Manage data protection operations for FlexGroup volumes

ONTAP 9

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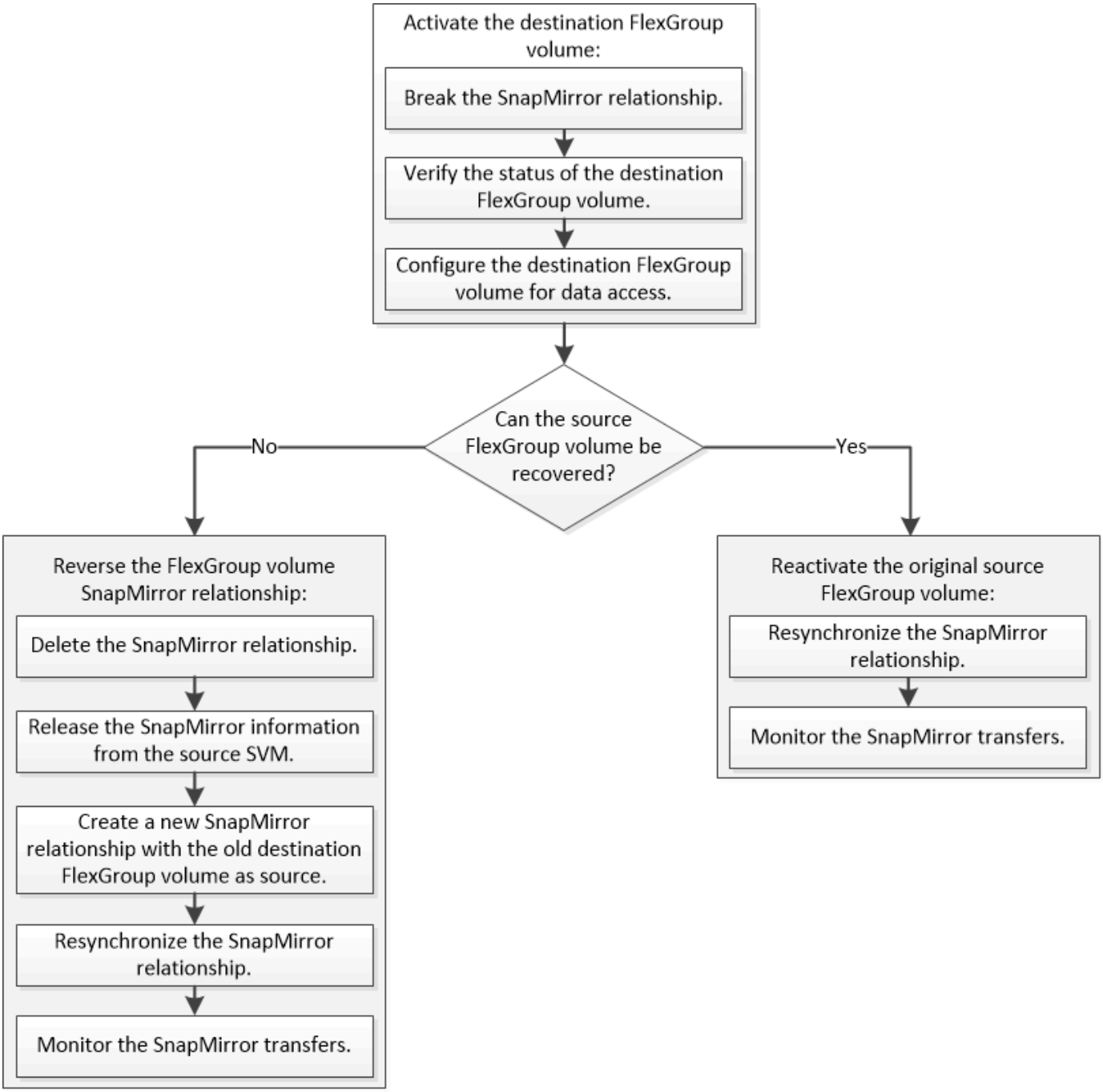
Disaster recovery workflow for FlexGroup volumes

When a disaster strikes on the source FlexGroup volume, you should activate the destination FlexGroup volume and redirect client access. Depending on whether the source FlexGroup volume can be recovered, you should either reactivate the source FlexGroup volume or reverse the SnapMirror relationship.



