

Veritas™ Cluster Server Agent for Network Appliance SnapMirror Installation and Configuration Guide

AIX, HP-UX, Linux, Solaris

5.0

Veritas Cluster Server Agent for Network Appliance SnapMirror Installation and Configuration Guide

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Introducing the Network Appliance SnapMirror agent

This chapter contains the following topics:

- [About the Network Appliance SnapMirror agent](#)
- [Supported software and hardware](#)
- [Typical Network Appliance SnapMirror setup in a VCS cluster](#)
- [Network Appliance SnapMirror agent functions](#)

About the Network Appliance SnapMirror agent

The VCS enterprise agent for Network Appliance SnapMirror from Symantec provides failover support and recovery. The agent provides failover support and recovery in environments employing SnapMirror to replicate data between Network Appliance Filer and Fabric Attached Storage devices.

The VCS enterprise agent for Network Appliance SnapMirror monitors and manages the state of replicated filer devices that are attached to hosts. The agent ensures that at one time, only one host has safe exclusive access to the configured filer devices.

The agent determines the current role of the filer volumes with respect to replication. The agent also promotes a read-only target to a read-write source during a wide-area failover.

The agent only supports NFS as the data transfer protocol between host and filer; iSCSI connections to the filer are not supported.

You can use the agent in the replicated data clusters and in the global clusters that run VCS.

Supported software and hardware

The Network Appliance SnapMirror agent supports VCS 5.0.

The agent supports the following versions of Network Appliance hardware and software:

- Network Appliance FAS devices (any model)
- Network Appliance ONTAP 6.4 and later

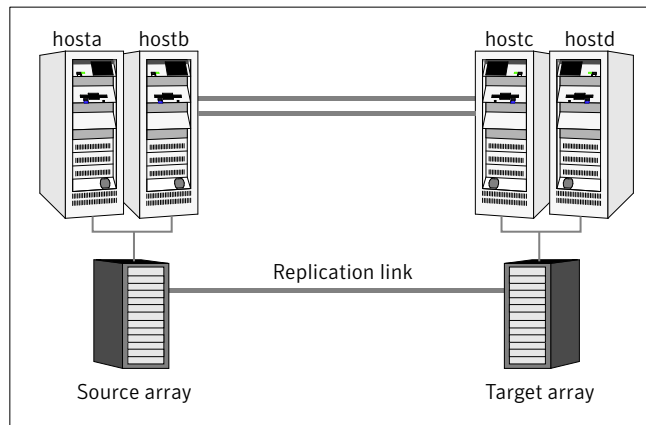
The agent does not support the following:

- NetApp F800 filer series
- The iSCSI protocol
- NetApp SnapMirror in the synchronous mode

Typical Network Appliance SnapMirror setup in a VCS cluster

Figure 1-1 displays a typical cluster setup in a Network Appliance SnapMirror environment.

Figure 1-1 Typical cluster setup in a Network Appliance SnapMirror environment



Clustering in a SnapMirror environment typically consists of the following hardware infrastructure:

- One or more source hosts that are connected by an ethernet cable to a Network Appliance device. The host must support NFS as the transport protocol.
- One or more target hosts that are attached to a second filer with similar characteristics as the source hosts. The volumes are SnapMirror targets.
- Network heartbeating between the two data centers to determine their health; this network heartbeating could be LLT or TCP/IP. See “[About cluster heartbeats](#)” on page 18.
- In a replicated data cluster environment, all hosts are part of the same cluster. You must connect them with the dual and dedicated networks that support LLT.
- In a global cluster environment, you must attach all hosts in the same cluster to the same filer.

Network Appliance SnapMirror agent functions

The Network Appliance SnapMirror agent monitors and manages the state of replicated Network Appliance devices that are attached to VCS nodes. Agent functions bring resources online, take them offline, and perform different monitoring actions. Agent functions are also known as entry points.

