Sun Cluster Geographic Edition Reference Manual

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Preface

The *Sun Cluster Geographic Edition System Reference Manual* provides reference information for commands, functions, and other public interfaces in Sun™ Cluster Geographic Edition software. This book is intended for experienced system administrators with extensive knowledge of Sun software and hardware. This book is not to be used as a planning or presales guide. The information in this book assumes knowledge of the Solaris™ Operating System (Solaris OS) and expertise with the volume manager software that is used with Sun Cluster software.

Both novice users and those familiar with the Solaris OS can use online man pages to obtain information about their SPARC® based system and its features.

A man page is intended to answer concisely the question "What does this command do?" The man pages in general comprise a reference manual. They are not intended to be a tutorial.

How the Reference Manual Is Organized

The following contains a brief description of each man page section and the information it references:

- Section 1 describes, in alphabetical order, commands available with the operating system.
- Section 1M describes, in alphabetical order, commands that are used chiefly for system maintenance and administration purposes.
- Section 2 describes all of the system calls. Most of these calls have one or more error returns. An error condition is indicated by an otherwise impossible returned value.
- Section 3 describes functions found in various libraries, other than those functions that directly call UNIX® system primitives, which are described in Section 2.
- Section 4 outlines the formats of various files. The C structure declarations for the file formats are given where applicable.
- Section 5 contains miscellaneous documentation such as character-set tables.
- Section 6 contains available games and demos.
- Section 7 describes various special files that refer to specific hardware peripherals and device drivers. STREAMS software drivers, modules, and the STREAMS-generic set of system calls are also described.

- Section 9 provides reference information that is needed to write device drivers in the kernel environment. This section describes two device driver interface specifications: the Device Driver Interface (DDI) and the Driver/Kernel Interface (DKI).
- Section 9E describes the DDI/DKI, DDI-only, and DKI-only entry-point routines a developer can include in a device driver.
- Section 9F describes the kernel functions available for use by device drivers.
- Section 9S describes the data structures that drivers use to share information between the driver and the kernel.

The following is a generic format for man pages. The man pages of each manual section generally follow this order, but include only needed headings. For example, if no bugs can be reported, no BUGS section is included. See the `intro` pages for more information and detail about each section, and `man`(1) for general information about man pages.

NAME — This section gives the names of the commands or functions that are documented, followed by a brief description of what they do.

SYNOPSIS — This section shows the syntax of commands or functions. If a command or file does not exist in the standard path, its full path name is shown. Options and arguments are alphabetized, with single-letter arguments first, and options with arguments next, unless a different argument order is required.

The following special characters are used in this section:

[ ]	Brackets. The option or argument that is enclosed in these brackets is optional. If the brackets are omitted, the argument must be specified.
. . .	Ellipses. Several values can be provided for the previous argument, or the previous argument can be specified multiple times, for example, "`filename` . . .".
|	Separator. Only one of the arguments separated by this character can be specified at a time.
{ }	Braces. The options and/or arguments enclosed within braces are interdependent. All characters within braces must be treated as a unit.

PROTOCOL — This section occurs only in subsection 3R and indicates the protocol description file.

DESCRIPTION — This section defines the functionality and behavior of the service. Thus it describes concisely what the command does. DESCRIPTION does not discuss OPTIONS or cite EXAMPLES. Interactive commands, subcommands, requests, macros, and functions are described under USAGE.

IOCTL	This section appears on pages in Section 7 only. Only the device class that supplies appropriate parameters to the `ioctl`(2) system call is called `ioctl` and generates its own heading. `ioctl` calls for a specific device are listed alphabetically (on the man page for that specific device). `ioctl` calls are used for a particular class of devices. All these calls have an `io` ending, such as `mtio`(7I).
OPTIONS	This section lists the command options with a concise summary of what each option does. The options are listed literally and in the order in which they appear in the SYNOPSIS section. Possible arguments to options are discussed under the option, and where appropriate, default values are supplied.
OPERANDS	This section lists the command operands and describes how they affect the actions of the command.
OUTPUT	This section describes the output—standard output, standard error, or output files—generated by the command.
RETURN VALUES	If the man page documents functions that return values, this section lists these values and describes the conditions under which they are returned. If a function can return only constant values, such as 0 or –1, these values are listed in tagged paragraphs. Otherwise, a single paragraph describes the return values of each function. Functions that are declared void do not return values, so they are not discussed in RETURN VALUES.
ERRORS	On failure, most functions place an error code in the global variable `errno` that indicates why they failed. This section lists alphabetically all error codes a function can generate and describes the conditions that cause each error. When more than one condition can cause the same error, each condition is described in a separate paragraph under the error code.
USAGE	This section lists special rules, features, and commands that require in-depth explanations. The subsections that are listed here are used to explain built-in functionality: Commands Modifiers Variables Expressions Input Grammar
EXAMPLES	This section provides examples of usage or of how to use a command or function. Wherever possible, a complete example, which includes command-line entry and machine response, is

	shown. Whenever an example is given, the prompt is shown as `example%`, or if the user must be superuser, `example#`. Examples are followed by explanations, variable substitution rules, or returned values. Most examples illustrate concepts from the SYNOPSIS, DESCRIPTION, OPTIONS, and USAGE sections.
ENVIRONMENT VARIABLES	This section lists any environment variables that the command or function affects, followed by a brief description of the effect.
EXIT STATUS	This section lists the values the command returns to the calling program or shell and the conditions that cause these values to be returned. Usually, zero is returned for successful completion, and values other than zero are returned for various error conditions.
FILES	This section lists all file names that are referred to by the man page, files of interest, and files created or required by commands. Each file name is followed by a descriptive summary or explanation.
ATTRIBUTES	This section lists characteristics of commands, utilities, and device drivers by defining the attribute type and its corresponding value. See `attributes`(5) for more information.
SEE ALSO	This section lists references to other man pages, Sun documentation, and third-party publications.
DIAGNOSTICS	This section lists diagnostic messages with a brief explanation of the condition that caused the error.
WARNINGS	This section lists warnings about special conditions that could seriously affect your working conditions. WARNINGS is not a list of diagnostics.
NOTES	This section lists additional information that does not belong elsewhere on the page. NOTES covers points of special interest to the user. Critical information is never covered here.
BUGS	This section describes known bugs and, wherever possible, suggests workarounds.

REFERENCE

SC311m

Name geoadm – enable or disable the Sun Cluster Geographic Edition infrastructure on the local cluster

Synopsis

```
/usr/cluster/bin/geoadm [subcommand] -?

/usr/cluster/bin/geoadm -V

/usr/cluster/bin/geoadm show

/usr/cluster/bin/geoadm start

/usr/cluster/bin/geoadm status

/usr/cluster/bin/geoadm stop [-f | -i ]
```

Description The `geoadm` command enables or disables the Sun Cluster Geographic Edition infrastructure on the local cluster. You can also use this command to check whether the Sun Cluster Geographic Edition software is enabled on the cluster.

