Manage SnapMirror volume replication

ONTAP 9

NetApp
February 20, 2026

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Convert an existing ONTAP SnapMirror DP-type relationship to XDP

If you are upgrading to ONTAP 9.12.1 or later, you must convert DP-type relationships to XDP before upgrading. ONTAP 9.12.1 and later does not support DP-type relationships. You can easily convert an existing DP-type relationship to XDP to take advantage of version-flexible SnapMirror.

Before upgrading to ONTAP 9.12.1, you must convert existing DP-type relationships to XDP before you can upgrade to ONTAP 9.12.1 and later releases.

About this task

- SnapMirror does not automatically convert existing DP-type relationships to XDP. To convert the relationship, you need to break and delete the existing relationship, create a new XDP relationship, and resync the relationship.
- When planning your conversion, you should be aware that background preparation and the data warehousing phase of an XDP SnapMirror relationship can take a long time. It is not uncommon to see the SnapMirror relationship reporting the status "preparing" for an extended time period.

> After you convert a SnapMirror relationship type from DP to XDP, space-related settings, such as autosize and space guarantee are no longer replicated to the destination.

Steps

1. From the destination cluster, ensure that the SnapMirror relationship is type DP, that the mirror state is SnapMirrored, the relationship status is Idle, and the relationship is healthy:

   ```
   snapmirror show -destination-path <SVM:volume>
   ```

   The following example shows the output from the `snapmirror show` command:

```
cluster_dst::>snapmirror show -destination-path svm_backup:volA_dst

Source Path: svm1:volA
Destination Path: svm_backup:volA_dst
Relationship Type: DP
SnapMirror Schedule: -
Tries Limit: -
Throttle (KB/sec): unlimited
Mirror State: Snapmirrored
Relationship Status: Idle
Transfer Snapshot: -
Snapshot Progress: -
Total Progress: -
Snapshot Checkpoint: -
Newest Snapshot: snapmirror.10af643c-32d1-11e3-954b-
123478563412_2147484682.2014-06-27_100026
Newest Snapshot Timestamp: 06/27 10:00:55
Exported Snapshot: snapmirror.10af643c-32d1-11e3-954b-
123478563412_2147484682.2014-06-27_100026
Exported Snapshot Timestamp: 06/27 10:00:55
Healthy: true
```

You might find it helpful to retain a copy of the `snapmirror show` command output to keep track existing of the relationship settings. Learn more about `snapmirror show` in the ONTAP command reference.

2. From the source and the destination volumes, ensure that both volumes have a common snapshot:

```
volume snapshot show -vserver <SVM> -volume <volume>
```

The following example shows the `volume snapshot show` output for the source and the destination volumes:

```
cluster_src:> volume snapshot show -vserver vsm1 -volume volA
---Blocks---
Vserver Volume Snapshot State Size Total% Used%
-------- ------- ------------------------------ -------- --------
------ -----
svm1 volA
weekly.2014-06-09_0736 valid 76KB 0% 28%
weekly.2014-06-16_1305 valid 80KB 0% 29%
daily.2014-06-26_0842 valid 76KB 0% 28%
hourly.2014-06-26_1205 valid 72KB 0% 27%
hourly.2014-06-26_1305 valid 72KB 0% 27%
hourly.2014-06-26_1405 valid 76KB 0% 28%
hourly.2014-06-26_1505 valid 72KB 0% 27%
hourly.2014-06-26_1605 valid 72KB 0% 27%
daily.2014-06-27_0921 valid 60KB 0% 24%
hourly.2014-06-27_0921 valid 76KB 0% 28%
snapmirror.10af643c-32d1-11e3-954b-123478563412_2147484682.2014-06-
27_100026
valid 44KB 0% 19%
11 entries were displayed.


cluster_dest:> volume snapshot show -vserver svm_backup -volume volA_dst
---Blocks---
Vserver Volume Snapshot State Size Total% Used%
-------- ------- ------------------------------ -------- --------
------ -----
svm_backup volA_dst
weekly.2014-06-09_0736 valid 76KB 0% 30%
weekly.2014-06-16_1305 valid 80KB 0% 31%
daily.2014-06-26_0842 valid 76KB 0% 30%
hourly.2014-06-26_1205 valid 72KB 0% 29%
hourly.2014-06-26_1305 valid 72KB 0% 29%
hourly.2014-06-26_1405 valid 76KB 0% 30%
hourly.2014-06-26_1505 valid 72KB 0% 29%
hourly.2014-06-26_1605 valid 72KB 0% 29%
daily.2014-06-27_0921 valid 60KB 0% 25%
hourly.2014-06-27_0921 valid 76KB 0% 30%
snapmirror.10af643c-32d1-11e3-954b-123478563412_2147484682.2014-06-
27_100026
```

3. To ensure scheduled updates will not run during the conversion, quiesce the existing DP-type relationship:

```
snapmirror quiesce -source-path <SVM:volume> -destination-path
<SVM:volume>
```

You must run this command from the destination SVM or the destination cluster.

The following example quiesces the relationship between the source volume `volA` on `svm1` and the destination volume `volA_dst` on `svm_backup`:

```
cluster_dst::> snapmirror quiesce -destination-path svm_backup:volA_dst
```

Learn more about `snapmirror quiesce` in the ONTAP command reference.

4. Break the existing DP-type relationship:

```
snapmirror break -destination-path <SVM:volume>
```

You must run this command from the destination SVM or the destination cluster.

The following example breaks the relationship between the source volume `volA` on `svm1` and the destination volume `volA_dst` on `svm_backup`:

```
cluster_dst::> snapmirror break -destination-path svm_backup:volA_dst
```

Learn more about `snapmirror break` in the ONTAP command reference.

5. If automatic deletion of snapshots is enabled on the destination volume, disable it:

```
volume snapshot autodelete modify -vserver _SVM_ -volume _volume_
-enabled false
```

The following example disables snapshot autodelete on the destination volume `volA_dst`:

```
cluster_dst::> volume snapshot autodelete modify -vserver svm_backup
-volume volA_dst -enabled false
```

6. Delete the existing DP-type relationship:

```
snapmirror delete -destination-path <SVM:volume>
```

Learn more about `snapmirror-delete` in the ONTAP command reference.

