

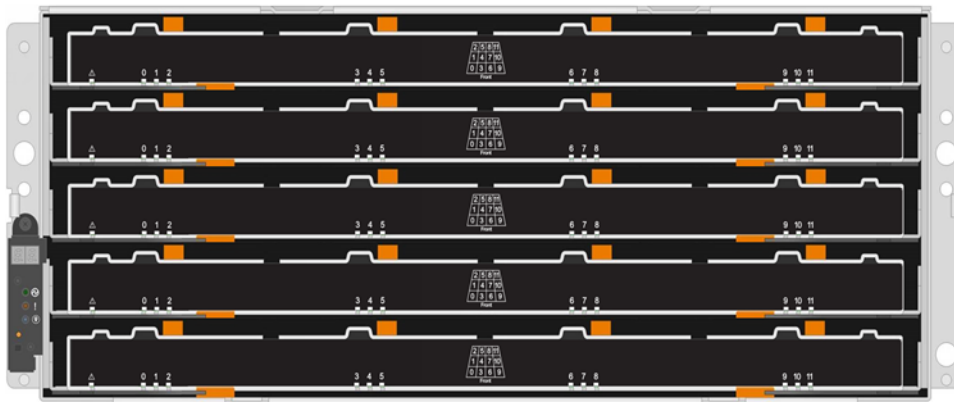
Replacing a drive drawer in E5760 and E2860 shelves

The steps to replace a failed drive drawer in an E-Series E5760 controller shelf, E2860 controller shelf or a DE460C drive shelf depend on whether the volumes in the drawer are protected by Drawer Loss Protection. If all volumes in the drive drawer are in volume groups or disk pools that have Drawer Loss Protection, you can perform this procedure online. Otherwise, you must stop all host I/O activity and power off the shelf before replacing the drive drawer.

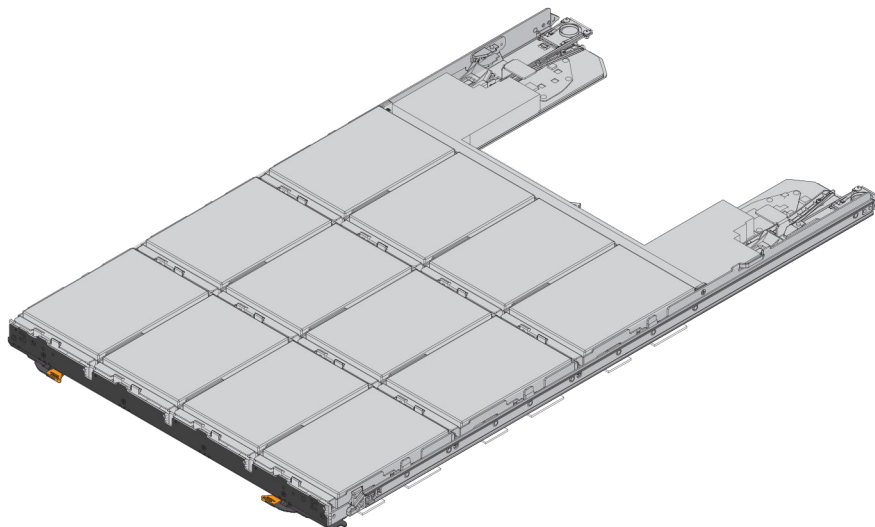
This procedure applies to the following controller shelf and drive shelf:

- E5760 controller shelf
- E2860 controller shelf
- DE460C drive shelf

Each of these 60-drive shelves has five drive drawers.



And each of the five drawers can hold up to 12 drives.



Before you begin

- You have obtained the following items:
 - Antistatic protection
 - **Attention: Possible hardware damage** – To prevent electrostatic discharge damage to the drive shelf, use proper antistatic protection when handling drive shelf components.
 - Replacement drive drawer
 - Replacement left and right cable chains
 - Flashlight
 - Permanent marker
 - You have installed SANtricity System Manager on a management station, so you can use the storage array's command line interface (CLI)

Note: If this software has not yet been installed, follow the instructions in the *SANtricity System Manager Express Guide* or the *SANtricity Power Guide for Advanced Users* for your operating system to download and install it.

Steps

1. [Preparing to remove a drive drawer](#) on page 2
2. [Removing the cable chains](#) on page 5
3. [Removing a drive drawer](#) on page 10
4. [Installing a drive drawer](#) on page 13
5. [Attaching the cable chains](#) on page 14
6. [Reinstalling the drives](#) on page 18

Related information

[SANtricity System Manager 11.40 Installing and Configuring for Linux Express Guide](#)
[SANtricity System Manager 11.40 Installing and Configuring for VMware Express Guide](#)
[SANtricity System Manager 11.40 Installing and Configuring for Windows Express Guide](#)
[SANtricity 11.40 Installing and Configuring for Linux Power Guide for Advanced Users](#)
[SANtricity 11.40 Installing and Configuring for VMware Power Guide for Advanced Users](#)
[SANtricity 11.40 Installing and Configuring for Windows Power Guide for Advanced Users](#)

Preparing to remove a drive drawer

If the drive shelf is powered on, you must issue the `Set Drawer Service Action Allowed Indicator` CLI command to prevent the controller from accessing the drive drawer. This command also allows you to determine if the drives in the drawer are in volume groups or disk pools protected by Drawer Loss Protection. If the command fails, you will need to power off the controller shelf before replacing the drawer.