After installation, the Sun Cluster Geographic Edition product must be enabled by running the command `geoadm start`. This command enables the cluster to participate in partnerships and to host protection groups. The `geoadm start` command configures the highly available infrastructure that unlocks the Sun Cluster Geographic Edition module on the cluster.

The `geoadm stop` command stops the highly available infrastructure that leaves the Sun Cluster Geographic Edition module locked on the cluster. Run the `geoadm stop` command before you remove product packages.

Note – The `geoadm stop` command can successfully disable the Sun Cluster Geographic Edition module on a cluster only under one condition. All local states of the protection groups in which the cluster is involved must be `Offline` or `Unknown`.

Running the `geoadm start` or the `geoadm stop` command on one node of the cluster affects the entire cluster.

To use the `geoadm` command to enable or disable the Sun Cluster Geographic Edition infrastructure, you must be assigned the proper role-based access control (RBAC) rights profile.

If you have root access, you have permissions to perform any operation. If you do not have root access, the following RBAC rights apply:

- **Basic Solaris User.** You can read information about Sun Cluster Geographic Edition entities by running commands such as `geopg list`, `geohb list`, and `geops list`.
- **Geo Management.** You can perform all the read operations that someone with Basic Solaris User access can perform. You can also perform administrative and configuration tasks such as `geohb create`, `geopg switchover`, `geoadm start`, and `geoadm stop`.

For more information, see the `rbac`(5) man page and "Sun Cluster Geographic Edition Software and RBAC" in *Sun Cluster Geographic Edition System Administration Guide*.

The general form of this command is as follows:

`geoadm` [*subcommand*] [*options*] [*operands*]

You can omit *subcommand* only if *options* specifies the option `-?`, `-o`, `-V`, or `-v`.

Each option of this command has a long form and a short form. Both forms of each option are given with the description of the option in the OPTIONS section of this man page.

Subcommands The following subcommands are supported:

`show`
Display whether the Sun Cluster Geographic Edition software is enabled on the cluster.

`start`
Configure and enable the Sun Cluster Geographic Edition infrastructure on the cluster.

`status`
Display the runtime status of the Sun Cluster Geographic Edition entities on the local cluster.

The Sun Cluster Geographic Edition software must be installed on the local cluster before you can run the `status` subcommand. You can run the `status` subcommand whether or not the cluster has been enabled for partnership.

The `status` subcommand displays the following information:

- Whether the local cluster is enabled for partnership.
- Whether the local cluster is involved in a partnership. If the cluster is involved in a partnership, the `status` subcommand lists all partnership members.
- Heartbeat status.
- Protection group status.
- Status of ongoing transactions.

See the EXTENDED DESCRIPTION section for details about the possible values for each status.

`stop`
Disable the Sun Cluster Geographic Edition infrastructure and configuration on the cluster.

Caution – All protection groups on the cluster must be in the `Offline` state to run the `stop` subcommand successfully.

The `stop` subcommand removes the cluster state and Sun Cluster Geographic Edition infrastructure resource groups on the cluster, but the `stop` subcommand does not remove data replication resource groups.

The Sun Cluster Geographic Edition infrastructure is enabled and configured again the first time you run the `start` subcommand after running the `stop` subcommand.

Options The following options are supported:

`-?`
`--help`
Displays help information. When this option is used, no other processing is performed.

You can specify this option without a subcommand or with a subcommand.

If you specify this option without a subcommand, the list of subcommands for this command is displayed.

If you specify this option with a subcommand, the usage options for the subcommand are displayed.

The question mark might be interpreted as a special character by some shells. Use quotes (`-"?"`) or an escape character to avoid pattern matching.

`-f`
`--force`
Indicates that you want to bypass the command confirmation questions while the Sun Cluster Geographic Edition infrastructure is being disabled.

`-i`
`--interactive`
Indicates that you want to display the interactive command confirmation questions while the Sun Cluster Geographic Edition infrastructure is being disabled.

`-V`
`--version`
Displays the version of the command.

Do not specify this option with subcommands, operands, or other options. The subcommands, operands, or other options are ignored. The `-V` option only displays the version of the command. No other operations are performed.

Extended Description

The following sections list the status descriptions.

Partnership Status

Partnership status displays status for the local cluster only. The partnership status can be one of the following:

OK	The partner clusters are connected.
Error	The partner clusters are disconnected.

Synchronization Status

Synchronization status displays status for all the clusters in a partnership. The partnership synchronization status can be one of the following:

OK	The configuration is synchronized between partner clusters.
Error	The configuration on the partner clusters is different. You must synchronize the partnership again.
Mismatch	The partner clusters have been configured individually. Therefore, you must remove the configuration on one cluster and copy the configuration of the partner cluster.
Unknown	Information is not accessible because the partners are disconnected.

Intercluster Resource Management Connection Status

Intercluster Resource Management (ICRM) Connection status displays status for the cluster management agent that is running on the remote cluster. The ICRM connection status can be one of the following:

OK	The ICRM module on each of the partner clusters can communicate with each other.
Error	The ICRM module on the local cluster is unable to communicate with the ICRM module on the remote cluster.

Heartbeat Status

Heartbeat status displays status for the local cluster only. The heartbeat status can be one of the following:

OK	Heartbeat monitoring is enabled, and the partner cluster is responding within timeout and retry periods.
Error	Heartbeat monitoring is running, but the partner cluster is not responding and retries have timed out.
Offline	Heartbeat monitoring is offline.

Heartbeat Plug-in Status

Heartbeat plug-in status displays status for the local cluster only. The heartbeat plug-in status can be one of the following:

OK	The partner cluster is responding.
Inactive	The plug-in is not in use. It is a standby plug-in that is used for retrying if other plug-ins do not respond.
No-Response	The partner cluster is not responding.

Protection Group Status

Protection group status displays the overall status for all the clusters in the protection group. The overall protection group status can be one of the following:

OK	The protection group is online, application resource groups are online, and data replication is running.
Offline	The protection group is inactive.
Degraded	The protection group and the application resource groups are online, but data replication is either not running or is in a partial error state.
Error	The protection group is online, but at least one component of the partnership, such as configuration, data replication, or resource groups, is in an error state.
Unknown	The protection group is online, but the status for at least one component of the partnership, such as configuration, data replication, or resource groups, is unknown.

Configuration Status

The configuration status of a protection group displays the status for a single cluster only. The configuration status of a protection group can be one of the following:

OK	The protection group configuration has been validated without errors on the cluster.
Error	The validation of the protection group configuration resulted in an error. You must validate the protection group again.
Unknown	Information is not accessible because the partner clusters are disconnected.

Data Replication Status

Data replication status displays the status of data replication that has been configured for the protection group on a single cluster. The data replication status of a protection group can be one of the following:

OK	Data replication is configured, online, and running without errors.
Degraded	Data replication is either off or in a partial error state.
Error	Data replication is not operating because of an error.
None	Data replication has not been configured.
Unknown	Information is not accessible because the partners are disconnected.

