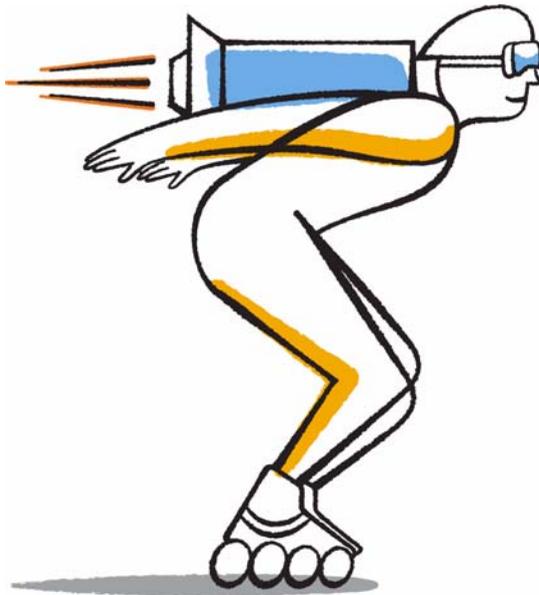




Data ONTAP[®] 8.1

Vserver Root Volume Protection Express Guide For 7-Mode Administrators Learning Cluster-Mode



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Deciding whether to use this guide

You can use load-sharing mirrors to reduce the network traffic to a FlexVol volume. This guide provides examples that show how to create a set of load-sharing mirrors for the Vserver namespace root volume on each node of a cluster, which is a NetApp best practice.

A Vserver namespace root volume contains only directories used as mount points (the paths where data volumes are junctioned (mounted) into the namespace). These directories do not often change. NAS clients cannot access data in the namespace if the Vserver root volume becomes unavailable. By following the best practice of creating a load-sharing mirror on each node of the cluster for the Vserver namespace root volume, you protect the availability of the root volume in the event of a node outage or failover.

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

This guide assumes the following:

- You have experience administering Data ONTAP operating in 7-Mode but are new to Cluster-Mode.
- You are a cluster administrator. Vserver administrators cannot create load-sharing mirrors.
- You are using FlexVol volumes and not an Infinite Volume.

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

If you plan to use this guide to help you create a set of load-sharing mirrors for the Vserver namespace root volume, the examples assume that the clients accessing the load-sharing mirrors will be CIFS or NFSv3 NAS clients. SAN client connections (FC, FCoE, or iSCSI) do not depend on the Vserver namespace root volume.

Note: 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.

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.

- *Data ONTAP Logical Storage Management Guide for Cluster-Mode*
- *SnapMirror Configuration and Best Practices Guide for Data ONTAP 8.1 Operating in Cluster-Mode (TR-4015)*

Related information

[Documentation on the NetApp Support Site: support.netapp.com](http://support.netapp.com)

Mode differences: Vserver namespace root volume

In Cluster-Mode, NAS clients can use a single NFS mount point or CIFS share to access a namespace of potentially thousands of volumes. The root volume for a Vserver namespace contains the paths where the data volumes are junctioned into the namespace. NAS clients cannot access data if the root volume is unavailable.

Note: SAN client connections (FC, FCoE, or iSCSI) do not depend on the Vserver namespace root volume.

In Cluster-Mode, Data ONTAP can create a very large data container, a single namespace, for many volumes. NAS clients can access data anywhere in the namespace using a single NFS mount point or CIFS share.

To the NAS clients, each volume appears as a folder or subdirectory, nested off the root of the NFS file system mount point or CIFS share. Volumes can be added at any time and are immediately available to the clients, with no remount required for visibility to the new storage.

A Vserver with FlexVol volumes has a unique global namespace, which enables the NAS clients to access data without specifying the physical location of the data. The data volumes of each Vserver are related through junctions and are mounted on junction paths. The file system of each data volume appears as if it were mounted at the junctions.