Before you begin

Before issuing the CLI command, confirm that the drive shelf meets all of these conditions:

- The drive shelf cannot be over temperature.
- Both fans must be installed and have a status of Optimal.
- All drive shelf components must be in place.

- The volumes in the drive drawer cannot be in a Degraded state.

Attention: Possible loss of data access – If a volume is already in a Degraded state, and you remove drives from the drive drawer, the volume can fail.

About this task

When you issue the `Set Drawer Service Action Allowed Indicator` CLI command, all drives in the affected drive drawer are checked to ensure they belong to volume groups or disk pools that have Drawer Loss Protection, as follows:

- If all drives in the drawer are in volume groups or disk pools that have Drawer Loss Protection, the command succeeds. You do not need to stop host I/O activity or power down the shelf to perform this procedure.
- If any drives in the drawer are in volume groups or disk pools that do not have Drawer Loss Protection, a warning is displayed, indicating that this command could not be completed. To avoid data loss, you must stop all host I/O activity and power down both the drive shelf and the controller shelf before removing the drive drawer.

Steps

1. Determine if the drive shelf is powered on.
 - If the power is off, you do not need to issue the CLI command. Go to [Removing the cable chains](#) on page 5.
 - If the power is on, go to the next step.
2. Type this command on the command line, and press **Enter**:

```
SMcli <ctrl_IP1> -p "array_password" -c "set tray [trayID] drawer [drawerID]
serviceAllowedIndicator=on;"
```

Command	Description
<code><ctrl_IP1></code>	The identifier of the controller.
<code>array_password</code>	The password for the storage array. You must enclose the value for <code>array_password</code> in double quotation marks ("").
<code>[trayID]</code>	The identifier of the drive shelf that contains the drive drawer that you want to replace. Drive shelf ID values are 0 to 99. You must enclose the value for <code>trayID</code> in square brackets.
<code>[drawerID]</code>	The identifier of the drive drawer that you want to replace. Drawer ID values are 1 (top drawer) to 5 (bottom drawer). You must enclose the value for <code>drawerID</code> in square brackets.

Example

This command ensures you can remove the top-most drawer in drive shelf 10:

```
SMcli <ctrl_IP1> -p "safety-1" -c "set tray [10] drawer [1]
serviceAllowedIndicator=forceOnWarning;"
```

3. Determine if you need to stop host I/O activity, as follows:
 - If the command succeeds, you do not need to stop host I/O activity. All drives in the drawer are in volume groups or disk pools that have Drawer Loss Protection. Go to [Removing the cable chains](#) on page 5.

Attention: Possible damage to drives – Wait 30 seconds after the command completes before you open the drive drawer. Waiting 30 seconds allows the drives to spin down, which prevents possible damage to the hardware.

- If a warning is displayed indicating that this command could not be completed, you must stop host I/O activity before removing the drawer. The warning is displayed because one or more drives in the affected drawer are in volume groups or disk pools that do not have Drawer Loss Protection. To avoid losing data, you must complete the next steps to stop host I/O activity and to power off the drive shelf and the controller shelf.

4. Ensure that no I/O operations are occurring between the storage array and all connected hosts. For example, you can perform these steps:

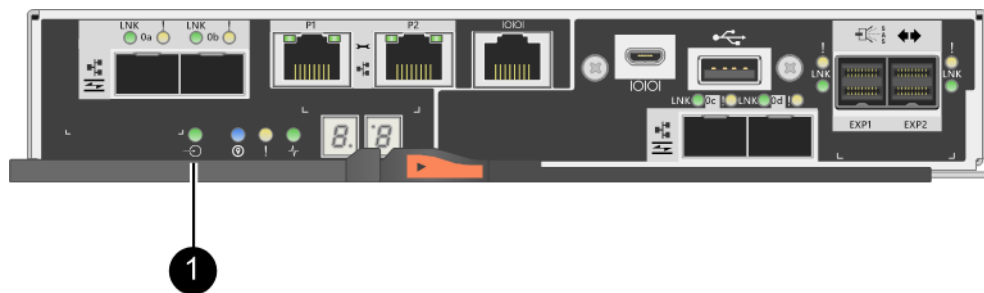
- Stop all processes that involve the LUNs mapped from the storage to the hosts.
- Ensure that no applications are writing data to any LUNs mapped from the storage to the hosts.
- Unmount all file systems associated with volumes on the array.

Note: The exact steps to stop host I/O operations depend on the host operating system and the configuration, which are beyond the scope of these instructions. If you are not sure how to stop host I/O operations in your environment, consider shutting down the host.

Attention: Possible data loss – If you continue this procedure while I/O operations are occurring, the host application might lose data because the storage array will not be accessible.

5. If the storage array participates in a mirroring relationship, stop all host I/O operations on the secondary storage array.
6. Wait for any data in cache memory to be written to the drives.

The green Cache Active LED on the back of each controller is on when cached data needs to be written to the drives. You must wait for this LED to turn off.



Callout	Type of host ports
1	Cache Active LED

7. From the Home page of SANtricity System Manager, select **View Operations in Progress**.
8. Wait for all operations to complete before continuing with the next step.
9. Power off the shelves as follows:

If you are...	Follow these steps...
Replacing a drive drawer in a controller shelf or expansion shelf WITH Drawer Loss Protection	There is NO need to power off any of the shelves. This operation can be done online, because the Set Drawer Service Action Allowed Indicator CLI command completed successfully.
Replacing a drive drawer in a controller shelf without Drawer Loss Protection	<ol style="list-style-type: none"> Turn off both power switches on the controller shelf. Wait for all LEDs on the controller shelf to go dark.