About this task

Client access to the destination FlexGroup volume is blocked for a brief period when some SnapMirror operations, such as SnapMirror break and resynchronization, are running. If the SnapMirror operation fails, it is possible that some of the constituents remain in this state and access to the FlexGroup volume is denied. In such cases, you must retry the SnapMirror operation.

Activate the destination FlexGroup volume

When the source FlexGroup volume is unable to serve data due to events such as data corruption, accidental deletion or an offline state, you must activate the destination FlexGroup volume to provide data access until you recover the data on the source FlexGroup volume. Activation involves stopping future SnapMirror data transfers and

breaking the SnapMirror relationship.

About this task

You must perform this task from the destination cluster.

Steps

1. Disable future transfers for the FlexGroup volume SnapMirror relationship: `snapmirror quiesce dest_svm:dest_flexgroup`

   ```
   cluster2::> snapmirror quiesce -destination-path vsd:dst
   ```

2. Break the FlexGroup volume SnapMirror relationship: `snapmirror break dest_svm:dest_flexgroup`

   ```
   cluster2::> snapmirror break -destination-path vsd:dst
   ```

3. View the status of the SnapMirror relationship: `snapmirror show -expand`

```
cluster2::> snapmirror show -expand

Progress
Source            Destination Mirror  Relationship   Total
Last
Path        Type  Path        State   Status         Progress  Healthy
Updated
----------- ---- ------------ ------- -------------- --------- -------
--------
vss:s       XDP  vsd:dst        Broken-off
                                    Idle           -         true    -
vss:s__0001 XDP  vsd:dst__0001  Broken-off
                                    Idle           -         true    -
vss:s__0002 XDP  vsd:dst__0002  Broken-off
                                    Idle           -         true    -
vss:s__0003 XDP  vsd:dst__0003  Broken-off
                                    Idle           -         true    -
vss:s__0004 XDP  vsd:dst__0004  Broken-off
                                    Idle           -         true    -
vss:s__0005 XDP  vsd:dst__0005  Broken-off
                                    Idle           -         true    -
vss:s__0006 XDP  vsd:dst__0006  Broken-off
                                    Idle           -         true    -
vss:s__0007 XDP  vsd:dst__0007  Broken-off
                                    Idle           -         true    -
vss:s__0008 XDP  vsd:dst__0008  Broken-off
                                    Idle           -         true    -
...
```

The SnapMirror relationship status of each constituent is `Broken-off`.

4. Verify that the destination FlexGroup volume is read/write: `volume show -vserver svm_name`

```
cluster2::> volume show -vserver vsd
Vserver   Volume       Aggregate    State      Type       Size
Available Used%
--------- ------------ ------------ ---------- ---- ----------
---------- -----
vsd       dst          -            online     **RW**          2GB
1.54GB   22%
vsd       d2           -            online     DP           2GB
1.55GB   22%
vsd       root_vs0     aggr1        online     RW        100MB
94.02MB    5%
3 entries were displayed.
```

5. Redirect clients to the destination FlexGroup volume.

Reactivate the original source FlexGroup volume after disaster

When the source FlexGroup volume becomes available, you can resynchronize the original source and original destination FlexGroup volumes. Any new data on the destination FlexGroup volume is lost.

About this task

Any active quota rules on the destination volume are deactivated and the quota rules are deleted before resynchronization is performed.

You can use the `volume quota policy rule create` and `volume quota modify` commands to create and reactivate quota rules after the resynchronization operation is complete.

