

# Veritas™ Cluster Server Agent for EMC SRDF/Star Installation and Configuration Guide

AIX, HP-UX, Linux, Solaris

5.0

# Veritas Cluster Server Agent for EMC SRDF/Star Installation and Configuration Guide

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# Introducing the Veritas agent for EMC SRDF/Star

This chapter includes the following topics:

- [About the agent for EMC SRDF/Star](#)
- [Supported software for the EMC SRDF/Star agent](#)
- [Supported hardware for SRDFStar](#)
- [Typical EMC SRDF/Star setup using VCS clusters](#)
- [EMC SRDF/Star agent functions](#)

## About the agent for EMC SRDF/Star

The VCS enterprise agent for EMC SRDF/Star provides failover support and recovery in environments that use the SRDF/Star solution to protect their data. SRDF/Star employs a three-point triangular topology to provide data protection and failure recovery among three geographically separated sites.

The SRDF/Star solution mirrors production data on a Symmetrix array at a local site, called the workload site, to Symmetrix arrays at two remote sites. SRDF/Star technology replicates data synchronously to one remote site, called the sync target, and asynchronously to the other remote site, called the async target. The sync target is in the same region as the workload site; the async target is at a distant location.

SRDF/Star protects against a workload site failure by performing incremental recovery and data replication among the three sites. Depending upon the failure scenario, either of the remote sites can become the new production workload site.

The agent monitors and manages data recovery and replication for a specific composite group that you configure as part of the SRDF/Star configuration.

Before bringing the agent online, ensure that:

- SRDF/Star is configured such that STAR can be enabled from the sites.
- The Workload site can be failed over from one site to the other.

See the following Technical Support TechNote for the latest updates or software issues for this agent:

<http://seer.entsupport.symantec.com/docs/282004.htm>

## Supported software for the EMC SRDF/Star agent

For information on the software versions that the agent for EMC SRDF/Star supports, see the Symantec Operations Readiness Tools (SORT) site:

<https://sort.symantec.com/agents>.

## Supported hardware for SRDFStar

This support only exists if the host, HBA, and array combination is in EMC's hardware compatibility list.

The agent supports SRDF/Star on all microcode levels on all Symmetrix arrays.

---

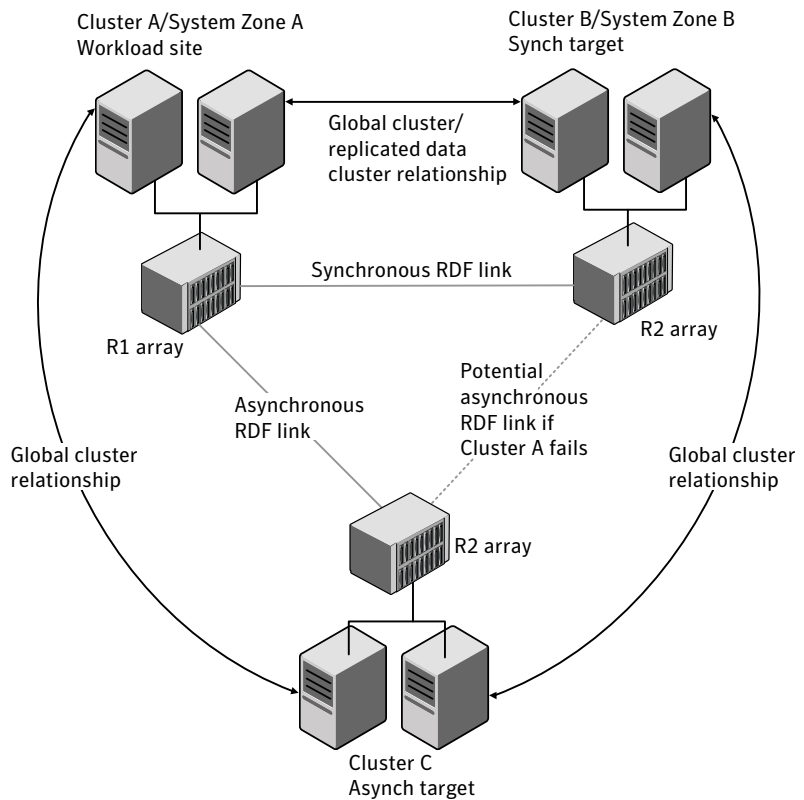
**Note:** The agent supports the configuration in which the STAR composite group has multiple RDF (RA) groups configured for either link (sync or async link). The agent also supports the configuration that has meta devices.

---

## Typical EMC SRDF/Star setup using VCS clusters

[Figure 1-1](#) shows a typical cluster setup in an EMC SRDF/Star configuration.

**Figure 1-1** Typical cluster setup in SRDF/Star



Clustering in an SRDF/Star environment typically consists of the following infrastructure:

The array at the workload site

The workload site comprises one or more workload hosts directly attached to a Symmetrix array. The array contains R1 devices that are part of the SRDF/Star configuration.

The R1 devices must also be in an SRDF/S relationship with the regional sync target and in a concurrent SRDF/A relationship with the distant asynch target.

#### The array at the sync target

The sync target comprises one or more sync target hosts directly attached to a Symmetrix array containing R2 devices that are part of the SRDF/Star configuration. The sync target array is paired with the workload array through a synchronous RDF link. The sync target hosts and array must be a sufficient distance away to survive a local disaster at the workload site, yet still be close enough to maintain synchronous replication.

#### The array at the async target

The async target comprises one or more async target hosts directly attached to a Symmetrix array containing R2 devices that are part of the SRDF/Star configuration. The async target array is paired with the workload array through an asynchronous RDF link. The sync target hosts and array must be a sufficient distance away to survive a regional disaster across the workload and sync target sites.

#### A global cluster configuration

All three clusters are members of a VCS global cluster relationship. The sync target hosts and the async target hosts are paired with the workload hosts in a VCS global cluster relationship. In VCS parlance, each cluster has two remote clusters.