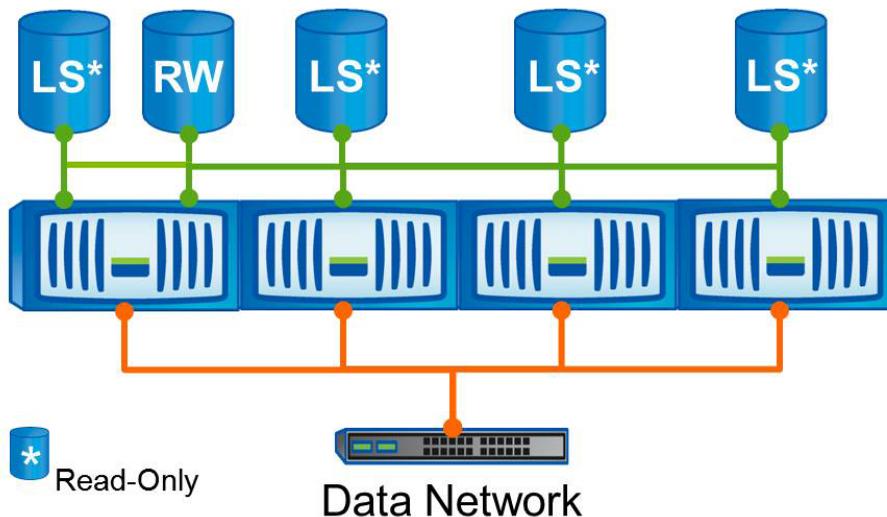
Every Vserver has a root volume that serves as the entry point to the namespace provided by that Vserver. The root volume of a Vserver is a FlexVol volume that resides at the top level of the namespace hierarchy and contains the directories that are used as mount points, the paths where data volumes are junctioned into the namespace.

In the unlikely event that the root volume of a Vserver namespace 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.

Mode differences: load-sharing mirrors

In Cluster-Mode, you can use load-sharing SnapMirror relationships to provide clients with read-only replicas of volumes that are frequently read but infrequently updated. Data ONTAP automatically directs client requests to the load-sharing destination volumes instead of to the source volume.

A group of load-sharing mirror destination volumes that replicate from the same source volume is referred to as a *load-sharing mirror set*. The load-sharing mirrors in a set should be created on different aggregates and should be accessed by different nodes in the cluster to achieve proper load balancing of client requests. There is no 7-Mode task that corresponds directly to the Cluster-Mode task of creating a load-sharing mirror set.



Each load-sharing mirror in a set must belong to the same Vserver as the source volume. A source volume and its set of load-sharing mirrors cannot be accessed by administrators of other Vservers.

In 7-Mode, you can use mirrors to make data available in multiple locations, but the relationship between a source volume and its set of load-sharing mirrors is different from the relationship between a source volume and its data-protection mirrors.

When a client read request comes in for a volume that is the source for a set of load-sharing mirrors, Data ONTAP automatically directs that request to a load-sharing mirror, not to the requested source volume. If the source volume is unavailable, client requests are not disrupted, because the requests are directed to the load-sharing mirrors, not to the source volume.

The failover of a load-sharing mirror relationship does not present a data availability gap while you break the mirror relationship and establish the mirror as the new source volume, as it would with data

protection mirrors. Instead, when a source volume becomes unavailable, client read requests continue to be directed to the load-sharing mirrors, giving you time to *promote* a member of the load-sharing mirror set to be the new source volume.

Load-sharing mirrors do not provide protection from a site disaster, such as fire or flood, because both the source volume and the destination volume must be on the same cluster and Vserver, and all the nodes of a cluster must be geographically collocated.

Cluster-Mode provides additional SnapMirror commands that help you create and manage load-sharing mirrors without having to edit any configuration files, which you have to do for mirrors in 7-Mode. For more information about the SnapMirror commands, see the *Data ONTAP Commands: Manual Page Reference for Cluster-Mode*.