Steps

1. From the destination cluster, resynchronize the FlexGroup volume SnapMirror relationship: `snapmirror resync -destination-path dst_svm:dest_flexgroup`
2. View the status of the SnapMirror relationship: `snapmirror show -expand`

```
cluster2::> snapmirror show -expand

Progress
Source            Destination Mirror  Relationship   Total
Last
Path        Type  Path        State   Status         Progress  Healthy
Updated
----------- ---- ------------ ------- -------------- --------- -------
--------
vss:s       XDP  vsd:dst        Snapmirrored
                                    Idle           -         true    -
vss:s__0001 XDP  vsd:dst__0001  Snapmirrored
                                    Idle           -         true    -
vss:s__0002 XDP  vsd:dst__0002  Snapmirrored
                                    Idle           -         true    -
vss:s__0003 XDP  vsd:dst__0003  Snapmirrored
                                    Idle           -         true    -
vss:s__0004 XDP  vsd:dst__0004  Snapmirrored
                                    Idle           -         true    -
vss:s__0005 XDP  vsd:dst__0005  Snapmirrored
                                    Idle           -         true    -
vss:s__0006 XDP  vsd:dst__0006  Snapmirrored
                                    Idle           -         true    -
vss:s__0007 XDP  vsd:dst__0007  Snapmirrored
                                    Idle           -         true    -
vss:s__0008 XDP  vsd:dst__0008  Snapmirrored
                                    Idle           -         true    -
...
```

The SnapMirror relationship status of each constituent is `Snapmirrored`.

Reverse a SnapMirror relationship between FlexGroup volumes during disaster recovery

When a disaster disables the source FlexGroup volume of a SnapMirror relationship, you can use the destination FlexGroup volume to serve data while you repair or replace the source FlexGroup volume. After the source FlexGroup volume is online, you can make the original source FlexGroup volume a read-only destination and reverse the SnapMirror relationship.

About this task

Any active quota rules on the destination volume are deactivated and the quota rules are deleted before resynchronization is performed.

You can use the `volume quota policy rule create` and `volume quota modify` commands to create

and reactivate quota rules after the resynchronization operation is complete.

Steps

1. On the original destination FlexGroup volume, remove the data protection mirror relationship between the source FlexGroup volume and the destination FlexGroup volume: `snapmirror delete -destination -path svm_name:volume_name`

   ```
   cluster2::> snapmirror delete -destination-path vsd:dst
   ```

2. On the original source FlexGroup volume, remove the relationship information from the source FlexGroup volume: `snapmirror release -destination-path svm_name:volume_name -relationship -info-only`

   After deleting a SnapMirror relationship, you must remove the relationship information from the source FlexGroup volume before attempting a resynchronization operation.

   ```
   cluster1::> snapmirror release -destination-path vsd:dst -relationship
   -info-only true
   ```

3. On the new destination FlexGroup volume, create the mirror relationship: `snapmirror create -source-path src_svm_name:volume_name -destination-path dst_svm_name:volume_name -type XDP -policy MirrorAllSnapshots`

   ```
   cluster1::> snapmirror create -source-path vsd:dst -destination-path
   vss:src -type XDP -policy MirrorAllSnapshots
   ```

4. On the new destination FlexGroup volume, resynchronize the source FlexGroup: `snapmirror resync -source-path svm_name:volume_name`

   ```
   cluster1::> snapmirror resync -source-path vsd:dst
   ```

5. Monitor the SnapMirror transfers: `snapmirror show -expand`

```
cluster2::> snapmirror show -expand

Progress
Source            Destination Mirror  Relationship   Total
Last
Path        Type  Path        State   Status         Progress  Healthy
Updated
----------- ---- ------------ ------- -------------- --------- -------
--------
vsd:dst       XDP  vss:src        Snapmirrored
                                      Idle           -         true    -
vss:dst__0001 XDP  vss:src__0001  Snapmirrored
                                      Idle           -         true    -
vsd:dst__0002 XDP  vss:src__0002  Snapmirrored
                                      Idle           -         true    -
vsd:dst__0003 XDP  vss:src__0003  Snapmirrored
                                      Idle           -         true    -
vsd:dst__0004 XDP  vss:src__0004  Snapmirrored
                                      Idle           -         true    -
vsd:dst__0005 XDP  vss:src__0005  Snapmirrored
                                      Idle           -         true    -
vsd:dst__0006 XDP  vss:src__0006  Snapmirrored
                                      Idle           -         true    -
vsd:dst__0007 XDP  vss:src__0007  Snapmirrored
                                      Idle           -         true    -
vsd:dst__0008 XDP  vss:src__0008  Snapmirrored
                                      Idle           -         true    -
...
```

The SnapMirror relationship status of each constituent shows as `Snapmirrored` that indicates that the resynchronization was successful.