Resource Groups Status

Resource group status displays the status of resource groups that have been configured for the protection group on a single cluster. The resource group status of a protection group can be one of the following:

OK	All resource groups are online on the primary cluster, and all resource groups are offline or unmanaged on the secondary cluster.
Error	Not all resource groups are online on the primary cluster, or not all resource groups are offline or unmanaged on the secondary cluster.
Unknown	Information is not accessible because the partners are disconnected.

Exit Status

The following exit values are returned:

`0`	The command completed successfully.
nonzero	An error has occurred.

Examples

EXAMPLE 1 Enabling the Sun Cluster Geographic Edition Infrastructure

The following `geoadm` command enables the Sun Cluster Geographic Edition control module on the local cluster.

```
# geoadm start
```

EXAMPLE 2 Disabling the Sun Cluster Geographic Edition Infrastructure

The following `geoadm` command removes the infrastructure resource groups that were created when you enabled the Sun Cluster Geographic Edition infrastructure.

```
# geoadm stop
```

EXAMPLE 3 Checking the Status of the Sun Cluster Geographic Edition Infrastructure

The following `geoadm` command displays whether the Sun Cluster Geographic Edition infrastructure is enabled on the local cluster and, if enable, the nodes on which the infrastructure is active.

```
# geoadm show
--- CLUSTER LEVEL INFORMATION ---
Sun Cluster Geographic Edition is active on:
node phys-paris-2, cluster cluster-paris

Command execution successful
#
```

EXAMPLE 4 Monitoring the Runtime Status of the Sun Cluster Geographic Edition Software

The following `geoadm` command displays the runtime status of the local Sun Cluster Geographic Edition enabled cluster.

```
# 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 "tcpg"     : OK
   Partnership              : "paris-newyork-ps"
   Synchronization          : OK

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

  Cluster cluster-newyork   : OK
     Role                   : Secondary
     PG activation state    : Activated
     Configuration          : OK
     Data replication       : OK
```

EXAMPLE 4 Monitoring the Runtime Status of the Sun Cluster Geographic Edition Software *(Continued)*

```
     Resource groups        : OK

Pending operations
Protection group "tcpg" : Start
```

Attributes

See `attributes`(5) for descriptions of the following attributes.

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Architecture	SPARC
Availability	SUNWscgctl
Interface Stability	Evolving

See Also

`rbac`(5), `geohb`(1M), `geopg`(1M), `geops`(1M)

Name geohb – configure and manage the heartbeat mechanism

Synopsis

```
/usr/cluster/bin/geohb -?

/usr/cluster/bin/geohb -V

/usr/cluster/bin/geohb add-plugin pluginname heartbeatname -p property [-p...]

/usr/cluster/bin/geohb create heartbeatname -r clusterlist [-p property] [-p...]

/usr/cluster/bin/geohb delete heartbeatname

/usr/cluster/bin/geohb list heartbeatname ...

/usr/cluster/bin/geohb modify-plugin -p property [-p...] pluginname heartbeatname

/usr/cluster/bin/geohb remove-plugin pluginname heartbeatname

/usr/cluster/bin/geohb set-prop [-p property] [-p...] heartbeatname ...
```

Description The `geohb` command enables you to configure and manage the heartbeat mechanism.

A heartbeat is a monitor between two clusters: a requester cluster and a responder cluster. Creating a partnership establishes two heartbeats, one in each direction. For example, a partnership between a primary cluster, `cluster-paris`, and a secondary cluster, `cluster-newyork`, contains two heartbeats. One heartbeat has `cluster-paris` as the requester and `cluster-newyork` as the responder. The other heartbeat has `cluster-newyork` as the requester and `cluster-newyork` as the responder.

The Sun Cluster Geographic Edition software provides a default heartbeat mechanism that is based on the TCP/UDP plug-in as the primary plug-in and the ping plug-in as backup. The `geohb` command enables you to configure and maintain heartbeats. You can perform the following tasks:

- Configuring a heartbeat between clusters that participate in a partnership. Configuring a heartbeat includes the configuration of associated plug-ins.
- Creating or deleting a heartbeat property.
- Adding, modifying, and removing plug-ins that are associated with a heartbeat.
- Retrieving the current configuration of a heartbeat and its associated plug-ins.

Run the `geohb` command on a cluster that has been enabled for partnership.

To run the `geohb` command to configure and manage the heartbeat mechanism, you must be assigned the proper role-based access control (RBAC) rights profile.

If you have root access, you have permissions to perform any operation. If you do not have root access, the following RBAC rights apply:

- **Basic Solaris User.** You can read information about Sun Cluster Geographic Edition entities by running commands such as `geopg list`, `geohb list`, and `geops list`.
- **Geo Management.** You can perform all the read operations that someone with Basic Solaris User access can perform. You can also perform administrative and configuration tasks such as `geohb create`, `geopg switchover`, `geoadm start`, and `geoadm stop`.

For more information, see the `rbac`(5) man page and "Sun Cluster Geographic Edition Software and RBAC" in *Sun Cluster Geographic Edition System Administration Guide*.

The general form of this command is as follows:

`geohb` [*subcommand*] [*options*] [*operands*]

You can omit *subcommand* only if *options* specifies the option `-?`, `-o`, `-V`, or `-v`.

Each option of this command has a long form and a short form. Both forms of each option are given with the description of the option in the OPTIONS section of this man page.

Subcommands

The following subcommands are supported:

`add-plugin`
Add a plug-in to an existing heartbeat. If you specify a custom plug-in, you must also specify the path to your custom plug-in command by using the `Query_cmd` property.

`create`
Create a heartbeat. You can monitor heartbeat status by running the `geoadm`(1M) command. You must configure the remote cluster to make the heartbeat operational.

Note – If you create a custom heartbeat, you must add at least one plug-in to prevent the partnership from remaining in degraded mode.

`delete`
Delete a heartbeat.

`list`
Display existing configuration information.

`modify-plugin`
Modify heartbeat plug-in properties.

`remove-plugin`
Remove a plug-in from a heartbeat.

`set-prop`
Modify heartbeat properties.

Options

The following options are supported:

`-?`
`--help`
Displays help information. When this option is used, no other processing is performed.

You can specify this option without a subcommand or with a subcommand.

If you specify this option without a subcommand, the list of subcommands for this command is displayed.

If you specify this option with a subcommand, the usage options for the subcommand are displayed.

The question mark might be interpreted as a special character by some shells. Use quotes (`-"?"`) or an escape character to avoid pattern matching.

`-p` *property*
`--property` *property*
Specifies the properties of a heartbeat or heartbeat plug-in.

A heartbeat property is assigned a value by using a *name*=*statement* pair. Multiple properties might be set at one time by using multiple statements.

The values for these properties are assigned at creation and tunable at runtime.

See the EXTENDED DESCRIPTION section for currently defined properties.

`-r` *clusterlist*
`--remote-cluster` *clusterlist*
Specifies the name of a remote cluster with which the local cluster should establish heartbeat monitoring.

