



Sun Cluster Geographic Edition Data Replication Guide for EMC Symmetrix Remote Data Facility



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Preface

Sun Cluster Geographic Edition Data Replication Guide for EMC Symmetrix Remote Data Facility provides procedures for administering EMC Symmetrix Remote Data Facility data replication with Sun™ Cluster Geographic Edition software. This document is intended for experienced system administrators with extensive knowledge of Sun software and hardware. This document is not to be used as a planning or presales guide.

The instructions in this book assume knowledge of the Solaris™ Operating System (Solaris OS) and Sun Cluster software, and expertise with the volume manager software that is used with the Sun Cluster software.

Related Books

Information about related Sun Cluster Geographic Edition topics is available in the documentation that is listed in the following table. All Sun Cluster Geographic Edition documentation is available at <http://docs.sun.com>.

Topic	Documentation
Overview	<i>Sun Cluster Geographic Edition Overview</i>
Glossary	<i>Sun Java Enterprise System Glossary</i>
Hardware administration	Individual hardware administration guides
Software installation	<i>Sun Cluster Geographic Edition Installation Guide</i>
System administration	<i>Sun Cluster Geographic Edition System Administration Guide</i> <i>Sun Cluster Geographic Edition Data Replication Guide for Sun StorEdge Availability Suite</i> <i>Sun Cluster Geographic Edition Data Replication Guide for Hitachi TrueCopy</i> <i>Sun Cluster Geographic Edition Data Replication Guide for EMC Symmetrix Remote Data Facility</i>
Command and function references	<i>Sun Cluster Geographic Edition Reference Manual</i>

For a complete list of Sun Cluster documentation, see the release notes for your Sun Cluster software at <http://docs.sun.com>.

Using UNIX Commands

This document contains information about commands that are used to install, configure, or administer a Sun Cluster Geographic Edition configuration. This document might not contain complete information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

See one or more of the following sources for this information:

- Online documentation for the Solaris software system
- Other software documentation that you received with your system
- Solaris OS man pages

Related Third-Party Web Site References

Third-party URLs are referenced in this document and provide additional, related information.

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Documentation, Support, and Training

The Sun web site provides information about the following additional resources:

- [Documentation \(http://www.sun.com/documentation/\)](http://www.sun.com/documentation/)
- [Support \(http://www.sun.com/support/\)](http://www.sun.com/support/)
- [Training \(http://www.sun.com/training/\)](http://www.sun.com/training/)

Typographic Conventions

The following table describes the typographic conventions that are used in this book.

TABLE P-1 Typographic Conventions

Typeface	Meaning	Example
AaBbCc123	The names of commands, files, and directories, and onscreen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. <code>machine_name%</code> you have mail.
AaBbCc123	What you type, contrasted with onscreen computer output	<code>machine_name%</code> su Password:
<i>aabcc123</i>	Placeholder: replace with a real name or value	The command to remove a file is <i>rm filename</i> .
<i>AaBbCc123</i>	Book titles, new terms, and terms to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . <i>A cache</i> is a copy that is stored locally. Do <i>not</i> save the file. Note: Some emphasized items appear bold online.

Shell Prompts in Command Examples

The following table shows the default UNIX system prompt and superuser prompt for the C shell, Bourne shell, and Korn shell.

TABLE P-2 Shell Prompts

Shell	Prompt
C shell	<code>machine_name%</code>
C shell for superuser	<code>machine_name#</code>
Bourne shell and Korn shell	<code>\$</code>
Bourne shell and Korn shell for superuser	<code>#</code>

Replicating Data With EMC Symmetrix Remote Data Facility Software

During data replication, data from a primary cluster is copied to a backup or secondary cluster. The secondary cluster can be located at a geographically separated site from the primary cluster. This distance depends on the distance support that is available from your data replication product.

The Sun Cluster Geographic Edition software supports the use of EMC Symmetrix Remote Data Facility software for data replication. Before you can replicate data with EMC Symmetrix Remote Data Facility software, you must be familiar with the EMC Symmetrix Remote Data Facility documentation and have the EMC Symmetrix Remote Data Facility product and the latest patches installed on your system. For information about installing the EMC Symmetrix Remote Data Facility software, see the EMC Symmetrix Remote Data Facility product documentation.

This chapter contains the procedures for configuring and administering data replication with EMC Symmetrix Remote Data Facility software of Sun Cluster Geographic Edition. The chapter contains the following sections:

- “Administering Data Replication in an EMC Symmetrix Remote Data Facility Protection Group” on page 11
- “Initial Configuration of EMC Symmetrix Remote Data Facility Software” on page 13

For information about creating and deleting data replication device groups, see “Administering EMC Symmetrix Remote Data Facility Data Replication Device Groups” on page 38. For information about obtaining a global and a detailed runtime status of replication, see “Checking the Runtime Status of EMC Symmetrix Remote Data Facility Data Replication” on page 56.

Administering Data Replication in an EMC Symmetrix Remote Data Facility Protection Group

This section summarizes the steps for configuring EMC Symmetrix Remote Data Facility data replication in a protection group.

TABLE 1-1 Administration Tasks for EMC Symmetrix Remote Data Facility Data Replication

Task	Description
Perform an initial configuration of the EMC Symmetrix Remote Data Facility software.	See “Initial Configuration of EMC Symmetrix Remote Data Facility Software” on page 13.
Create a protection group that is configured for EMC Symmetrix Remote Data Facility data replication.	See “How to Create and Configure an EMC Symmetrix Remote Data Facility Protection Group” on page 28
Add a device group that is controlled by EMC Symmetrix Remote Data Facility.	See “How to Add a Data Replication Device Group to an EMC Symmetrix Remote Data Facility Protection Group” on page 39.
Add application resource groups to the protection group.	See “How to Add an Application Resource Group to an EMC Symmetrix Remote Data Facility Protection Group” on page 35.
Replicate the protection group configuration to a secondary cluster.	See “How to Replicate the EMC Symmetrix Remote Data Facility Protection Group Configuration to a Partner Cluster” on page 46.
Activate the protection group.	See “How to Activate an EMC Symmetrix Remote Data Facility Protection Group” on page 48.
Verify the protection group configuration.	Perform a trial a switchover or takeover and test some simple failure scenarios before bringing your system online. See Chapter 3. Note – You cannot perform personality swaps if you are running EMC Symmetrix Remote Data Facility/Asynchronous data replication.
Check the runtime status of replication.	See “Checking the Runtime Status of EMC Symmetrix Remote Data Facility Data Replication” on page 56.
Detect failure.	See “Detecting Cluster Failure on a System That Uses EMC Symmetrix Remote Data Facility Data Replication” on page 59.
Migrate services by using a switchover.	See “Migrating Services That Use EMC Symmetrix Remote Data Facility Data Replication With a Switchover” on page 60. Note – You cannot perform personality swaps if you are running EMC Symmetrix Remote Data Facility/Asynchronous data replication.
Migrate services by using a takeover.	See “Forcing a Takeover on a System That Uses EMC Symmetrix Remote Data Facility Data Replication” on page 63.

TABLE 1-1 Administration Tasks for EMC Symmetrix Remote Data Facility Data Replication
(Continued)

Task	Description
Recover data after forcing a takeover.	See “Recovering Services to a Cluster on a System That Uses EMC Symmetrix Remote Data Facility Replication” on page 65.

Initial Configuration of EMC Symmetrix Remote Data Facility Software

This section describes the steps you need to perform to configure EMC Symmetrix Remote Data Facility software on the primary and secondary clusters. It also includes information about the preconditions for creating EMC Symmetrix Remote Data Facility protection groups.

Initial configuration of the primary and secondary clusters includes the following:

- Configuring an EMC Symmetrix Remote Data Facility device group, `devgroup1`, with the required number of disks
- Configuring the VERITAS Volume Manager disk group, `dg1`
- Configuring the VERITAS Volume Manager volume, `vol1`
- Configuring the file system, which includes creating the file system, creating mount points, and adding entries to the `/etc/vfstab` file
- Creating an application resource group, `apprg1`, which contains a `HASstoragePlus` resource

Sun Cluster Geographic Edition software supports the hardware configurations that are supported by the Sun Cluster software. Contact your Sun service representative for information about current supported Sun Cluster configurations.

Configuring Data Replication With EMC Symmetrix Remote Data Facility Software on the Primary Cluster

This section describes the steps you must perform on the primary cluster before you can configure EMC Symmetrix Remote Data Facility data replication with Sun Cluster Geographic Edition software.

Setting Up Device Groups

EMC Symmetrix Remote Data Facility devices are configured in pairs. The mirroring relationship between the pairs becomes operational as soon as the EMC Symmetrix Remote Data Facility links are online. If you enable a two-way mirror disks with dynamic EMC Symmetrix Remote Data Facility functionality, you can set up the pair of devices at any time.

The EMC Symmetrix global memory stores information about the pair state of operating EMC Symmetrix Remote Data Facility devices.

Sun Cluster device groups are the entities that you can create and use to manage and control EMC Symmetrix Remote Data Facility pairs. The `SYMCLI` database file of the host stores information about the device group and the devices that are contained by the group.

The EMC Symmetrix Remote Data Facility device group can hold one of two types of devices:

- RDF1 source device, which acts as the primary
- RDF2 target device, which acts as the secondary

As a result, you can create two types of EMC Symmetrix Remote Data Facility device group, RDF1 and RDF2. An EMC Symmetrix Remote Data Facility device can be moved to another device group only if the source and destination groups are of the same group type.

You can create RDF1 device groups on a host attached to the EMC Symmetrix software that contains the RDF1 devices. You can create RDF2 device groups on a host attached to the EMC Symmetrix software that contains the RDF2 devices. You can perform the same EMC Symmetrix Remote Data Facility operations from the primary or secondary cluster, using the device group that was built on that side.

When you add remote data facility devices to a device group, all of the devices must adhere to the following restrictions:

- The device must be an EMC Symmetrix Remote Data Facility device.
- The device must be either an RDF1 or RDF2 type device, as specified by the device group type.
- The device must belong to the same EMC Symmetrix Remote Data Facility group number.
- The EMC Symmetrix Remote Data Facility device group configuration must be the same on all nodes of both the primary and secondary clusters. For example, if you have a device group `DG1`, which is configured as RDF1, on `node1` of `clusterA`, then `node2` of `clusterA` should also have a device group called `DG1` with the same disk set. Also, `clusterB` should have an EMC Symmetrix Remote Data Facility device group called `DG1`, which is configured as RDF2, defined on all nodes.

Checking the Configuration of EMC Symmetrix Remote Data Facility Devices

Before adding EMC Symmetrix Remote Data Facility devices to a device group, use the `symrdf list` command to list the EMC Symmetrix Remote Data Facility devices configured on the EMC Symmetrix units attached to your host.

```
# symrdf list
```

By default, the command displays devices by their EMC Symmetrix device name, a hexadecimal number that the EMC Symmetrix software assigns to each physical device. To display devices by their physical host name, use the `pd` argument with the `symrdf` command.

```
# symrdf list pd
```

Creating a RDF1 Device Group

The following steps create a device group of type RDF1 and add an RDF1 EMC Symmetrix device to the group.

1. Create a device group named `devgroup1`.

```
phys-paris-1# symdg create devgroup1 -type rdf1
```

2. Add an RDF1 device, with the EMC Symmetrix device name of 085, to the device group on the EMC Symmetrix storage unit identified by the number 000000003264.

A default logical name of the form `DEV001` is assigned to the RDF1 device.

```
phys-paris-1# symld -g devgroup1 -sid 3264 add dev 085
```

▼ How to Configure the Volumes for Use With EMC Symmetrix Remote Data Facility Replication

EMC Symmetrix Remote Data Facility supports VERITAS Volume Manager volumes. You must configure VERITAS Volume Manager volumes on the disks you selected for your EMC Symmetrix Remote Data Facility device group.

- 1 **Create VERITAS Volume Manager disk groups on shared disks in `cluster-paris`.**

For example, the `d1` and `d2` disks are configured as part of a VERITAS Volume Manager disk group, which is called `dg1`, by using commands, such as `vxdiskadm` and `vxvg`.

- 2 **After configuration is complete, verify that the disk group was created by using the `vxvg list` command.**

This command should list `dg1` as a disk group.

- 3 **Create the VERITAS Volume Manager volume.**

For example, a volume that is called `vol1` is created in the `dg1` disk group. The appropriate VERITAS Volume Manager commands, such as `vxassist`, are used to configure the volume.

▼ How to Configure the Sun Cluster Device Group That Is Controlled by EMC Symmetrix Remote Data Facility

- 1 **Register the VERITAS Volume Manager disk group that you configured in the previous procedure with Sun Cluster.**

Use the Sun Cluster commands, `scsetup` or `scconf`.

For more information about these commands, refer to the `scsetup(1M)` or the `scconf(1M)` man page.

- 2 **Synchronize the VERITAS Volume Manager configuration with Sun Cluster software, again by using the `scsetup` or `scconf` commands.**

3 After configuration is complete, verify the disk group registration.

```
phys-paris-1# scstat -D
```

The VERITAS Volume Manager disk group, dg1, should be displayed in the output.

For more information about the `scstat` command, see the `scstat(1M)` man page.

▼ How to Configure a Highly Available File System for EMC Symmetrix Remote Data Facility Replication

Before You Begin

Before you configure the file system on `cluster-paris`, ensure that the Sun Cluster entities you require, such as application resource groups, device groups, volumes, and mount points, have already been configured.

1 Create the required file system on the `vol1` volume at the command line.**2 Create the required mount points on all cluster `paris` nodes.****3 Add an entry to the `/etc/vfstab` file that contains information such as the mount location.**

Whether the file system is to be mounted locally or globally depends on various factors, such as your performance requirements, or the type of application resource group you are using.

Note – You must set the `mount at boot` field in this file to `no`. This value prevents the file system from mounting on the secondary cluster at cluster startup. Instead, the Sun Cluster software and the Sun Cluster Geographic Edition framework handle mounting the file system by using the `HASStoragePlus` resource when the application is brought online on the primary cluster.

4 Add the `HASStoragePlus` resource to the application resource group, `apprg1`.

Adding the resource to the application resource group ensures that the necessary file systems are mounted before the application is brought online.

For more information about the `HASStoragePlus` resource type, refer to the *Sun Cluster Data Services Planning and Administration Guide for Solaris OS*.

5 Verify that the disk group was registered properly.

```
phys-paris-1# scstat -D
```

The following command should display the VERITAS Volume Manager disk group dg1.

Example 1–1 Configuring a Highly Available Cluster File System

This example creates a locally mounted filesystem, with `HASStoragePlus`. The filesystem created in this example is mounted locally every time the resource is brought online.

This example assumes that the `apprg1` resource group already exists.