online	<p>Creates a lock file on the local host to indicate that the resource is online.</p> <p>Depending on whether the filer is source or target and the state of the specified volume on the filer, the agent performs the online function.</p> <p>See “About the Network Appliance SnapMirror agent’s online function” on page 11.</p>
offline	<p>The agent removes the lock file. The agent does not perform any filer operations because taking the resource offline is not an indication of a pending role swap.</p>
monitor	<p>Verifies that the lock file exists.</p> <ul style="list-style-type: none">■ If the lock file exists, the monitor entry point reports the status of the resource as online.■ If the lock file does not exist, the monitor entry point reports the status of the resource as offline.
open	<p>Removes the lock file on the system on which this entry point is called. The agent prevents potential concurrency violation if the group fails over to another node.</p> <p>Note: The agent does not remove the lock file if the agent was started after a <code>hastop -force</code> command.</p>
clean	<p>Performs the same operation as offline.</p>

About the Network Appliance SnapMirror agent's online function

The agent's online entry point checks the state of the specified volume on the local filer device. The volume on the local filer is in the `SOURCE` state when it is the replication source. The volume is in the `SNAPMIRRORED` state when it is the replication target.

The agent performs the following online functions:

- If the state of the volume on the local filer device is source, the agent creates a lock file to indicate that the resource can come online.
- If the filer is a target, the agent attempts to reverse the direction of replication. To reverse the replication, the agent promotes the local filer to a source and the original source to a target.
- If the original source is down, the agent performs a mirror breakoff to enable local write access.
- If the original source returns to life, you must resynchronize data manually.
- If read-write access is enabled successfully, the online entry point touches a lock file.

Installing and removing the agent

This chapter contains the following topics:

- [Before you install the SnapMirror agent](#)
- [Installing the agent for SnapMirror](#)
- [Removing the agent for SnapMirror](#)

Before you install the SnapMirror agent

Set up your cluster. For information about installing and configuring VCS, see the *Veritas Cluster Server Installation Guide*.

Set up replication and the required hardware infrastructure.

See [“Typical Network Appliance SnapMirror setup in a VCS cluster”](#) on page 9.

Installing the agent for SnapMirror

You must install the Network Appliance SnapMirror agent on each node in the cluster. In global cluster environments, install the agent on each node in each cluster. These instructions assume that you have already installed VCS.

To install the agent on AIX systems

- 1 Determine the device access name of the disc drive.

```
# cd /dev
# lsdev -C -c cdrom
```

The output resembles:

```
cd0 Available 10-60-00-4,0 16 Bit SCSI Multimedia CD-ROM Drive
```

In this example, the CD device access name is cd0.

- 2 Insert the disc into the system's drive.
- 3 Mount the disc.

```
# mkdir -p /cdrom  
# mount -V cdrfs -o ro /dev/cd0 /cdrom
```
- 4 Add the filesets for the software.

```
# cd /cdrom  
# installp -ac -d /cdrom/aix/replication/ntap_agent\  
/5.0.00.0/pkgsrc/VRTSvcna.rte.bff VRTSvcna
```

To install the agent on HP-UX systems

- 1 Insert the disc into the system's drive.
- 2 Create a mount point directory. For example, /cdrom. The directory must have read-write permissions.
- 3 Determine the block device file for the disc drive.

```
# ioscan -fnC disk
```

For example, the listing may indicate the block device is /dev/dsk/c1t2d0.
- 4 Start the Portable File System (PFS).

```
# nohup pfs_mountd &  
# nohup pfsd &
```
- 5 Mount the disc.

```
# /usr/sbin/pfs_mount -t rrip /dev/dsk/c#t#d# /cdrom
```

The variable /c#t#d# represents the location of the drive.
- 6 Install the agent software. Type one of the following commands depending on the operating system on the node.

```
HP-UX (PA) # swinstall -s /cdrom/hpux/replication\  
/ntap_agent/5.0.00.0/PA/depot VRTSvcna
```

```
HP-UX (IA) # swinstall -s /cdrom/hpux/replication\  
/ntap_agent/5.0.00.0/IA/depot VRTSvcna
```

To install the agent on Linux systems

- 1 Log in as superuser.
- 2 Insert the disc into the system's drive.
- 3 Mount the disc, if the disc does not automatically mount.

```
# mount -o ro /dev/cdrom /mnt/cdrom
```
- 4 Navigate to the /mnt directory.

```
# cd /mnt/cdrom
```

- 5 Navigate to the location of the agent package.

```
# cd linux/linux/platform/replication/ntap_agent/5.0.00.0/rpms/
```

The variable *platform* represents the Linux distribution and architecture: redhatlinux, redhatlinuxIA64, redhatlinuxX86_64, suselinux, suselinuxIA64, suselinuxX86_64.
- 6 Install the agent software:

```
# rpm -ivh agentrpm
```

The variable *agentrpm* represents the agent package in the rpms directory.