You must run this command from the destination SVM or the destination cluster.

The following example deletes the relationship between the source volume `volA` on `svm1` and the destination volume `volA_dst` on `svm_backup`:

```
cluster_dst::> snapmirror delete -destination-path svm_backup:volA_dst
```

7. Release the origin SVM disaster recovery relationship on the source:

```
snapmirror release -destination-path <SVM:volume> -relationship-info
-only true
```

The following example releases the SVM disaster recovery relationship:

```
cluster_src::> snapmirror release -destination-path svm_backup:volA_dst
-relationship-info-only true
```

Learn more about `snapmirror release` in the ONTAP command reference.

8. You can use the output you retained from the `snapmirror show` command to create the new XDP-type relationship:

```
snapmirror create -source-path <SVM:volume> -destination-path
<SVM:volume>  -type XDP -schedule <schedule> -policy <policy>
```

The new relationship must use the same source and destination volume. Learn more about the commands described in this procedure in the ONTAP command reference.

You must run this command from the destination SVM or the destination cluster.

The following example creates a SnapMirror disaster recovery relationship between the source volume `volA` on `svm1` and the destination volume `volA_dst` on `svm_backup` using the default `MirrorAllSnapshots` policy:

```
cluster_dst::> snapmirror create -source-path svm1:volA -destination
-path svm_backup:volA_dst
-type XDP -schedule my_daily -policy MirrorAllSnapshots
```

9. Resync the source and destination volumes:

```
snapmirror resync -source-path <SVM:volume> -destination-path
<SVM:volume>
```

To improve resync time, you can use the `-quick-resync` option, but you should be aware that storage efficiency savings can be lost.

> You must run this command from the destination SVM or the destination cluster. Although resync does not require a baseline transfer, it can be time-consuming. You might want to run the resync in off-peak hours.

The following example resyncs the relationship between the source volume `volA` on `svm1` and the destination volume `volA_dst` on `svm_backup`:

```
cluster_dst::> snapmirror resync -source-path svm1:volA -destination
-path svm_backup:volA_dst
```

Learn more about `snapmirror resync` in the ONTAP command reference.

10. If you disabled automatic deletion of snapshots, reenable it:

```
volume snapshot autodelete modify -vserver <SVM> -volume <volume>
-enabled true
```

After you finish

1. Use the `snapmirror show` command to verify that the SnapMirror relationship was created.

   Learn more about `snapmirror show` in the ONTAP command reference.

2. Once the SnapMirror XDP destination volume begins updating snapshots as defined by the SnapMirror policy, use the output of `snapmirror list-destinations` command from the source cluster to display the new SnapMirror XDP relationship.

Additional information about DP-type relationships

Beginning with ONTAP 9.3, XDP mode is the default, and any invocations of DP mode on the command line or in new or existing scripts are automatically converted to XDP mode.

Existing relationships are not affected. If a relationship is already of type DP, it will continue to be of type DP. Beginning with ONTAP 9.5, MirrorAndVault is the default policy when no data protection mode is specified or when XDP mode is specified as the relationship type. The table below shows the expected behavior.

If you specify…	The type is…	The default policy (if you do not specify a policy) is…
DP	XDP	MirrorAllSnapshots (SnapMirror DR)

Nothing	XDP	MirrorAndVault (unified replication)
XDP	XDP	MirrorAndVault (unified replication)

As the table shows, the default policies assigned to XDP in different circumstances ensure that the conversion maintains the functional equivalence of the previous types. Of course, you can use different policies as needed, including policies for unified replication:

If you specify…	And the policy is…	The result is…
DP	MirrorAllSnapshots	SnapMirror DR
	XDPDefault	SnapVault
	MirrorAndVault	Unified replication
XDP	MirrorAllSnapshots	SnapMirror DR
	XDPDefault	SnapVault
	MirrorAndVault	Unified replication

The only exceptions to conversion are as follows:

- SVM data protection relationships continue to default to DP mode in ONTAP 9.3 and earlier.

  Beginning with ONTAP 9.4, SVM data protection relationships default to XDP mode.

- Root volume load-sharing data protection relationships continue to default to DP mode.
- SnapLock data protection relationships continue to default to DP mode in ONTAP 9.4 and earlier.

  Beginning with ONTAP 9.5, SnapLock data protection relationships default to XDP mode.

- Explicit invocations of DP continue to default to DP mode if you set the following cluster-wide option:

  ```
  options replication.create_data_protection_rels.enable on
  ```

  This option is ignored if you do not explicitly invoke DP.

Related information

- snapmirror create
- snapmirror delete
- snapmirror quiesce
- snapmirror release
- snapmirror resync

Convert the type of an ONTAP SnapMirror relationship

Beginning with ONTAP 9.5, SnapMirror synchronous is supported. You can convert an SnapMirror asynchronous relationship to a SnapMirror synchronous relationship or vice versa without performing a baseline transfer.

About this task

You cannot convert an SnapMirror asynchronous relationship to a SnapMirror synchronous relationship or vice versa by changing the SnapMirror policy.

Steps

- **Converting an SnapMirror asynchronous relationship to a SnapMirror synchronous relationship**
  a. From the destination cluster, delete the SnapMirror asynchronous relationship:

     ```
     snapmirror delete -destination-path <SVM:volume>
     ```

     ```
     cluster2::>snapmirror delete -destination-path vs1_dr:vol1
     ```

  b. From the source cluster, release the SnapMirror relationship without deleting the common snapshots:

     ```
     snapmirror release -relationship-info-only true -destination-path
     <destination_SVM>:<destination_volume>
     ```

     ```
     cluster1::>snapmirror release -relationship-info-only true
     -destination-path vs1_dr:vol1
     ```

  c. From the destination cluster, create a SnapMirror synchronous relationship:

     ```
     snapmirror create -source-path src_SVM:src_volume -destination-path
     <destination_SVM>:<destination_volume> -policy sync-mirror
     ```

     ```
     cluster2::>snapmirror create -source-path vs1:vol1 -destination-path
     vs1_dr:vol1 -policy sync
     ```

  d. Resynchronize the SnapMirror synchronous relationship:

     ```
     snapmirror resync -destination-path <destination_SVM:destination_volume>
     ```

     ```
     cluster2::>snapmirror resync -destination-path vs1_dr:vol1
     ```

- **Converting a SnapMirror synchronous relationship to an SnapMirror asynchronous relationship**
  a. From the destination cluster, quiesce the existing SnapMirror synchronous relationship:

     ```
     snapmirror quiesce -destination-path <destination_SVM>:<destination_volume>
     ```

```
cluster2::> snapmirror quiesce -destination-path vs1_dr:vol1
```

b. From the destination cluster, delete the SnapMirror asynchronous relationship:

```
snapmirror delete -destination-path <SVM:volume>
```

```
cluster2::>snapmirror delete -destination-path vs1_dr:vol1
```

c. From the source cluster, release the SnapMirror relationship without deleting the common snapshots:

```
snapmirror release -relationship-info-only true -destination-path
<destination_SVM:destination_volume>
```

```
cluster1::>snapmirror release -relationship-info-only true
-destination-path vs1_dr:vol1
```

d. From the destination cluster, create an SnapMirror asynchronous relationship:

```
snapmirror create -source-path src_SVM:src_volume -destination-path
<destination_SVM:destination_volume> -policy MirrorAllSnapshots
```

```
cluster2::>snapmirror create -source-path vs1:vol1 -destination-path
vs1_dr:vol1 -policy sync
```

e. Resynchronize the SnapMirror synchronous relationship:

```
snapmirror resync -destination-path <destination_SVM:destination_volume>
```

```
cluster2::>snapmirror resync -destination-path vs1_dr:vol1
```

Related information

- snapmirror create
- snapmirror delete
- snapmirror quiesce
- snapmirror release
- snapmirror resync

Convert the mode of an ONTAP SnapMirror synchronous relationship

Beginning with ONTAP 9.5, SnapMirror synchronous relationships are supported. You

can convert the mode of a SnapMirror synchronous relationship from StrictSync to Sync or vice versa.

About this task

You cannot modify the policy of a SnapMirror synchronous relationship to convert its mode.

Steps

1. From the destination cluster, quiesce the existing SnapMirror synchronous relationship:

   `snapmirror quiesce -destination-path <destination_SVM>:<destination_volume>`

   ```
   cluster2::> snapmirror quiesce -destination-path vs1_dr:vol1
   ```

2. From the destination cluster, delete the existing SnapMirror synchronous relationship:

   `snapmirror delete -destination-path <destination_SVM>:<destination_volume>`

   ```
   cluster2::> snapmirror delete -destination-path vs1_dr:vol1
   ```

3. From the source cluster, release the SnapMirror relationship without deleting the common snapshots:

   `snapmirror release -relationship-info-only true -destination-path <destination_SVM>:<destination_volume>`

   ```
   cluster1::> snapmirror release -relationship-info-only true -destination
   -path vs1_dr:vol1
   ```

4. From the destination cluster, create a SnapMirror synchronous relationship by specifying the mode to which you want to convert the SnapMirror synchronous relationship:

   `snapmirror create -source-path vs1:vol1 -destination-path <destination_SVM>:<destination_volume> -policy Sync|StrictSync`

   ```
   cluster2::> snapmirror create -source-path vs1:vol1 -destination-path
   vs1_dr:vol1 -policy Sync
   ```

5. From the destination cluster, resynchronize the SnapMirror relationship:

   `snapmirror resync -destination-path <destination_SVM>:<destination_volume>`

   ```
   cluster2::> snapmirror resync -destination-path vs1_dr:vol1
   ```

Related information

- snapmirror create
- snapmirror delete
- snapmirror quiesce
- snapmirror release
- snapmirror resync

Create and delete ONTAP SnapMirror failover test volumes

Beginning with ONTAP 9.14.1, you can use System Manager to create a volume clone to test SnapMirror failover and disaster recovery without disrupting the active SnapMIrror relationship. When you finish testing, you can clean up the associated data and delete the test volume.

Create a SnapMirror failover test volume

About this task

- You can perform failover tests on synchronous and SnapMirror asynchronous relationships.
- A volume clone is created to perform the disaster recovery test.
- The clone volume is created on the same storage VM as the SnapMirror destination.
- You can use FlexVol and FlexGroup SnapMirror relationships.
- If a test clone already exists for the selected relationship, you cannot create another clone for that relationship.
- SnapLock vault relationships are not supported.

Before you begin

- You must be a cluster administrator.
- The SnapMirror license must be installed on the source and destination cluster.

Steps

1. On the destination cluster, select **Protection > Relationships**.
2. Select ⋮ next to the relationship source and choose **Test Failover**.
3. In the **Test Failover** window, select **Test Failover**.
4. Select **Storage > Volumes**, and verify that the test failover volume is listed.
5. Select **Storage > Shares**.
6. Select + Add and choose **Share**.
7. In the **Add share** window, type a name for the share in the **Share Name** field.
8. In the **Folder** field, select **Browse**, select the test clone volume, and **Save**.
9. At the bottom of the **Add share** window, choose **Save**.
10. In the **Storage > Shares** pane, locate the share you created and select ⌄ to view the share information.
11. Under **SMB/CIFS Access**, copy or make note of the access path for the share; for example, `\\123.456.7.890\failover_test`.

12. Use the SMB access path to open the share on the client and verify that the test volume has read and write capabilities.

Clean up failover data and delete the test volume

After you have completed failover testing, you can clean up all data associated with the test volume and delete it.

Steps

1. On the destination cluster, select **Protection > Relationships**.
2. Select ⋮ next to the relationship source and choose **Clean Up Test Failover**.
3. In the **Clean Up Test Failover** window, select **Clean Up**.
4. Select **Storage > Volumes** and verify that the test volume was deleted.

Serve data from a SnapMirror DR destination volume

Make the ONTAP SnapMirror destination volume writeable

You need to make the destination volume writeable before you can serve data from the volume to clients. To serve data from a mirror destination when a source becomes unavailable, stop scheduled transfers to the destination, and then break the SnapMirror relationship to make the destination writable.

About this task

You must perform this task from the destination SVM or the destination cluster.

