Move and copy volumes

ONTAP 9

NetApp
February 12, 2026

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Move a FlexVol volume overview

You can move or copy volumes for capacity utilization, improved performance, and to satisfy service-level agreements. Knowing how moving a FlexVol volume works helps you to determine whether the volume move satisfies service-level agreements and to understand where a volume move is in the volume move process.

FlexVol volumes are moved from one aggregate or node to another within the same storage virtual machine (SVM). A volume move does not disrupt client access during the move.

> During the cutover phase of a volume move operation, you cannot create FlexClone files or FlexClone LUNs of a FlexVol volume.

Moving a volume occurs in multiple phases:

- A new volume is made on the destination aggregate.
- The data from the original volume is copied to the new volume.

  During this time, the original volume is intact and available for clients to access.

- At the end of the move process, client access is temporarily blocked.

  During this time the system performs a final replication from the source volume to the destination volume, swaps the identities of the source and destination volumes, and changes the destination volume to the source volume.

- After completing the move, the system routes client traffic to the new source volume and resumes client access.

The move is not disruptive to client access because the time in which client access is blocked ends before clients notice a disruption and time out. Client access is blocked for 30 seconds by default. If the volume move operation cannot finish in the time that access is denied, the system aborts this final phase of the volume move operation and allows client access. The system attempts the final phase three times by default. After the third attempt, the system waits an hour before attempting the final phase sequence again. The system runs the final phase of the volume move operation until the volume move is complete.

Considerations and recommendations when moving volumes

There are several considerations and recommendations to be aware of when moving a volume. These are based on the volume you are moving as well as the system configuration such as MetroCluster. You should understand all the relevant issues before moving a volume.

General considerations and recommendations

- If you’re upgrading the release family for a cluster, don’t move a volume until after you upgrade all of the

nodes in the cluster.

This recommendation prevents you from inadvertently attempting to move a volume from a newer release family to an older release family.

- The source volume must be consistent.
- If you have assigned one or more aggregates to the associated storage virtual machine (SVM), the destination aggregate must be one of the assigned aggregates.
- You should only move a volume to a later ONTAP version.
- You cannot move a volume to or from a taken-over CFO aggregate.
- If a volume that contains LUNs isn't NVFAIL enabled before you move it, the volume will be NVFAIL enabled after you move it.
- You can move a volume from a Flash Pool aggregate to another Flash Pool aggregate.
  - The caching policies of that volume are also moved.
  - The move might affect volume performance.
- You can move volumes between a Flash Pool aggregate and a non-Flash Pool aggregate.
  - If you move a volume from a Flash Pool aggregate to a non-Flash Pool aggregate, ONTAP displays a message warning you that the move might affect volume performance and asks whether you want to continue.
  - If you move a volume from a non-Flash Pool aggregate to a Flash Pool aggregate, ONTAP assigns the `auto` caching policy.
- Volumes have the data-at-rest protections of the aggregate they reside on. If you move a volume from an aggregate that consists of NSE drives to one that does not, the volume no longer has NSE data-at-rest protection.
- If you're moving FabricPool optimized volumes from ONTAP 9.13.1 or earlier to ONTAP 9.15.1 or later, see the NetApp Knowledge Base: CONTAP-307878 - Unexpected reboot during FabricPool optimized volume move if the source ONTAP is less than 9.14.1 and destination is greater than 9.14.1.
- Beginning with ONTAP 9.15.1, moving volumes from an A400 system to an A70, A90, or A1K system may cause increased read latency issues. For details and recommended actions, see the NetApp Knowledge Base: CONTAP-556247 - Slow Compression / Decompression on volumes after being moved from A400 to A70, A90 and A1K.

FlexClone volume considerations and recommendations

- FlexClone volumes cannot be offline when they are being moved.
- You can move FlexClone volumes from one aggregate to another aggregate on the same node or another node in the same SVM without initiating the `vol clone split start` command.

  By initiating a volume move operation on a FlexClone volume, the clone volume is split during the move process to a different aggregate. After the volume move on the clone volume is complete, the volume that moved no longer appears as a clone, but appears instead as an independent volume without any clone relationship with the previous parent volume.

- FlexClone volume snapshots aren't lost after moving a clone.
- You can move FlexClone parent volumes from one aggregate to another aggregate.

  When you move a FlexClone parent volume, a temporary volume is left behind that acts as a parent

volume for all FlexClone volumes. No operations are allowed on the temporary volume except to take it offline or to delete it. After all FlexClone volumes are either split or destroyed, the temporary volume is cleaned up automatically.

- After you move a FlexClone child volume, the volume is no longer a FlexClone volume.
- FlexClone move operations are mutually exclusive from FlexClone copy or split operations.
- If a clone-splitting operation is in progress, moving a volume might fail.