Expand FlexGroup volumes in a SnapMirror relationship

Expand FlexGroup volumes in a SnapMirror relationship

Starting with ONTAP 9.3, you can expand the source FlexGroup volume and destination FlexGroup volume that are in a SnapMirror relationship by adding new constituents to the volumes. You can expand the destination volumes either manually or automatically.

About this task

- After expansion, the number of constituents in the source FlexGroup volume and destination FlexGroup volume of a SnapMirror relationship must match.

  If the number of constituents in the volumes does not match, the SnapMirror transfers fail.

- You should not perform any SnapMirror operation when the expansion process is in progress.
- If a disaster strikes before the expansion process is complete, you must break the SnapMirror relationship and wait until the operation succeeds.

> You should break the SnapMirror relationship when the expansion process is in progress only in the case of a disaster. In the case of a disaster, the break operation can take some time to complete. You should wait for the break operation to get completed successfully before performing a resync operation. If the break operation fails, you must retry the break operation. If the break operation fails, some of the new constituents might remain in the destination FlexGroup volume after the break operation. It is best to delete these constituents manually before proceeding further.

Expand the source FlexGroup volume of a SnapMirror relationship

Starting with ONTAP 9.3, you can expand the source FlexGroup volume of a SnapMirror relationship by adding new constituents to the source volume. You can expand the source volume in the same way that you expand a regular FlexGroup volume (read-write volume).

Steps

1. Expand the source FlexGroup volume: `volume expand -vserver vserver_name -volume fg_src -aggr-list aggregate name,... [-aggr-list-multiplier constituents_per_aggr]`

```
cluster1::> volume expand -volume src_fg -aggr-list aggr1 -aggr-list
-multiplier 2 -vserver vs_src

Warning: The following number of constituents of size 50GB will be added
to FlexGroup "src_fg": 2.
Expanding the FlexGroup will cause the state of all Snapshot copies to
be set to "partial".
Partial Snapshot copies cannot be restored.
Do you want to continue? {y|n}: Y
[Job 146] Job succeeded: Successful
```

The state of all of the Snapshot copies that are taken before the volume is expanded changes to partial.

Expand the destination FlexGroup volume of a SnapMirror relationship

You can expand the destination FlexGroup volume and reestablish the SnapMirror relationship either automatically or manually. By default, the SnapMirror relationship is set for automatic expansion, and the destination FlexGroup volume expands automatically if the source volume expands.

What you'll need

- The source FlexGroup volume must have been expanded.

- The SnapMirror relationship must be in the `SnapMirrored` state.

  The SnapMirror relationship must not be broken or deleted.

About this task

- When the destination FlexGroup volume is created, the volume is set up for automatic expansion by default.

  You can modify the destination FlexGroup volume for manual expansion, if required.

  The best practice is to expand the destination FlexGroup volume automatically.

- All SnapMirror operations fail until both the source FlexGroup volume and destination FlexGroup volume have expanded and have the same number of constituents.
- If you expand the destination FlexGroup volume after the SnapMirror relationship is broken or deleted, you cannot resync the original relationship again.

  If you intend to reuse the destination FlexGroup volume, you must not expand the volume after deleting the SnapMirror relationship.

Choices

- Perform an update transfer to expand the destination FlexGroup volume automatically:

  a. Perform a SnapMirror update transfer: `snapmirror update -destination-path svm:vol_name`

  b. Verify that the status of the SnapMirror relationship is in the `SnapMirrored` state: `snapmirror show`

  ```
  cluster2::> snapmirror show

  Progress
  Source            Destination Mirror  Relationship   Total
  Last
  Path        Type  Path        State   Status         Progress
  Healthy Updated
  ----------- ---- ------------ ------- -------------- ---------
  ------- --------
  vs_src:src_fg
              XDP  vs_dst:dst_fg
                                Snapmirrored
                                        Idle           -         true
  -
  ```

  Based on the size and availability of aggregates, the aggregates are automatically selected, and new constituents that match the constituents of the source FlexGroup volume are added to the destination FlexGroup volume. After expansion, a resynchronization operation is automatically triggered.