Steps

You can use System Manager or the ONTAP CLI to make a destination volume writable.

System Manager

1. Select the protection relationship: click **Protection > Relationships**, and then click the desired volume name.
2. Click ⋮.
3. Stop scheduled transfers : click **Pause**.
4. Make the destination writable: click **Break**.
5. Go to the main **Relationships** page to verify that the relationship state displays as "broken off".

Next steps

You need to reverse resynchronize the replication relationship after you make a destination volume writeable.

When the disabled source volume is available again, you should reverse resynchronize the relationship again to copy the current data to the original source volume.

CLI

1. Stop scheduled transfers to the destination:

   ```
   snapmirror quiesce -source-path <SVM:volume|cluster://SVM/volume>
   -destination-path <SVM:volume|cluster://SVM/volume>
   ```

   The following example stops scheduled transfers between the source volume `volA` on `svm1` and the destination volume `volA_dst` on `svm_backup`:

   ```
   cluster_dst::> snapmirror quiesce -source-path svm1:volA
   -destination-path svm_backup:volA_dst
   ```

   Learn more about `snapmirror quiesce` in the ONTAP command reference.

2. Stop ongoing transfers to the destination:

   ```
   snapmirror abort -source-path <SVM:volume|cluster://SVM/volume>
   -destination-path <SVM:volume|cluster://SVM/volume>
   ```

   ⓘ This step is not required for SnapMirror synchronous relationships (supported beginning with ONTAP 9.5).

   The following example stops ongoing transfers between the source volume `volA` on `svm1` and the destination volume `volA_dst` on `svm_backup`:

   ```
   cluster_dst::> snapmirror abort -source-path svm1:volA -destination
   -path svm_backup:volA_dst
   ```

Learn more about `snapmirror abort` in the ONTAP command reference.

3. Break the SnapMirror DR relationship:

```
snapmirror break -source-path <SVM:volume|cluster://SVM/volume>
-destination-path <SVM:volume|cluster://SVM/volume>
```

The following example breaks the relationship between the source volume `volA` on `svm1` and the destination volume `volA_dst` on `svm_backup`:

```
cluster_dst::> snapmirror break -source-path svm1:volA -destination
-path svm_backup:volA_dst
```

Learn more about `snapmirror break` in the ONTAP command reference.

Next steps

You need to resynchronize the replication relationship after you make a destination volume writeable.

Other ways to do this in ONTAP

To perform these tasks with…	See this content…
System Manager Classic (available with ONTAP 9.7 and earlier)	Volume disaster recovery overview

Configure the ONTAP SnapMirror destination volume for data access

After making the destination volume writeable, you must configure the volume for data access. NAS clients, NVMe subsystem, and SAN hosts can access the data from the destination volume until the source volume is reactivated.

NAS environment:

1. Mount the NAS volume to the namespace using the same junction path that the source volume was mounted to in the source SVM.
2. Apply the appropriate ACLs to the SMB shares at the destination volume.
3. Assign the NFS export policies to the destination volume.
4. Apply the quota rules to the destination volume.
5. Redirect clients to the destination volume.
6. Remount the NFS and SMB shares on the clients.

SAN environment:

1. Map the LUNs in the volume to the appropriate initiator group.
2. For iSCSI, create iSCSI sessions from the SAN host initiators to the SAN LIFs.

3. On the SAN client, perform a storage re-scan to detect the connected LUNs.

For information about NVMe environment, see SAN administration.

Reactivate the original ONTAP SnapMirror source volume

You can reestablish the original data protection relationship between the source and destination volumes when you no longer need to serve data from the destination.

About this task

- The procedure below assumes that the baseline in the original source volume is intact. If the baseline is not intact, you must create and initialize the relationship between the volume you are serving data from and the original source volume before performing the procedure.
- Background preparation and the data warehousing phase of an XDP SnapMirror relationship can take a long time. It is not uncommon to see the SnapMirror relationship reporting the status "preparing" for an extended time period.

Steps

1. Reverse the original data protection relationship:

   `snapmirror resync -source-path` *`SVM:volume`* `-destination-path` *`SVM:volume`*

   Learn more about `snapmirror resync` in the ONTAP command reference.

   > You must run this command from the original source SVM or the original source cluster. Although resync does not require a baseline transfer, it can be time-consuming. You might want to run the resync in off-peak hours. The command fails if a common snapshot does not exist on the source and destination. Use `snapmirror initialize` to re-initialize the relationship. Learn more about `snapmirror initialize` in the ONTAP command reference.

   The following example reverses the relationship between the original source volume, `volA` on `svm1`, and the volume you are serving data from, `volA_dst` on `svm_backup`:

   ```
   cluster_src::> snapmirror resync -source-path svm_backup:volA_dst
   -destination-path svm1:volA
   ```

2. When you are ready to reestablish data access to the original source, stop access to the original destination volume. One way to do this is to stop the original destination SVM:

   `vserver stop -vserver` *`SVM`*

   > You must run this command from the original destination SVM or the original destination cluster. This command stops user access to the entire original destination SVM. You may want to stop access to the original destination volume using other methods.

   The following example stops the original destination SVM:

```
cluster_dst::> vserver stop svm_backup
```

Learn more about `vserver stop` in the ONTAP command reference.

3. Update the reversed relationship:

`snapmirror update -source-path SVM:volume -destination-path SVM:volume`

> You must run this command from the original source SVM or the original source cluster.

The following example updates the relationship between the volume you are serving data from, `volA_dst` on `svm_backup`, and the original source volume, `volA` on `svm1`:

```
cluster_src::> snapmirror update -source-path svm_backup:volA_dst
-destination-path svm1:volA
```

Learn more about `snapmirror update` in the ONTAP command reference.

4. From the original source SVM or the original source cluster, stop scheduled transfers for the reversed relationship:

`snapmirror quiesce -source-path SVM:volume -destination-path SVM:volume`

> You must run this command from the original source SVM or the original source cluster.

The following example stops scheduled transfers between the original destination volume, `volA_dst` on `svm_backup`, and the original source volume, `volA` on `svm1`:

```
cluster_src::> snapmirror quiesce -source-path svm_backup:volA_dst
-destination-path svm1:volA
```

Learn more about `snapmirror quiesce` in the ONTAP command reference.

