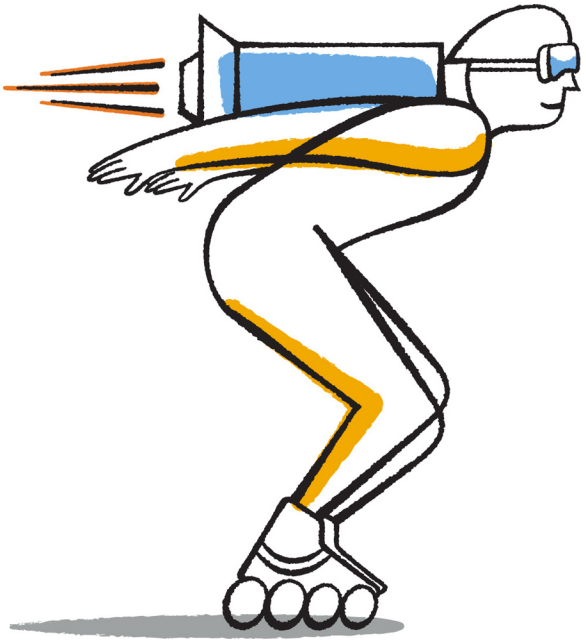
Clustered Data ONTAP® 8.2

Vserver Root Volume Protection Express Guide



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Deciding whether to use this guide

This guide provides examples that show how to create load-sharing mirrors on every node of a cluster to protect the Vserver root volume, which is a NetApp best practice for NAS-enabled Vservers. It also provides examples of how to recover from volume failures or losses by promoting the Vserver root volume from a load-sharing mirror.

Every Vserver has a root volume that serves as the entry point to the namespace provided by that Vserver. The root volume of any Vserver is a FlexVol volume that resides at the top level of the namespace hierarchy and contains directories that are used as mount points, the paths where data volumes are junctioned into the namespace. These directories do not often change.

In the unlikely event that the root volume of the Vserver is unavailable, NAS clients cannot access the namespace hierarchy and therefore cannot access data in the namespace. For this reason, it is a NetApp best practice to create a load-sharing mirror for the root volume on each node of the cluster so that the namespace directory information remains available in the event of a node outage or failover.

You should use this guide if you want to create or recover from load-sharing mirrors and do not want a lot of conceptual background for the tasks.

This guide assumes the following:

- You are a cluster administrator.
  Vserver administrators cannot create load-sharing mirrors.
- The root volume you want to protect is for a Vserver that uses FlexVol volumes and not an Infinite Volume.
- You have NAS clients using CIFS or NFSv3.
  NFSv4 clients are not supported with read-only load-sharing mirrors. Data ONTAP routes NFSv4 clients to the source volume of a load-sharing mirror for direct read and write access.
  SAN client connections (FC, FCoE, or iSCSI) do not depend on the Vserver root volume.

The examples in this guide show how to create a set of load-sharing mirrors for the Vserver root volume, but you can follow the same procedures to create load-sharing mirrors for other FlexVol volumes.

If these assumptions are not correct for your situation, or if you want more conceptual background information, you should see the following documentation instead. This documentation is available from the NetApp Support Site.

- *Clustered Data ONTAP Logical Storage Management Guide*
- Technical Report 4015: SnapMirror Configuration and Best Practices Guide for Clustered Data ONTAP 8.2