- Expand the destination FlexGroup volume manually:

a. If the SnapMirror relationship is in the auto-expand mode, set the SnapMirror relationship to the manual expand mode: `snapmirror modify -destination-path svm:vol_name -is-auto-expand -enabled false`

```
cluster2::> snapmirror modify -destination-path vs_dst:dst_fg -is
-auto-expand-enabled false
Operation succeeded: snapmirror modify for the relationship with
destination "vs_dst:dst_fg".
```

b. Quiesce the SnapMirror relationship: `snapmirror quiesce -destination-path svm:vol_name`

```
cluster2::> snapmirror quiesce -destination-path vs_dst:dst_fg
Operation succeeded: snapmirror quiesce for destination
"vs_dst:dst_fg".
```

c. Expand the destination FlexGroup volume: `volume expand -vserver vserver_name -volume fg_name -aggr-list aggregate name,... [-aggr-list-multiplier constituents_per_aggr]`

```
cluster2::> volume expand -volume dst_fg -aggr-list aggr1 -aggr-list
-multiplier 2  -vserver vs_dst

Warning: The following number of constituents of size 50GB will be
added to FlexGroup "dst_fg": 2.
Do you want to continue? {y|n}: y
[Job 68] Job succeeded: Successful
```

d. Resynchronize the SnapMirror relationship: `snapmirror resync -destination-path svm:vol_name`

```
cluster2::> snapmirror resync -destination-path vs_dst:dst_fg
Operation is queued: snapmirror resync to destination
"vs_dst:dst_fg".
```

e. Verify that the status of the SnapMirror relationship is `SnapMirrored`: `snapmirror show`

```
cluster2::> snapmirror show

Progress
Source            Destination Mirror  Relationship   Total
Last
Path        Type  Path        State   Status         Progress
Healthy Updated
----------- ---- ------------ ------- -------------- ---------
------- --------
vs_src:src_fg
            XDP  vs_dst:dst_fg
                              Snapmirrored
                                      Idle           -         true
-
```

Perform a SnapMirror single file restore from a FlexGroup volume

Starting in ONTAP 9.8, you can restore a single file from a FlexGroup SnapMirror vault or from a UDP destination.

About this task

- You can restore from a FlexGroup volume of any geometry to FlexGroup volume of any geometry
- Only one file per restore operation is supported
- You can restore to either the original source FlexGroup volume or to a new FlexGroup volume
- Remote fenced file lookup is not supported.

  Single file restore fails if the source file is fenced.
- You can restart or clean up an aborted single file restore
- You should clean up a failed single file restore transfer by using the `clean-up-failure` option of the `snapmirror restore` command
- Expansion of FlexGroup volumes is supported when a FlexGroup single file restore is in progress or in an aborted state

Steps

1. Restore a file from a FlexGroup volume:`snapmirror restore -destination-path destination_path -source-path source_path -file-list /f1 -throttle throttle -source-snapshot snapshot`

   The following is an example of a FlexGroup volume single file restore operation.