5. When the final update is complete and the relationship indicates "Quiesced" for the relationship status, run the following command from the original source SVM or the original source cluster to break the reversed relationship::

`snapmirror break -source-path SVM:volume -destination-path SVM:volume`

> You must run this command from the original source SVM or the source cluster.

The following example breaks the relationship between the original destination volume, `volA_dst` on `svm_backup`, and the original source volume, `volA` on `svm1`:

```
cluster_scr::> snapmirror break -source-path svm_backup:volA_dst
-destination-path svm1:volA
```

Learn more about `snapmirror break` in the ONTAP command reference.

6. From the original source SVM or the original source cluster, delete the reversed data protection relationship:

   `snapmirror delete -source-path SVM:volume -destination-path SVM:volume`

   You must run this command from the original source SVM or the original source cluster.

   The following example deletes the reversed relationship between the original source volume, `volA` on `svm1`, and the volume you are serving data from, `volA_dst` on `svm_backup`:

   ```
   cluster_src::> snapmirror delete -source-path svm_backup:volA_dst
   -destination-path svm1:volA
   ```

   Learn more about `snapmirror delete` in the ONTAP command reference.

7. Release the reversed relationship from the original destination SVM or the original destination cluster.

   `snapmirror release -source-path SVM:volume -destination-path SVM:volume`

   You must run this command from the original destination SVM or the original destination cluster.

   The following example releases the reversed relationship between the original destination volume, `volA_dst` on `svm_backup`, and the original source volume, `volA` on `svm1`:

   ```
   cluster_dst::> snapmirror release -source-path svm_backup:volA_dst
   -destination-path svm1:volA
   ```

   Learn more about `snapmirror release` in the ONTAP command reference.

8. Reestablish the original data protection relationship from the original destination:

   `snapmirror resync -source-path SVM:volume -destination-path SVM:volume`

   The following example reestablishes the relationship between the original source volume, `volA` on `svm1`, and the original destination volume, `volA_dst` on `svm_backup`:

   ```
   cluster_dst::> snapmirror resync -source-path svm1:volA -destination
   -path svm_backup:volA_dst
   ```

Learn more about `snapmirror resync` in the ONTAP command reference.

9. If needed, start the original destination SVM:

   `vserver start -vserver SVM`

   The following example starts the original destination SVM:

   ```
   cluster_dst::> vserver start svm_backup
   ```

   Learn more about `vserver start` in the ONTAP command reference.

After you finish

Use the `snapmirror show` command to verify that the SnapMirror relationship was created.

Learn more about `snapmirror show` in the ONTAP command reference.

Restore files from a SnapMirror destination volume

Restore a file, LUN, or NVMe namespace from an ONTAP SnapMirror destination

You can restore a single file, LUN, a set of files or LUNs from a snapshot, or an NVMe namespace from a SnapMirror destination volume. Beginning with ONTAP 9.7, you can also restore NVMe namespaces from a SnapMirror synchronous destination. You can restore files to the original source volume or to a different volume.

Before you begin

To restore a file or LUN from a SnapMirror synchronous destination (supported beginning with ONTAP 9.5), you must first delete and release the relationship.

About this task

The volume to which you are restoring files or LUNs (the destination volume) must be a read-write volume:

- SnapMirror performs an *incremental restore* if the source and destination volumes have a common snapshot (as is typically the case when you are restoring to the original source volume).
- Otherwise, SnapMirror performs a *baseline restore*, in which the specified snapshot and all the data blocks it references are transferred to the destination volume.

Steps

1. List the snapshots in the destination volume:

   `volume snapshot show -vserver <SVM> -volume volume`

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

   The following example shows the snapshots on the `vserverB:secondary1` destination:

```
cluster_dst::> volume snapshot show -vserver vserverB -volume secondary1

Vserver     Volume      Snapshot                State    Size  Total%
Used%
-------     ------      ---------- ----------- ------   -----  ------
-----
vserverB    secondary1  hourly.2013-01-25_0005  valid   224KB     0%
0%
                        daily.2013-01-25_0010   valid   92KB      0%
0%
                        hourly.2013-01-25_0105  valid   228KB     0%
0%
                        hourly.2013-01-25_0205  valid   236KB     0%
0%
                        hourly.2013-01-25_0305  valid   244KB     0%
0%
                        hourly.2013-01-25_0405  valid   244KB     0%
0%
                        hourly.2013-01-25_0505  valid   244KB     0%
0%

7 entries were displayed.
```

2. Restore a single file or LUN or a set of files or LUNs from a snapshot in a SnapMirror destination volume:

```
snapmirror restore -source-path <SVM:volume>|<cluster://SVM/volume>, …
-destination-path <SVM:volume>|<cluster://SVM/volume>, … -source-snapshot
snapshot -file-list <source_file_path,@destination_file_path>
```

You must run this command from the destination SVM or the destination cluster.

The following command restores the files `file1` and `file2` from the snapshot `daily.2013-01-25_0010` in the original destination volume `secondary1`, to the same location in the active file system of the original source volume `primary1`:

```
cluster_dst::> snapmirror restore -source-path vserverB:secondary1
-destination-path vserverA:primary1 -source-snapshot daily.2013-01-
25_0010 -file-list /dir1/file1,/dir2/file2

[Job 3479] Job is queued: snapmirror restore for the relationship with
destination vserverA:primary1
```

The following command restores the files `file1` and `file2` from the snapshot `daily.2013-01-25_0010` in the original destination volume `secondary1`, to a different location in the active file system of the original source volume `primary1`.

The destination file path begins with the @ symbol followed by the path of the file from the root of the original source volume. In this example, `file1` is restored to `/dir1/file1.new` and file2 is restored to `/dir2.new/file2` on `primary1`:

```
cluster_dst::> snapmirror restore -source-path vserverB:secondary1
-destination-path vserverA:primary1 -source-snapshot daily.2013-01-
25_0010 -file-list
/dir/file1,@/dir1/file1.new,/dir2/file2,@/dir2.new/file2

[Job 3479] Job is queued: snapmirror restore for the relationship with
destination vserverA:primary1
```

The following command restores the files `file1` and `file3` from the snapshot `daily.2013-01-25_0010` in the original destination volume `secondary1`, to different locations in the active file system of the original source volume `primary1`, and restores `file2` from `snap1` to the same location in the active file system of `primary1`.