To install the agent on Solaris systems

- 1 Insert the disc into the system's drive.

```
# cd /cdrom/cdrom0
```
- 2 Navigate to the location of the agent package.

```
# cd /solaris/sparc/replication/ntap_agent/5.0.00.0/pkgs/
```
- 3 Install the agent binaries.

```
# pkgadd -d . VRTSvcsna
```

Removing the agent for SnapMirror

Before you attempt to remove the agent, make sure the application service group is not online. You must remove the agent from each node in the cluster.

To remove the agent from an AIX cluster

- ◆ Type the following command on each node to remove the agent. Answer prompts accordingly:

```
# installp -u VRTSvcsna
```

To remove the agent from an HP-UX cluster

- ◆ Type the following command on each node to remove the agent. Answer prompts accordingly:

```
# swremove VRTSvcsna
```

To remove the agent from a Linux cluster

- ◆ Type one of the following commands on each system to remove the agent

```
RHEL 4 # rpm -e VRTSvcsna-5.0-GA_RHEL4.i686.rpm
```

```
SLES 9 # rpm -e VRTSvcsna-5.0-GA_SLES9.i586.rpm
```

To remove the agent from a Solaris cluster

- ◆ Type the following command on each node to remove the agent. Answer prompts accordingly:

```
# pkgrm VRTSvcsna
```


Configuring the Network Appliance SnapMirror agent

This chapter contains the following topics:

- [Configuration Concepts](#)
- [Before you configure the SnapMirror agent](#)
- [Configuring the agent](#)

Configuration Concepts

Review the resource type definition and the attribute definitions for the agent.

NetAppSnapMirror resource type definition

The NetAppSnapMirror resource type in VCS defines the Network Appliance SnapMirror agent.

```
type NetAppSnapMirror (
    static int ActionTimeout = 120
    static keylist SupportedActions = { update, reestablish, swap }
    static int MonitorInterval = 300
    static int NumThreads = 1
    static str ArgList[] = { VolumeName, SnapMirrorSchedule,
        LocalFileName, LocalFilerPword, RemoteFilerName,
        RemoteFilerPword }
    str VolumeName
    str SnapMirrorSchedule
    str LocalFileName
    str LocalFilerPword
    str RemoteFilerName
    str RemoteFilerPword
)
```

Attribute definitions for the SnapMirror agent

Review the description of the agent attributes. You must assign values to the following attributes.

LocalFilerName	Specifies the DNS resolvable name of the local NetApp filer. Type-Dimension: string-scalar
LocalFilerPword	A valid encrypted password for the root user on the local filer. If you enter the password from the command line, run the <code>vcscrypt</code> command to encrypt the password. Do not encrypt passwords when entering them from the GUI. If you do not specify a password, the agent uses the <code>hosts.equiv</code> file on filer to determine access rights. Type-Dimension: string-scalar
RemoteFilerName	Specifies the DNS resolvable name of the remote NetApp filer. Type-Dimension: string-scalar
RemoteFilerPword	A valid encrypted password for the root user on the remote filer. If you enter the password from the command line, run the <code>vcscrypt</code> command to encrypt the password. Do not encrypt passwords when entering them from the GUI. If you do not specify a password, the agent uses the <code>hosts.equiv</code> file on filer to determine access rights. Type-Dimension: string-scalar
VolumeName	Specifies the name of the replicated volume on the filer. You must use same case for the volume name as on the filer because the attribute value is case-sensitive. Type-Dimension: string-scalar
SnapMirrorSchedule	Specifies the schedule that the destination uses for updating data. This attribute should be left empty when used with NetApp SnapManager. Example: 0-59/5 * * * Type-Dimension: string-scalar

Sample Configuration

Configure SnapMirror related resources as follows. The locally attached filer is netapp1. The filer volume is unixvol.

```
Mount ntap (
  MountPoint = "/ntap"
  BlockDevice = "netapp1:/vol/unixvol"
  FSType = nfs
  FsckOpt = "-n"
)

NetAppSnapMirror sm (
  VolumeName = unixvol
  SnapMirrorSchedule = "0-59/5 * * *"
  LocalFilerName = netapp1
  LocalFilerPword = aoaMboDodOhmPocMe
  RemoteFilerName = netapp2
  RemoteFilerPword = aoaMboDodOhmPocMe
)

ntap requires sm
```

