



# Volumes

## System Manager Classic

NetApp  
January 13, 2022

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# Volumes

You can use System Manager to create, edit, and delete volumes.

You can access all the volumes in the cluster by using the Volumes tab or you can access the volumes specific to an SVM by using **SVMs > Volumes**.



The Volumes tab is displayed only if you have enabled the CIFS and NFS licenses.

## Related information

[ONTAP concepts](#)

[Logical storage management](#)

## Editing volume properties

You can modify volume properties such as the volume name, security style, fractional reserve, and space guarantee by using System Manager. You can modify storage efficiency settings (deduplication schedule, deduplication policy, and compression) and space reclamation settings.

### Before you begin

For enabling volume encryption, you must have installed the volume encryption license by using System Manager, and you must have enabled “key-manager setup” by using the command-line interface (CLI). You must refresh your web browser after enabling “key-manager setup”.

### About this task

- You can set the fractional reserve to either zero percent or 100 percent.
- Data compression is not supported on 32-bit volumes.
- For Data ONTAP 8.3.1 clusters, you can enable both inline compression and background compression for Cloud Volumes ONTAP for AWS (AWS).

Compression is not supported for Data ONTAP Edge.

- You cannot rename a SnapLock Compliance volume.

### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select the storage virtual machine (SVM) in which the volume that you want to edit resides.
3. Select the volume that you want to modify, and then click **Edit**.

The Edit Volume dialog box is displayed.

4. In the **General** tab, modify the following properties as required:
  - Change the volume name
  - Enable volume encryption

This option is available only if you have enabled the Volume Encryption license and if the corresponding platform supports encryption. You can perform key-manager set up from the CLI.

- Change the security style of the volume
- Enable or disable thin provisioning

5. Click the **Storage Efficiency** tab, and enable storage efficiency by configuring the following properties:

- Deduplication
- Data compression You cannot enable background compression for a volume that is contained by an aggregate with All Flash Optimized personality. You can enable only inline compression for these volumes.

You can enable inline deduplication only on a volume that is contained by an aggregate with All Flash Optimized personality or on a volume in a Flash Pool aggregate.

6. For SnapLock volumes, click the **SnapLock** tab, and perform the following steps:

a. Specify the autocommit period.

The autocommit period determines how long a file in the volume must remain unchanged before the file is committed to WORM state.

b. Specify the minimum retention period and maximum retention period.

The values must be in the range of 1 day through 70 years or Infinite.

c. Select the default retention period.

The default retention period must be within the specified minimum retention period and maximum retention period.

7. Click the **Advanced** tab, and enable the following properties:

- If you want the volume to automatically grow when the used space in the volume is above the grow threshold, select **Grow**.
- If you want the volume to grow or shrink in size in response to the amount of used space, select **Grow or Shrink**.

a. Specify the maximum size to which the volume can grow.

◦ Enable automatic deletion of older Snapshot copies by choosing one of the following options:

▪ Try

Deletes the Snapshot copies that are not locked by any other subsystems.

▪ Destroy

Deletes the Snapshot copies that are locked by the data-backing functionality.

▪ Disrupt

Deletes the Snapshot copies that can disrupt the data transfer.

◦ Select the caching policy that you want to assign to the volume.

This option is available only for FlexVol volumes in a Flash Pool aggregate.

- Select the retention priority for cached data in the volume.

This option is available only for FlexVol volumes in a Flash Pool aggregate.

- Specify the fractional reserve that you want to set for the volume.
- Update the access time for reading the file.

This option is disabled for SnapLock volumes.

8. Click **Save and Close**.

## Related information

[Volumes window](#)

[Setting up CIFS](#)

## Editing data protection volumes

You can use System Manager to modify the volume name for a data protection (DP) volume. If the source volume does not have storage efficiency enabled, you might want to enable storage efficiency only on the destination volume.

### About this task

You cannot modify storage efficiency on a mirror DP volume.

### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select the storage virtual machine (SVM) in which the DP volume that you want to edit resides.
3. Select the volume that you want to modify, and then click **Edit**.
4. In the **Edit Data Protection Volume** dialog box, modify the volume name.
5. Ensure the **Enable Storage Efficiency** option is selected.

If storage efficiency is already enabled on the volume, then the check box is selected by default.

6. Click the **Advanced** tab, and perform the following steps:
  - a. Select the caching policy that you want to assign to the volume.
  - b. Select the retention priority for the cached data in the volume.

These options are available only for data protection FlexVol volumes in a Flash Pool aggregate.

7. Click **Save**.

## Deleting volumes

You can use System Manager to delete a FlexVol volume when you no longer require the data that a volume contains or if you have copied the data that a volume contains to another location. When you delete a volume, all the data in the volume is destroyed, and

you cannot recover that data.

### Before you begin

The following conditions must exist before you delete a FlexVol volume:

- The volume must be unmounted and must be in the offline state.
- FlexClone volumes must be either split from the parent volume or destroyed if the FlexVol volume is cloned.
- The SnapMirror relationships must be deleted if the volume is in one or more SnapMirror relationships.

### About this task

You should be aware of the following limitations when deleting a FlexVol volume:

- You can delete a complete SnapLock Enterprise volume or a file in a SnapLock Enterprise volume; however, you cannot delete only the data within a file in a SnapLock Enterprise volume.
- You cannot delete a SnapLock Compliance volume if data is committed to the volume.
- If the FlexVol contains both qtrees and volumes, the qtrees appear as directories. You should be careful to not delete the qtrees accidentally when deleting volumes.
- If you have associated FlexCache volumes with an origin volume, then you must delete the FlexCache volumes before you can delete the origin volume.

### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select the storage virtual machine (SVM) in which the volume that you want to delete resides.
3. Select the volumes that you want to delete.
4. [NOTE]

Verify that you have selected the correct volumes that you want to delete. When you delete a volume, all the data in the volume is destroyed, and you cannot recover that data.

+ Click **Delete**.

1. Select the confirmation check box, and then click **Delete**.

### Related information

[Volumes window](#)

## Create FlexClone volumes

You can use System Manager to create a FlexClone volume when you require a writable, point-in-time copy of an existing FlexVol volume. You might want to create a copy of a volume for testing or to provide access to the volume for additional users without giving them access to the production data.

### Before you begin

- The FlexClone license must be installed on the storage system.
- The volume that you want to clone must be online and must be a non-root volume.

### About this task

The base Snapshot copy that is used to create a FlexClone volume of a SnapMirror destination is marked as busy and cannot be deleted. If a FlexClone volume is created from a Snapshot copy that is not the most recent Snapshot copy, and that Snapshot copy no longer exists on the source volume, all SnapMirror updates to the destination volume fail.

### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the FlexVol volume that you want to clone from the list of volumes.
4. Click **More Actions > Clone > Create > Volume**.
5. Type the name of the FlexClone volume that you want to create.
6. If you want to enable thin provisioning for the new FlexClone volume, select **Thin Provisioning**.

By default, this setting is the same as that of the parent volume.

7. Create a Snapshot copy or select an existing Snapshot copy that you want to use as the base Snapshot copy for creating the FlexClone volume.
8. Click **Clone**.

### Related information

[Volumes window](#)

## Create FlexClone files

You can use System Manager to create a FlexClone file, which is a writable copy of a parent file. You can use these copies to test applications.

### Before you begin

- The file that is cloned must be part of the active file system.
- The FlexClone license must be installed on the storage system.

### About this task

- FlexClone files are supported only for FlexVol volumes.

You can create a FlexClone file of a parent file that is within a volume by accessing the parent file from the volume in which it resides, not from the parent volume.

- You cannot create a FlexClone file on a SnapLock volume.

### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the volume in which you want to create a FlexClone file from the list of volumes.



4. Click **More Actions > Clone > Create > File**.
5. In the **Create FlexClone File** dialog box, select the file that you want to clone, and then specify a name for the FlexClone file.
6. Click **Clone**.

### Results

The FlexClone file is created in the same volume as the parent file.

### Related information

[Volumes window](#)

## Splitting a FlexClone volume from its parent volume

If you want a FlexClone volume to have its own disk space instead of using the disk space of its parent volume, you can split the volume from its parent by using System Manager. After the split, the FlexClone volume becomes a normal FlexVol volume.

### Before you begin

The FlexClone volume must be online.

### About this task

For systems that are *not* AFF systems, the clone-splitting operation deletes all of the existing Snapshot copies of the clone. The Snapshot copies that are required for SnapMirror updates are also deleted. Therefore, any subsequent SnapMirror updates might fail.

You can pause the clone-splitting operation if you have to perform any other operation on the volume. You can resume the clone-splitting process after the other operation is complete.

### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the FlexClone volume that you want to split from its parent volume.
4. Click **More Actions > Clone > Split**.
5. Confirm the FlexClone volume details for the clone-splitting operation, and then click **Start Split** in the confirmation dialog box.

### Related information

[Volumes window](#)

## Viewing the FlexClone volume hierarchy

You can use System Manager to view the hierarchy of FlexClone volumes and their parent volumes.

### Steps

1. Click **Storage > Volumes**.

2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the required volume from the list of volumes.
4. Click **More Actions > Clone > View Hierarchy**.

### Results

Volumes that have at least one child FlexClone volume are displayed. The FlexClone volumes are displayed as children of their respective parent volumes.

### Related information

[Volumes window](#)

## Changing the status of a volume

You can use System Manager to change the status of a FlexVol volume when you want to take a volume offline, bring a volume back online, or restrict access to a volume.

### Before you begin

- If you want a volume to be the target of a volume copy operation or a SnapMirror replication operation, the volume must be in the restricted state.
- If you want to take a NAS volume offline, the NAS volume must be unmounted.

### About this task

You can take a volume offline to perform maintenance on the volume, to move the volume, or to destroy the volume. When a volume is offline, the volume is unavailable for read or write access by clients. You cannot take a root volume offline.

### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the volume for which you want to modify the status.
4. From the **More Actions > Change status to** menu, select the required volume status.
5. Click **Ok** in the confirmation dialog box to change the volume status.

### Related information

[Volumes window](#)

## Viewing the list of saved Snapshot copies

You can use System Manager to view the list of all of the saved Snapshot copies for a selected volume from the Snapshot Copies tab in the lower pane of the Volumes window. You can use the list of saved Snapshot copies to rename, restore, or delete a Snapshot copy.

### Before you begin

The volume must be online.

### About this task

You can view Snapshot copies for only one volume at a time.

### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Click the plus sign (+) next to the volume for which you want to view saved Snapshot copies.
4. Click the **Show More Details** link to view more information about the volume.
5. Click the **Snapshot Copies** tab.

The list of available Snapshot copies for the selected volume is displayed.

## Create Snapshot copies outside a defined schedule

You can use System Manager to create a Snapshot copy of a volume outside a defined schedule to capture the state of the file system at a specific point in time.

### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the volume from the list of volumes.
4. Click **More Actions > Manage Snapshots > Create**.
5. In the **Create Snapshot Copy** dialog box, if you want to change the default name, specify a new name for the Snapshot copy.

Valid characters are ASCII characters, numerals, hyphens (-), underscores (\_), periods (.), and the plus (+) symbol.

The default name of a Snapshot copy consists of the volume name and the timestamp.

6. Click **Create**.
7. Verify that the Snapshot copy that you created is included in the list of Snapshot copies in the **Snapshot Copies** tab.

### Related information

[Volumes window](#)

## Setting the Snapshot copy reserve

You can use System Manager to reserve space (measured as a percentage) for the Snapshot copies in a volume. By setting the Snapshot copy reserve, you can allocate enough disk space for the Snapshot copies so that they do not consume the active file system space.

### About this task

The default space that is reserved for Snapshot copies is 5 percent for SAN and VMware volumes.

## Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the volume for which you want to set the Snapshot copy reserve.
4. Click **More Actions > Manage Snapshots > Configuration Settings**.
5. Type or select the percentage of volume space that you want to reserve for the Snapshot copies, and then click **OK**.

## Related information

[Volumes window](#)

# Hiding the Snapshot copy directory

You can use System Manager to hide the Snapshot copy directory (`.snapshot`) so that the Snapshot copy directory is not visible when you view your volume directories. By default, the `.snapshot` directory is visible.

## Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the volume for which you want hide the Snapshot copy directory.
4. Click **More Actions > Manage Snapshots > Configuration Settings**.
5. Ensure that the **Make snapshot directory (.snapshot) visible** option is not selected, and then click **OK**.

## Related information

[Volumes window](#)

# Scheduling automatic creation of Snapshot copies

You can use System Manager to set up a schedule for the automatic creating automatic Snapshot copies of a volume. You can specify the time and frequency of creating the copies. You can also specify the number of Snapshot copies that are saved.

## Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the required volume from the list of volumes.
4. Click **More Actions > Manage Snapshots > Configuration Settings**.
5. In the **Configure Volume Snapshot Copies** dialog box, select **Enable scheduled Snapshot Copies**.
6. Select a Snapshot policy.

You can schedule the creation of only policy-based Snapshot copies.

7. Click **OK** to save your changes and start your Snapshot copy schedule.

## Related information

[Volumes window](#)

# Restoring a volume from a Snapshot copy

You can use System Manager to restore a volume to a state that is recorded in a previously created Snapshot copy to retrieve lost information. When you restore a volume from a Snapshot copy, the restore operation overwrites the existing volume configuration. Any changes that were made to the data in the volume after the Snapshot copy was created are lost.

## Before you begin

- The SnapRestore license must be installed on your system.
- If the FlexVol volume that you want to restore contains a LUN, the LUN must be unmounted or unmapped.
- There must be enough space available for the restored volume.
- Users accessing the volume must be notified that you are going to revert a volume, and that the data from the selected Snapshot copy replaces the current data in the volume.

## About this task

- If the volume that you restore contains junction points to other volumes, the volumes that are mounted on these junction points will not be restored.
- You cannot restore Snapshot copies for SnapLock Compliance volumes.

## Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the volume that you want to restore from a Snapshot copy.
4. Click **More Actions > Manage Snapshots > Restore**.
5. Select the appropriate Snapshot copy, and then click **Restore**.
6. Select the confirmation check box, and then click **Restore**.

## Related information

[Volumes window](#)

# Extending the expiry date of Snapshot copies

You can use System Manager to extend the expiry date of the Snapshot copies in a volume.

## Before you begin

The SnapLock license must be installed on your system.

## About this task

You can extend the expiry date only for Snapshot copies in a data protection (DP) volume that is the destination in a SnapLock for SnapVault relationship.

### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select a volume.
4. Click **Show More Details** to view more information about the volume.
5. Click the **Snapshot Copies** tab.

The list of available Snapshot copies for the selected volume is displayed.

6. Select the Snapshot copy that you want to modify, and then click **Extend Expiry Date**.
7. In the **Extend Expiry Date** dialog box, specify the expiry date.

The values must be in the range of 1 day through 70 years or Infinite.

8. Click **OK**.

## Renaming Snapshot copies

You can use System Manager to rename a Snapshot copy to help you organize and manage your Snapshot copies.

### About this task

You cannot rename the Snapshot copies (which are committed to the WORM state) of a SnapLock DP volume that is in a SnapVault relationship.

### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Click the required volume.
4. Click the **Show More Details** link to view more information about the volume.
5. Click the **Snapshot Copies** tab.

The list of available Snapshot copies for the selected volume is displayed.

6. Select the Snapshot copy that you want to rename, and then click **More Actions > Rename**.
7. Specify a new name, and then click **Rename**.

Valid characters are ASCII characters, numerals, hyphens (-), underscores (\_), periods (.), and the plus (+) symbol.

8. Verify the Snapshot copy name in the **Snapshot Copies** tab of the **Volumes** window.

### Related information

[Volumes window](#)

# Deleting Snapshot copies

You can delete a Snapshot copy to conserve disk space or to free disk space by using System Manager. You can also delete a Snapshot copy if the Snapshot copy is no longer required.

## Before you begin

If you want to delete a Snapshot copy that is busy or locked, you must have released the Snapshot copy from the application that was using the Snapshot copy.

## About this task

- You cannot delete the base Snapshot copy in a parent volume if a FlexClone volume is using that Snapshot copy.

The base Snapshot copy is the Snapshot copy that is used to create a FlexClone volume. The base Snapshot copy always displays the status `busy` and Application Dependency as `busy, vclone` in the parent volume.

- You cannot delete a locked Snapshot copy that is used in a SnapMirror relationship.

The Snapshot copy is locked and is required for the next update.

- You cannot delete a Snapshot copy from a SnapLock DP volume that is used in a SnapVault relationship before the expiry time of the Snapshot copy.
- You cannot delete the unexpired Snapshot copies (which are committed to WORM state) of a SnapLock DP volume that is in a SnapVault relationship.

## Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Expand the required volume.
4. Click the **Show More Details** link to view more information about the volume.
5. Click the **Snapshot Copies** tab.

The list of available Snapshot copies for the selected volume is displayed.

6. Select the Snapshot copy that you want to delete.
7. Click **Delete**.
8. Select the confirmation check box, and then click **Delete**.

## Related information

[Volumes window](#)

[ONTAP 9 Documentation Center](#)

# Resizing volumes

When a volume reaches nearly full capacity, you can increase the size of the volume,

delete some Snapshot copies, or adjust the Snapshot reserve. You can use the Volume Resize wizard in System Manager to provide more free space.

#### About this task

- For a volume that is configured to grow automatically, you can modify the limit to which the volume can grow automatically based on the increased size of the volume.
- You cannot resize a data protection volume if its mirror relationship is broken or if a reverse resynchronization operation has been performed on the volume.

Instead, you must use the command-line interface (CLI).

#### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the volume that you want to resize.
4. Click **More Actions > Resize**.
5. Type or select information as prompted by the wizard.
6. Confirm the details, and then click **Finish** to complete the wizard.
7. Verify the changes that you made to the available space and the total space of the volume in the **Volumes** window.

#### Related information

[Volumes window](#)

## Enabling storage efficiency on a volume

You can use System Manager to enable storage efficiency and to configure both deduplication and data compression or only deduplication on a volume to save storage space. If you have not enabled storage efficiency when you created the volume, you can do so later by editing the volume.

#### Before you begin

- The volume must be online.
- If you want to use a policy-based deduplication schedule, you must have created an efficiency policy.

#### About this task

- You can enable background compression only if you have enabled background deduplication.
- You can enable inline compression and inline deduplication with or without enabling background compression and background deduplication, respectively.
- You can enable inline deduplication only on volumes that are contained by an aggregate with All Flash Optimized personality and on volumes that are contained by a Flash Pool aggregate.
- Starting with System Manager 9.6, editing storage efficiency is supported for FlexGroup DP volumes.

#### Steps

1. Click **Storage > Volumes**.



2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the volume for which you want to enable storage efficiency, and then click **Edit**.
4. In the **Edit Volume** dialog box, click **Storage Efficiency**.
5. Select the **Background Deduplication** check box.
6. Select one of the following methods to run deduplication:

If you want to run deduplication...	Then...
Based on a storage efficiency policy	<ol style="list-style-type: none"> <li>a. Ensure that the <b>Policy based</b> option is selected.</li> <li>b. Click <b>Choose</b>, and then select a storage efficiency policy.</li> <li>c. Click <b>OK</b>.</li> </ol>
When required	Select the <b>On-demand</b> option.

7. Select the **Background Compression** check box to enable background compression.

You cannot enable background compression for a volume that is contained by an aggregate with All Flash Optimized personality.

8. Select the **Inline Compression** check box to compress data while it is being written to the volume.

By default, inline compression is enabled on volumes that are contained by an aggregate with All Flash Optimized personality.

