



Manage SM-BC and protect data

ONTAP 9

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Manage SM-BC and protect data

Create a common Snapshot copy

In addition to the regularly scheduled Snapshot copy operations, you can manually create a common [Snapshot copy](#) between the volumes in the primary SnapMirror consistency group and the volumes in the secondary SnapMirror consistency group.

About this task

- In ONTAP 9.8, the scheduled snapshot creation interval is one hour.

Beginning with ONTAP 9.9.1, that interval is 12 hours.

Before you begin

- The SnapMirror group relationship must be in sync.

Steps

1. Create a common Snapshot copy:

```
destination::>snapmirror update -destination-path vs1_dst:/cg/cg_dst
```

2. Monitor the progress of the update:

```
destination::>snapmirror show -fields -newest-snapshot
```

Perform a planned failover

In a planned failover, you switch the roles of the primary and secondary clusters, so that the secondary cluster takes over from the primary cluster. During a failover, what is normally the secondary cluster processes input and output requests locally without disrupting client operations.

You may want to perform a planned failover to test the health of your disaster recovery configuration or to perform maintenance on the primary cluster.

About this task

A planned failover is initiated by the administrator of the secondary cluster. The operation requires switching the primary and secondary roles so that the secondary cluster takes over from the primary. The new primary cluster can then begin processing input and output requests locally without disrupting client operations.

Before you begin

- The SM-BC relationship must be in sync.
- You cannot initiate a planned failover when a nondisruptive operation is in process. Nondisruptive operations include volume moves, aggregate relocations, and storage failovers.
- The ONTAP Mediator must be configured, connected, and in quorum.

Steps

You can perform a planned failover using the ONTAP CLI or System Manager.

System Manager

1. In System Manager, select **Protection > Overview > Relationships**.
2. Identify the SM-BC relationship you want to failover. Next to its name, select the ... next to the relationship's name, then select **Failover**.
3. To monitor the status of the failover, use the `snapmirror failover show` in the ONTAP CLI.

CLI

1. From the destination cluster, initiate the failover operation:

```
destination::>snapmirror failover start -destination-path  
vs1_dst:/cg/cg_dst
```

2. Monitor the progress of the failover:

```
destination::>snapmirror failover show
```

3. When the failover operation is complete, you can monitor the Synchronous SnapMirror protection relationship status from the destination:

```
destination::>snapmirror show
```

Recover from automatic unplanned failover operations

An automatic unplanned failover (AUFO) operation occurs when the primary cluster is down or isolated. The ONTAP Mediator detects when a failover occurs and, and executes an automatic unplanned failover to the the secondary cluster. The secondary cluster is converted to the primary and begins serving clients. This operation is performed only with assistance from the ONTAP Mediator.




After the automatic unplanned failover, it is important to rescan the host LUN I/O paths so that there is no loss of I/O paths.

Reestablish the protection relationship after an unplanned failover

You can reestablish the protection relationship using System Manager or the ONTAP CLI.

System Manager

Steps

1. Navigate to **Protection > Relationships** and wait for the relationship state to show “InSync.”
2. To resume operations on the original source cluster, click  and select **Failover**.

CLI

You can monitor the status of the automatic unplanned failover using the `snapmirror failover show` command.

For example:

```
ClusterB::> snapmirror failover show -instance
Start Time: 9/23/2020 22:03:29
      Source Path: vs1:/cg/scg3
Destination Path: vs3:/cg/dcg3
Failover Status: completed
      Error Reason:
              End Time: 9/23/2020 22:03:30
Primary Data Cluster: cluster-2
Last Progress Update: -
      Failover Type: unplanned
Error Reason codes: -
```

Refer to the [EMS reference](#) to learn about event messages and about corrective actions.

Resume protection in a fan-out configuration after failover

If you experience a failover on the secondary cluster in the SM-BC relationship, the asynchronous SnapMirror destination becomes unhealthy. You must manually restore protection by deleting and recreating the relationship with the asynchronous SnapMirror endpoint.