1. Create a UNIX file system (UFS).

```
phys-paris-1# newfs dev/vx/dsk/dg1/vol1
```

2. Create mount points on all cluster paris nodes.

```
phys-paris-1# mkdir /mounts/sample
```

3. Add the following entry to the /etc/vfstab file:

```
phys-paris-1# /dev/vs/dsk/dg1/vol1 /dev/vx/rdisk/dg1/vol1 /mounts/sample \
ufs 2 no logging
```

4. Add the HASStoragePlus resource type.

```
phys-paris-1# scrgadm -a -j rs-hasp -g apprg1 -t SUNW.HASStoragePlus \
-x FilesystemMountPoints=/mounts/sample -x AffinityOn=TRUE \
-x GlobalDevicePaths=dg1
```

Configuring Data Replication With EMC Symmetrix Remote Data Facility Software on the Secondary Cluster

This section describes the steps you must complete on the secondary cluster before you can configure EMC Symmetrix Remote Data Facility data replication in Sun Cluster Geographic Edition software.

▼ How to Create the RDF2 Device Group on the Secondary Cluster

Before You Begin

Before you can issue the EMC Symmetrix Remote Data Facility commands on the secondary cluster, you need to create a RDF2 type device group on the secondary cluster that contains the same definitions as the RDF1 device group.

- 1 Use the `syndg export` command to create a text file, `devgroup1.txt`, that contains the RDF1 group definitions.

```
phys-paris-1# syndg export devgroup -f devgroup.txt -rdf
```

- 2 Use the `rcp` or `ftp` command to transfer the file to the secondary cluster.

```
phys-paris-1# rcp devgroup1.txt phys-newyork-2:/.
```

- 3 On the secondary cluster, use the `syndg import` command to create the RDF2 device group by using the definitions from the text file.

Run the following command on each node in the newyork cluster.

```
phys-newyork-1# syndg import devgroup1 -f devgroup1.txt
```

```
Adding standard device 054 as DEV001...
```

```
Adding standard device 055 as DEV002...
```

Configuring the Other Entities on the Secondary Cluster

Next, you need to configure the volume manager, the Sun Cluster device groups, and the highly available cluster file system. You can configure these entities in two ways:

- By replicating the volume manager information from `cluster-paris`
- By creating a copy of the volume manager configuration on the LUNs of `cluster-newyork` by using the VERITAS Volume Manager commands `vxdiskadm` and `vxassist`

Each of these methods is described in the following procedures.

▼ How to Replicate the Volume Manager Configuration Information From the Primary Cluster

1 Start replication for the `devgroup1` device group.

```
phys-paris-1# symrdf -g devgroup1 -noprompt establish
```

```
An RDF 'Incremental Establish' operation execution is in progress for device group
'devgroup1'. Please wait...
```

```
Write Disable device(s) on RA at target (R2).....Done.
Suspend RDF link(s).....Done.
Mark target (R2) devices to refresh from source (R1).....Started.
Device: 054 ..... Marked.
Mark target (R2) devices to refresh from source (R1).....Done.
Suspend RDF link(s).....Done.
Merge device track tables between source and target.....Started.
Device: 09C ..... Merged.
Merge device track tables between source and target.....Done.
Resume RDF link(s).....Done.
```

```
The RDF 'Incremental Establish' operation successfully initiated for device group
'devgroup1'.
```

2 Confirm that the state of the EMC Symmetrix Remote Data Facility pair is synchronized.

```
phys-newyork-1# symrdf -g devgroup1 verify
```

```
All devices in the RDF group 'devgroup1' are in the 'Synchronized' state.
```

3 Split the pair by using the `symrdf split` command.

```
phys-paris-1# symrdf -g devgroup1 -noprompt split
```

```
An RDF 'Split' operation execution is in progress for device group 'devgroup1'.
Please wait...
```

```
Suspend RDF link(s).....Done.
Read/Write Enable device(s) on RA at target (R2).....Done.
The RDF 'Split' operation device group 'devgroup1'.
```

4 Enable all the volumes to be scanned.

```
phys-newyork-1# vxdctl enable
```

5 Import the VERITAS Volume Manager disk group, dg1.

```
phys-newyork-1# vxdg -C import dg1
```

6 Verify that the VERITAS Volume Manager disk group was successfully imported.

```
phys-newyork-1# vxdg list
```

7 Enable the VERITAS Volume Manager volume.

```
phys-newyork-1# /usr/sbin/vxrecover -g dg1 -s -b
```

8 Verify that the VERITAS Volume Manager volumes are recognized and enabled.

```
phys-newyork-1# vxprint
```

9 Register the VERITAS Volume Manager disk group, dg1, in Sun Cluster software.

```
phys-newyork-1# scconf -a -D type=vxvm, name=dg1, \
nodeList=phys-newyork-1:phys-newyork-2
```

10 Add an entry to the /etc/vfstab file on phys-newyork-1.

```
phys-newyork-1# /dev/vx/dsk/dg1/vol1 /dev/vx/rdisk/dg1/vol1 \
/mounts/sample ufs 2 no logging
```

11 Create a mount directory on newyork.

```
phys-newyork-1# mkdir -p /mounts/sample
phys-newyork-2# mkdir -p /mounts/sample
```

12 Create an application resource group, apprg1, by using the scrgadm command.

```
phys-newyork-1# scrgadm -a -g apprg1
```

13 Create the HASStoragePlus resource in apprg1.

```
phys-newyork-1# scrgadm -a -j rs-hasp -g apprg1 -t SUNW.HASStoragePlus \
-x FilesystemMountPoints=/mounts/sample -x AffinityOn=TRUE \
-x GlobalDevicePaths=dg1 \
```

14 Confirm that the application resource group is correctly configured by bringing it online and taking it offline again.

```
phys-newyork-1# scswitch -Z -g apprg1
phys-newyork-1# scswitch -F -g apprg1
```

15 Unmount the file system.

```
phys-newyork-1# umount /mounts/sample
```

16 Take the Sun Cluster device group offline.

```
phys-newyork-1# scswitch -F -D dg1
```

17 Verify that the VERITAS Volume Manager disk group was deported.

```
phys-newyork-1# vxdg list
```

18 Reestablish the EMC Symmetrix Remote Data Facility pair.

```
phys-newyork-1# symrdf -g devgroup1 -noprompt establish
```

Initial configuration on the secondary cluster is now complete.

▼ How to Create a Copy of the Volume Manager Configuration

This task copies the volume manager configuration from the primary cluster, `cluster-paris`, to LUNs of the secondary cluster, `cluster-newyork`, by using the VERITAS Volume Manager commands `vxdiskadm` and `vxassist` command.

Note – The device group, `devgroup1`, must be in the `Split` state throughout this procedure.

1 Confirm that the pair is in the Split state.

```
phys-newyork-1# symrdf -g devgroup1 query
```

Source (R1) View				Target (R2) View				MODES				
Standard	Logical	Device	Dev	LI	K	ST	T	R1 Inv	R2 Inv	MDA	RDF Pair	STATE
DEV001	00EC	RW	0	0	NR	00EC	RW	0	0	S..	Split	
DEV002	00ED	RW	0	0	NR	00ED	RW	0	0	S..	Split	

2 Import the VERITAS Volume Manager disk group.

```
phys-newyork-1# vxdg -C import dg1
```

3 Verify that the VERITAS Volume Manager disk group was successfully imported.

```
phys-newyork-1# vxdg list
```

4 Enable the VERITAS Volume Manager volume.

```
phys-newyork-1# /usr/sbin/vxrecover -g dg1 -s -b
```

5 Verify that the VERITAS Volume Manager volumes are recognized and enabled.

```
phys-newyork-1# vxprint
```

6 Register the VERITAS Volume Manager disk group, dg1, in Sun Cluster software.

```
phys-newyork-1# scconf -a -D type=vxvm, name=dg1, \  
nodeList=phys-newyork-1:phys-newyork-2
```

7 Create a VERITAS Volume Manager volume.**8 Synchronize the VERITAS Volume Manager information with the Sun Cluster device group and verify the output.**

```
phys-newyork-1# scconf -c -D name=dg1, sync  
phys-newyork-1# scstat -D
```

9 Create a mount directory on phys-newyork-1.

```
phys-newyork-1# mkdir -p /mounts/sample
```

10 Create an application resource group, apprg1 by using the scrgadm command.

```
phys-newyork-1# scrgadm -a -g apprg1
```

11 Create the HAStoragePlus resource in apprg1.

```
phys-newyork-1# scrgadm -a -j rs-hasp -g apprg1 -t SUNW.HAStoragePlus \  
-x FilesystemMountPoints=/mounts/sample -x AffinityOn=TRUE \  
-x GlobalDevicePaths=dg1
```

12 If necessary, confirm that the application resource group is correctly configured by bringing it online and taking it offline again.

```
phys-newyork-1# scswitch -z -g apprg1 -h phys-newyork-1  
phys-newyork-1# scswitch -F -g apprg1
```

13 Unmount the file system.

```
phys-newyork-1# umount /mounts/sample
```

14 Take the Sun Cluster device group offline.

```
phys-newyork-1# scswitch -F -D dg1
```

15 Verify that the VERITAS Volume Manager disk group was deported.

```
phys-newyork-1# vxdg list
```


Administering EMC Symmetrix Remote Data Facility Protection Groups

This chapter contains the procedures for configuring and administering data replication with EMC Symmetrix Remote Data Facility software. The chapter contains the following sections:

- “Strategies for Creating EMC Symmetrix Remote Data Facility Protection Groups” on page 23
- “Creating, Modifying, Validating, and Deleting an EMC Symmetrix Remote Data Facility Protection Group” on page 27
- “Administering EMC Symmetrix Remote Data Facility Application Resource Groups” on page 35
- “Administering EMC Symmetrix Remote Data Facility Data Replication Device Groups” on page 38
- “Replicating the EMC Symmetrix Remote Data Facility Protection Group Configuration to a Partner Cluster” on page 45
- “Activating an EMC Symmetrix Remote Data Facility Protection Group” on page 47
- “Deactivating an EMC Symmetrix Remote Data Facility Protection Group” on page 51
- “Resynchronizing an EMC Symmetrix Remote Data Facility Protection Group” on page 55
- “Checking the Runtime Status of EMC Symmetrix Remote Data Facility Data Replication” on page 56

Strategies for Creating EMC Symmetrix Remote Data Facility Protection Groups

Before you begin creating protection groups, consider which of the following strategies is best for you:

- Creating the protection group while the application remains online.
While this strategy allows you to create a protection group without any application outage, it requires issuing more commands.
- Taking the application offline before creating the protection group.

The following sections describe the steps for each strategy.

Creating a Protection Group While the Application Is Offline

To create a protection group while the application resource groups is offline, complete the following steps.

- Create the protection group from a node on one cluster.
For more information, see [“How to Create and Configure an EMC Symmetrix Remote Data Facility Protection Group”](#) on page 28.
- Add the data replication device group to the protection group.
For more information, see [“How to Add a Data Replication Device Group to an EMC Symmetrix Remote Data Facility Protection Group”](#) on page 39.
- Take the application resource group offline.
- Add the application resource group to the protection group.
For more information, see [“How to Add an Application Resource Group to an EMC Symmetrix Remote Data Facility Protection Group”](#) on page 35.
- On the other cluster, retrieve the protection group configuration.
For more information, see [“How to Replicate the EMC Symmetrix Remote Data Facility Protection Group Configuration to a Partner Cluster”](#) on page 46.
- From either cluster, start the protection group globally.
For more information, see [“How to Activate an EMC Symmetrix Remote Data Facility Protection Group”](#) on page 48.

Creating a Protection Group While the Application Is Online

To add an existing application resource group to a new protection group without taking the application offline, complete the following steps on the cluster where the application resource group is online.

- Create the protection group from a cluster node.
For more information, see [“How to Create and Configure an EMC Symmetrix Remote Data Facility Protection Group”](#) on page 28.
- Add the data replication device group to the protection group.
For more information, see [“How to Add a Data Replication Device Group to an EMC Symmetrix Remote Data Facility Protection Group”](#) on page 39.
- Start the protection group locally.
For more information, see [“How to Activate an EMC Symmetrix Remote Data Facility Protection Group”](#) on page 48.

- Add the application resource group to the protection group.
For more information, see “How to Add an Application Resource Group to an EMC Symmetrix Remote Data Facility Protection Group” on page 35.

Complete the following steps on the other cluster.

- Retrieve the protection group configuration.
For more information, see “How to Replicate the EMC Symmetrix Remote Data Facility Protection Group Configuration to a Partner Cluster” on page 46.
- Activate the protection group locally.
For more information, see “How to Activate an EMC Symmetrix Remote Data Facility Protection Group” on page 48.

EXAMPLE 2-1 Creating an EMC Symmetrix Remote Data Facility Protection Group While the Application Remains Online

This example creates a protection group without taking the application offline.

In this example, the `apprg1` resource group is online on the `cluster-paris` cluster.

1. Create the protection group on `cluster-paris`.

```
phys-paris-1# geogg create -d srdf -p Nodelist=phys-paris-1,phys-paris-2 \
-o Primary -s paris-newyork-ps srdfpg
Protection group "srdfpg" has been successfully created
```

2. Add the device group, `devgroup1`, to the protection group.

```
phys-paris-1# geogg add-device-group devgroup1 -p CG_or_DG=DG srdfpg
```

3. Activate the protection group locally.

```
phys-paris-1# geogg start -e local srdfpg
Processing operation... this may take a while...
Protection group "srdfpg" successfully started.
```

4. Add an application resource group that is already online to the protection group.

```
phys-paris-1# geogg add-resource-group apprg1 srdfpg
Following resource groups were successfully inserted:
"apprg1"
```

5. Verify that the application resource group was added successfully.

```
phys-paris-1# geoadm status
Cluster: cluster-paris

Partnership "paris-newyork-ps"      : OK
Partner clusters                    : newyork
Synchronization                     : OK
```

EXAMPLE 2-1 Creating an EMC Symmetrix Remote Data Facility Protection Group While the Application Remains Online *(Continued)*

```

ICRM Connection                : OK

Heartbeat "hb_cluster-paris~cluster-newyork" monitoring \
"paris-newyork-ps" OK
  Plug-in "ping_plugin"        : Inactive
  Plug-in "tcp_udp_plugin"     : OK

Protection group "srdfpg"      : Degraded
  Partnership                   : paris-newyork-ps
  Synchronization              : OK

Cluster cluster-paris         : Degraded
  Role                          : Primary
  Configuration                 : OK
  Data replication             : Degraded
  Resource groups              : OK

Cluster cluster-newyork      : Unknown
  Role                          : Unknown
  Configuration                 : Unknown
  Data Replication             : Unknown
  Resource Groups              : Unknown

```

6. On one node of the partner cluster, retrieve the protection group.

```

phys-newyork-1# geopg get -s paris-newyork-ps srdfpg
Protection group "srdfpg" has been successfully created.