9. Select the **Inline Deduplication** check box to run deduplication before data is written to the disk.

By default, inline deduplication is enabled on volumes that are contained by an aggregate with All Flash Optimized personality.

10. Click **Save and Close**.

## Related information

[Volumes window](#)

## Changing the deduplication schedule

You can use System Manager to change the deduplication schedule by choosing to run deduplication manually, automatically, or on a schedule that you specify.

### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the read/write volume for which you want to modify the deduplication schedule.
4. Click **Edit**, and then click the **Storage Efficiency** tab.

5. Change the deduplication schedule as required.
6. Click **Save and Close**.

#### Related information

[Volumes window](#)

## Running deduplication operations

You can use System Manager to run deduplication immediately after creating a FlexVol volume or to schedule deduplication to run at a specified time.

#### Before you begin

- Deduplication must be enabled on the volume.
- The volume must be online and mounted.

#### About this task

Deduplication is a background process that consumes system resources during the operation; therefore, it might affect other operations that are in progress. You must cancel deduplication before you can perform any other operation.

#### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the volume for which you want to run deduplication.
4. Click **More Actions > Storage Efficiency**.
5. If you are running deduplication on the volume for the first time, run deduplication on the entire volume data by selecting **Scan Entire Volume** in the **Storage Efficiency** dialog box.
6. Click **Start**.
7. View the last-run details of the deduplication operation in the **Storage Efficiency** tab of the **Volumes** window.

#### Related information

[Volumes window](#)

## Moving FlexVol volumes between aggregates or nodes

You can nondisruptively move a FlexVol volume to a different aggregate or a different node for capacity utilization and improved performance by using System Manager.

#### Before you begin

If you are moving a data protection (DP) volume, the data protection mirror relationships must be initialized before you move the volume.

#### About this task

You cannot move SnapLock volumes between aggregates and nodes.

## Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the volume that you want to move.
4. Click **More Actions > Move**.
5. In the **Move Volume** dialog box, select the destination aggregate or node for the volume, and then change the tiering policy.



- You cannot change the tiering policy of a root volume.
- You cannot move the root volume to FabricPool.
- For read/write volumes, you can set the tiering policy as “back up” during the volume move.

The tiering policy changes to “snapshot-only” after the move.

- Capacity tier values that are displayed in the “Used After Move” in both the source aggregate and destination aggregate are estimated values.

For the exact values, you must navigate to the Aggregate window and view the details of a specific aggregate.

6. Click **Move**.

## Manually triggering the cutover for volume move

For a volume move operation, you can use System Manager to manually trigger the cutover when the volume enters the cutover deferred phase. You can set the duration of the cutover and the cutover action to be performed by the system if the operation fails within that duration.

### Steps

1. Click **Storage > SVMs**.
2. Select the SVM, and then click **SVM Settings**.
3. Click the **Volumes** tab.
4. Expand the volume for which the volume move operation has been initiated.
5. Click the **Show More Details** link to view more information about the volume.
6. In the **Overview** tab, click **Cutover**.
7. In the **Cutover** dialog box, click **Advanced Options**.
8. Specify the cutover action and the cutover window period.
9. Click **OK**.

## Assigning volumes to Storage QoS

You can limit the throughput of FlexVol volumes and FlexGroup volumes by assigning them to storage Quality of Service (QoS) policy groups. You can assign storage QoS for

new volumes, or you can modify the storage QoS details of the volumes that are already assigned to a policy group by using System Manager.

#### About this task

- You can assign storage QoS only to read/write (rw) volumes that are online.
- You cannot assign storage QoS to a volume if the following storage objects are assigned to a policy group:
  - Parent storage virtual machine (SVM) of the volume
  - Child LUNs of the volume
  - Child files of the volume
- You can assign storage QoS or modify the QoS details for a maximum of 10 volumes simultaneously.

#### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select one or more volumes for which you want to assign storage QoS.
4. Click **More Actions > Storage QoS**.
5. In the **Quality of Service Details** dialog box, select the **Manage Storage Quality of Service** check box if you want to manage the workload performance of the FlexVol volume.

If some of the volumes that you selected are already assigned to a policy group, the changes that you make might affect the performance of these volumes.

6. Create a new storage QoS policy group or select an existing policy group to control the input/output (I/O) performance of the FlexVol volume:

If you want to...	Do this...
Create a new policy group	<p>a. Select <b>New Policy Group</b>.</p> <p>b. Specify the policy group name.</p> <p>c. Specify the minimum throughput limit.</p> <ul style="list-style-type: none"> <li>◦ In System Manager 9.5, you can set the minimum throughput limit only on a performance-based All Flash Optimized personality. In System Manager 9.6, you can also set the minimum throughput limit for ONTAP Select Premium systems.</li> <li>◦ You cannot set the minimum throughput limit for volumes on a FabricPool-enabled aggregate.</li> <li>◦ If you do not specify the minimum throughput value or if the minimum throughput value is set to 0, the system automatically displays “None” as the value.</li> </ul> <p style="padding-left: 40px;">This value is case-sensitive.</p> <p>d. Specify the maximum throughput limit to prevent the workload of the objects in the policy group from exceeding the specified throughput limit.</p> <ul style="list-style-type: none"> <li>◦ The minimum throughput limit and the maximum throughput limit must be of the same unit type.</li> <li>◦ If you do not specify the minimum throughput limit, then you can set the maximum throughput limit in IOPS, B/s, KB/s, MB/s, and so on.</li> <li>◦ If you do not specify the maximum throughput value, the system automatically displays “Unlimited” as the value.</li> </ul> <p style="padding-left: 40px;">This value is case-sensitive. The unit that you specify does not affect the maximum throughput.</p>

If you want to...	Do this...
Select an existing policy group	<p>a. Select <b>Existing Policy Group</b>, and then click <b>Choose</b> to select an existing policy group from the Select Policy Group dialog box.</p> <p>b. Specify the minimum throughput limit.</p> <ul style="list-style-type: none"> <li>◦ In System Manager 9.5, you can set the minimum throughput limit only on a performance-based All Flash Optimized personality. In System Manager 9.6, you can also set the minimum throughput limit for ONTAP Select Premium systems.</li> <li>◦ You cannot set the minimum throughput limit for volumes on a FabricPool-enabled aggregate.</li> <li>◦ If you do not specify the minimum throughput value or if the minimum throughput value is set to 0, the system automatically displays “None” as the value.</li> </ul> <p style="padding-left: 40px;">This value is case-sensitive.</p> <p>c. Specify the maximum throughput limit to prevent the workload of the objects in the policy group from exceeding the specified throughput limit.</p> <ul style="list-style-type: none"> <li>◦ The minimum throughput limit and the maximum throughput limit must be of the same unit type.</li> <li>◦ If you do not specify the minimum throughput limit, then you can set the maximum throughput limit in IOPS, B/s, KB/s, MB/s, and so on.</li> <li>◦ If you do not specify the maximum throughput value, the system automatically displays “Unlimited” as the value.</li> </ul> <p style="padding-left: 40px;">This value is case-sensitive. The unit that you specify does not affect the maximum throughput.</p> <p style="padding-left: 40px;">If the policy group is assigned to more than one object, the maximum throughput that you specify is shared among the objects.</p>

7. Click the link that specifies the number of volumes if you want to review the list of selected volumes, and then click **Discard** if you want to remove any volumes from the list.

The link is displayed only when multiple volumes are selected.

8. Click **OK**.

# Create a mirror relationship from a source SVM

You can use System Manager to create a mirror relationship from the source storage virtual machine (SVM), and to assign a mirror policy and schedule to the mirror relationship. The mirror copy enables quick availability of data if the data on the source volume is corrupted or lost.

## Before you begin

- The SnapMirror license must be enabled on the source cluster and destination cluster.



- For some platforms, it is not mandatory for the source cluster to have the SnapMirror license enabled if the destination cluster has the SnapMirror license and Data Protection Optimization (DPO) license enabled.
- After the DPO license is enabled on the destination cluster, you must refresh the browser of the source cluster to enable the `Protect` option.

- While mirroring a SnapLock volume, the SnapMirror license must be installed on both the source cluster and destination cluster, and the SnapLock license must be installed on the destination cluster.
- The source cluster and destination cluster and the source SVM and destination SVM must be in a healthy peer relationship.
- The destination aggregate must have space available.
- FlexVol volumes must be online and of type read/write.
- The SnapLock aggregate type must be the same on both clusters.
- A maximum of 25 volumes can be protected in one selection.
- If you are connecting from a cluster running ONTAP 9.2 or earlier to a remote cluster on which Security Assertion Markup Language (SAML) authentication is enabled, password-based authentication must be enabled on the remote cluster.

## About this task

- System Manager does not support a cascade relationship.

For example, a destination volume in a relationship cannot be the source volume in another relationship.

- You can create a mirror relationship between SnapLock volumes of the same type only.

For example, if the source volume is a SnapLock Enterprise volume, then the destination volume must also be a SnapLock Enterprise volume.

- If encryption is enabled on the source volume and the destination cluster is running a version of ONTAP software earlier than ONTAP 9.3, then encryption is disabled on the destination volume by default.
- SVMs that are peered only for FlexCache applications and do not have peering permissions for SnapMirror applications are not shown in the list of SVMs in this task. You can use the ONTAP System Manager 9.6 enhanced peering workflow to give permission to, or peer to, these SVMs. You then can select them in this task to create a protection relationship.

## Steps


1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.

3. Select the volumes for which you want to create mirror relationships, and then click **More Actions > Protect**.

The **Protect** option is available only for a read/write volume.