The cluster (preference) list in the cluster configuration would look like the following for each cluster:

- Workload site cluster A  
ClusterList=[Cluster\_A=0, Cluster\_B=1, Cluster\_C=2]
- Sync target site cluster B  
ClusterList=[Cluster\_A, Cluster\_B, Cluster\_C]
- Async target site cluster C  
ClusterList=[Cluster\_A, Cluster\_B, Cluster\_C]

**Note:** In a global cluster environment, you must attach all hosts in a cluster to the same Symmetrix array.

#### A replicated data cluster configuration

The workload hosts and sync hosts belong to one cluster. The async hosts belong to a second cluster. The workload hosts belong to one system zone of replicated data cluster, and sync hosts belong to the second system zone of the replicated data cluster. All workload hosts are connected to the same Symmetrix array. All sync site hosts are connected to the same Symmetrix array.

The cluster (preference) list in the cluster configuration would look like the following for each cluster:

- Workload site cluster A  
ClusterList=[Cluster\_A=0, Cluster\_B=1]  
System Zones=[Workload\_Host=0;  
Sync\_Host1=1]

#### Network heartbeats

You must configure network heartbeats among the three data centers to monitor their health.

See [“About cluster heartbeats”](#) on page 31.

## EMC SRDF/Star agent functions

The VCS enterprise agent for EMC SRDF/Star (SRDFStar agent) facilitates workload site transitions.

The SRDFStar agent uses SYMCLI to do the following:

- Verify the momentary state of the target sites and STAR (PROTECTED, CONNECTED, DISCONNECTED, HALTED, TRIPPED)
- Switch the workload site from one site to the other
- Provide a mechanism for manual interventions using action entry points

[Table 1-1](#) describes the agent functions:

**Table 1-1** Agent functions

Function	Description
open	<p>Checks if the lock file exists in the agent directory. The existence of the lock file indicates that a resource of type SRDFStar (the SRDFStar resource) is online.</p> <p>If open detects the lock file, it waits until at least one of the resource's parent resources is probed.</p> <p>It then does either of the following:</p> <ul style="list-style-type: none"> <li>■ If the parent resource is ONLINE, the agent probably called open in response to being restarted. The agent can restart whenever it or HAD has been forcibly killed. In this case, open does not remove the lock file.</li> <li>■ If the parent resource is OFFLINE, then the agent is being started in response to HAD being stopped gracefully and then restarted. In this case, open removes the lock file.</li> </ul> <p>For example, if the agent calls open and detects that the lock file is present and that the disk group resource above it is ONLINE, the SRDFStar resource was probably already ONLINE. In this case, open leaves the lock file in place. If the agent detects that the disk group is OFFLINE, then the host rebooted and the application failed over, allowing no chance to delete the lock file. In this case, open removes the lock file and the agent reports OFFLINE because the group is probably ONLINE elsewhere.</p>
online	<p>Determines if the local site is the workload site and checks the state of Star. If the local site is the workload site and the state of Star is PROTECTED, the agent creates a lock file on the workload host. The lock file indicates that the SRDFStar resource is ONLINE and that the workload site is STAR-PROTECTED.</p> <p>If the local site is the workload site but state of STAR is not PROTECTED, then the online entry point brings the workload site into STAR-PROTECTED state and creates a lock file on the workload host. If the online entry point determines that the local site is not the workload site, it tries to convert the local site to the workload site. To achieve this conversion, the online entry point tries to change the local site from either the sync or async target into the workload site. If successful, the online entry point creates the lock file on the new workload host.</p>
monitor	<p>Verifies that the lock file exists. If the lock file exists, the agent reports the status of the SRDFStar resource as ONLINE. If the lock file does not exist, the agent reports the status of the resource as OFFLINE.</p>

**Table 1-1** Agent functions (*continued*)

Function	Description
offline	Checks the value of HaltOnOffline attribute. If the value is 1 and the target sites are in the CONNECTED/PROTECTED state, the offline entry point issues a symstar halt command. This command halts STAR. The offline entry point also removes the lock file that is created by the online entry point.
clean	Removes the lock file that is created by the online entry point.
info	Sets the StarState attribute to the Star state as displayed in the output of the symstar query command. Reports the state of the sync and async target sites and the state of the SRDF/Star configuration. Also sends an SMTP notification (if configured to do so) whenever the value of StarState changes to a different value.

Table 1-1 Agent functions (continued)

Function	Description
action	<p>Actions initiate symstar commands to perform various operations. For entry points that perform operations on specified sites, the site name is passed to the entry point as arguments.</p> <p><b>Note:</b> Invoking some of the action entry points while the application is running can cause disruptions. For example, invoking the halt action while the application is running makes the underlying devices write-disabled and causes the application to crash.</p> <p>The following are the action entry points:</p> <ul style="list-style-type: none"><li>■ connect Connects to a specified remote site</li><li>■ disconnect Disconnects from a specified remote site</li><li>■ protect Protects a specified remote site</li><li>■ unprotect Unprotects a specified remote site</li><li>■ enable Enables Star protection</li><li>■ disable Disables Star protection</li><li>■ reset Moves a specified site from the PATHFAIL state to the DISCONNECTED state</li><li>■ cleanup Performs cleanup on the specified site after a link failure</li><li>■ halt Brings the target sites into the HALTED state</li><li>■ halt-reset Brings the target sites into the DISCONNECTED state from the HALTED state</li></ul> <p><b>Note:</b> The timeout for action entry points is specified by the value of the ActionTimeout attribute. The action entry points extend this timeout value to 1 day before running the symstar commands. This behavior avoids the termination of any running symstar commands.</p>

## About the agent’s online function

The online entry point determines the current workload site and then acts as described in these scenarios.



## Scenario I: The local site is the current workload site

This scenario has two subcases. One is when the local site name is the same as that of either the workload site or the sync target site. The other is when the local site name is the same as that of the async target site.

