# Cabling E-Series Hardware

**NetApp®**

# Contents

# Overview and requirements

Learn about the cabling requirements and considerations for E-Series controller shelves and supported drive shelves.

### When to use this guide

This information is intended for a hardware installer or system administrator who is installing or expanding a storage system. It is assumed that you have installed the storage system as described in the *Installation and Setup Instructions* for your hardware.

For information about cabling to support mirroring features, see the *Synchronous and Asynchronous Mirroring Feature Descriptions and Deployment Guide*.

### Applicable hardware models

This information applies to the following hardware models:

- EF580

- EF280

- E5712 and E5724

- E5760

- E2812 and E2824

- DE212C and DE224C

- DE460C

For information about cabling older models, see the *Hardware Cabling Guide*.

### Required components

In addition to controller shelves and drive shelves, you might need some or all of the following components when cabling your storage system:

- Cables: SAS, Fibre Channel (FC), Ethernet, InfiniBand

- Small form-factor pluggable (SFP) or Quad SFP (QSFP) transceivers

- Switches

- Host bus adapters (HBAs)

- Host channel adapters (HCAs)

- Network interface cards (NICs)

# Cabling your storage system

You can cable a host directly to a controller or use switches to connect a host to a controller. If your storage system includes one or more drive shelves, you must cable them to your controller shelf. You can add a new drive shelf while power is still applied to other components of the storage system. In addition, you can connect your storage system to a network for out-of-band management.

**Choices**

- Host cabling on page 5
  You can cable a host directly to a controller or use switches to connect a host to a controller.

- Drive shelf cabling on page 7
  You must connect each controller in the controller shelf to an I/O module (IOM) in a drive shelf.

- Power cabling on page 8
  You must connect each component's power supplies to separate power circuits.

- Hot adding a drive shelf on page 9
  You can add a new drive shelf while power is still applied to the other components of the storage system. You can configure, reconfigure, add, or relocate storage system capacity without interrupting user access to data.

- Ethernet cabling for a management station on page 13
  You can connect your storage system to an Ethernet network for out-of-band storage array management. You must use Ethernet cables for all storage array management connections.

## Host cabling

You can cable a host directly to a controller or use switches to connect a host to a controller.

**Choices**
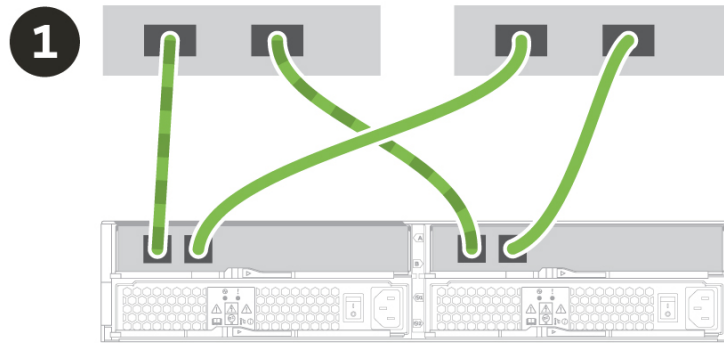
- Cabling for a direct-attached topology on page 5
  A direct-attached topology connects host adapters directly to controllers in your storage system.

- Cabling for a switch topology on page 6
  A topology that uses switches to connect hosts to the controllers in your storage system must support the connection type used between the host and the controller. The host adapters in the hosts might be HBAs for Fibre Channel, HCAs for InfiniBand, or Ethernet for iSCSI.

### Cabling for a direct-attached topology

A direct-attached topology connects host adapters directly to controllers in your storage system.

**About this task**

The following figure shows an example connection. To help ensure maximum performance, make sure to use all available host adapter ports.