`-V`
`--version`
Displays the version of the command.

Do not specify this option with subcommands, operands, or other options. The subcommands, operands, or other options are ignored. The `-V` option only displays the version of the command. No other operations are performed.

Operands The following operands are supported:

heartbeatname
Specifies an identifier for the heartbeat on the local cluster. If you are trying to create a new heartbeat, and the specified identifier already exists, the `geohb create` command fails.

pluginname
Specifies the name of the heartbeat plug-in.

Extended Description The following sections list the heartbeat and heartbeat plug-in properties.

Heartbeat Properties You can specify the following heartbeat property:

`Query_interval`
Specifies the frequency between heartbeat status requests in seconds. The plug-in enters emergency mode if three `Query_interval` periods pass without response. The plug-in times out and enters error mode if a further `Query_interval` period passes with no response.

Optional property.

Type: Integer.

Tuning recommendations: The value of this property is assigned at creation and tunable at runtime.

Default value: 120 seconds.

Heartbeat Plug-in Properties

Heartbeat plug-in properties determine how a heartbeat functions.

`Plugin_properties`
Specifies a property string that is specific to the plug-in.

Optional property.

Type: String.

Tuning recommendations: The value of this property is assigned at creation and tunable at runtime.

Default value: None, except for heartbeats that use the default heartbeat plug-ins, `tcp_udp_plugin` and `ping-plugin`.

For the `tcp_udp_plugin` plug-in, the format of this string is predefined as *remote_IP_address*`/UDP/2084[/ipsec],`*remote_IP_address*`/TCP/2084[/ipsec]`. The *remote_IP_address* argument specifies the IP address of the partner cluster. The optional `/ipsec` string indicates that the plug-in uses IPsec.

For the `ping-plugin`, the format of this string is predefined as *remote_IP_address*, where *remote_IP_address* specifies the IP address of the partner cluster.

`Query_cmd`
Specifies the path to the command for a heartbeat status request.

Required property if the plug-in does not specify a predefined plug-in.

Type: String.

Tuning recommendations: The value of this property is assigned at creation and tunable at runtime.

Default value: None.

`Requester_agent`
Specifies the absolute path to requester agent.

Optional property.

Type: String.

Tuning recommendations: The value of this property for the default plug-in should not be tuned except for testing purposes.

Default value: None.

`Responder_agent`
Specifies the absolute path to the responder agent.

Optional property.

Type: String.

Tuning recommendations: The value of this property for the default plug-in should not be tuned except for testing purposes.

Default value: None.

`Type`
Specifies the type of plug-in. Set to either `Primary` or `Backup`.

Required property.

Type: Enum.

Tuning recommendations: The value of this property is assigned at creation and tunable at runtime.

Default value: None, except for heartbeats with default heartbeat name `ping_plugin`. In this case, the default value is `Backup`.

Exit Status

The following exit values are returned:

`0`	The command completed successfully, indicating that the remote cluster is alive.
nonzero	An error has occurred, meaning that the remote cluster did not respond to the heartbeat check.

Examples

EXAMPLE 1 Creating a Heartbeat

The following `geohb` command creates a heartbeat that is named `paris-to-newyork`, which communicates between the local cluster and the cluster `cluster-newyork`.

```
# geohb create paris-to-newyork -r cluster-newyork
```

EXAMPLE 2 Creating a Heartbeat Plug-in

The following `geohb` command creates a heartbeat plug-in that is named `command1` for the heartbeat `paris-to-newyork`.

```
# geohb add-plugin command1 paris-to-newyork -p Query_cmd=/usr/bin/hb/
```

EXAMPLE 3 Modifying a Heartbeat

The following `geohb` command modifies the properties for the default heartbeat between `cluster-paris` and `cluster-newyork`.

```
# geohb set-prop -p Query_interval=60 hb_cluster-paris~cluster-newyork
```

EXAMPLE 4 Modifying a Heartbeat Plug-in

The following `geohb` command modifies the properties of the default TCP/UDP plug-in, `tcp_udp_plugin`, to use only TCP.

```
# geohb modify-plugin -p Plugin_properties=paris-cluster/TCP/2084 \
tcp_udp_plugin hb_cluster-paris~cluster-newyork
```

EXAMPLE 5 Deleting a Plug-in From a Heartbeat

The following `geohb` command deletes the plug-in that is named `command1`, from the heartbeat that is named `paris-to-newyork`.

```
# geohb remove-plugin command1 paris-to-newyork
```

Attributes

See `attributes`(5) for descriptions of the following attributes.

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Architecture	SPARC
Availability	SUNWscgctl
Interface Stability	Evolving

See Also

`rbac`(5), `geops`(1M)

Name geopg – create or manage protection groups

Synopsis

/usr/cluster/bin/geopg -?

/usr/cluster/bin/geopg -V

/usr/cluster/bin/geopg add-device-group -p *property* [-p...] *devicegroupname* *protectiongroupname*

/usr/cluster/bin/geopg add-resource-group *resourcegroup* [,*resourcegroup*...] *protectiongroupname*

/usr/cluster/bin/geopg create *protectiongroupname* -s *partnershipname* -o *localrole* [-d *datareplicationtype*] [-p *property*] [-p...]

/usr/cluster/bin/geopg delete *protectiongroupname*

/usr/cluster/bin/geopg get [*protectiongroupname*] -s *partnershipname*

/usr/cluster/bin/geopg list [*protectiongroupname*] [...]

/usr/cluster/bin/geopg modify-device-group *devicegroupname protectiongroupname* -p *property* [-p...]

/usr/cluster/bin/geopg remove-device-group *devicegroupname protectiongroupname*

/usr/cluster/bin/geopg remove-resource-group *resourcegroup* [,*resourcegroup*...] *protectiongroupname*

/usr/cluster/bin/geopg set-prop *protectiongroupname* -p *property* [-p...]

/usr/cluster/bin/geopg start *protectiongroupname* -e [[local] | [global]] [-n]

/usr/cluster/bin/geopg stop *protectiongroupname* -e [[local] | [global]] [-D]

/usr/cluster/bin/geopg switchover -m *newprimaryclustername protectiongroupname* [-f]

/usr/cluster/bin/geopg takeover [-f] *protectiongroupname*

/usr/cluster/bin/geopg update *protectiongroupname*

/usr/cluster/bin/geopg validate *protectiongroupname*

Description The geopg command enables you to configure and maintain protection groups. You can perform the following tasks:

- Configuring a protection group between clusters that participate in a partnership. This task includes the configuration of associated data replication parameters.
- Adding or removing resource groups and data-replication disk device groups.
- Adding, modifying, and removing data replication parameters that are associated with a protection group property.
- Retrieving the current configuration of a specific protection group or all defined protection groups.
- Activating a protection group.

- Deactivating a protection group.
- Switching over the role of a protection group.
- Taking over the primary role of a protection group.

Before you can create a protection group, the clusters that will be hosting the protection group must already be in a partnership.