### The local site name same as workload or sync target

In this scenario, the local site is the current workload site and the local site name is the same as either the workload site or the sync target site (as specified in options file as part of the SRDF/Star configuration).

Under these conditions, the online entry point checks the state of Star and then takes one of the following actions:

- If STAR is in the PROTECTED state, the online entry point creates the lock file and the SRDFStar resource comes online.
- If STAR is not in the PROTECTED state, the online entry point determines the state of the remote sites from the values of the syncSite and asyncSite attributes.

At this point, the remote sites can be in one of the following states:

- HALTED
- HALTFAIL
- PATHFAIL
- ISOLATED
- CONNECTED
- DISCONNECTED

The online entry point takes one of the following actions:

- If one or both of the remote sites cannot transition to the PROTECTED state, the entry point checks the value of the ForceOnline attribute. If ForceOnline is set to 0, then the SRDFStar resource does not go online. If ForceOnline is set to 1, the entry point creates the lock file and the SRDFStar resource goes online.
- If both of the syncSite and asyncSite attributes are specified and both the remote sites transition to the PROTECTED state, the entry point checks the value of OnlineOnState attribute.

If OnlineOnState is set to protected, the entry point issues the command to move Star to the PROTECTED state in the background. The entry point then creates the lock file and the SRDFStar resource goes online.

If OnlineOnState is set to star\_protected, the entry point issues the command to move Star into the PROTECTED state in the foreground. That is, the

SRDFStar resource goes online only after the command has finished. If the command is not successful, the entry point checks the value of the ForceOnline attribute. If ForceOnline is set to 0, the SRDFStar resource does not go online. If ForceOnline is set to 1, the entry point creates the lock file and the SRDFStar resource goes online.

- If only one of the syncSite or asyncSite attributes is specified and that site transitions to the PROTECTED state successfully, the entry point creates the lock file and the SRDFStar resource goes online. Otherwise, the SRDFStar resource goes online only if ForceOnline is set to 1.
- If neither of the syncSite or asyncSite attributes is specified, the SRDFStar resource remains OFFLINE.

### **Local site name same as asynch target**

In this scenario, the local site is the current workload site and the local site name is the same as the async target site (as specified in options file as part of the SRDF/Star configuration). The syncSite attribute is not specified.

The entry point attempts to transition only the site specified by the asyncSite attribute to the protected state. The entry point also attempts to move the second remote site to the connected state. The entry point does this so that, in the future, it is possible to switch from the local site by halting STAR. In such a case, the OnlineOnState attribute is irrelevant because both remote sites cannot be moved to the protected state and STAR protection cannot be enabled. If the asyncSite does not transition to the protected state, then the SRDFStar resource goes online only if ForceOnline is set to 1.

### **Scenario II: The local site is not the current workload site**

In this scenario, the local site is not the current workload site. The online entry point attempts to make the local site the current workload site by doing the following:

- The entry point determines the state of STAR. If STAR is in a tripped state, the entry point checks the value of the attribute TripTakeover. If TripTakeover is set to 0, the SRDFStar resource does not go online. If TripTakeover is set to 1, the entry point makes the local site the current workload site. The entry point also makes the local site the current workload site if Star is in the halted or protected state.
- The entry point checks the value of KeepDataFrom, KeepDataOn, and UseMostRecentData attributes as it makes the local site the current workload site. It checks these values to determine which site's data it uses to synchronize the local site.

- If UseMostRecentData is set to 1, then the entry point determines which site has most recent data using symstar query command output and uses that output to synchronize the local site.
- If UseMostRecentData is set to 0 and KeepDataOn is set to switch, then KeepDataFrom attribute value is used to determine which site's data is to be used to synchronize the local site.

After making the local site the current workload site, the entry point tries to transition the remote sites and Star to the PROTECTED state as described in the first scenario.

See [“Scenario I: The local site is the current workload site”](#) on page 17.



# Installing and removing the agent for EMC SRDF/Star

This chapter includes the following topics:

- [Before you install the agent for EMC SRDF/Star](#)
- [Installing the agent for EMC SRDF/Star](#)
- [Upgrading the agent for EMC SRDF/Star](#)
- [Removing the agent for EMC SRDF/Star](#)

## Before you install the agent for EMC SRDF/Star

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 EMC SRDF/Star setup using VCS clusters”](#) on page 10.

## Installing the agent for EMC SRDF/Star

You must install the EMC SRDF/Star 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 in a VCS environment

- 1 Download the Agent Pack from the Symantec Operations Readiness Tools (SORT) site: <https://sort.symantec.com/agents>.

You can download the complete Agent Pack tar file or the individual agent tar file.

- 2 Uncompress the file to a temporary location, say /tmp.
- 3 If you downloaded the complete Agent Pack tar file, navigate to the directory containing the package for the platform running in your environment.

AIX      `cd1/aix/vcs/replication/srdfstar_agent/  
agent_version/pkgs/`

HP-UX    `cd1/hpux/generic/vcs/replication/srdfstar_agent/  
(PA)      agent_version/PA/depot/`

HP-UX    `cd1/hpux/generic/vcs/replication/srdfstar_agent/  
(IA)      agent_version/IA/depot`

Linux    `cd1/linux/generic/vcs/replication/srdfstar_agent/  
agent_version/rpms/`

Solaris   `cd1/solaris/dist_arch/vcs/replication/srdfstar_agent/  
agent_version/pkgs/`

If you downloaded the individual agent tar file, navigate to the pkgs directory (for AIX, HP-UX, and Solaris), or rpms directory (for Linux).

- 4 Log in as superuser.
- 5 Install the package.