If you are...	Follow these steps...
Replacing a drive drawer in an expansion drive shelf without Drawer Loss Protection	<ol style="list-style-type: none"> a. Turn off both power switches on the controller shelf. b. Wait for all LEDs on the controller shelf to go dark. c. Turn off both power switches on the drive shelf. d. Wait two minutes for drive activity to stop.

Removing the cable chains

Left and right cable chains for each drive drawer in either the E5760 controller shelf, E2860 controller shelf or the DE460C drive shelf allow the drawers to slide in and out. Before you can remove a drive drawer, you must remove both cable chains.

Before you begin

- You have issued the `Set Drawer Attention Indicator` CLI command, or you have stopped host I/O activity and powered off the drive shelf and controller shelf.
- You have obtained the following items:
 - Antistatic protection

Attention: Possible hardware damage – To prevent electrostatic discharge damage to the shelf, use proper antistatic protection when handling shelf components.
 - Flashlight

About this task

Each drive drawer has left and right cable chains. The metal ends on the cable chains slide into corresponding vertical and horizontal guide rails inside the enclosure, as follows:

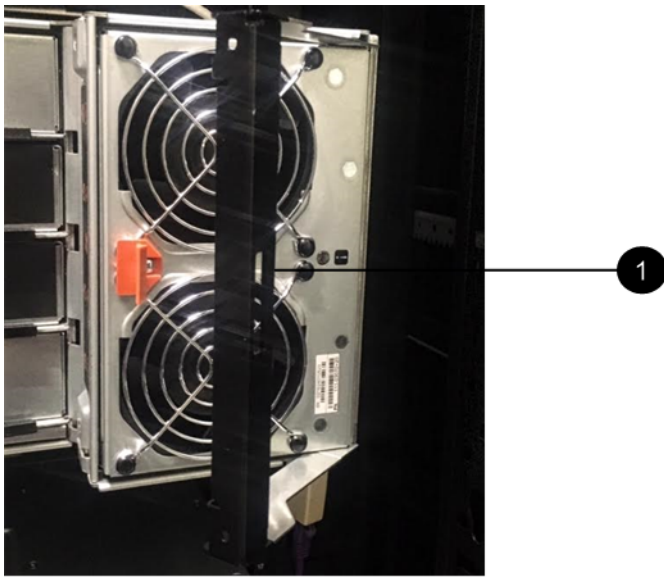
- The left and right vertical guide rails connect the cable chain to the enclosure's midplane.
- The left and right horizontal guide rails connect the cable chain to the individual drawer.

Attention: Possible hardware damage — If you are replacing a drive drawer and the shelf is powered on, you must perform the following instructions:

Steps

1. Put on antistatic protection.
2. From the rear of the drive shelf, remove the right fan canister:
 - a. Press the orange tab to release the fan canister handle.

The figure shows the handle for the fan canister extended and released from the orange tab on the left.



1	fan canister handle
---	---------------------

- b. Using the handle, pull the fan canister out of the drive tray, and set it aside.
- c. If the tray is powered on, ensure that the left fan goes to its maximum speed.

Attention: Possible equipment damage due to overheating – If the tray is powered on, do not remove both fans at the same time. Otherwise, the equipment might overheat.

3. Determine which cable chain to disconnect:

- If the power is on, the amber Attention LED on the front of the drawer indicates the cable chain you need to disconnect.
- If the power is off, you must manually determine which of the five cable chains to disconnect.

The figure shows the right side of the drive shelf with the fan canister removed. With the fan canister removed, you can see the five cable chains and the vertical and horizontal connectors for each drawer. The call outs for drive drawer 1 are provided.



1	Cable chain
2	Vertical connector (connected to the midplane)
3	Horizontal connector (connected to the drive drawer)

The top cable chain is attached to drive drawer 1. The bottom cable chain is attached to drive drawer 5.

4. For easy access, use your finger to move the cable chain on the right side to the left.
5. Disconnect any of the right cable chains from its corresponding vertical guide rail.

Attention: Possible hardware damage — If the drive tray is powered on, the cable chain is energized until both ends are unplugged. To avoid shorting out the equipment, do not allow the unplugged cable chain connector to touch the metal chassis if the other end of the cable chain is still plugged in.

- a. Using a flashlight, locate the orange ring on the end of the cable chain that is connected to the vertical guide rail in the enclosure.



1	Orange ring on the vertical guide rail
2	Cable chain, partially removed

- b. To unlatch the cable chain, insert your finger into the orange ring and press towards the middle of the system.
- c. To unplug the cable chain, carefully pull your finger toward you approximately 1 inch (2.5 cm).