**Two hosts and two controllers**



**1**     Connect each host adapter port directly to the host ports on the controllers.
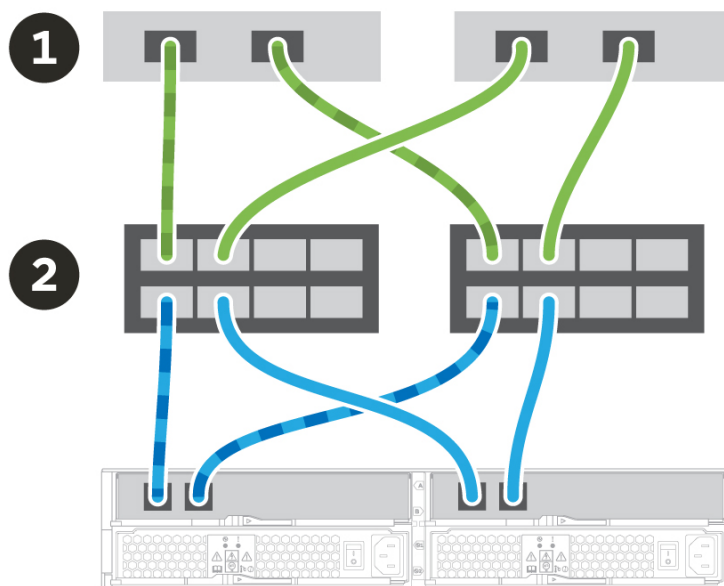
## Cabling for a switch topology

A topology that uses switches to connect hosts to the controllers in your storage system must support the connection type used between the host and the controller. The host adapters in the hosts might be HBAs for Fibre Channel, HCAs for InfiniBand, or Ethernet for iSCSI.

**About this task**

The following figure shows an example connection.

For Fibre Channel, make sure to use single-initiator, single-target zoning.

**Two hosts and two switches**



**1**     Connect each host adapter directly to the switch.

**2** Connect each switch directly to the host ports on the controllers.

# Drive shelf cabling

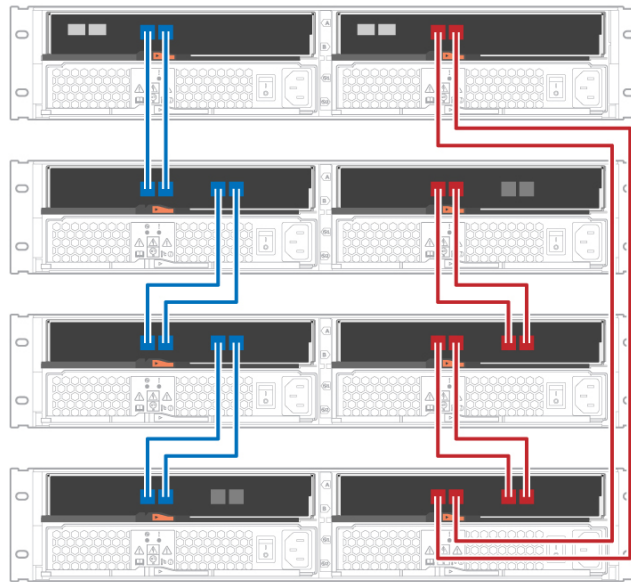You must connect each controller in the controller shelf to an I/O module (IOM) in a drive shelf.

### Choices

- Cabling a 12-drive or 24-drive shelf on page 7
  You can cable your controller shelf to one or more 12-drive or 24-drive shelves with SAS-3 drives.
- Cabling a 60-drive shelf on page 8
  You can cable your controller shelf to one or more 60-drive shelves with SAS-3 drives.