AIX                    `# installp -ac -d VRTSvcsst.rte.bff VRTSvcsst.rte`

HP-UX                `# swinstall -s `pwd` VRTSvcsst`  
(IA/PA)

Linux                `# rpm -ihv \  
VRTSvcsst-AgentVersion-Linux_GENERIC.noarch.rpm`

Solaris              `# pkgadd -d . VRTSvcsst`

## Upgrading the agent for EMC SRDF/Star

You must upgrade the agent on each node in the cluster.

### To upgrade the agent software

- 1 Save the VCS configuration and stop the VCS engine.

```
# haconf -dump -makero
# hstop -all -force
```

- 2 Remove the agent from the node.

See [“Removing the agent for EMC SRDF/Star”](#) on page 23.

- 3 Delete the file /etc/VRTSvcs/conf/config/SRDFStarTypes.cf.

- 4 Install the current version of the agent.

See [“Installing the agent for EMC SRDF/Star”](#) on page 21.

- 5 Copy the file SRDFStarTypes.cf from the directory /etc/VRTSvcs/conf/ to the /etc/VRTSvcs/conf/config directory.

- 6 Repeat step 2 through step 5 on each node.

- 7 From a node in the cluster, edit your configuration file /etc/VRTSvcs/conf/config/main.cf.

Configure the new attributes, if applicable.

- 8 Verify the configuration

```
# hacf -verify config
```

- 9 Start VCS on local node first.

- 10 Start VCS on other nodes.

## Removing the agent for EMC SRDF/Star

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, type the following command on each node. Answer prompts accordingly:

```
AIX          # installp -u VRTSvcsst.rte
HP-UX        # swremove VRTSvcsst
```

**Linux**           # rpm -e VRTSvcsst

**Solaris**        # pkgrm VRTSvcsst



# Configuring the agent for EMC SRDF/Star

This chapter includes the following topics:

- [Configuration concepts for the EMC SRDF/Star agent](#)
- [Before you configure the agent for EMC SRDF/Star](#)
- [Configuring the agent for EMC SRDF/Star](#)

## Configuration concepts for the EMC SRDF/Star agent

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

### SRDFStar resource type definition

The agent is represented by the SRDFStar resource type in VCS.

```
type SRDFStar (  
    static keylist SupportedActions = { connect, protect, enable,  
    disconnect, unprotect, disable, reset, halt_reset, halt, cleanup }  
    static int InfoInterval = 600  
    static int NumThreads = 1  
    static int OfflineMonitorInterval = 0  
    static int OnlineTimeout = 1200  
    static int OfflineTimeout = 1200  
    static int RestartLimit = 1  
    static str ArgList[] = { SymHome, GrpName, SyncSite, AsyncSite,  
    UseMostRecentData, KeepDataOn, KeepDataFrom, OnlineOn  
    State, TripTakeover, ForceOnline, HaltOnOffline}  
    str SymHome = "/usr/symcli"
```

```
str GrpName
str SyncSite
str AsyncSite
int UseMostRecentData = 1
str KeepDataOn = SWITCH
str KeepDataFrom
str OnlineOnState = STAR_PROTECTED
int TripTakeover = 0
int ForceOnline = 0
int HaltOnOffline = 1
temp str VCSResLock
temp str StarState
)
```

## Attribute definitions for the SRDF/Star agent

Review the description of the agent attributes.

### Required Attributes

You must assign values to the following required attributes.

Table 3-1 Required attributes

Attribute	Description
GrpName	<p>Specifies the name of one Symmetrix composite group that is a part of the SRDF/Star configuration..</p> <p>Type-dimension: string-scalar</p> <p>Default: ""</p>
SyncSite	<p>Specifies the name of the target site for synchronous replication when the local site becomes the workload site. Set this attribute at only the sync site; do not set it in the VCS configuration at the async site.</p> <p>Type-dimension: string-scalar</p> <p>Default: ""</p>
AsyncSite	<p>Specifies the name of the target site for asynchronous replication when the local site becomes the workload site.</p> <p>Type-dimension: string-scalar</p> <p>Default: ""</p>

## Optional attributes

You may optionally configure the following attributes.

**Table 3-2** Optional attributes

Attribute	Description
SymHome	Specifies the home directory for the Symmetrix CLI software. Type-dimension: string-scalar
UseMostRecentData	Specifies if the local site is to be synchronized so that the most recently available data is used. This attribute value is used only during VCS failover and when the agent is converting the local site to the workload site.  If UseMostRecentData is set to 0, the most recent data will not be used.  If UseMostRecentData is set to 1, the most recent data will be used.  Type-dimension: integer-scalar  Default: 1  Possible values: 0 or 1
KeepDataOn	Specifies which of either a symstar switch or a symstar connect operation causes the data to be synchronized.  Type-dimension: string-scalar  Default: "SWITCH"  Possible values: "SWITCH"
KeepDataFrom	The name of the site that would serve as a source for data at the time of a symstar switch or symstar connect operation.  Set this attribute only if UseMostRecentData is set to 0.  Type-dimension: string-scalar  Default: ""

**Table 3-2** Optional attributes (*continued*)

Attribute	Description
OnlineOnState	<p>Indicates the state that the Star system or the target sites must attain before the SRDFStar resource is considered to be in the ONLINE state.</p> <p>Type-dimension: string-scalar</p> <p>Default: "STAR_PROTECTED"</p> <p>Possible values: "STAR_PROTECTED" or "PROTECTED"</p> <p>A value of "STAR_PROTECTED" indicates that the resource is considered to be ONLINE only when the Star system is in the PROTECTED state.</p> <p>A value of "PROTECTED" indicates that the resource is considered to be online only when both target sites are in the PROTECTED state.</p>
TripTakeover	<p>Becomes relevant at the time of switching the workload site to another site. Specifies whether or not the agent is to convert the local site to a workload site when Star is in the tripped state.</p> <p>If TripTakeover is set to 0, the local site is not converted to a workload site.</p> <p>If TripTakeover is set to 1, the local site is converted to a workload site.</p> <p>Type-dimension: integer-scalar</p> <p>Default: 0</p> <p>Possible values: 0 or 1</p>
ForceOnline	<p>Becomes relevant at the time of enabling STAR at the current workload site. Indicates if VCS is to bring the SRDFStar resource online in the event that the target sites, the Star, or both, can not attain a protected state.</p> <p>If ForceOnline is set to 1, then the OnlineOnState attribute is overridden.</p> <p>Type-dimension: integer-scalar</p> <p>Default: 0</p> <p>Possible values: 0 or 1</p> <p><b>Note:</b> Ensure that the ForceOnline attribute is set to the proper value before you bring the agent online.</p>