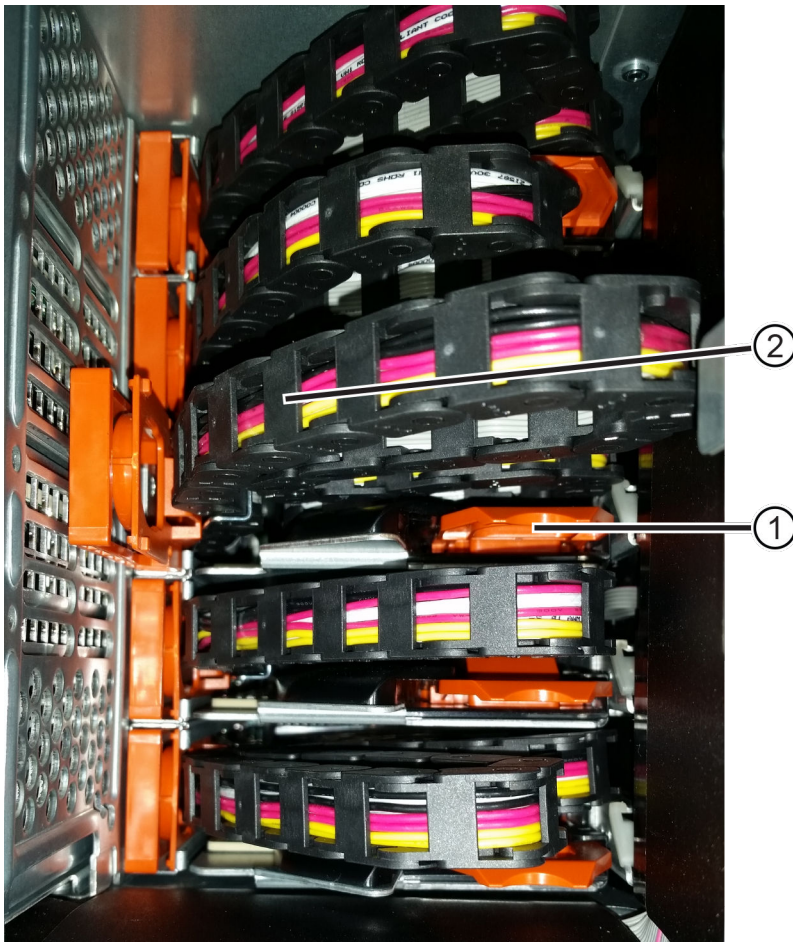
Attention: Leave the cable chain connector within the vertical guide rail.

Attention: Possible hardware damage — If the drive tray is powered on, do not allow the cable chain connector to touch the metal chassis.

6. Disconnect the other end of the cable chain:

- a. Using a flashlight, locate the orange ring on the end of the cable chain that is attached to the horizontal guide rail in the enclosure.

The figure shows the horizontal connector on the right and the cable chain disconnected and partially pulled out on the left side.



1	Orange ring on horizontal guide rail
2	Cable chain, partially removed

- b. To unlatch the cable chain, gently insert your finger into the orange ring and push down.

The figure shows the orange ring on the horizontal guide rail (see item 1 in the figure above) being pushed down so that the rest of the cable chain can be pulled out of the enclosure.

- c. Pull your finger toward you to unplug the cable chain.

7. Carefully pull the entire cable chain out of the drive shelf.

8. Replace the right fan canister:

- a. Slide the fan canister all the way into the shelf.
- b. Move the fan canister handle until it latches with the orange tab.
- c. If the drive shelf is receiving power, confirm that the amber Attention LED on the back of the fan is not illuminated and that air is coming out the back of the fan.

Note: If the power is off, the fans do not run and the LED is not on.

The LED could remain on for as long as a minute after you reinstall the fan while both fans settle into the correct speed.

9. From the back of the drive shelf, remove the left fan canister.
10. If the drive shelf is receiving power, ensure that the right fan goes to its maximum speed.

Attention: Possible equipment damage due to overheating – If the shelf is powered on, do not remove both fans at the same time. Otherwise, the equipment might overheat.

11. Disconnect the left cable chain from its vertical guide rail:

- a. Using a flashlight, locate the orange ring on the end of the cable chain attached to the vertical guide rail.
- b. To unlatch the cable chain, insert your finger into the orange ring.
- c. To unplug the cable chain, pull toward you approximately 1 inch (2.5 cm).

Attention: Leave the cable chain connector within the vertical guide rail.

Attention: Possible hardware damage — If the drive tray is powered on, the cable chain is energized until both ends are unplugged. To avoid shorting out the equipment, do not allow the unplugged cable chain connector to touch the metal chassis if the other end of the cable chain is still plugged in.

12. Disconnect the left cable chain from the horizontal guide rail, and pull the entire cable chain out of the drive shelf.

If you are performing this procedure with the power on, all LEDs go off when you disconnect the last cable chain connector, including the amber Attention LED

13. Replace the left fan canister. If the drive shelf is receiving power, confirm that the amber LED on the back of the fan is not illuminated and that air is coming out the back of the fan.

The LED could remain on for as long as a minute after you reinstall the fan while both fans settle into the correct speed.

Removing a drive drawer

After removing the right and left cable chains, you can remove the drive drawer from the drive shelf. Removing a drive drawer entails sliding the drawer part of the way out, recording the locations of the drives, removing the drives, and removing the drive drawer.

Before you begin

- You have removed the right and left cable chains for the drive drawer.
- You have replaced the right and left fan canisters.
- You have obtained a permanent marker to note the exact location of each drive as you remove the drive from the drawer.

