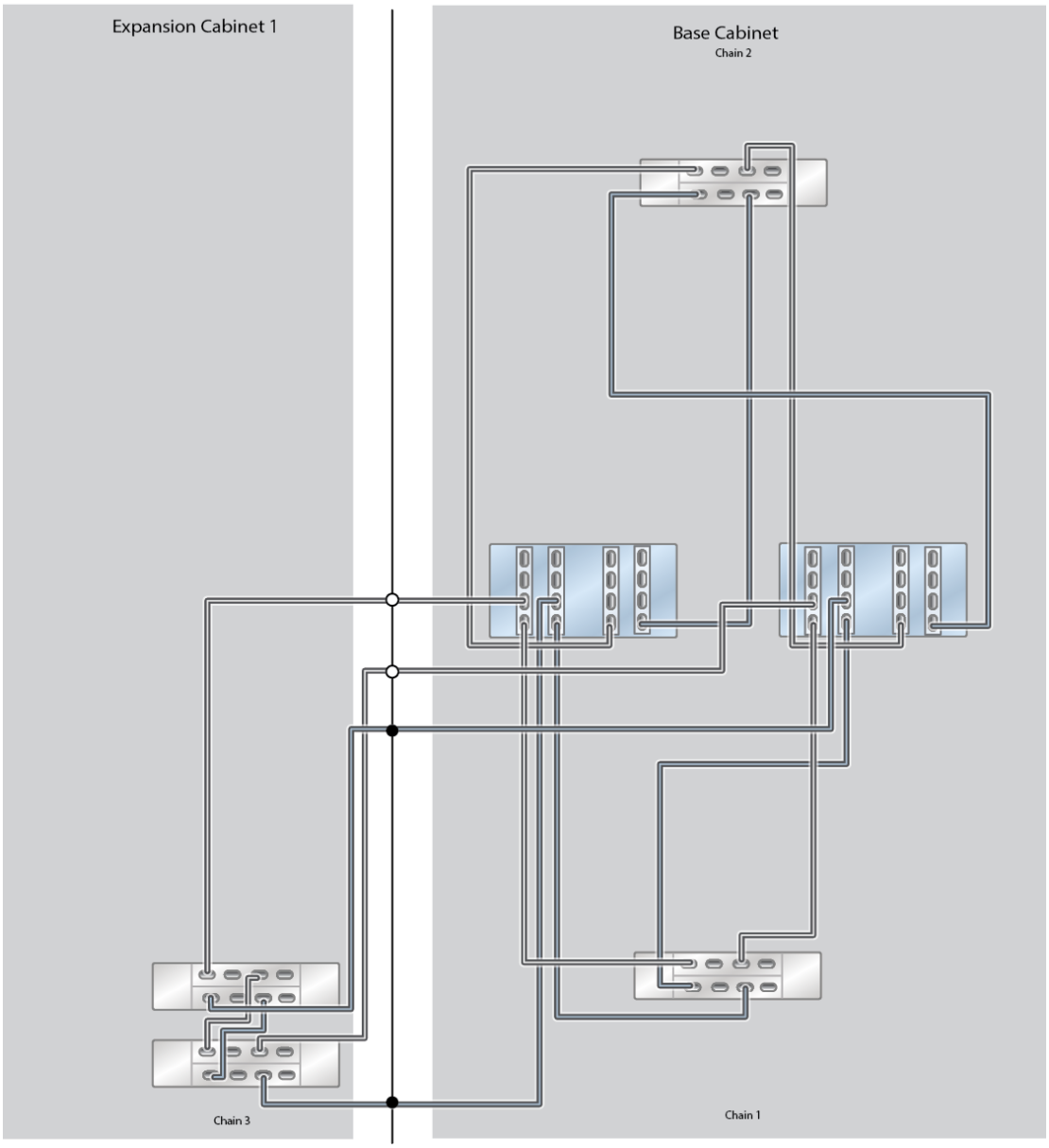
The following diagrams illustrate the cabling of Oracle ZFS Storage Appliance Racked System ZS5-4 expansion cabinet configurations. The legend for each diagram is as follows:

- A hollow circle indicates the cable connection to the top IOM (IOM 1).
- A solid circle indicates the cable connection to the bottom IOM (IOM 0).

> **Note:**
>
> The base cabinet can contain all Oracle Storage Drive Enclosure DE3-24P (HDD) disk shelves, or Oracle Storage Drive Enclosure DE3-24P All-Flash disk shelves, or a mix of Oracle Storage Drive Enclosure DE3-24C and DE3-24P disk shelves, as described in Base Cabinet Configurations for Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configurations.

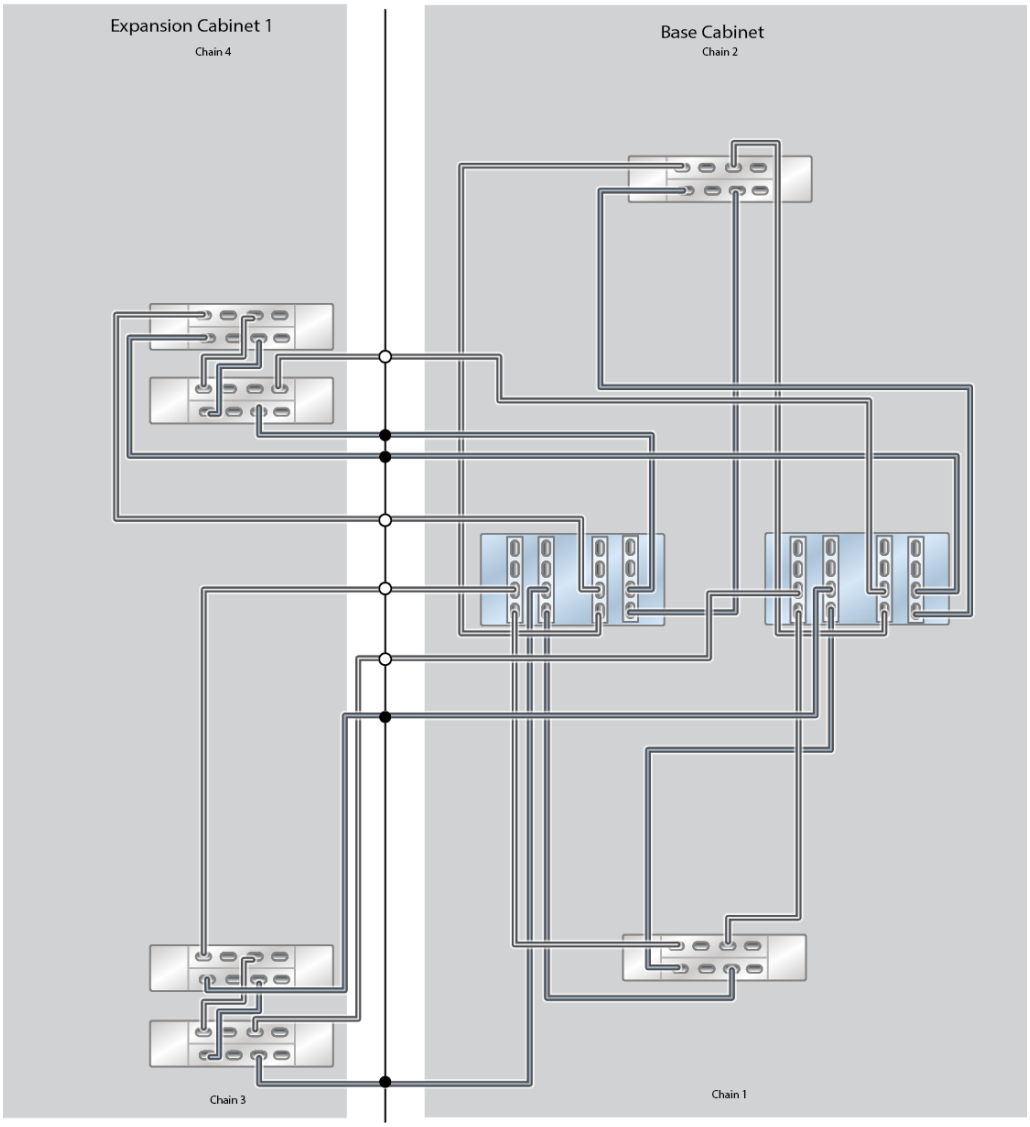
Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configuration:

One Expansion Cabinet with Two Oracle Storage Drive Enclosure DE3-24C Disk Shelves



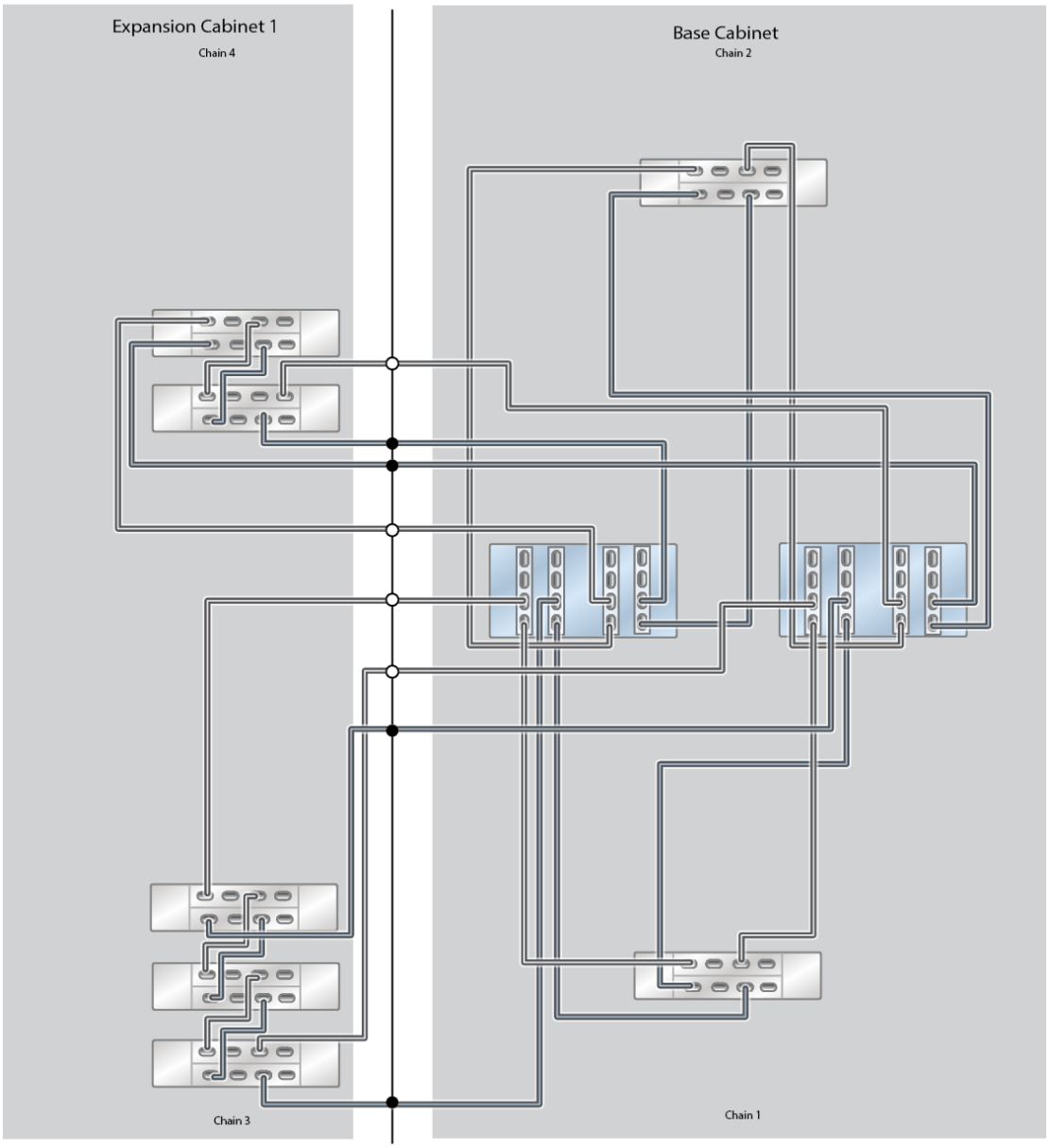
Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configuration:

One Expansion Cabinet with Four Oracle Storage Drive Enclosure DE3-24C Disk Shelves



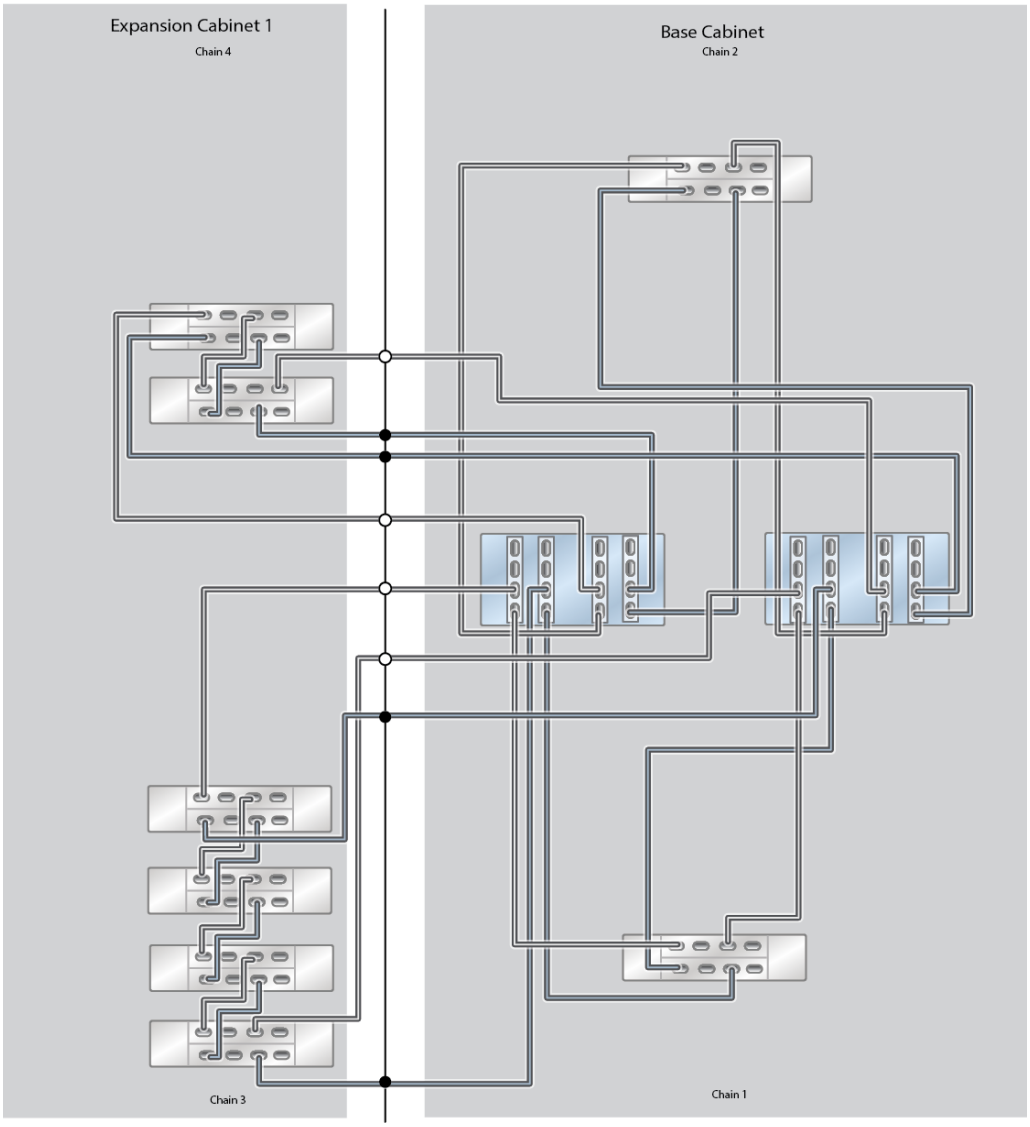
Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configuration:

One Expansion Cabinet with Five Oracle Storage Drive Enclosure DE3-24C Disk Shelves (Half Rack)



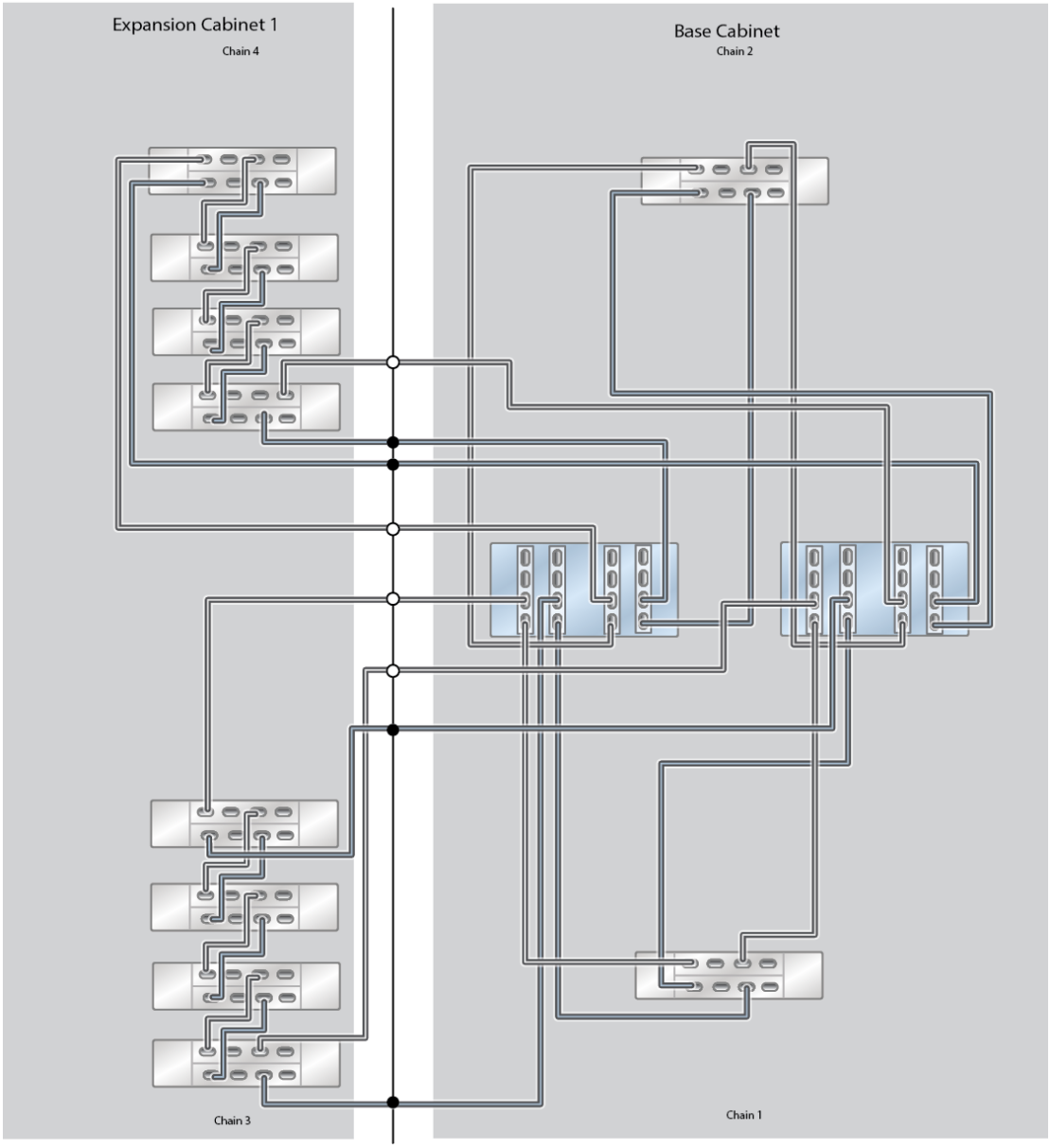
Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configuration:

One Expansion Cabinet with Six Oracle Storage Drive Enclosure DE3-24C Disk Shelves



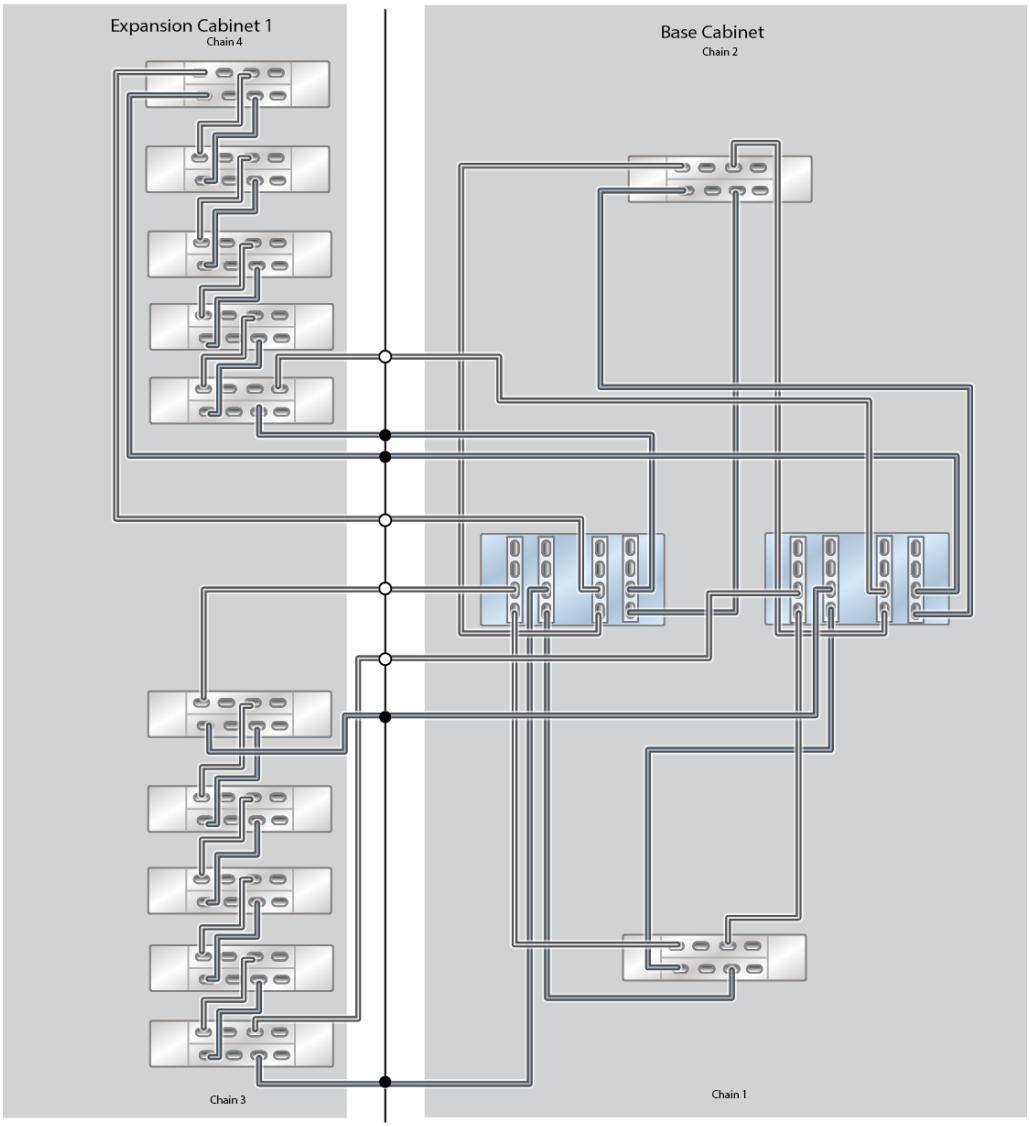
Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configuration:

One Expansion Cabinet with Eight Oracle Storage Drive Enclosure DE3-24C Disk Shelves



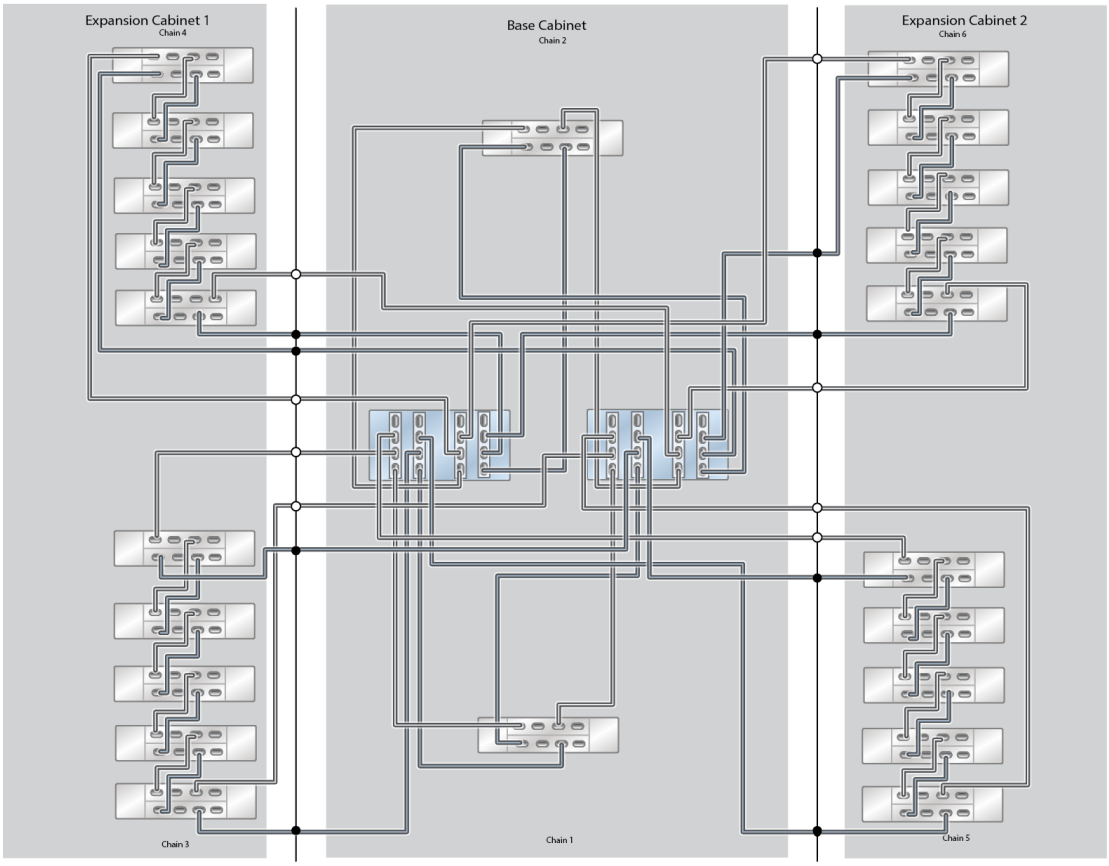
Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configuration:

One Expansion Cabinet with 10 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



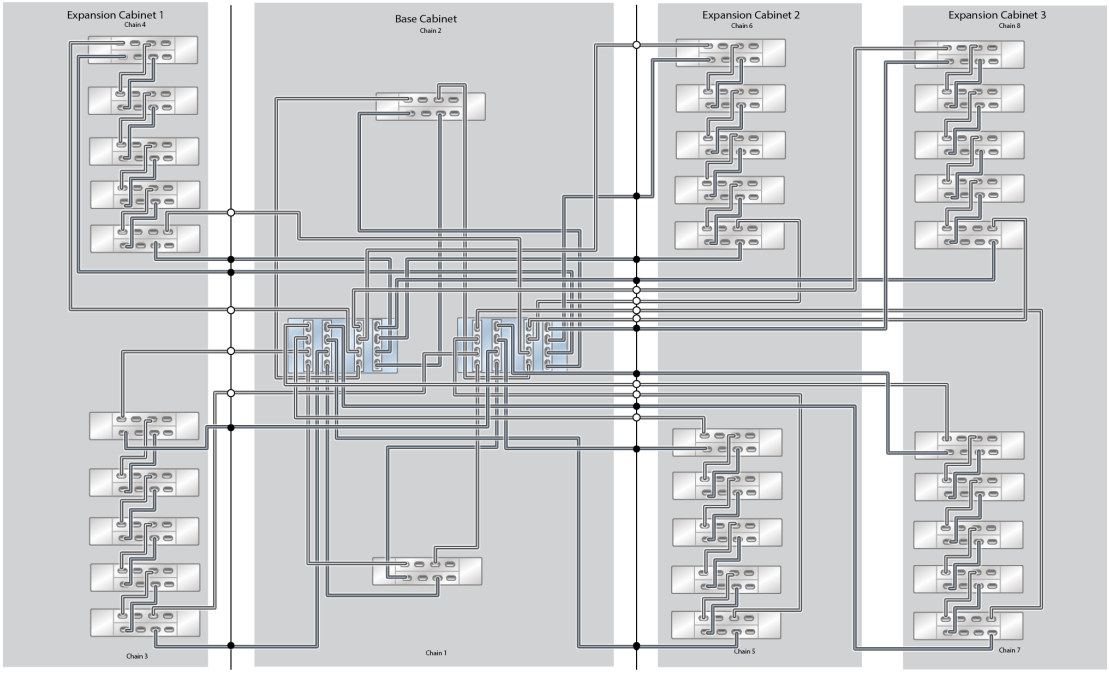
Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configuration:

Two Expansion Cabinets with 20 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



Oracle ZFS Storage Appliance Racked System ZS5-4 Performance Configuration:

Three Expansion Cabinets with 30 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



12

Oracle ZFS Storage Appliance Racked System ZS5-2

This section provides overviews and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS5-2, which is a pre-racked and pre-cabled system that supports two configuration types: capacity configurations and performance configurations.

This section contains the following topics:

- Capacity Configurations for Oracle ZFS Storage Appliance Racked System ZS5-2
- Performance Configurations for Oracle ZFS Storage Appliance Racked System ZS5-2

Capacity Configurations for Oracle ZFS Storage Appliance Racked System ZS5-2

This section provides an overview and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS5-2 capacity configurations.