**Table 3-2** Optional attributes (*continued*)

Attribute	Description
HaltOnOffline	<p>Becomes relevant and the time of offlining the SRDFStar resource.</p> <p>Indicates if the agent must issue the halt command while going offline.</p> <p>If HaltOnOffline is set to 1, the agent issues the halt command while going offline. Set HaltOnOffline to 1 at the async site.</p> <p>Type-dimension: integer-scalar</p> <p>Default: 1</p> <p>Possible values: 0 or 1</p>

## Internal attributes

The following attributes are for internal use only; do not modify their values.

**Table 3-3**

Attribute	Description
VCSResLock	<p>Used by the agent to serialize management of composite groups for parallel service groups. Do not modify the value of this attribute</p> <p>Type-dimension: temp string-scalar</p>
StarState	<p>Used by the agent to store the current state of STAR. Do not modify the value of this attribute. The value of this attribute can be displayed using the GUI or the following command:</p> <pre>hares -display SRDFStarResourceName</pre> <p>Type-dimension: temp string-scalar</p>

## Recommended values for the SRDFStar agent attributes

SyncSite	If the sync target site is down, set the SyncSite to "". Set the attribute to "" at the async site because no sync target site exists.
AsyncSite	If the async target site is down, you can set AsyncSite to "".
UseMostRecentData	If the most recent data is to be used at the time of VCS failover, set UseMostRecentData to 1. If UseMostRecentData is set to 1, then the SRDF agent ignores the values of the KeepDataFrom and KeepDataOn.

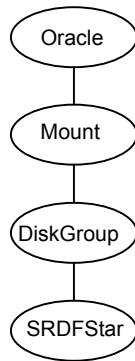
KeepDataOn	Set this attribute to SWITCH if UseMostRecentData is set to 0.
KeepDataFrom	Set this attribute to the name of the site whose data is to be used at the time of symstar switch and symstar connect. Set this attribute only if UseMostRecentData is set to 0.
OnlineOnState	Set this attribute to star_protected if the applications should be brought only if STAR is in protected state. should be Set the OnlineOnState attribute to PROTECTED if the applications can be brought up even if STAR is not protected. This attribute is irrelevant at async site. This is because STAR cannot be enabled at async site.
ForceOnline	Set this attribute to 1 only if the target sites or STAR cannot attain protected state. Otherwise, set it to 0. If ForceOnline is set to 1 then OnlineOnState attribute is ignored by the agent. ForceOnline attribute value is checked by the agent at the time of VCS failover after switching the workload site or at the time of onlining the SRDFStar resource on the current workload site.
TripTakeover	Set this attribute to 1 only if the local site has to be converted to workload site and STAR is in TRIPPED state. Otherwise, set this attribute to 0. Its value is checked by the SRDFStar agent before switching the workload site at the time of VCS failover.
HaltOnOffline	Set this attribute to 1 if the data from the current workload site has to be flushed to the target sites at the time of offlining the SRDFStar resource or at the time of VCS failover. Otherwise it should be set to 0.  Set HaltOnOffline to 1 at the async site.

## Sample configuration

The DiskGroup resource depends on the SRDFStar resource.

[Figure 3-1](#) shows the dependency graph for a VCS service group with a resource of type SRDFStar.

**Figure 3-1** Sample configuration for the agent



A resource of type SRDFStar comes online first in the application service group.

## Before you configure the agent for EMC SRDF/Star

Before you configure the agent, review the following information:

- Set up the SRDF/Star configuration.
- Review the configuration concepts, which describe the agent's type definition and attributes.  
 See ["Configuration concepts for the EMC SRDF/Star agent"](#) on page 25.
- Verify that you have installed the agent on all systems in the cluster.
- Verify the hardware setup for the agent.  
 See ["Typical EMC SRDF/Star setup using VCS clusters"](#) on page 10.
- Make sure that the cluster has an effective heartbeat mechanism in place.  
 See ["About cluster heartbeats"](#) on page 31.  
 See ["About preventing split-brain"](#) on page 32.

### About cluster heartbeats

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.

## About preventing split-brain

Split-brain occurs when all heartbeat links between the primary and secondary hosts are cut. In this situation, each side mistakenly assumes that the other side is down. You can minimize the effects of split-brain by ensuring that the cluster heartbeat links pass through a similar physical infrastructure as the replication links. When you ensure that both pass through the same infrastructure, if one breaks, so does the other.

Even if the cluster heartbeat links pass through the same physical infrastructure as the replication links and all links break simultaneously, split-brain can still occur if the service group starts on a remote site. In this case, neither remote site is protecting the original workload site. To prevent this type of split-brain scenario, configure the steward utility on all three sites such that each site acts as the arbitrator for the other two sites.

## Configuring the agent for EMC SRDF/Star

You can adapt most clustered applications to a disaster recovery environment by:

- Converting their devices to be part of the SRDF/Star composite group
- Synchronizing the devices
- Creating a resource of type SRDFStar and adding it to the service group

Symmetrix device groups are configured as resources of type SRDFStar.

Ensure also that you get the `OnlineTimeout` and `OnlineRetryLimit` attributes for the SRDFStar resource so that its entry points do not time out, or so that they are automatically restarted if they do not time out.

After configuration, the application service group must follow the dependency diagram.