4. Select the **Replication** type:

If you selected the replication type as...	Do this...
Asynchronous	<ol style="list-style-type: none"> <li><b>Optional:</b> If you do not know the replication type and relationship type, click <b>Help me Choose</b>, specify the values, and then click <b>Apply</b>.</li> <li>Select the relationship type.  The relationship type can be mirror, vault, or mirror and vault.</li> <li>Select a cluster and an SVM.  If the selected cluster is running a version of ONTAP software earlier than ONTAP 9.3, then only peered SVMs are listed. If the selected cluster is running ONTAP 9.3 or later, peered SVMs and permitted SVMs are listed.</li> <li>Modify the volume name suffix, if required.</li> </ol>
Synchronous	<ol style="list-style-type: none"> <li><b>Optional:</b> If you do not know the replication type and relationship type, click <b>Help me Choose</b>, specify the values, and then click <b>Apply</b>.</li> <li>Select the synchronization policy.  The synchronization policy can be StrictSync or Sync.</li> <li>Select a cluster and an SVM.  If the selected cluster is running a version of ONTAP software earlier than ONTAP 9.3, then only peered SVMs are listed. If the selected cluster is running ONTAP 9.3 or later, peered SVMs and permitted SVMs are listed.</li> <li>Modify the volume name suffix, if required.</li> </ol>

5. Click , update the protection policy and protection schedule, select **FabricPool-enabled aggregate**, and then initialize the protection relationship.
6. Click **Save**.

## Results



A new destination volume of type *dp* is created with the following default settings:

- Autogrow is enabled.
- Compression is disabled.
- The language attribute is set to match the language attribute of the source volume.

If the destination FlexVol volume is on a different SVM than the source FlexVol volume, then a peer relationship is created between the two SVMs if the relationship does not already exist.

A mirror relationship is created between the source volume and the destination volume. The base Snapshot copy is transferred to the destination volume if you have opted to initialize the relationship.

## Related information

[Protection window](#)

# Create a vault relationship from a source SVM

You can use System Manager to create a vault relationship from the source storage virtual machine (SVM), and to assign a vault policy to the vault relationship to create a backup vault. In the event of data loss or corruption on a system, backed-up data can be restored from the backup vault destination.

## Before you begin

- The SnapVault license or SnapMirror license must be enabled on both the source cluster and the destination cluster.



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- For some platforms, it is not mandatory for the source cluster to have the SnapVault license or the SnapMirror license enabled if the destination cluster has the SnapVault license or the SnapMirror license, and the Data Protection Optimization \ (DPO\ ) license enabled.
- After the DPO license is enabled on the destination cluster, you must refresh the browser of the source cluster to enable the `Protect` option.

+

- The source cluster and destination cluster and the source SVM and destination SVM must be in a healthy peer relationship.
- The destination aggregate must have space available.
- The source aggregate and the destination aggregate must be 64-bit aggregates.
- A vault (XDP) policy must exist.

If a vault policy does not exist, you must create a vault policy or accept the default vault policy (named

XDPDefault) that is automatically assigned.

- FlexVol volumes must be online and of type read/write.
- The SnapLock aggregate type must be the same.
- A maximum of 25 volumes can be protected in one selection.
- If you are connecting from a cluster running ONTAP 9.2 or earlier to a remote cluster on which Security Assertion Markup Language (SAML) authentication is enabled, password-based authentication must be enabled on the remote cluster.

#### About this task

- System Manager does not support a cascade relationship.

For example, a destination volume in a relationship cannot be the source volume in another relationship.

- You can create a lock-vault relationship only between a non-SnapLock (primary) volume and a SnapLock destination (secondary) volume.
- If encryption is enabled on the source volume and the destination cluster is running a version of ONTAP software earlier than ONTAP 9.3, then encryption is disabled on the destination volume by default.

#### Steps


1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the volumes for which you want to create vault relationships, and then click **More Actions > Protect**.

The **Protect** option is available only for a read/write volume.

4. Select the **Replication** type:

If you selected the replication type as...	Do this...
Asynchronous	<ol style="list-style-type: none"><li>a. <b>Optional:</b> If you do not know the replication type and relationship type, click <b>Help me Choose</b>, specify the values, and then click <b>Apply</b>.</li><li>b. Select the relationship type.  The relationship type can be mirror, vault, or mirror and vault.</li><li>c. Select a cluster and an SVM.  If the selected cluster is running a version of ONTAP software earlier than ONTAP 9.3, then only peered SVMs are listed. If the selected cluster is running ONTAP 9.3 or later, peered SVMs and permitted SVMs are listed.</li><li>d. Modify the volume name suffix, if required.</li></ol>

If you selected the replication type as...	Do this...
Synchronous	<p>a. <b>Optional:</b> If you do not know the replication type and relationship type, click <b>Help me Choose</b>, specify the values, and then click <b>Apply</b>.</p> <p>b. Select the synchronization policy.</p> <p>The synchronization policy can be StrictSync or Sync.</p> <p>c. Select a cluster and an SVM.</p> <p>If the selected cluster is running a version of ONTAP software earlier than ONTAP 9.3, then only peered SVMs are listed. If the selected cluster is running ONTAP 9.3 or later, peered SVMs and permitted SVMs are listed.</p> <p>d. Modify the volume name suffix, if required.</p>

5. Click , update the protection policy and protection schedule, enable SnapLock properties on the destination volume, select a FabricPool-enabled aggregate, and then initialize the protection relationship.
6. Click **Save**.

## Related information

[Protection window](#)

# Create a mirror and vault relationship from a source SVM

You can use System Manager to create a mirror and vault relationship from the source storage virtual machine (SVM). Creating this relationship enables you to better protect your data by periodically transferring data from the source volume to the destination volume. This relationship also enables you to retain data for long periods by creating backups of the source volume.

## Before you begin

- The source cluster must be running ONTAP 8.3.2 or later.
- The SnapMirror license must be enabled on the source cluster and destination cluster.
  - For some platforms, it is not mandatory for the source cluster to have the SnapMirror license enabled if the destination cluster has the SnapMirror license and Data Protection Optimization (DPO) license enabled.
  - After the DPO license is enabled on the destination cluster, you must refresh the browser of the source cluster to enable the `Protect` option.
- The source cluster and destination cluster must be in a healthy peer relationship.
- The source SVM and destination SVM must be in a healthy peer relationship, or the destination SVM must



have permission to peer.

- The destination aggregate must have space available.
- The source aggregate and the destination aggregate must be 64-bit aggregates.
- FlexVol volumes must be online and of type read/write.
- The SnapLock aggregate type must be the same.
- A maximum of 25 volumes can be protected in one selection.
- If you are connecting from a cluster running ONTAP 9.2 or earlier to a remote cluster on which Security Assertion Markup Language (SAML) authentication is enabled, password-based authentication must be enabled on the remote cluster.

#### About this task

- System Manager does not support a cascade relationship.

For example, a destination volume in a relationship cannot be the source volume in another relationship.

- If encryption is enabled on the source volume and the destination cluster is running a version of ONTAP software earlier than ONTAP 9.3, then encryption is disabled on the destination volume by default.
- SVMs that are peered only for FlexCache applications and do not have peering permissions for SnapMirror applications are not shown in the list of SVMs in this task. You can use the ONTAP System Manager 9.6 enhanced peering workflow to give permission to, or peer to, these SVMs. You then can select them in this task to create a protection relationship.


#### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the volumes for which you want to create mirror and vault relationships, and then click **More Actions > Protect**.

The **Protect** option is available only for a read/write volume.

4. Select the **Replication** type:

If you selected the replication type as...	Do this...
Asynchronous	<p>a. <b>Optional:</b> If you do not know the replication type and relationship type, click <b>Help me Choose</b>, specify the values, and then click <b>Apply</b>.</p> <p>b. Select the relationship type.</p> <p>The relationship type can be mirror, vault, or mirror and vault.</p> <p>c. Select a cluster and an SVM.</p> <p>If the selected cluster is running a version of ONTAP software earlier than ONTAP 9.3, then only peered SVMs are listed. If the selected cluster is running ONTAP 9.3 or later, peered SVMs and permitted SVMs are listed.</p> <p>d. Modify the volume name suffix, if required.</p>
Synchronous	<p>a. <b>Optional:</b> If you do not know the replication type and relationship type, click <b>Help me Choose</b>, specify the values, and then click <b>Apply</b>.</p> <p>b. Select the synchronization policy.</p> <p>The synchronization policy can be StrictSync or Sync.</p> <p>c. Select a cluster and an SVM.</p> <p>If the selected cluster is running a version of ONTAP software earlier than ONTAP 9.3, then only peered SVMs are listed. If the selected cluster is running ONTAP 9.3 or later, peered SVMs and permitted SVMs are listed.</p> <p>d. Modify the volume name suffix, if required.</p>

5. Click , update the protection policy and protection schedule, select **FabricPool-enabled aggregate**, and then initialize the protection relationship.

6. Click **Save**.

## Create an NFS datastore for VMware

You can use the Create NFS Datastore for VMware wizard in System Manager to create an NFS datastore for VMware. You can create a volume for the NFS datastore and specify the ESX servers that can access the NFS datastore.

### Before you begin

The NFS service must be licensed.

### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the volume, and then click **More Actions > Provision Storage for VMware**.
4. In the **Create NFS Datastore for VMware** wizard, type or select information as required.
5. Confirm the details, and then click **Finish** to complete the wizard.

## Changing the tiering policy of a volume

You can use System Manager to change the default tiering policy of a volume to control whether the data of the volume is moved to the cloud tier when the data becomes inactive.

### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the volume for which you want to change the tiering policy, and then click **More Actions > Change Tiering Policy**.
4. Select the required tiering policy from the **Tiering Policy** list, and then click **Save**.

## Create FlexGroup volumes

A FlexGroup volume can contain many volumes that can be administered as a group instead of individually. You can use System Manager to create a FlexGroup volume by selecting specific aggregates or by selecting system-recommended aggregates.

### About this task

- You can create only read/write (rw) FlexGroup volumes.
- Starting with System Manager 9.6, you can create FlexGroup volumes in a MetroCluster configuration.

### Steps

1. Click **Storage > Volumes**.
2. Click **Create > Create FlexGroup**.
3. In the **Create FlexGroup** window, specify a name for the FlexGroup volume.