```

7. Activate the protection group locally on the partner cluster.

```

phys-newyork-1# geopg start -e local srdfpg
Processing operation... this may take a while...
Protection group "srdfpg" successfully started.

```

8. Verify that the protection group was successfully created and activated.

Running the `geoadm status` command on `cluster-paris` produces the following output:

```

phys-paris-1# geoadm status
Cluster: cluster-paris

Partnership "paris-newyork-ps"    : OK
  Partner clusters                 : newyork
  Synchronization                 : OK
  ICRM Connection                 : OK

Heartbeat "hb_cluster-paris~cluster-newyork" monitoring \

```

EXAMPLE 2-1 Creating an EMC Symmetrix Remote Data Facility Protection Group While the Application Remains Online (Continued)

```

"paris-newyork-ps": OK
  Plug-in "ping-plugin"      : Inactive
  Plug-in "tcp_udp_plugin"   : OK

Protection group "srdfpg"    : Degraded
  Partnership                : paris-newyork-ps
  Synchronization           : OK

Cluster cluster-paris       : Degraded
  Role                       : Primary
  Configuration              : OK
  Data replication           : Degraded
  Resource groups            : OK

Cluster cluster-newyork     : Degraded
  Role                       : Secondary
  Configuration              : OK
  Data Replication           : Degraded
  Resource Groups            : OK

```

Creating, Modifying, Validating, and Deleting an EMC Symmetrix Remote Data Facility Protection Group

This section contains procedures for the following tasks:

- “How to Create and Configure an EMC Symmetrix Remote Data Facility Protection Group” on page 28
- “How the Data Replication Subsystem Validates the Device Group” on page 29
- “How to Modify an EMC Symmetrix Remote Data Facility Protection Group” on page 30
- “Validating an EMC Symmetrix Remote Data Facility Protection Group” on page 31
- “How to Delete an EMC Symmetrix Remote Data Facility Protection Group” on page 32
- “How to Create a Protection Group That Does Not Require Data Replication” on page 33

Note – You can create protection groups that are not configured to use data replication. To create a protection group that does not use a data replication subsystem, omit the `-d datareplicationtype` option when you use the `geopg` command. The `geoadm status` command shows a state for these protection groups of Degraded.

For more information, see “How to Create a Protection Group That Does Not Require Data Replication” on page 33.

▼ How to Create and Configure an EMC Symmetrix Remote Data Facility Protection Group

Before You Begin Before you create a protection group, ensure that the following conditions are met:

- The local cluster is a member of a partnership.
- The protection group you are creating does not already exist.

Note – Protection group names are unique in the global Sun Cluster Geographic Edition namespace. You cannot use the same protection group name in two partnerships on the same system.

You can also replicate the existing configuration of a protection group from a remote cluster to the local cluster. For more information, see [“Replicating the EMC Symmetrix Remote Data Facility Protection Group Configuration to a Partner Cluster”](#) on page 45.

1 Log in to a cluster node.

You must be assigned the Geo Management RBAC rights profile to complete this procedure. For more information about RBAC, see “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

2 Create a new protection group that uses SRDF replication by using the `geopg create` command.

This command creates a protection group on all nodes of the local cluster.

```
# geopg create -s partnershipname -o localrole -d srdf [-p property [-p...]] \  
protectiongroupname
```

- | | |
|---------------------------------|--|
| <code>-s partnershipname</code> | Specifies the name of the partnership. |
| <code>-o localrole</code> | Specifies the role of this protection group on the local cluster as either primary or secondary. |
| <code>-d srdf</code> | Specifies that the protection group data is replicated by the EMC Symmetrix Remote Data Facility software. |
| <code>-p propertysetting</code> | Specifies the properties of the protection group. |

You can specify the following properties:

- **Description** – Describes the protection group.
- **Timeout** – Specifies the time-out period for the protection group in seconds.
- **NodeList** – Lists the host names of the machines that can be primary for the replication subsystem.
- **Cluster_dgs** – Lists the device groups where the data is written.

For more information about the properties you can set, see Appendix A, “Standard Sun Cluster Geographic Edition Properties,” in *Sun Cluster Geographic Edition System Administration Guide*.

protectiongroupname Specifies the name of the protection group.

For information about the names and values that are supported by Sun Cluster Geographic Edition software, see Appendix B, “Legal Names and Values of Sun Cluster Geographic Edition Entities,” in *Sun Cluster Geographic Edition System Administration Guide*.

For more information about the `geopg` command, refer to the `geopg(1M)` man page.

Example 2-2 Creating and Configuring an EMC Symmetrix Remote Data Facility Protection Group

This example creates an EMC Symmetrix Remote Data Facility protection group on `cluster-paris`, which is set as the primary cluster.

```
# geopg create -s paris-newyork-ps -o primary -d srdf \
-p Nodelist=phys-paris-1,phys-paris-2 srdfpg
```

Example 2-3 Creating an EMC Symmetrix Remote Data Facility Protection Group for Application Resource Groups That Are Online

This example creates an EMC Symmetrix Remote Data Facility protection group, `srdfpg`, for an application resource group, `resourcegroup1`, that is currently online on `cluster-newyork`.

1. Create the protection group without the application resource group.

```
# geopg create -s paris-newyork-ps -o primary -d srdf \
-p nodelist=phys-paris-1,phys-paris-2 srdfpg
```

2. Activate the protection group.

```
# geopg start -e local srdfpg
```

3. Add the application resource group.

```
# geopg add-resource-group resourcegroup1 srdfpg
```

How the Data Replication Subsystem Validates the Device Group

The Sun Cluster Geographic Edition data replication layer validates the protection group’s replication role against the configuration of the EMC Symmetrix Remote Data Facility RDF1 and RDF2 devices. If the configurations do not match, the validation returns an error.

If the `Cluster_dgs` property is specified, then the data replication layer verifies that the device group specified is a valid Sun Cluster device group. The data replication layer also verifies that the device group is of a valid type.

Note – The device groups that are specified in the `Cluster_dgs` property must be written to only by applications that belong to the protection group. This property must not specify device groups that receive information from applications outside the protection group.

A Sun Cluster replication resource group is automatically created when the protection group is created.



Caution – These automatically created replication resource groups are for Sun Cluster Geographic Edition internal implementation purposes only. Use caution when you modify these resource groups by using Sun Cluster commands.

▼ How to Modify an EMC Symmetrix Remote Data Facility Protection Group

Before You Begin Before modifying the configuration of your protection group, ensure that the protection group you want to modify exists locally.

1 Log in to one of the cluster nodes.

You must be assigned the Geo Management RBAC rights profile to complete this procedure. For more information about RBAC, see “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

2 Modify the configuration of the protection group.

This command modifies the properties of a protection group on all nodes of the local cluster. If the partner cluster contains a protection group of the same name, this command also propagates the new configuration information to the partner cluster.

```
# geopg set-prop -p property [-p...] \  
protectiongroupname
```

`-p propertysetting` Specifies the properties of the protection group.

For more information about the properties you can set, see Appendix A, “Standard Sun Cluster Geographic Edition Properties,” in *Sun Cluster Geographic Edition System Administration Guide*.

`protectiongroupname` Specifies the name of the protection group.

For information about the names and values that are supported by Sun Cluster Geographic Edition software, see Appendix B, “Legal Names and Values of Sun Cluster Geographic Edition Entities,” in *Sun Cluster Geographic Edition System Administration Guide*.

For more information about the `geopg` command, refer to the `geopg(1M)` man page.

Example 2–4 Modifying the Configuration of a Protection Group

This example modifies the `Timeout` property of the protection group that was created in [Example 2–2](#).

```
# geopg set-prop -p Timeout=2700 srdfpg
```

Validating an EMC Symmetrix Remote Data Facility Protection Group

During protection group validation, the EMC Symmetrix Remote Data Facility data replication layer of the Sun Cluster Geographic Edition software validates the following:

- The `SYMCLI` is installed on at least one of the nodes in the `NodeList` property.
- The specified device group is a valid Sun Cluster device group. The data replication layer uses the `scstat -D` command if the `Cluster_dgs` property is specified. The data replication layer also verifies that the device group is of a valid type.
- The properties are valid for each EMC Symmetrix Remote Data Facility device group that has been added to the protection group.

When the `geoadm status` output displays that the `Configuration` status of a protection group is `Error`, you can validate the configuration by using the `geopg validate` command. This command checks the current state of the protection group and its entities.

If the protection group and its entities are valid, then the `Configuration` status of the protection groups is set to `OK`. If the `geopg validate` command finds an error in the configuration files, then the command displays a message about the error and the configuration remains in the error state. In such a case, you can fix the error in the configuration, and run the `geopg validate` command again.

▼ How to Validate an EMC Symmetrix Remote Data Facility Protection Group

Before You Begin Ensure that the protection group you want to validate exists locally and that the common agent container is online on all nodes of both clusters in the partnership.

1 Log in to one of the cluster nodes.

You must be assigned the Geo Management RBAC rights profile to complete this procedure. For more information about RBAC, see “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

2 Validate the configuration of the protection group.

This command validates the configuration of the protection group on the local cluster only. To validate the protection group configuration on the partner cluster, run the command again on the partner cluster.

```
# geopg validate protectiongroupname
```

protectiongroupname Specifies a unique name that identifies a single protection group

Example 2–5 Validating the Configuration of a Protection Group

This ex

ample validates a protection group.

```
# 6
```

▼ How to Delete an EMC Symmetrix Remote Data Facility Protection Group

Before You Begin

If you want to delete the protection group everywhere, you must run the `geopg delete` command on each cluster where the protection group exists.

Before deleting a protection group, ensure that the following conditions are met:

- The protection group you want to delete exists locally.
- The protection group is offline on both clusters in the partnership.

Note – You must remove the application resource groups from the protection group in order to keep the application resource groups online while deleting the protection group. See [Example 2–10](#) for examples of this procedure.

1 Log in to one of the nodes on the primary cluster, `cluster-paris`.

You must be assigned the Geo Management RBAC rights profile to complete this procedure. For more information about RBAC, see “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

2 Delete the protection group.

This command deletes the configuration of the protection group from the local cluster. The command also removes the replication resource group for each EMC Symmetrix Remote Data Facility device group in the protection group. This command does not alter the pair state of the EMC Symmetrix Remote Data Facility device group.

```
# geopg delete protectiongroupname
```

protectiongroupname Specifies the name of the protection group

3 To also delete the protection group on the secondary cluster, repeat step 1 and step 2 on cluster-newyork.**Example 2–6 Deleting a Protection Group**

This example deletes a protection group from both partner clusters. The protection group is offline on both partner clusters.

In this example, `cluster-paris` is the primary cluster. For a reminder of the sample cluster configuration, see “Example Sun Cluster Geographic Edition Cluster Configuration” in *Sun Cluster Geographic Edition System Administration Guide*.

```
# rlogin phys-paris-1 -l root
phys-paris-1# geopg delete srdfpg
# rlogin phys-newyork-1 -l root
phys-newyork-1# geopg delete srdfpg
```

Example 2–7 Deleting an EMC Symmetrix Remote Data Facility Protection Group While Keeping Application Resource Groups Online

This example keeps online two application resource groups, `apprg1` and `apprg2`, while deleting their protection group, `srdfpg` from both partner clusters. Remove the application resource groups from the protection group, then delete the protection group.

```
phys-paris-1# geopg remove-resource-group apprg1,apprg2 srdfpg
phys-paris-1# geopg stop -e global srdfpg
phys-paris-1# geopg delete srdfpg
phys-newyork-1# geopg delete srdfpg
```

▼ How to Create a Protection Group That Does Not Require Data Replication

Before You Begin Ensure that the following conditions are met:

- The local cluster is a member of a partnership.

- The protection group does not already exist.

Note – Protection group names are unique in the global Sun Cluster Geographic Edition namespace. You cannot use the same protection group name in two partnerships on the same system.

1 Log in to a cluster node.

You must be assigned the Geo Management RBAC rights profile to complete this procedure. For more information about RBAC, see “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

2 Create a new protection group by using the `geopg create` command.

This command creates a protection group on all nodes of the local cluster.

```
# geopg create -s partnershipname -o localrole \
[-p property [-p...]] \
protectiongroupname
```

- s *partnershipname* Specifies the name of the partnership.
- o *localrole* Specifies the role of this protection group on the local cluster as either Primary or Secondary.
- p *propertysetting* Specifies the properties of the protection group.

You can set the following properties:

- **Description** – Describes the protection group.
- **Timeout** – Specifies the time-out period for the protection group in seconds.
- **NodeList** – Lists the host names of the machines that can be primary for the replication subsystem.
- **Cluster_dgs** – Lists the device groups where the data is written.

For more information about the properties you can set, see Appendix A, “Standard Sun Cluster Geographic Edition Properties,” in *Sun Cluster Geographic Edition System Administration Guide*.

protectiongroupname Specifies the name of the protection group.

For information about the names and values that are supported by Sun Cluster Geographic Edition software, see Appendix B, “Legal Names and Values of Sun Cluster Geographic Edition Entities,” in *Sun Cluster Geographic Edition System Administration Guide*.

For more information about the `geopg` command, refer to the `geopg(1M)` man page.

Example 2–8 Creating and Configuring a Protection Group That Is Not Replicated

This example creates a protection group that is not replicated.

```
# geogg create -s paris-newyork-ps -o primary example-pg
```

Next Steps See “[Administering EMC Symmetrix Remote Data Facility Application Resource Groups](#)” on page 35 for information on adding resource groups to a protection group.

Administering EMC Symmetrix Remote Data Facility Application Resource Groups

To make an application highly available, the application must be managed as a resource in an application resource group.

All the entities you configure for the application resource group on the primary cluster, such as resources, resource groups, and the application resource group, must be replicated to the secondary cluster. The resource group names must be identical on both clusters. Also, the data that the application resource uses must be replicated to the secondary cluster.

This section contains information about the following tasks:

- “[How to Add an Application Resource Group to an EMC Symmetrix Remote Data Facility Protection Group](#)” on page 35
- “[How to Delete an Application Resource Group From an EMC Symmetrix Remote Data Facility Protection Group](#)” on page 37

▼ How to Add an Application Resource Group to an EMC Symmetrix Remote Data Facility Protection Group

Before You Begin You can add an existing resource group to the list of application resource groups for a protection group. Before you add an application resource group to a protection group, ensure that the following conditions are met:

- The protection group is defined.
- The resource group exists on both clusters and is in an appropriate state.
- The `Auto_start_on_new_cluster` property of the resource group is set to `False`. You can view this property by using the `scrgadm` command.

```
# scrgadm -pvv -g apprg | grep Auto_start_on_new_cluster
```

Setting the `Auto_start_on_new_cluster` property to `False` prevents the Sun Cluster resource group manager from automatically starting the resource groups in the protection group. Therefore, after the Sun Cluster Geographic Edition software restarts and communicates with the remote cluster to ensure that the remote cluster is running and that the remote cluster is the secondary cluster for that resource group. The Sun Cluster Geographic Edition software does not automatically start the resource group on the primary cluster.