See [“Sample configuration”](#) on page 30.

## 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 (SRDFStar) is not added to your configuration, add it. From the Cluster Explorer **File** menu, choose **Import Types** and select:  
`/etc/VRTSvcs/conf/SRDFStarTypes.cf.`



- 3 Click **Import**.
- 4 Save the configuration.

## Additional configuration considerations

The following are important implementation guidelines for the SRDF/Star agent:

- Set the `OnlineTimeout`, `Offline Timeout`, and `OnlineRetrryLimit` attributes for the SRDFStar resource such that its entry points do not time out. If you must set them, so that they do timeout, ensure that they are automatically restarted.
- If `HaltOnOffline` is set to 1, then the SRDFStar agent takes a long time to go OFFLINE because the `symstar halt` command is invoked by the offline entry point. This means that the system reboot and execution of the `hastop -all` command also takes a long time. Set `HaltOnOffline` in these cases to 0. However, in case of planned failover, before switching the workload site to another site, set `HaltOnOffline` to 1 to prevent data loss.
- The info entry point is run periodically as defined by the `InfoInterval` attribute. `InfoInterval` is set to 600 seconds by default. Set it to a different value according to your requirements.
- The info entry point can also be invoked manually to get the state of target sites and STAR using the following command:
 

```
hares -refreshinfo SRDFStarResName -sys SysName
```
- The value of `ResourceInfo` can be displayed using the following command:
 

```
hares -value SRDFStarResName -sys SysName
```
- The value of `ResourceInfo` can be flushed using the following command:
 

```
hares -flushinfo SRDFStarResName -sys SysName
```

## Sample configuration file for a global cluster environment

See the *Veritas Cluster Server Implementation Guide* for the details of setting up VCS global clusters.

The following is a sample `main.cf` file for the Workload site in a VCS global cluster environment.

```
include "types.cf"
include "SRDFStarTypes.cf"
cluster vcs_A (
  UserNames = { admin = aHIaHChEIdIIgQIcHF }
  Administrators = { admin }
)
remoteclass vcs_B (
```

```

ClusterAddress = "a.b.c.d"
)
remotecluster vcs_C (
ClusterAddress = "a.b.c.d"
)
heartbeat Icmp (
ClusterList = { vcs_B, vcs_C }
AYATimeout = 30
Arguments @vcs_B = { "a.b.c.d" }
Arguments @vcs_C = { "a.b.c.d" }
)
system sysA (
)
group ClusterService (
SystemList = { sysA = 1 }
AutoStartList = { sysA }
Tag = CSG
Application wac (
StartProgram = "/opt/VRTSvcs/bin/wacstart"
StopProgram = "/opt/VRTSvcs/bin/wacstop"
MonitorProcesses = { "/opt/VRTSvcs/bin/wac" }
)
IP webip (
Device = bge0
Address = "a.b.c.d"
NetMask = "255.255.240.0"
)
NIC csgnic (
Device = bge0
)
wac requires webip
webip requires csgnic
group myapp (
SystemList = { sysA = 1 }
ClusterList = { vcs_B = 0, vcs_C = 1 }
)
Application testApp (
StartProgram = "/testApp/start.sh"
StopProgram = "/testApp/stop.sh"
MonitorProgram = "/testApp/monitor.sh"
)
Mount Mount-testvoll (
MountPoint = "/testdir/testvoll"

```

```

BlockDevice = "/dev/vx/dsk/stardg/testvoll1"
FSType = vxfs
FsckOpt = "-y"
)
DiskGroup VM_stardg (
DiskGroup = stardg
)
NotifierMngr ntfr (
SnmppConsoles = { sysA = Error }
SmtppServer = "x.y.yourcompany.com"
SmtppRecipients = { "xyz@yourcompany.com" = Error }
)
SRDFStar srdffstar_testAppstar (
GrpName = STAR-cg
SyncSite = SYNC_TARGET
AsyncSite = ASYNC_TARGET
OnlineOnState = STAR_PROTECTED
)
Mount-testvoll1 requires VM_stardg
VM_stardg requires srdffstar_testAppstar
testApp requires Mount-testvoll1

```

The main.cf file for the sync site is similar to the main.cf for the Workload site except for the SRDFStar resource definition.

The following is the SRDFStar resource definition in the main.cf file for the sync site:

```

SRDFStar srdffstar_testAppstar (
GrpName = STAR-cg
SyncSite = WORKLOAD_SITE
AsyncSite = ASYNC_TARGET
OnlineOnState = STAR_PROTECTED
)

```

The main.cf file for the async site is similar to main.cf file for the Workload site except for the SRDFStar resource definition. The following is the SRDFStar resource definition in the main.cf file for the async site:

```

SRDFStar srdffstar_testAppstar (
GrpName = STAR-cg
AsyncSite = SYNC_TARGET

```

## Sample configuration file for a replicated data cluster environment

See the *Veritas Cluster Server Implementation Guide* for the details of setting up VCS replicated data clusters.