This section contains the following topics:

- Overview of Oracle ZFS Storage Appliance Racked System ZS5-2 Capacity Configurations
- Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS5-2 Capacity Configurations

Overview of Oracle ZFS Storage Appliance Racked System ZS5-2 Capacity Configurations

Capacity configurations take advantage of high-capacity disk shelves and are available in a base cabinet, or a base cabinet with one expansion cabinet. Two Oracle ZFS Storage ZS5-2 controllers and up to 16 Oracle Storage Drive Enclosure DE3-24C disk shelves can be supported, as shown in the following table.

Table 12-1 Oracle ZFS Storage Appliance Racked System ZS5-2 Capacity Configurations Components

Base Cabinet	Expansion Cabinet 1
Up to 8 Oracle Storage Drive Enclosure DE3-24C disk shelves Two Oracle ZFS Storage ZS5-2 controllers	Up to 8 Oracle Storage Drive Enclosure DE3-24C disk shelves

Configurations are offered in multiples of two disk shelves, as well as half-rack expansion: 1 disk shelf (minimum), 2, 4, 6, 8, 10, 12, 13 (half rack), 14, and 16 (maximum).

Each Oracle ZFS Storage ZS5-2 controller supports one or two SAS HBA cards. Two SAS HBA cards must be installed in each Oracle ZFS Storage ZS5-2 controller to support disk shelves in the expansion cabinet.

Clustered Oracle ZFS Storage ZS5-2 controllers that contain two SAS HBAs each support a high-availability configuration consisting of:

- Two chains of four disk shelves per disk chain in the base cabinet for a total of eight disk shelves, and
- One expansion cabinet that supports two chains with a maximum of four disk shelves per disk chain, for a total of eight disk shelves.

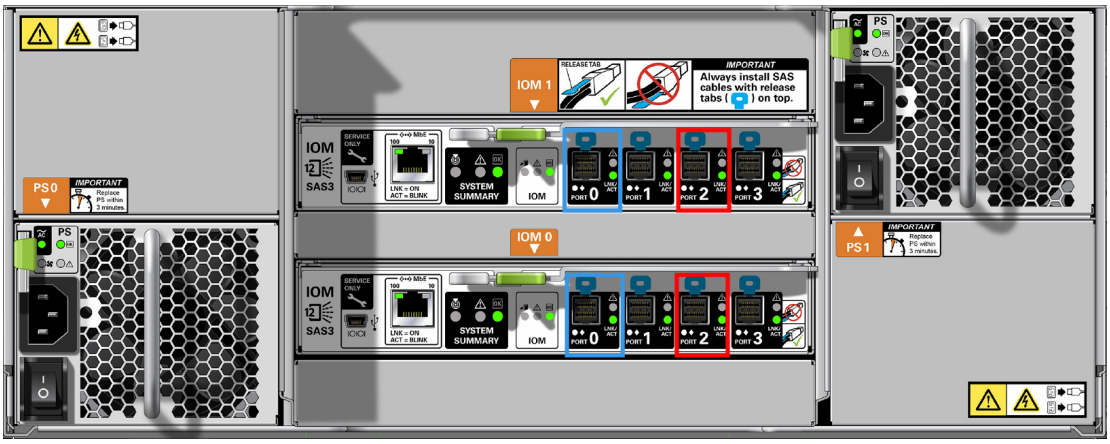
The cabinets are self-contained and pre-cabled following the required cabling methodology. Pre-racked system cabling tables and diagrams, which can also be used for planning future system expansion, are provided in the section Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS5-2 Capacity Configurations.

Each cabinet contains 42 rack units (RUs), with RU01 on the bottom. Each Oracle ZFS Storage ZS5-2 controller occupies two rack units, and its location is referenced by the bottommost rack unit number. The top controller is referred to as Controller 1 and is located in RU20 in the base cabinet, and the bottom controller is Controller 0 in RU17. Because the Oracle ZFS Storage ZS5-2 controller occupies two rack units, the base cabinet contains a filler panel above each controller so the cabinet layout is similar to those of other Oracle racked systems with three-rack-unit controllers. The following figure shows the slot number for each HBA card, as well as the port numbers in each card.

Oracle ZFS Storage ZS5-2 Controller HBA Slot Numbers (Back View)

Each Oracle Storage Drive Enclosure DE3-24C disk shelf occupies four rack units, and disk shelves are normally installed from the bottom of the cabinet to the top for stability. To provide higher performance capabilities, disk chains are alternated from the bottom to the top of the base cabinet, with four disk shelves per chain and gaps between components. Therefore, the first disk shelf is in RU01, the second in RU05, the third in RU23, the fourth in RU27, the fifth in RU09, and so on in an alternating manner. As shown in the following figure, the Oracle Storage Drive Enclosure DE3-24C disk shelf has two I/O Modules (IOMs) with four ports each. In all cabling configurations, Port 1 and Port 3 are never used.

Oracle Storage Drive Enclosure DE3-24C Disk Shelf HBA Connections (Back View)



Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS5-2 Capacity Configurations

The following table describes the locations and port connections for two controllers and eight disk shelves in the base cabinet, using 3-meter SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs.

Table 12-2 Base Cabinet: Controller and Disk Shelf Locations and Connections

FROM	TO				
RU	CONTROLLER	HBA PORT	RU	DISK SHELF	DISK SHELF PORT
20	1	Slot 2, Port 0	1	1	IOM 1, Port 2
17	0	Slot 6, Port 0	1	1	IOM 0 Port 2
20	1	Slot 2, Port 1	23	3	IOM 1, Port 2
17	0	Slot 6, Port 1	23	3	IOM 0 Port 2
17	0	Slot 2, Port 0	1, 5, 13	1, 2, 6	IOM 1, Port 0
20	1	Slot 6, Port 0	1, 5, 13	1, 2, 6	IOM 0, Port 0
17	0	Slot 2, Port 1	27, 35	4, 8	IOM 1, Port 0
20	1	Slot 6, Port 1	27, 35	4, 8	IOM 0, Port 0

The following table describes the locations and port connections for eight disk shelves in an expansion cabinet, using 6-meter SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs. The expansion Cabinet supports disk shelves 9 through 16.

Table 12-3 Expansion Cabinet: Controller and Disk Shelf Locations and Connections

FROM	TO				
RU	CONTROLLER	HBA PORT	RU	DISK SHELF	DISK SHELF PORT
20	1	Slot 2, Port 2	1	9	IOM 1, Port 2
17	0	Slot 6, Port 2	1	9	IOM 0, Port 2

Table 12-3 (Cont.) Expansion Cabinet: Controller and Disk Shelf Locations and Connections

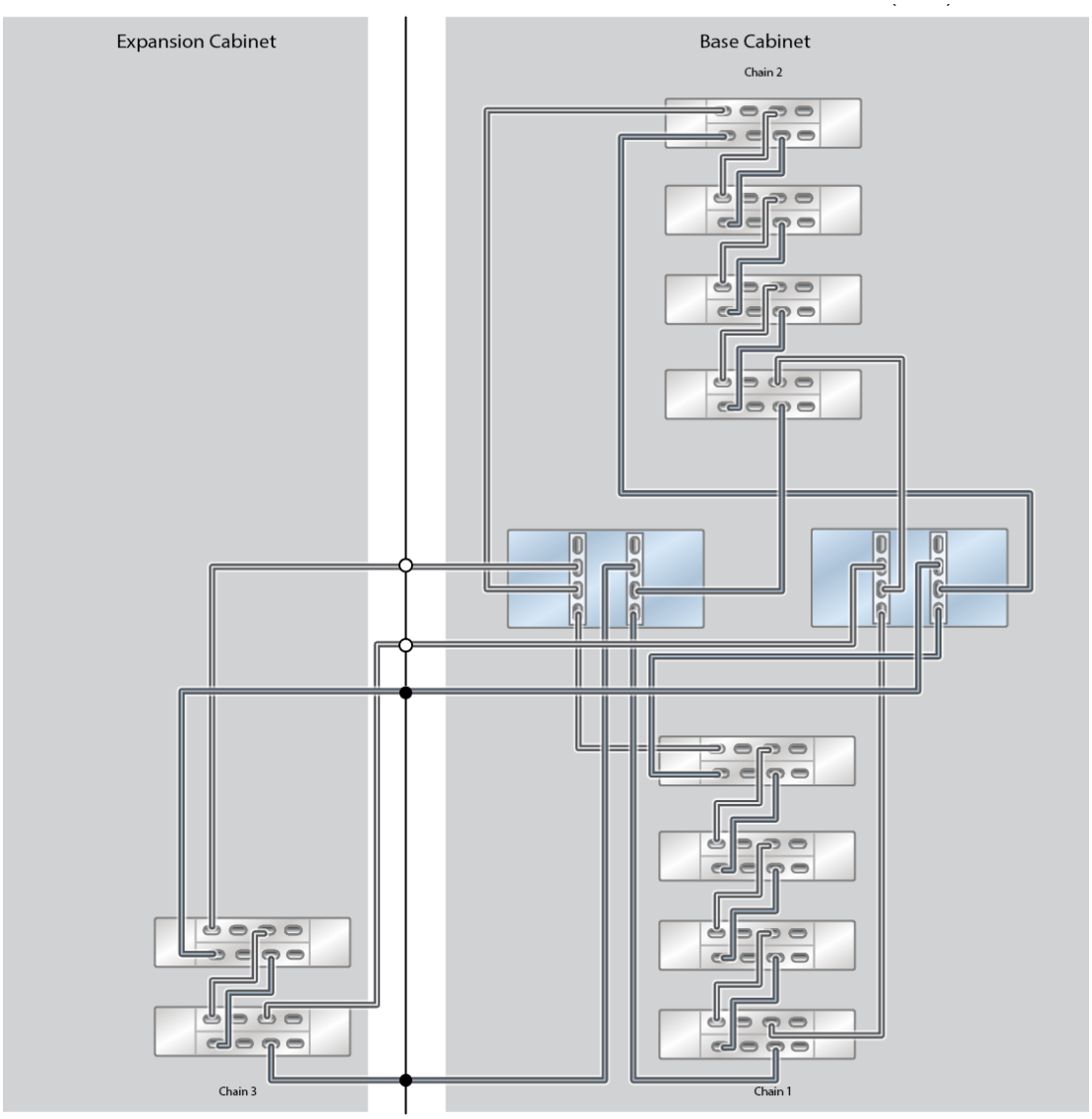
FROM	TO				
20	1	Slot 2, Port 3	21	11	IOM 1, Port 2
17	0	Slot 6, Port 3	21	11	IOM 0, Port 2
17	0	Slot 2, Port 2	5, 9, 13	10, 13, 14	IOM 1, Port 0
20	1	Slot 6, Port 2	5, 9, 13	10, 13, 14	IOM 0, Port 0
17	0	Slot 2, Port 3	25, 33	12, 16	IOM 1, Port 0
20	1	Slot 6, Port 3	25, 33	12, 16	IOM 0, Port 0

The following diagrams illustrate how pre-racked systems are cabled, as well as how to expand your system in the future. The legend for each diagram is as follows:

- A hollow circle indicates the cable connection to the top IOM (IOM 1).
- A solid circle indicates the cable connection to the bottom IOM (IOM 0).

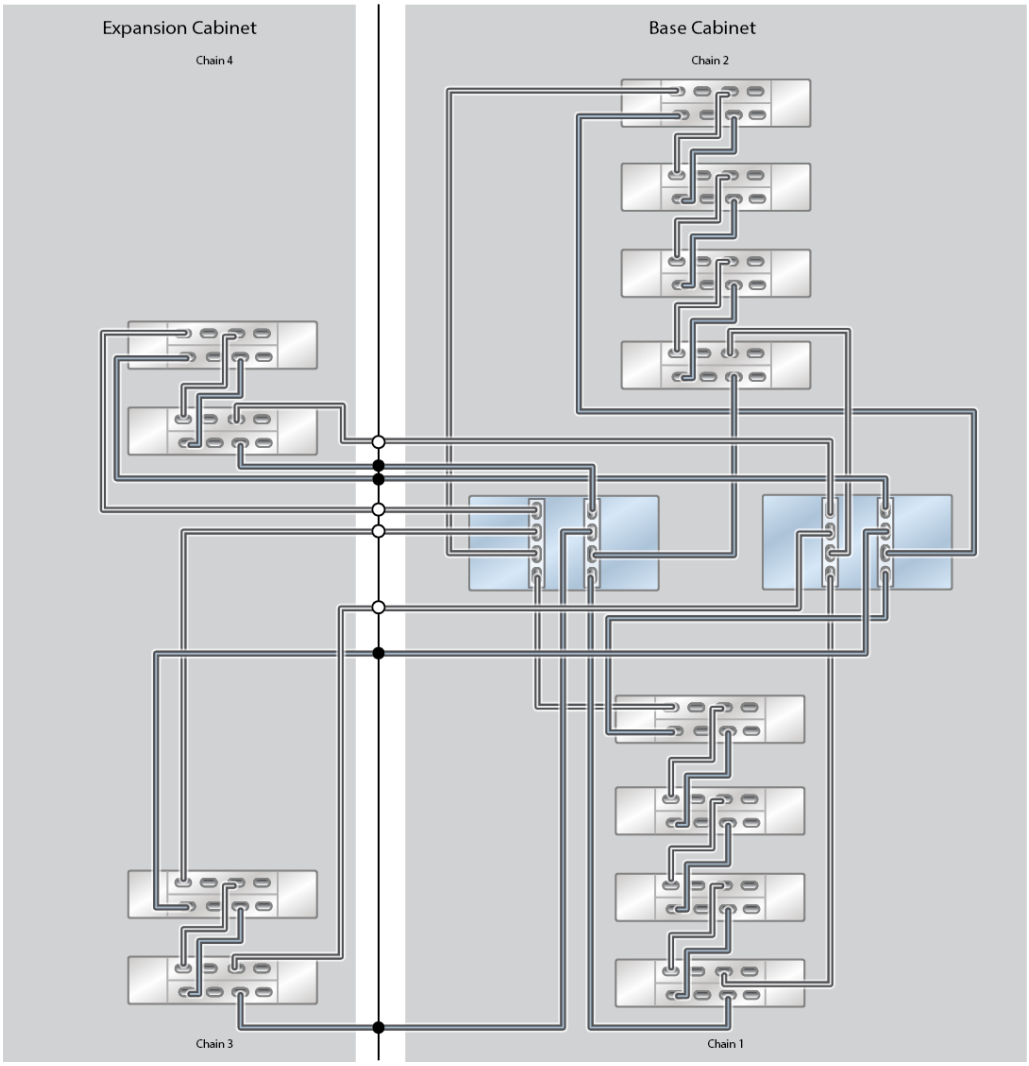
Oracle ZFS Storage Appliance Racked System ZS5-2 Capacity Configuration:

10 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



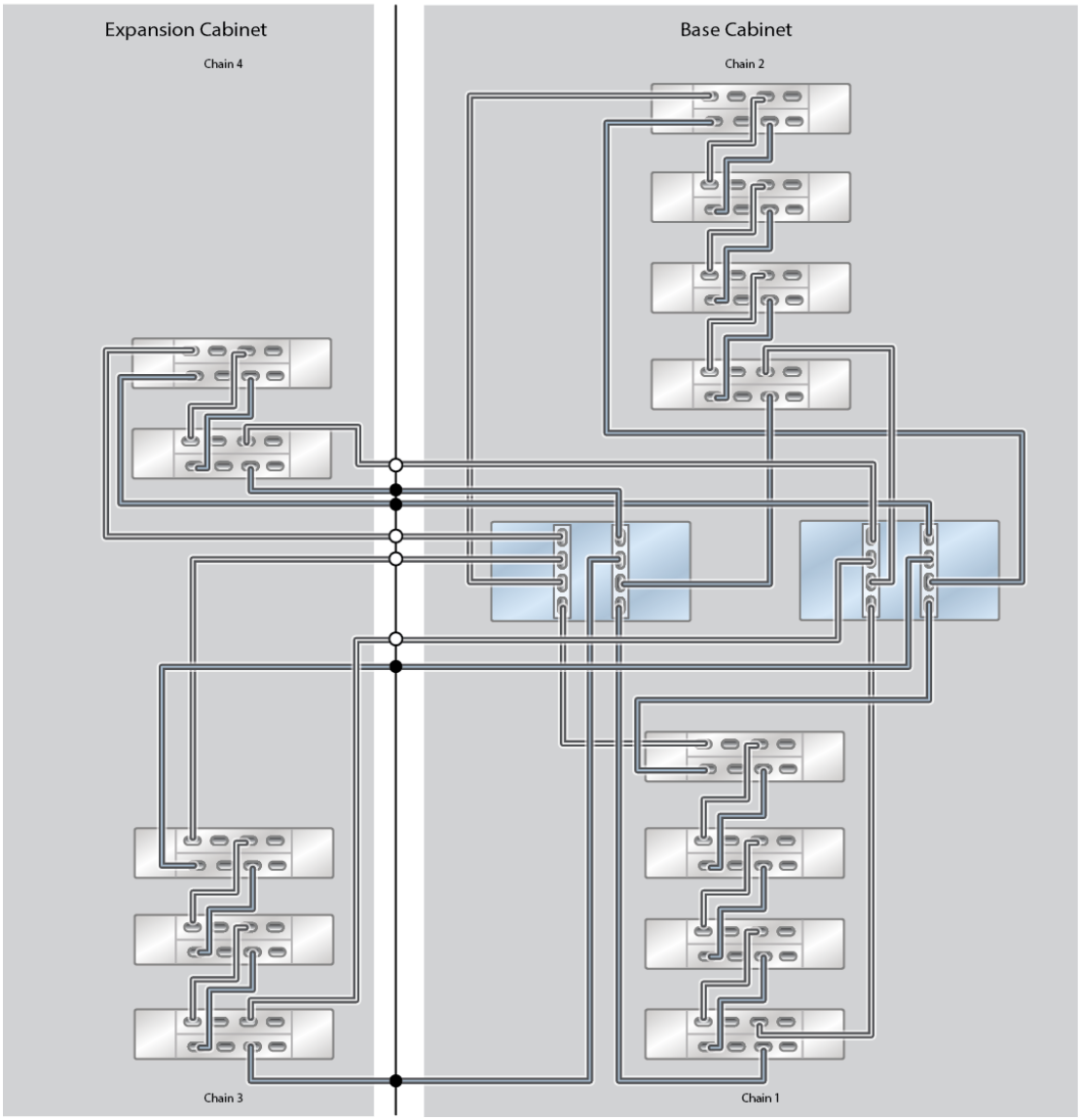
Oracle ZFS Storage Appliance Racked System ZS5-2 Capacity Configuration:

12 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



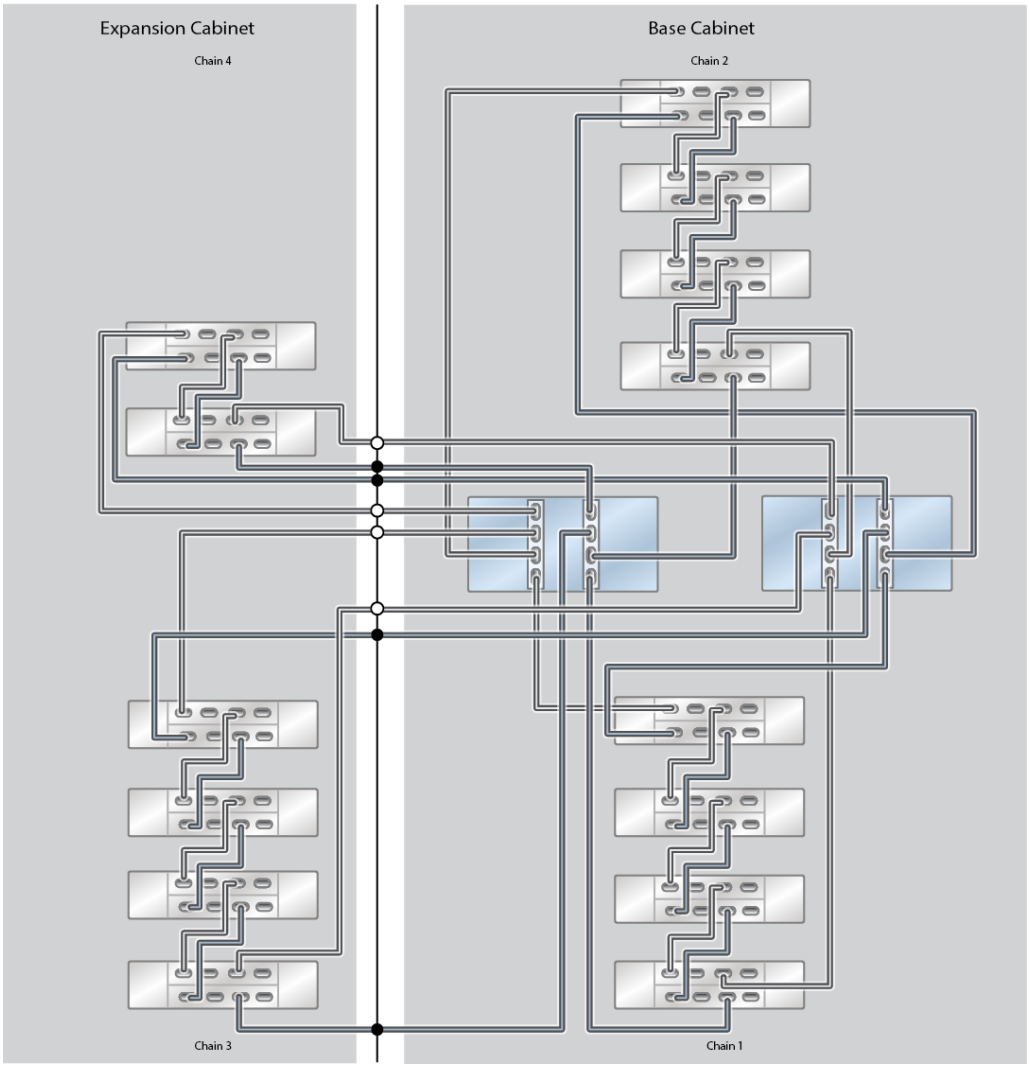
Oracle ZFS Storage Appliance Racked System ZS5-2 Capacity Configuration:

13 Oracle Storage Drive Enclosure DE3-24C Disk Shelves (Half Rack)



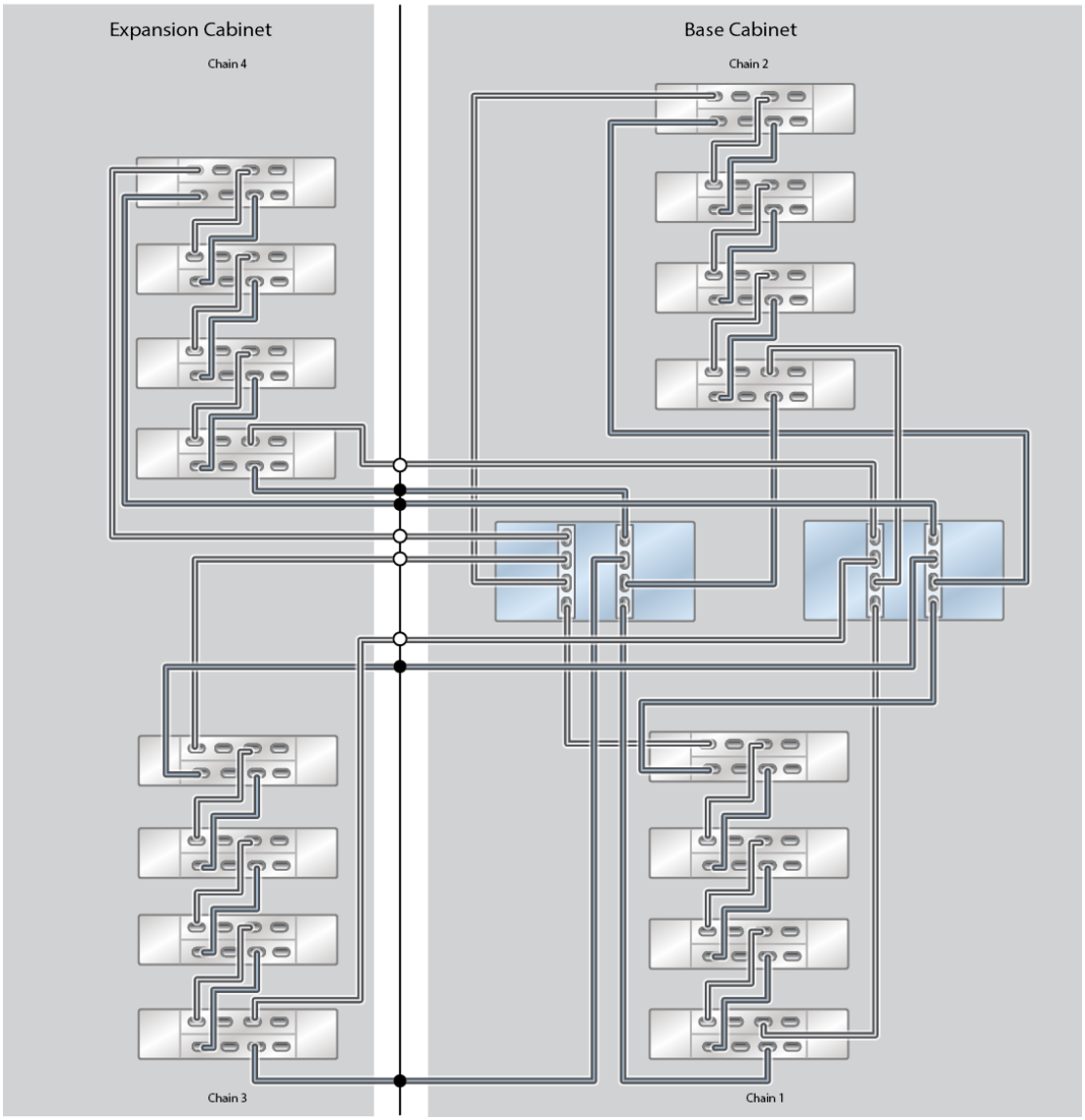
Oracle ZFS Storage Appliance Racked System ZS5-2 Capacity Configuration:

14 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



Oracle ZFS Storage Appliance Racked System ZS5-2 Capacity Configuration:

16 Oracle Storage Drive Enclosure DE3-24C Disk Shelves



Performance Configurations for Oracle ZFS Storage Appliance Racked System ZS5-2

This section provides an overview and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS5-2 performance configurations.

This section contains the following topics:

- Overview of Oracle ZFS Storage Appliance Racked System ZS5-2 Performance Configurations
- Base Cabinet Configurations for Oracle ZFS Storage Appliance Racked System ZS5-2 Performance Configurations

Overview of Oracle ZFS Storage Appliance Racked System ZS5-2 Performance Configurations

Performance configurations take advantage of high-performance disk shelves and are available in a base cabinet. Five base cabinet options are offered in a total of 22 possible system configurations, and all base cabinet options contain two Oracle ZFS Storage ZS5-2 controllers.

ZS5-2 Racked System maximum performance configurations feature up to four Oracle Storage Drive Enclosure DE3-24P All-Flash disk shelves. The disk shelves are configured as one single shelf per chain to obtain maximum performance. No expansion cabinets are supported for this configurations.

Table 12-4 Oracle ZFS Storage Appliance Racked System ZS5-2 Maximum Performance Configurations Components

Base Cabinet	Expansion Cabinet
Up to four Oracle Storage Drive Enclosure DE3-24P All-Flash disk shelves Two Oracle ZFS Storage ZS5-2 controllers	Not supported

Oracle ZFS Storage Appliance Racked System ZS5-2 optimum performance configurations feature up to 16 Oracle Storage Drive Enclosure DE3-24P disk shelves (configured as four shelves per chain), as well as a combination of up to 14 Oracle Storage Drive Enclosure DE3-24C and DE3-24P disk shelves in the base cabinet. No expansion cabinets are supported.

Table 12-5 Oracle ZFS Storage Appliance Racked System ZS5-2 Optimum Performance Configurations Components

Base Cabinet	Expansion Cabinet
Up to 16 Oracle Storage Drive Enclosure DE3-24P disk shelves, or up to 14 Oracle Storage Drive Enclosure DE3-24P and DE3-24C disk shelves Two Oracle ZFS Storage ZS5-2 controllers	Not supported

The Oracle ZFS Storage Appliance Racked System ZS5-2 performance configurations support various storage options.

Table 12-6 Oracle ZFS Storage Appliance Racked System ZS5-2 Disk Shelf Device Types and Allowable Configurations

Disk Shelf	Data Devices	Read Cache Devices	Log Devices
Oracle Storage Drive Enclosure DE3-24P All-Flash	3.2 TB SSDs: 24 in slots 0 - 23 or 20 in slots 0 - 19	Not allowed	200 GB SSDs in slot 20 - 23
Oracle Storage Drive Enclosure DE3-24P	1.2 TB HDDs: 24 in slots 0 - 23 or 20 in slots 0 - 19	3.2 TB SSDs in slot 20 - 23	200 GB SSDs in slot 20 - 23

Table 12-6 (Cont.) Oracle ZFS Storage Appliance Racked System ZS5-2 Disk Shelf Device Types and Allowable Configurations

Disk Shelf	Data Devices	Read Cache Devices	Log Devices
Oracle Storage Drive Enclosure DE3-24C	8 TB HDDs: 24 in slots 0 - 23 or 20 in slots 0 - 19	3.2 TB SSDs in slot 20 - 23	200 GB SSDs in slot 20 - 23

Disk Shelf Allowable Configurations and Load Priority

The following are allowable configurations for additional Oracle Storage Drive Enclosure DE3-24 disk shelf pairs:

- 20 SSD or HDD data drives and up to 4 SSD log or read cache devices
- 20 SSD or HDD data drives and 2 SSD log or read cache devices
- 24 SSD or HDD data drives

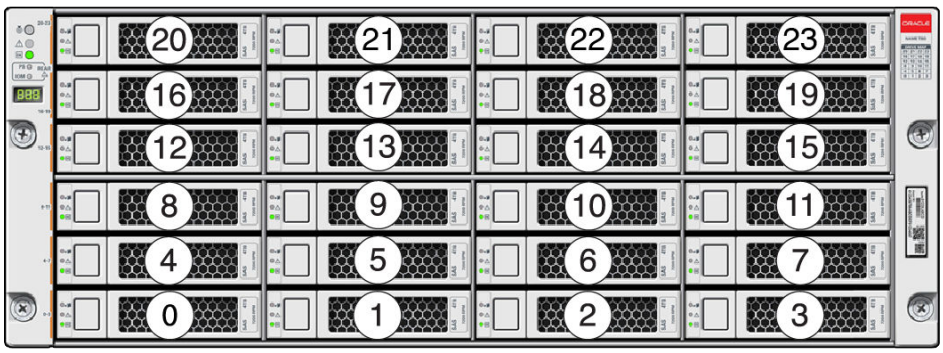
The placement of Oracle Storage Drive Enclosure DE3-24 disk shelves follows this priority:

1. Oracle Storage Drive Enclosure DE3-24 disk shelves with SSD log devices
2. Oracle Storage Drive Enclosure DE3-24 disk shelves with SSD read cache devices
3. Oracle Storage Drive Enclosure DE3-24 disk shelves without SSD log or read cache devices

In all cases, the placement of SSD log devices takes precedence over SSD read cache devices, and the placement is always in disk shelf pairs. SSD log and read cache devices can be installed into Oracle Storage Drive Enclosure DE3-24 disk shelves in slots 20, 21, 22, and 23 in that order of priority.