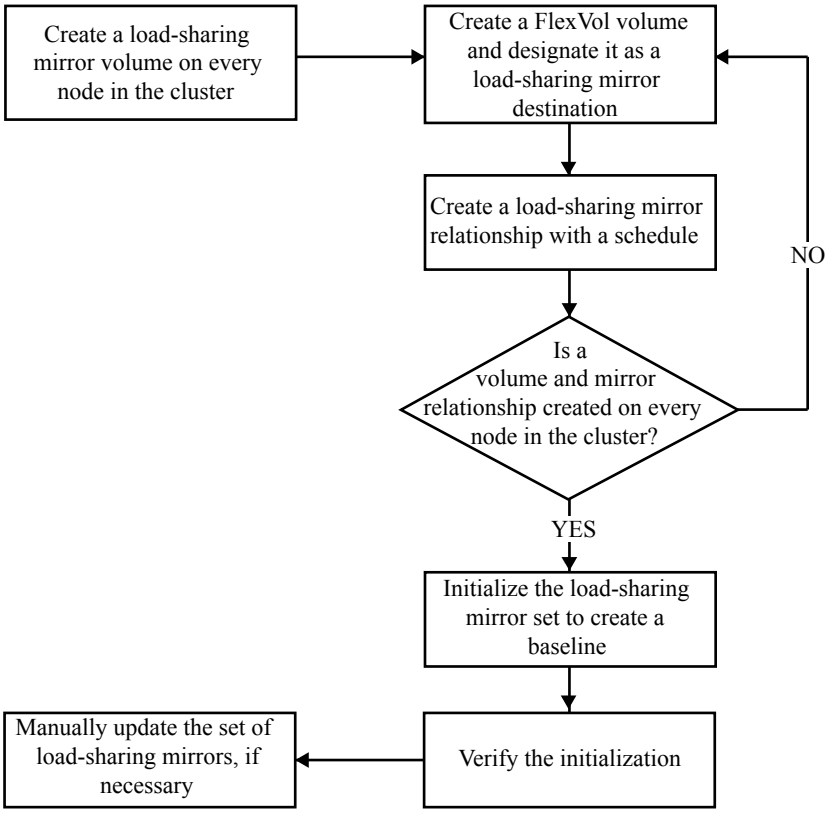
Related information

Documentation on the NetApp Support Site: support.netapp.com

Technical Report: SnapMirror Configuration and Best Practices Guide for Clustered Data ONTAP: media.netapp.com/documents/tr-4015.pdf

Vserver root volume protection workflow

To protect the Vserver namespace root volume, you can create a load-sharing mirror volume on every node in the cluster, including the node in which the root volume is located. Then you create a mirror relationship to each load-sharing mirror volume, and initialize the set of load-sharing mirror volumes.

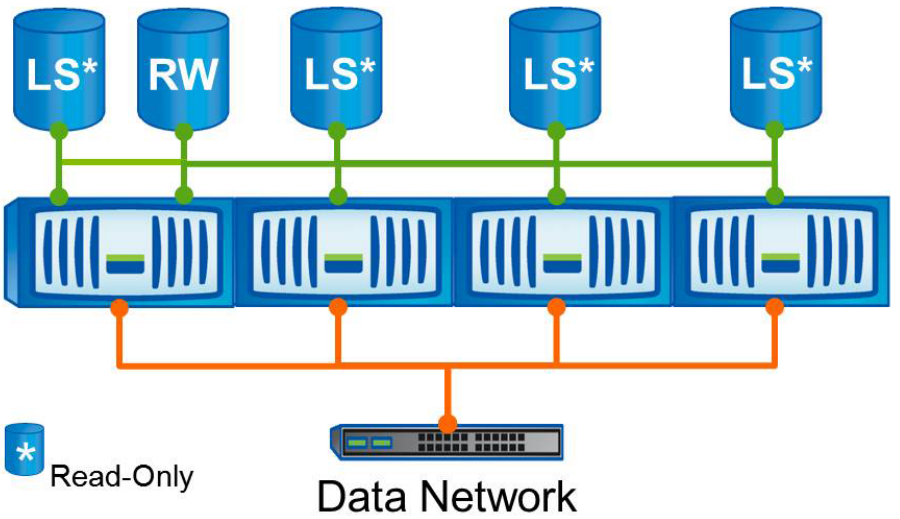


Creating a FlexVol volume for load-sharing

You must create a FlexVol volume and designate it as a load-sharing mirror destination before you can create mirror relationships for load-sharing.

About this task

A group of load-sharing mirror destination volumes that replicate from the same source volume is referred to as a *load-sharing mirror set*.



When a client requests access to a volume configured with a set of load-sharing mirrors, Data ONTAP directs all client connections only to the load-sharing mirror destination volumes. The set of load-sharing mirrors you create for the Vserver root volume should therefore include a load-sharing mirror on the same node where the source volume resides.

Steps

1. Use the `volume create` command with the `-type` parameter set to `DP` to create a destination volume for the load-sharing mirror.

   Note: The destination volume that you create must be the same size or greater than the source volume.

   When you create a FlexVol volume using the -type DP option, it is created with settings that reflect best practices for destination volumes that are going to be used for data protection. These are different from the default settings used for RW.