The following is a sample main.cf file for the Workload site in a VCS global cluster environment.

```
include "types.cf"
include "SRDFStarTypes.cf"
cluster vcs_A (
  UserNames = { admin = aHiaHChEIdIIgQIcHF }
  Administrators = { admin }
)
remotecluster vcs_B (
  ClusterAddress = "a.b.c.d"
)
heartbeat Icmp (
  ClusterList = { vcs_B }
  AYATimeout = 30
  Arguments @vcs_B = { "a.b.c.d" }
)
system sysA (
)
system sysB (
)
group ClusterService (
  SystemList = { sysA = 0, sysB = 1 }
  AutoStartList = { sysA, sysB }
  Tag = CSG
  Application wac (
    StartProgram = "/opt/VRTSvcs/bin/wacstart"
    StopProgram = "/opt/VRTSvcs/bin/wacstop"
    MonitorProcesses = { "/opt/VRTSvcs/bin/wac" }
  )
  IP webip (
    Device = bge0
    Address = "a.b.c.d"
    NetMask = "255.255.240.0"
  )
  NIC csgnic (
    Device = bge0
  )
)
```

```

    wac requires webip
    webip requires csgnic
    group myapp (
        SystemList = { sysA = 0, sysB = 1}
        SystemZones= {sysA = 0, sysB = 1}
        ClusterList = { vcs_A = 0, vcs_B = 1 }
    )
    Application testApp (
        StartProgram = "/testApp/start.sh"
        StopProgram = "/testApp/stop.sh"
        MonitorProgram = "/testApp/monitor.sh"
    )
    Mount Mount-testvoll (
        MountPoint = "/testdir/testvoll"
        BlockDevice = "/dev/vx/dsk/stardg/testvoll"
        FSType = vxfs
        FsckOpt = "-y"
    )
    DiskGroup VM_stardg (
        DiskGroup = stardg
    )
    NotifierMngr ntfr (
        SnmpConsoles = { sysA = Error }
        SntpServer = "x.y.yourcompany.com"
        SntpRecipients = { "xyz@yourcompany.com" = Error }
    )
    SRDFStar srdfstar_testAppstar (
        GrpName = STAR-cg
        SyncSite = SYNC_TARGET
        AsyncSite = ASYNC_TARGET
        OnlineOnState = STAR_PROTECTED
    )
    Mount-testvoll requires VM_stardg
    VM_stardg requires srdfstar_testAppstar
    testApp requires Mount-testvoll

```

The main.cf file for the sync site is similar to the main.cf for the Workload site except for the SRDFStar resource definition.

The following is the SRDFStar resource definition in the main.cf file for the sync site:

```

SRDFStar srdfstar_testAppstar (
    GrpName = STAR-cg

```

```
SyncSite = WORKLOAD_SITE
AsyncSite = ASYNC_TARGET
OnlineOnState = STAR_PROTECTED
)
```

The main.cf file for the async site is similar to main.cf file for the Workload site except for the SRDFStar resource definition. The following is the SRDFStar resource definition in the main.cf file for the async site:

```
SRDFStar srdfstar_testAppstar (
GrpName = STAR-cg
AsyncSite = SYNC_TARGET
```

# Managing and testing clustering support for EMC SRDF/Star

This chapter includes the following topics:

- [Typical test setup for the EMC SRDF/Star agent](#)
- [Testing service group migration](#)
- [Testing host failure](#)
- [Performing a disaster test](#)
- [Performing the failback test](#)
- [Failure scenarios for EMC SRDF/Star](#)

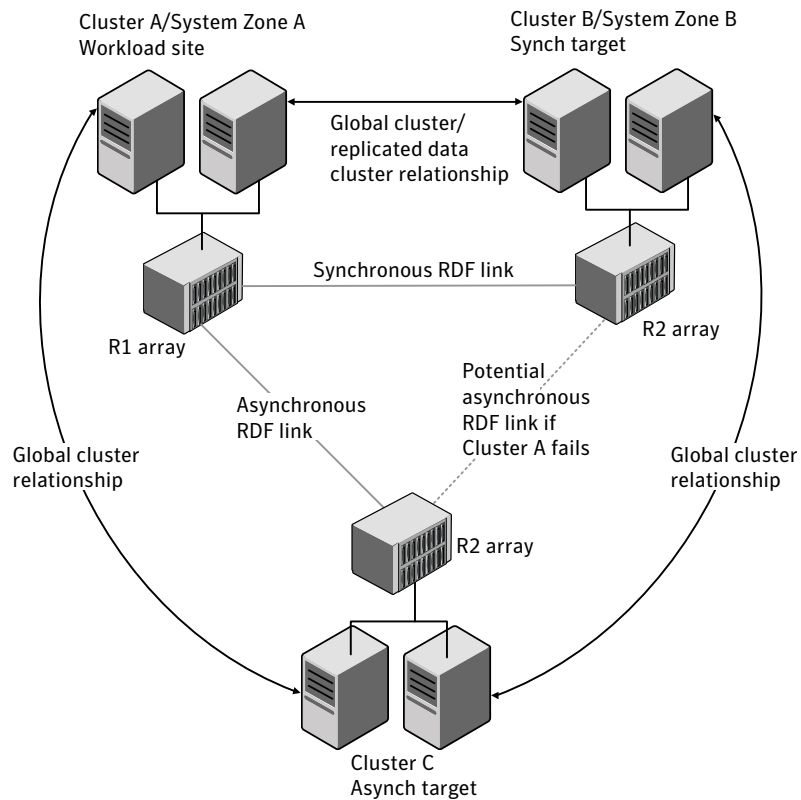
## Typical test setup for the EMC SRDF/Star agent

A typical test environment includes the following characteristics:

- Two hosts (hosta and hostb) attached to the array at the workload site A.
- Two hosts are attached to the array at the remote sync target site B.
- Two hosts are attached to the array at the remote async target site C.
- The application is running on hosta and Star protection is enabled.
- Clusters in the Star system have one network heartbeat.

[Figure 4-1](#) depicts a typical test environment.

**Figure 4-1** Typical test setup



## Testing service group migration

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

## To perform the service group migration test

- 1 In the Service Groups tab of the Cluster Explorer configuration tree, right-click the service group.

Migrate the service group to a host that is attached to the same array.

- 2 Click **Switch To**, and click the system that is attached to the same array (hostb) from the menu.

The service group comes online on hostb and site A remains the workload site with Star protection enabled.



- 3 In the Service Groups tab of the Cluster Explorer configuration tree, right-click the service group.  
Migrate the service group to a host that is attached to the array at the sync target site B.
- 4 Click **Switch To**, and click the hostc system that is attached to the array at the sync target site B.  
The service group comes online on hostc and sites A and B switch roles. Site A becomes the new sync target and site B becomes the new workload site with Star protection enabled.
- 5 In the Service Groups tab of the Cluster Explorer configuration tree, right-click the service group.  
Migrate the service group back to its original host.
- 6 Click **Switch To**, and click the system on which the group was initially online (hosta).  
The group comes online on hosta and sites A and B switch roles again. Site A is now the workload site with Star protection enabled and site B is now the sync target.