To run the `geopg` command to create, modify, or delete a protection group, or a data-replication disk device group, you must be assigned the proper role-based access control (RBAC) rights profile.

If you have root access, you have permissions to perform any operation. If you do not have root access, the following RBAC rights apply:

- **Basic Solaris User.** You can read information about Sun Cluster Geographic Edition entities by running commands such as `geopg list`, `geohb list`, and `geops list`.
- **Geo Management.** You can perform all the read operations that someone with Basic Solaris User access can perform. You can also perform administrative and configuration tasks such as `geohb create`, `geopg switchover`, `geoadm start`, and `geoadm stop`.

For more information, see the `rbac`(5) man page and "Sun Cluster Geographic Edition Software and RBAC" in *Sun Cluster Geographic Edition System Administration Guide*.

The general form of this command is as follows:

`geopg` [*subcommand*] [*options*] [*operands*]

You can omit *subcommand* only if *options* specifies the option `-?`, `-o`, `-V`, or `-v`.

Each option of this command has a long form and a short form. Both forms of each option are given with the description of the option in the OPTIONS section of this man page.

Subcommands

The following subcommands are supported:

`add-device-group`
Enable a data-replication disk device group to be part of a protection group.

`add-resource-group`
Enable an application resource group to be part of a protection group.

If a protection group is online when you add a resource group, the resource group must be in either the `unmanaged` or `online` state. To start an unmanaged resource group, run the `geopg start` command.

If a protection group is offline, the resource group must be in the `unmanaged` state when you add the resource group. If the resource group is offline, bring the resource group to the `unmanaged` state before adding the resource group to an offline protection group.

`create`
Create a protection group within an existing partnership.

When you create a protection group, the management module updates the local configuration and notifies remote clusters of configuration changes.

`delete`
Delete a protection group.

`get`
Create the local configuration for a protection group that already exists on the remote partner cluster by retrieving the configuration from the partner cluster. If you do not specify a protection group name, then the all the protection groups that have been configured for the partnership on the remote cluster will be created on the local cluster.

`list`
Display the following information about the protection group:

- Defined protection groups
- Resource groups that are wrapped into protection groups
- Operation status information

If you do not specify the name of a protection group, then the `list` subcommand displays information for all the protection groups configured on the local cluster.

`modify-device-group`
Modify the properties of a data-replication disk device group.

`remove-device-group`
Remove data-replication disk device groups from a protection group.

Removing a data-replication device group does not stop data replication or change the data-replication status for that data-replication device group.

`remove-resource-group`
Remove resource groups from a protection group.

Removing an application resource group does not change the application resource group to the `unmanaged` state.

`set-prop`
Modify the properties of a protection group.

`start`
Start a protection group. When you start a protection group, the role of the protection group on a cluster is the role that was assigned to the protection group when you created the protection group.

The `start` subcommand runs the `scswitch -Z -g` *resourcegroups* command to bring resources and resource groups under the management of the protection group. For more information about running this command, see the `scswitch`(1M) man page.

You can start a protection group on the following levels:

- On all clusters where the protection group has been configured.

- Only on the primary cluster of the protection group. The secondary cluster remains inactive.
- Only on the secondary cluster of the protection group, after the primary cluster has been activated.

Starting a protection group enables the following events to occur:

- The protection group configuration can be validated.
- Clusters can determine whether an operation has been completed.
- Data replication can be started.
- Protected applications can be started.
- If the partner can be reached, the partner cluster can be notified of the protection group activation.

`stop`
Stop a protection group. You can stop a protection group on the following levels:

- On all clusters where the protection group has been configured.
- On the primary cluster of the protection group only. The secondary cluster remains active.
- On the secondary cluster of the protection group only, after the primary cluster has been deactivated.

Stopping a protection group enables the following events to occur:

- The protection group goes offline.
- Depending on the data replication you are using, data replication stops.
- Protected applications stop.
- If the partner cluster is reachable, the partner cluster is notified that the protection group has been stopped.

`switchover`
Switch the assigned role of a cluster in the protection group. The protection group must be started before you can perform a switchover.

`takeover`
Force a cluster to become the `PRIMARY` cluster without considering the partner cluster state.

If you issue a takeover from the secondary cluster and the cluster is able to communicate with the partner cluster, the Sun Cluster Geographic Edition software switches the role of the partner cluster so that the partner cluster becomes the new secondary. This operation is not the same as a switchover. The protection group is deactivated on the new secondary.

After successful completion of the `geopg takeover` command, reactivating the protection group on the secondary cluster might require data recovery and actions to synchronize data.

Note – When possible, run the `geopg switchover` command instead of the `geopg takeover` command to coordinate between partner clusters to avoid loss of replicated data.

Run the `geopg takeover` command only in situations when the primary cluster is not available or during unplanned downtime. The situation must justify a potential loss of data and the time required to repair and to reactivate the protection group on the secondary cluster.

`update`
Resynchronize the configuration information of the local protection group with the partner's configuration information. The `geopg update` command overwrites the configuration of the protection group on the local cluster with the configuration from the partner cluster.

`validate`
Validate a protection group on the local cluster by performing a sanity check of the dynamic values.

Options The following options are supported:

`-?`
`--help`
Displays help information. When this option is used, no other processing is performed.

You can specify this option without a subcommand or with a subcommand.

If you specify this option without a subcommand, the list of subcommands for this command is displayed.

If you specify this option with a subcommand, the usage options for the subcommand are displayed.

The question mark might be interpreted as a special character by some shells. Use quotes (`-"?"`) or an escape character to avoid pattern matching.

`-D`
`--only-datarep`
Specifies that only the data replication should be deactivated, leaving the protection group active. If you do not use this option, the entire protection group is deactivated. To stop a protection group that has already had its data replication subsystem stopped, you must run the `geopg stop` command again and omit this option.

`-d` *datareplicationtype*
`--datarep-type` *datareplicationtype*
Specifies the data replication mechanism for data replication between the clusters of the protection group.

The *datareptype* must be one of the following strings:

`avs`	Specifies that the data replication mechanism is Sun Availability Suite Remote Mirror Release 3.2, with patches.
`srdf`	Specifies that the data replication mechanism is EMC Symmetrix Remote Data Facility.

`truecopy`	Specifies that the data replication mechanism is Hitachi TrueCopy. This product works with Command and Control Interface RAID-Manager/Solaris Version 01-10-03/02, which requires Sun StorEdge™ 9970/9980 Array or Hitachi Lightning 9900 Series storage hardware.

`-e` `<local|global>`
`--scope` `<local|global>`
Specifies whether the command operates only on the local cluster, `local`, or on both clusters, `global`, where the protection group has been configured.

`-f`
`--force`
Forces the command to perform the operation without asking the user for confirmation.

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

`-n`
`--nodatarep`
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.

`-o` *localrole*
`--role` *localrole*
Specifies the role of the local cluster as either `PRIMARY` or `SECONDARY` when used with the `create` subcommand. You can change the role of a cluster by running the `geopg switchover` command.