Steps

1. Verify the failover has completed successfully:
`snapmirror failover show`
2. On the asynchronous Snapmirror endpoint, delete the fan-out endpoint:
`snapmirror delete -destination-path destination_path`
3. On the third site, create an asynchronous SnapMirror relationships between the new SM-BC primary volume and the async fan-out destination volume:
`snapmirror create -source-path source_path -destination-path destination_path -policy MirrorAllSnapshots -schedule schedule`
4. Resynchronize the relationship:
`snapmirror resync -destination-path destination_path`
5. Verify the relationship status and health:
`snapmirror show`

Monitor SnapMirror Business Continuity operations

You can monitor the following SnapMirror Business Continuity (SM-BC) operations to ensure the health of your SM-BC configuration:

- ONTAP Mediator
- Planned failover operations
- Automatic unplanned failover operations
- SM-BC availability

ONTAP Mediator

During normal operations, the ONTAP Mediator state should be connected. If it is in any other state, this might indicate an error condition. You can review the [Event Management System \(EMS\) messages](#) to determine the error and appropriate corrective actions.

Planned failover operations

You can monitor status and progress of a planned failover operation using the `snapmirror failover show` command. For example:

```
ClusterB::> snapmirror failover start -destination-path vs1:/cg/dcg1
```

Once the failover operation is complete, you can monitor the Synchronous SnapMirror protection status from the new destination cluster. For example:

```
ClusterA::> snapmirror show
```

Refer to the [EMS reference](#) to learn about event messages and corrective actions.

Automatic unplanned failover operations

During an unplanned automatic failover, you can monitor the status of the operation using the `snapmirror failover show` command.

```
ClusterB::> snapmirror failover show -instance
Start Time: 9/23/2020 22:03:29
    Source Path: vs1:/cg/scg3
    Destination Path: vs3:/cg/dcg3
    Failover Status: completed
    Error Reason:
        End Time: 9/23/2020 22:03:30
Primary Data Cluster: cluster-2
Last Progress Update: -
    Failover Type: unplanned
Error Reason codes: -
```

Refer to the [EMS reference](#) to learn about event messages and about corrective actions.

SM-BC availability

You can check the availability of the SM-BC relationship using a series of commands, either on the primary cluster, the secondary cluster, or both.

Commands you use include the `snapmirror mediator show` command on both the primary and secondary cluster to check the connection and quorum status, the `snapmirror show` command, and the `volume show` command. For example:

```

SMBC_A::*> snapmirror mediator show
Mediator Address Peer Cluster      Connection Status Quorum Status
-----
10.236.172.86    SMBC_B      connected      true

SMBC_B::*> snapmirror mediator show
Mediator Address Peer Cluster      Connection Status Quorum Status
-----
10.236.172.86    SMBC_A      connected      true

SMBC_B::*> snapmirror show -expand

Progress
Source          Destination Mirror Relationship Total
Last
Path            Type Path            State Status Progress Healthy
Updated
-----
-----
vs0:/cg/cg1 XDP vs1:/cg/cg1_dp Snapmirrored InSync - true -
vs0:vol1 XDP vs1:vol1_dp Snapmirrored InSync - true -
2 entries were displayed.

SMBC_A::*> volume show -fields is-smbc-master,smbc-consensus,is-smbc-
failover-capable -volume vol1
vserver volume is-smbc-master is-smbc-failover-capable smbc-consensus
-----
vs0 vol1 true false Consensus

SMBC_B::*> volume show -fields is-smbc-master,smbc-consensus,is-smbc-
failover-capable -volume vol1_dp
vserver volume is-smbc-master is-smbc-failover-capable smbc-consensus
-----
vs1 vol1_dp false true No-consensus

```

Add or remove volumes to a consistency group

As your application workload requirements change, you may need to add or remove volumes from a consistency group to ensure business continuity. The process of adding and removing volumes in an active SM-BC relationship depends on the version of ONTAP you are using.

In most instances, this is a disruptive process requiring you to break the SnapMirror relationship, modify the consistency group, then resume protection. Beginning with ONTAP 9.13.1, adding volumes to a consistency group with an active SM-BC relationship is a non-disruptive operation.

About this task

- In ONTAP 9.8 through 9.9.1, you can add or remove volumes to a consistency group using the ONTAP CLI.
- Beginning with ONTAP 9.10.1, it is recommended that you manage [consistency groups](#) through System Manager or with the ONTAP REST API.

If you want to change the composition of the consistency group by adding or removing a volume, you must first delete the original relationship and then create the consistency group again with the new composition.

- Beginning in ONTAP 9.13.1, you can non-disruptively add volumes to a consistency group with an active SM-BC relationship from the source or destination.