Before you configure the SnapMirror agent

Before you configure the agent, review the following information:

- Review the configuration concepts, which describe the agent's type definition and attributes.
See [“Configuration Concepts”](#) on page 15.
- Verify that you have installed the agent on all systems in the cluster.
- Verify the hardware setup for the agent.
See [“Typical Network Appliance SnapMirror setup in a VCS cluster”](#) on page 9.
- Make sure the cluster has an effective heartbeat mechanism in place.
See [“About cluster heartbeats”](#) on page 18.

You can automate the mounting of filer volumes through VCS. Configure a resource of type Mount as the parent of the NetAppSnapMirror resource and set the FSType attribute of the Mount resource to nfs. You must also configure the filer to export the volumes to the clustered hosts.

About cluster heartbeats

In a replicated data cluster, robust heartbeating is accomplished through dual, dedicated networks over which the Low Latency Transport (LLT) runs.

Additionally, you can configure a low-priority heartbeat across public networks.

In a global cluster, VCS sends ICMP pings over the public network between the two sites for network heartbeating. To minimize the risk of split-brain, VCS sends ICMP pings to highly available IP addresses. VCS global clusters also notify the administrators when the sites cannot communicate.

Configuring the agent

If you plan to configure the agent in a global cluster, make sure that you have configured the global service group for the application. If you plan to configure the agent in a replicated data cluster, make sure the required replication infrastructure is in place. Also make sure that you have configured the application. See the *Veritas Cluster Server User's Guide* for more information.

Configuring the agent manually in a global cluster

Configuring the agent manually in a global cluster involves the following tasks.

To configure the agent in a global cluster

- 1 Start Cluster Manager and log on to the cluster.
- 2 If the agent resource type (NetAppSnapMirror) is not added to your configuration, add it. From the Cluster Explorer **File** menu, choose **Import Types** and select `/etc/VRTSvcs/conf/NetAppSnapMirrorTypes.cf`.
- 3 Click **Import**.
- 4 Save the configuration.
- 5 Add a resource of type NetAppSnapMirror at the bottom of the service group.
- 6 Configure the attributes of the NetAppSnapMirror resource.
- 7 If the service group is not configured as a global group, configure the service group using the Global Group Configuration Wizard. See the *Veritas Cluster Server User's Guide* for more information.
- 8 Change the ClusterFailOverPolicy from the default, if necessary. Symantec recommends keeping the default, which is Manual, to minimize the chance of failing over on a split-brain.

Repeat [step 5](#) through [step 8](#) for each service group in each cluster that uses replicated data.

Configuring the agent manually in a replicated data cluster

Configuring the agent manually in a replicated data cluster involves the following tasks.

To configure the agent in a replicated data cluster

- 1 Start Cluster Manager and log on to the cluster.
- 2 If the agent resource type (NetAppSnapMirror) is not added to your configuration, add it. From the Cluster Explorer **File** menu, choose **Import Types** and select `/etc/VRTSvcs/conf/NetAppSnapMirrorTypes.cf`.
- 3 Click **Import**.
- 4 Save the configuration.
- 5 In each service group that uses replicated data, add a resource of type NetAppSnapMirror at the bottom of the service group.
- 6 Configure the attributes of the NetAppSnapMirror resource. Note that some attributes must be localized to reflect values for hosts that are attached to different arrays.
- 7 Set the SystemZones attribute for the service group to reflect which hosts are attached to the same array.

Managing and testing clustering support for SnapMirror

This chapter contains the following topics:

- [Typical Network Appliance SnapMirror agent test setup](#)
- [Testing service group migration](#)
- [Testing host failure](#)
- [Performing a disaster test](#)
- [Failure scenarios](#)