`-p` *property*
`--property` *property*
Sets the properties of a protection group.

A protection group property is assigned a value by using a *name*=*statement* pair statement. You can set multiple properties one time by using multiple statements.

See the EXTENDED DESCRIPTION section for defined properties.

`-s` *partnershipname*
`--partnership` *partnershipname*
Specifies the name of the partnership where the protection group will be configured.

`-V`
`--version`
Displays the version of the command.

Do not specify this option with subcommands, operands, or other options. The subcommands, operands, or other options are ignored. The `-V` option only displays the version of the command. No other operations are performed.

Operands The following operand is supported:

devicegroupname
Specifies the name of the disk device group to be created or added to the protection group.

protectiongroupname
Specifies the name of the protection group. The `create` subcommand fails if the protection group that is specified with this option already exists. The `modify` subcommand fails if the specified protection group is not valid.

resourcegroupname
Specifies a comma-separated list of resource groups to add to or delete from the protection group. The specified resource groups must already be defined.

If a protection group is online when you add a resource group, the resource group must be in either the `unmanaged` or `online` state. To start an unmanaged resource group, run the `geopg start` command.

If the protection group is offline when you add a resource group, the resource group must be in the `unmanaged` state before you add the resource group.

Extended Description The following tables list the properties. The values of these properties are assigned at creation. The property values, such as `true` and `false`, are *not* case sensitive. Specific information about when you can tune the properties is provided in the property description.

General Protection Group Properties

`Description`
Describes the protection group.

Optional property.

Type: string.

Default value: none.

Tuning recommendations: Assigned at creation and tunable at runtime.

`RoleChange_ActionArgs`
Specifies the arguments that follow the system-defined arguments that are paired with the role change callback script during a protection group switchover or takeover.

Optional property.

Type: string.

Default value: none.

Tuning recommendations: Assigned at creation and tunable at runtime.

`RoleChange_ActionCmd`
Specifies the absolute path to the executable file to run when the primary cluster of the protection group changes. This file should exist on all nodes of both partner clusters that host the protection group. This script is run before the application resource group is brought online on the new primary cluster.

Optional property.

Type: string.

Default value: none.

Tuning recommendations: Assigned at creation and tunable at runtime.

`Timeout`

Specifies in seconds the longest time the Sun Cluster Geographic Edition software waits for a response after running a `geopg` command, such as `start`, `stop`, `switchover`, and `takeover`. If the command does not return within the `timeout` period, the Sun Cluster Geographic Edition software reports the operation as timed out, even if the underlying command that was run eventually completes successfully.

The `timeout` period applies to operations on a per-cluster basis. An operation with a local scope times out if the operation is not completed after the specified `timeout` period.

An operation with a global scope consists of an action on the local cluster and an action on the remote cluster. The local and remote action are timed separately. So, an operation with a global scope times out if the local operation is not completed after the specified `timeout` period or if the remote operation is not completed after the specified timeout period.

For example, the following operation is started with a local scope:

```
# geopg start -e Local protectiongroupname
```

If the `timeout` property is set to 3000 seconds, then the `geopg start` operation times out if the operation does not complete after 3000 seconds.

You can start the same operation with a global scope as follows:

```
# geopg start -e Global protectiongroupname
```

If the `timeout` property is set to 3000 seconds, then the `geopg start` operation times out if the operation is not completed on the local cluster after 3000 seconds or if the operation is not completed on the remote cluster after 3000 seconds. If the local action takes 1500 seconds and the remote action takes 1500 seconds, the operation is not time out.

The protection group `timeout` value is an estimated value that is applied to some sub-operations. The `timeout` value does not apply to the entire operation, so not every operation on a protection group is timed against the `timeout` period. For example, the time taken to initialize the data structure and check for the precondition of the operation are not timed in the `timeout` period.

The `timeout` property has a maximum of 1,000,000 seconds.

Optional property.

Type: Integer. A minimum value of at least 20 is required.

Default value: 3600 seconds.

Tuning recommendations: Assigned at creation and tunable at runtime.

Sun Availability Suite Data Replication Type Properties

Device Group Property: `Enable_volume_set`
Defines whether the volume sets that are defined in the file are enabled. Set to either `True` or `False` (case insensitive).

Optional property.

Type: Boolean.

Tuning recommendations: You cannot tune this property after it has been successfully validated during creation, replication, or synchronization.

Default value: `False`.

Device Group Property: `Local_logical_host`
Defines the local logical host name that is used for the replication of the disk device group. Do not use an underscore character (_) in the logical host name.

Required property.

Type: string.

Tuning recommendations: You cannot tune this property after it has been successfully validated during creation, replication, or synchronization.

Default value: none.

Data Replication Property: `Nodelist`
Lists the host names of the machines that can be primary for the replication mechanism. This list is comma delimited.

Optional property.

Type: string array.

Tuning recommendations: You can tune this property only when the protection group is offline.

Default value: All the nodes in the cluster.

Device Group Property: `Remote_logical_host`
Specifies the remote logical host name that is used for the replication of the disk device group.

Required property.

Type: string.

Tuning recommendations: You cannot tune this property after it has been successfully validated during creation, replication, or synchronization.

Default value: none.

Hitachi TrueCopy Data Replication Type Properties

Data Replication Property: `Cluster_dgs`
Lists the disk device groups where the data is written. The list is comma delimited.

Optional property.

Type: string array.

Tuning recommendations: You can tune this property at any time.

Default value: empty.

Device Group Property: `Fence_level`
Defines the fence level that is used by the disk device group. The fence level determines the level of consistency among the primary and secondary volumes for that disk device group. Possible values are `data`, `status`, `never`, and `async`.

You can set this property to any valid `Fence_level` when the current pair state is `SMPL`.

Caution – To avoid application failure on the primary cluster, specify a `Fence_level` of `never` or `async`. If the `Fence_level` parameter is not set to `never` or `async`, data replication might not function properly when the secondary site fails.

Do not use programs that would prevent the `Fence_level` parameter from being set to `data` or `status` because these values might be required in special circumstances.

If you have special requirements to use a `Fence_level` of `data` or `status`, consult your Sun representative.

Required property.

Type: enum.

Tuning recommendations: You can tune this property only when the protection group is offline. For a Hitachi TrueCopy device group, if the pair has already been created, this property can be set only to the current `Fence_level` of the pair. If you want to change the `Fence_level` of an existing pair, modify the `Fence_level` by using the Hitachi TrueCopy CCI commands first, then tune the `Fence_level` property.

Default value: none.

Data Replication Property: `Nodelist`
Lists the host names of the machines that can be primary for the replication mechanism. This list is comma delimited.

Optional property.

Type: string array.

Tuning recommendations: You can tune this property at any time.

Default value: empty.

EMC Symmetrix Remote Data Facility Data Replication Type Properties

Data Replication Property: `Cluster_dgs`
Lists the disk device groups where the data is written. The list is comma delimited.

Optional property.

Type: string array.