For more information about load-sharing mirrors, see the *Data ONTAP Logical Storage Management Guide for Cluster-Mode*.

Related information

[Documentation on the NetApp Support Site: support.netapp.com](http://support.netapp.com)

Creating a set of load-sharing mirrors

You can create a set of one or more load-sharing mirrors to a read-write volume to reduce the amount of work that a volume would otherwise have to do.

About this task

This is useful for frequently read but infrequently updated data. An example might be shared binary files. You can set up one or more load-sharing mirrors to a volume that is mounted at the `/bin` directory. Client requests to read the binaries on that volume are routed to the load-sharing mirrors, not to the read-write volume.

Creating a FlexVol volume for load-sharing

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

About this task

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 a Vserver namespace root volume should therefore include a load-sharing mirror on the same node where the source volume resides. The load-sharing mirror on the same node as the namespace root volume provides a destination volume that the namespace can use as a direct data access path to data volumes on that node.

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.

See the *Data ONTAP Cluster-Mode Administration Reference* for details about the `volume create` command.

Example

The following example creates a volume for a load-sharing mirror on the same node as the source volume. The source volume is the 20-MB namespace root volume for Vserver `vs1` on aggregate `aggr1`. The command creates volume `vs1_ls_a`, also located on Vserver `vs1` on aggregate `aggr1`, with the volume type `DP`.

```
cluster1::> volume create -vserver vs1 -volume vs1_ls_a -aggregate
aggr1 -size 20MB -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 namespace root volume, one on each of the remaining three nodes of this cluster.

```
cluster1::> volume create -vserver vs1 -volume vs1_ls_b
-aggregate aggr2 -size 20MB -type DP

cluster1::> volume create -vserver vs1 -volume vs1_ls_c
-aggregate aggr3 -size 20MB -type DP

cluster1::> volume create -vserver vs1 -volume vs1_ls_d
-aggregate aggr4 -size 20MB -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 create the mirror relationship 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 endpoint and a destination endpoint.

Example

The following example creates a load-sharing mirror relationship with the namespace root volume for Vserver `vs1`. The new load-sharing mirror, `vs1_ls_a`, is created with an hourly update schedule.

```
cluster1::> snapmirror create -source-path //vs1/vs1
-destination-path //vs1/vs1_ls_a -type LS -schedule hourly
[Job 171] Job is queued: snapmirror create the relationship with
destination //vs1/vs1_ls_a
[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 in the group.

2. Repeat Step 1 to add load-sharing mirror relationships to the source volume, up to the maximum number allowed for a load-sharing mirror fanout.

Example

The following example creates load-sharing mirror relationships between the Vserver namespace root volume vs1 and the destination volumes vs1_ls_b, vs1_ls_c, and vs1_ls_d. The `-schedule` parameter does not need to be used again, because Data ONTAP automatically applies the same schedule to all load-sharing mirrors in the same set.

```
cluster1::> snapmirror create -source-path //vs1/vs1
-destination-path //vs1/vs1_ls_b -type LS
[Job 172] Job is queued: snapmirror create the relationship with
destination //vs1_ls_b
[Job 172] Job succeeded: SnapMirror: done

cluster1::> snapmirror create -source-path //vs1/vs1
-destination-path //vs1/vs1_ls_c -type LS
[Job 173] Job is queued: snapmirror create the relationship with
destination //vs1_ls_c
[Job 173] Job succeeded: SnapMirror: done

cluster1::> snapmirror create -source-path //vs1/vs1
-destination-path //vs1/vs1_ls_d -type LS
[Job 174] Job is queued: snapmirror create the relationship with
destination //vs1_ls_d
[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.

Step

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 namespace root volume vs1 to all of its load-sharing mirrors.

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

Accessing the source volume of a load-sharing mirror set

By default, all clients requesting access to the source volume are granted read-only access. You can grant read/write access to a source volume for CIFS shares and NFS clients by accessing a special administrative mount point.