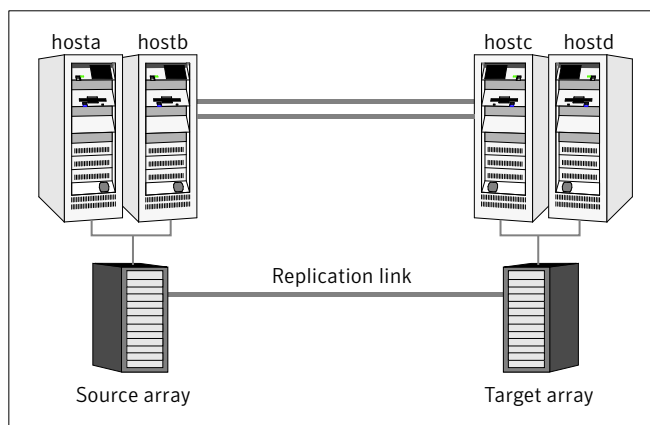
Typical Network Appliance SnapMirror agent test setup

A typical test environment includes:

- Two hosts (hosta and host b) connected to a filer.
- Other hosts (hostc and host d) connected to another filer at the DR site.
- A single heartbeat over a shared network that connects the two sites. The two clusters are managed as a unit by the VCS Global Cluster Option.

Figure 4-2 depicts a typical test environment.

Figure 4-2 Typical test setup



Testing service group migration

Verify the service group can migrate to different hosts in the cluster.

To perform the service group migration test

- 1 Migrate the service group to a host that is attached to the same array. In the Service Groups tab of the Cluster Explorer configuration tree, right-click the service group.
- 2 Click **Switch To**, and click the system that is attached to the same array (hostb) from the menu.
- 3 Migrate the service group to a host that is attached to a different array. In the Service Groups tab of the Cluster Explorer configuration tree, right-click the service group.
- 4 Click **Switch To**, and click the system that is attached to the another array (hostc) from the menu.
The local volumes become source volumes and the original volumes become targets.
- 5 Migrate the service group back to its original host. In the Service Groups tab of the Cluster Explorer configuration tree, right-click the service group.
- 6 Click **Switch To**, and click the system on which the group was initially online (hosta).

Testing host failure

In this scenario, the host where the application runs is lost. Eventually all the hosts in the system zone or cluster are lost.

To perform the host failure test

- 1 Halt the or shut down host where the application runs (hosta).
- 2 Halt or shut down hostb.
In a replicated data cluster, the group fails over to hostc or hostd depending on the FailOverPolicy in the cluster.
In a global cluster, a cluster down alert appears and gives you the opportunity to fail over the service group manually.
- 3 Switch the service group to its original host when VCS starts. In the Service Groups tab of the Cluster Explorer configuration tree, right-click the service group.
- 4 Click **Switch To**, and click the system on which the service group was initially online (hosta).

Performing a disaster test

Test how robust your cluster is in case of a disaster.

To perform a disaster test

- 1 Shut down the host on which the service group is online as well as the filer to which it is attached.
If you can not shut down the filer, disconnect it from the network to make it invisible to the remote site.
- 2 In a global cluster, the administrator is notified of the failure. The administrator can then initiate the failover.
- 3 Reboot the host and restart the filer. After the filer comes up, issue the swap action to resynchronize all data back to the source. After the resynchronization completes, switch the application back to the primary node.

Failure scenarios

Review the failure scenarios and agent behavior in response to failure.

Host or application failure

In a global cluster environment, VCS detects the outage and recommends failing over to the DR site in one of the following cases:

- The primary host that runs the application fails
- The application itself fails

In this case, the VCS agents for SnapMirror attempt a data migration because both filers are healthy. The agent takes over the target data and reverses the role of replication. The data migration during a host or application failure involves:

- Performing a mirror break to enable write access to the target (through the NetAppSnapMirror agent).
- Updating the SnapMirror configuration to demote the original source to a target, and begin replicating from the new source (also through the NetAppSnapMirror agent).
- Mounting the filer volumes using the Mount agent, and specifying nfs as the FSType.
- Starting the application services (through the VCS agents for various applications).

Site Disaster

In a global cluster environment, if the site running the application fails, VCS detects the outage and recommends failing over to the DR site.

The agent for SnapMirror attempts a data migration, which means taking over the target data and reversing the role of replication. The data migration during a site disaster involves:

- Performing a mirror break to enable write access to the target (through the NetAppSnapMirror agent).
- Updating the SnapMirror configuration to demote the original source to a target, and begin replicating from the new source (also through the NetAppSnapMirror agent).
- Mounting the filer volumes using the Mount agent, and specifying nfs as the FSType.

- Starting the application services (through the VCS agents for various applications).

If the original filer returns, the you must resynchronize the filer.

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