Removing volumes is a disruptive operation. You must break the SnapMirror relationship before proceeding removing volumes.

ONTAP 9.8-9.13.0

Before you begin

- You cannot begin to modify the consistency group while it is in the InSync state.
- The destination volume should be of type DP.
- The new volume you add to expand the consistency group must have a pair of common Snapshot copies between the source and destination volumes.

Steps

The examples shown in two volume mappings: $\text{vol_src1} \longleftrightarrow \text{vol_dst1}$ and $\text{vol_src2} \longleftrightarrow \text{vol_dst2}$, in a consistency group relationship between the end points $\text{vs1_src}:/\text{cg}/\text{cg_src}$ and $\text{vs1_dst}:/\text{cg}/\text{cg_dst}$.

1. On the source and destination clusters, verify there is a common Snapshot between the source and destination clusters with the command `snapshot show -vserver svm_name -volume volume_name -snapshot snapmirror`

```
source::>snapshot show -vserver vs1_src -volume vol_src3 -snapshot snapmirror*
```

```
destination::>snapshot show -vserver vs1_dst -volume vol_dst3 -snapshot snapmirror*
```

2. If no common Snapshot copy exists, create and initialize a FlexVol SnapMirror relationship:

```
destination::>snapmirror initialize -source-path vs1_src:vol_src3  
-destination-path vs1_dst:vol_dst3
```

3. Delete the consistency group relationship:

```
destination::>snapmirror delete -destination-path vs1_dst:vol_dst3
```

4. Release the source SnapMirror relationship and retain the common Snapshot copies:

```
source::>snapmirror release -relationship-info-only true -destination-path  
vs1_dst:vol_dst3
```

5. Unmap the LUNs and delete the existing consistency group relationship:

```
destination::>lun mapping delete -vserver vs1_dst -path <lun_path> -igroup  
<igroup_name>
```



The destination LUNs are unmapped, while the LUNs on the primary copy continue to serve the host I/O.

```
destination::>snapmirror delete -destination-path vs1_dst:/cg/cg_dst
```

```
source::>snapmirror release -destination-path vs1_dst:/cg/cg_dst  
-relationship-info-only true
```

6. If you are using ONTAP 9.10.1 through 9.13.0, delete and recreate the consistency group on

the source with the correct composition. Follow the steps in [Delete a consistency group](#) and then [Configure a single consistency group](#). In ONTAP 9.10.1 and later, you must perform the delete and create operations in System Manager or with the ONTAP REST API; there is no CLI procedure.

If you are using ONTAP 9.8, 9.0, or 9.9.1, skip to the next step.

7. Create the new consistency group on the destination with the new composition:

```
destination:>snapmirror create -source-path vs1_src:/cg/cg_src  
-destination-path vs1_dst:/cg/cg_dst -cg-item-mappings vol_src1:@vol_dst1,  
vol_src2:@vol_dst2, vol_src3:@vol_dst3
```

8. Resynchronize the zero RTO consistency group relationship to ensure it is in sync:

```
destination:>snapmirror resync -destination-path vs1_dst:/cg/cg_dst
```

9. Remap the LUNs that you unmapped in Step 5:

```
destination:> lun map -vserver vs1_dst -path lun_path -igroup igroup_name
```


10. Rescan host LUN I/O paths to restore all paths to the LUNs.

ONTAP 9.13.1 and later

Beginning in ONTAP 9.13.1, you can non-disruptively add volumes to a consistency group with an active SM-BC relationship. SM-BC supports adding volumes from both the source or destination.

For details on adding volumes from the source consistency group, see [Modify a consistency group](#).

Add a volume from the destination cluster

1. On the destination cluster, select **Protection > Relationships**.
2. Find the SM-BC relationship you want to add volumes to. Select  then **Expand**.
3. Select the volume relationships whose volumes are to be added to consistency group
4. Select **Expand**.

Convert existing relationships to SM-BC relationships

If you have an existing Synchronous SnapMirror relationship between a source and destination cluster, you can convert it to an SM-BC relationship. This allows you to associate the mirrored volumes with a consistency group, ensuring zero RPO across a multi-volume workload. Additionally, you can retain existing SnapMirror snapshots if you need to revert to a point in time prior to establishing the SM-BC relationship.