   ```
   vserverA::> snapmirror restore -destination-path vs0:fg2 -source-path
   vs0:fgd -file-list /f1 -throttle 5 -source-snapshot snapmirror.81072ce1-
   ```

```
d57b-11e9-94c0-005056a7e422_2159190496.2019-09-19_062631
[Job 135] Job is queued: snapmirror restore from source "vs0:fgd" for
the snapshot snapmirror.81072ce1-d57b-11e9-94c0-
005056a7e422_2159190496.2019-09-19_062631.
vserverA::> snapmirror show

Source              Destination Mirror   Relationship
Total Last
Path       Type   Path            State    Status           Progress
Healthy Updated
---------- ----      ------------     -------    ---------
----- --------- ------- --------
vs0:v1d RST    vs0:v2          -           Transferring Idle 83.12KB
true 09/19 11:38:42

vserverA::*> snapmirror show vs0:fg2

Source Path: vs0:fgd
Source Cluster: -
Source Vserver: vs0
Source Volume: fgd
Destination Path: vs0:fg2
Destination Cluster: -
Destination Vserver: vs0
Destination Volume: fg2
Relationship Type: RST
Relationship Group Type: none
Managing Vserver: vs0
SnapMirror Schedule: -
SnapMirror Policy Type: -
SnapMirror Policy: -
Tries Limit: -
Throttle (KB/sec): unlimited
Current Transfer Throttle (KB/sec): 2
Mirror State: -
Relationship Status: Transferring
File Restore File Count: 1
File Restore File List: f1
Transfer Snapshot: snapmirror.81072ce1-d57b-11e9-94c0-
005056a7e422_2159190496.2019-09-19_062631
Snapshot Progress: 2.87MB
Total Progress: 2.87MB
Network Compression Ratio: 1:1
Snapshot Checkpoint: 2.97KB
Newest Snapshot: -
Newest Snapshot Timestamp: -
```

```
Exported Snapshot: -
Exported Snapshot Timestamp: -
Healthy: true
Physical Replica: -
Relationship ID: e6081667-dacb-11e9-94c0-005056a7e422
Source Vserver UUID: 81072ce1-d57b-11e9-94c0-005056a7e422
Destination Vserver UUID: 81072ce1-d57b-11e9-94c0-005056a7e422
Current Operation ID: 138f12e6-dacc-11e9-94c0-005056a7e422
Transfer Type: cg_file_restore
Transfer Error: -
Last Transfer Type: -
Last Transfer Error: -
Last Transfer Error Codes: -
Last Transfer Size: -
Last Transfer Network Compression Ratio: -
Last Transfer Duration: -
Last Transfer From: -
Last Transfer End Timestamp: -
Unhealthy Reason: -
Progress Last Updated: 09/19 07:07:36
Relationship Capability: 8.2 and above
Lag Time: -
Current Transfer Priority: normal
SMTape Operation: -
Constituent Relationship: false
Destination Volume Node Name: vserverA
Identity Preserve Vserver DR: -
Number of Successful Updates: 0
Number of Failed Updates: 0
Number of Successful Resyncs: 0
Number of Failed Resyncs: 0
Number of Successful Breaks: 0
Number of Failed Breaks: 0
Total Transfer Bytes: 0
Total Transfer Time in Seconds: 0
Source Volume MSIDs Preserved: -
OpMask: ffffffffffffffff
Is Auto Expand Enabled: -
Source Endpoint UUID: -
Destination Endpoint UUID: -
Is Catalog Enabled: false
```

Restore a FlexGroup volume from a SnapVault backup

You can perform a full-volume restore operation of FlexGroup volumes from a Snapshot

copy in the SnapVault secondary volume. You can restore the FlexGroup volume either to the original source volume or to a new FlexGroup volume.

What you'll need

You must be aware of certain considerations for restoring FlexGroup volumes.

Considerations for SnapVault restore operations for FlexGroup volumes

You must also be aware of certain considerations when you restore from SnapVault backups for FlexGroup volumes.

- Only baseline restore is supported with partial Snapshot copies from a SnapVault backup.

  The number of constituents in the destination volume must match the number of constituents in the source volume when the Snapshot copy was taken.

- If a restore operation fails, no other operations are allowed until the restore operation is complete.

  You can either retry the restore operation or run the restore operation with the `cleanup` parameter.

- A FlexGroup volume can be the source volume of only one backup relationship or restore relationship.

  A FlexGroup volume cannot be the source of two SnapVault relationships, two restore relationships, or a SnapVault relationship and a restore relationship.

- SnapVault backup and restore operations cannot run in parallel.

  When either a baseline restore operation or an incremental restore operation is in progress, you should quiesce the backup operations.

- You must abort a restore operation of a partial Snapshot copy from the destination FlexGroup volume.

  You cannot abort the restore operation of a partial Snapshot copy from the source volume.

- If you abort a restore operation, you must restart the restore operation with the same Snapshot copy that was used for the previous restore operation.

About this task

Any active quota rules on the destination FlexGroup 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.