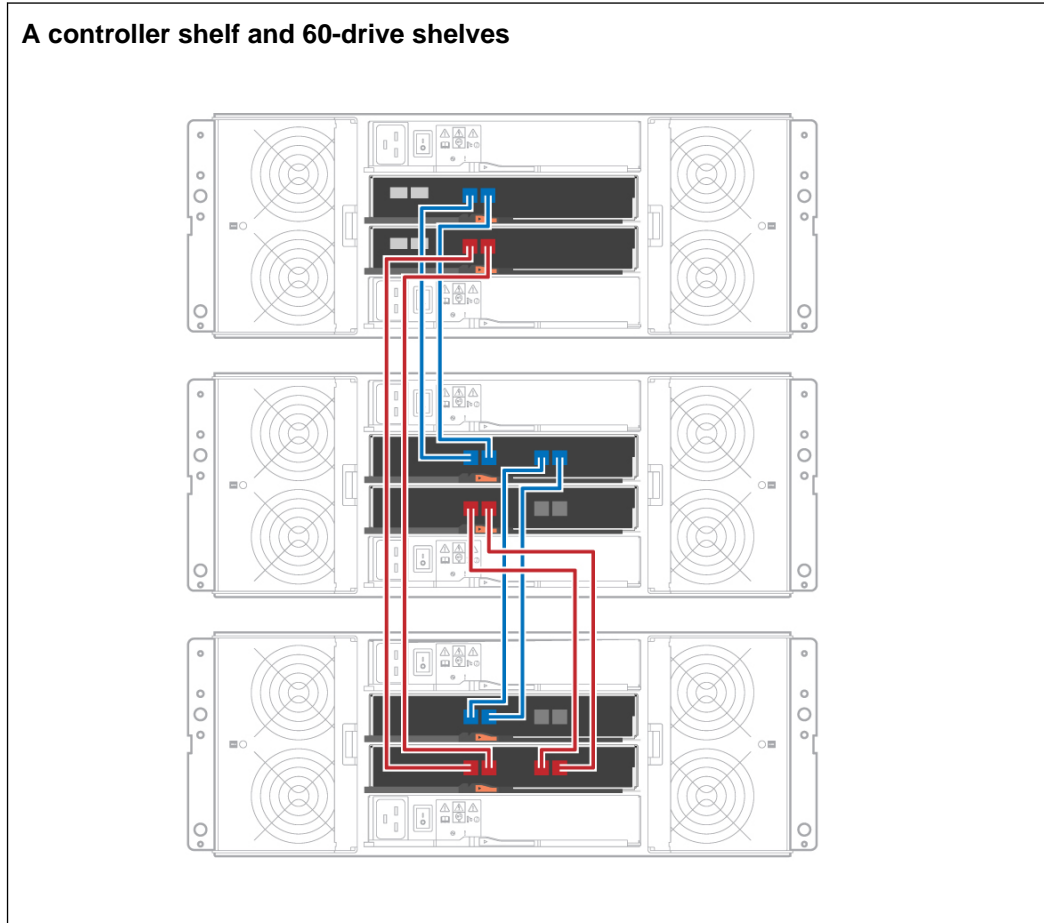## Cabling a 12-drive or 24-drive shelf

You can cable your controller shelf to one or more 12-drive or 24-drive shelves with SAS-3 drives.



**A controller shelf and 12-drive or 24-drive shelves**

## Cabling a 60-drive shelf

You can cable your controller shelf to one or more 60-drive shelves with SAS-3 drives.



**A controller shelf and 60-drive shelves**

# Power cabling

You must connect each component's power supplies to separate power circuits.

### Before you begin

- You have confirmed that your location provides the necessary power.

- The two power switches on the two shelf power supplies must be turned off.

### About this task

The power source for your storage system must be able to accommodate the power requirements of the new drive shelf. For information about the power consumption for your storage system, see the *Hardware Universe*.

### Step

**1.** Connect the two power cables for each shelf to different power distribution units (PDUs) in the cabinet or rack.

# Hot adding a drive shelf

You can add a new drive shelf while power is still applied to the other components of the storage system. You can configure, reconfigure, add, or relocate storage system capacity without interrupting user access to data.

**About this task**

To maintain system integrity, you must follow the procedure exactly in the order presented.

**Steps**

1. Prepare to add the drive shelf on page 9
   Before you hot add a drive shelf, you must check for critical events and check the status of the IOMs.

2. Install the drive shelf and apply power on page 10
   You install a new drive shelf or a previously installed drive shelf, turn on the power, and check for any LEDs that require attention.

3. Connect the drive shelf on page 11
   You connect the drive shelf to controller A, confirm IOM status, and then connect the drive shelf to controller B.

4. Complete hot add on page 12
   You complete the hot add by checking for any errors and confirming that the newly added drive shelf uses the latest firmware.

## Prepare to add the drive shelf

Before you hot add a drive shelf, you must check for critical events and check the status of the IOMs.

**Before you begin**

- The power source for your storage system must be able to accommodate the power requirements of the new drive shelf. For the power specification for your drive shelf, see the *Hardware Universe*.

- The cabling pattern for the existing storage system must match one of the applicable schemes shown in this guide.

**Steps**

1. In SANtricity System Manager, select **Support > Support Center > Diagnostics**.

2. Select **Collect Support Data**.

   The Collect Support Data dialog box appears.

3. Click **Collect**.

   The file is saved in the Downloads folder for your browser with the name `support-data.7z`. The data is not automatically sent to technical support.

4. Select **Support > Event Log**.

   The Event Log page displays the event data.