Oracle Storage Drive Enclosure DE3-24P Disk Shelf Drive Locations (Front View)

Oracle Storage Drive Enclosure DE3-24C Disk Shelf Drive Locations (Front View)



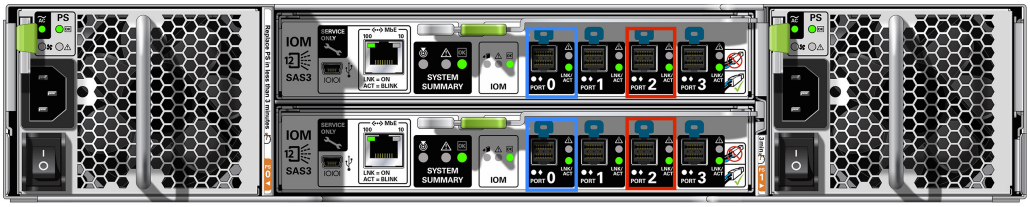
Base Cabinet Configurations for Oracle ZFS Storage Appliance Racked System ZS5-2 Performance Configurations

Oracle ZFS Storage Appliance Racked System ZS5-2 maximum performance configurations require two SAS-3 HBAs, which provide the maximum of eight ports of SAS-3 HBA connectivity.

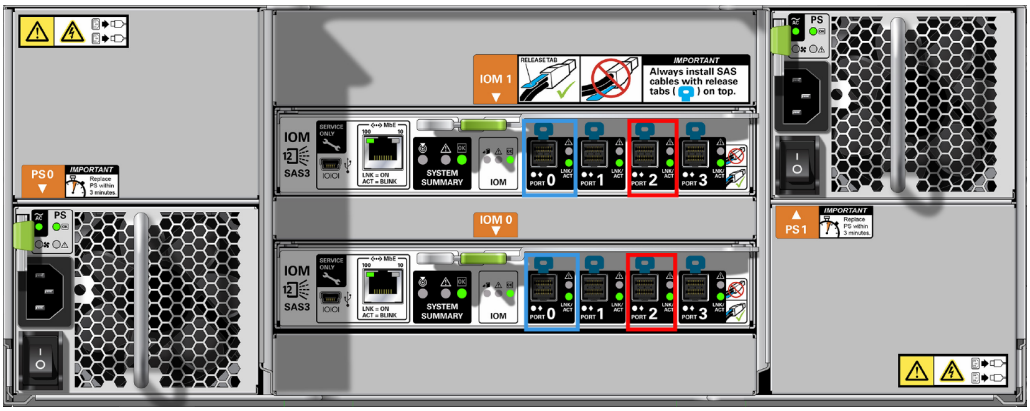
The SAS-3 HBA port numbering order is ascending, from bottom (Port 0) to top (Port 3). Both SAS-3 HBA cards and Oracle Storage Drive Enclosure DE3-24 disk shelves use the SFF 8644 connectors.

Oracle ZFS Storage ZS5-2 Controller HBA Slot Numbers (Back View)

Oracle Storage Drive Enclosure DE3-24P Disk Shelf HBA Connections (Back View)



Oracle Storage Drive Enclosure DE3-24C Disk Shelf HBA Connections (Back View)



The Oracle ZFS Storage Appliance Racked System ZS5-2 cabling configurations follow standard cabling methodologies with additional restrictions that allow use of the cable management arm (CMA). They provide a more practical implementation for SSD

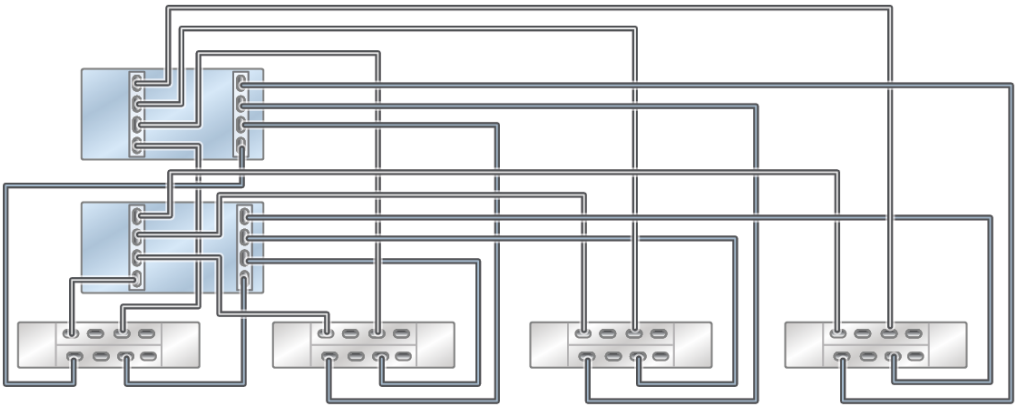
log device and read cache device matching, and can be configured for maximum or optimal performance.

Any upgrades that change the number of SAS-3 HBA cards, or include more than one cabinet that is not an original Oracle ZFS Storage Appliance Racked System ZS5-2 or not compatible with Oracle ZFS Storage Appliance Racked System ZS5-2 must be re-cabled for that particular configuration. For cabling examples of connecting Oracle Storage Drive Enclosure DE3-24 disk shelves to an Oracle ZFS Storage ZS5-2 controller with 4x4 port SAS-3 HBAs, see Cabling Oracle Storage Drive Enclosure DE3-24 Disk Shelves to Oracle ZFS Storage ZS5-2 Controllers. For SAS cable length guidelines, see Cabinet and Cabling Guidelines.

The cabinets are self-contained and pre-cabled following the required cabling methodology. The following diagrams illustrate how the five base cabinet options are cabled.

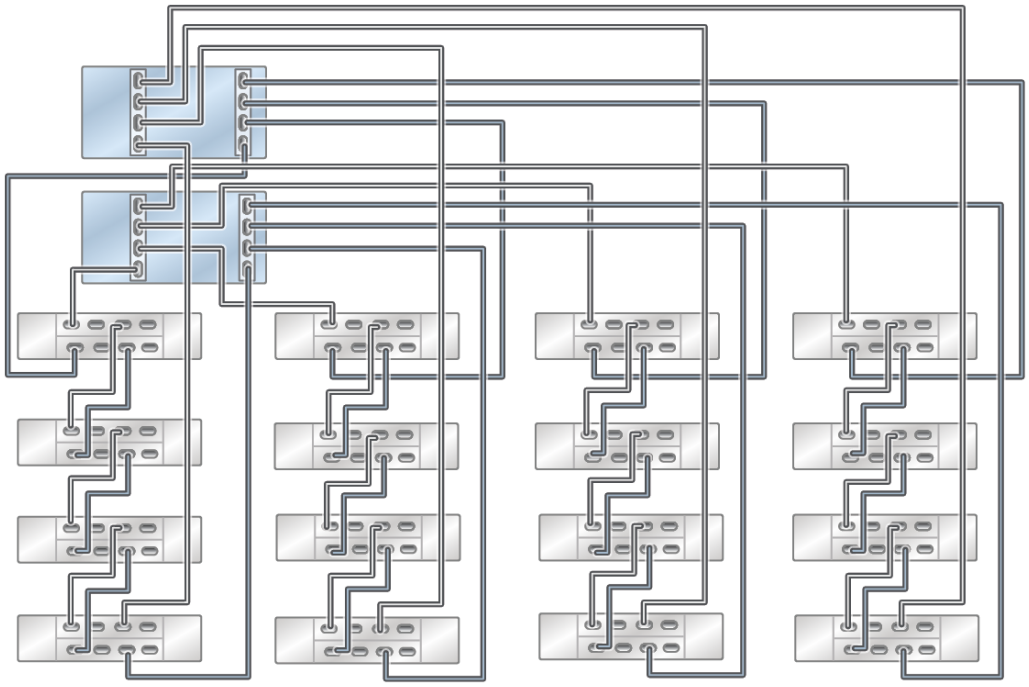
Oracle ZFS Storage Appliance Racked System ZS5-2 Performance Configuration:

Four Oracle Storage Drive Enclosure DE3-24P All-Flash Disk Shelves (maximum performance)



Oracle ZFS Storage Appliance Racked System ZS5-2 Performance Configuration:

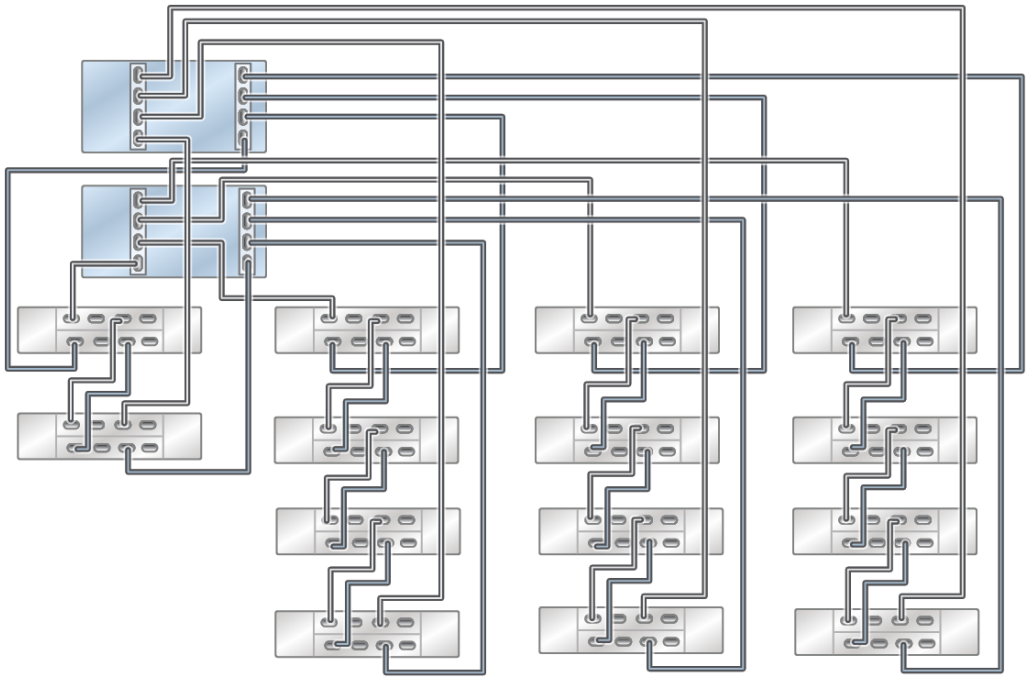
16 Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)



Oracle ZFS Storage Appliance Racked System ZS5-2 Performance Configuration:

Two Oracle Storage Drive Enclosure DE3-24C (bottom left) and

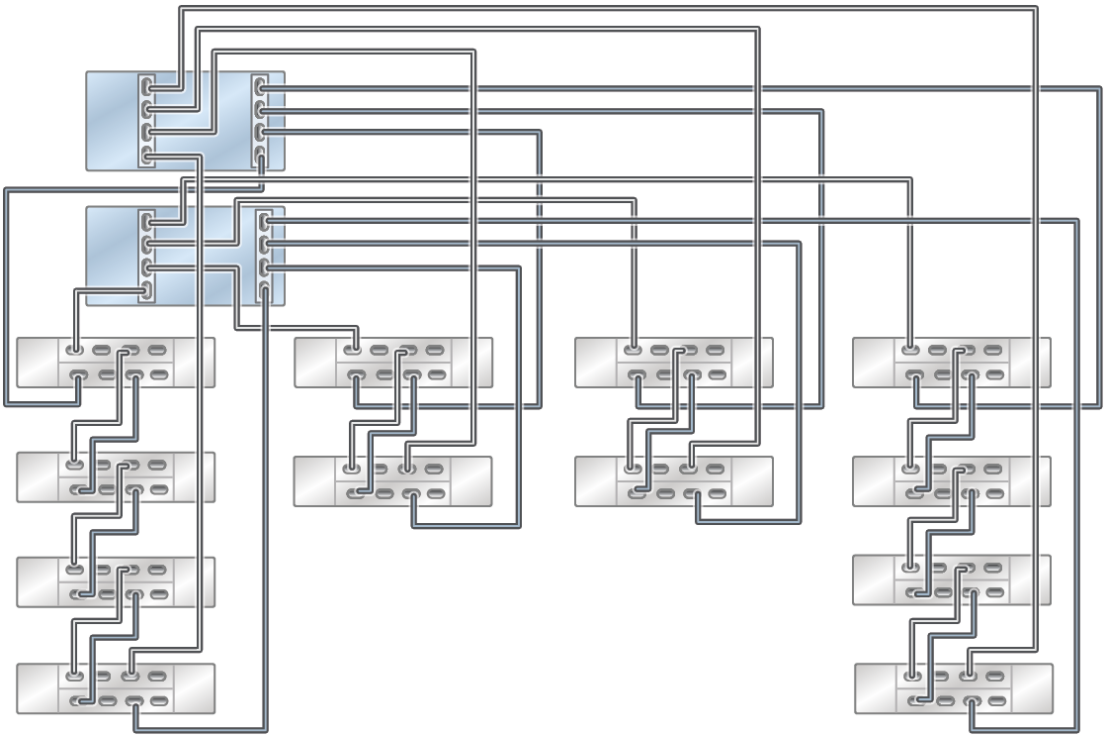
12 Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)



Oracle ZFS Storage Appliance Racked System ZS5-2 Performance Configuration:

Four Oracle Storage Drive Enclosure DE3-24C (bottom left) and

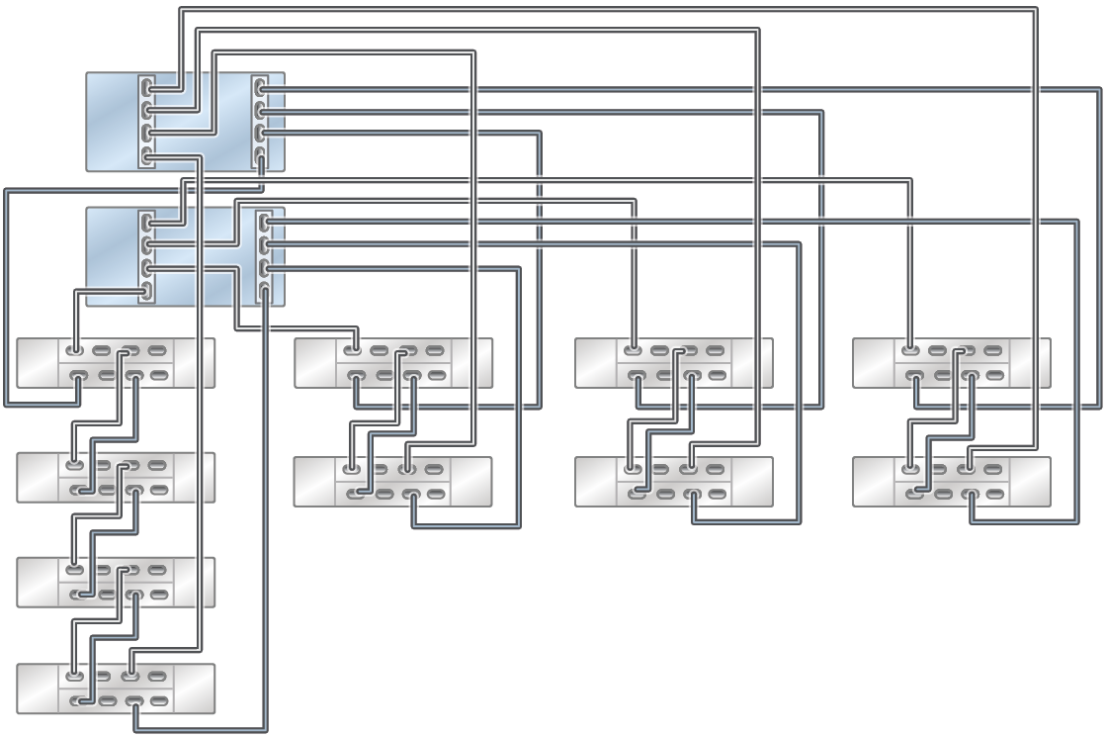
Eight Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)



Oracle ZFS Storage Appliance Racked System ZS5-2 Performance Configuration:

Six Oracle Storage Drive Enclosure DE3-24C (first two chains from the left) and

Four Oracle Storage Drive Enclosure DE3-24P Disk Shelves (optimum performance)



13

Oracle ZFS Storage Appliance Racked System ZS4-4

This section provides overviews and cabling diagrams for Oracle ZFS Storage Appliance Racked System ZS4-4, which is pre-racked and pre-cabled system that supports capacity configurations.

This section contains the following topics:

- Overview of Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configurations
- Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configurations

Overview of Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configurations

Capacity configurations take advantage of high-capacity disk shelves and are available in a base cabinet, or a base cabinet with up to two expansion cabinets. Two Oracle ZFS Storage ZS4-4 controllers and up to 28 Oracle Storage Drive Enclosure DE2-24C disk shelves can be supported, as shown in the following table.

Table 13-1 Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configurations Components

Base Cabinet	Expansion Cabinet 1	Expansion Cabinet 2
Up to 8 Oracle Storage Drive Enclosure DE2-24C disk shelves Two Oracle ZFS Storage ZS4-4 controllers	Up to 10 Oracle Storage Drive Enclosure DE2-24C disk shelves	Up to 10 Oracle Storage Drive Enclosure DE2-24C disk shelves

Configurations are offered in multiples of two disk shelves, as well as half-rack expansion: 2 disk shelves (minimum), 4, 6, 8, 10, 12, 13 (half rack), 14, 16, 18, 20, 22, 23 (half rack), 24, 26, and 28 (maximum).

Each Oracle ZFS Storage ZS4-4 controller supports two, three, or four SAS HBA cards. Four SAS HBA cards must be installed in each Oracle ZFS Storage ZS4-4 controller to support disk shelves in the expansion cabinet(s).

Clustered Oracle ZFS Storage ZS4-4 controllers that contain four SAS HBAs each support a high-availability configuration consisting of:

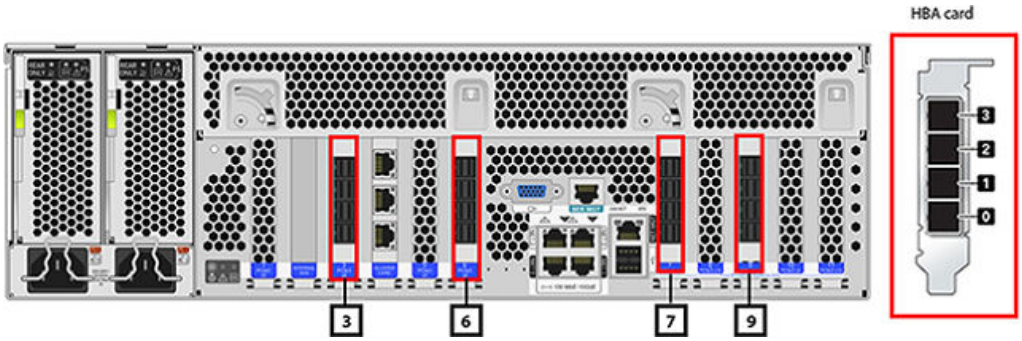
- Four chains of two disk shelves per disk chain in the base cabinet for a total of eight disk shelves, and

- One to two expansion cabinets, each cabinet supporting two chains with a maximum of five disk shelves per disk chain, for a total of 10 disk shelves for one expansion cabinet or 20 disk shelves for two expansion cabinets.

The cabinets are self-contained and pre-cabled following the required cabling methodology. Pre-racked system cabling tables and diagrams, which can also be used for planning future system expansion, are provided in the section Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configurations.

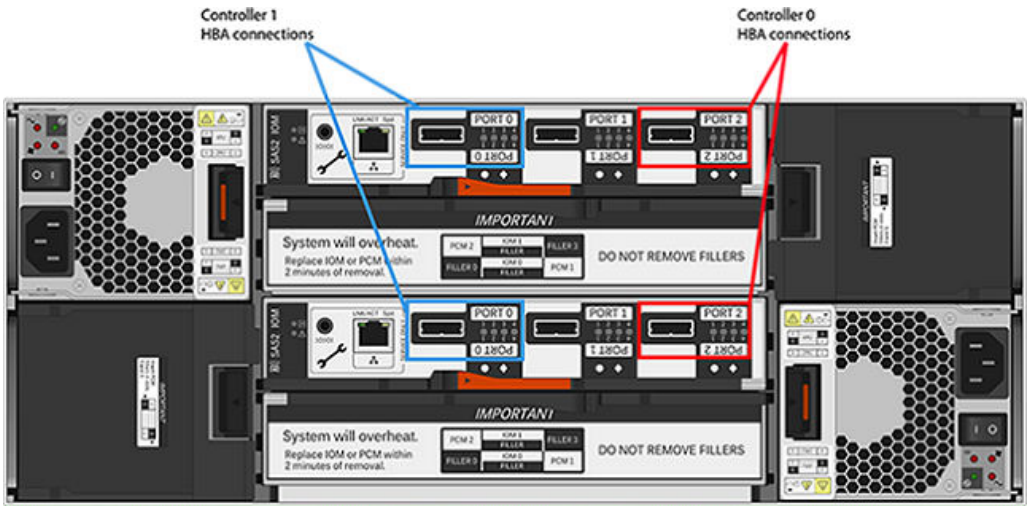
Each cabinet contains 42 rack units (RUs), with RU01 on the bottom. Each Oracle ZFS Storage ZS4-4 controller occupies three rack units, and its location is referenced by the bottommost rack unit number. The top controller is referred to as Controller 1 and is located in RU20 in the base cabinet, and the bottom controller is Controller 0 in RU17. The following figure shows the slot number for each HBA card, as well as the port numbers in each card.

Oracle ZFS Storage ZS4-4 Controller HBA Slot Numbers (Back View)



Each Oracle Storage Drive Enclosure DE2-24C disk shelf occupies four rack units, and disk shelves are racked from the bottom of the cabinet to the top for stability. Therefore, the first disk shelf is in RU01, the second in RU05, and so on. As shown in the following figure, the Oracle Storage Drive Enclosure DE2-24C disk shelf has two I/O Modules (IOMs) with three ports each. Controller 1 uses Port 0, and Controller 0 uses Port 2. In all cabling configurations, Port 1 is never used.

Oracle Storage Drive Enclosure DE2-24C Disk Shelf HBA Connections (Back View)



Cabling Tables and Diagrams for Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configurations

The following table describes the locations and port connections for two controllers and eight disk shelves in the base cabinet, using 3-meter SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs.

Table 13-2 Base Cabinet: Controller and Disk Shelf Locations and Connections

FROM	TO				
RU	**CONTROLLER**	**HBA PORT**	**RU**	**DISK SHELF**	**DISK SHELF PORT**
20	1	Slot 3, Port 0	1	1	IOM 0, Port 0
17	0	Slot 6, Port 1	1	1	IOM 1, Port 2
20	1	Slot 6, Port 0	9	3	IOM 0, Port 0
17	0	Slot 7, Port 1	9	3	IOM 1, Port 2
20	1	Slot 7, Port 0	23	5	IOM 0, Port 0
17	0	Slot 9, Port 1	23	5	IOM 1, Port 2
20	1	Slot 9, Port 0	31	7	IOM 0, Port 0
17	0	Slot 3, Port 1	31	7	IOM 1, Port 2
17	0	Slot 3, Port 0	5	2	IOM 0, Port 2
20	1	Slot 6, Port 1	5	2	IOM 1, Port 0
17	0	Slot 6, Port 0	13	4	IOM 0, Port 2
20	1	Slot 7, Port 1	13	4	IOM 1, Port 0
17	0	Slot 7, Port 0	27	6	IOM 0, Port 2
20	1	Slot 9, Port 1	27	6	IOM 1, Port 0
17	0	Slot 9, Port 0	35	8	IOM 0, Port 2
20	1	Slot 3, Port 1	35	8	IOM 1, Port 0

The following table describes the locations and port connections for 10 disk shelves in Expansion Cabinet 1, using 6-meter SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs. Expansion Cabinet 1 supports disk shelves 9 through 18.

Table 13-3 Expansion Cabinet 1: Controller and Disk Shelf Locations and Connections

FROM	TO				
RU	**CONTROLLER**	**HBA PORT**	**RU**	**DISK SHELF**	**DISK SHELF PORT**
20	1	Slot 3, Port 2	1	9	IOM 0, Port 0
17	0	Slot 6, Port 3	1	9	IOM 1, Port 2
20	1	Slot 6, Port 2	21	11	IOM 0, Port 0
17	0	Slot 7, Port 3	21	11	IOM 1, Port 2
17	0	Slot 3, Port 2	5, 9, 13, 18	10, 13, 14, 17	IOM 0, Port 2

Table 13-3 (Cont.) Expansion Cabinet 1: Controller and Disk Shelf Locations and Connections

FROM	TO				
20	1	Slot 6, Port 3	5, 9, 13, 18	10, 13, 14, 17	IOM 1, Port 0
17	0	Slot 6, Port 2	25, 29, 33, 37	12, 15, 16, 18	IOM 0, Port 2
20	1	Slot 7, Port 3	25, 29, 33, 37	12, 15, 16, 18	IOM 1, Port 0

The following table describes the locations and port connections for 10 disk shelves in Expansion Cabinet 2, using 6-meter SAS cables. The first disk shelf is located in RU01, and each disk shelf has two IOMs. Expansion Cabinet 2 supports disk shelves 19 through 28.

Table 13-4 Expansion Cabinet 2: Controller and Disk Shelf Locations and Connections

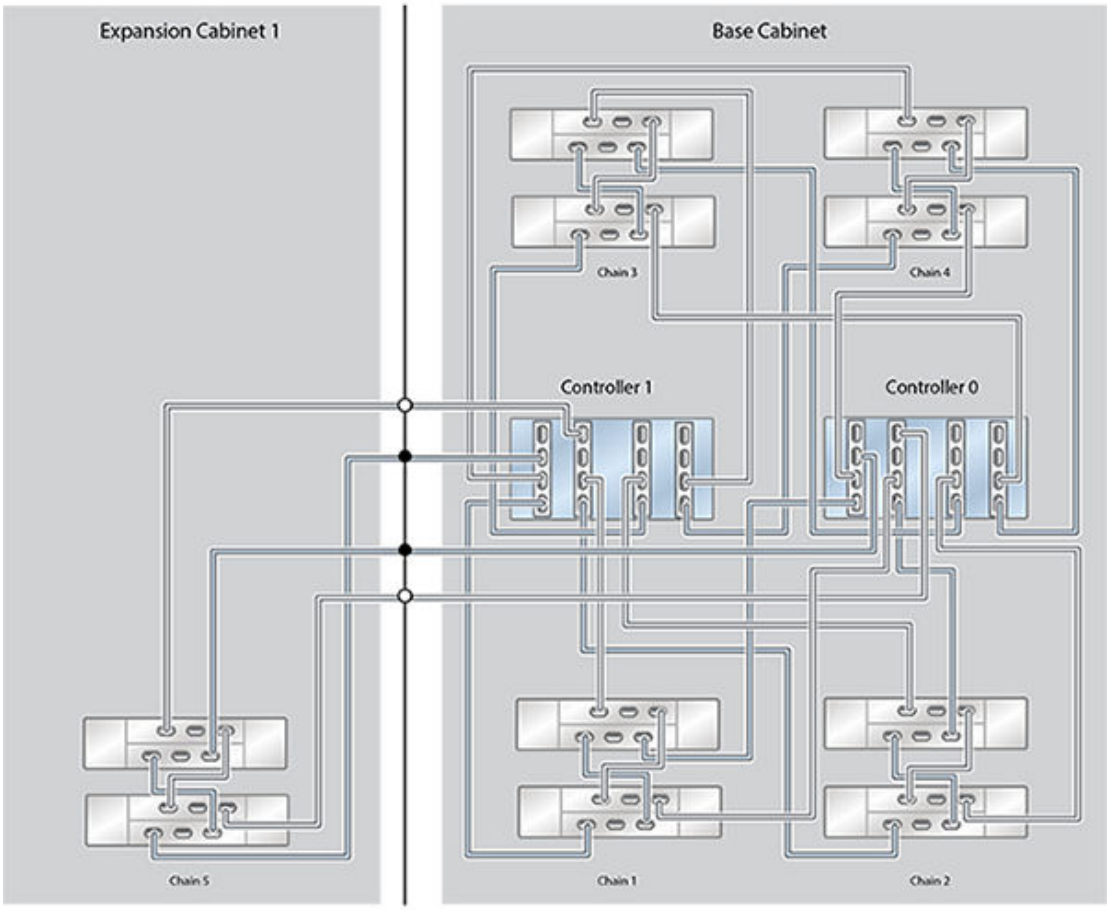
FROM	TO				
RU	CONTROLLER	HBA PORT	RU	DISK SHELF	DISK SHELF PORT
20	1	Slot 7, Port 2	1	19	IOM 0, Port 0
17	0	Slot 9, Port 3	1	19	IOM 1, Port 2
20	1	Slot 9, Port 2	21	21	IOM 0, Port 0
17	0	Slot 3, Port 3	21	21	IOM 1, Port 2
17	0	Slot 7, Port 2	5, 9, 13, 18	20, 23, 24, 27	IOM 0, Port 2
20	1	Slot 9, Port 3	5, 9, 13, 18	20, 23, 24, 27	IOM 1, Port 0
17	0	Slot 9, Port 2	25, 29, 33, 37	22, 25, 26, 28	IOM 0, Port 2
20	1	Slot 3, Port 3	25, 29, 33, 37	22, 25, 26, 28	IOM 1, Port 0

The following diagrams illustrate how pre-racked systems are cabled, as well as how to expand your system in the future. The legend for each diagram is as follows:

- A hollow circle indicates the cable connection to the top IOM (IOM 1).
- A solid circle indicates the cable connection to the bottom IOM (IOM 0).