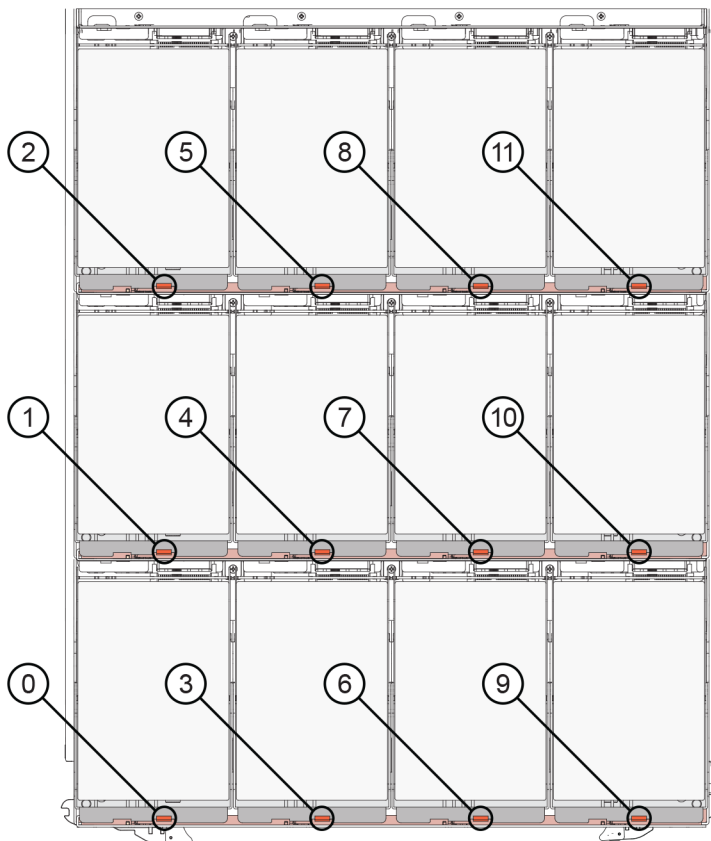
Steps

1. Remove the bezel from the front of the drive shelf.
2. Unlatch the drive drawer by pulling out on both levers.
3. Using the extended levers, carefully pull the drive drawer out until it stops. Do not completely remove the drive drawer from the drive shelf.
4. If volumes have already been created and assigned, use a permanent marker to note the exact location of each drive. For example, using the following drawing as a reference, write the appropriate slot number on the top of each drive.



Attention: Possible loss of data access – Make sure to record the exact location of each drive before removing it.

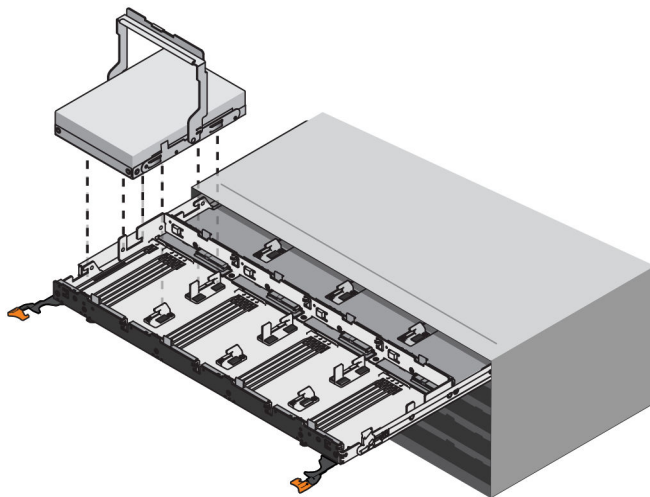
5. Remove the drives from the drive drawer:
 - a. Gently pull back the orange release latch that is visible on the center front of each drive. The following image shows the orange release latch for all 12 drives in a drive drawer.



0	Orange release latch for drive 0
---	----------------------------------

1	Orange release latch for drive 1
2	Orange release latch for drive 2
3	Orange release latch for drive 3
4	Orange release latch for drive 4
5	Orange release latch for drive 5
6	Orange release latch for drive 6
7	Orange release latch for drive 7
8	Orange release latch for drive 8
9	Orange release latch for drive 9
10	Orange release latch for drive 10
11	Orange release latch for drive 11

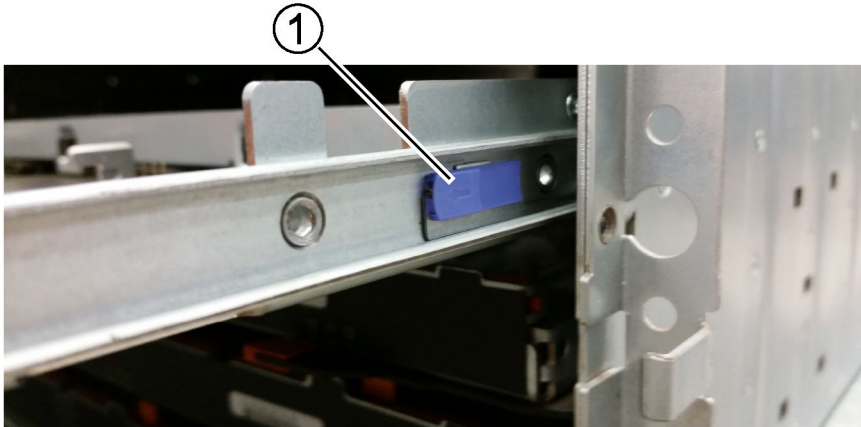
- b. Raise the drive handle to vertical.
- c. Use the handle to lift the drive from the drive drawer.



- d. Place the drive on a flat, static-free surface and away from magnetic devices.

Attention: Possible loss of data access – Magnetic fields can destroy all data on the drive and cause irreparable damage to the drive circuitry. To avoid loss of data access and damage to the drives, always keep drives away from magnetic devices.

6. Remove the drive drawer:
 - a. Locate the plastic release lever on each side of the drive drawer.



1	Drive drawer release lever
---	----------------------------

- b. Disengage both release levers by pulling the latches toward you.
- c. While holding both release levers, pull the drive drawer toward you.
- d. Remove the drive drawer from the drive shelf.