Application resource groups should be online only on primary cluster when the protection group is activated.

Set the `Auto_start_on_new_cluster` property to `False` as follows:

```
# scrgadm -c -g apprg1 -y Auto_start_on_new_cluster=False
```

- The application resource group must not have dependencies on resource groups and resources outside of this protection group. To add several application resource groups that share dependencies, you must add the application resource groups to the protection group in a single operation. If you add the application resource groups separately, the operation fails.

The protection group can be activated or deactivated and the resource group can be either `Online` or `Offline`.

If the resource group is `Offline` and the protection group is `Active` after the configuration of the protection group has changed, the local state of the protection group becomes `Degraded`.

If the resource group to add is `Online` and the protection group is deactivated, the request is rejected. You must activate the protection group before adding an activate resource group.

1 Log in to a cluster node.

You must be assigned the Geo Management RBAC rights profile to complete this procedure. For more information about RBAC, see “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

2 Add an application resource group to the protection group.

This command adds an application resource group to a protection group on the local cluster. Then the command propagates the new configuration information to the partner cluster if the partner cluster contains a protection group of the same name.

```
# geopg add-resource-group resourcegrouplist protectiongroup
```

resourcegrouplist Specifies the name or names of the application resource group.

You can specify more than one resource group in a comma-separated list.

protectiongroup Specifies the name of the protection group.

For information about the names and values that are supported by Sun Cluster Geographic Edition software, see Appendix B, “Legal Names and Values of Sun Cluster Geographic Edition Entities,” in *Sun Cluster Geographic Edition System Administration Guide*.

If the add operation is unsuccessful on the local cluster, the configuration of the protection group is not modified. Otherwise, the Configuration status is set to OK on the local cluster.

If the Configuration status is OK on the local cluster, but the add operation is unsuccessful on the partner cluster, the Configuration status is set to Error on the partner cluster.

After the application resource group is added to the protection group, the application resource group is managed as an entity of the protection group. Then the application resource group is affected by protection group operations such as start, stop, switchover, and takeover.

Example 2–9 Adding an Application Resource Group to a Protection Group

This example adds two application resource groups, `apprg1` and `apprg2`, to `srdfpg`.

```
# geopg add-resource-group apprg1,apprg2 srdfpg
```

▼ How to Delete an Application Resource Group From an EMC Symmetrix Remote Data Facility Protection Group

You can remove an application resource group from a protection group without altering the state or contents of an application resource group.

Before You Begin Ensure that the following conditions are met:

- The protection group is defined on the local cluster.
- The resource group to be removed is part of the application resource groups of the protection group.

1 Log in to a cluster node.

You must be assigned the Geo Management RBAC rights profile to complete this procedure. For more information about RBAC, see “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

2 Remove the application resource group from the protection group.

This command removes an application resource group from the protection group on the local cluster. If the partner cluster contains a protection group of the same name, then the command removes the application resource group from the protection group on the partner cluster.

```
# geopg remove-resource-group resourcegrouplist protectiongroup
```

`resourcegrouplist` Specifies the name of the application resource group.

You can specify more than one resource group in a comma-separated list.

protectiongroup Specifies the name of the protection group.

If the remove operation is unsuccessful on the local cluster, the configuration of the protection group is not modified. Otherwise, the Configuration status is set to OK on the local cluster.

If the Configuration status is OK on the local cluster, but the remove operation is unsuccessful on the partner cluster, the Configuration status is set to Error on the partner cluster.

Example 2–10 Deleting an Application Resource Group From a Protection Group

This example removes two application resource groups, `apprg1` and `apprg2`, from `srdffg`.

```
# geopg remove-resource-group apprg1,apprg2 srdffg
```

Administering EMC Symmetrix Remote Data Facility Data Replication Device Groups

This section provides the following information about administering EMC Symmetrix Remote Data Facility data replication device groups:

- [“How to Add a Data Replication Device Group to an EMC Symmetrix Remote Data Facility Protection Group” on page 39](#)
- [“Validations Made by the Data Replication Subsystem” on page 40](#)
- [“How the State of the EMC Symmetrix Remote Data Facility Device Group Is Validated” on page 40](#)
- [“How to Modify an EMC Symmetrix Remote Data Facility Data Replication Device Group” on page 44](#)
- [“How to Delete a Data Replication Device Group From an EMC Symmetrix Remote Data Facility Protection Group” on page 44](#)

For details about configuring a EMC Symmetrix Remote Data Facility data replication protection group, see [“How to Create and Configure an EMC Symmetrix Remote Data Facility Protection Group” on page 28](#).

▼ How to Add a Data Replication Device Group to an EMC Symmetrix Remote Data Facility Protection Group

1 Log in to a cluster node.

You must be assigned the Geo Management RBAC rights profile to complete this procedure. For more information about RBAC, see “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

2 Create a data replication device group in the protection group.

This command adds a device group to a protection group on the local cluster and propagates the new configuration to the partner cluster if the partner cluster contains a protection group of the same name.

```
# geopg add-device-group -p property [-p...] devicegroupname protectiongroupname
```

-p property

Specifies the properties of the data replication device group.

You can specify the following EMC Symmetrix Remote Data Facility properties:

- **DG_or_CG** – Specifies that the device group is an EMC Symmetrix Remote Data Facility device group.

You must set this property to DG.

- **R1SID** – Specifies the primary (RDF1) EMC Symmetrix ID of the EMC Symmetrix devices.

The data replication layer automatically sets the value of this property. You should specify the primary (RDF1) EMC Symmetrix ID of the EMC Symmetrix devices if you plan to change the settings of the EMC Symmetrix host.

- **R2SID** – Specifies the secondary (RDF2) EMC Symmetrix ID of the EMC Symmetrix devices.

The data replication layer automatically sets the value of this property. You should specify the primary (RDF1) EMC Symmetrix ID of the EMC Symmetrix devices if you plan to change the settings of the EMC Symmetrix host.

devicegroupname

Specifies the name of the new data replication device group.

protectiongroupname

Specifies the name of the protection group that will contain the new data replication device group.

For information about the names and values that are supported by Sun Cluster Geographic Edition software, see Appendix B, “Legal Names and Values of Sun Cluster Geographic Edition Entities,” in *Sun Cluster Geographic Edition System Administration Guide*.

For more information about the `geopg` command, refer to the `geopg(1M)` man page.

Example 2–11 Adding a Data Replication Device Group to an EMC Symmetrix Remote Data Facility Protection Group

This example adds the EMC Symmetrix Remote Data Facility data replication device group to the `srdfpg` protection group.

```
# geopg add-device-group devgroup1 srdfpg
```

Validations Made by the Data Replication Subsystem

When the EMC Symmetrix Remote Data Facility device group is added to a protection group, the data replication layer makes the following validations.

- The specified device group name exists in the EMC Symmetrix Remote Data Facility configuration.
- The replication role matches the EMC Symmetrix Remote Data Facility protection group role.
- The EMC Symmetrix source, `R1SID`, and the EMC Symmetrix target, `R2SID`, can be reached.

When an EMC Symmetrix Remote Data Facility device group is added to a protection group, a Sun Cluster data replication resource is automatically created by this command. This resource monitors data replication state. The name of the resource is

`sc_ggeo_dr-SRDFprotectiongroupname-devicegroupname`. This resource is placed in the corresponding Sun Cluster resource group, which is named `sc_geo_dr-SRDFprotectiongroupname`.



Caution – You must use caution before you modify these replication resources with Sun Cluster commands. These resources are for internal implementation purposes only.

How the State of the EMC Symmetrix Remote Data Facility Device Group Is Validated

For validation purposes, Sun Cluster Geographic Edition gives each EMC Symmetrix Remote Data Facility device group a state according to the current state of its pair. This state is returned by the `symrdf -g dgroupname query` command.

The remainder of this section describes the individual device group states and how these states are validated against the local role of the protection group.

Determining the State of an Individual EMC Symmetrix Remote Data Facility Device Group

An individual EMC Symmetrix Remote Data Facility device group can be in one of the following states:

- Synchronized
- SynInProgress
- Failedover
- R1 Updated
- R1 UpdInProgress
- Split
- Suspended
- Partitioned
- Invalid

Determining the Aggregate EMC Symmetrix Remote Data Facility Device Group State

If a protection group contains only one EMC Symmetrix Remote Data Facility device group, then the aggregate device group state is the same as the individual device group state.

When a protection group contains multiple EMC Symmetrix Remote Data Facility device groups, the aggregate device group state is obtained as described in the following table.

TABLE 2-1 Conditions That Determine the Aggregate Device Group State

Condition	Aggregate Device Group State
Any of the individual device group states are Invalid.	Invalid
Any of the individual device groups states are Partitioned and none of the individual device group states is Invalid.	Partitioned
One or more of the individual device groups states are Suspended and none of the individual device group states is Invalid, or Partitioned.	Suspended
One or more of the individual device groups states are Split and none of the individual device group states is Invalid, Partitioned, or Suspended.	Split

TABLE 2-1 Conditions That Determine the Aggregate Device Group State *(Continued)*

Condition	Aggregate Device Group State
One or more of the individual device groups states are R1 UpdInProg and none of the individual device group states is Invalid, Partitioned, Suspended, or Split.	R1 UpdInProg
One or more of the individual device groups states are R1 Updated and none of the individual device group states is Invalid, Partitioned, Suspended, Split, or R1 UpdInProg.	R1 Updated
One or more of the individual device groups states are Failedover and none of the individual device group states is Invalid, Partitioned, Suspended, Split, R1 UpdInProg, or R1 Updated.	Failedover
One or more of the individual device groups states are SynInProg and none of the individual device group states is Invalid, Partitioned, Suspended, Split, R1 UpdInProg, R1 Updated, or Failedover.	SynInProg
All of the individual device group states are Synchronized.	Synchronized

Determining the EMC Symmetrix Remote Data Facility Pair State

The resource status message reflects the role and state of the RDF pair. For example, the resource status and status message of `Faulted Split`, is reported when the RDF pair is in a `Split` state.

The RDF pair state is mapped to the associated resource status as described in the following table.

TABLE 2-2 Mapping From the RDF Pair State to the Resource Status

Condition	Resource Status	Status Message
The RDF pair state is <code>Invalid</code> and the pair state is not <code>Incorrect Role</code> .	<code>Faulted</code>	<code>Invalid state</code>
The RDF pair state is <code>Partitioned</code> and the pair state is not <code>Incorrect Role</code> , or <code>Invalid</code> .	<code>Faulted</code>	<code>Partitioned</code>
The RDF pair state is <code>Suspended</code> and the pair state is not <code>Incorrect Role</code> , <code>Invalid</code> , or <code>Partitioned</code> .	<code>Faulted</code>	<code>Suspended</code>

TABLE 2-2 Mapping From the RDF Pair State to the Resource Status (Continued)

Condition	Resource Status	Status Message
The RDF pair state is SyncInProgress and the pair state is not Incorrect Role, Invalid, Partitioned, or Suspended.	Degraded	SyncInProgress
The RDF pair state is R1 UpdInProgress and the pair state is not Incorrect Role, Invalid, Partitioned, Suspended, or SyncInProgress.	Faulted	R1 UpdInProgress
The RDF pair state is Split and the pair state is not Incorrect Role, Invalid, Partitioned, Suspended, SyncInProgress, or R1 UpdInProgress.	Faulted	Split
The RDF pair state is Failed over and the pair state is not Incorrect Role, Invalid, Partitioned, Suspended, SyncInProgress, R1 UpdInProgress, or Split.	Faulted	Failed over
The RDF pair state is R1 Updated and the pair state is not Incorrect Role, Invalid, Partitioned, Suspended, SyncInProgress, R1 UpdInProgress, Split, or Failed over.	Faulted	Replicating with role change
The RDF pair state is Synchronized.	Online	Replicating

The state of the RDF pair determines the availability of consistent data in the partnership. When the state of the RDF resource on the primary or secondary cluster is Degraded or Faulted, the data volumes might not be synchronized even if the application can still write data from the primary volume to the secondary volume. The RDF pair will be in a Partitioned state and the invalid entries will be logged as the data is written to the primary volume. Manual recovery operations are required to resolve the error and resynchronize the data.

▼ How to Modify an EMC Symmetrix Remote Data Facility Data Replication Device Group

1 Log in to a cluster node.

You must be assigned the Geo Management RBAC rights profile to complete this procedure. For more information about RBAC, see “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

2 Modify the device group.

This command modifies the properties of a device group in a protection group on the local cluster. Then the command propagates the new configuration to the partner cluster if the partner cluster contains a protection group of the same name.

```
# geogp modify-device-group -p property [-p...] \  
srdfddevicegroupname protectiongroupname
```

-p property Specifies the properties of the data replication device group.

For more information about the properties you can set, see Appendix A, “Standard Sun Cluster Geographic Edition Properties,” in *Sun Cluster Geographic Edition System Administration Guide*.

srdfddevicegroupname Specifies the name of the new data replication device group.

protectiongroupname Specifies the name of the protection group that will contain the new data replication device group.

Example 2–12 Modifying the Properties of an EMC Symmetrix Remote Data Facility Data Replication Device Group

This example modifies the R1SID properties of a data replication device group that is part of an EMC Symmetrix Remote Data Facility protection group.

```
# geogp modify-device-group -p R1SID=215 srdfdg srdfdpg
```

▼ How to Delete a Data Replication Device Group From an EMC Symmetrix Remote Data Facility Protection Group

Before You Begin

You might delete a data replication device group from a protection group if you added a data replication device group to a protection group. Normally, after an application is configured to write to a set of disks, you would not change the disks.

Deleting a data replication device group does not stop replication or change the replication status of the data replication device group.

For information about deleting protection groups, refer to “[How to Delete an EMC Symmetrix Remote Data Facility Protection Group](#)” on page 32. For information about deleting application resource groups from a protection group, refer to “[How to Delete an Application Resource Group From an EMC Symmetrix Remote Data Facility Protection Group](#)” on page 37.

1 Log in to a cluster node.

You must be assigned the Geo Management RBAC rights profile to complete this procedure. For more information about RBAC, see “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

2 Remove the device group.

This command removes a device group from a protection group on the local cluster. Then the command propagates the new configuration to the partner cluster if the partner cluster contains a protection group of the same name.

```
# geopg remove-device-group devicegroupname protectiongroupname
```

devicegroupname Specifies the name of the data replication device group

protectiongroupname Specifies the name of the protection group

When a device group is deleted from an EMC Symmetrix Remote Data Facility protection group, the corresponding Sun Cluster resource, `sc_geo_dr-SRDF-protectiongroupname-devicegroupname`, is removed from the replication resource group. As a result, the deleted device group is no longer monitored. The replication resource group is removed when the protection group is deleted.