5. Select the heading of the **Priority** column to sort critical events to the top of the list.

6. Review the system critical events for events that have occurred in the last two to three weeks, and verify that any recent critical events have been resolved or otherwise addressed.

   **Note:** If unresolved critical events have occurred within the previous two to three weeks, stop the procedure and contact technical support. Continue the procedure only when the issue is resolved.

7. Select **Hardware**.

8. Select the **IOMs (ESMs)** icon.

   

   The Shelf Component Settings dialog box appears with the **IOMs (ESMs)** tab selected.

9. Make sure that the status shown for each IOM/ESM is *Optimal*.

10. Click **Show more settings**.

11. Confirm that the following conditions exist:

    • The number of ESMs/IOMs detected matches the number of ESMs/IOMs installed in the system and that for each drive shelf.

    • Both of the ESMs/IOMs show that communication is OK.

    • The data rate is 12Gb/s for DE212C, DE224C, and DE460C drive shelves or 6 Gb/s for other drive trays.

**After you finish**

Go to *Install the drive shelf* on page 10.

## Install the drive shelf and apply power

You install a new drive shelf or a previously installed drive shelf, turn on the power, and check for any LEDs that require attention.

**Steps**

1. If you are installing a drive shelf that has previously been installed in a storage system, remove the drives. The drives must be installed one at a time later in this procedure.

   If the installation history of the drive shelf that you are installing is unknown, you should assume that it has been previously installed in a storage system.

2. Install the drive shelf in the rack that holds the storage system components.

   **Attention:** See the installation instructions for your model for the full procedure for physical installation and power cabling. The installation instructions for your model includes notes and warnings that you must take into account to safely install a drive shelf.

3. Power on the new drive shelf, and confirm that no amber attention LEDs are illuminated on the drive shelf. If possible, resolve any fault conditions before you continue with this procedure.

**After you finish**

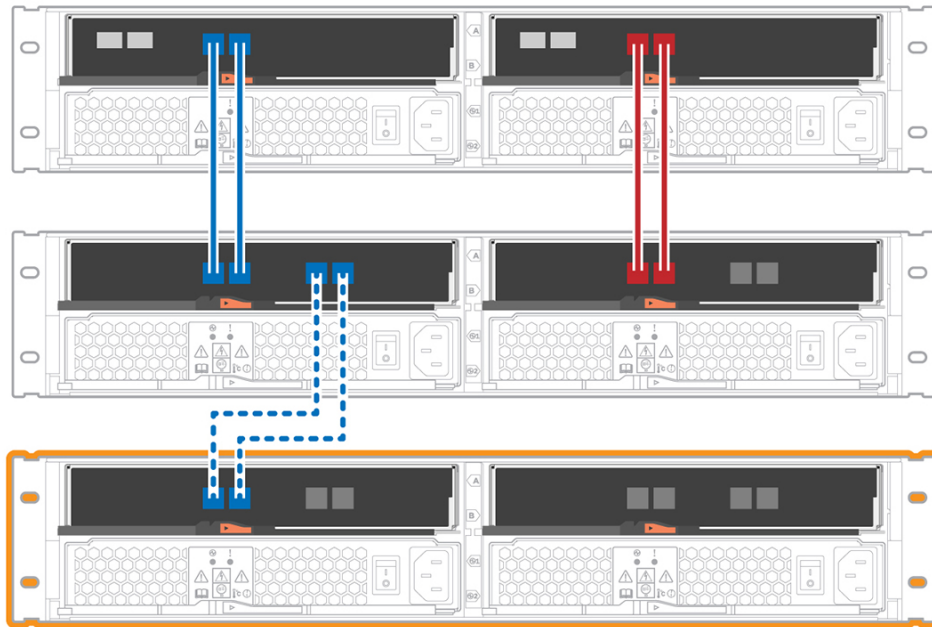Go to *Connect the drive shelf* on page 11.

## Connect the drive shelf

You connect the drive shelf to controller A, confirm IOM status, and then connect the drive shelf to controller B.

**Steps**

1. Connect the drive shelf to controller A.

   The following figure shows an example connection between an additional drive shelf and controller A.



2. In SANtricity System Manager, click **Hardware**.

   > **Note:** At this point in the procedure, you have only one active path to the controller shelf.