In this example, the file `file1` is restored to `/dir1/file1.new` and `file3` is restored to `/dir3.new/file3`:

```
cluster_dst::> snapmirror restore -source-path vserverB:secondary1
-destination-path vserverA:primary1 -source-snapshot daily.2013-01-
25_0010 -file-list
/dir/file1,@/dir1/file1.new,/dir2/file2,/dir3/file3,@/dir3.new/file3

[Job 3479] Job is queued: snapmirror restore for the relationship with
destination vserverA:primary1
```

Related information

- snapmirror restore

Restore volume contents from an ONTAP SnapMirror destination

You can restore the contents of an entire volume from a snapshot in a SnapMirror destination volume. You can restore the volume's contents to the original source volume or to a different volume.

About this task

This procedure applies to FAS, AFF, and ASA systems. If you have an ASA r2 system (ASA A1K, ASA A90, ASA A70, ASA A50, ASA A30, ASA A20, or ASA C30), follow these steps to restore data. ASA r2 systems provide a simplified ONTAP experience specific to SAN-only customers.

The destination volume for the restore operation must be one of the following:

- A read-write volume, in which case SnapMirror performs an *incremental restore*, provided that the source and destination volumes have a common snapshot (as is typically the case when you are restoring to the original source volume).

The command fails if there is not a common snapshot. You cannot restore the contents of a volume to an empty read-write volume.

- An empty data protection volume, in which case SnapMirror performs a *baseline restore*, in which the specified snapshot and all the data blocks it references are transferred to the source volume.

Restoring the contents of a volume is a disruptive operation. SMB traffic must not be running on the SnapVault primary volume when a restore operation is running.

If the destination volume for the restore operation has compression enabled, and the source volume does not have compression enabled, disable compression on the destination volume. You need to re-enable compression after the restore operation is complete.

Any quota rules defined for the destination volume are deactivated before the restore is performed. You can use the `volume quota modify` command to reactivate quota rules after the restore operation is complete.

When data in a volume is lost or corrupted, you can roll back your data by restoring from an earlier snapshot.

This procedure replaces the current data on the source volume with data from an earlier snapshot version. You should perform this task on the destination cluster.

Steps

You can restore a volume's contents using System Manager or the ONTAP CLI.

System Manager

1. Click **Protection > Relationships**, and then click the source volume name.
2. Click ⋮ and then select **Restore**.
3. Under **Source**, the source volume is selected by default. Click **Other Volume** if you want to choose a volume other than the source.
4. Under **Destination**, choose the snapshot you want to restore.
5. If your source and destination are located on different clusters, on the remote cluster, click **Protection > Relationships** to monitor the restore progress.

CLI

1. List the snapshots in the destination volume:

   ```
   volume snapshot show -vserver <SVM> -volume <volume>
   ```

   The following example shows the snapshots on the `vserverB:secondary1` destination:

   ```
   cluster_dst::> volume snapshot show -vserver vserverB -volume
   secondary1

   Vserver     Volume      Snapshot                State    Size
   Total% Used%
   -------     ------      ---------- ----------- ------   -----
   ------ -----
   vserverB    secondary1  hourly.2013-01-25_0005  valid   224KB     0%
   0%
                           daily.2013-01-25_0010   valid   92KB      0%
   0%
                           hourly.2013-01-25_0105  valid   228KB     0%
   0%
                           hourly.2013-01-25_0205  valid   236KB     0%
   0%
                           hourly.2013-01-25_0305  valid   244KB     0%
   0%
                           hourly.2013-01-25_0405  valid   244KB     0%
   0%
                           hourly.2013-01-25_0505  valid   244KB     0%
   0%

   7 entries were displayed.
   ```

2. Restore the contents of a volume from a snapshot in a SnapMirror destination volume:

   ```
   snapmirror restore -source-path <SVM:volume>|<cluster://SVM/volume>
   -destination-path <SVM:volume>|<cluster://SVM/volume> -source-snapshot
   ```

`<snapshot>`

> You must run this command from the original source SVM or the original source cluster.

The following command restores the contents of the original source volume `primary1` from the snapshot `daily.2013-01-25_0010` in the original destination volume `secondary1`:

```
cluster_src::> snapmirror restore -source-path vserverB:secondary1
-destination-path vserverA:primary1 -source-snapshot daily.2013-01-
25_0010

Warning: All data newer than snapshot daily.2013-01-25_0010 on
volume vserverA:primary1 will be deleted.

Do you want to continue? {y|n}: y

[Job 34] Job is queued: snapmirror restore from source
vserverB:secondary1 for the snapshot daily.2013-01-25_0010.
```

3. Remount the restored volume and restart all applications that use the volume.

Other ways to do this in ONTAP

To perform these tasks with…	See this content…
System Manager Classic (available with ONTAP 9.7 and earlier)	Volume restore using SnapVault overview

Related information

- snapmirror restore
- volume snapshot show

Update an ONTAP SnapMirror replication relationship manually

You might need to update a replication relationship manually if an update fails because the source volume has been moved.

About this task

SnapMirror aborts any transfers from a moved source volume until you update the replication relationship manually.

Beginning with ONTAP 9.5, SnapMirror synchronous relationships are supported. Although the source and destination volumes are in sync at all times in these relationships, the view from the secondary cluster is synchronized with the primary only on an hourly basis. If you want to view the point-in-time data at the destination, you should perform a manual update by running the `snapmirror update` command.

Step

1. Update a replication relationship manually:

```
snapmirror update -source-path <SVM:volume>|<cluster://SVM/volume>, …
-destination-path <SVM:volume>|<cluster://SVM/volume>, …
```

> You must run this command from the destination SVM or the destination cluster. The command fails if a common snapshot does not exist on the source and destination. Use `snapmirror initialize` to re-initialize the relationship. Learn more about `snapmirror initialize` in the ONTAP command reference.