Steps

1. Restore the FlexGroup volume: `snapmirror restore -source-path src_svm:src_flexgroup -destination-path dest_svm:dest_flexgroup -snapshot snapshot_name`

   `snapshot_name` is the Snapshot copy that is to be restored from the source volume to the destination volume. If the Snapshot copy is not specified, the destination volume is restored from the latest Snapshot copy.

```
vserverA::> snapmirror restore -source-path vserverB:dstFG -destination
-path vserverA:newFG -snapshot daily.2016-07-15_0010
Warning: This is a disruptive operation and the volume vserverA:newFG
will be read-only until the operation completes
Do you want to continue? {y|n}: y
```

Disable SVM protection on a FlexGroup volume

When the SVM DR flag is set to `protected` on a FlexGroup volume, you can set the flag to unprotected to disable SVM DR `protection` on a FlexGroup volume.

What you'll need

- The SVM DR relationship between the primary and secondary is healthy.
- SVM DR protection parameter is set to `protected`.

Steps

1. Disable protection by using the `volume modify` command to change the `vserver-dr-protection` parameter for the FlexGroup volume to `unprotected`.

```
cluster2::> volume modify -vserver vs1 -volume fg_src -vserver-dr
-protection unprotected
[Job 5384] Job is queued: Modify fg_src.
[Job 5384] Steps completed: 4 of 4.
cluster2::>
```

2. Update the SVM at the secondary site: `snapmirror update -destination-path destination_svm_name: -source-path Source_svm_name:`
3. Verify that the SnapMirror relationship is healthy: `snapmirror show`
4. Verify that the FlexGroup SnapMirror relationship has been removed: `snapmirror show -expand`

Enable SVM protection on a FlexGroup volume

When the SVM DR protection flag is set to `unprotected` on a FlexGroup volume, you can set the flag to `protected` to enable SVM DR protection.

What you'll need

- The SVM DR relationship between the primary and secondary is healthy.
- SVM DR protection parameter is set to `unprotected`.

Steps

1. Enable protection by using the `volume modify` to change the `vserver-dr-protection` parameter for the FlexGroup volume to `protected`.

```
cluster2::> volume modify -vserver vs1 -volume fg_src -vserver-dr
-protection protected
[Job 5384] Job is queued: Modify fg_src.
[Job 5384] Steps completed: 4 of 4.
cluster2::>
```

2. Update the SVM at the secondary site: `snapmirror update -destination-path destination_svm_name -source-path source_svm_name`

```
snapmirror update -destination-path vs1_dst: -source-path vs1:
```

3. Verify that the SnapMirror relationship is healthy: `snapmirror show`

```
cluster2::> snapmirror show

Progress
Source            Destination Mirror  Relationship   Total
Last
Path        Type  Path        State   Status         Progress  Healthy
Updated
----------- ---- ------------ ------- -------------- --------- -------
--------
vs1:        XDP  vs1_dst:     Snapmirrored
                                 Idle           -         true    -
```

4. Verify that the FlexGroup SnapMirror relationship is healthy: `snapmirror show -expand`

```
cluster2::> snapmirror show -expand

Progress
Source            Destination Mirror  Relationship   Total
Last
Path        Type  Path        State   Status         Progress  Healthy
Updated
----------- ---- ------------ ------- -------------- --------- -------
--------
vs1:        XDP  vs1_dst:     Snapmirrored
                                    Idle           -         true    -
vs1:fg_src  XDP  vs1_dst:fg_src
                              Snapmirrored
                                    Idle           -         true    -
vs1:fg_src__0001
            XDP  vs1_dst:fg_src__0001
                              Snapmirrored
                                    Idle           -         true    -
vs1:fg_src__0002
            XDP  vs1_dst:fg_src__0002
                              Snapmirrored
                                    Idle           -         true    -
vs1:fg_src__0003
            XDP  vs1_dst:fg_src__0003
                              Snapmirrored
                                    Idle           -         true    -
vs1:fg_src__0004
            XDP  vs1_dst:fg_src__0004
                              Snapmirrored
                                    Idle           -         true    -
6 entries were displayed.
```