Example 2–13 Deleting a Replication Device Group From an EMC Symmetrix Remote Data Facility Protection Group

This example removes an EMC Symmetrix Remote Data Facility data replication device group `srdfdg` from the `srdfpg` protection group.

```
# geopg remove-device-group srdfdg srdfpg
```

Replicating the EMC Symmetrix Remote Data Facility Protection Group Configuration to a Partner Cluster

After you have configured data replication, resource groups, and resources on your primary and secondary clusters and you have configured your primary cluster for those entities, you can replicate the configuration of the protection group to the secondary cluster.

▼ How to Replicate the EMC Symmetrix Remote Data Facility Protection Group Configuration to a Partner Cluster

Before You Begin Before you replicate the configuration of an EMC Symmetrix Remote Data Facility protection group to a partner cluster, ensure that the following conditions are met:

- The protection group is defined on the remote cluster, not on the local cluster.
- The device groups in the protection group on the remote cluster exist on the local cluster.
- System files have been updated for the application.
- The application resource groups in the protection group on the remote cluster exist on the local cluster.
- The `Auto_start_on_new_cluster` property of the application resource group is set to `False`. You can view this property by using the `scrgadm` command.

```
# scrgadm -pvv -g apprg1 | grep Auto_start_on_new_cluster
```

Setting the `Auto_start_on_new_cluster` property to `False` prevents the Sun Cluster resource group manager from automatically starting the resource groups in the protection group. Therefore, after the Sun Cluster Geographic Edition software restarts and communicates with the remote cluster to ensure that the remote cluster is running and that the remote cluster is the secondary cluster for that resource group. The Sun Cluster Geographic Edition software does not automatically start the resource group on the primary cluster.

Application resource groups should be online only on primary cluster when the protection group is activated.

Set the `Auto_start_on_new_cluster` property to `False` as follows:

```
# scrgadm -c -g apprg1 -y Auto_start_on_new_cluster=False
```

1 Log in to `phys-newyork-1`.

You must be assigned the Geo Management RBAC rights profile to complete this procedure. For more information about RBAC, see “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

`phys-newyork-1` is a node on the secondary cluster. For a reminder of which node is `phys-newyork-1`, see “Example Sun Cluster Geographic Edition Cluster Configuration” in *Sun Cluster Geographic Edition System Administration Guide*.

2 Replicate the protection group configuration to the partner cluster by using the `geopg get` command.

This command retrieves the configuration information of the protection group from the remote cluster and creates the protection group on the local cluster.

```
phys-newyork-1# geopg get -s partnershipname protectiongroup
```

`-s partnershipname` Specifies the name of the partnership from which the protection group configuration information should be retrieved and the name of the partnership where the protection will be created locally.

`protectiongroup` Specifies the name of the protection group.

If no protection group is specified, then all protection groups that exist in the specified partnership on the remote partner are created on the local cluster.

Note – The `geopg get` command replicates Sun Cluster Geographic Edition related entities. For information about how to replicate Sun Cluster entities, see “Replicating and Upgrading Configuration Data for Resource Groups, Resource Types, and Resources” in *Sun Cluster Data Services Planning and Administration Guide for Solaris OS*.

Example 2–14 Replicating the EMC Symmetrix Remote Data Facility Protection Group to a Partner Cluster

This example replicates the configuration of `srdfpg` from `cluster-paris` to `cluster-newyork`.

```
# rlogin phys-newyork-1 -l root
phys-newyork-1# geopg get -s paris-newyork-ps srdfpg
```

Activating an EMC Symmetrix Remote Data Facility Protection Group

When you activate a protection group, the protection group assumes the role that you assigned to it during configuration. You can activate a protection group in the following ways:

- Globally – Activates a protection group on both clusters where the protection group is configured
- On the primary cluster only – Secondary cluster remains inactive
- On the secondary cluster only – Primary cluster remains inactive

Activating an EMC Symmetrix Remote Data Facility protection group on a cluster has the following effect on the data replication layer:

- The data replication configuration of the protection group is validated. During validation, the current local role of a protection group is compared with the configuration of the EMC Symmetrix Remote Data Facility device groups.

If the EMC Symmetrix Remote Data Facility device group is not in a `Failedover` state, the local role of the protection group should match the role of the EMC Symmetrix Remote Data Facility device group.

If the EMC Symmetrix Remote Data Facility device group is in a `Failedover` state, then the local role of the protection group becomes secondary while the role of the EMC Symmetrix Remote Data Facility device group remains primary.

- Data replication is started on the data replication device groups that are configured for the protection group, no matter whether the activation occurs on a primary or secondary cluster. Data is always replicated from the cluster on which the local role of the protection group is primary to the cluster on which the local role of the protection group is secondary.

Application handling proceeds only after data replication has been started successfully.

Activating a protection group has the following effect on the application layer:

- When a protection group is activated on the primary cluster, the application resource groups that are configured for the protection group are also started. Use the following Sun Cluster command on the primary cluster to bring the resource groups online:

```
# scswitch -Z -g rglis
```

- When a protection group is activated on the secondary cluster, the application resource groups are *not* started. The resource groups are put into the unmanaged state.

▼ How to Activate an EMC Symmetrix Remote Data Facility Protection Group

1 Log in to a cluster node.

You must be assigned the Geo Management RBAC rights profile to complete this procedure. For more information about RBAC, see “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

2 Activate the protection group.

When you activate a protection group, its application resource groups are also brought online.

```
# geopg start -e scope [-n] protectiongroupname
```

`-e scope` Specifies the scope of the command.

If the scope is Local, then the command operates on the local cluster only. If the scope is Global, the command operates on both clusters that deploy the protection group.

Note – The property values, such as Global and Local, are *not* case sensitive.

-n Prevents the start of data replication at protection group startup.

If you omit this option, the data replication subsystem starts at the same time as the protection group.

protectiongroupname Specifies the name of the protection group.

The `geopg start` command uses the `scswitch -Z -g resourcegroup` command to bring resource groups and resources online. For more information about using this command, see the `scswitch(1M)` man page.

Example 2-15 How the Sun Cluster Geographic Edition Software Issues the Command to Start Replication

This example illustrates how the Sun Cluster Geographic Edition software determines the EMC Symmetrix Remote Data Facility command that is used to start data replication.

First, the EMC Symmetrix Remote Data Facility protection group is created.

```
phys-paris-1# geopg create -s paris-newyork-ps -o primary -d srdf srdfpg
```

The device group `devgroup1` is added to the protection group.

```
phys-paris-1# geopg add-device-group devgroup1 srdfpg
```

The current RDF pair state of an EMC Symmetrix Remote Data Facility device group, `devgroup1`, is returned in the output of the `symrdf query` command as follows:

```
phys-paris-1# symrdf -g devgroup1 query
Device Group (DG) Name      : devgroup1
DG's Type                   : RDF1
DG's Symmetrix ID          : 000187401215
```

	Source (R1) View				Target (R2) View				MODES	
	ST			LI	ST					
Standard	A			N	A					
Logical	T	R1 Inv	R2 Inv	K	T	R1 Inv	R2 Inv		RDF	Pair
Device	Dev	E	Tracks	Tracks	S	Dev	E	Tracks	Tracks	MDA STATE

```

-----
DEV001  00E4 RW      0      36 NR 00E4 RW      36      0 S.. Split
DEV002  00E5 RW      0      36 NR 00E5 RW      36      0 S.. Split
DEV003  00E6 RW      0      36 NR 00E6 RW      36      0 S.. Split
    
```

The aggregate device group state is *Split*.

Next, the protection group, *srdfpg*, is activated by using the *geopg start* command.

```
phys-paris-1# geopg start -e local srdfpg
```

The Sun Cluster Geographic Edition software runs the *symrdf -g devgroup1 establish* command at the data replication level. If the command is successful, the state of *devgroup1* is returned in the output of the *symrdf query* command as follows:

```
phys-paris-1# symrdf -g devgroup1 query
Device Group (DG) Name      : devgroup1
DG's Type                   : RDF1
DG's Symmetrix ID          : 000187401215
    
```

Source (R1) View				Target (R2) View				MODES	
-----				-----				-----	
Standard	Logical	Device	Dev	ST	LI	ST			
A	T	R1 Inv	R2 Inv	N	K	T	R1 Inv	R2 Inv	RDF Pair
E	Tracks	Tracks	S	Dev	E	Tracks	Tracks	MDA	STATE
-----				-----				-----	
DEV001	00E4	RW	0	0	RW	00E4	WD	0	0 S.. Synchronized
DEV002	00E5	RW	0	0	RW	00E5	WD	0	0 S.. Synchronized
DEV003	00E6	RW	0	0	RW	00E6	WD	0	0 S.. Synchronized
DEV004	00E7	RW	0	0	RW	00E7	WD	0	0 S.. Synchronized
DEV005	00E8	RW	0	0	RW	00E8	WD	0	0 S.. Synchronized
DEV006	00E9	RW	0	0	RW	00E9	WD	0	0 S.. Synchronized

Example 2-16 Activating an EMC Symmetrix Remote Data Facility Protection Group Globally

This example activates a protection group globally.

```
# geopg start -e global srdfpg
```

The protection group, *srdfpg*, is activated on both clusters where the protection group is configured.

Example 2-17 Activating an EMC Symmetrix Remote Data Facility Protection Group Locally

This example activates a protection group on a local cluster only. This local cluster might be a primary cluster or a secondary cluster, depending on the role of the cluster.

```
# geopg start -e local srdffg
```

Deactivating an EMC Symmetrix Remote Data Facility Protection Group

You can deactivate a protection group on the following levels:

- Globally – Deactivates a protection group on both clusters where the protection group is configured.
- On the primary cluster only – Secondary cluster remains active.
- On the secondary cluster only – Primary cluster remains active.

Deactivating an EMC Symmetrix Remote Data Facility protection group on a cluster has the following effect on the data replication layer:

- The data replication configuration of the protection group is validated. During validation, the current local role of the protection group is compared with the aggregate device group state. If validation is successful, data replication is stopped.
- Data replication is stopped on the data replication device groups that are configured for the protection group, whether the deactivation occurs on a primary or secondary cluster.

Deactivating a protection group has the following effect on the application layer:

- When a protection group is deactivated on the primary cluster, all of the application resource groups configured for the protection group are stopped and unmanaged.
- When a protection group is deactivated on the secondary cluster, the resource groups on the secondary cluster are not affected. Application resource groups that are configured for the protection group might remain active on the primary cluster, depending on the activation state of the primary cluster.

The EMC Symmetrix Remote Data Facility command that is used to stop data replication depends on the RDF state of the EMC Symmetrix Remote Data Facility device group.

The following table describes the EMC Symmetrix Remote Data Facility command that is used to stop data replication for each of the possible combinations of factors.

TABLE 2-3 Commands Used to Stop EMC Symmetrix Remote Data Facility Data Replication

Aggregate Device Group State	Valid Local Protection Group Role	EMC Symmetrix Remote Data Facility Command
Split, Suspended, Partitioned, or Failover	primary or secondary	No command is run because no data is being replicated.
Synchronized or R1Updated	primary or secondary	The symrdf split command is run.

▼ How to Deactivate an EMC Symmetrix Remote Data Facility Protection Group

1 Log in to a cluster node.

You must be assigned the Geo Management RBAC rights profile to complete this procedure. For more information about RBAC, see “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

2 Deactivate the protection group.

When you deactivate a protection group on the primary cluster, its application resource groups are also taken offline.

```
# geopg stop -e scope [-D] protectiongroupname
```

-e scope Specifies the scope of the command.

If the scope is `Local`, then the command operates on the local cluster only. If the scope is `Global`, the command operates on both clusters where the protection group is deployed.

Note – The property values, such as `Global` and `Local`, are *not* case sensitive.

-D Specifies that only data replication should be stopped and the protection group should be online.

If you omit this option, the data replication subsystem and the protection group are both stopped.

protectiongroupname Specifies the name of the protection group.

Example 2-18 How the Sun Cluster Geographic Edition Software Issues the Command to Stop Replication

This example illustrates how the Sun Cluster Geographic Edition software determines the EMC Symmetrix Remote Data Facility command that is used to stop data replication.

The current state of the EMC Symmetrix Remote Data Facility device group, `devgroup1`, is returned in the output of the `symrdf` query command as follows:

```
phys-paris-1# symrdf -g devgroup1 query
Device Group (DG) Name      : devgroup1
DG's Type                   : RDF1
DG's Symmetrix ID          : 000187401215
```

Source (R1) View					Target (R2) View				MODES			
Standard	Logical	Device	Dev	Dev	LI	ST	T	R1 Inv	R2 Inv	Tracks	MDA	STATE
ST	A	T	R1 Inv	R2 Inv	N	A	T	R1 Inv	R2 Inv	Tracks	MDA	STATE
DEV001	00E4	RW	0	0	RW	00E4	WD	0	0	S..	Synchronized	
DEV002	00E5	RW	0	0	RW	00E5	WD	0	0	S..	Synchronized	
DEV003	00E6	RW	0	0	RW	00E6	WD	0	0	S..	Synchronized	
DEV004	00E7	RW	0	0	RW	00E7	WD	0	0	S..	Synchronized	
DEV005	00E8	RW	0	0	RW	00E8	WD	0	0	S..	Synchronized	
DEV006	00E9	RW	0	0	RW	00E9	WD	0	0	S..	Synchronized	

A device group, `devgroup1`, is added to the protection group as follows:

```
phys-paris-1# geopg add-device-group -p DG_or_CG=DG devgroup1 srdfpg
```

Next, the protection group, `srdfpg`, is deactivated by using the `geopg stop` command.

```
phys-paris-1# geopg stop -s local srdfpg
```

The Sun Cluster Geographic Edition software runs the `symrdf -g devgroup1 split` command at the data replication level.