The following example updates the relationship between the source volume `volA` on `svm1` and the destination volume `volA_dst` on `svm_backup`:

```
cluster_src::> snapmirror update -source-path svm1:volA -destination
-path svm_backup:volA_dst
```

Learn more about `snapmirror update` in the ONTAP command reference.

Resynchronize an ONTAP SnapMirror replication relationship

You need to resynchronize a replication relationship after you make a destination volume writeable, after an update fails because a common snapshot does not exist on the source and destination volumes, or if you want to change the replication policy for the relationship.

Beginning with ONTAP 9.8, you can use System Manager to perform a reverse resynchronization operation to delete an existing protection relationship and reverse the functions of the source and destination volumes. Then you use the destination volume to serve data while you repair or replace the source, update the source, and reestablish the original configuration of the systems.

> System Manager does not support reverse resynchronization with intracluster relationships. You can use the ONTAP CLI to perform reverse resync operations with intracluster relationships.

About this task

- Although resync does not require a baseline transfer, it can be time-consuming. You might want to run the resync in off-peak hours.
- Volumes that are part of a fan-out or cascade configuration can take longer to resynchronize. It is not uncommon to see the SnapMirror relationship reporting the status "preparing" for an extended time period.
- Beginning with ONTAP 9.13.1, ONTAP attempts to use quick-resync by default to reduce resync time. The following conditions must be present for quick-resync to be used by default:
  - FlexVol volumes have no clones on the volume
  - When using the MirrorAllSnapshots policy

Using `-quick-resync` can consume additional space on the resync destination volume due to removal of storage efficiency on transferred data blocks. This additional space consumption is recovered as part of the inline or post-replication storage efficiency application on the resync destination.

The `-quick-resync` parameter is optional. You can enable or disable quick-resync by using the `-quick-resync true|false` parameter with the `snapmirror resync` command.

For more information about `-quick-resync`, see the ONTAP command reference.

Steps

You can use System Manager or the ONTAP CLI to perform this task. If you use the ONTAP CLI, the procedure is the same regardless of whether you are making a destination volume writable or you are updating the replication relationship.

System Manager reverse resync

After you break a relationship to make a destination writable, reverse resynchronize the relationship:

1. On the destination cluster, click **Protection > Relationships**.
2. Hover over the broken off relationship you want to reverse, click ⋮, and select **Reverse Resync**.
3. In the **Reverse resync relationship** window, click **Reverse resync**.
4. Under **Relationships**, monitor the reverse resynchronization progress by viewing **Transfer Status** for the relationship.

Next steps

When the original source is available again, you can reestablish the original relationship by breaking the reversed relationship and performing another reverse resync operation. The reverse resync process will copy any changes from the site that is serving data to the original source and make the original source read-writable again.

System Manager resync

1. Click **Protection > Relationships**.
2. Hover over the relationship you want to resynchronize, and click ⋮ and then select **Break**.
3. When the relationship state displays "Broken off," click ⋮ and then select **Resync**.
4. Under **Relationships**, monitor the resynchronization progress by checking the relationship state. The state changes to "Mirrored" when resynchronization is complete.

CLI

1. Resync the source and destination volumes:

```
snapmirror resync -source-path <SVM:volume|cluster://SVM/volume>
-destination-path <SVM:volume|cluster://SVM/volume> -type DP|XDP
-policy <policy>
```

ⓘ You must run this command from the destination SVM or the destination cluster.

The following example resynchronizes the relationship between the source volume `volA` on `svm1` and the destination volume `volA_dst` on `svm_backup`:

```
cluster_dst::> snapmirror resync -source-path svm1:volA -destination
-path svm_backup:volA_dst
```

Learn more about `snapmirror resync` in the ONTAP command reference.

Related information

- Resynchronize the data on an ONTAP SnapMirror destination SVM

Delete an ONTAP SnapMirror volume replication relationship

You can use the `snapmirror delete` and `snapmirror release` commands to delete a volume replication relationship. You can then delete unneeded destination volumes manually.

About this task

The `snapmirror release` command deletes any SnapMirror-created snapshots from the source. You can use the `-relationship-info-only` option to preserve the snapshots.

Steps

1. Quiesce the replication relationship:

   `snapmirror quiesce -destination-path <SVM:volume>|<cluster://SVM/volume>`

   ```
   cluster_dst::> snapmirror quiesce -destination-path svm_backup:volA_dst
   ```

   Learn more about `snapmirror quiesce` in the ONTAP command reference.

2. (Optional) Break the replication relationship if you require the destination volume to be a read/write volume. You can skip this step if you plan to delete the destination volume or if you don't need the volume to be read/write:

   `snapmirror break -source-path <SVM:volume>|<cluster://SVM/volume>, …`
   `-destination-path <SVM:volume>|<cluster://SVM/volume>, …`

   ```
   cluster_dst::> snapmirror break -source-path svm1:volA -destination-path
   svm_backup:volA_dst
   ```

   Learn more about `snapmirror break` in the ONTAP command reference.

3. Delete the replication relationship:

   `snapmirror delete -source-path <SVM:volume>|<cluster://SVM/volume>, …`
   `-destination-path <SVM:volume>|<cluster://SVM/volume>, …`

   You must run this command from the destination cluster or destination SVM.

   The following example deletes the relationship between the source volume `volA` on `svm1` and the destination volume `volA_dst` on `svm_backup`:

   ```
   cluster_dst::> snapmirror delete -source-path svm1:volA -destination
   -path svm_backup:volA_dst
   ```

Learn more about `snapmirror delete` in the ONTAP command reference.

4. Release replication relationship information from the source SVM:

```
snapmirror release -source-path <SVM:volume>|<cluster://SVM/volume>, …
-destination-path <SVM:volume>|<cluster://SVM/volume>, …
```

> You must run this command from the source cluster or source SVM.

The following example releases information for the specified replication relationship from the source SVM `svm1`:

```
cluster_src::> snapmirror release -source-path svm1:volA -destination
-path svm_backup:volA_dst
```

Learn more about `snapmirror release` in the ONTAP command reference.