Before you begin

- A zero RPO Synchronous SnapMirror relationship must exist between the primary and secondary cluster.
- All LUNs on the destination volume must be unmapped before the zero RTO SnapMirror relationship can be created.
- SM-BC only supports SAN protocols (not NFS/CIFS). Ensure no constituent of the consistency group is mounted for NAS access.

About this task

- You must be a cluster and SVM administrator on the primary and secondary clusters.
- You cannot convert zero RPO to zero RTO sync by changing the SnapMirror policy.
- You must ensure the LUNs are unmapped before issuing the `snapmirror create` command.

If existing LUNs on the secondary volume are mapped and the `AutomatedFailover` policy is configured, the `snapmirror create` will trigger an error.

Steps

1. From the secondary cluster, perform a SnapMirror update on the existing relationship:

```
destination::>snapmirror update -destination-path vs1_dst:vol1
```

2. Verify that the SnapMirror update completed successfully:

```
destination::>snapmirror show
```

3. Quiesce each of the zero RPO synchronous relationships:

```
destination::>snapmirror quiesce -destination-path vs1_dst:vol1
```

```
destination::>snapmirror quiesce -destination-path vs1_dst:vol2
```

4. Delete each of the zero RPO synchronous relationships:

```
destination::>snapmirror delete -destination-path vs1_dst:vol1
```

```
destination::>snapmirror delete -destination-path vs1_dst:vol2
```

5. Release the source SnapMirror relationship but retain the common Snapshot copies:

```
source::>snapmirror release -relationship-info-only true -destination-path  
vs1_dst:vol1
```

```
source::>snapmirror release -relationship-info-only true -destination-path  
vs1_dst:vol2
```

6. Create a group zero RTO Synchronous Snapmirror relationship:

```
destination::> snapmirror create -source-path vs1_src:/cg/cg_src -destination  
-path vs1_dst:/cg/cg_dst -cg-item-mappings vol1:@vol1,vol2:@vol2 -policy  
AutomatedFailover
```

7. Resynchronize the consistency group:

```
destination::> snapmirror resync -destination-path vs1_dst:/cg/cg_dst
```

8. Rescan host LUN I/O paths to restore all paths to the LUNs.

Upgrade and revert ONTAP with SM-BC

SnapMirror Business Continuity (SM-BC) is supported beginning with ONTAP 9.8. Upgrading and reverting your ONTAP cluster has implications on your SM-BC relationships depending on the ONTAP version to which you are upgrading or reverting.

Upgrade ONTAP with SM-BC

To use SM-BC, all nodes on the source and destination clusters must be running ONTAP 9.8 or later.

When upgrading ONTAP with active SM-BC relationships, you should use [automated nondisruptive upgrade \(ANDU\)](#). Using ANDU ensures your SM-BC relationships are in sync and healthy during the upgrade process.

There are no configuration steps to prepare SM-BC deployments for ONTAP upgrades. However, it is recommended that before and after the upgrade, you should check that:

- SM-BC relationships are in sync.
- There are no errors related to SnapMirror in the event log.
- The Mediator is online and healthy from both clusters.
- All hosts can see all paths properly to protect LUNs.



When you upgrade clusters from ONTAP 9.8 or 9.9.1 to ONTAP 9.10.1 and later, ONTAP creates new [consistency groups](#) on both source and destination clusters for SM-BC relationships that can be configured using System Manager.



The `snapmirror quiesce` and `snapmirror resume` commands are not supported with SM-BC.

Revert to ONTAP 9.9.1 from ONTAP 9.10.1

To revert relationships from 9.10.1 to 9.9.1, SM-BC relationships must be deleted, followed by the 9.10.1 consistency group instance. Consistency groups with an active SM-BC relationship cannot be deleted. Any FlexVol volumes that were upgraded to 9.10.1 previously associated with another Smart Container or Enterprise App in 9.9.1 or earlier will no longer be associated on revert. Deleting consistency groups does not delete the constituent volumes or volume granular snapshots. Refer to [Delete a consistency group](#) for more information on this task in ONTAP 9.10.1 and later.

Revert to ONTAP 9.7 from ONTAP 9.8



SM-BC is not supported with mixed ONTAP 9.7 and ONTAP 9.8 clusters.

When you revert from ONTAP 9.8 to ONTAP 9.7, you must be aware of the following:

- If the cluster host an SM-BC destination, reverting to ONTAP 9.7 is not allowed until the relationship is broken and deleted.
- If the cluster hosts an SM-BC source, reverting to ONTAP 9.7 is not allowed until the relationship is released.
- All user-created custom SM-BC SnapMirror policies must be deleted before reverting to ONTAP 9.7.