The administrative mount point is the path that servers requiring read/write access to the load-sharing mirror set must mount.

A volume can be mounted inside other volumes, also referred to as a nested volume. When a new volume is mounted inside a volume that is configured in a load-sharing set, clients cannot see the new mount point until after the load-sharing mirror set has been updated. After changes are made to a source volume, you risk access issues until you manually replicate the source volume to the load-sharing mirror set or until the next scheduled replication occurs. Until the source volume is replicated, you risk the following access issues:

- If you create or mount a new volume on a source volume without replicating the load-sharing mirrors, the new or mounted volume is not visible unless you access it through the `/.admin` link.
- If you delete or unmount a volume on a source volume without replicating the load-sharing mirrors, a client might stop responding if it attempts to do a directory listing at the read-only mount point of the load-sharing mirrors.

Granting read/write access to source volumes for NFS clients

If you are mounting a volume that has one or more mirrors from an NFS client that must have access to the source read-write volume (for instance, to make changes to it), you must mount it through the `/.admin` link at the root of the Vserver.

Step

1. Mount the volume using the `/.admin` link.

The `/.admin` link routes requests to the parent read-write volume regardless of whether the volume has any mirrors.

Example

For example, the following command mounts the NFS export path and adds `/.admin` to the volume path. Any process or application running on the NFS client system must use the path `mountpoint` for read/write access to Vserver namespace root volume `vs1`.

```
# mount -t nfs vs1:/.admin mountpoint
```

If you are mounting a client that does not require read-write access to the source volume, use the following command:

```
# mount -t nfs vs1:/ mountpoint
```

Granting read/write access to source volumes for CIFS shares

If you are mounting a volume that has one or more mirrors from a CIFS client that must have access to the parent read-write volume (for instance, to make changes to it), you must create a new CIFS share.

Step

1. Use the `vserver cifs share create` command to maintain access to the parent read-write volume.

Example

To mount a client that requires read-write access to the source volume of a load-sharing mirror set, Vserver namespace root volume `vs1`, use the following command:

```
cluster1::> vserver cifs share create -vserver vs1 -share-name vs1_rw  
-path /.admin
```

To mount a client that requires only read access, use the command without the `/.admin` link. Requests from this CIFS share will be redirected to a load-sharing mirror.

```
cluster1::> vserver cifs share create -vserver vs1 -share-name vs1_r  
-path /
```

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 Vserver namespace root volume vs1.

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

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:

<i>SnapMirror Configuration and Best Practices Guide for Data ONTAP 8.1 Operating in Cluster-Mode (TR-4015)</i>	Provides information and best practices related to configuring replication in NetApp Data ONTAP software operating in Cluster-Mode.
<i>Data ONTAP Data Protection Guide for Cluster-Mode</i>	Describes how to manage your backup and recover data on clustered systems with Data ONTAP.
<i>Data ONTAP Logical Storage Management Guide for Cluster-Mode</i>	Describes how to efficiently manage your logical storage resources on systems running Data ONTAP operating in Cluster-Mode, using volumes, FlexClone volumes, files and LUNs, FlexCache volumes, deduplication, compression, qtrees, and quotas.
<i>Data ONTAP Network Management Guide for Cluster-Mode</i>	Describes how to connect your cluster to your Ethernet networks and how to manage logical interfaces (LIFs).
<i>Data ONTAP System Administration Guide for Cluster-Mode</i>	Describes general system administration for NetApp systems running Data ONTAP operating in Cluster-Mode.
<i>Data ONTAP 7-Mode to Cluster-Mode Command Map</i>	Provides a mapping of 7-Mode commands to Cluster-Mode commands.
NetApp Knowledgebase	(A database of articles) Provides troubleshooting information, FAQs, and instructions for a wide range of NetApp products and technologies.

Related information

[Documentation on the NetApp Support Site: support.netapp.com](http://support.netapp.com)

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