  You should not move a volume until clone-splitting operations are completed.

MetroCluster considerations and recommendations

- During a volume move in a MetroCluster configuration, when a temporary volume is created on the destination aggregate on the source cluster a record of the temporary volume corresponding to the volume in the mirrored, but unassimilated, aggregate is also created on the surviving cluster.
- If a MetroCluster switchover occurs before the cutover, the destination volume has a record and is a temporary volume (a volume of type TMP).

  Move job restarts on the surviving (disaster recovery) cluster, reports a failure, and cleans up all move-related items including the temporary volume. In any event where cleanup cannot be done correctly, an EMS is generated alerting the system administrator to do the necessary cleanup.

- If a MetroCluster switchover occurs after the cutover phase has started but before the move job has completed (that is, the move reached a stage where it can update the cluster to point to the destination aggregate), the move job restarts on the surviving (disaster recovery) cluster and runs to completion.

  All move-related items are cleaned up including the temporary volume (original source). In any event where cleanup cannot be done correctly, an EMS is generated alerting the system administrator to do the necessary cleanup.

- Neither forced nor unforced MetroCluster switchbacks are allowed if there are any volume move operations in progress for volumes belonging to the switched over site.

  Switchbacks aren’t blocked when volume move operations are in progress for volumes local to the surviving site.

- Unforced MetroCluster switchovers are blocked, but forced MetroCluster switchovers aren’t blocked if there are any volume move operations in progress.

Requirements for moving volumes in a SAN environment

You need to prepare before moving a volume in a SAN environment.

Before moving a volume containing LUNs or namespaces, you must meet the following requirements:

- For volumes containing one or more LUNs, you should have a minimum of two paths per LUN (LIFs) connecting to each node in the cluster.

  This eliminates single points of failure and enables the system to survive component failures.

- For volumes containing namespaces, the cluster must be running ONTAP 9.6 or later.

Volume move is not supported for NVMe configurations running ONTAP 9.5.

Move an ONTAP volume

You can move a FlexVol volume to a different aggregate, node, or both within the same storage virtual machine (SVM) to balance storage capacity after determining that there is a storage capacity imbalance.

About this task

By default, if the cutover operation fails to complete within 30 seconds, it will retry. You can adjust the default behavior by using the `-cutover-window` and `-cutover-action` parameters, both of which require advanced privilege level access.

You must be a cluster administrator to perform this task.

Before you begin

- If you are moving a volume that uses 8K adaptive compression to one of the following platforms, you should increase the size of the volume's active file system before moving the volume. Data is compressed differently on these platforms so that space is saved at the aggregate level instead of the volume level. Because of this difference, the size of the volume's active file system should be increase by the amount of 8k compression savings to prevent the volume from running out of space during the volume move.
  - AFF and FAS platforms that support dedicated offload processor storage efficiency

    Learn more about AFF and FAS platforms that support dedicated offload processor storage efficiency.

  - AFF C-Series platforms

    See the Hardware Universe for a full list of C-series platforms.
- If you are moving a data protection mirror and you have not initialized the mirror relationship, use the `snapmirror initialize` command to initialize the mirror relationship. Learn more about `snapmirror initialize` in the ONTAP command reference.

  Data protection mirror relationships must be initialized before you can move one of the volumes.

Steps

1. Determine an aggregate to which you can move the volume:

   ```
   volume move target-aggr show
   ```

   The aggregate that you select must have enough space for the volume; that is, the available size is bigger than the volume that you are moving.

   The following example shows that the vs2 volume can be moved to any of the listed aggregates:

```
cluster1::> volume move target-aggr show -vserver vs2 -volume user_max
Aggregate Name   Available Size   Storage Type
--------------   --------------   ------------
aggr2            467.9GB          hdd
node12a_aggr3    10.34GB          hdd
node12a_aggr2    10.36GB          hdd
node12a_aggr1    10.36GB          hdd
node12a_aggr4    10.36GB          hdd
5 entries were displayed.
```

Learn more about `volume move target-aggr show` in the ONTAP command reference.

2. Perform a validation check to verify that the volume can be moved to the intended aggregate:

```
volume move start -perform-validation-only
```

Learn more about `volume move start` in the ONTAP command reference.

3. Move the volume:

```
volume move start
```

The following command moves the user_max volume on the vs2 SVM to the node12a_aggr3 aggregate. The move runs as a background process.

```
cluster1::> volume move start -vserver vs2 -volume user_max
-destination-aggregate node12a_aggr3
```

4. Determine the status of the volume move operation:

```
volume move show
```

The following example shows the state of a volume move that completed the replication phase and is in the cutover phase:

```
cluster1::> volume move show
Vserver   Volume     State    Move Phase  Percent-Complete Time-To-
Complete
--------- ---------- -------- ----------  ----------------
----------------
vs2       user_max   healthy  cutover     -                -
```

The volume move is complete when it no longer appears in the `volume move show` command output.