3. Scroll down, as necessary, to see all the drive shelves in the new storage system. If the new drive shelf is not displayed, resolve the connection issue.

4. Select the **ESMs/IOMs** icon for the new drive shelf.
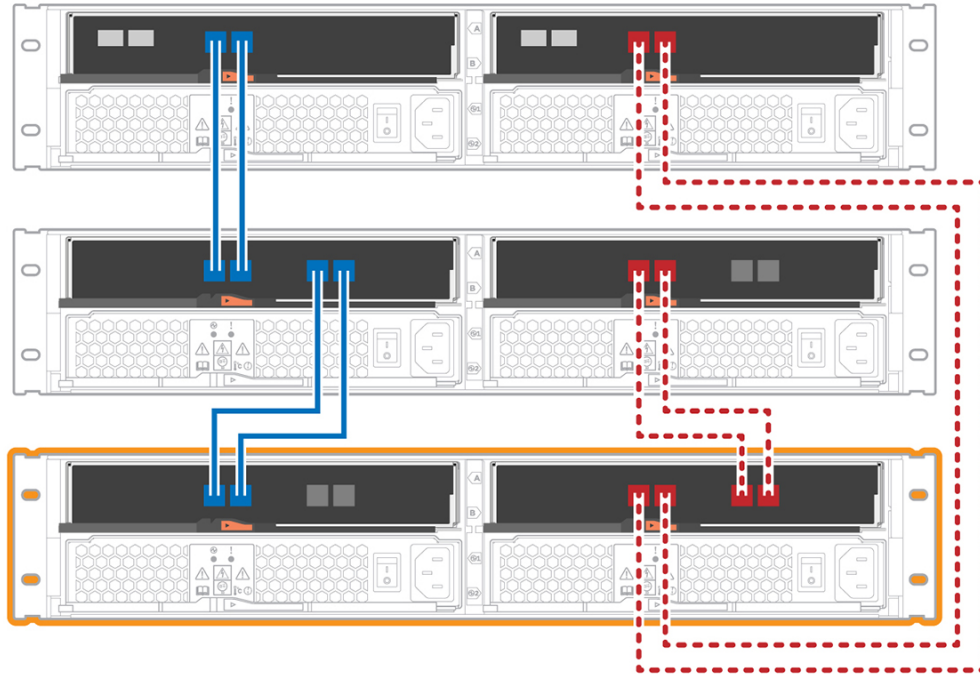
   

   The **Shelf Component Settings** dialog box appears.

5. Select the **ESMs/IOMs** tab in the **Shelf Component Settings** dialog box.

6. Select **Show more options**, and verify the following:

   - IOM/ESM A is listed.

   - Current data rate is 12 Gbps for a SAS-3 drive shelf.

   - Card communications is OK.

**7.** Connect the drive shelf to controller B.

The following figure shows an example connection between an additional drive shelf and controller B.



**8.** If it is not already selected, select the **ESMs/IOMs** tab in the **Shelf Component Settings** dialog box, and then select **Show more options**. Verify that Card communications is **YES**.

> **Note:** Optimal status indicates that the loss of redundancy error associated with the new drive shelf has been resolved and the storage system is stabilized.

**After you finish**

Go to

## Complete hot add

You complete the hot add by checking for any errors and confirming that the newly added drive shelf uses the latest firmware.

**Steps**

**1.** In SANtricity System Manager, click **Home**.

**2.** If the link labeled **Recover from problems** appears at the center top of the page, click the link, and resolve any issues indicated in the Recovery Guru.

**3.** In SANtricity System Manager, click **Hardware**, and scroll down, as necessary, to see the newly added drive shelf.

**4.** For drives that were previously installed in a different storage system, add one drive at time to the newly installed drive shelf. Wait for each drive to be recognized before you insert the next drive.

When a drive is recognized by the storage system, the representation of the drive slot in the **Hardware** page displays as a blue rectangle.

5. Select **Support > Support Center > Support Resources** tab.

6. Click the **Software and Firmware Inventory** link, and check which versions of the IOM/ESM firmware and the drive firmware are installed on the new drive shelf.

   **Note:** You might need to scroll down the page to locate this link.

7. If necessary, upgrade the drive firmware.

   IOM/ESM firmware automatically upgrades to the latest version unless you have disabled the upgrade feature.