Installing a drive drawer

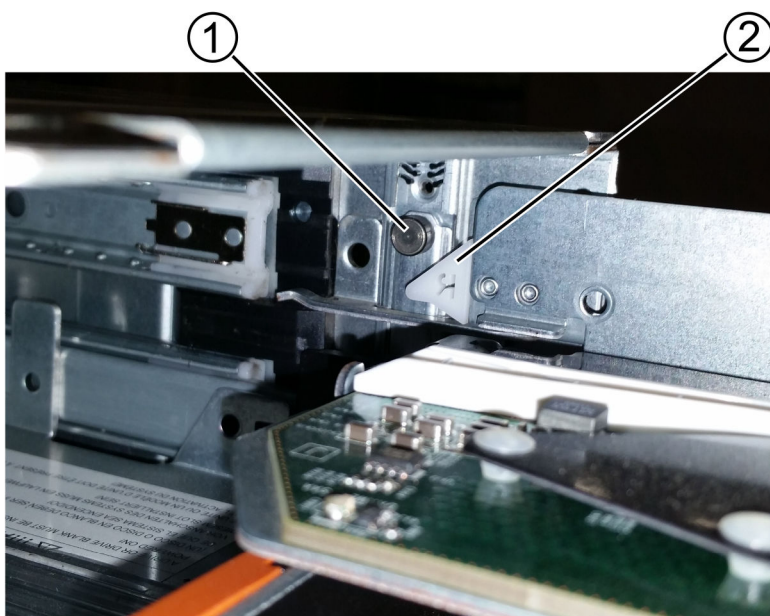
Installing a drive drawer into a drive tray entails sliding the drawer into the empty slot, installing the drives, and replacing the front bezel.

Before you begin

- You know where to install each drive.
- You have obtained the following items:
 - Replacement drive drawer
 - Flashlight

Steps

1. From the front of the drive shelf, shine a flashlight into the empty drawer slot, and locate the lock-out tumbler for that slot.
The lock-out tumbler assembly is a safety feature that prevents you from being able to open more than one drive drawer at one time.



1	Lock-out tumbler
2	Drawer guide

2. Position the replacement drive drawer in front of the empty slot and slightly to the right of center.

Positioning the drawer slightly to the right of center helps to ensure that the lock-out tumbler and the drawer guide are correctly engaged.

3. Slide the drive drawer into the slot, and ensure that the drawer guide slides under the lock-out tumbler.

Attention: Risk of equipment damage – Damage occurs if the drawer guide does not slide under the lock-out tumbler.

4. Carefully push the drive drawer all the way in until the latch fully engages.

Note: Experiencing a higher level of resistance is normal when pushing the drawer closed for the first time.

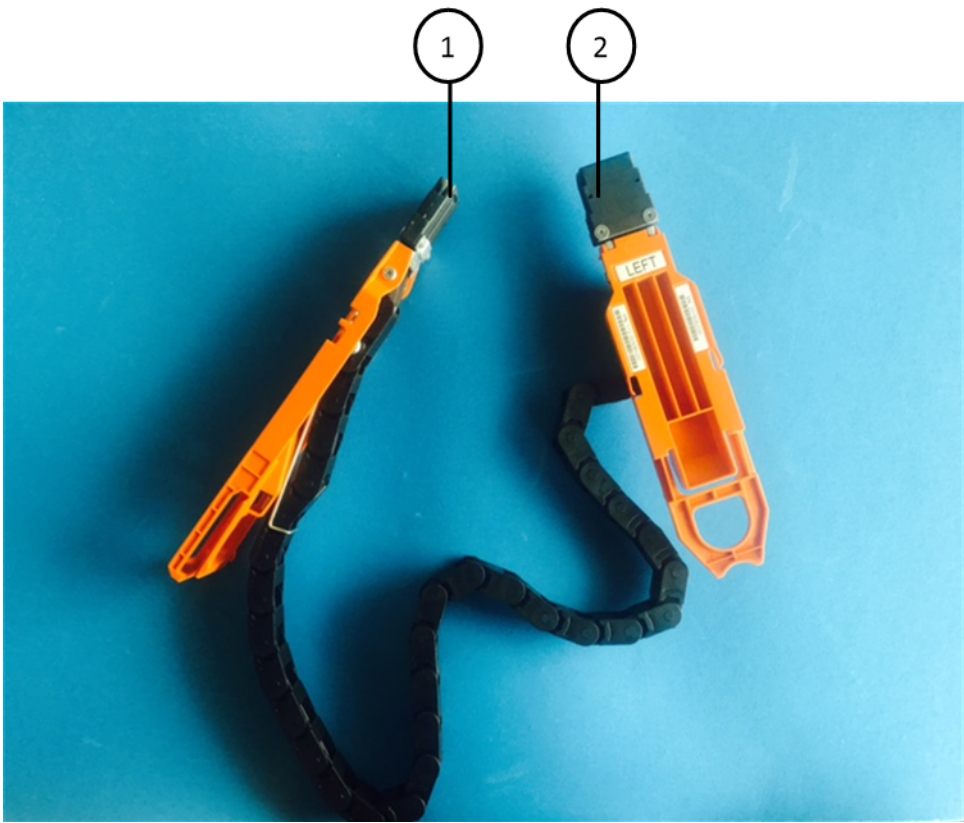
Attention: Risk of equipment damage — Stop pushing the drive drawer if you feel binding. Use the release levers at the front of the drawer to slide the drawer back out. Then, reinsert the drawer into the slot, ensure the tumbler is above the rail, and the rails are aligned correctly.

Attaching the cable chains

When attaching a cable chain, reverse the order you used when disconnecting the cable chain. You must insert the chain's horizontal connector into the horizontal guide rail in the enclosure before inserting the chain's vertical connector into the vertical guide rail in the enclosure.