If the command is successful, the state of `devgroup1` is returned in the output of the `symrdf` query command as follows:

```
phys-paris-1# symrdf -g devgroup1 query
Device Group (DG) Name      : devgroup1
DG's Type                   : RDF1
```

DG's Symmetrix ID : 000187401215

Source (R1) View					Target (R2) View					MODES			
Standard	Logical	Device	Dev	ST	LI	ST	Dev	Dev	R1 Inv	R2 Inv	MDA	RDF Pair	STATE
				A	N	A							
				T	K	T							
				E	S	E							
				0	0	0							
				0	0	0							
				0	0	0							
				0	0	0							
				0	0	0							
				0	0	0							

Example 2-19 Deactivating a Protection Group on All Clusters

This example deactivates a protection group on all clusters.

```
# geopg stop -e global srdfpg
```

Example 2-20 Deactivating a Protection Group on a Local Cluster

This example deactivates a protection group on the local cluster.

```
# geopg stop -e local srdfpg
```

Example 2-21 Stopping Data Replication While Leaving the Protection Group Online

This example stops only data replication on both partner clusters.

```
# geopg stop -e local -D srdfpg
```

If the administrator decides later to deactivate both the protection group and its underlying data replication subsystem, the administrator can rerun the command without the -D option:

```
# geopg stop -e local srdfpg
```

Example 2–22 Deactivating an EMC Symmetrix Remote Data Facility Protection Group While Keeping Application Resource Groups Online

This example keeps two application resource groups, `apprg1` and `apprg2`, online while deactivating their protection group, `srdpfg`, on both clusters.

1. Remove the application resource groups from the protection group.

```
# geopg remove-resource-group apprg1,apprg2 srdpfg
```

2. Deactivate the protection group.

```
# geopg stop -e global srdpfg
```

Resynchronizing an EMC Symmetrix Remote Data Facility Protection Group

You can resynchronize the configuration information of the local protection group with the configuration information that is retrieved from the partner cluster. You need to resynchronize a protection group when its Synchronization status in the output of the `geoadm status` command is Error.

For example, you might need to resynchronize protection groups after booting the cluster. For more information, see “Booting a Cluster” in *Sun Cluster Geographic Edition System Administration Guide*.

Resynchronizing a protection group updates only entities that are related to Sun Cluster Geographic Edition software. For information about how to update Sun Cluster entities, see “Replicating and Upgrading Configuration Data for Resource Groups, Resource Types, and Resources” in *Sun Cluster Data Services Planning and Administration Guide for Solaris OS*.

▼ How to Resynchronize a Protection Group

Before You Begin The protection group must be deactivated on the cluster where you are running the `geopg update` command. For information about deactivating a protection group, see [“Deactivating an EMC Symmetrix Remote Data Facility Protection Group”](#) on page 51.

1 Log in to a cluster node.

You must be assigned the Geo Management RBAC rights profile to complete this procedure. For more information about RBAC, see “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

2 Resynchronize the protection group.

This command synchronizes the local Sun Cluster Geographic Edition configuration information on the local cluster with the configuration information retrieved from the partner cluster.

```
# geopg update protectiongroupname
```

protectiongroupname Specifies the name of the protection group

Example 2–23 Resynchronizing a Protection Group

This example resynchronizes a protection group.

```
# geopg update srdpfg
```

Checking the Runtime Status of EMC Symmetrix Remote Data Facility Data Replication

You can obtain an overall view of the status of replication as well as a more detailed runtime status of the EMC Symmetrix Remote Data Facility replication resource groups. The following sections describe the procedures for checking each status.

Displaying an EMC Symmetrix Remote Data Facility Runtime Status Overview

The status of each EMC Symmetrix Remote Data Facility data replication resource indicates the status of replication on a particular device group. The status of all the resources under a protection group are aggregated in the replication status. This replication status is the second component of the protection group state. For more information about the states of protection groups, refer to “Monitoring the Runtime Status of the Sun Cluster Geographic Edition Software” in *Sun Cluster Geographic Edition System Administration Guide*.

To view the overall status of replication, look at the protection group state as described in the following procedure.

▼ How to Check the Overall Runtime Status of Replication

1 Access a node of the cluster where the protection group has been defined.

You must be assigned the Basic Solaris User RBAC rights profile to complete this procedure. For more information about RBAC, see “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

2 Check the runtime status of replication.

```
# geoadm status
```

Refer to the Protection Group section of the output for replication information. The information that is displayed by this command includes the following:

- Whether the local cluster is enabled for partnership participation
- Whether the local cluster is involved in a partnership
- Status of the heartbeat configuration
- Status of the defined protection groups
- Status of current transactions

3 Check the runtime status of data replication for each EMC Symmetrix Remote Data Facility device group.

```
# scstat -g | grep SRDF | grep pgname
```

Refer to the Status and Status Message fields for the data replication device group you want to check.

See Also For more information about these fields, see [Table 2–4](#).

Displaying a Detailed EMC Symmetrix Remote Data Facility Runtime Status

The Sun Cluster Geographic Edition software internally creates and maintains one replication resource group for each protection group. The name of the replication resource group has the following format:

```
# sc_geo_dr-SRDF-protectiongroupname
```

If you add an EMC Symmetrix Remote Data Facility device group to a protection group, Sun Cluster Geographic Edition software creates a resource for each device group. This resource monitors the status of replication for its device group. The name of each resource has the following format:

```
# sc_geo_dr-SRDFprotectiongroupname-srdfdevicegroupname
```

You can monitor the status of replication of this device group by checking the Status and Status Message of this resource. Use the `scstat -g` command to display resource status and the status message.

The following table describes the Status and Status Message values that are returned by the `scstat -g` command when the State of the EMC Symmetrix Remote Data Facility replication resource group is OnLine.

TABLE 2-4 State and Status Messages of an Online EMC Symmetrix Remote Data Facility Replication Resource Group

Status	Status Message
Online	Replicating
Degraded	Suspended
Degraded	SyncInProg
Faulted	Incorrect role
Faulted	Invalid state
Faulted	Partitioned
Faulted	R1 UpdInProg
Faulted	Split
Faulted	Failed over

For more information about these values, refer to the EMC Symmetrix Remote Data Facility documentation.

For more information about the `scstat` command, see the `scstat(1M)` man page.

Migrating Services That Use EMC Symmetrix Remote Data Facility Data Replication

This chapter provides information about migrating services for maintenance or as a result of cluster failure. This chapter contains the following sections:

- “Detecting Cluster Failure on a System That Uses EMC Symmetrix Remote Data Facility Data Replication” on page 59
- “Migrating Services That Use EMC Symmetrix Remote Data Facility Data Replication With a Switchover” on page 60
- “Forcing a Takeover on a System That Uses EMC Symmetrix Remote Data Facility Data Replication” on page 63
- “Recovering Services to a Cluster on a System That Uses EMC Symmetrix Remote Data Facility Replication” on page 65
- “Recovering From a Switchover Failure on a System That Uses EMC Symmetrix Remote Data Facility Replication” on page 74
- “Recovering From an EMC Symmetrix Remote Data Facility Data Replication Error” on page 78

Detecting Cluster Failure on a System That Uses EMC Symmetrix Remote Data Facility Data Replication

This section describes the internal processes that occur when failure is detected on a primary or a secondary cluster.

Detecting Primary Cluster Failure

When the primary cluster for a protection group fails, the secondary cluster in the partnership detects the failure. The cluster that fails might be a member of more than one partnership, resulting in multiple failure detections.

The following actions take place when a primary cluster failure occurs. During a failure, the appropriate protection groups are in the Unknown state on the cluster that failed.

- Heartbeat failure is detected by a partner cluster.
- The heartbeat is activated in emergency mode to verify that the heartbeat loss is not transient and that the primary cluster has failed. The heartbeat remains in the `OnLine` state during this default time-out interval, while the heartbeat mechanism continues to retry the primary cluster.

This query interval is set by using the `Query_interval` heartbeat property. If the heartbeat still fails after the interval you configured, a heartbeat-lost event is generated and logged in the system log. When you use the default interval, the emergency-mode retry behavior might delay heartbeat-loss notification for about nine minutes. Messages are displayed in the graphical user interface (GUI) and in the output of the `geoadm status` command.

For more information about logging, see “Viewing the Sun Cluster Geographic Edition Log Messages” in *Sun Cluster Geographic Edition System Administration Guide*.

- If the partnership is configured for heartbeat-loss notification, then one or both of the following actions occurs:
 - An email is sent to the address that is configured by the `Notification_emailaddr`s property.
 - The script defined in `Notification_actioncmd` is executed.

For more information about configuring heartbeat-loss notification, see “Configuring Heartbeat-Loss Notification” in *Sun Cluster Geographic Edition System Administration Guide*.

Detecting Secondary Cluster Failure

When a secondary cluster for a protection group fails, a cluster in the same partnership detects the failure. The cluster that failed might be a member of more than one partnership, resulting in multiple failure detections.

During failure detection, the following actions take place:

- Heartbeat failure is detected by a partner cluster.
- The heartbeat is activated in emergency mode to verify that the secondary cluster is dead.
- When a failure is confirmed by the Sun Cluster Geographic Edition product, the cluster notifies the administrator. The system detects all protection groups for which the cluster that failed was acting as secondary. The state of the appropriate protection groups is marked `Unknown`.

Migrating Services That Use EMC Symmetrix Remote Data Facility Data Replication With a Switchover

Perform a switchover of an EMC Symmetrix Remote Data Facility protection group when you want to migrate services to the partner cluster in an orderly fashion. Basic Sun Cluster Geographic Edition operations such as `geopg switchover`, perform a `symrdf swap` operation. The `symrdf swap` operation requires more time for static RDF than dynamic RDF. Therefore, you must increase the value of the `timeout` property of the protection group when using static RDF.

A switchover consists of the following:

- Application services are brought offline on the former primary cluster, `cluster-paris`.
For a reminder of which cluster is `cluster-paris`, see “Example Sun Cluster Geographic Edition Cluster Configuration” in *Sun Cluster Geographic Edition System Administration Guide*.
- The data replication role is reversed and now continues to run from the new primary, `cluster-newyork`, to the former primary, `cluster-paris`.
- Application services are brought online on the new primary cluster, `cluster-newyork`.

Note – You cannot perform personality swaps if you are running EMC Symmetrix Remote Data Facility/Asynchronous data replication.

Validations That Occur Before a Switchover

When a switchover is initiated by using the `geogg switchover` command, the data replication subsystem runs several validations on both clusters. The switchover is performed only if the validation step succeeds on both clusters.

First, the replication subsystem checks that the EMC Symmetrix Remote Data Facility device group is in a valid aggregate RDF pair state. Then, it checks that the local device group type on the target primary cluster, `cluster-newyork`, is RDF2. The local device group state is returned by the `symrdf -g device-group-name -query` command. These values correspond to a RDF1 or RDF2 state. The following table describes the EMC Symmetrix Remote Data Facility command that is run on the new primary cluster, `cluster-newyork`.

TABLE 3-1 EMC Symmetrix Remote Data Facility Switchover Validations on the New Primary Cluster

RDF Pair State	EMC Symmetrix Remote Data Facility Switchover Command That Is Run on <code>cluster-newyork</code>
Synchronized	Suspends the RDF link.
R1Updated, Failedover, Suspended	The <code>symrdf swap</code> command switches the role.
Other RDF pair states	No command is run.

Results of a Switchover From a Replication Perspective

After a successful switchover, at the data replication level the roles of the primary and secondary volumes have been switched. The pre-switchover RDF1 volumes become the RDF2 volumes. The pre-switchover RDF2 volumes become the RDF1 volumes. Data replication continues from the new RDF1 volumes to the new RDF2 volumes.

The `Local - role` property of the protection group is also switched regardless of whether the application could be brought online on the new primary cluster as part of the switchover operation. On the cluster on which the protection group had a `Local - role` of `Secondary`, the `Local - role` property of the protection group becomes `Primary`. On the cluster on which the protection group had a `Local - role` of `Primary`, the `Local - role` property of the protection group becomes `Secondary`.

▼ How to Switch Over an EMC Symmetrix Remote Data Facility Protection Group From Primary to Secondary

Before You Begin For a successful switchover, data replication must be active between the primary and the secondary clusters and data volumes on the two clusters must be synchronized.

Before you switch over a protection group from the primary cluster to the secondary cluster, ensure that the following conditions are met:

- The Sun Cluster Geographic Edition software is up and running on the both clusters.
- The secondary cluster is a member of a partnership.
- Both cluster partners can be reached.
- The protection group is in the OK state.



Caution – If you have configured the `Cluster_dgs` property, only applications that belong to the protection group can write to the device groups specified in the `Cluster_dgs` property.

1 Log in to a cluster node.

You must be assigned the Geo Management RBAC rights profile to complete this procedure. For more information about RBAC, see “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

2 Initiate the switchover.

The application resource groups that are a part of the protection group are stopped and started during the switchover.

```
# geopg switchover [-f] -m newprimarycluster protectiongroupname
```

`-f` Forces the command to perform the operation without asking you for confirmation

`-m newprimarycluster` Specifies the name of the cluster that is to be the new primary cluster for the protection group

`protectiongroupname` Specifies the name of the protection group

Example 3-1 Forcing a Switchover From Primary to Secondary

This example performs a switchover to the secondary cluster.

```
# geopg switchover -f -m cluster-newyork srdpfg
```

Forcing a Takeover on a System That Uses EMC Symmetrix Remote Data Facility Data Replication

Perform a takeover when applications need to be brought online on the secondary cluster regardless of whether the data is completely consistent between the primary volume and the secondary volume. The information in this section assumes that the protection group has been started.

The following steps occur after a takeover is initiated:

- If the former primary cluster, `cluster-paris`, can be reached and the protection group is not locked for notification handling or some other reason, the application services are taken offline on the former primary cluster.

For a reminder of which cluster is `cluster-paris`, see “Example Sun Cluster Geographic Edition Cluster Configuration” in *Sun Cluster Geographic Edition System Administration Guide*.

- Data volumes of the former primary cluster, `cluster-paris`, are taken over by the new primary cluster, `cluster-newyork`.

Note – This data might be inconsistent with the original primary volumes. After the takeover, data replication from the new primary cluster, `cluster-newyork`, to the former primary cluster, `cluster-paris`, is stopped.

- Application services are brought online on the new primary cluster, `cluster-newyork`.

For details about the possible conditions of the primary and secondary cluster before and after takeover, see Appendix C, “Takeover Postconditions,” in *Sun Cluster Geographic Edition System Administration Guide*.

This following sections describe the steps you must perform to force a takeover by a secondary cluster.

Validations That Occur Before a Takeover

When a takeover is initiated by using the `geopg takeover` command, the data replication subsystem runs several validations on both clusters. These step are conducted on the original primary cluster only if the primary cluster can be reached. If validation on the original primary cluster fails, the takeover still occurs.

First, the replication subsystem checks that the EMC Symmetrix Remote Data Facility device group is in a valid aggregate RDF pair state. The EMC Symmetrix Remote Data Facility commands that are used for the takeover are described in the following table.