Tuning recommendations: You can tune this property only when the protection group is offline on both partner clusters.

Default value: empty.

Data Replication Property: `DG_or_CG`
Specifies the device group identifier as "SRDF Device Group." You must set this property to `DG`.

Optional property.

Type: string.

Tuning recommendations: You cannot tune this property.

Default value: DG.

Data Replication Property: `Nodelist`
Lists the host names of the machines that can be primary for the replication mechanism. This list is comma delimited.

Optional property.

Type: string array.

Tuning recommendations: You can tune this property at any time.

Default value: empty.

Data Replication Property: `R1_SID`
Specifies the Symmetrix Remote Data Facility identification of the primary devices.

Required property.

Type: integer.

Tuning recommendations: You can tune this property at any time. If you do not specify a values this property when you add a device group, the Sun Cluster Geographic Edition software searches for the value and sets the property automatically.

Default value: none, until you add a Symmetrix Remote Data Facility device group.

Data Replication Property: `R2_SID`
Specifies the Symmetrix Remote Data Facility identification of the secondary devices.

Required property.

Type: integer.

Tuning recommendations: You can tune this property at any time. If you do not specify a values this property when you add a device group, the Sun Cluster Geographic Edition software searches for the value and sets the property automatically.

Default value: none, until you add a Symmetrix Remote Data Facility device group.

Exit Status

The following exit values are returned:

`0`	The command completed successfully.
nonzero	An error has occurred.

Examples

EXAMPLE 1 Creating a Protection Group That Uses Data Replication

The following `geopg` command creates a Sun StorEdge Availability Suite 3.2.1 protection group on the primary cluster `cluster-paris`.

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

EXAMPLE 2 Creating a Protection Group That Does Not Use Data Replication

The following `geopg` command creates a protection group that is not configured to use data replication.

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

EXAMPLE 3 Deleting a Protection Group While Keeping Application Resource Groups Online

The following `geopg` command keeps two application resource groups, `apprg1` and `apprg2`, online while deleting their protection group, `avspg`. Remove the application resource groups from the protection group, then delete the protection group.

```
# geopg remove-resource-group apprg1,apprg2 avspg
# geopg stop -e global avspg
# geopg delete avspg
```

EXAMPLE 4 Modifying a Protection Group

The following `geopg` command modifies the timeout property of the protection group `avspg`.

```
# geopg set-prop -p Timeout=3000 avspg
```

EXAMPLE 5 Adding a Data Replication Device Group to a Sun StorEdge Availability Suite 3.2.1 Protection Group

The following `geopg` command creates a Sun StorEdge Availability Suite 3.2.1 data replication device group in the `avspg` protection group.

```
# geopg add-device-group -p Local_logical_host=lh-paris-1 \
-p Remote_logical_host=lh-newyork-1 avsdg avspg
```

Attributes

See `attributes`(5) for descriptions of the following attributes.

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Architecture	SPARC
Availability	SUNWscgctl
Interface Stability	Evolving

See Also

`rbac`(5), `geops`(1M)

Name geops – create, configure, and manage partnerships between clusters

Synopsis

```
/usr/cluster/bin/geops [subcommand] -?

/usr/cluster/bin/geops -V

/usr/cluster/bin/geops add-trust -c remotepartnerclustername

/usr/cluster/bin/geops create -c remotepartnerclustername partnershipname
     [-h heartbeatname] [-p property [,...]]

/usr/cluster/bin/geops join-partnership remoteclustername partnershipname
     [-h heartbeatname]

/usr/cluster/bin/geops leave-partnership partnershipname

/usr/cluster/bin/geops list partnershipname

/usr/cluster/bin/geops remove-trust -c remotepartnerclustername

/usr/cluster/bin/geops set-prop partnershipname -p property [,...]

/usr/cluster/bin/geops update partnershipname

/usr/cluster/bin/geops verify-trust [-c remotepartnerclustername]
```

Description The `geops` command enables you to create, configure, and manage the partnerships that are defined between clusters. A partnership is a pair of clusters that define a cluster infrastructure on which an application might be protected against disaster.

Two clusters must be configured to trust each other before you create a partnership between two clusters.

A partnership requires a running heartbeat between clusters. Partner clusters monitor each other with heartbeats.

The Sun Cluster Geographic Edition software notifies all remote partners of changes in the partnership configuration.

Run the `geops` command on a cluster that has been enabled for partnership.

To run the `geops` command to create, configure, and manage the partnerships, you must be assigned the proper role-based access control (RBAC) rights profile.

If you have root access, you have permissions to perform any operation. If you do not have root access, the following RBAC rights apply:

- **Basic Solaris User.** You can read information about Sun Cluster Geographic Edition entities by running commands such as `geopg list`, `geohb list`, and `geops list`.
- **Geo Management.** You can perform all the read operations that someone with Basic Solaris User access can perform. You can also perform administrative and configuration tasks such as `geohb create`, `geopg switchover`, `geoadm start`, and `geoadm stop`.

Note – You must have root access to run the following subcommands:

- `geops add-trust`
- `geops remove-trust`
- `geops verify-trust`

For more information, see the `rbac`(5) man page and "Sun Cluster Geographic Edition Software and RBAC" in *Sun Cluster Geographic Edition System Administration Guide*.

The general form of this command is as follows:

`geops` [*subcommand*] [*options*] [*operands*]

You can omit *subcommand* only if *options* specifies the option `-?`, `-o`, `-V`, or `-v`.

Each option of this command has a long form and a short form. Both forms of each option are given with the description of the option in the OPTIONS section of this man page.

Subcommands

The following subcommands are supported:

`add-trust`
: Retrieve public keys of a remote cluster and add the keys to the truststore file on every node of the local cluster. The `truststore` file is at `/etc/opt/SUNWcacao/security/jsse/truststore`.

  The new key is not added to the trustore file if an entry with the same alias already exists in the truststore file on a node. If the existing entry contains a key that is different from the new key, you must delete the entry from the truststore file before you add the new key.

`create`
: Create a partnership between the local cluster and a remote cluster. The two clusters must be configured to trust each other.

`join-partnership`
: Enable the local cluster to join an existing partnership.

  Running the `geops join-partnership` command on a cluster that is already a member of a partnership causes the partnership configuration from the remote cluster to overwrite the partnership configuration of the local cluster.

`leave-partnership`
: Remove the local cluster from a partnership. This subcommand deletes the partnership when the last participating cluster in the partnership leaves.

`list`
: Display partnership configuration information.

`remove-trust`
: Remove all keys for the remote cluster from the `truststore` file on the local node. You must remove all keys for the remote cluster from the local host before you can add a new key.

  To remove a key from a cluster, run the `remove-trust` subcommand from each node of the cluster.

`set-prop`
Modify the properties of a partnership. This subcommand updates the local cluster configuration and notifies remote partner clusters of the configuration change.

`update`
Synchronize information with the partner cluster. The `geops update` command overwrites the configuration on the local cluster with the configuration from the remote partner cluster.