**After you finish**

The hot add procedure is complete. You can resume normal operations.

# Ethernet cabling for a management station

You can connect your storage system to an Ethernet network for out-of-band storage array management. You must use Ethernet cables for all storage array management connections.

**Choices**

- Direct topology on page 13
  A direct topology connects your controller directly to an Ethernet network.
- Fabric topology on page 14
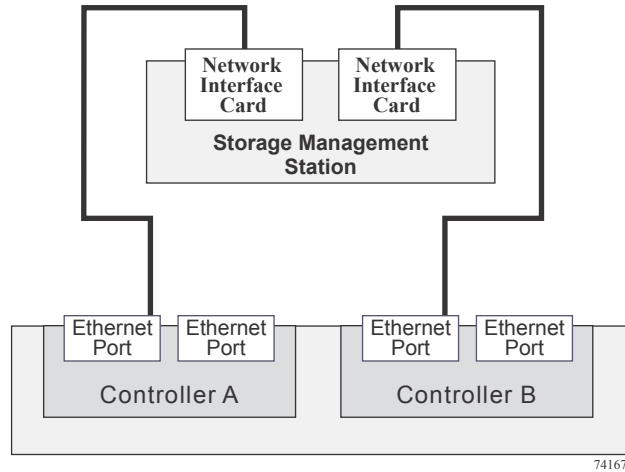  A fabric topology uses a switch to connect your controller to an Ethernet network.

## Direct topology

A direct topology connects your controller directly to an Ethernet network.

**About this task**

You must connect management port 1 on each controller for out-of-band management and leave port 2 available for access to the storage array by technical support.
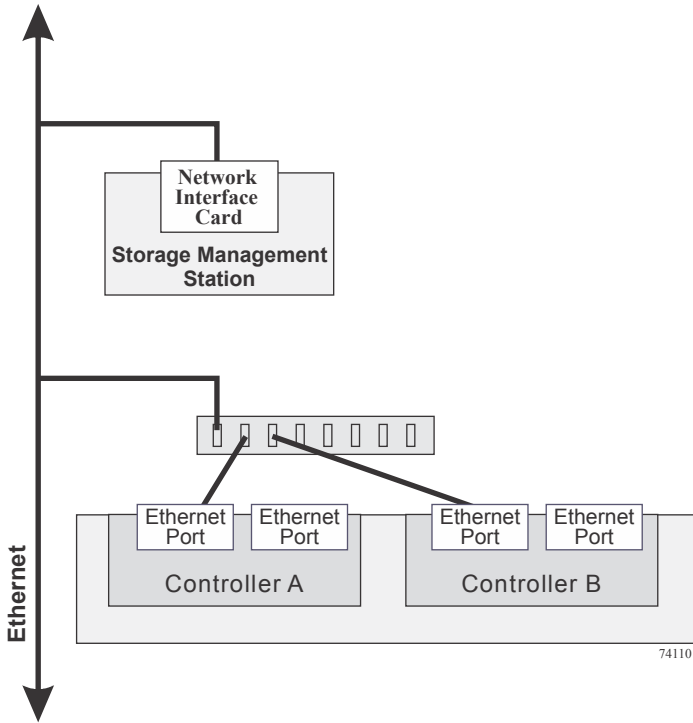
**Direct storage management connections**

```
                    ┌─────────────────┐   ┌─────────────────┐
                    │    Network      │   │    Network      │
                    │   Interface     │   │   Interface     │
                    │     Card        │   │     Card        │
                    └─────────────────┴───┴─────────────────┘
                         Storage Management
                              Station

          ┌─────────┬─────────┐         ┌─────────┬─────────┐
          │Ethernet │Ethernet │         │Ethernet │Ethernet │
          │  Port   │  Port   │         │  Port   │  Port   │
          └─────────┴─────────┘         └─────────┴─────────┘
               Controller A                  Controller B

                                                        74167
```

## Fabric topology

A fabric topology uses a switch to connect your controller to an Ethernet network.

### About this task

You must connect management port 1 on each controller for out-of-band management and leave port 2 available for access to the storage array by technical support.

**Fabric storage management connections**

**Network Interface Card**

**Storage Management Station**

Ethernet Port | Ethernet Port

Ethernet Port | Ethernet Port

Controller A

Controller B

**Ethernet**

74110

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