See the *Clustered Data ONTAP Logical Storage Management Guide* for details about the `volume create` command.

Example

The following example creates a destination volume for a load-sharing mirror on the same node as the source volume. The source volume is the root volume for Vserver vs1, which is the minimum size of 1 GB, on aggregate aggr1. The aggregate on which you create the destination volume determines the node in which the volume is created. The command creates a mirror destination volume vs1_m1, also located on Vserver vs1 on aggregate aggr1, with the volume type DP. This follows the NetApp best practice naming convention of naming the load-sharing mirror destination volumes the same as the Vserver name appended with a mirror designation, such as _m1, _m2, and so on.

```
cluster1::> volume create -vserver vs1 -volume vs1_m1 -aggregate
aggr1 -size 1GB -type DP
```

2. Repeat the previous step for each load-sharing mirror that you want.

Example

The following example creates three more destination volumes that will be used as load-sharing mirrors for the root volume, one on each of the remaining three nodes of this cluster.

```
cluster1::> volume create -vserver vs1 -volume vs1_m2
-aggregate aggr2 -size 1GB -type DP

cluster1::> volume create -vserver vs1 -volume vs1_m3
-aggregate aggr3 -size 1GB -type DP

cluster1::> volume create -vserver vs1 -volume vs1_m4
-aggregate aggr4 -size 1GB -type DP
```

Creating load-sharing mirror relationships

Before you can replicate data from the source FlexVol volume to the load-sharing mirror destination volumes, you must create the mirror relationships by using the `snapmirror create` command.

Steps

1. Use the `snapmirror create` command with the `-type LS` parameter to create a load-sharing mirror relationship between the source volume and a destination volume.

Example

The following command creates a load-sharing mirror relationship between the source root volume vs1_root for Vserver vs1 and the load-sharing destination volume vs1_m1, and specifies

the default hourly update schedule, which is a NetApp best practice if you do not have an existing schedule. If you do have an existing schedule configured, then you can specify that instead.

```
cluster1::> snapmirror create -source-path //vs1/vs1_root
-destination-path //vs1/vs1_m1 -type LS -schedule hourly
[Job 171] Job is queued: snapmirror create the relationship with
destination //vs1/vs1_m1
[Job 171] Job succeeded: SnapMirror: done
```

When you create a relationship for a load-sharing mirror, the attributes for that load-sharing mirror (throttles, update schedules, and so on) are shared by all of the load-sharing mirrors that share the same source volume.

2. Repeat Step 1 to add a load-sharing mirror relationship to the destination volume on each node in the cluster.

Example

The following command creates load-sharing mirror relationships between the Vserver root volume vs1_root and the destination volumes vs1_m2, vs1_m3, and vs1_m4. The `-schedule` parameter does not need to be used again, because Data ONTAP automatically applies the same schedule to the set of all load-sharing mirrors that share the same source volume.

```
cluster1::> snapmirror create -source-path //vs1/vs1_root
-destination-path //vs1/vs1_m2 -type LS
[Job 172] Job is queued: snapmirror create the relationship with
destination //vs1_m2
[Job 172] Job succeeded: SnapMirror: done

cluster1::> snapmirror create -source-path //vs1/vs1_root
-destination-path //vs1/vs1_m3 -type LS
[Job 173] Job is queued: snapmirror create the relationship with
destination //vs1_m3
[Job 173] Job succeeded: SnapMirror: done

cluster1::> snapmirror create -source-path //vs1/vs1_root
-destination-path //vs1/vs1_m4 -type LS
[Job 174] Job is queued: snapmirror create the relationship with
destination //vs1_m4
[Job 174] Job succeeded: SnapMirror: done
```

Creating a baseline for a set of load-sharing mirrors

You initialize the set of load-sharing mirrors to create a baseline of the source FlexVol volume to the load-sharing mirror destination volumes.

Steps

1. Use the `snapmirror initialize-ls-set` command to initialize all of the load-sharing mirrors in the set.

   Note: Do not use the `snapmirror initialize` command to initialize a set of load-sharing mirrors. The `snapmirror initialize` command is for initializing individual volumes.