By default, the aggregates are selected according to best practices.

4. Click the **Volume Encryption** button to enable encryption for the volume.

This option is available only if you have enabled the Volume Encryption license and if the corresponding platform supports encryption.

Turning on volume encryption might affect the cross-volume storage efficiency when the selected aggregates are encrypted.

5. Specify a size for the FlexGroup volume.



You must also specify the measurement units.

6. Enable the **FabricPool** toggle button to use FabricPool aggregates in the FlexGroup volume.

- When you enable **FabricPool**, you can select the Tiering policy from the following choices in the drop-down menu:
  - **Snapshot-only**  
  
Moves the Snapshot copies of only those volumes that are currently not being referenced by the active file system. Snapshot-only policy is the default tiering policy.
  - **Auto**  
  
Moves the inactive (cold) data and the Snapshot copies from the active file system to the cloud tier.
  - **Backup (for System Manager 9.5)**  
  
Moves the newly transferred data of a data protection (DP) volume to the cloud tier.
  - **All (starting with System Manager 9.6)**  
  
Moves all data to the cloud tier.
  - **None**  
  
Prevents the data on the volume from being moved to a cloud tier.
- If you leave **FabricPool** in the “not enabled” position, only non-FabricPool aggregates are included in the created FlexGroup volume, and the tiering policy is set to “None”.
- If no FabricPool aggregates exist in the SVM, then **FabricPool** displays in the “not enabled” position and cannot be changed.
- If only FabricPool aggregates exist in the SVM, then the **FabricPool** button is displays in the “enabled” position and cannot be changed.

7. If you want to specify particular aggregates, click  (advanced options).

The aggregates associated with the FlexGroup volume you are creating are selected by default, according to best practices. They are displayed next to the **Aggregates** label.

8. In the **Protection** section, perform the following actions:

- a. Enable the **Volume Protection** option.
- b. Select the **Replication** type.



The **Synchronous** replication type is not supported for FlexGroup volumes.

- c. Click **Help me Choose**, if you do not know the replication type and relationship type.
  - Specify the values and click **Apply**.

The replication type and the relationship type is automatically selected based on the values specified.

- d. Select the relationship type.

The relationship types can be mirror, vault, or mirror and vault.

- e. Select a cluster and an SVM for the destination volume.

If the selected cluster is running a version of ONTAP software earlier than ONTAP 9.3, then only peered SVMs are listed. If the selected cluster is running ONTAP 9.3 or later, peered SVMs and permitted SVMs are listed.

- f. Modify the volume name suffix as required.

9. Click **Create** to create the FlexGroup volume.

## Related information

[Volumes window](#)

# Viewing FlexGroup volume information

You can use System Manager to view information about a FlexGroup volume. You can view a graphical representation of the space allocated, the protection status, and the performance of a FlexGroup volume.

## About this task

You can also view the Snapshot copies that are available for the FlexGroup volume, the data protection relationships for the FlexGroup volume, and the average performance metrics, read performance metrics, and write performance metrics of the FlexGroup volume based on latency, IOPS, and throughput.

## Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. From the displayed list of FlexGroup volumes, select the FlexGroup volume about which you want to view information.

The information about the FlexGroup volume, the space allocated to the FlexGroup volume, the protection status of the FlexGroup volume, and the performance information about the FlexGroup volume are displayed.

4. Click the **Show More Details** link to view more information about the FlexGroup volume.
5. Click the **Snapshot Copies** tab to view the Snapshot copies of the FlexGroup volume.
6. Click the **Data Protection** tab to view the data protection relationships for the FlexGroup volume.
7. Click the **Storage Efficiency** tab to view the storage efficiency settings.
8. Click the **Performance** tab to view the average performance metrics, read performance metrics, and write performance metrics of the FlexGroup volume based on latency, IOPS, and throughput.

## Related information

[Volumes window](#)



# Editing FlexGroup volumes

Starting with System Manager 9.6, you can edit the properties of an existing FlexGroup volume.

## Before you begin

The FlexGroup volume must be online.

## About this task

FabricPool FlexGroup volumes can be expanded under the following conditions:

- A FabricPool FlexGroup volume can be expanded only with FabricPool aggregates.
- A non-FabricPool FlexGroup volume can be expanded only with non-FabricPool aggregates.
- If the FlexGroup volume contains a mix of FabricPool and non-FabricPool volumes, then the FlexGroup volume can be expanded with both FabricPool and non-FabricPool aggregates.


## Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the FlexGroup volume that you want to modify, and click **Edit**.
4. If you want to rename the FlexGroup volume, enter the new name in the **Name** field.

Starting with System Manager 9.6, you can also rename FlexGroup DP volumes.


5. Enable the **Encrypted** option to enable encryption for the volume.

This option is available only if you have enabled the Volume Encryption license and if the corresponding platform supports encryption.

6. Specify the percentage of the Snapshot copy reserve.
7. Click  to modify the FlexGroup volume settings. Refer to [Specifying advanced options for a FlexGroup volume](#).
8. Specify the size to which you want to resize the FlexGroup volume.

By default, existing aggregates are used to resize the FlexGroup volume. The minimum size that is allowed for the volume is displayed next to the size fields.



If you want to expand the FlexGroup volume by adding new resources, click  (advanced options). Refer to [Specifying advanced options for a FlexGroup volume](#).

9. Click **Save** to save the changes.

## Related information

[Volumes window](#)

# Specifying advanced options for a FlexGroup volume

When you create a FlexGroup volume, you can specify options you want to associate

with the FlexGroup volume.

### Steps

1. In the **Create FlexGroup** window, click  to specify the advanced options.

The Advanced Options window displays. It contains sections (the headings in the left column), in which you can specify various options.

2. In the **General Details** section, select the space reserve and security style, and then set the UNIX permission for the volume.

You should note the following limitations:

- The Space Reserve option is not available for FabricPool aggregates.
  - When thin provisioning is enabled, space is allocated to the volume from the aggregate only when data is written to the volume.
  - For All-Flash Optimized storage systems, thin provisioning is enabled by default, and for other storage systems, thick provisioning is enabled by default.
3. In the **Aggregates** section, you can enable the **Select Aggregates** button to override the best practices defaults and select your choices from a list of FabricPool aggregates.
  4. In the **Optimize Space** section, you can enable deduplication on the volume.

System Manager uses the default deduplication schedule. If the specified volume size exceeds the limit that is required for running deduplication, the volume is created and deduplication is not enabled.

For systems with All Flash Optimized personality, inline compression and the `auto` deduplication schedule is enabled by default.

5. In the **QoS** (Quality of Service) section, specify the policy group to control the input/output (I/O) performance of the FlexGroup volume.
6. Click **Apply** to update the changes.

## Resizing FlexGroup volumes

You can use System Manager to resize a FlexGroup volume by resizing existing resources or by adding new resources.

### Before you begin


- To resize a FlexGroup volume, there must be enough free space on the existing aggregates.
- To expand a FlexGroup volume, there must be enough free space on the aggregate that you are using for expansion.

### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the FlexGroup volume that you want to resize, and then click **More Actions > Resize**.
4. In the **Resize FlexGroup Volume** window, specify the size to which you want to resize the FlexGroup volume.

By default, existing aggregates are used to resize the FlexGroup volume. Starting with System Manager 9.6, the minimum size that is allowed for the volume is displayed next to the size fields.



If you want to expand the FlexGroup volume by adding new resources, click  (advanced options).

5. Specify the percentage of the Snapshot copy reserve.
6. Click **Resize** to resize the FlexGroup volume.

#### Related information

[Volumes window](#)

## Changing the status of a FlexGroup volume

You can use System Manager to change the status of a FlexGroup volume when you want to take a FlexGroup volume offline, bring a FlexGroup volume back online, or restrict access to a FlexGroup volume.

#### About this task

System Manager does not support constituent-level management for FlexGroup volumes.

#### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the FlexGroup volume for which you want to modify the status.
4. Click **More Actions > Change status to**, and then update the FlexGroup volume status by selecting the required status.

#### Related information

[Volumes window](#)

## Deleting FlexGroup volumes

You can use System Manager to delete a FlexGroup volume when you no longer require the FlexGroup volume.

#### Before you begin

- The junction path of the FlexGroup volume must be unmounted.
- The FlexGroup volume must be offline.

#### About this task

System Manager does not support constituent level of management for FlexGroup volumes.

#### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.

3. Select the FlexGroup volume that you want to delete, and then click **Delete**.
4. Select the confirmation check box, and then click **OK**.

## Related information

[Volumes window](#)

# Create FlexCache volumes

Starting with System Manager 9.6, you can create a FlexCache volume.

## About this task

You must have a FlexCache capacity license before you can create a FlexCache volume.

## Steps

1. Click **Storage > Volumes**.
2. In the **Volumes** window, click **Create > FlexCache**.

The Create FlexCache volume window displays.

3. The following fields in the **Origin Volume** area display values for the origin volume for which you want to create a FlexCache volume. You can modify them.
  - **Cluster**: Use the drop-down menu to select the cluster associated with the origin volume.
  - **SVM**: Use the drop-down menu to select the SVM that contains the origin volume.

If you choose an SVM that is not peered, but is permitted to peer, System Manager allows you to peer it explicitly.
  - **Volume**: Use the drop-down menu to select the volume name, or enter the name into the field.
4. The following fields in the **FlexCache Volume** area display default values for the FlexCache volume you are creating. You can modify them.
  - **SVM**: Use the drop-down menu to select the SVM in which you want to create the FlexCache volume. If the FlexCache license capacity is full or almost full, you can select **Manage FlexCache license** to modify your license.
  - **New Volume Name**: Enter a name for the FlexCache volume.
  - **Size**: Specify the size for the FlexCache volume, including the measurement units.

The size field is initially set by default. The size you specify cannot exceed the licensed capacity size.