Before you begin

- You have replaced the drive drawer and all of the drives.
- You have two replacement cable chains, marked as LEFT and RIGHT (on the horizontal connector next to the drive drawer).



Callout	Cable chain	Connector	Connects to
1	Left	Vertical	Midplane
2		Horizontal	Drive drawer



Callout	Cable chain	Connector	Connects to
1	Right	Horizontal	Drive drawer
2		Vertical	Midplane

Steps

1. From the back of the drive shelf, remove the fan canister on the right side, and set it aside.
2. If the shelf is powered on, ensure that the left fan goes to its maximum speed.
Attention: Possible equipment damage due to overheating – If the shelf is powered on, do not remove both fans at the same time. Otherwise, the equipment might overheat.

3. Attach the right cable chain:

- a. Locate the horizontal and vertical connectors on the right cable chain and the corresponding horizontal guide rail and vertical guide rail inside the enclosure.
- b. Align both cable chain connectors with their corresponding guide rails.
- c. Slide the cable chain's horizontal connector onto the horizontal guide rail, and push it in as far as it can go.

The figure shows the horizontal and vertical guide rails for the second drive drawer in the enclosure.



1	Horizontal guide rail
2	Vertical guide rail

Attention: Risk of equipment malfunction — Make sure to slide the connector into the guide rail. If the connector rests on the top of the guide rail, problems might occur when the system runs.

- d. Slide the vertical connector on the right cable chain into the vertical guide rail.
- e. After you have reconnected both ends of the cable chain, carefully pull on the cable chain to verify that both connectors are latched.

Attention: Risk of equipment malfunction — If the connectors are not latched, the cable chain might come loose during drawer operation.

- 4. Reinstall the right fan canister. If the drive shelf is receiving power, confirm that the amber LED on the back of the fan is now off and that air is now coming out of the back.

The LED could remain on for as long as a minute after you reinstall the fan while the fan settles into the correct speed.

- 5. From the back of the drive shelf, remove the fan canister on the left side of the shelf.
- 6. If the shelf is powered on, ensure that the right fan goes to its maximum speed.

Attention: Possible equipment damage due to overheating – If the shelf is powered on, do not remove both fans at the same time. Otherwise, the equipment might overheat.

7. Reattach the left cable chain:

- a. Locate the horizontal and vertical connectors on the cable chain and their corresponding horizontal and vertical guide rails inside the enclosure.
- b. Align both cable chain connectors with their corresponding guide rails.
- c. Slide the cable chain's horizontal connector into the horizontal guide rail and push it in as far as it will go.

Attention: Risk of equipment malfunction — Make sure to slide the connector within the guide rail. If the connector rests on the top of the guide rail, problems might occur when the system runs.

- d. Slide the vertical connector on the left cable chain into the vertical guide rail.
- e. After you reconnect both ends of the cable chain, carefully pull on the cable chain to verify that both connectors are latched.

Attention: Risk of equipment malfunction — If the connectors are not latched, the cable chain might come loose during drawer operation.

8. Reinstall the left fan canister. If the drive shelf is receiving power, confirm that the amber LED on the back of the fan is now off and that air is now coming out of the back.

The LED could remain on for as long as a minute after you reinstall the fan while both fans settle into the correct speed.

Reinstalling the drives

After inserting a drive drawer for replacement, reinsert the drives and replace the front bezel in the correct order.

Before you begin

- You know where to install each drive.
- You have already replaced the drive drawer.
- The new drawer cables have been installed.

Steps

1. Reinstall the drives in the drive drawer:

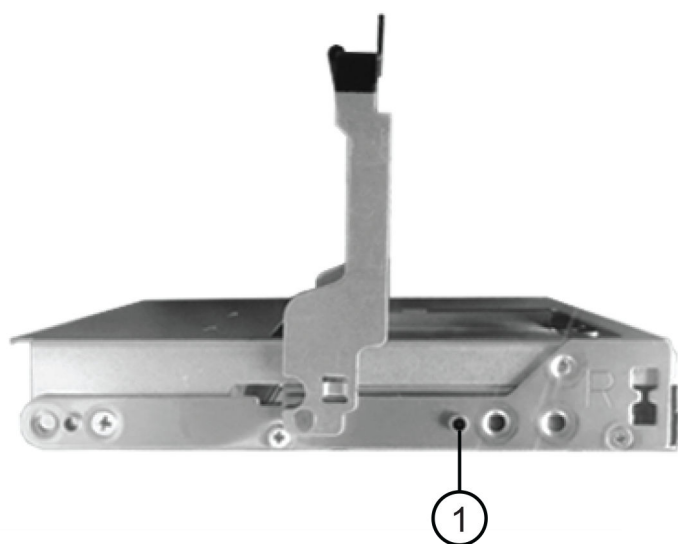
- a. Unlatch the drive drawer by pulling out on both levers at the front of the drawer.
- b. Using the extended levers, carefully pull the drive drawer out until it stops. Do not completely remove the drive drawer from the drive shelf.
- c. Determine which drive to install in each slot by using the notes you made when removing the drives.

Attention: Possible loss of data access – You must install each drive in its original location in the drive drawer.