   #### Example

   The following example creates a baseline copy of the Vserver root volume vs1_root to all of its load-sharing mirrors. Specify the source path to identify the load-sharing mirror set instead of a destination path, because in a load-sharing mirror set the source path is common to all relationships that are being initialized.

   ```
   cluster1::> snapmirror initialize-ls-set -source-path //vs1/vs1_root
   [Job 175] Job is queued: snapmirror load-share initialize for source
   cluster1//vs1/vs1_root.
   ```

2. Use the `snapmirror show` command to verify the progress of the replication.

   #### Example

   The following example shows the progress of the replication process to the four load-sharing mirrors that were created for the Vserver root volume vs1_root.

   ```
   cluster01::> snapmirror show
                                                                        Progress
   Source            Destination  Mirror  Relationship  Total          Last
   Path        Type  Path         State   Status        Progress  Healthy Updated
   ----------- ---- ------------ ------- -------------- --------- ------- --------
   cluster01://vs1/vs1_root
               LS   cluster01://vs1/vs1_m1
                                 Snapmirrored
                                         Idle          -         true    -
                    cluster01://vs1/vs1_m2
                                 Snapmirrored
                                         Idle          -         true    -
                    cluster01://vs1/vs1_m3
                                 Snapmirrored
                                         Idle          -         true    -
                    cluster01://vs1/vs1_m4
                                 Snapmirrored
                                         Idle          -         true    -
   ```

After you finish

After creating and initializing a set of mirrors, you might need to add another load-sharing mirror later. This can occur when you add another node to the cluster that contains volumes managed by the Vserver. For information about how to add a new load-sharing mirror to an existing load-sharing mirror set, including how to mount the new volume, see the *Clustered Data ONTAP Logical Storage Management Guide*.

Updating a set of load-sharing mirrors

You can update a set of load-sharing mirrors if you think an update is necessary before the next scheduled update.

Step

1. Use the `snapmirror update-ls-set` command to update all of the load-sharing mirrors in the set.

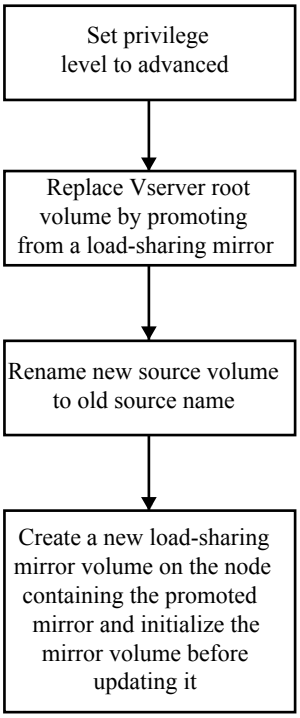
Example

The following example updates all of the load-sharing mirrors in the set created for the Vserver root volume vs1_root.

```
cluster1::> snapmirror update-ls-set -source-path //vs1/vs1_root
[Job 193] Job is queued: snapmirror load-share update for source
cluster1://vs1/vs1_root.
```

Vserver root volume promote workflow

If the Vserver root volume becomes unavailable and you have protected it with a set of load-sharing mirrors, you can promote one of the mirrored volumes and then rename it to take the place of the original Vserver source volume.



Replacing the Vserver root volume by promoting a load-sharing mirror

If the Vserver root volume becomes unavailable, NAS clients cannot mount the root of the namespace. To facilitate data access to the clients, you must replace the root volume by promoting one of the load-sharing mirror volumes and then renaming the promoted volume to the original Vserver root volume name.

About this task

Because promoting mirrors is an infrequent operation used only to recover from volume failures or losses, the command can be run only at the advanced privilege level and higher. The promoted mirror

has the same attributes as the source Vserver root volume. When you recover the Vserver root volume from a load-sharing mirror, the old source Vserver root volume is deleted after the load-sharing mirror is promoted.

Steps

1. Use the `set -privilege advanced` command to set the privilege level to advanced.
2. Use the `snapmirror promote` command to promote a load-sharing mirror as the new Vserver root volume.

   Data ONTAP makes the load-sharing mirror destination volume a read/write volume, redirects all load-sharing mirrors in the set to the new source volume, and deletes the original source Vserver root volume if it is accessible.