Manage storage efficiency on ONTAP SnapMirror volumes

SnapMirror preserves storage efficiency on the source and destination volumes except when postprocess data compression is enabled on the destination volume. In that case, all storage efficiency is lost on the destination volume. To correct this issue, you need to disable postprocess compression on the destination volume, update the relationship manually, and re-enable storage efficiency.

About this task

You can use the `volume efficiency show` command to determine whether efficiency is enabled on a volume. Learn more about `volume efficiency show` in the ONTAP command reference.

You can check if SnapMirror is maintaining storage efficiency by viewing the SnapMirror audit logs and locating the transfer description. If the transfer description displays `transfer_desc=Logical Transfer with Storage Efficiency`, SnapMirror is maintaining storage efficiency. If the transfer description displays `transfer_desc=Logical Transfer`, SnapMirror is not maintaining storage efficiency. For example:

```
Fri May 22 02:13:02 CDT 2020 ScheduledUpdate[May 22 02:12:00]:cc0fbc29-
b665-11e5-a626-00a09860c273 Operation-Uuid=39fbcf48-550a-4282-a906-
df35632c73a1 Group=none Operation-Cookie=0 action=End source=<sourcepath>
destination=<destpath> status=Success bytes_transferred=117080571
network_compression_ratio=1.0:1 transfer_desc=Logical Transfer - Optimized
Directory Mode
```

Before you begin

- The source and destination clusters and SVMs must be peered.

  Cluster and SVM peering

- You must disable postprocess compression on the destination volume.
- Logical Transfer with storage: Beginning with ONTAP 9.3, manual update is no longer required to re-enable storage efficiency. If SnapMirror detects that postprocess compression has been disabled, it automatically re-enables storage efficiency at the next scheduled update. Both the source and the destination must be running ONTAP 9.3.
- Beginning with ONTAP 9.3, AFF systems manage storage efficiency settings differently from FAS systems after a destination volume is made writeable:
  - After you make a destination volume writeable using the `snapmirror break` command, the caching policy on the volume is automatically set to `auto` (the default).

    This behavior is applicable to FlexVol volumes, only, and it does not apply to FlexGroup volumes.

    Learn more about `snapmirror break` in the ONTAP command reference.

  - On resync, the caching policy is automatically set to `none`, and deduplication and inline compression are automatically disabled, regardless of your original settings. You must modify the settings manually as needed.

Manual updates with storage efficiency enabled can be time-consuming. You might want to run the operation in off-peak hours.

Steps

1. Update a replication relationship and re-enable storage efficiency:

```
snapmirror update -source-path <SVM:volume>|<cluster://SVM/volume>, ...
-destination-path <SVM:volume>|<cluster://SVM/volume>, ... -enable
-storage-efficiency true
```

You must run this command from the destination SVM or the destination cluster. The command fails if a common snapshot does not exist on the source and destination. Use `snapmirror initialize` to re-initialize the relationship. Learn more about `snapmirror initialize` in the ONTAP command reference.

The following example updates the relationship between the source volume `volA` on `svm1` and the destination volume `volA_dst` on `svm_backup`, and re-enables storage efficiency:

```
cluster_dst::> snapmirror update -source-path svm1:volA -destination
-path svm_backup:volA_dst -enable-storage-efficiency true
```

Learn more about `snapmirror update` in the ONTAP command reference.

Use ONTAP SnapMirror global throttling

Global network throttling is available for all SnapMirror and SnapVault transfers at a per-

node level.

About this task

SnapMirror global throttling restricts the bandwidth used by incoming and/or outgoing SnapMirror and SnapVault transfers. The restriction is enforced cluster wide on all nodes in the cluster.

For example, if the outgoing throttle is set to 100 MBps, each node in the cluster will have the outgoing bandwidth set to 100 MBps. If global throttling is disabled, it is disabled on all nodes.

Although data transfer rates are often expressed in bits per second (bps), the throttle values must be entered in kilobytes per second (KBps).

> In ONTAP 9.9.1 and earlier releases, the throttle has no effect on `volume move` transfers or load-sharing mirror transfers. Beginning with ONTAP 9.10.0, you can specify an option to throttle a volume move operation. For details, see How to throttle volume move in ONTAP 9.10 and later.

Global throttling works with the per-relationship throttle feature for SnapMirror and SnapVault transfers. The per-relationship throttle is enforced until the combined bandwidth of per-relationship transfers exceeds the value of the global throttle, after which the global throttle is enforced. A throttle value `0` implies that global throttling is disabled.

> SnapMirror global throttling has no effect on SnapMirror synchronous relationships when they are In-Sync. However, the throttle does effect SnapMirror synchronous relationships when they perform an asynchronous transfer phase such as an initialization operation or after an Out Of Sync event. For this reason, enabling global throttling with SnapMirror synchronous relationships is not recommended.

Steps

1. Enable global throttling:

   `options -option-name replication.throttle.enable on|off`

   The following example shows how to enable SnapMirror global throttling on `cluster_dst`:

   ```
   cluster_dst::> options -option-name replication.throttle.enable on
   ```

2. Specify the maximum total bandwidth used by incoming transfers on the destination cluster:

   `options -option-name replication.throttle.incoming.max_kbs <KBps>`

   The recommended minimum throttle bandwidth is 4 kilobytes per second (KBps) and the maximum is up to 2 terabytes per second (TBps). The default value for this option is `unlimited`, which means there is no limit on total bandwidth used.

   The following example shows how to set the maximum total bandwidth used by incoming transfers to 100 megabits per second (Mbps):

```
cluster_dst::> options -option-name
replication.throttle.incoming.max_kbs 12500
```

100 megabits per second (Mbps) = 12500 kilobytes per second (KBps)

3. Specify the maximum total bandwidth used by outgoing transfers on the source cluster:

   `options -option-name replication.throttle.outgoing.max_kbs <KBps>`

   The recommended minimum throttle bandwidth is 4 KBps and the maximum is up to 2 TBps. The default value for this option is `unlimited`, which means there is no limit on total bandwidth used. Parameter values are in kilobytes per second (KBps).

   The following example shows how to set the maximum total bandwidth used by outgoing transfers to 100 Mbps:

   ```
   cluster_src::> options -option-name
   replication.throttle.outgoing.max_kbs 12500
   ```

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