5. Click **Save** to create the FlexCache volume.

You can return to the **Volumes** window to view the FlexCache volume in the list of volumes.

## Related information

[Volumes window](#)

# Viewing FlexCache volume information

Starting with System Manager 9.6, you can view information about a FlexCache volume. You can view a graphical representation of the space allocated and the performance of a FlexCache volume.

## Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. From the displayed list of volumes, select the FlexCache volume about which you want to view information.

The **Style** column displays "FlexCache" for a FlexCache volume.

When you make a selection, the Volume window for the selected FlexCache volume displays.

4. Initially, the **Volume** window displays the **Overview** tab. Click the tabs to view additional details about the FlexCache volume:

Click this tab...	To view these details...
<b>Overview</b>	General information about the FlexCache volume, the space allocated to the FlexCache volume, and performance information about the FlexCache volume.
<b>Storage Efficiency</b>	The storage efficiency settings of the FlexCache volume.
<b>Performance</b>	The average performance metrics, read performance metrics, and write performance metrics of the FlexCache volume based on latency, IOPS, and throughput. Also, the percentage of cache hits or cache misses is displayed.

5. Click **More actions** to view additional information and take actions from the selections in the drop-down menu:


Action	Description
Change status	Enables you to change the status of the FlexCache volume. Refer to <a href="#">Changing the status of a FlexCache volume</a> .
Resize	Enables you to resize the FlexCache volume. Refer to <a href="#">Resizing FlexCache volumes</a> .
Storage Efficiency	Enables you to adjust parameters to improve the storage efficiency of the FlexCache volume.

Action	Description
Storage QoS	Enables you to adjust the minimum and maximum storage limits for the FlexCache volume.
Encryption rekey	Enables you to reset the encryption key (only if you have enabled encryption on the peer cluster that includes the FlexCache volume)

## Editing FlexCache volumes

Starting with System Manager 9.6, you can edit the properties of an existing FlexCache volume.

### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the FlexCache volume that you want to modify, and click **Edit**.
4. Enter a new name for the FlexCache volume in the **Volume** field under **FlexCache Volume**.
5. Enter a new size for the FlexCache volume in the **Size** field under **FlexCache Volume**, and select the measurement unit from the drop-down menu.
6. Enable or disable encryption.
7. Click  to modify the FlexCache volume advanced settings. Refer to [Setting advanced settings for FlexCache volumes](#).
8. Click **Save** to save the changes.


### Related information

[Volumes window](#)

## Specifying advanced options for a FlexCache volume

Starting with System Manager 9.6, when you edit a FlexCache volume, you can specify the advanced options that you want to associate with the FlexCache volume.

### Steps

1. In the **Edit FlexCache volume** window, click  to specify the advanced options.

The Advanced Options window displays. It contains sections (the headings in the left column), in which you can specify various options.

2. In the **General Details** section, you can edit the permissions for the volume.
3. In the **Aggregates** section, you can enable the **Select Aggregates** toggle button to override the best practices defaults and select your choices from a list of aggregates.
4. In the **Storage Efficiency** section, you can enable compression and deduplication on the volume.

Deduplication is not enabled by default for FlexCache volumes. System Manager uses the default deduplication schedule if the specified volume size exceeds the limit that is required for running deduplication.

5. Click **Apply** to update the changes.

## Resizing FlexCache volumes

Starting with System Manager 9.6, you can resize a FlexCache volume by resizing existing resources or by adding new resources.

### Before you begin


- To resize a FlexCache volume, there must be enough free space on the existing aggregates.
- To expand a FlexCache volume, there must be enough free space on the aggregate that you are using for expansion.

### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the FlexCache volume that you want to resize, and then click **More Actions > Resize**.
4. In the **Resize FlexCache Volume** window, specify the size to which you want to resize the FlexCache volume.

By default, existing aggregates are used to resize the FlexCache volume. Starting with System Manager 9.6, the maximum size that is allowed for the volume is displayed next to the size field.



If you want to expand the FlexCache volume by adding new resources, click  (advanced options). Refer to [Specifying advanced options for FlexCache volumes](#).

5. Click **Save** to resize the FlexCache volume.

### Related information

[Volumes window](#)

## Changing the status of a FlexCache volume

Starting with System Manager 9.6, you can change the status of a FlexCache volume when you want to take it offline, bring a FlexCache volume back online, or restrict access to a FlexCache volume.

### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the FlexCache volume for which you want to modify the status.
4. Click **More Actions > Change status to**, and then update the FlexCache volume status by selecting the required status.



To take a FlexCache volume offline and to change the status to "restricted", you must first unmount the volume.

## Deleting FlexCache volumes

Starting with System Manager 9.6, you can delete a FlexCache volume when you no longer require it.

### Before you begin

- The junction path of the FlexCache volume must be unmounted.
- The FlexCache volume must be offline.

### Steps

1. Click **Storage > Volumes**.
2. From the drop-down menu in the **SVM** field, select **All SVMs**.
3. Select the FlexCache volume that you want to delete, and then click **Delete**.
4. Select the confirmation check box, and then click **OK**.

### Related information

[Volumes window](#)

## What NetApp Volume Encryption is

NetApp Volume Encryption is the process of protecting the user data, including the metadata, by encrypting the data before storing it on the disk. The data is decrypted and provided to the user only after proper authentication is provided.

To encrypt data, an encryption key is required. Each volume is assigned an encryption key to encrypt/decrypt operations of its data.

When NetApp Aggregate Encryption is enabled on an aggregate, new volumes are encrypted by default. Volume encryption can override the default encryption.



When a selected aggregate is encrypted, volume encryption affects cross-volume storage efficiency.

## Snapshot configuration

You can configure Snapshot copies by setting a schedule for an existing Snapshot policy. Starting with ONTAP 9.4, you can have less than 1024 Snapshot copies of a FlexVol volume.

## How volume guarantees work for FlexVol volumes

Volume guarantees (sometimes called *space guarantees*) determine how space for a



volume is allocated from its containing aggregate—whether or not the space is preallocated for the volume.

The guarantee is an attribute of the volume.

You set the guarantee when you create a new volume; you can also change the guarantee for an existing volume, provided that sufficient free space exists to honor the new guarantee.

Volume guarantee types can be `volume` (the default type) or `none`.

- A guarantee type of `volume` allocates space in the aggregate for the entire volume when you create the volume, regardless of whether that space is used for data yet.

The allocated space cannot be provided to or allocated for any other volume in that aggregate.

- A guarantee of `none` allocates space from the aggregate only as it is needed by the volume.

The amount of space consumed by volumes with this guarantee type grows as data is added instead of being determined by the initial volume size, which might leave space unused if the volume data does not grow to that size. The maximum size of a volume with a guarantee of `none` is not limited by the amount of free space in its aggregate. It is possible for the total size of all volumes associated with an aggregate to exceed the amount of free space for the aggregate, although the amount of space that can actually be used is limited by the size of aggregate.

Writes to LUNs or files (including space-reserved LUNs and files) contained by that volume could fail if the containing aggregate does not have enough available space to accommodate the write.

When space in the aggregate is allocated for a `volume` guarantee for an existing volume, that space is no longer considered free in the aggregate, even if the volume is not yet using the space. Operations that consume free space in the aggregate, such as creation of aggregate Snapshot copies or creation of new volumes in the containing aggregate, can occur only if there is enough available free space in that aggregate; these operations are prevented from using space already allocated to another volume.

When the free space in an aggregate is exhausted, only writes to volumes or files in that aggregate with preallocated space are guaranteed to succeed.

Guarantees are honored only for online volumes. If you take a volume offline, any allocated but unused space for that volume becomes available for other volumes in that aggregate. When you try to bring that volume back online, if there is insufficient available space in the aggregate to fulfill its guarantee, it will remain offline. You must force the volume online, at which point the volume's guarantee will be disabled.

### Related information

[NetApp Technical Report 3965: NetApp Thin Provisioning Deployment and Implementation Data ONTAP 8.1 \(7-Mode\)](#)

## FlexClone volumes and space guarantees

A FlexClone volume inherits its initial space guarantee from its parent volume. For example, if you create a FlexClone volume from a parent volume with a space guarantee of `volume`, then the FlexClone volume's initial space guarantee will be `volume` also. You can change the FlexClone volume's space guarantee.

For example, suppose that you have a 100-MB FlexVol volume with a space guarantee of `volume`, with 70 MB used and 30 MB free, and you use that FlexVol volume as a parent volume for a new FlexClone volume. The new FlexClone volume has an initial space guarantee of `volume`, but it does not require a full 100 MB of space from the aggregate, as it would if you had copied the volume. Instead, the aggregate needs to allocate only 30 MB (100 MB minus 70 MB) of free space to the clone.

If you have multiple clones with the same parent volume and a space guarantee of `volume`, they all share the same shared parent space with each other, so the space savings are even greater.



The shared space depends on the existence of the shared Snapshot copy (the base Snapshot copy that was used to create the FlexClone volume). If you delete this shared Snapshot copy, you lose the space savings provided by the FlexClone volume.

## Thin provisioning for greater efficiencies using FlexVol volumes

With thin provisioning, when you create volumes and LUNs in a given aggregate, you do not actually allocate any space for those in advance. The space is allocated as data is written to the volumes or LUNs.

The unused aggregate space is available to other volumes and LUNs. By allowing as-needed provisioning and space reclamation, thin provisioning can improve storage utilization and decrease storage costs.

A FlexVol volume can share its containing aggregate with other FlexVol volumes. Therefore, a single aggregate is the shared source of all the storage used by the FlexVol volumes it contains. Flexible volumes are no longer bound by the limitations of the disks on which they reside. A FlexVol volume can be sized based on how much data you want to store in it, rather than on the size of your disk. This flexibility enables you to maximize the performance and capacity utilization of the storage systems. Because FlexVol volumes can access all available physical storage in the system, improvements in storage utilization are possible.