   Attention: The recovered Vserver root source volume might not have all of the data that the original source volume had because the SnapMirror load-sharing relationship has a scheduled, asynchronous update and the update might not have occurred recently.
3. From the admin privilege level, use the `volume rename` command to rename the promoted Vserver root volume to the original Vserver root volume name.

   Renaming the promoted Vserver root volume maintains the original naming convention and is a NetApp best practice for NAS-enabled Vservers.
4. Create a new load-sharing mirror volume on the same node to replace the promoted load-sharing mirror volume and initialize the load-sharing mirror volume before updating it.

   The new load-sharing mirror volume is now part of the load-sharing mirror set.

Example

The following example shows how to promote a load-sharing mirror volume as the Vserver root volume and replace the promoted load-sharing mirror volume:

```
cluster1::> set -privilege advanced

Warning: These advanced commands are potentially dangerous; use them only when
directed to do so
by technical support.
Do you want to continue? {y|n}: y

cluster1::*> snapmirror promote -destination-path vs1_root:vs1_m2

Warning: Promote will delete the read-write volume
       cluster1://vs1_root and replace it with cluster1://vs1_m2.
Do you want to continue? {y|n}: y
[Job 489] Job succeeded: SnapMirror: done

cluster1::*> set -privilege admin

cluster1::> volume rename -vserver vs1 -volume vs1_m2 -newname vs1_root
[Job 1438] Job succeeded: Successful

cluster1::> snapmirror show –type LS
Source            Destination  Mirror      Relationship   Total
Path         Type Path         State       Status         Progress   Healthy
------------ ---- ------------ ---------- --------------  ---------  ------
```

```
cluster1://vs1/vs1_root
             LS   cluster1://vs1/vs1_root

cluster1::>volume create -vserver vs1 -volume vs1_m2 -aggregate aggr2 -size 1GB -type
DP

cluster1::>snapmirror create -source-path //vs1/vs1_root -destination-path //vs1/
vs1_m2 -type LS -schedule hourly
[Job 171] Job is queued: snapmirror create the relationship with destination //vs1/
vs1_m2
[Job 171] Job succeeded: SnapMirror: done

cluster1::>snapmirror initialize -source-path //vs1/vs1_root -destination-path  //vs1/
vs1_m2  -type LS

cluster1::>snapmirror update-ls-set -source-path //vs1/vs1_root
[Job 193] Job is queued: snapmirror load-share update for source cluster1://vs1/
vs1_root.

cluster1::> snapmirror show
                                                                       Progress
Source            Destination  Mirror  Relationship  Total            Last
Path        Type  Path         State   Status        Progress  Healthy Updated
----------- ---- ------------ ------- -------------- --------- ------- --------
cluster1://vs1/vs1_root
            LS   cluster1://vs1/vs1_m1
                              Snapmirrored
                                     Idle               -         true    -
                 cluster1://vs1/vs1_m3
                               Snapmirrored
                                      Idle              -         true    -
                 cluster1://vs1/vs1_m4
                               Snapmirrored
                                      Idle              -         true    -
                 cluster1://vs1/vs1_m2
                               Snapmirrored
                                      Idle              -         true    -
```

Where to find additional information

There are additional documents to help you learn more about load-sharing mirrors and other methods of protecting the availability of your data resources.

All of the following documentation is available from the NetApp Support Site:

Technical Report 4015: SnapMirror Configuration and Best Practices Guide for Clustered Data ONTAP 8.2	Provides information and best practices related to configuring replication in clustered Data ONTAP.
Clustered Data ONTAP Data Protection Guide	Describes how to manage your backup and recover data on clustered systems.
Clustered Data ONTAP Logical Storage Management Guide	Describes how to efficiently manage your logical storage resources on systems running clustered Data ONTAP, using volumes, FlexClone volumes, files and LUNs, FlexCache volumes, deduplication, compression, qtrees, and quotas.
Clustered Data ONTAP Network Management Guide	Describes how to connect your cluster to your Ethernet networks and how to manage logical interfaces (LIFs).
Clustered Data ONTAP System Administration Guide for Cluster Administrators	Describes general system administration for NetApp systems running clustered Data ONTAP.

Related information

Documentation on the NetApp Support Site: support.netapp.com

Technical Report: SnapMirror Configuration and Best Practices Guide for Clustered Data ONTAP: media.netapp.com/documents/tr-4015.pdf

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