This subcommand cannot update a partnership while the cluster is disconnected from the partner cluster.

If the remote partner cluster is down, modifications to the local cluster might not be propagated to the remote partner cluster.

`verify-trust`
Retrieve node information on the remote cluster and establish a secure Java Management Extensions (JMX) connection from the local host to every node of the remote cluster. The `verify-trust` subcommand verifies that the certificates have been exchanged properly between the remote and the local clusters.

If you do not specify a remote cluster, the `verify-trust` subcommand verifies the connections between the local host and other nodes of the local cluster.

Options The following options are supported:

`-?`
`--help`
Displays help information. When this option is used, no other processing is performed.

You can specify this option without a subcommand or with a subcommand.

If you specify this option without a subcommand, the list of subcommands for this command is displayed.

If you specify this option with a subcommand, the usage options for the subcommand are displayed.

The question mark might be interpreted as a special character by some shells. Use quotes (`-"?"`) or an escape character to avoid pattern matching.

`-c` *remoteclustername*
`--cluster` *remoteclustername*
Specifies the logical hostname of the cluster with which to form a partnership. The logical hostname is used by the Sun Cluster Geographic Edition software and maps to the name of the remote partner cluster. For example, a remote partner cluster name might resemble the following:

```
cluster-paris
```

When you use this option with the `add-trust`, `remote-trust`, or `verify-trust` subcommand, the option specifies the alias where the public keys on the remote cluster are stored. An alias for certificates on the remote cluster must have the following pattern:

remotepartnercluster`.certificate[0-9]*`

Keys and only keys that belong to the remote cluster should have their alias match this pattern.

Note – The `remove-trust` subcommand removes only keys you have added with the `add-trust` subcommand, and keys with an alias that matches the following pattern:

remotepartnercluster`.certificate[0-9]*`.

`-h` *heartbeatname*
`--heartbeat-name` *heartbeatname*
Specifies an identifier for the heartbeat on a partner cluster that the local cluster can use to monitor partner availability. You must create the heartbeat by running the `geohb` command before you specify the heartbeat in the `geops` command.

If this option is omitted, the Sun Cluster Geographic Edition software uses the default heartbeat mechanism between member clusters.

`-p` *property*
`--property` *property*
Specifies the value of partnership properties. You can specify multiple properties at one time by using multiple statements.

See the EXTENDED DESCRIPTION section for a description of the properties.

`-V`
`--version`
Displays the version of the command.

Do not specify this option with subcommands, operands, or other options. The subcommands, operands, or other options are ignored. The `-V` option only displays the version of the command. No other operations are performed.

Operands

The following operand is supported:

partnershipname Specifies the name of the partnership

Extended Description

The following section lists the partnership properties. These properties are set at creation and tunable at runtime.

Partnership Properties

`Description`
Describes the partnership.

Optional property.

Type: String.

Default value: Empty string.

`Notification_ActionCmd`
Specifies the path to the script or command that is triggered when a heartbeat-loss notification is issued.

Optional property.

Type: String.

Default value: Empty string.

The Sun Cluster Geographic Edition software enables you to specify a command to run when a heartbeat-loss notification is issued. You can specify the path to the command by using the `Notification_ActionCmd` property. The command runs with root permissions, so the file must have root ownership and execution permissions. If both `Notification_ActionCmd` and `Notification_EmailAddrs` properties have been configured, an email is sent after the command that is specified in the `Notification_ActionCmd` property is run.

Caution – A heartbeat loss indicates only a lost connection to a remote cluster and not the cause for the lost connection. A remote cluster that has lost a heartbeat connection might still be functioning even though the heartbeat monitoring has lost its connection.

Therefore, you must exercise caution in the script you specify for the `Notification_actioncmd` parameter. For example, if you specify a forced takeover or a switchover in the `Notification_actioncmd` script, a takeover or a switchover might be run even though one might not be necessary.

`Notification_EmailAddrs`
Specifies the email address to send messages to when a heartbeat-loss notification is issued. You can specify multiple email addresses by separating each email address with a comma.

Optional property.

Type: String array.

Default value: Empty string.

The `Notification_EmailAddrs` and the `Notification_ActionCmd` properties enable notification in heartbeat-loss events. Heartbeat-loss events are detected locally on each cluster of the partnership, and the notification is triggered locally on the cluster where the event is detected. The email addresses and the notification action path should be valid on each cluster in the partnership.

Exit Status

The following exit values are returned:

`0`	The command completed successfully.
nonzero	An error has occurred.

Examples

EXAMPLE 1 Adding Trust Between Two Clusters

The following `geops` commands add trust between the clusters `cluster-paris` and `cluster-newyork`.

1. Add cluster `cluster-newyork` to the trust on the cluster `cluster-paris`.

```
cluster-paris# /usr/cluster/bin/geops add-trust -c cluster-newyork
```

EXAMPLE 1 Adding Trust Between Two Clusters *(Continued)*

Keys are stored on every node of cluster `cluster-paris` with alias `cluster-newyork.certificate`*number*.

2. Add cluster `cluster-paris` to the trust on the cluster `cluster-newyork`.

```
cluster-newyork# /usr/cluster/bin/geops add-trust -c cluster-paris
```

3. Verify trust between the two clusters.

```
cluster-paris# /usr/cluster/bin/geops verify-trust -c cluster-newyork
```

```
cluster-newyork# /usr/cluster/bin/geops verify-trust -c cluster-paris
```

EXAMPLE 2 Creating a Partnership

The following `geops` command creates the partnership `paris-newyork-ps`, on the cluster `cluster-paris`.

```
cluster-paris# geops create -c cluster-newyork -p Description=Transatlantic \
-p Notification_emailaddrs=sysadmin@companyX.com paris-newyork-ps
```

EXAMPLE 3 Joining a Partnership

The following `geops` command joins `cluster-paris` and `cluster-newyork` in the `paris-newyork-ps` partnership.

```
cluster-paris# geops join-partnership cluster-newyork paris-newyork-ps
```

EXAMPLE 4 Modifying a Partnership

The following `geops` command modifies the notification email address for `cluster-paris`.

```
cluster-paris# geops set-prop -p Notification_emailaddrs=operations@companyX.com \
paris-newyork-ps
```

EXAMPLE 5 Leaving a Partnership

The following `geops` command removes the cluster `cluster-paris` from the partnership `paris-newyork-ps`.

```
cluster-paris# geops leave-partnership paris-newyork-ps
```

EXAMPLE 6 Resynchronizing a Partnership

The following `geops` command resynchronizes the partnership `paris-newyork-ps`.

EXAMPLE 6 Resynchronizing a Partnership *(Continued)*

The `geops update` command overwrites the configuration on the local cluster with the configuration from the remote partner cluster.

```
# geops update paris-newyork-ps
```

Attributes

See `attributes`(5) for descriptions of the following attributes.

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Architecture	SPARC
Availability	SUNWscgctl
Interface Stability	Evolving

See Also

`rbac`(5)

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