Learn more about `volume move show` in the ONTAP command reference.

5. Optionally, view compression savings:

```
volume show-footprint -vserver <SVM> -volume <volume_name>
```

Additional aggregate-level savings might be realized through a post-process conversion scan that runs automatically and shortly after the volume move is completed.

Related information

- Considerations and recommendations when moving volumes

Increase an ONTAP volume's active file system before migrating from 8k adaptive compression

Platforms that support 8k adaptive compression save space at the volume level. AFF C-Series platforms and platforms that support 32k compression save space at the aggregate level. When migrating a volume from 8k adaptive compression to an AFF C-Series platform or to a platform with 32k compression, you need to increase the size of the volume's active file system by the 8k compression savings. This prevents the volume from running out of free space during the volume move.

The following systems support 32k compression:

Unresolved directive in volumes/increase-volume-active-file-system-size.adoc - include::_include/dedicated-offload-processor-supported-platforms.adoc[]

Learn more about AFF and FAS platforms that support 32k compression.

See the Hardware Universe for a full list of AFF C-series platforms.

About this task

Perform these steps if you are migrating your data using a volume move operation. If you are migrating your data using a SnapMirror operation, you do not need to manually increase the size of the active file system. SnapMirror destination volumes use volume autosize by default and therefore are not expected to run out of space due to compression savings being realized at the aggregate layer instead of the volume layer.

Before you begin

If logical space reporting and enforcement is not enabled on your volume, you can optionally enable it by setting the `-is-space-reporting-logical` and `-is-space-enforcement-logical` parameters to **true**. Enabling these settings before the volume move can help you assess if your volume is large enough to accommodate the compression savings loss at the volume layer when you convert from 8k compression. You should enable these settings on the volume. If you enable these settings at the SVM level, they are applied to newly created volumes only.

Steps

1. Verify the volume's current size and snapshot reserve:

```
volume show-space
```

2. Check the volume's compression space savings:

```
volume show -vserver -volume -fields compression-space-saved
```

3. Increase the volume's active filesystem size by the amount shown for `compression-space-saved` plus the snapshot reserve.

```
volume size -vserver <vserver_name> -volume <volume_name> -new-size
+<size>
```

Example

IF a volume is 100GB and has a 20% snapshot reserve; then the the active filesystem is 80GB and the snapshot reserve is 20GB. To increase the active filesystem by 20GB, you must add 25GB to the overall volume size; that is, 20GB for the active filesystem and 5GB (20%) for the snapshot reserve.

```
volume size -vserver svm1 -volume volx -size +20GB
```

4. Verify that the size of the volume is increase:

```
volume show -vserver <vserver_name> -volume <volume_name> -fields size
```

Result

Your volume's active file system size is increased and you are ready to move the volume.

What's next?

Perform a volume move to migrate your data.

Commands for moving volumes in ONTAP

The ONTAP CLI provides specific commands for managing volume movement. Depending on what you need to do, use the following commands to manage quota rules and quota policies:

If you want to…	Use this command…
Abort an active volume move operation.	`volume move abort`

If you want to…	Use this command…
Show status of a volume moving from one aggregate to another aggregate.	`volume move show`
Start moving a volume from one aggregate to another aggregate.	`volume move start`
Manage target aggregates for volume move.	`volume move target-aggr`
Trigger cutover of a move job.	`volume move trigger-cutover`
Change the amount of time client access is blocked if the default is not adequate.	`volume move start` or `volume move modify` with the `-cutover-window` parameter. The `volume move modify` command is an advanced command and the `-cutover-window` is an advanced parameter.
Determine what the system does if the volume move operation cannot be completed during the time client access is blocked.	`volume move start` or `volume move modify` with the `-cutover-action` parameter. The `volume move modify` command is an advanced command and the `-cutover-action` is an advanced parameter.

Related information

- volume move

Methods for copying a volume

The method you use for copying a volume depends on whether you are copying it to the same aggregate or a different aggregate, and whether you want to retain snapshots from the original volume. Copying a volume creates a standalone copy of a volume that you can use for testing and other purposes.

The following table lists characteristics of the copy and the methods used to create that copy.

If you want to copy a volume…	Then the method you use is…
Within the same aggregate and you do not want to copy snapshots from the original volume.	Creating a FlexClone volume of the original volume.
To another aggregate and you do not want to copy snapshots from the original volume.	Creating a FlexClone volume of the original volume, and then moving the volume to another aggregate by using the `volume move` command.

If you want to copy a volume…	Then the method you use is…
To another aggregate and preserve all of the snapshots from the original volume.	Replicating the original volume using SnapMirror, and then breaking the SnapMirror relationship to make a read-write volume copy.

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