### Example

A 500-GB volume is allocated with only 100 GB of actual data; the remaining 400 GB allocated has no data stored in it. This unused capacity is assigned to a business application, even though the application might not need all 400 GB until later. The allocated but unused 400 GB of excess capacity is temporarily wasted.

With thin provisioning, the storage administrator provisions 500 GB to the business application but uses only 100 GB for the data. The difference is that with thin provisioning, the unused 400 GB is still available to other applications. This approach allows the application to grow transparently, and the physical storage is fully allocated only when the application needs it. The rest of the storage remains in the free pool to be used as needed.

## Using space reservations with FlexVol volumes

Using space reservation, you can provision FlexVol volumes. Thin provisioning appears to provide more storage than is actually available from a given aggregate, as long as not all of that storage is currently being used.

Thick provisioning sets aside enough storage from the aggregate to ensure that any block in the volume can be written to at any time.

Aggregates can provide storage to volumes contained by more than one storage virtual machine (SVM). If you

are using thin provisioning, and you need to maintain strict separation between your SVMs (for example, if you are providing storage in a multi-tenancy environment), you should either use fully allocated volumes (thick provisioning) or ensure that your aggregates are not shared between tenants.

When the space reserve is set to “Default”, the ONTAP space reservation settings apply to the volumes.

### Related information

[NetApp Technical Report 3563: NetApp Thin Provisioning Increases Storage Utilization With On Demand Allocation](#)

[NetApp Technical Report 3483: Thin Provisioning in a NetApp SAN or IP SAN Enterprise Environment](#)

## Benefits of storage efficiency

Storage efficiency enables you to store the maximum amount of data for the lowest cost and accommodate rapid data growth while consuming less space. You can use technologies such as RAID-DP, FlexVol, Snapshot copies, deduplication, data compression, SnapMirror, and FlexClone to increase storage utilization and decrease storage costs. When used together, these technologies help to achieve increased performance.

- High-density disk drives, such as serial advanced technology attachment (SATA) drives mitigated with RAID-DP technology, provide increased efficiency and read performance.
- RAID-DP is a double-parity RAID6 implementation that protects against dual disk drive failures.
- Thin provisioning enables you to maintain a common unallocated storage space that is readily available to other applications as required.

It is based on FlexVol technology.

- Snapshot copies are a point-in-time, read-only view of a data volume, which consume minimal storage space.

Two Snapshot copies created in sequence differ only by the blocks added or changed in the time interval between the two. This block incremental behavior limits the associated consumption of storage capacity.

- Deduplication saves storage space by eliminating redundant data blocks within a FlexVol volume.
- Data compression stores more data in less space and reduces the time and bandwidth required to replicate data during volume SnapMirror transfers.

You have to choose the type of compression (inline or background) based on your requirement and the configurations of your storage system. Inline compression checks if data can be compressed, compresses data, and then writes data to the volume. Background compression runs on all the files, irrespective of whether the file is compressible or not, after all the data is written to the volume.

- SnapMirror technology is a flexible solution for replicating data over local area, wide area, and Fibre Channel networks.

It can serve as a critical component in implementing enterprise data protection strategies. You can replicate your data to one or more storage systems to minimize downtime costs in case of a production site failure. You can also use SnapMirror technology to centralize the backup of data to disks from multiple data centers.

- FlexClone technology copies data volumes, files, and LUNs as instant virtual copies.

A FlexClone volume, file, or LUN is a writable point-in-time image of the FlexVol volume or another FlexClone volume, file, or LUN. This technology enables you to use space efficiently, storing only data that changes between the parent and the clone.

- The unified architecture integrates multiprotocol support to enable both file-based and block-based storage on a single platform.

With FlexArray Virtualization, you can virtualize your entire storage infrastructure under one interface, and you can apply all the preceding efficiencies to your non-NetApp systems.

## Data compression and deduplication

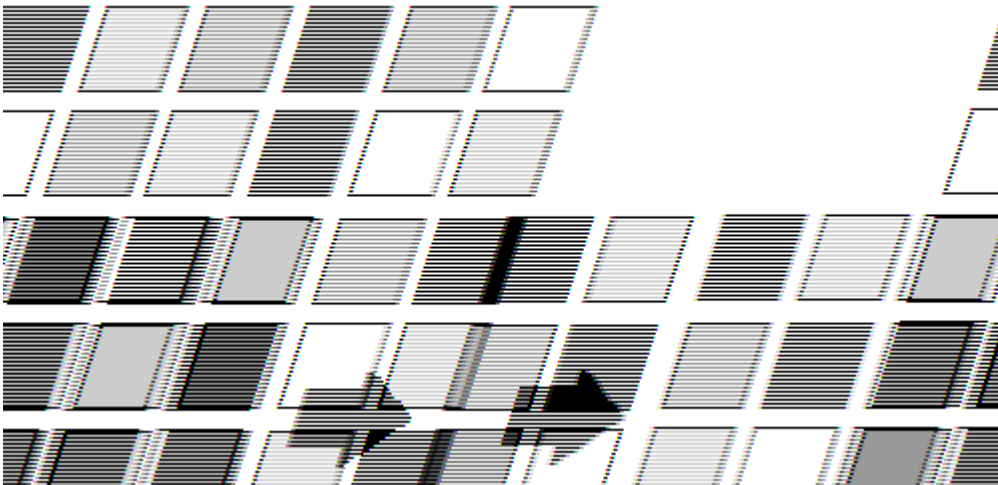
Beginning with Data ONTAP 8.0.1, data compression is supported with deduplication.

When both data compression and deduplication are enabled on a FlexVol volume, the data is first compressed and then deduplicated. Therefore, deduplication can further increase the space savings by removing duplicate blocks in the FlexVol volume.

Though data compression and deduplication can be enabled on a FlexVol volume, the savings might not be the sum of the savings when each is run individually on a data set. The combined savings can yield higher savings than running deduplication or data compression individually.

You can achieve better savings when you run the data compression scanner before deduplication. This is because data compression scanner cannot run on data that is locked by deduplication, but deduplication can run on compressed data.

The following illustration shows how data is first compressed and then deduplicated:



When you run deduplication on a FlexVol volume that contains uncompressed data, it scans all the uncompressed blocks in the FlexVol volume and creates a digital fingerprint for each of the blocks.



If a FlexVol volume has compressed data, but the compression option is disabled on that volume, then you might lose the space savings when you run the `sis undo` command.

# Guidelines for using deduplication

You must remember certain guidelines about system resources and free space when using deduplication.

The guidelines are as follows:

- If you have a performance-sensitive solution, you must carefully consider the performance impact of deduplication and measure the impact in a test setup before using deduplication.
- Deduplication is a background process that consumes system resources while it is running.

If the data does not change very often in a FlexVol volume, it is best to run deduplication less frequently. Multiple concurrent deduplication operations running on a storage system lead to a higher consumption of system resources.

- You must ensure that sufficient free space exists for deduplication metadata in the volumes and aggregates.
- If deduplication is used on the source volume, you must use deduplication on the destination volume.
- You must use automatic mode when possible so that deduplication runs only when significant additional data has been written to each FlexVol volume.
- You must run deduplication before creating a Snapshot copy to obtain maximum savings.
- You must set the Snapshot reserve to greater than 0 if Snapshot copies are used.

## Options for resizing volumes

You can use the Volume Resize wizard to change your volume size, adjust the Snapshot reserve, delete Snapshot copies, and dynamically view the results of your changes.

The Volume Resize wizard displays a bar graph that displays the current space allocations within the volume, including the amount of used and free space. When you make changes to the size or Snapshot reserve of the volume, this graph is updated dynamically to reflect the changes.

You can also use the **Calculate space** button to determine the amount of space that is freed by deleting selected Snapshot copies.

You can use the Volume Resize wizard to make the following changes to your volume:

- **Change the volume size**

You can change the total volume size to increase or decrease storage space.

- **Adjust Snapshot reserve**

You can adjust the amount of space reserved for Snapshot copies to increase or decrease storage space.

- **Delete Snapshot copies**

You can delete Snapshot copies to reclaim volume space.



Snapshot copies that are in use cannot be deleted.

- **Autogrow**

You can specify the limit to which the volume can be grown automatically, if required.

## Considerations when moving volumes

Moving a volume has many considerations and recommendations that are influenced by the volume you are moving or by the system configuration. You should understand the considerations associated with moving volumes.

- If you move a volume that has inline deduplication enabled from an aggregate with All Flash Optimized personality or a Flash Pool aggregate to an HDD aggregate, inline deduplication is disabled on the volume.
- If you move a volume that has background deduplication and inline compression enabled from an aggregate with All Flash Optimized personality to an HDD aggregate, then background compression, background deduplication, and inline compression are automatically enabled on the volume.
- If you move a volume that has background compression enabled from an HDD aggregate to an aggregate with All Flash Optimized personality, background compression is disabled on the volume.
- If you move a volume from a Flash Pool aggregate to a non-Flash Pool aggregate, the caching policies and retention priority are disabled.
- If you move a volume from a non-Flash Pool aggregate to a Flash Pool aggregate, the `default` caching policy and the `default` retention priority are automatically assigned to the volume.

## Volumes window

You can use the Volumes window to manage your FlexVol volumes and FlexGroup volumes. Starting with System Manager 9.6, you can also manage FlexCache volumes.

You cannot view or manage volumes that are in storage virtual machines (SVMs) that are configured for disaster recovery by using System Manager. You must use the CLI instead.



The command buttons and list of columns will differ based on the type of volume that is selected. You can view only those command buttons and columns that are applicable for the selected volume.

### Selection field

- **SVM selection pull-down menu**

Enables you to select all SVMs or a specific SVM to display in the list.

### Command buttons

- **Create**

Provides the following options:

- **FlexVol**

Opens the Create Volume dialog box, which enables you to add FlexVol volumes.

- **FlexGroup**

Opens the Create FlexGroup window, which enables you to create FlexGroup volumes.