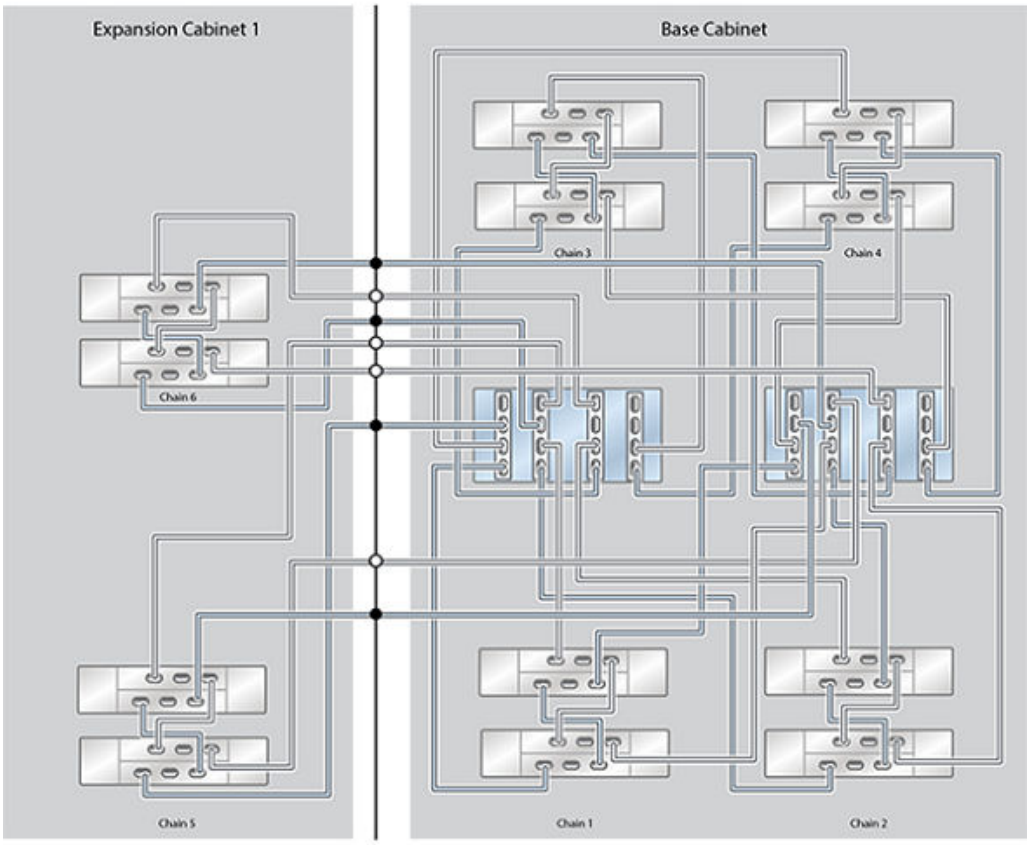
Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configuration:

10 Oracle Storage Drive Enclosure DE2-24C Disk Shelves



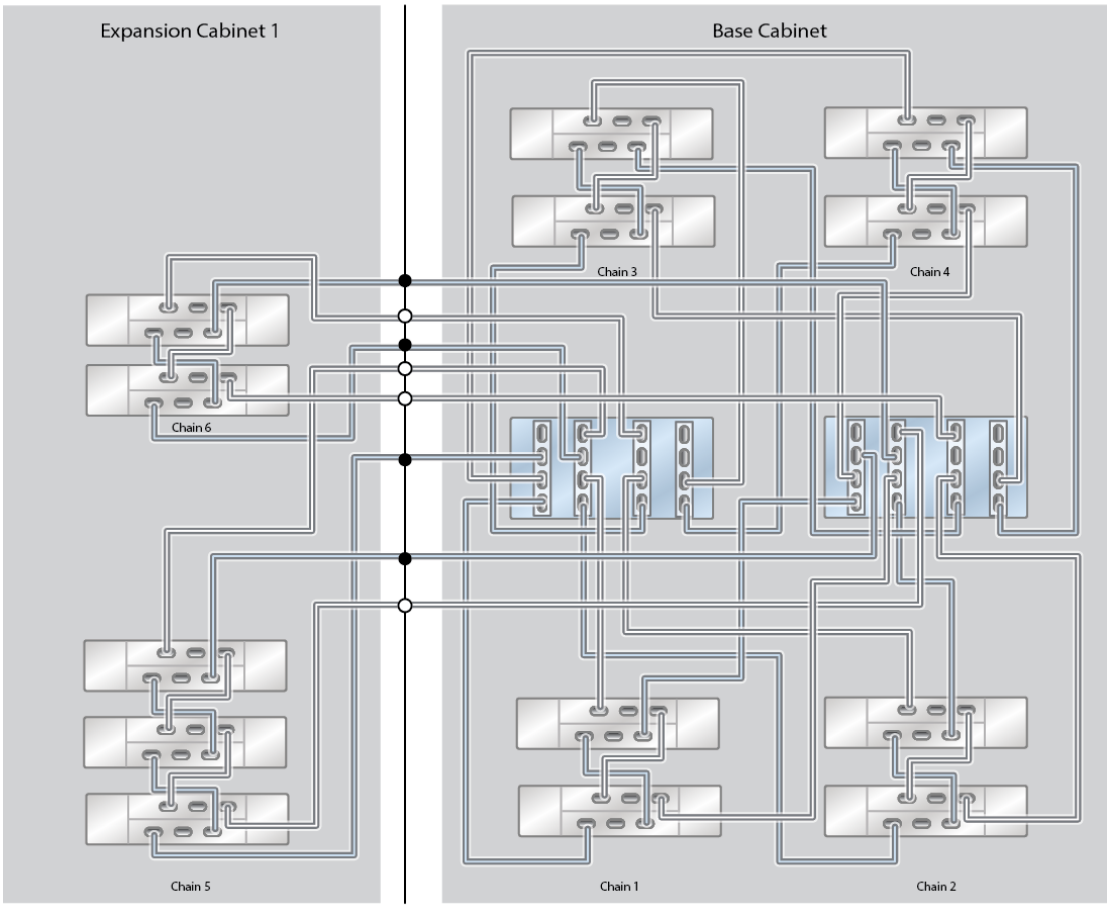
Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configuration:

12 Oracle Storage Drive Enclosure DE2-24C Disk Shelves



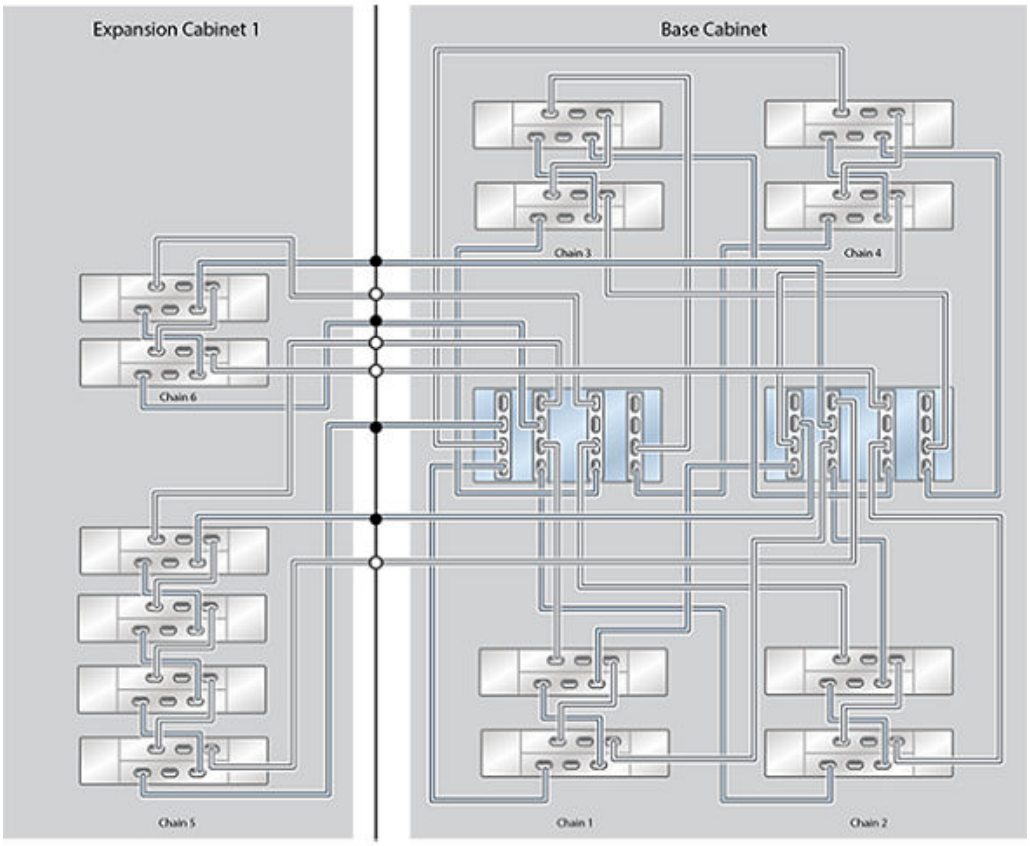
Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configuration:

13 Oracle Storage Drive Enclosure DE2-24C Disk Shelves (Half Rack)



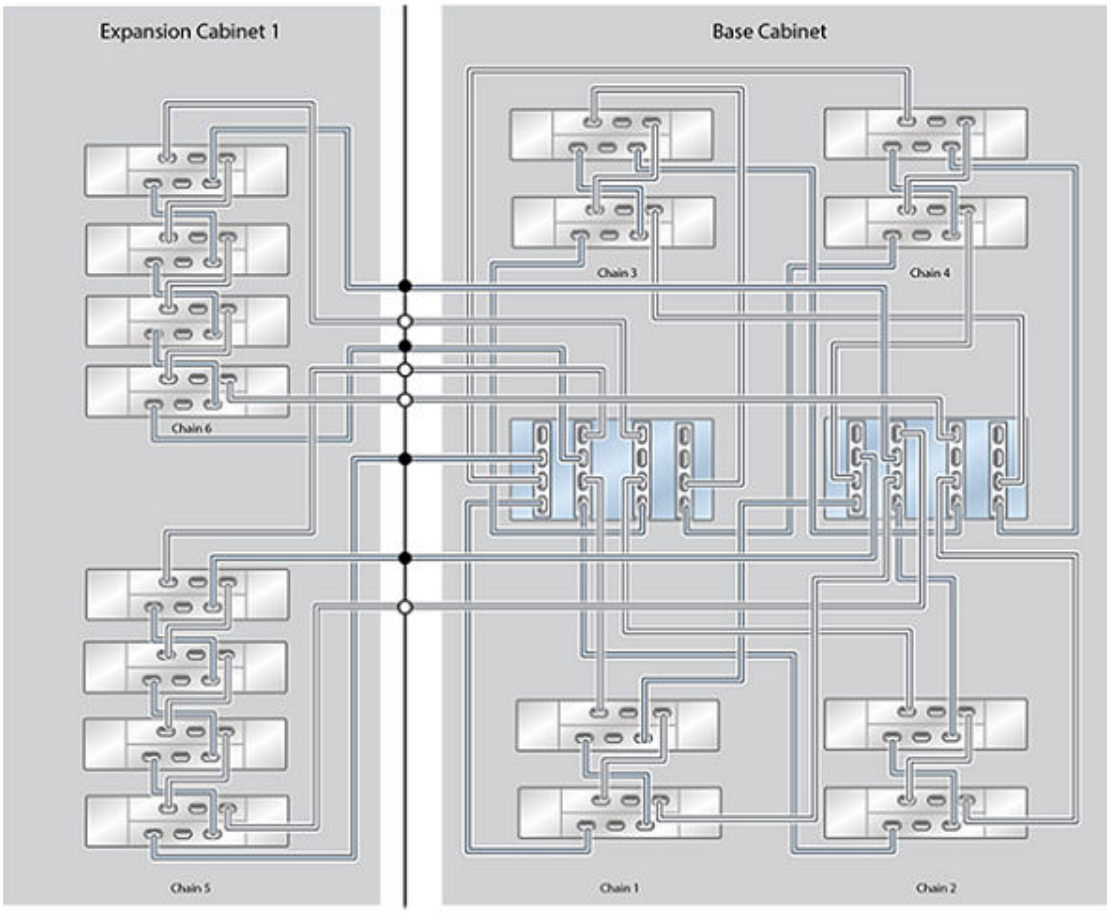
Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configuration:

14 Oracle Storage Drive Enclosure DE2-24C Disk Shelves



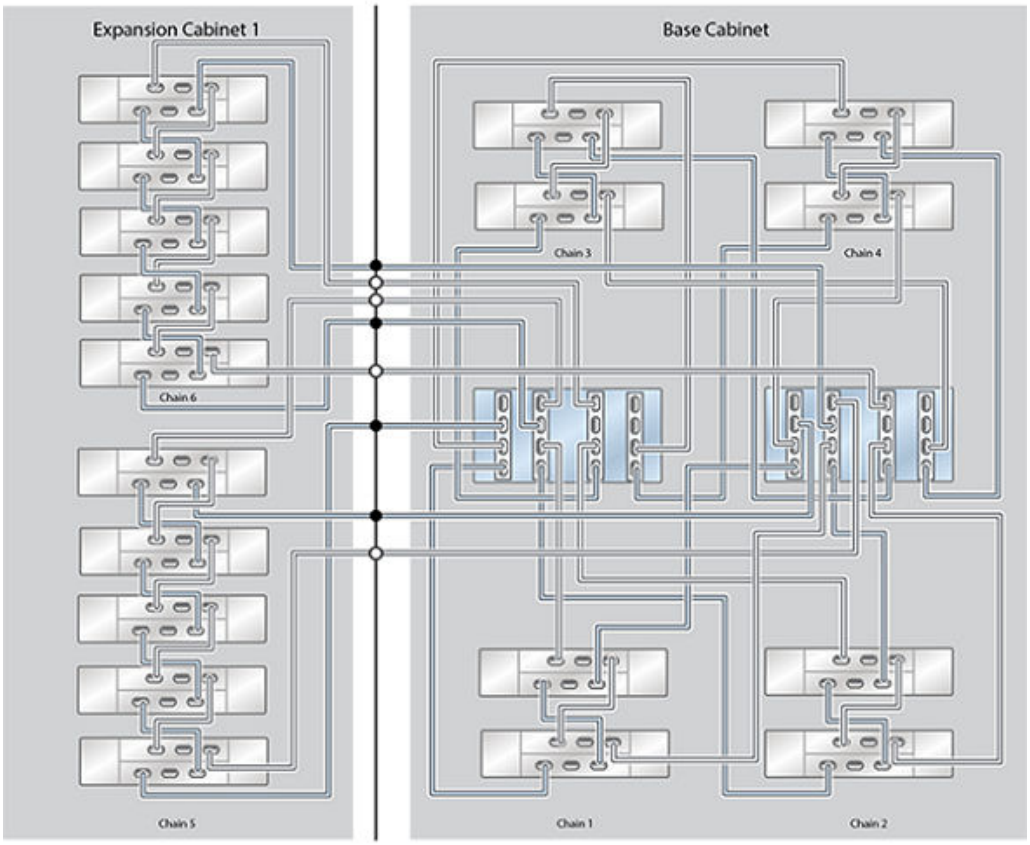
Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configuration:

16 Oracle Storage Drive Enclosure DE2-24C Disk Shelves



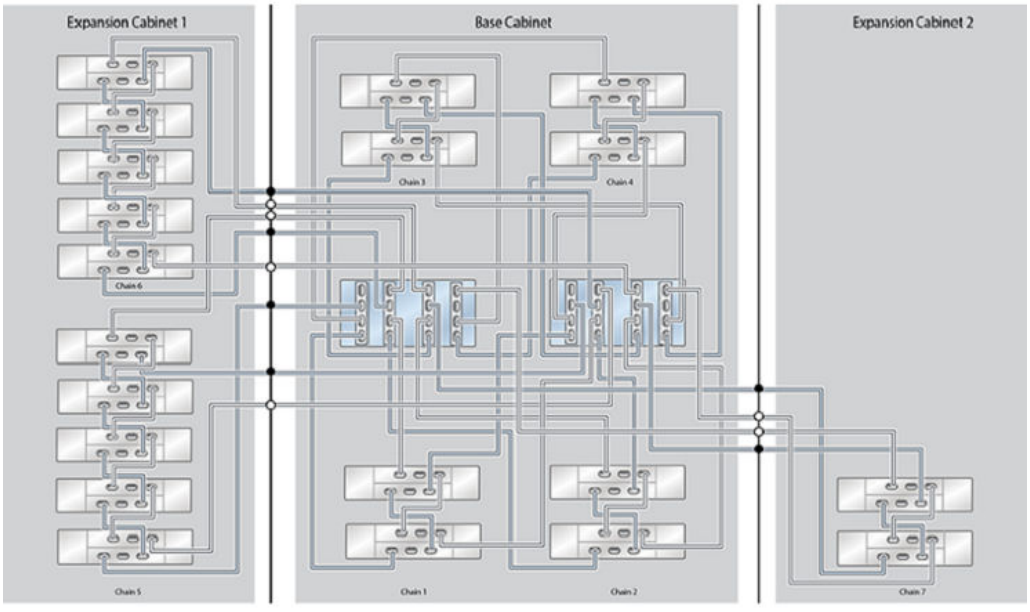
Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configuration:

18 Oracle Storage Drive Enclosure DE2-24C Disk Shelves



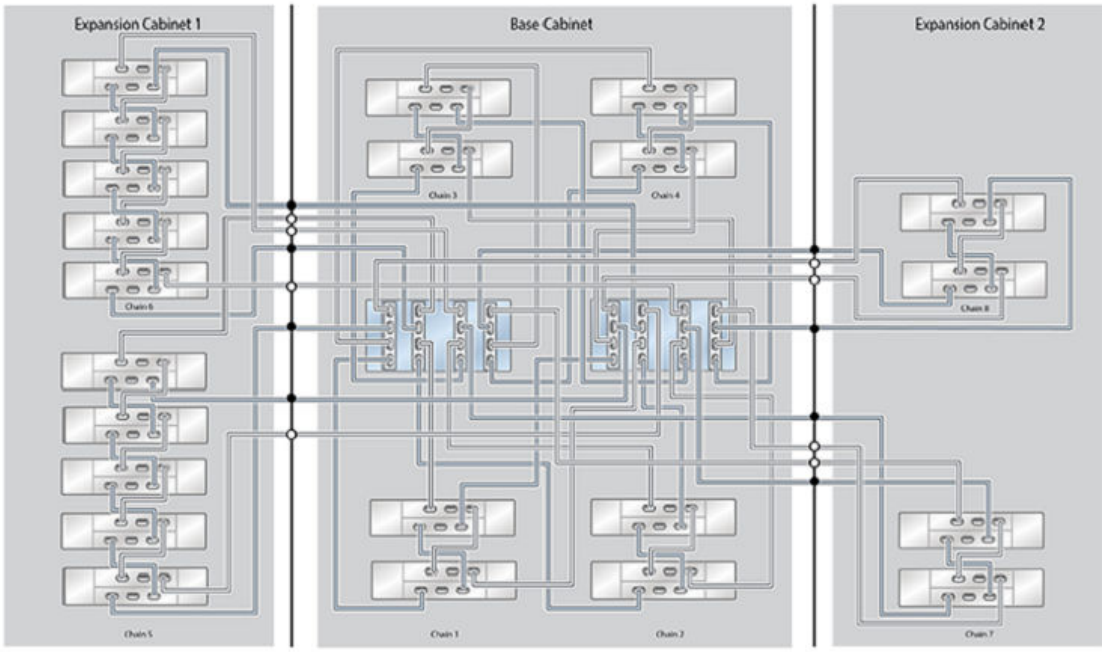
Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configuration:

20 Oracle Storage Drive Enclosure DE2-24C Disk Shelves



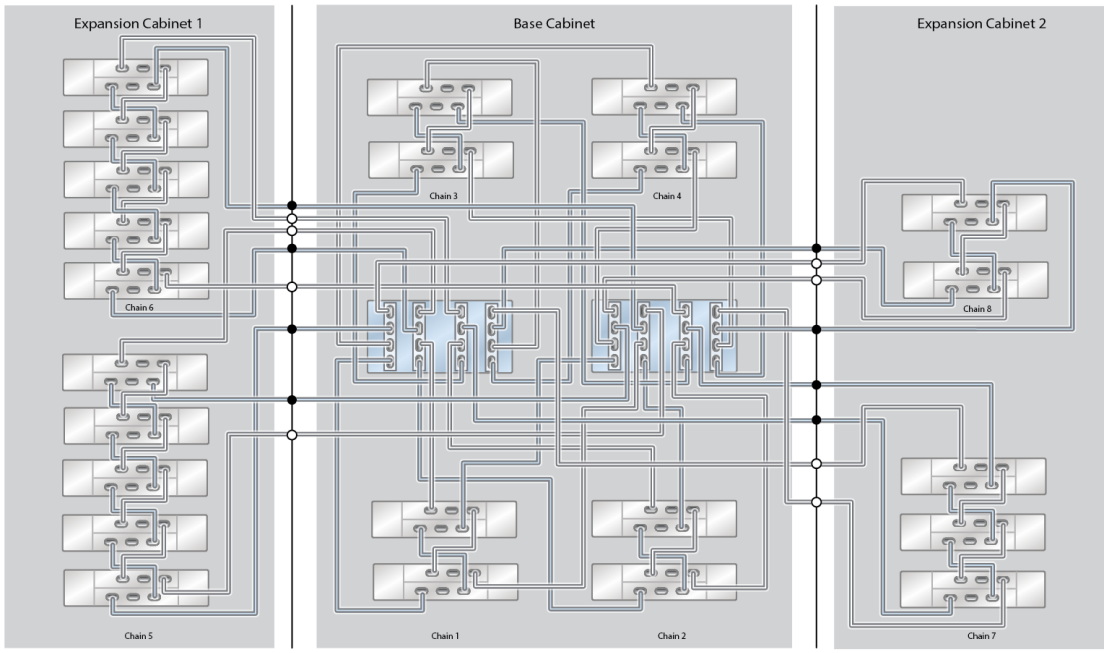
Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configuration:

22 Oracle Storage Drive Enclosure DE2-24C Disk Shelves



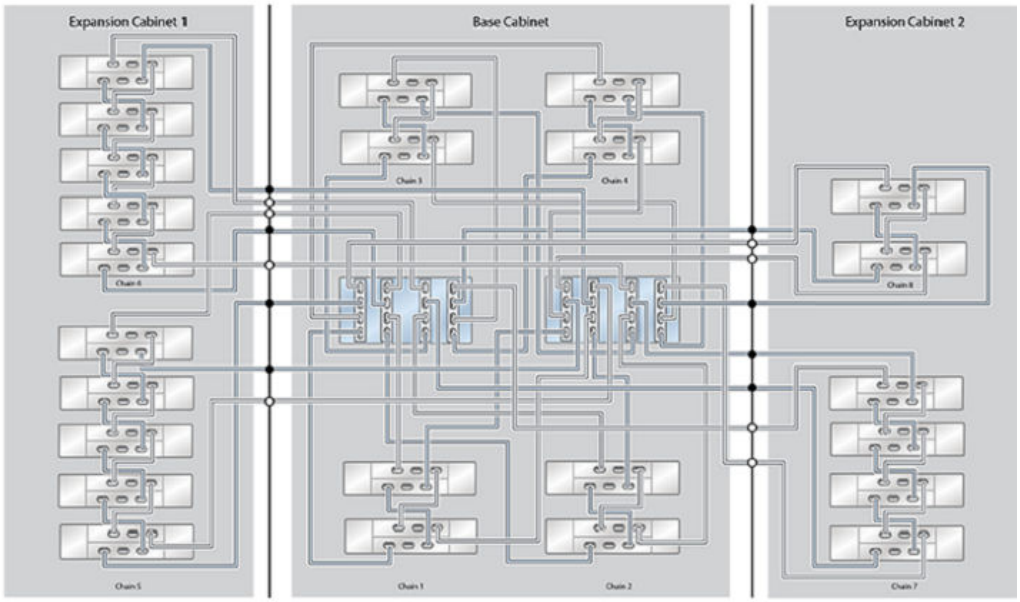
Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configuration:

23 Oracle Storage Drive Enclosure DE2-24C Disk Shelves (Half Rack)



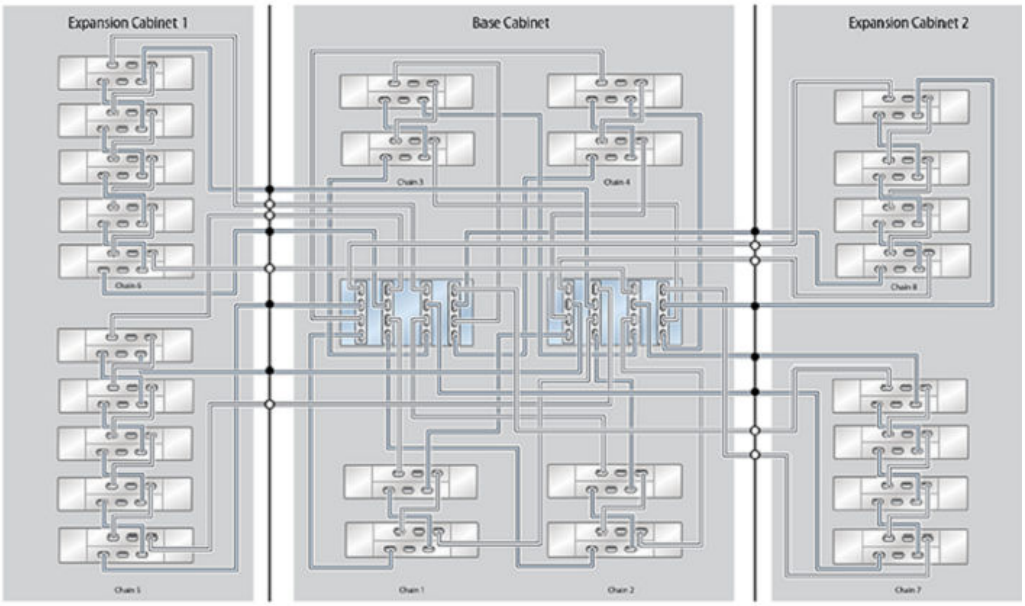
Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configuration:

24 Oracle Storage Drive Enclosure DE2-24C Disk Shelves



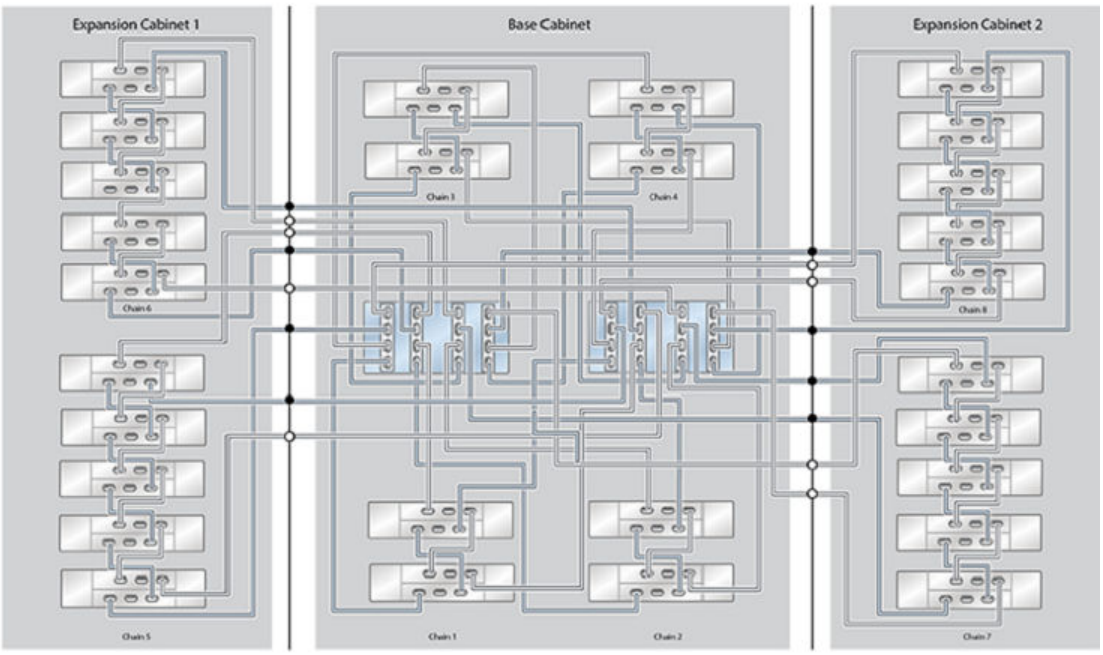
Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configuration:

26 Oracle Storage Drive Enclosure DE2-24C Disk Shelves



Oracle ZFS Storage Appliance Racked System ZS4-4 Capacity Configuration:

28 Oracle Storage Drive Enclosure DE2-24C Disk Shelves


Expansion Cabinet 1
Base Cabinet
Expansion Cabinet 2
Chain 3
Chain 4
Chain 6
Chain 8
Chain 5
Chain 1
Chain 2
Chain 7