Manage SnapMirror active sync and protect data

ONTAP 9

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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

The scheduled Snapshot creation 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 of clusters in a SnapMirror active sync relationship

In a planned failover of ONTAP clusters in a SnapMirror active sync relationship, 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 SnapMirror active sync 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

From ONTAP 9.8 through 9.14.1, SnapMirror active sync is referred to as SnapMirror Business Continuity (SM-BC).

1. In System Manager, select **Protection > Overview > Relationships**.
2. Identify the SnapMirror active sync 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 SnapMirror synchronous 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

From ONTAP 9.8 through 9.14.1, SnapMirror active sync is referred to as SnapMirror Business Continuity (SM-BC).

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

Beginning with ONTAP 9.15.1, SnapMirror active sync supports automatic reconfiguration in the fan-out leg after a failover event. For more information, see fan-out configurations.

If you’re using ONTAP 9.14.1 or earlier and you experience a failover on the secondary cluster in the SnapMirror active sync relationship, the SnapMirror asynchronous destination becomes unhealthy. You must manually restore protection by deleting and recreating the relationship with the SnapMirror asynchronous endpoint.

Steps

1. Verify the failover has completed successfully:
   `snapmirror failover show`
2. On the Snapmirror asynchronous endpoint, delete the fan-out endpoint:
   `snapmirror delete -destination-path` *`destination_path`*
3. On the third site, create a SnapMirror asynchronous relationships between the new SnapMirror active sync 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 heath:
`snapmirror show`

Monitor SnapMirror active sync operations

You can monitor the following SnapMirror active sync operations to ensure the health of your SnapMirror active sync configuration:

- ONTAP Mediator
- Planned failover operations
- Automatic unplanned failover operations
- SnapMirror active sync availability

Beginning in ONTAP 9.15.1, System Manager displays the status of your SnapMirror active sync relationship from either cluster. You can also monitor the ONTAP Mediator's status from either cluster in System Manager.

ONTAP Mediator

During normal operations, the ONTAP Mediator state should be connected. If it's 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 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.

SnapMirror active sync availability

You can check the availability of the SnapMirror active sync 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 an active SnapMirror active sync 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 SnapMirror relationship is a non-disruptive operation.

About this task

- In ONTAP 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 SnapMirror relationship from the source or destination.

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

ONTAP 9.9.1-9.13.0

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: `vol_src1` ←→ `vol_dst1` and `vol_src2` ←→ `vol_dst2`, in a consistency group relationship between the end points `vs1_src:/cg/cg_src` and `vs1_dst:/cg/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 and 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 9.9.1, 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 SnapMirror active sync relationship. SnapMirror active sync supports adding volumes from both the source or destination.

> From ONTAP 9.8 through 9.14.1, SnapMirror active sync is referred to as SnapMirror Business Continuity (SM-BC).

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 SnapMirror configuration 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**.

Upgrade and revert ONTAP with SnapMirror active sync

SnapMirror active sync is supported beginning with ONTAP 9.9.1. Upgrading and reverting your ONTAP cluster has implications on your SnapMirror active sync relationships depending on the ONTAP version to which you are upgrading or reverting.

Upgrade ONTAP with SnapMirror active sync

To use SnapMirror active sync, all nodes on the source and destination clusters must be running ONTAP 9.9.1 or later.

When upgrading ONTAP with active SnapMirror active sync relationships, you should use automated

nondisruptive upgrade (ANDU). Using ANDU ensures your SnapMirror active sync relationships are in sync and healthy during the upgrade process.

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

- SnapMirror active sync 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 9.9.1 or 9.9.1 to ONTAP 9.10.1 and later, ONTAP creates new consistency groups on both source and destination clusters for SnapMirror active sync relationships that can be configured using System Manager.

The `snapmirror quiesce` and `snampirror resume` commands are not supported with SnapMirror active sync.

Revert to ONTAP 9.9.1 from ONTAP 9.10.1

To revert relationships from 9.10.1 to 9.9.1, SnapMirror active sync relationships must be deleted, followed by the 9.10.1 consistency group instance. Consistency groups with an active SnapMirror active sync 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 from ONTAP 9.9.1

SnapMirror active sync is not supported with mixed ONTAP clusters than include releases earlier than ONTAP 9.9.1.