- **FlexCache**

Opens the Create FlexCache Volume window, which enables you to create FlexCache volumes.

- **Edit**

Enables you to edit the properties of the selected volume.

- **Delete**

Deletes the selected volume or volumes.

- **More Actions**

Provides the following options:

- **Change status to**

Changes the status of the selected volume to one of the following statuses:

- Online
- Offline
- Restrict

- **Resize**

Enables you to change the size of the volume.

For FlexGroup volumes, you can use existing resources to resize the volumes or you can add new resources to expand the volumes.

For FlexCache volumes, you can also add or remove an aggregate.

- **Protect**

Opens the Create Protection Relationship window for the volumes that are selected as source.

- **Manage Snapshots**

Provides a list of Snapshot options, including the following:

- **Create**

Displays the Create Snapshot dialog box, which you can use to create a Snapshot copy of the selected volume.

- **Configuration Settings**

Configures the Snapshot settings.

- **Restore**

Restores a Snapshot copy of the selected volume.

- **Clone**

Provides a list of clone options, including the following:

- **Create**

Creates a clone of the selected volume or a clone of a file from the selected volume.

- **Split**

Splits the clone from the parent volume.

- **View Hierarchy**

Displays information about the clone hierarchy.

- **Storage Efficiency**

Opens the Storage Efficiency dialog box, which you can use to manually start deduplication or to abort a running deduplication operation. This button is displayed only if deduplication is enabled on the storage system.

- **Move**

Opens the Move Volume dialog box, which you can use to move volumes from one aggregate or node to another aggregate or node within the same SVM.

- **Storage QoS**

Opens the Quality of Service details dialog box, which you can use to assign one or more volumes to a new or existing policy group.

- **Change Tiering Policy**

Enables you to change the tiering policy of the selected volume.

- **Volume Encryption Rekey**

Changes the data encryption key of the volume.

The data in the volume is re-encrypted using the new key that is automatically generated. The old key is automatically deleted after the rekey operation finishes.

Starting with System Manager 9.6, volume encryption rekey is supported for FlexGroup DP volumes and FlexCache volumes. Rekey is disabled for volumes that have inherited encryption from an NAE aggregate.





If you initiate a volume move operation when the rekey operation of the same volume is in progress, the rekey operation is aborted. In System Manager 9.5 and earlier version, if you try to move a volume when a conversion or rekey operation of a volume is in progress, then the operation is aborted without warning. Starting with System Manager 9.6, if you attempt a volume move during a conversion or rekey operation, a message is displayed warning that the conversion or rekey operation will be aborted if you continue.

- **Provision Storage for VMware**

Enables you to create a volume for the NFS datastore and to specify the ESX servers that can access the NFS datastore.

- **View Missing Protection Relationship**

Displays the read/write volumes that are online and are not protected, and displays the volumes that have protection relationships but are not initialized.

- **Reset Filters**

Enables you to reset the filters that were set to view missing protection relationships.

- **Refresh**

Updates the information in the window.



Enables you to select which details you want to display in the list on the Volumes window.

## Volume list

- **Status**

Displays the status of the volume.

- **Name**

Displays the name of the volume.

- **Style**

In System Manager 9.5, this column displays the type of volume, such as FlexVol or FlexGroup. FlexCache volumes created by using the CLI are displayed as FlexGroup volumes.

In System Manager 9.6, this column displays the type of volume: FlexVol, FlexGroup, or FlexCache.

- **SVM**

Displays the SVM that contains the volume.

- **Aggregates**

Displays the name of the aggregates belonging to the volume.

- **Thin Provisioned**

Displays whether a space guarantee is set for the selected volume. Valid values for online volumes are Yes and No.

- **Root volume**

Displays whether the volume is a root volume.

- **Available Space**

Displays the available space in the volume.

- **Total Space**

Displays the total space in the volume, which includes the space that is reserved for Snapshot copies.

- **% Used**

Displays the amount of space (in percentage) that is used in the volume.

- **Logical Used %**

Displays the amount of logical space (in percentage), including space reserves, that is used in the volume.



This field is displayed only if you have enabled logical space reporting by using the CLI.

- **Logical Space Reporting**

Displays whether logical space reporting is enabled on the volume.



This field is displayed only if you have enabled logical space reporting by using the CLI.

- **Logical Space Enforcement**

Displays whether to perform logical space accounting on the volume.

- **Type**

Displays the type of volume: `rw` for read/write, `ls` for load sharing, or `dp` for data protection.

- **Protection Relationship**

Display whether the volume has a protection relationship initiated.

If the relationship is between an ONTAP system and a non-ONTAP system, the value is displayed as No by default.

- **Storage Efficiency**

Displays whether deduplication is enabled or disabled for the selected volume.

- **Encrypted**

Displays whether the volume is encrypted or not.

- **QoS Policy Group**

Displays the name of the Storage QoS policy group to which the volume is assigned. By default, this column is hidden.

- **SnapLock Type**

Displays the SnapLock type of the volume.

- **Clone**

Displays whether the volume is a FlexClone volume.

- **Is Volume Moving**

Displays whether a volume is being moved from one aggregate to another aggregate or from one node to another node.

- **Tiering Policy**

Displays the tiering policy of a FabricPool-enabled aggregate. The default tiering policy is “snapshot-only”.

- **Application**

Displays the name of the application that is assigned to the volume.

## Overview area

You can click the plus sign (+) to the left in the row in which a volume is listed to view an overview of the details about that volume.

- **Protection**

Displays the **Data Protection** tab of the Volume window for the selected volume.

- **Performance**

Displays the **Performance** tab of the Volume window for the selected volume.

- **Show More Details**

Displays the Volume window for the selected volume.

## Volume window for the selected volume

You can display this window by either of these methods:

- Clicking the volume name in the list of volumes on the Volumes window.
- Clicking **Show More Details** on the **Overview** area displayed for the selected volume.

The Volume window displays the following tabs:

- **Overview tab**

Displays general information about the selected volume, and displays a pictorial representation of the space allocation of the volume, the protection status of the volume, and the performance of the volume. The Overview tab displays details about the encryption of the volume, such as the encryption status and the encryption type, the conversion status or rekey status, information about a volume that is being moved, such as the state and phase of the volume move, the destination node and aggregate to which the volume is being moved, the percentage of volume move that is complete, the estimated time to complete the volume move operation, and details of the volume move operation. This tab also displays information about whether the volume is blocked for input/output (I/O) operations and the application blocking the operation.

For FlexCache volumes, details about the origin of the FlexCache volume are displayed.

The refresh interval for performance data is 15 seconds.

This tab contains the following command button:

- **Cutover**

Opens the Cutover dialog box, which enables you to manually trigger the cutover.

The **Cutover** command button is displayed only if the volume move operation is in the “replication” or “hard deferred” state.

- **Snapshot Copies tab**

Displays the Snapshot copies of the selected volume. This tab contains the following command buttons:

- **Create**

Opens the Create Snapshot Copy dialog box, which enables you to create a Snapshot copy of the selected volume.

- **Configuration Settings**

Configures the Snapshot settings.

- **More Actions › Rename**

Opens the Rename Snapshot Copy dialog box, which enables you to rename a selected Snapshot copy.

- **More Actions › Restore**

Restores a Snapshot copy.

- **More Actions › Extend Expiry Period**

Extends the expiry period of a Snapshot copy.

- **Delete**

Deletes the selected Snapshot copy.

- **Refresh**

Updates the information in the window.

- **Data Protection tab**

Displays data protection information about the selected volume.

If the source volume (read/write volume) is selected, the tab displays all of the mirror relationships, vault relationships, and mirror and vault relationships that are related to the destination volume (DP volume). If the destination volume is selected, the tab displays the relationship with the source volume.

If some or all of the cluster peer relationships of the local cluster are in an unhealthy state, the Data Protection tab might take some time to display the protection relationships relating to a healthy cluster peer relationship. Relationships relating to unhealthy cluster peer relationships are not displayed.

- **Storage Efficiency tab**

Displays information in the following panes:

- Bar graph

Displays (in graphical format) the volume space that is used by data and Snapshot copies. You can view details about the space used before and after applying settings for storage efficiency savings.

- Details

Displays information about deduplication properties, including whether deduplication is enabled on the volume, the deduplication mode, the deduplication status, type, and whether inline or background compression is enabled on the volume.

- Last run details

Provides details about the last-run deduplication operation on the volume. Space savings resulting from compression and deduplication operations that are applied on the data on the volume are also displayed.

- **Performance tab**

Displays information about the average performance metrics, read performance metrics, and write performance metrics of the selected volume, including throughput, IOPS, and latency.

Changing the client time zone or the cluster time zone impacts the performance metrics graphs. You must refresh your browser to view the updated graphs.

- **FlexCache tab**

Displays details about FlexCache volumes only if the volume you selected is an origin volume that has FlexCache volumes associated with it. Otherwise, this tab does not appear.

## Related information

[Creating FlexVol volumes](#)

[Creating FlexClone volumes](#)

[Creating FlexClone files](#)

[Deleting volumes](#)

Setting the Snapshot copy reserve

Deleting Snapshot copies

Creating Snapshot copies outside a defined schedule

Editing volume properties

Changing the status of a volume

Enabling storage efficiency on a volume

Changing the deduplication schedule

Running deduplication operations

Splitting a FlexClone volume from its parent volume

Resizing volumes

Restoring a volume from a Snapshot copy

Scheduling automatic creation of Snapshot copies

Renaming Snapshot copies

Hiding the Snapshot copy directory

Viewing the FlexClone volume hierarchy

Creating FlexGroup volumes

Editing FlexGroup volumes

Resizing FlexGroup volumes

Changing the status of a FlexGroup volume

Deleting FlexGroup volumes

Viewing FlexGroup volume information

Creating FlexCache volumes

Editing FlexCache volumes

Resizing FlexCache volumes

Deleting FlexCache volumes

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