TABLE 3-2 EMC Symmetrix Remote Data Facility Takeover Validations on the New Primary Cluster

Aggregate RDF Pair State	Protection Group Local Role	EMC Symmetrix Remote Data Facility Takeover Commands That Are Run on <code>cluster-newyork</code>
FailedOver	Primary	<pre>symrdf \$option \$dg write_disable r2 symrdf -g dg suspend symrdf \$option \$dg rw_enable r1</pre>
FailedOver	Secondary	No command is run.
Synchronized, Suspended, R1 Updated, Partitioned	All	<code>symrdf -g dg failover</code>

Results of a Takeover From a Replication Perspective

From a replication perspective, after a successful takeover, the `Local - role` property of the protection group is changed to reflect the new role, regardless of whether the application could be brought online on the new primary cluster as part of the takeover operation. On `cluster-newyork`, where the protection group had a `Local - role` of `Secondary`, the `Local - role` property of the protection group becomes `Primary`. On `cluster-paris`, where the protection group had a `Local - role` of `Primary`, the following might occur:

- If the cluster can be reached, the `Local - role` property of the protection group becomes `Secondary`.
- If the cluster cannot be reached, the `Local - role` property of the protection group remains `Primary`.

If the takeover is successful, the applications are brought online. You do not need to run a separate `geopg start` command.



Caution – After a successful takeover, data replication between the new primary cluster, `cluster-newyork`, and the old primary cluster, `cluster-paris`, is stopped. If you want to run a `geopg start` command, you must use the `-n` option to prevent replication from resuming.

▼ How to Force Immediate Takeover of EMC Symmetrix Remote Data Facility Services by a Secondary Cluster

Before You Begin Before you force the secondary cluster to assume the activity of the primary cluster, ensure that the following conditions are met:

- Sun Cluster Geographic Edition software is up and running on the cluster.
- The cluster is a member of a partnership.
- The Configuration status of the protection group is OK on the secondary cluster.

1 Log in to a node in the secondary cluster.

You must be assigned the Geo Management RBAC rights profile to complete this procedure. For more information about RBAC, see “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

2 Initiate the takeover.

```
# geopg takeover [-f] protectiongroupname
```

-f Forces the command to perform the operation without your confirmation

protectiongroupname Specifies the name of the protection group

Example 3–2 Forcing a Takeover by a Secondary Cluster

This example forces the takeover of `srdpfg` by the secondary cluster `cluster-newyork`.

The `phys-newyork-1` cluster is the first node of the secondary cluster. For a reminder of which node is `phys-newyork-1`, see “Example Sun Cluster Geographic Edition Cluster Configuration” in *Sun Cluster Geographic Edition System Administration Guide*.

```
phys-newyork-1# geopg takeover -f srdpfg
```

Next Steps For information about the state of the primary and secondary clusters after a takeover, see Appendix C, “Takeover Postconditions,” in *Sun Cluster Geographic Edition System Administration Guide*.

Recovering Services to a Cluster on a System That Uses EMC Symmetrix Remote Data Facility Replication

After a successful takeover operation, the secondary cluster, `cluster-newyork`, becomes the primary for the protection group and the services are online on the secondary cluster. After the recovery of the original primary cluster, `cluster-paris`, the services can be brought online again on the original primary by using a process called failback.

Sun Cluster Geographic Edition software supports the following two kinds of failback:

- **Failback-switchover.** During a failback-switchover, applications are brought online again on the original primary cluster, `cluster-paris`, after the data of the original primary cluster was resynchronized with the data on the secondary cluster, `cluster-newyork`.

For a reminder of which clusters are `cluster-paris` and `cluster-newyork`, see “Example Sun Cluster Geographic Edition Cluster Configuration” in *Sun Cluster Geographic Edition System Administration Guide*.

- **Failback-takeover.** During a failback-takeover, applications are brought online again on the original primary cluster, `cluster-paris`, and use the current data on the original primary cluster. Any updates that occurred on the secondary cluster, `cluster-newyork`, while it was acting as primary, are discarded.

If you want to leave the new primary, `cluster-newyork`, as the primary cluster and the original primary cluster, `cluster-paris`, as the secondary after the original primary restarts, you can resynchronize and revalidate the protection group configuration without performing a switchover or takeover.

▼ How to Resynchronize and Revalidate the Protection Group Configuration

Use this procedure to resynchronize and revalidate data on the original primary cluster, `cluster-paris`, with the data on the current primary cluster, `cluster-newyork`.

Before You Begin

Before you resynchronize and revalidate the protection group configuration, a takeover has occurred on `cluster-newyork`. The clusters now have the following roles:

- If the original primary cluster, `cluster-paris`, has been down, confirm that the cluster is booted and that the Sun Cluster Geographic Edition infrastructure is enabled on the cluster. For more information about booting a cluster, see “Booting a Cluster” in *Sun Cluster Geographic Edition System Administration Guide*.
- The protection group on `cluster-newyork` has the primary role.
- The protection group on `cluster-paris` has either the primary role or secondary role, depending on whether the protection group could be reached during the takeover.

- 1 **Resynchronize the original primary cluster, `cluster-paris`, with the current primary cluster, `cluster-newyork`.**

`cluster-paris` forfeits its own configuration and replicates the `cluster-newyork` configuration locally. Resynchronize both the partnership and protection group configurations.

- a. **On `cluster-paris`, resynchronize the partnership.**

```
phys-paris-1# geops update partnershipname
```

partnershipname Specifies the name of the partnership

Note – You need to perform this step only once, even if you are resynchronizing multiple protection groups.

For more information about synchronizing partnerships, see “Resynchronizing a Partnership” in *Sun Cluster Geographic Edition System Administration Guide*.

b. On cluster-paris, resynchronize each protection group.

Because the role of the protection group on `cluster-newyork` is primary, this step ensures that the role of the protection group on `cluster-paris` is secondary.

```
phys-paris-1# geopg update protectiongroupname
```

protectiongroupname Specifies the name of the protection group

For more information about synchronizing protection groups, see “Resynchronizing an EMC Symmetrix Remote Data Facility Protection Group” on page 55.

2 On cluster-paris, validate the cluster configuration for each protection group.

```
phys-paris-1# geopg validate protectiongroupname
```

protectiongroupname Specifies a unique name that identifies a single protection group

For more information, see “How to Validate an EMC Symmetrix Remote Data Facility Protection Group” on page 31.

3 On cluster-paris, activate each protection group.

Because the protection group on `cluster-paris` has a role of secondary, the `geopg start` command does not restart the application on `cluster-paris`.

```
phys-paris-1# geopg start -n -e local protectiongroupname
```

`-e local` Specifies the scope of the command.

By specifying a `local` scope, the command operates on the local cluster only.

`-n` Specifies that data replication should not be used for this protection group. If this option is omitted, data replication starts at the same time as the protection group.

protectiongroupname Specifies the name of the protection group.

Because the protection group has a role of secondary, the data is synchronized from the current primary, `cluster-newyork`, to the current secondary, `cluster-paris`.

For more information about the `geopg start` command, see “How to Activate an EMC Symmetrix Remote Data Facility Protection Group” on page 48.

4 Confirm that the protection group configuration is OK.

First, confirm that the state of the protection group on `cluster-newyork` is OK. The protection group has a local state of OK when the EMC Symmetrix Remote Data Facility device groups on `cluster-newyork` have a Synchronized EMC Symmetrix Remote Data Facility pair state.

```
phys-newyork-1# geoadm status
```

Refer to the Protection Group section of the output.

Next, confirm that all resources in the replication resource group, `protectiongroupname-rep-rg`, report a status of OK

```
phys-newyork-1# scstat -g
```

▼ How to Perform a Failback-Switchover on a System That Uses EMC Symmetrix Remote Data Facility Replication

Use this procedure to restart an application on the original primary cluster, `cluster-paris`, after the data on this cluster has been resynchronized with the data on the current primary cluster, `cluster-newyork`.

Note – The failback procedures apply only to clusters in a partnership. You need to perform the following procedure only once per partnership.

Before You Begin

Before you perform a failback-switchover, a takeover has occurred on `cluster-newyork`. The clusters have the following roles:

- If the original primary cluster, `cluster-paris`, has been down, confirm that the cluster is booted and that the Sun Cluster Geographic Edition infrastructure is enabled on the cluster. For more information about booting a cluster, see “Booting a Cluster” in *Sun Cluster Geographic Edition System Administration Guide*.
- The protection group on `cluster-newyork` has the primary role.
- The protection group on `cluster-paris` has either the primary role or secondary role, depending on whether `cluster-paris` can be reached during the takeover from `cluster-newyork`.

1 Resynchronize the original primary cluster, `cluster-paris`, with the current primary cluster, `cluster-newyork`.

`cluster-paris` forfeits its own configuration and replicates the `cluster-newyork` configuration locally. Resynchronize both the partnership and protection group configurations.

a. On `cluster-paris`, resynchronize the partnership.

```
phys-paris-1# geops update partnershipname
```

partnershipname Specifies the name of the partnership

Note – You need to perform this step only once per partnership, even if you are performing a failback-switchover for multiple protection groups in the partnership.

For more information about synchronizing partnerships, see “Resynchronizing a Partnership” in *Sun Cluster Geographic Edition System Administration Guide*.

b. On `cluster-paris`, resynchronize each protection group.

Because the local role of the protection group on `cluster-newyork` is now primary, this step ensures that the role of the protection group on `cluster-paris` becomes secondary.

```
phys-paris-1# geopg update protectiongroupname
```

protectiongroupname Specifies the name of the protection group

For more information about synchronizing protection groups, see “Resynchronizing an EMC Symmetrix Remote Data Facility Protection Group” on page 55.

2 On `cluster-paris`, validate the cluster configuration for each protection group.

Ensure that the protection group is not in an error state. A protection group cannot be started when it is in an error state.

```
phys-paris-1# geopg validate protectiongroupname
```

protectiongroupname Specifies a unique name that identifies a single protection group

For more information, see “How to Validate an EMC Symmetrix Remote Data Facility Protection Group” on page 31.

3 On `cluster-paris`, activate each protection group.

Because the protection group on `cluster-paris` has a role of secondary, the `geopg start` command does not restart the application on `cluster-paris`.

```
phys-paris-1# geopg start -e local protectiongroupname
```

`-e local` Specifies the scope of the command.

By specifying a `local` scope, the command operates on the local cluster only.

protectiongroupname Specifies the name of the protection group.

Note – Do not use the `-n` option when performing a failback-switchover because the data needs to be synchronized from the current primary, `cluster-newyork`, to the current secondary, `cluster-paris`.

Because the protection group has a role of secondary, the data is synchronized from the current primary, `cluster-newyork`, to the current secondary, `cluster-paris`.

For more information about the `geopg start` command, see [“How to Activate an EMC Symmetrix Remote Data Facility Protection Group”](#) on page 48.

4 Confirm that the data is completely synchronized.

The data is completely synchronized when the state of the protection group on `cluster-newyork` is OK. The protection group has a local state of OK when the EMC Symmetrix Remote Data Facility device groups on `cluster-newyork` have a Synchronized RDF pair state.

To confirm that the state of the protection group on `cluster-newyork` is OK, use the following command:

```
phys-newyork-1# geoadm status
```

Refer to the Protection Group section of the output.

5 On either cluster, perform a switchover from `cluster-newyork` to `cluster-paris` for each protection group.

```
# geopg switchover [-f] -m clusterparis protectiongroupname
```

For more information, see [“How to Switch Over an EMC Symmetrix Remote Data Facility Protection Group From Primary to Secondary”](#) on page 62.

`cluster-paris` resumes its original role as primary cluster for the protection group.

6 Ensure that the switchover was performed successfully.

Verify that the protection group is now primary on `cluster-paris` and secondary on `cluster-newyork` and that the state for “Data replication” and “Resource groups” is OK on both clusters.

```
# geoadm status
```

Check the runtime status of application resource group and data replication for each EMC Symmetrix Remote Data Facility protection group.

```
# scstat -g
```

Refer to the Status and Status Message fields that are presented for the data replication device group you want to check. For more information about these fields, see [Table 2-1](#).

For more information about the runtime status of data replication see, [“Checking the Runtime Status of EMC Symmetrix Remote Data Facility Data Replication”](#) on page 56.

▼ How to Perform a Failback-Takeover on a System That Uses EMC Symmetrix Remote Data Facility Replication

Use this procedure to restart an application on the original primary cluster, `cluster-paris` and use the current data on the original primary cluster. Any updates that occurred on the secondary cluster, `cluster-newyork`, while it was acting as primary are discarded.

The failback procedures apply only to clusters in a partnership. You need to perform the following procedure only once per partnership.

Note – To resume using the data on the original primary, `cluster-paris`, you must not have replicated data from the new primary, `cluster-newyork`, to the original primary cluster, `cluster-paris`, at any point after the takeover operation on `cluster-newyork`. To prevent data replication between the new primary and the original primary, you must have used the `-n` option whenever you used the `geopg start` command.

Before You Begin Ensure that the clusters have the following roles:

- If the original primary cluster, `cluster-paris`, has been down, confirm that the cluster is booted and that the Sun Cluster Geographic Edition infrastructure is enabled on the cluster. For more information about booting a cluster, see “Booting a Cluster” in *Sun Cluster Geographic Edition System Administration Guide*.
- The protection group on `cluster-newyork` has the primary role.
- The protection group on `cluster-paris` has either the primary role or secondary role, depending on whether `cluster-paris` can be reached during the takeover from `cluster-newyork`.

1 Resynchronize the original primary cluster, `cluster-paris`, with the original secondary cluster, `cluster-newyork`.

`cluster-paris` forfeits its own configuration and replicates the `cluster-newyork` configuration locally.

a. On `cluster-paris`, resynchronize the partnership.

```
phys-paris-1# geopg update partnershipname
partnershipname    Specifies the name of the partnership
```

Note – You need to perform this step only once per partnership, even if you are performing a failback-takeover for multiple protection groups in the partnership.

For more information about synchronizing partnerships, see “Resynchronizing a Partnership” in *Sun Cluster Geographic Edition System Administration Guide*.

b. On cluster-paris, resynchronize each protection group.

Because the local role of the protection group on cluster-newyork is now primary, this step ensures that the role of the protection group on cluster-paris becomes secondary.

```
phys-paris-1# geopg update protectiongroupname
```

protectiongroupname Specifies the name of the protection group

For more information about resynchronizing protection groups, see [“How to Resynchronize a Protection Group” on page 55.](#)

2 On cluster-paris, validate the configuration for each protection group.

Ensure that the protection group is not in an error state. A protection group cannot be started when it is in an error state.

```
phys-paris-1# geopg validate protectiongroupname
```

protectiongroupname Specifies a unique name that identifies a single protection group

For more information, see [“How to Validate an EMC Symmetrix Remote Data Facility Protection Group” on page 31.](#)

3 On cluster-paris, activate each protection group in the secondary role without data replication.

Because the protection group on cluster-paris has a role of secondary, the `geopg start` command does not restart the application on cluster-paris.