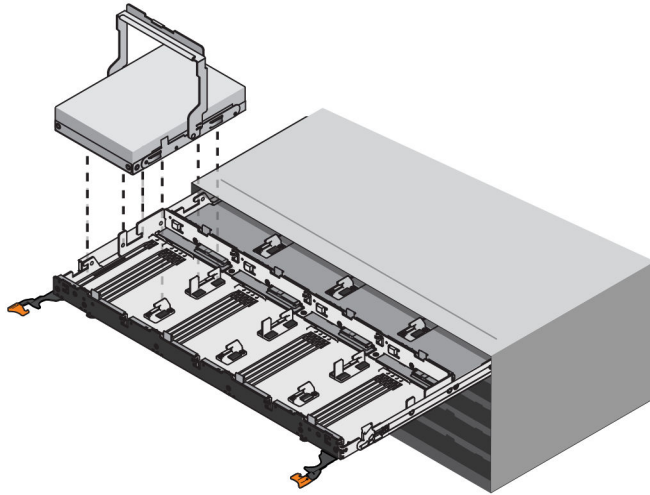
- d. Raise the handle on the drive to vertical.
- e. Align the two raised buttons on each side of the drive with the notches on the drawer.

The figure shows the right side view of a drive, showing the location of the raised buttons.



1	Raised button on the right side of the drive.
---	---

- f. Lower the drive straight down, making sure the drive is pressed all the way down into the bay, and then rotate the drive handle down until the drive snaps into place.



g. Repeat these steps to install all of the drives.

2. Slide the drawer back into the drive shelf by pushing it from the center and closing both levers.

Attention: Risk of equipment malfunction – Make sure to completely close the drive drawer by pushing both levers. You must completely close the drive drawer to allow proper airflow and prevent overheating.

3. Attach the bezel to the front of the drive shelf.
4. If you have powered down one or more shelves, reapply power:

If you...	Follow these steps...
Replaced a drive drawer in a controller shelf without Drawer Loss Protection	<ol style="list-style-type: none"> a. Turn on both power switches on the controller shelf. b. Wait 10 minutes for the power-on process to complete. c. Confirm that both fans come on and that the amber LED on the back of the fans is off.
Replaced a drive drawer in an expansion drive shelf without Drawer Loss Protection	<ol style="list-style-type: none"> a. Turn on both power switches on the drive shelf. b. Confirm that both fans come on and that the amber LED on the back of the fans is off. c. Wait two minutes before applying power to the controller shelf. d. Turn on both power switches on the controller shelf. e. Wait 10 minutes for the power-on process to complete. f. Confirm that both fans come on and that the amber LED on the back of the fans is off.

Copyright information

Copyright © 1994–2017 NetApp, Inc. All rights reserved. Printed in the U.S.

No part of this document covered by copyright may be reproduced in any form or by any means—graphic, electronic, or mechanical, including photocopying, recording, taping, or storage in an electronic retrieval system—without prior written permission of the copyright owner.

Software derived from copyrighted NetApp material is subject to the following license and disclaimer:

THIS SOFTWARE IS PROVIDED BY NETAPP "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY DISCLAIMED. IN NO EVENT SHALL NETAPP BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

NetApp reserves the right to change any products described herein at any time, and without notice. NetApp assumes no responsibility or liability arising from the use of products described herein, except as expressly agreed to in writing by NetApp. The use or purchase of this product does not convey a license under any patent rights, trademark rights, or any other intellectual property rights of NetApp.

The product described in this manual may be protected by one or more U.S. patents, foreign patents, or pending applications.

RESTRICTED RIGHTS LEGEND: Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.277-7103 (October 1988) and FAR 52-227-19 (June 1987).

Trademark information

Active IQ, AltaVault, Arch Design, ASUP, AutoSupport, Campaign Express, Clustered Data ONTAP, Customer Fitness, Data ONTAP, DataMotion, Element, Fitness, Flash Accel, Flash Cache, Flash Pool, FlexArray, FlexCache, FlexClone, FlexPod, FlexScale, FlexShare, FlexVol, FPolicy, Fueled by SolidFire, GetSuccessful, Helix Design, LockVault, Manage ONTAP, MetroCluster, MultiStore, NetApp, NetApp Insight, OnCommand, ONTAP, ONTAPI, RAID DP, RAID-TEC, SANscreen, SANshare, SANtricity, SecureShare, Simplicity, Simulate ONTAP, Snap Creator, SnapCenter, SnapCopy, SnapDrive, SnapIntegrator, SnapLock, SnapManager, SnapMirror, SnapMover, SnapProtect, SnapRestore, Snapshot, SnapValidator, SnapVault, SolidFire, SolidFire Helix, StorageGRID, SyncMirror, Tech OnTap, Unbound Cloud, and WAFL and other names are trademarks or registered trademarks of NetApp, Inc., in the United States, and/or other countries. All other brands or products are trademarks or registered trademarks of their respective holders and should be treated as such. A current list of NetApp trademarks is available on the web.

<http://www.netapp.com/us/legal/netapptmlist.aspx>

How to send comments about documentation and receive update notifications

You can help us to improve the quality of our documentation by sending us your feedback. You can receive automatic notification when production-level (GA/FCS) documentation is initially released or important changes are made to existing production-level documents.

If you have suggestions for improving this document, send us your comments by email.

docomments@netapp.com

To help us direct your comments to the correct division, include in the subject line the product name, version, and operating system.

If you want to be notified automatically when production-level documentation is released or important changes are made to existing production-level documents, follow Twitter account @NetAppDoc.

You can also contact us in the following ways:

- NetApp, Inc., 495 East Java Drive, Sunnyvale, CA 94089 U.S.
- Telephone: +1 (408) 822-6000

- Fax: +1 (408) 822-4501
- Support telephone: +1 (888) 463-8277