When you revert from ONTAP 9.9.1 to an earlier release of ONTAP, you must be aware of the following:

- If the cluster hosts an SnapMirror active sync destination, reverting to ONTAP 9.8 or earlier is not allowed until the relationship is broken and deleted.
- If the cluster hosts an SnapMirror active sync source, reverting to ONTAP 9.8 or earlier is not allowed until the relationship is released.
- All user-created custom SnapMirror active sync policies must be deleted before reverting to ONTAP 9.8 or earlier.

To meet these requirements, see Remove a SnapMirror active sync configuration.

Steps

1. Confirm your readiness to revert, entering the following command from one of the clusters in the SnapMirror active sync relationship:

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

   The following sample output shows a cluster that is not ready to revert with instructions for clean up.

```
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 9.9.1"
```

```
    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>
```

2. Once you've satisfied the requirements of the revert check, see Revert ONTAP.

Remove a SnapMirror active sync configuration

If you no longer require zero RTO SnapMirror synchronous protection, you can delete your SnapMirror active sync relationship.

Remove an asymmetric configuration

- Before you delete the SnapMirror active sync 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 SnapMirror active sync 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 a symmetric active/active configuration

You can remove a symmetric configuration using System Manager or the ONTAP CLI. In both interfaces, there are different steps for uniform and non-uniform configurations.

System Manager

Steps for a uniform configuration

1. On the primary site, remove the remote hosts from the igroup and terminate replication.
   a. Navigate to **Hosts** > **SAN Initiator Groups**.
   b. Select the igroup you want to modify then **Edit**.
   c. Remove the remote initiator and terminate igroup replication. Select **Save**.
2. On the secondary site, delete the replicated relationship by unmapping the LUNs.
   a. Navigate to **Hosts** > **SAN Initiator Groups**.
   b. Select the igroup with the SnapMirror relationship, then **Delete**.
   c. In the dialog box, select the **Unmap the associated LUNs** box then **Delete**.
   d. Navigate to **Protection** > **Relationships**.
   e. Select the SnapMirror active sync relationship then **Release** to delete the relationships.

Steps for a non-uniform configuration

1. On the primary site, remove the remote hosts from the igroup and terminate replication.
   a. Navigate to **Hosts** > **SAN Initiator Groups**.
   b. Select the igroup you want to modify then **Edit**.
   c. Remove the remote initiator and terminate igroup replication. Select **Save**.
2. On the secondary site, remove the SnapMirror active sync relationship.
   a. Navigate to **Protection** > **Relationships**.
   b. Select the SnapMirror active sync relationship then **Release** to delete the relationships.

CLI

Steps for a uniform configuration

1. Move all the VM workloads to the host local to source cluster of SnapMirror active sync.
2. On the source cluster, remove the initiators from the igroup and modify the igroup configuration to terminate igroup replication.

   ```
   SiteA::> igroup remove -vserver svm_name -igroup igroup_name -initiator
   host2
   SiteA::> igroup modify -vserver svm_name -igroup igroup_name -replication
   -peer "-"
   ```

3. On the secondary site, delete the LUN mapping and remove the igroup configuration:

   ```
   SiteB::> lun mapping delete -vserver svm_name -igroup igroup_name -path <>
   SiteB::> igroup delete -vserver svm_name -igroup igroup_name
   ```

4. On the secondary site, delete the SnapMirror active sync relationship.

   ```
   SiteB::> snapmirror delete -destination-path destination_path
   ```

5. On the primary site, release the SnapMirror active sync relationship from primary site.

   ```
   SiteA::> snapmirror release -destination-path destination_path
   ```

6. Rediscover the paths to verify that only the local path is available to the host.

Steps for a non-uniform configuration

1. Move all the VM workloads to the host local to source cluster of SnapMirror active sync.
2. On the source cluster, remove the initiators from the igroup.

   ```
   SiteA::> igroup remove -vserver svm_name -igroup igroup_name -initiator
   host2
   ```

3. On the secondary site, delete the LUN mapping and remove the igroup configuration:

   ```
   SiteB::> lun mapping delete -vserver svm_name -igroup igroup_name -path <>
   SiteB::> igroup delete -vserver svm_name -igroup igroup_name
   ```

4. On the secondary site, delete the SnapMirror active sync relationship.

   ```
   SiteB::> snapmirror delete -destination-path destination_path
   ```

5. On the primary site, release the SnapMirror active sync relationship from primary site.

   ```
   SiteA::> snapmirror release -destination-path destination_path
   ```

6. Rediscover the paths to verify that only the local path is available to the host.

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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