## Testing host failure

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

### To perform the host failure test

- 1 Halt or shut down the host where the application runs (hosta).  
The service group fails over to hostb.
- 2 Halt or shut down hostb.  
In a global cluster, a cluster down alert appears and the service group fails over to site B or site C, depending on the values of the ClusterList and ClusterFailoverPolicy attributes.  
In a replicated data cluster, the service group fails over to site B or site C, depending on the values of the SystemZones, FailoverPolicy, AutoFailover, ClusterList, and ClusterFailoverPolicy attributes.
- 3 Power on the two hosts that were shut down.
- 4 Switch the service group to its original host when VCS starts.  
Do the following:

- In the **Service Groups** tab of the Cluster Explorer configuration tree, right-click the service group.
- Click **Switch To**, and click the system on which the service group was initially online (hosta).  
The service group comes online on hosta.

## Performing a disaster test

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

### To perform a disaster test

- 1 Shut down all hosts and the Symmetrix array at the workload site. If you cannot shut down the workload site Symmetrix array, disconnect all of the links for the Symmetrix array and simultaneously shut down the hosts. This action mimics a disaster scenario from the point of view of the remote sites.
- 2 In a global cluster, a cluster down alert appears and the service group fails over to site B or site C, depending on the values of the ClusterList and ClusterFailoverPolicy attributes.

In a replicated data cluster, the service group fails over to site B or site C, depending on the values of the SystemZones, FailoverPolicy, AutoFailover, ClusterList and ClusterFailoverPolicy attributes.

## Performing the failback test

You can set up your cluster for a failback test.

The failback test verifies the application can fail back to its original host after a failover to a remote site.

### To perform a failback test

- 1 Reconnect the ESCON cable and reboot the original workload site hosts.
- 2 Take the service group offline.

```
hagrp -offline grpname -any
```

If you run the test in a global cluster, type the command from `hostc` or `hostd`.

Set the SRDFStar resource attribute `KeepDataFrom` before bringing the service group online. `KeepDataFrom` must point to the site from which you want to synchronize data. The default value is the site with the most recent data, which is known to the agent.

- 3 Bring the service group online at the workload site. Type

```
hagrp -online grpname -sys hosta
```

The devices synchronize, and the STAR state becomes the same as when the test began.

## Failure scenarios for EMC SRDF/Star

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

### Replication link failure

In this scenario, either or both of the synchronous and asynchronous replication links are lost. When any replication (RDF) link is lost, STAR goes into the tripped state.

At this point, the application continues to run on the workload site, but simultaneous synchronous and asynchronous replication is not available. Star is not in the PROTECTED state.

If desired, you can use the agent to switch the application to the sync or async target sites while the RDF links are unavailable. To do this, set the `ForceOnline` and `TripTakeover` attributes to 1.

---

**Note:** Symantec recommends that you set these attributes back to their default values after performing a switch of this type.

---

After both RDF links are available, Star remains in the TRIPPED state because the agent does not monitor the RDF link status. You can regain Star protection by re-enabling it outside of VCS control.

## Workload hosts and storage failure

In this scenario, the workload hosts and the storage array become unavailable. The original sync and async RDF links and the workload ICMP heartbeat links are lost. Under these conditions, you must use VCS to switch the application to either the sync target site or the async target site. While switching, you have a choice of using the data at either the sync or async target site. Set the `UseMostRecentData` and `KeepDataOn` attributes to specify which data you want to use.

If you switch to the sync target site, it becomes the new workload site. The agent then establishes a new async RDF link from this new workload site to the async target site.

At this point, no synchronous replication is available. Star is not in the PROTECTED state.

After the original workload site is available, you can regain Star protection by making the original workload site the new sync target site. You can then use the agent entry points to transition Star to the PROTECTED state.

See [“EMC SRDF/Star agent functions”](#) on page 13.

If you switch to the async target site, it becomes the new workload site. The agent then establishes a new async RDF link from this new workload site to one of the remote sites as specified by the `asyncSite` attribute.

At this point, no synchronous replication link is available. Star is not in the PROTECTED state.

Star protection is not available until the original workload site is recovered.

## Workload hosts failure

In this scenario, the workload hosts become unavailable, but the storage array is still online. The workload ICMP heartbeat links are lost, but the original synchronous and asynchronous RDF links are still available. Under these conditions, you must use VCS to switch the application over to either the sync or async target site, which becomes the sync or async site.

At this point, the original synchronous and asynchronous replication links and the original workload array are still available.

## Workload storage failure

In this scenario, the workload array becomes unavailable, but the application hosts are still online. The original synchronous and asynchronous RDF links are unavailable, but the workload ICMP heartbeat links are available. However, the application cannot run at the original workload site while the storage is down. Under these conditions, you must use VCS to switch the application to either the sync or the async target site. The result of switching to either site is the same as described in the workload hosts and storage failure scenario.

## Workload and sync target total site failure

In this scenario, the hosts and storage at both the workload site and the sync target site become unavailable. Under these conditions, you must use VCS to bring the application online at the async target site.

At this point, no synchronous replication link is available.

After both the workload site and sync target sites are available, you can regain Star protection by using VCS to perform a manual switch back to the workload site.

## Workload and async target total site failure

In this scenario, the hosts and storage at both the workload site and the async target become unavailable. Under these conditions, you must use VCS to switch the application to the sync target site.

At this point, no replication link is available.

After both the workload site and sync target sites are available, you can regain Star protection by using VCS to switch the application back to the workload site or you can use the agent action entry points to transition Star to the PROTECTED state.



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