To meet these requirements, see [Remove an SM-BC configuration](#).

Steps

1. Perform a revert check from one of the clusters in the SM-BC relationship:

```
cluster::*> system node revert-to -version 9.7 -check-only
```

Example:

```
cluster::*> system node revert-to -version 9.7 -check-only
Error: command failed: The revert check phase failed. The following
issues must be resolved before revert can be completed. Bring the data
LIFs down on running vservers. Command to list the running vservers:
vserver show -admin-state running Command to list the data LIFs that are
up: network interface show -role data -status-admin up Command to bring
all data LIFs down: network interface modify {-role data} -status-admin
down
Disable snapshot policies.
    Command to list snapshot policies: "snapshot policy show".
    Command to disable snapshot policies: "snapshot policy modify
-vserver
    * -enabled false"

    Break off the initialized online data-protection (DP) volumes and
delete
    Uninitialized online data-protection (DP) volumes present on the
local
    node.
    Command to list all online data-protection volumes on the local
node:
    volume show -type DP -state online -node <local-node-name>
    Before breaking off the initialized online data-protection volumes,
quiesce and abort transfers on associated SnapMirror relationships
and
    wait for the Relationship Status to be Quiesced.
    Command to quiesce a SnapMirror relationship: snapmirror quiesce
    Command to abort transfers on a SnapMirror relationship: snapmirror
abort
    Command to see if the Relationship Status of a SnapMirror
relationship
    is Quiesced: snapmirror show
    Command to break off a data-protection volume: snapmirror break
    Command to break off a data-protection volume which is the
destination
    of a SnapMirror relationship with a policy of type "vault":
snapmirror
    break -delete-snapshots
```

```

Uninitialized data-protection volumes are reported by the
"snapmirror
break" command when applied on a DP volume.
Command to delete volume: volume delete

Delete current version snapshots in advanced privilege level.
Command to list snapshots: "snapshot show -fs-version 9.8"
Command to delete snapshots: "snapshot prepare-for-revert -node
<nodename>"

Delete all user-created policies of the type active-strict-sync-
mirror
and active-sync-mirror.
The command to see all active-strict-sync-mirror and active-sync-
mirror
type policies is:
snapmirror policy show -type
active-strict-sync-mirror,active-sync-mirror
The command to delete a policy is :
snapmirror policy delete -vserver <SVM-name> -policy <policy-name>

```

For information on reverting clusters, see [Revert ONTAP](#).

Remove an SM-BC configuration

If you no longer require zero RTO Synchronous SnapMirror protection, you can delete your SM-BC relationship.

About this task

- Before you delete the SM-BC relationship, all LUNs in the destination cluster must be unmapped.
- After the LUNs are unmapped and the host is rescanned, the SCSI target notifies the hosts that the LUN inventory has changed. The existing LUNs on the zero RTO secondary volumes change to reflect a new identity after the zero RTO relationship is deleted. Hosts discover the secondary volume LUNs as new LUNs that have no relationship to the source volume LUNs.
- The secondary volumes remain DP volumes after the relationship is deleted. You can issue the `snapmirror break` command to convert them to read/write.
- Deleting the relationship is not allowed in the failed-over state when the relationship is not reversed.

Steps

1. From the secondary cluster, remove the SM-BC consistency group relationship between the source endpoint and destination endpoint:

```
destination::>snapmirror delete -destination-path vs1_dst:/cg/cg_dst
```

2. From the primary cluster, release the consistency group relationship and the Snapshot copies created for the relationship:

```
source::>snapmirror release -destination-path vs1_dst:/cg/cg_dst
```

3. Perform a host rescan to update the LUN inventory.
4. Beginning with ONTAP 9.10.1, deleting the SnapMirror relationship does not delete the consistency group. If you want to delete the consistency group, you must use System Manager or the ONTAP REST API. See [Delete a consistency group](#) for more information.

Remove ONTAP Mediator

If you want to remove an existing ONTAP Mediator configuration from your ONTAP clusters, you can do so by using the `snapmirror mediator remove` command.

Steps

1. Remove ONTAP Mediator:

```
snapmirror mediator remove -mediator-address 12.345.678.90 -peer-cluster  
cluster_xyz
```


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