Note – You must use the `-n` option which specifies that data replication should not be used for this protection group. If this option is omitted, data replication starts at the same time as the protection group.

```
phys-paris-1# geopg start -e local -n protectiongroupname
```

`-e local` Specifies the scope of the command.

By specifying a `local` scope, the command operates on the local cluster only.

`-n` Specifies that data replication should not be used for this protection group. If this option is omitted, data replication starts at the same time as the protection group.

protectiongroupname Specifies the name of the protection group

For more information, see [“How to Activate an EMC Symmetrix Remote Data Facility Protection Group” on page 48.](#)

Replication from cluster-newyork to cluster-paris is not started because the `-n` option is used on cluster-paris.

4 On cluster-paris, initiate a takeover for each protection group.

```
phys-paris-1# geopg takeover [-f] protectiongroupname
```

-f Forces the command to perform the operation without your confirmation

protectiongroupname Specifies the name of the protection group

For more information about the `geopg takeover` command, see [“How to Force Immediate Takeover of EMC Symmetrix Remote Data Facility Services by a Secondary Cluster”](#) on page 65.

The protection group on `cluster-paris` now has the primary role, and the protection group on `cluster-newyork` has the role of secondary. The application services are now online on `cluster-paris`.

5 On cluster-newyork, activate each protection group.

At the end of step 4, the local state of the protection group on `cluster-newyork` is `Offline`. To start monitoring the local state of the protection group, you must activate the protection group on `cluster-newyork`.

Because the protection group on `cluster-newyork` has a role of secondary, the `geopg start` command does not restart the application on `cluster-newyork`.

```
phys-newyork-1# geopg start -e local [-n] protectiongroupname
```

-e local Specifies the scope of the command.

By specifying a `local` scope, the command operates on the local cluster only.

-n Prevents the start of data replication at protection group startup.

If you omit this option, the data replication subsystem starts at the same time as the protection group.

protectiongroupname Specifies the name of the protection group.

For more information about the `geopg start` command, see [“How to Activate an EMC Symmetrix Remote Data Facility Protection Group”](#) on page 48.

6 Ensure that the takeover was performed successfully.

Verify that the protection group is now primary on `cluster-paris` and secondary on `cluster-newyork` and that the state for “Data replication” and “Resource groups” is OK on both clusters.

```
# geoadm status
```

Note – If you used the `-n` option in step 5 to prevent data replication from starting, the “Data replication” status will not be in the OK state.

Check the runtime status of application resource group and data replication for each EMC Symmetrix Remote Data Facility protection group.

```
# scstat -g
```

Refer to the Status and Status Message fields that are presented for the data replication device group you want to check. For more information about these fields, see [Table 2-1](#).

For more information about the runtime status of data replication see “[Checking the Runtime Status of EMC Symmetrix Remote Data Facility Data Replication](#)” on page 56.

Recovering From a Switchover Failure on a System That Uses EMC Symmetrix Remote Data Facility Replication

Basic Sun Cluster Geographic Edition operations such as `geopg switchover`, perform a `symrdf swap` operation at the EMC Symmetrix Remote Data Facility data replication level. In EMC Symmetrix Remote Data Facility terminology, a switchover is called a *swap*. The `symrdf swap` operation requires significantly more time for static RDF than dynamic RDF. Therefore, you might need to increase the value of the timeout property of the protection group when using static RDF.

If the `symrdf swap` command returns a value of 0, the switchover is successful. In some cases, the `symrdf swap` command might not be able to perform a swap. In these cases, a return value other than 0 is returned, which is considered a switchover failure.

Any result other than a swap implies that the secondary volumes might not be fully synchronized with the primary volumes. Sun Cluster Geographic Edition software does not start the applications on the new intended primary cluster in a switchover failure scenario.

The remainder of this section describes the initial conditions that lead to a switchover failure and how to recover from a switchover failure.

Switchover Failure Conditions

This section describes a switchover failure scenario. In this scenario, `cluster-paris` is the original primary cluster and `cluster-newyork` is the original secondary cluster.

A switchover switches the services from `cluster-paris` to `cluster-newyork` as follows:

```
phys-newyork-1# geopg switchover -f -m cluster-newyork srdffg
```

While processing the `geopg switchover` command, the `symrdf swap` command runs and returns errors for the EMC Symmetrix Remote Data Facility device group, `devgroup1`. As a result, the `geopg switchover` command returns the following failure message:

```
Processing operation.... this may take a while ....
"Switchover" failed for the following reason:
    Switchover failed for SRDF DG devgroup1
```

After this failure message has been issued, the two clusters are in the following states:

```
cluster-paris:
    srdfpg role: Secondary
cluster-newyork:
    srdfpg role: Secondary
```

```
phys-newyork-1# symdg list
```

D E V I C E G R O U P S							
Name	Type	Valid	Symmetrix ID	Devs	Number of		
					GKs	BCVs	VDEVs
devgroup1	RDF1	Yes	000187401215	2	0	0	0
devgroup2	RDF2	Yes	000187401215	6	0	0	0

Recovering From Switchover Failure

This section describes procedures to recover from the failure scenario described in the previous section. These procedures bring the application online on the appropriate cluster.

1. Place the EMC Symmetrix Remote Data Facility device group, `devgroup1`, in the `Split` state. Use the `symrdf split` commands to place the device groups that are in the protection group on both `cluster-paris` and `cluster-newyork` in the `Split` state.

```
phys-newyork-1# symrdf -g devgroup1 split
```

2. Make one of the clusters `Primary` for the protection group.

Make the original primary cluster, `cluster-paris`, `Primary` for the protection group if you intend to start the application on the original primary cluster. The application uses the current data on the original primary cluster.

Make the original secondary cluster, `cluster-newyork`, `Primary` for the protection group if you intend to start the application on the original secondary cluster. The application uses the current data on the original secondary cluster.



Caution – Because the `symrdf swap` command did not perform a swap, the data volumes on `cluster-newyork` might not be synchronized with the data volumes on `cluster-paris`. If you intend to start the application with the same data as appears on the original primary cluster, you must not make the original secondary cluster `Primary`.

▼ How to Make the Original Primary Cluster Primary for an EMC Symmetrix Remote Data Facility Protection Group

- 1 Deactivate the protection group on the original primary cluster.

```
phys-paris-1# geopg stop -e Local srdffg
```

- 2 Resynchronize the configuration of the protection group.

This command updates the configuration of the protection group on `cluster-paris` with the configuration information of the protection group on `cluster-newyork`.

```
phys-paris-1# geopg update srdffg
```

After the `geopg update` command run successfully, `srdffg` has the following role on each cluster:

```
cluster-paris:
    srdffg role: Primary
cluster-newyork:
    srdffg role: secondary
```

- 3 Run the `symrdf swap` command so that the device group, `devgroup1`, resumes the RDF1 role.

```
phys-paris-1# symrdf -g devgroup1 failover
```

```
phys-paris-1# symrdf -g devgroup1 swap
```

Confirm that the swap was successful by using the `symrdf list` command to view the device group information.

```
phys-paris-1# symdg list
```

Name	Type	Valid	Symmetrix ID	Devs	Number of		
					GKs	BCVs	VDEVs
devgroup1	RDF1	Yes	000187401215	6	0	0	0
devgroup2	RDF1	Yes	000187401215	2	0	0	0

- 4 Activate the protection group on both clusters in the partnership.

```
phys-paris-1# geopg start -e Global srdffg
```

This command starts the application on `cluster-paris`. Data replication starts from `cluster-paris` to `cluster-newyork`.

▼ How to Make the Original Secondary Cluster Primary for an EMC Symmetrix Remote Data Facility Protection Group

1 Resynchronize the configuration of the protection group.

This command updates the configuration of the protection group on `cluster-newyork` with the configuration information of the protection group on `cluster-paris`.

```
phys-newyork-1# geopg update srdfpg
```

After the `geopg update` command runs successfully, `srdfpg` has the following role on each cluster:

```
cluster-paris:
    srdfpg role: Secondary
cluster-newyork:
    srdfpg role: Primary
```

2 Run the `symrdf swap` command so that the device group, `devgroup2`, has the RDF2 role.

```
phys-paris-1# symrdf -g devgroup2 failover
```

```
phys-paris-1# symrdf -g devgroup2 swap
```

Confirm that the swap was successful by using the `symrdf list` command to view the device group information.

```
phys-paris-1# symdg list
```

D E V I C E G R O U P S							
Name	Type	Valid	Symmetrix ID	Devs	Number of		
					GKs	BCVs	VDEVs
devgroup1	RDF2	Yes	000187401215	6	0	0	
devgroup2	RDF2	Yes	000187401215	2	0	0	0

3 Activate the protection group on both clusters in the partnership.

```
phys-newyork-1# geopg start -e Global srdfpg
```

This command starts the application on `cluster-newyork`. Data replication starts from `cluster-newyork` to `cluster-paris`.



Caution – This command overwrites the data on `cluster-paris`.

Recovering From an EMC Symmetrix Remote Data Facility Data Replication Error

When an error occurs at the data replication level, the error is reflected in the status of the resource in the replication resource group of the relevant device group. This changed status appears in the Data Replication status field in the output of the `geoadm status` command for that protection group.

How to Detect Data Replication Errors

You can check the status of the replication resources by using the `scstat -g` command as follows:

```
phys-paris-1# scstat -g
```

For information about how different Resource status values map to actual replication pair states, see [Table 2-4](#).

Running the `scstat -g` command might return the following:

```
...
-- Resources --
           Resource Name           Node Name           State           Status Message
           -----
Resource: sc_geo_dr-SRDF-srdfpg-devgroup1 pemc1 Online Online - Partitioned
Resource: sc_geo_dr-SRDF-srdfpg-devgroup1 pemc2 Offline Offline
...
```

You can see the aggregate resource status for all device groups in the protection group by using the `geoadm status` command. For example, the output of the `scstat -g` command in the preceding example indicates that the EMC Symmetrix Remote Data Facility device group, `devgroup1`, is in the Suspended state on `cluster-paris`. [Table 2-4](#) indicates that the Suspended state corresponds to a resource status of `FAULTED`. So, the data replication state of the protection group is also `FAULTED`. This state is reflected in the output of the `geoadm status` command, which displays the state of the protection group as `Error`.

```
phys-paris-1# geoadm status
Cluster: cluster-paris
```

```
Partnership "paris-newyork-ps" : OK
  Partner clusters           : cluster-newyork
  Synchronization           : OK
  ICRM Connection            : OK
```

```

Heartbeat "paris-to-newyork" monitoring "cluster-newyork": OK
  Heartbeat plug-in "ping_plugin"           : Inactive
  Heartbeat plug-in "tcp_udp_plugin"        : OK

Protection group "srdfpg"   : Error
  Partnership              : paris-newyork-ps
  Synchronization         : OK

Cluster cluster-paris      : Error
  Role                     : Primary
  PG activation state      : Activated
  Configuration           : OK
  Data replication        : Error
  Resource groups         : OK

Cluster cluster-newyork    : Error
  Role                     : Secondary
  PG activation state      : Activated
  Configuration           : OK
  Data replication        : Error
  Resource groups         : OK

Pending Operations
  Protection Group        : "srdfpg"
  Operations              : start

```

▼ How to Recover From an EMC Symmetrix Remote Data Facility Data Replication Error

To recover from an error state, you might perform some or all of the steps in the following procedure.

- 1 Use the procedures in the EMC Symmetrix Remote Data Facility documentation to determine the causes of the FAULTED state. This state is indicated as PSUE.**
- 2 Recover from the faulted state by using the EMC Symmetrix Remote Data Facility procedures.**
If the recovery procedures change the state of the device group, this state is automatically detected by the resource and is reported as a new protection group state.
- 3 Revalidate the protection group configuration.**

```
phys-paris-1# geopg validate protectiongroupname
```

protectiongroupname Specifies the name of the EMC Symmetrix Remote Data Facility protection group

If the `geopg validate` command determines that the configuration is valid, the state of the protection group changes to reflect that fact. If the configuration is not valid, `geopg validate` returns a failure message.

4 Review the status of the protection group configuration.

```
phys-paris-1# geopg list protectiongroupname
```

protectiongroupname Specifies the name of the EMC Symmetrix Remote Data Facility protection group

5 Review the runtime status of the protection group.

```
phys-paris-1# geoadm status
```

Sun Cluster Geographic Edition Properties for EMC Symmetrix Remote Data Facility

This appendix provides the properties of Sun Cluster Geographic Edition data replication device groups.

This appendix contains the following sections:

- “EMC Symmetrix Remote Data Facility Properties” on page 81
- “EMC Symmetrix Remote Data Facility Properties That Must Not Be Changed” on page 82

EMC Symmetrix Remote Data Facility Properties

The following table describes the EMC Symmetrix Remote Data Facility properties that the Sun Cluster Geographic Edition software defines.

TABLE A-1 EMC Symmetrix Remote Data Facility Properties

Property	Description
Data Replication Property: Cluster_dgs (string array)	Lists the Sun Cluster device groups where the data is written. The list is comma delimited. Only applications that belong to the protection group should write to these device groups. Tuning recommendations: This property can only be tuned when the protection group is offline. Category: Optional Default: Empty

TABLE A-1 EMC Symmetrix Remote Data Facility Properties (Continued)

Property	Description
Data Replication Property: NodeList (string array)	Lists the host names of the machines that can be primary for the replication mechanism. This list is comma delimited. Tuning recommendations: This property can be tuned at any time. Category: Optional Default: All nodes in the cluster
Device Group Property: DG_or_CG (string)	Specifies if the device group is an EMC Symmetrix Remote Data Facility device group or a EMC Symmetrix Remote Data Facility consistency group. Tuning recommendations: This property must be set to DG. Category: Required Default: DG
Device Group Property: R1_SID (string)	Specifies the primary (RDF1) EMC Symmetrix ID of the EMC Symmetrix devices. Tuning recommendations: You can tune this property at any time. Category: Required Default: None, until you add a Symmetrix Remote Data Facility device group.
Device Group Property: R2_SID (string)	Specifies the secondary (RDF2) EMC Symmetrix ID of the EMC Symmetrix devices. Tuning recommendations: You can tune this property at any time. Category: Required Default: None, until you add a Symmetrix Remote Data Facility device group.

EMC Symmetrix Remote Data Facility Properties That Must Not Be Changed

The Sun Cluster Geographic Edition software internally changes some properties for the SUNWscgrepsrdf resource. Therefore, you must not edit these properties manually.

For EMC Symmetrix Remote Data Facility, do not edit the following properties:

- DG_or_CG – Defines the EMC Symmetrix Remote Data Facility device group that contains the volumes that are being replicated.
- R1_SID – Defines the local data replication role.

- R2_SID – Defines the local data replication role.
- SRDF_group
- Replication_role

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